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Contents

Intelle	ectual Property Rights	2
Legal	Notice	2
Moda	l verbs terminology	2
Forew	vord	31
1	Scope	32
2	References	32
3	Definitions, symbols and abbreviations	
3.1	Definitions	
3.2	Symbols	
3.3	Abbreviations	
3.4	Test tolerances	
3.5	Frequency bands grouping	
3.5.1	Introduction	
3.5.2	NR operating bands in FR1	
3.5.3	NR operating bands in FR2	
3.6 3.6.1	Applicability of requirements in this specification version	
3.6.2	RRC connected state requirements in DRX Number of serving carriers	
3.6.2.1	· · · · · · · · · · · · · · · · · · ·	
3.6.2.2	<u>e</u>	
3.6.2.3	· · · · · · · · · · · · · · · · · · ·	
3.6.2.4	· · · · · · · · · · · · · · · · · · ·	
3.6.3	Applicability for intra-band FR2	
3.6.4	Applicability for FR2 UE power classes	
3.6.5	Applicability for SDL bands	
3.6.6	Applicability of requirements for NGEN-DC operation	
3.6.7	Applicability of QCL	
4	SA: RRC_IDLE state mobility	
4.1	Cell Selection	
4.2	Cell Re-selection	
4.2.1	Introduction	
4.2.2 4.2.2.1	Requirements	
4.2.2.1 4.2.2.2	1 2	
4.2.2.3 4.2.2.3		
4.2.2.4 4.2.2.4	· · · · · · · · · · · · · · · · · · ·	
4.2.2.5		
4.2.2.6		
4.2.2.7		
5	SA: RRC_INACTIVE state mobility	
5.1	Cell Re-selection	
5.1.1	Introduction	
5.1.2	Requirements	
5.1.2.1		
5.1.2.2	<u> </u>	
5.1.2.3	* ·	
5.1.2.4 5.1.2.5	* *	
5.1.2.5 5.1.2.6		
5.1.2.6 5.1.2.7		
5.1.2.7 5.2	Void	
	RRC_CONNECTED state mobility	47
6	KKU, UJJNINEL JED SIZIE MODIIIIV	4/

6.1	Handover	47
6.1.1	NR Handover	
6.1.1.1	Introduction	
6.1.1.2	NR FR1 - NR FR1 Handover	
6.1.1.2.1	Handover delay	
6.1.1.2.2	Interruption time	
6.1.1.3	NR FR2- NR FR1 Handover	
6.1.1.3.1	Handover delay	
6.1.1.3.2	Interruption time	
6.1.1.4	NR FR2- NR FR2 Handover	
6.1.1.4.1	Handover delay	
6.1.1.4.2	Interruption time	
6.1.1.5	NR FR1- NR FR2 Handover	
6.1.1.5.1	Handover delay	
6.1.1.5.2	·	
	Interruption time	
6.1.2	NR Handover to other RATs	
6.1.2.1	NR – E-UTRAN Handover	
6.1.2.1.1	Introduction	
6.1.2.1.2	Handover delay	
6.1.2.1.3	Interruption time	
6.2	RRC Connection Mobility Control.	
6.2.1	SA: RRC Re-establishment	
6.2.1.1	Introduction	
6.2.1.2	Requirements	
6.2.1.2.1	UE Re-establishment delay requirement	52
6.2.2	Random access	53
6.2.2.1	Introduction	53
6.2.2.2	Requirements	53
6.2.2.2.1	Contention based random access	54
6.2.2.2.2	Non-Contention based random access	55
6.2.2.2.3	UE behaviour when configured with supplementary UL	
6.2.3	SA: RRC Connection Release with Redirection	
6.2.3.1	Introduction	
6.2.3.2	Requirements	
6.2.3.2.1	RRC connection release with redirection to NR	
6.2.3.2.2	RRC connection release with redirection to E-UTRAN	
7 Ti	ming	
7.1	UE transmit timing	
7.1.1	Introduction	57
7.1.2	Requirements	57
7.1.2.1	Gradual timing adjustment	58
7.1.2.2	Void	59
7.2	UE timer accuracy	59
7.2.1	Introduction	
7.2.2	Requirements	
7.3	Timing advance	
7.3.1	Introduction	
7.3.2	Requirements	
7.3.2.1	Timing Advance adjustment delay	
7.3.2.1	Timing Advance adjustment accuracy	
7.3.2.2	Cell phase synchronization accuracy	
7. 4 7.4.1	Definition	
7.4.2	Minimum requirements	
7.5	Maximum Transmission Timing Difference	
7.5.1	Introduction	
7.5.2	Minimum Requirements for inter-band EN-DC	
7.5.2.1	Minimum Requirements for inter-band synchronous EN-DC	
7.5.3	Minimum Requirements for intra-band EN-DC	
7.5.4	Minimum Requirements for NR Carrier Aggregation	
7.5.5	Minimum Requirements for inter-band NE-DC	
7.5.5.1	Minimum Requirements for inter-band synchronous NE-DC	62

7.5.6	Minimum Requirements for inter-band NR DC	63
7.6	Maximum Receive Timing Difference	63
7.6.1	Introduction	
7.6.2	Minimum Requirements for inter-band EN-DC	
7.6.2.1	Minimum Requirements for inter-band synchronous EN-DC	
7.6.3	Minimum Requirements for intra-band EN-DC	
7.6.4	Minimum Requirements for NR Carrier Aggregation	
7.6.5	Minimum Requirements for inter-band NE-DC	65
7.6.5.1	Minimum Requirements for inter-band synchronous NE-DC	
7.6.6	Minimum Requirements for inter-band NR DC	
7.7	deriveSSB-IndexFromCell tolerance	
7.7.1	Minimum requirements	
7.8	Void	66
8 5	Signalling characteristics	66
8.1	Radio Link Monitoring	
8.1.1	Introduction.	
8.1.2	Requirements for SSB based radio link monitoring	
8.1.2.1	Introduction	
8.1.2.2	Minimum requirement	
8.1.2.3	Measurement restrictions for SSB based RLM	
8.1.3	Requirements for CSI-RS based radio link monitoring	70
8.1.3.1	Introduction	
8.1.3.2	Minimum requirement	
8.1.3.3	Measurement restrictions for CSI-RS based RLM.	73
8.1.4	Minimum requirement at transitions	73
8.1.5	Minimum requirement for UE turning off the transmitter	74
8.1.6	Minimum requirement for L1 indication	74
8.1.7	Scheduling availability of UE during radio link monitoring	74
8.1.7.1	Scheduling availability of UE performing radio link monitoring with a same subcarrier spacing as PDSCH/PDCCH on FR1	74
8.1.7.2	Scheduling availability of UE performing radio link monitoring with a different subcarrier spacing than PDSCH/PDCCH on FR1	74
8.1.7.3	Scheduling availability of UE performing radio link monitoring on FR2	
8.1.7.4	Scheduling availability of UE performing radio link monitoring on FR1 or FR2 in case of FR1-	13
0.1.7.1	FR2 inter-band CA and NR-DC	75
8.2	Interruption	75
8.2.1	EN-DC Interruption	
8.2.1.1	Introduction	
8.2.1.2	Requirements	
8.2.1.2.		
8.2.1.2.	1	
8.2.1.2.	•	
8.2.1.2.		
8.2.1.2.	1 0	
8.2.1.2.	1	
8.2.1.2.	1 0 1	
8.2.2	SA: Interruptions with Standalone NR Carrier Aggregation	
8.2.2.1	Introduction	
8.2.2.2	Requirements	
8.2.2.2.	1	
8.2.2.2.	1	
8.2.2.2.		
8.2.2.2.	1	
8.2.2.2.		
8.2.2.2.		
8.2.3 8.2.3.1	NE-DC Interruptions	
	Introduction	
8.2.3.2 8.2.3.2.	Requirements	
8.2.3.2. 8.2.3.2.		
8.2.3.2.: 8.2.3.2.:		
U.L.J.L.	J INCHAPUON ALI DECHIDENI AUGUNITURASE	00

8.2.3.2.4	Interruptions at SCell activation/deactivation.	
8.2.3.2.5	Interruptions during measurements on SCC	
8.2.3.2.6	Interruptions at UL carrier RRC reconfiguration	
8.2.3.2.7	Interruptions due to Active BWP switching Requirement	
8.2.4	NR-DC: Interruptions	
8.2.4.1	Introduction	
8.2.4.2	Requirements	
8.2.4.2.1	Interruptions at PSCell/SCell addition/release	
8.2.4.2.2	Interruptions at SCell activation/deactivation	
8.2.4.2.3	Interruptions during measurements on SCC	
8.2.4.2.4	Interruptions at UL carrier RRC reconfiguration	
8.2.4.2.5	Interruptions due to Active BWP switching Requirement	
8.2.4.2.6	Interruptions at transitions between active and non-active during DRX	
8.2.4.2.7	Interruptions at transitions from non-DRX to DRX	
8.3	SCell Activation and Deactivation Delay	
8.3.1	Introduction	
8.3.2	SCell Activation Delay Requirement for Deactivated SCell	
8.3.3	SCell Deactivation Delay Requirement for Activated SCell	
8.4	UE UL carrier RRC reconfiguration delay	
8.4.1	Introduction	
8.4.2	UE UL carrier configuration delay requirement	
8.4.3	UE UL carrier deconfiguration delay requirement	
8.5	Link Recovery Procedures	
8.5.1	Introduction	
8.5.2	Requirements for SSB based beam failure detection	
8.5.2.1	Introduction	
8.5.2.2	Minimum requirement	
8.5.2.3	Measurement restriction for SSB based beam failure detection	
8.5.3	Requirements for CSI-RS based beam failure detection	
8.5.3.1	Introduction	
8.5.3.2	Minimum requirement	
8.5.3.3	Measurement restrictions for CSI-RS beam failure detection	
8.5.4	Minimum requirement for L1 indication	
8.5.5	Requirements for SSB based candidate beam detection	
8.5.5.1	Introduction	
8.5.5.2	Minimum requirement	
8.5.5.3	Measurement restriction for SSB based candidate beam detection	
8.5.6	Requirements for CSI-RS based candidate beam detection	
8.5.6.1	Introduction	
8.5.6.2	Minimum requirement	
8.5.6.3	Measurement restriction for CSI-RS based candidate beam detection	
8.5.7 8.5.7.1	Scheduling availability of UE during beam failure detection	.108
8.5.7.1	Scheduling availability of UE performing beam failure detection with a same subcarrier spacing as PDSCH/PDCCH on FR1	100
0 5 7 3		.108
8.5.7.2	Scheduling availability of UE performing beam failure detection with a different subcarrier	100
8.5.7.3	spacing than PDSCH/PDCCH on FR1Scheduling availability of UE performing beam failure detection on FR2	100
8.5.7.4	Scheduling availability of UE performing beam failure detection on FR1 or FR2 in case of FR1-	.109
0.3.7.4	FR2 inter-band CA and NR DC	100
8.5.8	Scheduling availability of UE during candidate beam detection	
8.5.8.1	Scheduling availability of UE performing L1-RSRP measurement with a same subcarrier spacing	.105
0.5.6.1	as PDSCH/PDCCH on FR1	100
8.5.8.2	Scheduling availability of UE performing L1-RSRP measurement with a different subcarrier	.109
0.3.6.2	spacing than PDSCH/PDCCH on FR1	110
9593	Scheduling availability of UE performing L1-RSRP measurement on FR2	
8.5.8.3 8.5.8.4	Scheduling availability of UE performing L1-RSRP measurement on FR2	.110
0.3.0.4	FR1-FR2 inter-band CA and NR-DC	110
8.5.9	Minimum requirement at transitions for beam failure detection	
8.6	Active BWP switch delay	
8.6.1	Introduction	
8.6.2	DCI and timer based BWP switch delay	
8.6.3	RRC based BWP switch delay	
0.0.0	1010 cusou D 111 Stricen doing	4

8.7	Void	
8.8	NE-DC: E-UTRAN PSCell Addition and Release Delay	112
8.8.1	Introduction	
8.8.2	E-UTRAN PSCell Addition Delay Requirement	
8.8.3	E-UTRAN PSCell Release Delay Requirement	
8.9	NR-DC: PSCell Addition and Release Delay	
8.9.1	Introduction	
8.9.2	PSCell Addition Delay Requirement	
8.9.3	PSCell Release Delay Requirement	
8.10	Active TCI state switching delay	
8.10.6	Active TCI state list update delay	
8.11	PSCell Change	11/
9 N	Measurement Procedure	.117
9.1	General measurement requirement	
9.1.1	Introduction	
9.1.2	Measurement gap	
9.1.2.1	EN-DC: Measurement Gap Sharing	125
9.1.2.1a	SA: Measurement Gap Sharing	126
9.1.2.1b	NE-DC: Measurement Gap Sharing	126
9.1.2.1c	NR-DC: Measurement Gap Sharing	127
9.1.3	UE Measurement capability	
9.1.3.1	EN-DC: Monitoring of multiple layers using gaps	128
9.1.3.1a		
9.1.3.1b		
9.1.3.1c		
9.1.3.2	EN-DC: Maximum allowed layers for multiple monitoring	
9.1.3.2a	, ,	
9.1.3.2b		
9.1.3.2c		
9.1.4	Capabilities for Support of Event Triggering and Reporting Criteria	
9.1.4.1	Introduction	
9.1.4.2	Requirements	
9.1.5	Carrier-specific scaling factor	
9.1.5.1	Monitoring of multiple layers outside gaps	133
9.1.5.1.1		12
01510	gaps SA mode: carrier-specific scaling factor for SSB-based measurements performed outside	134
9.1.5.1.2	gapsgaps	125
9.1.5.1.3		133
9.1.3.1.3	gapsgaps	
9.1.5.1.4		133
J.1.J.1.4	gapsgaps	135
9.1.5.2	Monitoring of multiple layers within gaps	
9.1.5.2.1		.150
).1.5. <u>2</u> .1	gaps	136
9.1.5.2.2	~ ·	
9.1.5.2.3		
9.1.5.2.4		
9.1.6	Minimum requirement at transitions	
9.2	NR intra-frequency measurements	
9.2.1	Introduction	
9.2.2	Requirements applicability	
9.2.3	Number of cells and number of SSB	
9.2.3.1	Requirements for FR1	
9.2.3.2	Requirements for FR2	
9.2.4	Measurement Reporting Requirements	
9.2.4.1	Periodic Reporting	
9.2.4.2	Event-triggered Periodic Reporting	
9.2.4.3	Event Triggered Reporting.	
9.2.5	Intrafrequency measurements without measurement gaps	144
9.2.5.1	Intrafrequency cell identification	144

9.2.5.2	Measurement period	
9.2.5.3	Scheduling availability of UE during intra-frequency measurements	
9.2.5.3.1	Scheduling availability of UE performing measurements in TDD bands on FR1	147
9.2.5.3.2	Scheduling availability of UE performing measurements with a different subcarrier spacing than PDSCH/PDCCH on FR1	148
9.2.5.3.3	Scheduling availability of UE performing measurements on FR2	
9.2.5.3.4	Scheduling availability of UE performing measurements on FR1 or FR2 in case of FR1-FR2 inter-band CA	
9.2.5.4	SFTD Measurements between PCell and PSCell.	
9.2.5.4.1	Introduction	
9.2.5.4.2	SFTD Measurement delay	
9.2.5.4.3	SFTD Measurement Reporting Delay	
9.2.6	Intra-frequency measurements with measurement gaps	
9.2.6.1	Void	
9.2.6.2	Intra-frequency cell identification	150
9.2.6.3	Intra-frequency Measurement Period	152
9.3	NR inter-frequency measurements	152
9.3.1	Introduction	
9.3.2	Requirements applicability	
9.3.2.1	Void	
9.3.2.2	Void	
9.3.3	Number of cells and number of SSB	
9.3.3.1	Requirements for FR1	
9.3.3.2	Requirements for FR2	
9.3.4	Inter-frequency cell identification	
9.3.4.1	Void	
9.3.4.2	Void	
9.3.5 9.3.5.1	Inter-frequency measurements	
9.3.5.1	VoidVoid	
9.3.5.3	VoidVoid	
9.3.5.5 9.3.6	Inter-frequency measurements reporting requirements.	
9.3.6.1	Periodic Reporting	
9.3.6.2	Event-triggered Periodic Reporting	
9.3.6.3	Event-triggered Reporting	
9.3.7	Void	
9.3.8	Inter-frequency SFTD measurement requirements	156
9.3.8.1	Introduction	156
9.3.8.2	SFTD Measurement delay	
9.3.8.3	SFTD Measurement reporting delay	
9.4	Inter-RAT measurements	
9.4.1	Introduction	
9.4.2	NR – E-UTRAN FDD measurements	
9.4.2.1	Introduction	
9.4.2.2	Requirements when no DRX is used	
9.4.2.3	Requirements when DRX is used	
9.4.2.4 9.4.2.4.1	Measurement reporting requirements	
9.4.2.4.1	Periodic Reporting Event-Triggered Periodic Reporting	
9.4.2.4.2	Event-Triggered Reporting Event-Triggered Reporting	
9.4.3	NR – E-UTRAN TDD measurements	
9.4.3.1	Introduction	
9.4.3.2	Requirements when no DRX is used	
9.4.3.3	Requirements when DRX is used	
9.4.3.4	Measurement reporting requirements	
9.4.3.4.1	Periodic Reporting	
9.4.3.4.2	Event-Triggered Periodic Reporting	
9.4.3.4.3	Event-Triggered Reporting	163
9.4.4	Inter-RAT RSTD measurements	
9.4.4.1	NR – E-UTRAN FDD RSTD measurements	
9.4.4.1.1	Introduction	
9.4.4.1.2	Requirements	164

9.4.4.2	NR – E-UTRAN TDD RSTD measurements	.167
9.4.4.2.1	Introduction	.167
9.4.4.2.2	Requirements	.168
9.4.5	Inter-RAT E-CID measurements	.171
9.4.5.1	NR-E-UTRAN FDD E-CID RSRP and RSRQ measurements	.171
9.4.5.1.1	Introduction	.171
9.4.5.1.2	Requirements	.171
9.4.5.1.3	Measurement Reporting Delay	.171
9.4.5.2	NR-E-UTRAN TDD E-CID RSRP and RSRQ measurements	
9.4.5.2.1		
9.4.5.2.2	Requirements	.172
9.4.5.2.3	•	
9.5	L1-RSRP measurements for Reporting	
9.5.1	Introduction	
9.5.2	Requirements applicability	
9.5.3	Measurement Reporting Requirements	
9.5.3.1	Periodic Reporting	
9.5.3.2	Semi-Persistent Reporting	
9.5.3.3	Aperiodic Reporting	
9.5.4	L1-RSRP measurement requirements	
9.5.4.1	SSB based L1-RSRP Reporting	
9.5.4.2	CSI-RS based L1-RSRP Reporting	
9.5.5	Measurement restriction for CSI-RS and SSB for L1-RSRP measurement	
9.5.5.1	Measurement restriction for SSB based L1-RSRP	
9.5.5.2	Measurement restriction for CSI-RS based L1-RSRP	
9.5.6	Scheduling availability of UE during L1-RSRP measurement	
9.5.6.1	Scheduling availability of UE performing L1-RSRP measurement with a same subcarrier spacing	,
, 10 10 1	as PDSCH/PDCCH on FR1	.179
9.5.6.2	Scheduling availability of UE performing L1-RSRP measurement with a different subcarrier	,
	spacing than PDSCH/PDCCH on FR1	.179
9.5.6.3	Scheduling availability of UE performing L1-RSRP measurement on FR2	
9.5.6.4	Scheduling availability of UE performing L1-RSRP measurement on FR1 or FR2 in case of	,
	FR1-FR2 inter-band CA.	.180
9.6	NE-DC: Measurements	
9.6.1	Introduction	
9.6.2	SFTD Measurements	
9.6.2.1	Introduction	
9.6.2.2	SFTD Measurement requirements	
	*	
10 M	Measurement Performance requirements	.181
10.1	NR measurements	
10.1.1	Introduction	
10.1.2	Intra-frequency RSRP accuracy requirements for FR1	.182
10.1.2.1	Intra-frequency SS-RSRP accuracy requirements	.182
10.1.2.1.	·	
10.1.2.1.	•	
10.1.2.2	Void	
10.1.3	Intra-frequency RSRP accuracy requirements for FR2	.183
10.1.3.1	Intra-frequency SS-RSRP accuracy requirements	.183
10.1.3.1.	· · · · · · · · · · · · · · · · · · ·	
10.1.3.1.	2 Relative SS-RSRP Accuracy	.184
10.1.3.2	Void	.184
10.1.4	Inter-frequency RSRP accuracy requirements for FR1	
10.1.4.1	Inter-frequency SS-RSRP accuracy requirements	
10.1.4.1.		
10.1.4.1.	·	
10.1.4.2	Void	
10.1.5	Inter-frequency RSRP accuracy requirements for FR2	.186
10.1.5.1	Inter-frequency SS-RSRP accuracy requirements	.186
10.1.5.1.	· · · · · · · · · · · · · · · · · · ·	
10.1.5.1.	·	.187
10 1 5 2	Void	.187

10.1.6	RSRP Measurement Report Mapping	
10.1.7	Intra-frequency RSRQ accuracy requirements for FR1	
10.1.7.1	Intra-frequency SS-RSRQ accuracy requirements in FR1	
10.1.7.1.1		
10.1.8	Intra-frequency RSRQ accuracy requirements for FR2	
10.1.8.1	Intra-frequency SS-RSRQ accuracy requirements in FR2	
10.1.8.1.		
10.1.9	Inter-frequency RSRQ accuracy requirements for FR1	
10.1.9.1	Inter-frequency SS-RSRQ accuracy requirements in FR1	
10.1.9.1.		
10.1.9.1.2		
10.1.10	Inter-frequency RSRQ accuracy requirements for FR2	
10.1.11	RSRQ report mapping	
10.1.12	Intra-frequency SINR accuracy requirements for FR1	
10.1.13	Intra-frequency SINR accuracy requirements for FR2	
10.1.14	Inter-frequency SINR accuracy requirements for FR1	
10.1.15	Inter-frequency SINR accuracy requirements for FR2	
10.1.16	SINR report mapping	
10.1.17	Power Headroom	
10.1.18 10.1.19	P _{CMAX,c,f}	
10.1.19	L1-RSRP accuracy requirements for FR1	
10.1.20	L1-RSRP accuracy requirements for FR2	
10.1.21	SFTD accuracy requirements E-UTRAN measurements	
10.2	Introduction	
10.2.1	E-UTRAN RSRP measurements	
10.2.2	E-UTRAN RSRQ measurements	
10.2.3	E-UTRAN RSTD measurements	
10.2.5	E-UTRAN RS-SINR measurements	
11 V	oid	209
Ammorr		210
	A (normative): Test Cases	
A.1 Pu	A (normative): Test Cases	210
A.1 Pu A.2 Re	A (normative): Test Cases	210
A.1 Pu A.2 Ro A.2.1	A (normative): Test Cases	210 210
A.1 Pt A.2 Ro A.2.1 A.2.1.1	A (normative): Test Cases	210 210 210
A.1 Pt A.2 Ro A.2.1 A.2.1.1 A.2.1.2	A (normative): Test Cases	210 210 210 211
A.1 Pu A.2 Ro A.2.1 A.2.1.1 A.2.1.2 A.2.1.3	A (normative): Test Cases	210 210 210 211 211
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4	A (normative): Test Cases	210 210 210 211 211
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4	A (normative): Test Cases	210 210 210 211 211
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4	A (normative): Test Cases	210 210 210 211 211 211
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri	A (normative): Test Cases	210 210 210 211 211 211
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1	A (normative): Test Cases	210 210 210 211 211 211 211
A.1 Pt A.2 R A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 R A.3.1 A.3.1.1	A (normative): Test Cases	210 210 210 211 211 211 211 211
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1 A.3.1.1 A.3.1.1.1	A (normative): Test Cases	210210210211211211211211211211211
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1.1 A.3.1.1.1 A.3.1.1.1	A (normative): Test Cases Irpose of annex equirement classification for statistical testing	210210210211211211211211211211211211212
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1 A.3.1.1.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2.1 A.3.1.2.1	A (normative): Test Cases Irpose of annex equirement classification for statistical testing	210210210211211211211211211212215216
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1.1 A.3.1.1.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2	A (normative): Test Cases Impose of annex equirement classification for statistical testing. Types of requirements in TS 38.133 Time and delay requirements on UE higher layer actions Measurements of power levels, relative powers and time Implementation requirements Physical layer timing requirements. RM test configurations Reference measurement channels. PDSCH FDD. TDD CORESET for RMSI scheduling FDD.	210210210211211211211211211212215216
A.1 Pt A.2 Ro A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2 A.3.1.2.1 A.3.1.2.1 A.3.1.3.1 A.3.1 A.3	A (normative): Test Cases Irpose of annex equirement classification for statistical testing Types of requirements in TS 38.133 Time and delay requirements on UE higher layer actions Measurements of power levels, relative powers and time Implementation requirements Physical layer timing requirements RM test configurations Reference measurement channels PDSCH FDD TDD CORESET for RMSI scheduling FDD. TDD CORESET for RMC scheduling FDD. TDD CORESET for RMC scheduling FDD.	210210210211211211211211212215216218
A.1 Pt A.2 Ro A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2.1 A.3.1.2.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1	A (normative): Test Cases	210210210211211211211211215215218218
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2.1 A.3.1.2.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1	A (normative): Test Cases	210210210211211211211211215215218218219
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2.1 A.3.1.2.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1	A (normative): Test Cases	210210210211211211211211212215218218219
A.1 Pt A.2 Rt A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Rt A.3.1.1.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2.1 A.3.1.2.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1 A.3.1.3.1	A (normative): Test Cases	210210210211211211211211211212215216218218219222
A.1 Pt A.2 Rt A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Rt A.3.1 A.3.1.1.1 A.3.1.1.1 A.3.1.2.2 A.3.1.2.1 A.3.1.2.1 A.3.1.3.1 A.3.1.3 A.3.1.3 A.3.1.3 A.3.1.3 A.3.1.3 A.3.1.3 A.3.1.3 A.3.1.3 A.3.1 A.3	A (normative): Test Cases Impose of annex equirement classification for statistical testing Types of requirements in TS 38.133 Time and delay requirements on UE higher layer actions Measurements of power levels, relative powers and time Implementation requirements Physical layer timing requirements. RM test configurations Reference measurement channels. PDSCH FDD TDD CORESET for RMSI scheduling FDD TDD CORESET for RMC scheduling FDD TDD TDD TDD TDD TDD TDD TD	210210210211211211211211215215216218219222
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1 A.3.1.1.1 A.3.1.1.1 A.3.1.2.1 A.3.1.2.1 A.3.1.2.1 A.3.1.3.1	A (normative): Test Cases	210210210211211211211211215215218218219222
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1 A.3.1.1.1 A.3.1.1.1 A.3.1.2.1 A.3.1.2.1 A.3.1.2.1 A.3.1.2.1 A.3.1.2.1 A.3.1.2.1 A.3.1.2.1 A.3.1.3.1	A (normative): Test Cases	210210210211211211211211215216218218219222222
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1 A.3.1.1.1 A.3.1.1.1 A.3.1.1.2 A.3.1.2.1 A.3.1.2.1 A.3.1.2.1 A.3.1.2.1 A.3.1.2.1 A.3.1.3.1	A (normative): Test Cases	210210210211211211211211215215218218219222222222
A.1 Pt A.2 Re A.2.1 A.2.1.1 A.2.1.2 A.2.1.3 A.2.1.4 A.3 Ri A.3.1 A.3.1.1.1 A.3.1.1.1 A.3.1.2.1 A.3.1.2.1 A.3.1.2.1 A.3.1.2.1 A.3.1.2.1 A.3.1.2.1 A.3.1.2.1 A.3.1.3.1	A (normative): Test Cases	210210210211211211211211215215218219219222222222222

A.3.3.1	DRX Configuration 1: DRX cycle = 40 ms and TAT = 500 ms	225
A.3.3.2	DRX Configuration 2: DRX cycle = 640 ms and TAT = 500 ms	225
A.3.3.3	DRX Configuration 3: DRX cycle = 40 ms and TAT = Infinity	
A.3.3.4	DRX Configuration 4: DRX cycle = 160 ms and TAT = Infinity	
A.3.3.5	DRX Configuration 5: DRX cycle = 320 ms and TAT = Infinity	
A.3.3.6	DRX Configuration 6: DRX cycle = 320 ms and TAT = 500 ms	
A.3.3.7	DRX Configuration 7: DRX cycle = 640 ms and TAT = Infinity	
A.3.3.8	DRX Configuration 8: DRX cycle = 320 ms and TAT = Infinity	
A.3.3.9	DRX Configuration 9: DRX cycle = 40 ms and TAT = 500 ms	
A.3.3.10	DRX Configuration 10: DRX cycle = 640 ms and TAT = 500 ms	
A.3.3.11	DRX Configuration 11: DRX cycle = 20 ms and TAT = Infinity	
A.3.3.12	DRX Configuration 12: DRX cycle = 640 ms and TAT = Infinity	
A.3.4	Test Cases with Different Channel Bandwidths	
A.3.4.1	Test Cases with Different E-UTRA Channel Bandwidths	
A.3.4.1.1	Introduction	
A.3.4.1.2	Principle of testing	
A.3.4.1.2 A.3.5	Test Cases for Synchronous and Asynchronous DC Operations	
A.3.5.1	EN-DC Test Cases for Synchronous and Asynchronous EN-DC Operations	
A.3.5.1	Introduction	
A.3.5.1.1 A.3.5.1.2		
	Principle of Testing	
A.3.6	Antenna configurations	
A.3.6.1	Antenna configurations for FR1	
A.3.6.1.1	Antenna connection for 4 Rx capable UEs	
A.3.6.1.1.		
A.3.6.1.1.		
A.3.6.2	Antenna configurations for FR2	
A.3.7	EN-DC test setup	
A.3.7.1	Introduction	
A.3.7.2	E-UTRAN Serving Cell Parameters	
A.3.7.2.1	E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR1	
A.3.7.2.2	E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR2	234
A.3.7A	NR FR1-FR2 test setup	235
A.3.7B	Void	235
A.3.7C	LTE-FR1/FR2 test setup	235
A.3.7D	NE-DC test setup	235
A.3.7D.1	Introduction	235
A.3.7D.2	E-UTRAN Serving Cell Parameters	235
A.3.7D.2.	E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR1	235
A.3.7D.2.		
A.3.8	PRACH configurations.	
A.3.8.1	Introduction	235
A.3.8.2	PRACH configurations in FR1	
A.3.8.2.1	FR1 PRACH configuration 1	
A.3.8.2.2	FR1 PRACH configuration 2	
A.3.8.2.3	FR1 PRACH configuration 3	
A.3.8.2.4	FR1 PRACH configuration 4	
A.3.8.3	PRACH configurations in FR2	
A.3.8.3.1	FR2 PRACH configuration 1	
A.3.8.3.1 A.3.8.3.2	FR2 PRACH configuration 2	
A.3.8.3.2 A.3.8.3.3	FR2 PRACH configuration 3	
A.3.8.3.4	FR2 PRACH configuration 4	
A.3.9	BWP configurations	
A.3.9.1	Introduction	
A.3.9.2	Downlink BWP configurations	
A.3.9.2.1	Initial BWP	
A.3.9.2.2	Dedicated BWP	
A.3.9.3	Uplink BWP configurations	
A.3.9.3.1	Initial BWP	
A.3.9.3.2	Dedicated BWP	
A.3.10	SSB Configurations	
A.3.10.1	SSB Configurations for FR1	
A.3.10.1.1	SSB pattern 1 in FR1: SSB allocation for SSB SCS=15 kHz in 10 MHz	243

A.3.10.1.2 SSB pattern 2 in FR1: SSB allocation for SSB SCS=30 kHz in 40 MHz	243
A.3.10.1.3 SSB pattern 3 in FR1: SSB allocation for SSB SCS=15 kHz in 10 MHz	
A.3.10.1.4 SSB pattern 4 in FR1: SSB allocation for SSB SCS=30 kHz in 40 MHz	244
A.3.10.1.5 SSB pattern 5 in FR1: SSB allocation for SSB SCS=15 kHz starting from odd SFN in 10 MHz	245
A.3.10.1.6 SSB pattern 6 in FR1: SSB allocation for SSB SCS=30 kHz starting from odd SFN in 40 MHz	
A.3.10.2 SSB Configurations for FR2	245
A.3.10.2.1 SSB pattern 1 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz	
A.3.10.2.2 SSB pattern 2 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz	
A.3.10.2.3 SSB pattern 3 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz	246
A.3.10.2.4 SSB pattern 4 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz	
A.3.10.2.5 SSB pattern 5 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz	
A.3.10.2.6 SSB pattern 6 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz	
A.3.10.2.7 SSB pattern 7 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz	
A.3.10.2.8 SSB pattern 8 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz	
A.3.11 SMTC Configurations	
A.3.11.1 SMTC pattern 1: SMTC period = 20 ms with SMTC duration = 1 ms	
A.3.11.2 SMTC pattern 2: SMTC period = 20 ms with SMTC duration = 5 ms	249
A.3.11.3 SMTC pattern 3: SMTC period = 160 ms with SMTC duration = 1 ms	249
A.3.11.4 SMTC pattern 4: SMTC period = 20 ms with SMTC duration = 1 ms	249
A.3.11.5 SMTC pattern 5: SMTC period = 20 ms with SMTC duration = 5 ms	
A.3.11.6 SMTC pattern 6: SMTC period = 20 ms with SMTC duration = 5 ms	
A.3.12 Test Cases with Different CC Configurations	
A.3.12.1 EN-DC Test Cases with Different EN-DC Configurations	250
A.3.12.1.1 Introduction	250
A.3.12.1.2 Principle of testing	250
A.3.12.2 Carrier Aggregation Test Cases with Different CA Configurations	250
A.3.12.2.1 Introduction	250
A.3.12.2.2 Principle of testing	251
A.3.13 Test Cases in SA and EN-DC Operations	251
A.3.13.1 Introduction	251
A.3.13.2 Principle of Testing	251
A.3.13A Test Cases involving E-UTRA/FR1 and FR2 carriers	251
A.3.13A.1 Introduction	251
A.3.13A.2 Principle of Testing in EN-DC	251
A.3.13A.3 Principle of Testing in SA	252
A.3.13A.4 Principle of Testing in E-UTRA	252
A.3.13B Test Cases for EN-DC and NE-DC Operations	253
A.3.13B.1 Active BWP switch Test Cases for EN-DC and NE-DC Operations	253
A.3.13B.1.1 Introduction	253
A.3.13B.1.2 Principle of Testing	253
A.3.13B.2 SFTD accuracy Test Cases for EN-DC and NE-DC Operations	253
A.3.13B.2.1 Introduction	253
A.3.13B.2.2 Principle of Testing	253
A.3.14 CSI-RS configurations	253
A.3.14.1 FDD	253
A.3.14.2 TDD	254
A.3.15 Angle of Arrival (AoA) for FR2 RRM test cases	257
A.3.15.1 Setup 1: Single AoA in Rx beam peak direction	
A.3.15.2 Setup 2: Single AoA in non Rx beam peak direction	
A.3.15.2.1 Setup 2a: Single AoA in non Rx beam peak direction without change in direction	257
A.3.15.2.2 Setup 2b: Single AoA in non Rx beam peak direction with change in direction	
A.3.15.3 Setup 3: 2 AoAs	
A.3.15.4 Setup 4: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak	258
A.3.15.4.1 Setup 4a: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak without change in direction	258
A.3.15.4.2 Setup 4b: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak with change in direction	258
A.3.16 TCI State Configuration	
A.3.16.1 Introduction	
A.3.16.2 TCI states	
A.3.17 Configurations of CSI-RS for tracking	
A.3.17.1 Configuration of CSI-RS for tracking for FR1	
5	

A.3.17.1	1.1 FDD	259
A.3.17.1	1.2 TDD	260
A.3.17.2	Configuration of CSI-RS for tracking for FR2	261
A.3.17.2		
A.3.18	Additional definitions related to OTA testing for FR2 RRM test cases	262
A.3.18.1	· · · · · · · · · · · · · · · · · · ·	
A.3.18.2		
	EN-DC tests with all NR cells in FR1	
A.4.1	Void	
A.4.2	Void	
A.4.3	RRC_CONNECTED state mobility	
A.4.3.1	Void	
A.4.3.2	RRC Connection Mobility Control	
A.4.3.2.		
A.4.4	Timing	
A.4.4.1	UE transmit timing	
A.4.4.1.		
A.4.4.1.	F	
A.4.4.1.	1	
A.4.4.2	UE timer accuracy	272
A.4.4.3	Timing advance	272
A.4.4.3.	1 EN-DC FR1 timing advance adjustment accuracy	272
A.4.4.3.	1.1 Test Purpose and Environment	272
A.4.4.3.	1.2 Test Parameters	272
A.4.4.3.	1.3 Test Requirements	275
A.4.5	Signaling characteristics	
A.4.5.1	Radio link Monitoring	
A.4.5.1.		
	non-DRX mode	
A.4.5.1.		
A.4.5.1.	1 · · · · · · · · · · · · · · · · · · ·	279
A.4.5.1.	6 · · · · · · · · · · · · · · · · · · ·	
	non-DRX mode	
A.4.5.1.	1	
A.4.5.1.		
	DRX mode	
A.4.5.1.	1.	283
A.4.5.1.		286
A.4.5.1.	Radio Link Monitoring In-sync Test for FR1 PSCell configured with SSB-based RLM RS in	
	DRX mode	287
A.4.5.1.4	4.1 Test Purpose and Environment	287
A.4.5.1.4	4.2 Test Requirements	290
A.4.5.1.	5 EN-DC Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with CSI-RS-based	
	RLM in non-DRX mode	290
A.4.5.1.	5.1 Test Purpose and Environment	290
A.4.5.1.	5.2 Test Requirements	294
A.4.5.1.	6 EN-DC Radio Link Monitoring In-sync Test for FR1 PSCell configured with CSI-RS-based	
	RLM in non-DRX mode	294
A.4.5.1.	6.1 Test Purpose and Environment	294
A.4.5.1.	6.2 Test Requirements	298
A.4.5.1.	7 EN-DC Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with CSI-RS-based	
	RLM in DRX mode	298
A.4.5.1.	7.1 Test Purpose and Environment	298
A.4.5.1.		301
A.4.5.1.	8 EN-DC Radio Link Monitoring In-sync Test for FR1 PSCell configured with CSI-RS-based	
	RLM in DRX mode	301

A.4.5.1.8.1	Test Purpose and Environment	301
A.4.5.1.8.2	Test Requirements	
A.4.5.2	Interruption	
A.4.5.2.1	E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in	
	synchronous EN-DC	305
A.4.5.2.1.1	Test Purpose and Environment	
A.4.5.2.1.2	Test Requirements	
A.4.5.2.2	E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in	
11.1.3.2.2	asynchronous EN-DC	308
A.4.5.2.2.1	Test Purpose and Environment.	
A.4.5.2.2.2	Test Requirements	
A.4.5.2.3	E-UTRAN – NR FR1 interruptions during measurements on deactivated NR SCC in	911
A.4.3.2.3	synchronous EN-DC	311
A.4.5.2.3.1	Test Purpose and Environment.	
A.4.5.2.3.1 A.4.5.2.3.2	Test Parpose and Environment Test Requirements	
A.4.5.2.4	E-UTRAN – NR FR1 interruptions during measurements on deactivated NR SCC in	510
A.4.3.2.4	asynchronous EN-DC	216
A.4.5.2.4.1	Test Purpose and Environment.	
A.4.5.2.4.1 A.4.5.2.4.2		
	Test Requirements	321
A.4.5.2.5	E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in	201
	synchronous EN-DC	
A.4.5.2.5.1	Test Purpose and Environment	
A.4.5.2.5.2	Test Requirements	324
A.4.5.2.6	E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in	
	asynchronous EN-DC	
A.4.5.2.6.1	Test Purpose and Environment	
A.4.5.2.6.2	Test Requirements	
A.4.5.2.7	Void	
A.4.5.3.1	SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle	
A.4.5.3.1.1	Test Purpose and Environment	
A.4.5.3.1.2	Test Requirements	
A.4.5.3.2	SCell Activation and deactivation of known SCell in FR1 for 640ms SCell measurement cycle	
A.4.5.3.2.1	Test Purpose and Environment.	
A.4.5.3.2.2	Test Requirements	
A.4.5.3.3	SCell Activation and deactivation of unknown SCell in FR1	
A.4.5.3.3.1	Test Purpose and Environment	334
A.4.5.3.3.2	Test Requirements	335
A.4.5.4	UE UL carrier RRC reconfiguration Delay	335
A.4.5.4.1	UE UL carrier RRC reconfiguration Delay	335
A.4.5.4.1.1	Test Purpose and Environment	335
A.4.5.4.1.2	Test Requirements	341
A.4.5.5	Beam Failure Detection and Link recovery procedures	
A.4.5.5.1	EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-	
	based BFD and LR in non-DRX mode	342
A.4.5.5.1.1	Test Purpose and Environment	
A.4.5.5.1.2	Test Requirements	
A.4.5.5.2	EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-	
	based BFD and LR in DRX mode	346
A.4.5.5.2.1	Test Purpose and Environment	
A.4.5.5.2.2	Test Requirements	
A.4.5.5.3	EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with CSI-	551
А.т.э.э.э	RS-based BFD and LR in non-DRX mode	351
A.4.5.5.3.1	Test Purpose and Environment.	
A.4.5.5.3.2	Test Requirements	
A.4.5.5.4	EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with CSI-	
A.4.J.J.4		250
A 15511	RS-based BFD and LR in DRX mode	
A.4.5.5.4.1	Test Purpose and Environment	
A.4.5.5.4.2	Test Requirements	
A.4.5.6.1	DCI-based and Timer-based Active BWP Switch	
A.4.5.6.1.1	E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC	
A.4.5.6.1.1.1	Test Purpose and Environment	
A.4.5.6.1.1.2	Test Requirements	363

A.4.5.6.1.2	E-UTRAN – NR PSCell FR1 DL active BWP switch with FR1 SCell in non-DRX in	264
A 45 C 1 2 1	synchronous EN-DC	
A.4.5.6.1.2.1	Test Purpose and Environment	
A.4.5.6.1.2.2	Test Requirements	
A.4.5.6.2	RRC-based Active BWP Switch	
A.4.5.6.2.1.1	Test Purpose and Environment	
A.4.5.6.2.1.2	Test Requirements	
A.4.5.7	PSCell addition and release delay	
A.4.5.7.1	Addition and Release Delay of known NR PSCell	
A.4.5.7.1.1	Test purpose and environment	
A.4.5.7.1.2	Test Requirements	
	easurement procedure	
A.4.6.1	Intra-frequency Measurements	
A.4.6.1.1	EN-DC event triggered reporting tests without gap under non-DRX	
A.4.6.1.1.1	Test purpose and Environment	
A.4.6.1.1.2	Test parameters	
A.4.6.1.1.3	Test Requirements.	
A.4.6.1.2	EN-DC event triggered reporting tests without gap under DRX	
A.4.6.1.2.1	Test purpose and Environment	
A.4.6.1.2.2	Test parameters	
A.4.6.1.2.2	Test Requirements	
A.4.6.1.3	EN-DC event triggered reporting tests with per-UE gaps under non-DRX	
A.4.6.1.3.1	Test purpose and Environment	
A.4.6.1.3.2	Test parameters	
A.4.6.1.3.3	Test Requirements	
A.4.6.1.4	EN-DC event triggered reporting tests with per-UE gaps under DRX	
A.4.6.1.4.1	Test purpose and Environment	
A.4.6.1.4.2	Test parameters	
A.4.6.1.4.3	Test Requirements	
A.4.6.1.5	EN-DC event triggered reporting tests without gap under non-DRX with SSB index reading	
A.4.6.1.5.1	Test purpose and Environment	
A.4.6.1.5.2	Test parameters	
A.4.6.1.5.3	Test Requirements	
A.4.6.1.6	EN-DC event triggered reporting tests with SSB index reading with per-UE gaps	
A.4.6.1.6.1	Test purpose and Environment	
A.4.6.1.6.2	Test parameters	
A.4.6.1.6.3	Test Requirements	
A.4.6.2	Inter-frequency Measurements	.393
A.4.6.2.1	EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX	202
	is not used	
A.4.6.2.1.1	Test Purpose and Environment	
A.4.6.2.1.2	Test Requirements	.396
A.4.6.2.2	EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX	20.5
	is used	
A.4.6.2.2.1	Test Purpose and Environment	
A.4.6.2.2.2	Test Requirements	
A.4.6.2.3	Void	
A.4.6.2.4	Void	.400
A.4.6.2.5	EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is	400
	not used	
A.4.6.2.5.1	Test Purpose and Environment	
A.4.6.2.5.2	Test Requirements	.403
A.4.6.2.6	EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is	
	used	
A.4.6.2.6.1	Test Purpose and Environment	
A.4.6.2.6.2	Test Requirements	
A.4.6.2.7	Void	
A.4.6.2.8	Void	
A.4.6.3	Void	
A.4.6.4	L1-RSRP measurement for beam reporting	
A.4.6.4.1	SSB based L1-RSRP measurement when DRX is not used	
A.4.6.4.1.1	Test Purpose and Environment	.408

A.4.6.4.1.2	Test parameters	408
A.4.6.4.1.3	Test Requirements	410
A.4.6.4.2	SSB based L1-RSRP measurement when DRX is used	410
A.4.6.4.2.1	Test Purpose and Environment	410
A.4.6.4.2.2	Test parameters	411
A.4.6.4.2.3	Test Requirements	412
A.4.6.4.3	CSI-RS based L1-RSRP measurement when DRX is not used	413
A.4.6.4.3.1	Test Purpose and Environment	413
A.4.6.4.3.2	Test parameters	413
A.4.6.4.3.3	Test Requirements	415
A.4.6.4.4	CSI-RS based L1-RSRP measurement when DRX is used	415
A.4.6.4.4.1	Test Purpose and Environment	415
A.4.6.4.4.2	Test parameters	415
A.4.6.4.4.3	Test Requirements	417
A.4.7 M	easurement Performance requirements	
A.4.7.1	SS-RSRP	418
A.4.7.1.1	EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell	418
A.4.7.1.1.1	Test Purpose and Environment	418
A.4.7.1.1.2	Test parameters	418
A.4.7.1.1.3	Test Requirements	421
A.4.7.1.2	EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell	421
A.4.7.1.2.1	Test Purpose and Environment	421
A.4.7.1.2.2	Test parameters	
A.4.7.1.2.3	Test Requirements	
A.4.7.1.3	Void	
A.4.7.2	SS-RSRQ	
A.4.7.2.1	EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell	
A.4.7.2.1.1	Test Purpose and Environment	
A.4.7.2.1.2	Test Parameters	
A.4.7.2.1.3	Test Requirements	
A.4.7.2.2	EN-DC Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell	
A.4.7.2.2.1	Test Purpose and Environment	
A.4.7.2.2.2	Test Parameters	
A.4.7.2.2.3	Test Requirements	
A.4.7.3	SS-SINR	432
A.4.7.3.1	EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell	
A.4.7.3.1.1	Test Purpose and Environment	
A.4.7.3.1.2	Test Parameters	
A.4.7.3.1.3	Test Requirements	435
A.4.7.3.2	EN-DC Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell	435
A.4.7.3.2.1	Test Purpose and Environment	
A.4.7.3.2.2	Test Parameters	
A.4.7.3.2.3	Test Requirements	
A.4.7.4	L1-RSRP measurement for beam reporting	
A.4.7.4.1	SSB based L1-RSRP measurement	
A.4.7.4.1.1	Test Purpose and Environment	438
A.4.7.4.1.2	Test parameters	
A.4.7.4.1.3	Test Requirements	
A.4.7.4.2	CSI-RS based L1-RSRP measurement on resource set with repetition off	
A.4.7.4.2.1	Test Purpose and Environment	
A.4.7.4.2.2	Test parameters	
A.4.7.4.2.3	Test Requirements	
A.4.7.5	SFTD accuracy	
A.4.7.5.1	SFTD accuracy	
A.4.7.5.1.1	Test Purpose and Environment	
A.4.7.5.1.2	Test Parameters	
A.4.7.5.1.3	Test Requirements	
A.4.7.5.2	Void	
A.4.7.5.3	Void	
A.4.8 V	id	
A.4A NE-I	C test with all NR cells in FR1	448

A.4A.1 Si	gnaling characteristics	
A.4A.1.1	E-UTRAN PSCell addition	
A.4A.1.1.1	Test purpose and environment	.448
A.4A.1.1.2	Test Requirements	.452
A.4A.1.2	Active BWP switch	.453
A.4A.1.2.1	E-UTRAN PSCell - NR PCell FR1 DCI-based and Timer-based DL active BWP switch in non-	
	DRX in synchronous NE-DC	.453
A.4A.1.2.1.1		
A.4A.2 M	easurement performance	
A.4A.2.1	SFTD accuracy	
A.4A.2.1.1	SFTD accuracy	
A.4A.2.1.1.1	·	
A.4A.2.1.1.2		
A.4A.2.1.1.3		
	-	
	OC tests with one or more NR cells in FR2	
	oid	
	oid	
A.5.3 RI	RC_CONNECTED state mobility	
A.5.3.1	Void	
A.5.3.2	RRC Connection Mobility Control	
A.5.3.2.1	Void	.460
A.5.3.2.2	Random Access	
A.5.3.2.2.1	Contention based random access test in FR2 for PSCell/SCell in EN-DC	.460
A.5.3.2.2.2	Non-contention based random access test in FR2 for PSCell/SCell in EN-DC	.464
A.5.3.2.3	Void	.467
A.5.4 Ti	ming	.467
A.5.4.1	UE transmit timing	.467
A.5.4.1.1	NR UE Transmit Timing Test for FR2	
A.5.4.1.1.1	Test Purpose and environment	
A.5.4.1.1.2	Test requirements	
A.5.4.2	UE timer accuracy	
A.5.4.3	Timing advance	
A.5.4.3.1	EN-DC FR2 timing advance adjustment accuracy	
A.5.4.3.1.1	Test Purpose and Environment	
A.5.4.3.1.2	Test Parameters	
A.5.4.3.1.3	Test Requirements	
A.5.5 Si	gnaling characteristics	
A.5.5.1	Radio link Monitoring	
A.5.5.1.1	· · · · · · · · · · · · · · · · · · ·	
	non-DRX mode	
A.5.5.1.1.1	Test Purpose and Environment.	
A.5.5.1.1.2	Test Requirements	
A.5.5.1.2	Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in	
11.0.0.1.2	non-DRX mode	.478
A.5.5.1.2.1	Test Purpose and Environment	
A.5.5.1.2.2	Test Requirements	
A.5.5.1.3	Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with SSB-based RLM RS in	. 101
11.3.3.1.3	DRX mode	487
A.5.5.1.3.1	Test Purpose and Environment	
A.5.5.1.3.2	Test Requirements	
A.5.5.1.4	Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in	.40-
А.Э.Э.1.¬	DRX mode	185
A.5.5.1.4.1	Test Purpose and Environment	
A.5.5.1.4.1 A.5.5.1.4.2	Test Requirements	
A.5.5.1.4.2 A.5.5.1.5	EN-DC Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with CSI-RS-based	.+00
n.J.J.1.J		.488
A 5 5 1 6	EN-DC Radio Link Monitoring In-sync Test for FR2 PSCell configured with CSI-RS-based	.400
A.5.5.1.6		401
A 5 5 1 C 1	RLM in non-DRX mode	
A.5.5.1.6.1	Test Pagniroment	
A.5.5.1.6.2	Test Requirements	.495

A.5.5.1.7	EN-DC Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with CSI-RS-based	
	RLM in DRX mode	
A.5.5.1.7.1	Test Purpose and Environment	
A.5.5.1.7.2	Test Requirements	499
A.5.5.1.8	EN-DC Radio Link Monitoring In-sync Test for FR2 PSCell configured with CSI-RS-based	
	RLM in DRX mode	
A.5.5.1.8.1	Test Purpose and Environment	
A.5.5.1.8.2	Test Requirements	
A.5.5.1.9	EN-DC Radio Link Monitoring UE Scheduling Restrictions on FR2	
A.5.5.1.9.1	Test Purpose and Environment	
A.5.5.1.9.2	Test Requirements	
A.5.5.2	Interruption	506
A.5.5.2.1	E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in	~ 0.
	synchronous EN-DC	
A.5.5.2.1.1	Test Purpose and Environment	
A.5.5.2.1.2	Test Requirements	508
A.5.5.2.2	E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in	70 0
1.5.5.0.0.1	asynchronous EN-DC	
A.5.5.2.2.1	Test Purpose and Environment	
A.5.5.2.2.2	Test Requirements	510
A.5.5.2.3	E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in	~ 1 1
	synchronous EN-DC	
A.5.5.2.3.1	Test Purpose and Environment	
A.5.5.2.3.2	Test Requirements	513
A.5.5.2.4	E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in	51
A 5 5 0 4 1	asynchronous EN-DC	
A.5.5.2.4.1	Test Purpose and Environment	
A.5.5.2.4.2	Test Requirements	516
A.5.5.2.5	E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in	<i>5</i> 1 5
A 5 5 2 5 1	synchronous EN-DC	
A.5.5.2.5.1	Test Purpose and Environment	
A.5.5.2.5.2	Test Requirements	515
A.5.5.2.6	E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC.	510
A.5.5.2.6.1	Test Purpose and Environment	
A.5.5.2.6.2	Test Requirements	
A.5.5.3.1	SCell Activation and deactivation of SCell in FR2 intra-band	
A.5.5.3.1.1	Test Purpose and Environment	
A.5.5.3.1.1 A.5.5.3.1.2	Test Requirements	
A.5.5.3.1.2 A.5.5.3.2	SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle	524 /52
A.5.5.3.2.1	Test Purpose and Environment	
A.5.5.3.2.2	Test Requirements	
A.5.5.3.3	Void	
A.5.5.3.4	VoidVoid	
A.5.5.3.5	SCell Activation and deactivation of SCell in FR2	
A.5.5.3.5.1	Test Purpose and Environment	
A.5.5.3.5.1 A.5.5.3.5.2	Test Requirements	
A.5.5.4	Void	
A.5.5.5	Beam Failure Detection and Link recovery procedures	
A.5.5.5.1	EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with SSB-	
11.3.3.3.1	based BFD and LR in non-DRX mode	531
A.5.5.5.1.1	Test Purpose and Environment	
A.5.5.5.1.2	Test Requirements	
A.5.5.5.2	EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with SSB-	
	based BFD and LR in DRX mode	534
A.5.5.5.2.1	Test Purpose and Environment	
A.5.5.5.2.2	Test Requirements	
A.5.5.5.3	EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with CSI-	
. 1.0.0.0.0	RS-based BFD and LR in non-DRX mode	538
A.5.5.5.3.1	Test Purpose and Environment	
A.5.5.5.3.2	Test Requirements	541

A.5.5.5.4	EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with CSI-	
	RS-based BFD and LR in DRX mode	
A.5.5.5.4.1	Test Purpose and Environment	
A.5.5.5.4.2	Test Requirements	545
A.5.5.5.5	EN-DC scheduling availability restriction during Beam Failure Detection and Link Recovery for	
	FR2 PSCell configured with SSB-based BFD and LR in non-DRX mode	545
A.5.5.5.5.1	Test Purpose and Environment	545
A.5.5.5.5.2	Test Requirements	548
A.5.5.6	Active BWP switch	
A.5.5.6.1	DCI-based and Timer-based Active BWP Switch	549
A.5.5.6.1.1	E-UTRAN – NR PSCell FR2 DL active BWP switch with non-DRX in synchronous EN-DC	
A.5.5.6.1.1.1	Test Purpose and Environment	
A.5.5.6.1.1.2	Test Requirements	
A.5.5.6.1.2	E-UTRAN – NR PSCell FR2 with FR2 SCell DL active BWP switch in non-DRX in	
A.J.J.0.1.2	synchronous EN-DC	550
A 5 5 6 1 0 1	·	
A.5.5.6.1.2.1	Test Purpose and Environment	
A.5.5.6.1.2.2	Test Requirements	
A.5.5.6.2	RRC-based Active BWP Switch	
A.5.5.6.2.1	E-UTRAN – NR PSCell FR2 DL active BWP switch with non-DRX in synchronous EN-DC	
A.5.5.6.2.1.1	Test Purpose and Environment	
A.5.5.6.2.1.2	Test Requirements	
A.5.5.7	PSCell addition and release delay	
A.5.5.7.1	Addition and Release Delay of NR PSCell	559
A.5.5.7.1.1	Test purpose and environment	559
A.5.5.7.1.2	Test Requirements	562
A.5.5.8	Active TCI state switch delay	
A.5.5.8.1	MAC-CE based active TCI state switch.	
A.5.5.8.1.1	E-UTRAN – NR PSCell FR2 active TCI state switch for a known TCI state	
A.5.5.8.1.1.1	Test Purpose and Environment	
A.5.5.8.1.1.2	Test Requirements	
A.5.5.8.2	RRC based active TCI state switch	
A.5.5.8.2.1	E-UTRAN – NR PSCell FR2 active TCI state switch for a known TCI state	
A.5.5.8.2.1.1	Test Purpose and Environment	
A.5.5.8.2.1.2	Test Requirements	
	easurement procedure	
A.5.6.1	Intra-frequency Measurements	
A.5.6.1.1	EN-DC event triggered reporting test without gap under non-DRX	
A.5.6.1.1.1	Test purpose and Environment	
A.5.6.1.1.2	Test Requirements	
A.5.6.1.2	EN-DC event triggered reporting test without gap under DRX	
A.5.6.1.2.1	Test purpose and Environment	573
A.5.6.1.2.2	Test Requirements	575
A.5.6.1.3	EN-DC event triggered reporting test with per-UE gaps under non-DRX	576
A.5.6.1.3.1	Test purpose and Environment	
A.5.6.1.3.2	Test Requirements	
A.5.6.1.4	EN-DC event triggered reporting test with per-UE gaps under DRX	
A.5.6.1.4.1	Test purpose and Environment	
A.5.6.1.4.2	Test Requirements	
A.5.6.2	Inter-frequency Measurements	
A.5.6.2.1	EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX	502
A.J.0.2.1		500
156211	is not used	
A.5.6.2.1.1	Test Purpose and Environment	
A.5.6.2.1.2	Test Requirements	585
A.5.6.2.2	EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX	- -
	is used	
A.5.6.2.2.1	Test Purpose and Environment	
A.5.6.2.2.2	Test Requirements	588
A.5.6.2.3	EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is	
	not used	588
A.5.6.2.3.1	Test Purpose and Environment	588
A 5 6 2 3 2	Test Requirements	591

A.5.6.2.4	EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is	500
A.5.6.2.4.1	used Test Purpose and Environment	
A.5.6.2.5	EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX	
	is not used	595
A.5.6.2.5.1	Test Purpose and Environment	
A.5.6.2.5.2	Test Requirements	
A.5.6.2.6	EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX	
	is used	599
A.5.6.2.6.1	Test Purpose and Environment	599
A.5.6.2.6.2	Test Requirements	603
A.5.6.2.7	EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is	
	not used	
A.5.6.2.7.1	Test Purpose and Environment	
A.5.6.2.7.2	Test Requirements	607
A.5.6.2.8	EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is	
	used	
A.5.6.2.8.1	Test Purpose and Environment	
A.5.6.2.8.2	Test Requirements	
A.5.6.3	L1-RSRP measurement for beam reporting	
A.5.6.3.1	SSB based L1-RSRP measurement when DRX is not used	
A.5.6.3.1.1	Test Purpose and Environment	
A.5.6.3.1.2 A.5.6.3.1.3	Test parameters	
A.5.6.3.1.3 A.5.6.3.1.3	Test Requirements	
A.5.6.3.1.3 A.5.6.3.2	Test Requirements	
A.5.6.3.2.1	Test Purpose and Environment	
A.5.6.3.2.1 A.5.6.3.2.2	Test parameters	
A.5.6.3.2.3	Test Requirements	
A.5.6.3.3	CSI-RS based L1-RSRP measurement when DRX is not used	
A.5.6.3.3.1	Test Purpose and Environment	
A.5.6.3.3.2	Test parameters	
A.5.6.3.3.3	Test Requirements	
A.5.6.3.4	CSI-RS based L1-RSRP measurement when DRX is used	
A.5.6.3.4.1	Test Purpose and Environment	
A.5.6.3.4.2	Test parameters.	
A.5.6.3.4.3	Test Requirements	
A.5.7 M	leasurement Performance requirements	
A.5.7.1	SS-RSRP	621
A.5.7.1.1	EN-DC intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell	621
A.5.7.1.1.1	Test Purpose and Environment	
A.5.7.1.1.2	Test parameters	622
A.5.7.1.1.3	Test Requirements	
A.5.7.1.2	EN-DC inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell	624
A.5.7.1.2.1	Test Purpose and Environment	
A.5.7.1.2.2	Test parameters	
A.5.7.1.2.3	Test Requirements	
A.5.7.1.3	EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell	
A.5.7.1.3.1	Test Purpose and Environment	
A.5.7.1.3.2	Test parameters	
A.5.7.1.3.3	Test Requirements	
A.5.7.2	SS-RSRQ	
A.5.7.2.1	EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell	
A.5.7.2.1.1	Test Purpose and Environment	
A.5.7.2.1.2	Test Parameters	
A.5.7.2.1.3	Test Requirements	
A.5.7.2.2	EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell	
A.5.7.2.2.1 A.5.7.2.2.2	Test Percenters	
A.5.7.2.2.2 A.5.7.2.2.3	Test Parameters Test Requirements	
	•	
A.5.7.3 A.5.7.3.1	SS-SINR	
A.J. 1. 3. I	EXPERA THURSHEUDEDCY HEANDEHICH ACCULACY WHITER A SCIVING COLLABOLER A LLDD TATGEL COLL	เวาท

A.5.7.3.	1	636
A.5.7.3.		
A.5.7.3.		
A.5.7.3.	2 EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell	638
A.5.7.3.	2.1 Test Purpose and Environment	638
A.5.7.3.	2.2 Test Parameters	638
A.5.7.3.	2.3 Test Requirements	640
A.5.7.4	L1-RSRP measurement for beam reporting	640
A.5.7.4.		
A.5.7.4.	•	
A.5.7.4.		
A.5.7.4.	•	
A.5.7.4.	•	
A.5.7.4. A.5.8	Void	
А.Э.О	V OIU	04.
A.6 1	NR standalone tests with all NR cells in FR1	646
A.6.1	SA: RRC_IDLE state mobility	646
A.6.1.1	Cell re-selection to NR	
A.6.1.1.		
A.6.1.1.	<u> </u>	
A.6.1.1.	•	
A.6.1.1.		
A.6.1.1.		
A.6.1.1.		
A.6.1.1. A.6.1.1.		
A.6.1.1.		
A.6.1.2.	8 · F · J	
A.6.1.2.	1	
A.6.1.2.		
A.6.1.2.	1	
A.6.1.2.	T - J	
A.6.1.2.	1	
A.6.1.2.		
A.6.1.2.	1	
A.6.2	SA: RRC_INACTIVE state mobility	658
A.6.3	RRC_CONNECTED state mobility	
A.6.3.1.	1 Intra-frequency handover from FR1 to FR1; known target cell	658
A.6.3.1.	1.1 Test Purpose and Environment	658
A.6.3.1.	1.2 Test Parameters	658
A.6.3.1.	1.3 Test Requirements	660
A.6.3.1.		
A.6.3.1.	*	
A.6.3.1.		
A.6.3.1.	•	
A.6.3.1.		
A.6.3.1.	•	
A.6.3.1. A.6.3.1.		
	•	
A.6.3.1.	4	
A.6.3.1.	č	
A.6.3.1.	1	
A.6.3.1.	1	
A.6.3.2.		
A.6.3.2.	1 *	
A.6.3.2.		
A.6.3.2.		
A 632	2. Random Access	680

A.6.3.2.2.1	Contention based random access test in FR1 for NR standalone	680
A.6.3.2.2.2	Non-Contention based random access test in FR1 for NR standalone	683
A.6.3.2.3.1	Redirection from NR in FR1 to NR in FR1	686
A.6.3.2.3.2	Redirection from NR in FR1 to E-UTRAN	688
A.6.4 Tim	ing	692
A.6.4.1.1	NR UE Transmit Timing Test for FR1	692
A.6.4.1.1.1	Test Purpose and environment	692
A.6.4.1.1.2	Test requirements	695
A.6.4.3.1	SA FR1 timing advance adjustment accuracy	695
A.6.4.3.1.1	Test Purpose and Environment	695
A.6.4.3.1.2	Test Parameters	695
A.6.4.3.1.3	Test Requirements	698
A.6.5 Sign	alling characteristics	698
A.6.5.1.1	Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in	
	non-DRX mode	
A.6.5.1.1.1	Test Purpose and Environment	
A.6.5.1.1.2	Test Requirements	702
A.6.5.1.2	Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode	702
A.6.5.1.2.1	Test Purpose and Environment	
A.6.5.1.2.2	Test Requirements	
A.6.5.1.3	Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode	706
A.6.5.1.3.1	Test Purpose and Environment.	
A.6.5.1.3.1 A.6.5.1.3.2	Test Requirements	
A.6.5.1.3.2 A.6.5.1.4	Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX	
A.0.3.1.4	mode	
A.6.5.1.4.1	Test Purpose and Environment.	
A.6.5.1.4.2	Test Requirements	
A.6.5.1.5	Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in	/ 12
11.0.3.1.3	non-DRX mode	713
A.6.5.1.5.1	Test Purpose and Environment	
A.6.5.1.5.2	Test Requirements	
A.6.5.1.6	Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-	
	DRX mode	716
A.6.5.1.6.1	Test Purpose and Environment	716
A.6.5.1.6.2	Test Requirements	
A.6.5.1.7	Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in	
	DRX mode	720
A.6.5.1.7.1	Test Purpose and Environment	720
A.6.5.1.7.2	Test Requirements	723
A.6.5.1.8	Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX	
	mode	
A.6.5.1.8.1	Test Purpose and Environment	
A.6.5.1.8.2	Test Requirements	
A.6.5.2.1	Interruptions during measurements on deactivated NR SCC in FR1	726
A.6.5.3.1	SCell Activation and deactivation of known SCell in FR1 in non-DRX for 160ms SCell	701
	measurement cycle	
A.6.5.3.1.1	Test Purpose and Environment	
A.6.5.3.1.2	Test Requirements	/36
A.6.5.3.2	SCell Activation and deactivation of known SCell in FR1 in non-DRX for 640 ms SCell	726
A C 5 2 2 1	measurement cycle	
A.6.5.3.2.1	Test Purpose and Environment	
A.6.5.3.2.2	Test Requirements	
A.6.5.3.3 A.6.5.3.3.1	SCell Activation and deactivation of unknown SCell in FR1 in non-DRX	
A.6.5.3.3.1 A.6.5.3.3.2	Test Peruirements	
A.6.5.3.3.2 A.6.5.4.1	Test Requirements	
A.6.5.4.1 A.6.5.4.1.1	Test Purpose and Environment	
A.6.5.4.1.2	Test Requirements	
A.6.5.4.2	Void	745

A.6.5.5.1	Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD	745
A 6 5 5 1 1	and LR in non-DRX mode	
A.6.5.5.1.1	Test Purpose and Environment	
A.6.5.5.1.2	Test Requirements	/49
A.6.5.5.2	Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode	740
A.6.5.5.2.1	Test Purpose and Environment	
A.6.5.5.2.2	Test Purpose and Environment Test Requirements	
A.6.5.5.3	Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based	133
A.0.3.3.3	BFD and LR in non-DRX mode	754
A.6.5.5.3.1	Test Purpose and Environment	
A.6.5.5.3.2	Test Requirements	
A.6.5.5.4	Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based	
	BFD and LR in DRX mode	758
A.6.5.5.4.1	Test Purpose and Environment	758
A.6.5.5.4.2	Test Requirements	
A.6.5.6.1	DCI-based and Timer-based Active BWP Switch	
A.6.5.6.1.1	NR FR1- NR FR1 DL active BWP switch of SCell with non-DRX in SA	
A.6.5.6.1.2	NR FR1 DL active BWP switch with non-DRX in SA	
A.6.5.6.2	RRC-based Active BWP Switch	
A.6.5.6.2.1	NR FR1 DL active BWP switch of Cell with non-DRX in SA	
	surement procedure	
A.6.6.1.1	SA event triggered reporting tests without gap under non-DRX	
A.6.6.1.1.1	Test purpose and Environment	
A.6.6.1.1.2	Test parameters	
A.6.6.1.1.3	Test Requirements	
A.6.6.1.2	SA event triggered reporting tests without gap under DRX	
A.6.6.1.2.1 A.6.6.1.2.2	Test purpose and Environment	
A.6.6.1.2.3	Test parameters Test Requirements	
A.6.6.1.3	SA event triggered reporting tests with per-UE gaps under non-DRX	
A.6.6.1.3.1	Test purpose and Environment	
A.6.6.1.3.2	Test parameters	
A.6.6.1.3.3	Test Requirements	
A.6.6.1.4	SA event triggered reporting tests with per-UE gaps under DRX	
A.6.6.1.4.1	Test purpose and Environment	
A.6.6.1.4.2	Test parameters	
A.6.6.1.4.3	Test Requirements	
A.6.6.1.5	SA event triggered reporting tests without gap under non-DRX with SSB index reading	783
A.6.6.1.5.1	Test purpose and Environment	783
A.6.6.1.5.2	Test parameters	783
A.6.6.1.5.3	Test Requirements	
A.6.6.1.6	SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading	
A.6.6.1.6.1	Test purpose and Environment	
A.6.6.1.6.2	Test parameters	
A.6.6.1.6.3	Test Requirements	786
A.6.6.2.1	SA event triggered reporting tests for FR1 without SSB time index detection when DRX is not	=0.4
	used	
A.6.6.2.1.1	Test Purpose and Environment	
A.6.6.2.1.2	Test Requirements	
A.6.6.2.2	SA event triggered reporting tests for FR1 without SSB time index detection when DRX is used	
A.6.6.2.2.1	Test Purpose and Environment	
A.6.6.2.2.2	Test Requirements	
A.6.6.2.3 A.6.6.2.4	VoidVoid	
A.6.6.2.4 A.6.6.2.5	Void	
A.6.6.2.5.1	Test Purpose and Environment	
A.6.6.2.5.1	Test Requirements	
A.6.6.2.6	SA event triggered reporting tests for FR1 with SSB time index detection when DRX is used	
A.6.6.2.6.1	Test Purpose and Environment	
A.6.6.2.6.2	Test Requirements	
A.6.6.2.7	Void	799

A.6.6.2.8	Void	
A.6.6.3	Inter-RAT Measurements	
A.6.6.3.1	SA NR - E-UTRAN event-triggered reporting in non-DRX in FR1	799
A.6.6.3.1.1	Test Purpose and Environment	799
A.6.6.3.1.2	Test Requirements	802
A.6.6.3.2	SA NR - E-UTRAN event-triggered reporting in DRX in FR1	803
A.6.6.3.2.1	Test Purpose and Environment	803
A.6.6.3.2.2	Test Requirements	806
A.6.6.4	L1-RSRP measurement for beam reporting.	806
A.6.6.4.1	SSB based L1-RSRP measurement when DRX is not used	806
A.6.6.4.1.1	Test Purpose and Environment	806
A.6.6.4.1.2	Test parameters	
A.6.6.4.1.3	Test Requirements	
A.6.6.4.2	SSB based L1-RSRP measurement when DRX is used	809
A.6.6.4.2.1	Test Purpose and Environment	809
A.6.6.4.2.2	Test parameters	809
A.6.6.4.2.3	Test Requirements	
A.6.6.4.3	CSI-RS based L1-RSRP measurement when DRX is not used	
A.6.6.4.3.1	Test Purpose and Environment	811
A.6.6.4.3.2	Test parameters	
A.6.6.4.3.3	Test Requirements	
A.6.6.4.4	CSI-RS based L1-RSRP measurement when DRX is used	
A.6.6.4.4.1	Test Purpose and Environment	814
A.6.6.4.4.2	Test parameters	
A.6.6.4.4.3	Test Requirements	
	easurement Performance requirements	
A.6.7.1.1	SA: intra-frequency case measurement accuracy with FR1 serving cell and FR1 target cell	
A.6.7.1.1.1	Test Purpose and Environment	
A.6.7.1.1.2	Test parameters	
A.6.7.1.1.3	Test Requirements	
A.6.7.1.2	SA inter-frequency case measurement accuracy with FR1 serving cell and FR1 target cell	
A.6.7.1.2.1	Test Purpose and Environment	
A.6.7.1.2.2	Test parameters	
A.6.7.1.2.3	Test Requirements	
A.6.7.1.3	Void	
A.6.7.2	SS-RSRQ	
A.6.7.2.1	SA: Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell	
A.6.7.2.1.1	Test Purpose and Environment	
A.6.7.2.1.2	Test Parameters	
A.6.7.2.1.3	Test Requirements	
A.6.7.2.2	SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell	
A.6.7.2.2.1	Test Purpose and Environment	
A.6.7.2.2.2	Test Parameters	
A.6.7.2.2.3 A.6.7.3.1	Test Requirements	
A.6.7.3.1 A.6.7.3.1.1		
A.6.7.3.1.1 A.6.7.3.1.2	Test Purpose and Environment.	
A.6.7.3.1.2 A.6.7.3.1.3	Test Parameters	
A.6.7.3.1.3 A.6.7.3.2	Test Requirements	
A.6.7.3.2.1	Test Purpose and Environment	
A.6.7.3.2.1 A.6.7.3.2.2	Test Parameters	
A.6.7.3.2.2 A.6.7.3.2.3	Test Requirements	
A.6.7.4.1	SSB based L1-RSRP measurement	
A.6.7.4.1.1	Test Purpose and Environment	
A.6.7.4.1.1 A.6.7.4.1.2	Test parameters	
A.6.7.4.1.2 A.6.7.4.1.3	Test Requirements	
A.6.7.4.1.3 A.6.7.4.2	CSI-RS based L1-RSRP measurement on resource set with repetition off	
A.6.7.4.2.1	Test Purpose and Environment	
A.6.7.4.2.1 A.6.7.4.2.2	Test parameters	
A.6.7.4.2.3	Test Requirements	
A.6.7.5.1	SA: inter-RAT measurement accuracy with FR1 serving cell	
A.6.7.5.1.1	Test Purpose and Environment	

A.6.7.5.1.2	Test parameters	
A.6.7.5.1.3	Test Requirements	
A.6.7.6.1	SA: inter-RAT measurement accuracy with FR1 serving cell	
A.6.7.6.1.1	Test Purpose and Environment	
A.6.7.6.1.2	Test parameters	
A.6.7.6.1.3	Test Requirements	
A.6.7.7.1	SA: inter-RAT measurement accuracy with FR1 serving cell	
A.6.7.7.1.1	Test Purpose and Environment	
A.6.7.7.1.2	Test parameters	
A.6.7.7.1.3	Test Requirements	854
A.7 NR stand	lalone tests with one or more NR cells in FR2	855
A.7.1 SA: R	RC_IDLE state mobility	855
A.7.1.1.1	Cell reselection to FR2 intra-frequency NR case	
A.7.1.1.1.1	Test Purpose and Environment	855
A.7.1.1.1.2	Test Parameters	855
A.7.1.1.3	Test Requirements	857
A.7.1.1.2	Cell reselection to FR2 inter-frequency NR case	857
A.7.1.1.2.1	Test Purpose and Environment	857
A.7.1.1.2.2	Test Parameters	857
A.7.1.1.2.3	Test Requirements	859
	RC_INACTIVE state mobility	
	CONNECTED state mobility	
A.7.3.1 Ha	ndover	
A.7.3.1.1	Inter-frequency handover from FR1 to FR2; unknown target cell	
A.7.3.1.1.1	Test Purpose and Environment	
A.7.3.1.1.2	Test Parameters	
A.7.3.1.1.3	Test Requirements	
A.7.3.1.2	Intra-frequency handover from FR2 to FR2; unknown target cell	
A.7.3.1.2.1	Test Purpose and Environment	
A.7.3.1.2.2	Test Parameters	
A.7.3.1.2.3	Test Requirements	
A.7.3.1.3	Inter-frequency handover from FR2 to FR2; unknown target cell	
A.7.3.1.3.1	Test Purpose and Environment	
A.7.3.1.3.2	Test Parameters	
	Requirements	
A.7.3.2.1	SA: RRC Re-establishment	
A.7.3.2.1.1	Intra-frequency RRC Re-establishment in FR2	
A.7.3.2.1.2	Inter-frequency RRC Re-establishment in FR2	
A.7.3.2.1.3	Intra-frequency RRC Re-establishment in FR2 without serving cell timing	
A.7.3.2.1.3.1	Test Purpose and Environment	
A.7.3.2.1.3.2	Test Requirements	
A.7.3.2.2	Random Access	
A.7.3.2.2.1	Contention based random access test in FR2 for NR Standalone	
A.7.3.2.2.2	Non-contention based random access test in FR2 for NR Standalone	
A.7.3.2.3	SA: RRC Connection Release with Redirection	
A.7.3.2.3.1	Redirection from NR in FR2 to NR in FR2	
	g	
A.7.4.1.1	NR UE Transmit Timing Test for FR2	
A.7.4.1.1.1	Test Purpose and environment	
A.7.4.1.1.2 A.7.4.3.1	Test requirements	
	SA FR2 timing advance adjustment accuracy	
A.7.4.3.1.1	Test Peremeters	
A.7.4.3.1.2	Test Parameters	
A.7.4.3.1.3	Test Requirements	
A.7.5 Signal A.7.5.1.1	ing characteristics	089
Δ./.J.1.1	non-DRX mode	22n
A.7.5.1.1.1	Test Purpose and Environment	
A.7.5.1.1.1 A.7.5.1.1.2	Test Requirements Test Requirements	
A.7.5.1.2 A.7.5.1.2	Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in non-	072
n.1.J.1.2	Radio Link Monitoring in-sync rest for FK2 reen configured with SSD-based KLM KS III Holl-	

A.7.5.1.2.1	Test Purpose and Environment	893
A.7.5.1.2.2	Test Requirements	
A.7.5.1.3	Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode	
A.7.5.1.3.1	Test Purpose and Environment.	
A.7.5.1.3.1 A.7.5.1.3.2	Test Requirements	
		099
A.7.5.1.4	Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode	
A.7.5.1.4.1	Test Purpose and Environment	899
A.7.5.1.4.2	Test Requirements	902
A.7.5.1.5	Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode	902
A.7.5.1.5.1	Test Purpose and Environment	
A.7.5.1.5.1 A.7.5.1.5.2	Test Requirements	
A.7.5.1.6	Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-	703
	DRX mode	
A.7.5.1.6.1	Test Purpose and Environment	
A.7.5.1.6.2	Test Requirements	908
A.7.5.1.7	Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode	909
A.7.5.1.7.1	Test Purpose and Environment	
A.7.5.1.7.2	Test Requirements	
A.7.5.1.8	Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX	
A 7 7 1 0 1	mode	
A.7.5.1.8.1	Test Purpose and Environment	
A.7.5.1.8.2	Test Requirements	
A.7.5.1.9	UE Radio Link Monitoring Scheduling Restrictions on FR2	
A.7.5.1.9.1	Test Purpose and Environment	
A.7.5.1.9.2	Test Requirements	
A.7.5.2.1	Interruptions during measurements on deactivated NR SCC in FR2	
A.7.5.3.1	SCell Activation and deactivation for SCell in FR2 intra-band in non-DRX	920
A.7.5.3.1.1	Test Purpose and Environment.	920
A.7.5.3.1.2	Test Requirements	922
A.7.5.3.2	SCell Activation and deactivation for FR1+FR2 inter-band with target SCell in FR2	922
A.7.5.3.2.1	Test Purpose and Environment	922
A.7.5.3.2.2	Test Requirements	925
A.7.5.5.1	Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode	
A.7.5.5.1.1	Test Purpose and Environment.	
A.7.5.5.1.1 A.7.5.5.1.2		
A.7.5.5.2 A.7.5.5.2	Test Requirements Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD	
	and LR in DRX mode	
A.7.5.5.2.1	Test Purpose and Environment	
A.7.5.5.2.2	Test Requirements	932
A.7.5.5.3	Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in non-DRX mode	933
A.7.5.5.3.1	Test Purpose and Environment	
A.7.5.5.3.2	Test Requirements	
A.7.5.5.4	Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in DRX mode	
A.7.5.5.4.1	Test Purpose and Environment.	
A.7.5.5.4.1 A.7.5.5.4.2	Test Requirements	
		939
A.7.5.5.5	Scheduling availability restriction during Beam Failure Detection and Link Recovery for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode	
A.7.5.5.5.1	Test Purpose and Environment	
A.7.5.5.5.2	Test Requirements	
A.7.5.6.1	DCI-based and Timer-based Active BWP Switch	
A.7.5.6.1.1	NR FR2- NR FR2 DL active BWP switch of SCell with non-DRX in SA	943
A.7.5.6.1.2	NR FR1- NR FR2 DL active BWP switch of SCell with non-DRX in SA	947
A.7.5.6.1.3	NR FR2 DL active BWP switch with non-DRX in SA	951
A.7.5.6.1.3.1	Test Purpose and Environment	951
A.7.5.6.1.3.2	Test Requirements	

A.7.5.6.2	RRC-based Active BWP Switch	954
A.7.5.7.1	Addition and Release Delay of known NR PSCell	957
A.7.5.7.1.1	Test Purpose and Environment	
A.7.5.7.2	Addition and Release Delay of unknown NR PSCell	960
A.7.5.7.2.1	Test Purpose and Environment	
A.7.5.8.1	MAC-CE based active TCI state switch	
A.7.5.8.2	RRC based active TCI state switch	
	easurement procedure	
A.7.6.1.1	SA event triggered reporting test without gap under non-DRX	
A.7.6.1.1.1	Test purpose and Environment	
A.7.6.1.1.2	Test Requirements	
A.7.6.1.2	SA event triggered reporting test without gap under DRX	
A.7.6.1.2.1	Test purpose and Environment	
A.7.6.1.2.2	Test Requirements	
A.7.6.1.3	SA event triggered reporting test with per-UE gaps under non-DRX	
A.7.6.1.3.1	Test purpose and Environment	
A.7.6.1.3.2	Test Requirements	
A.7.6.1.4	SA event triggered reporting test with per-UE gaps under DRX	
A.7.6.1.4.1	Test purpose and Environment	
A.7.6.1.4.2	Test Requirements	982
A.7.6.2.1	SA event triggered reporting tests For FR2 without SSB time index detection when DRX is not	
	used (PCell in FR2)	
A.7.6.2.1.1	Test Purpose and Environment	
A.7.6.2.1.2	Test Requirements	985
A.7.6.2.2	SA event triggered reporting tests For FR2 without SSB time index detection when DRX is used	005
176001	(PCell in FR2)	
A.7.6.2.2.1	Test Purpose and Environment	
A.7.6.2.2.2	Test Requirements	
A.7.6.2.3	SA event triggered reporting tests For FR2 with SSB time index detection when DRX is not used (PCell in FR2)	
A.7.6.2.3.1	Test Purpose and Environment.	
A.7.6.2.3.1 A.7.6.2.3.2	Test Requirements	
A.7.6.2.4	SA event triggered reporting tests For FR2 with SSB time index detection when DRX is used	991
A.7.0.2.4	(PCell in FR2)	991
A.7.6.2.4.1	Test Purpose and Environment	991
A.7.6.2.4.2	Test Requirements	993
A.7.6.2.5	SA event triggered reporting tests for FR2 without SSB time index detection when DRX is not used (PCell in FR1)	004
A.7.6.2.5.1	Test Purpose and Environment.	
A.7.6.2.5.1 A.7.6.2.5.2	Test Requirements	
A.7.6.2.5.2 A.7.6.2.6	SA event triggered reporting tests for FR2 without SSB time index detection when DRX is used	771
A.7.0.2.0	(PCell in FR1)	997
A.7.6.2.6.1	Test Purpose and Environment	
A.7.6.2.6.2	Test Requirements	
A.7.6.2.7	SA event triggered reporting tests for FR2 with SSB time index detection when DRX is not used	.1000
A.7.0.2.7	(PCell in FR1)	1001
A.7.6.2.7.1	Test Purpose and Environment	
A.7.6.2.7.2	Test Requirements	
A.7.6.2.8	SA event triggered reporting tests for FR2 with SSB time index detection when DRX is used	.1005
11.7.0.2.0	(PCell in FR1)	.1004
A.7.6.2.8.1	Test Purpose and Environment	
A.7.6.2.8.2	Test Requirements	
A.7.6.3	L1-RSRP measurement for beam reporting	
A.7.6.3.1	SSB based L1-RSRP measurement when DRX is not used	
A.7.6.3.1.1	Test Purpose and Environment	
A.7.6.3.1.2	Test parameters	
A.7.6.3.1.3	Test Requirements	
A.7.6.3.2	SSB based L1-RSRP measurement when DRX is used	
A.7.6.3.2.1	Test Purpose and Environment	
A.7.6.3.2.2	Test parameters	
A.7.6.3.2.3	Test Requirements	
A.7.6.3.3	CSI-RS based L1-RSRP measurement when DRX is not used	

A.7.6.3.3.1	Test Purpose and Environment	
A.7.6.3.3.2	Test parameters	1012
A.7.6.3.3.3	Test Requirements	1014
A.7.6.3.4 C	SI-RS based L1-RSRP measurement when DRX is used	1014
A.7.6.3.4.1	Test Purpose and Environment	1014
A.7.6.3.4.2	Test parameters	1015
A.7.6.3.4.3	Test Requirements	
A.7.7 Measure	ment Performance requirements	
	A intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell	
A.7.7.1.1.1	Test Purpose and Environment	
A.7.7.1.1.2	Test parameters	
A.7.7.1.1.3	Test Requirements	
	A inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell	
A.7.7.1.2.1	Test Purpose and Environment	
A.7.7.1.2.2	Test parameters.	
A.7.7.1.2.3	Test Requirements	
	A inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell	
A.7.7.1.3.1	Test Purpose and Environment	
A.7.7.1.3.1 A.7.7.1.3.2	Test parameters.	
A.7.7.1.3.2 A.7.7.1.3.3	Test Requirements	
	SRQ	
A.7.7.2.1 SA	A intra-frequency measurement accuracy with FR2 serving cell and FR2 target cell	
	Test Purpose and Environment	
A.7.7.2.1.2	Test Parameters	
A.7.7.2.1.3	Test Requirements	
	A Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell	
A.7.7.2.2.1	Test Purpose and Environment	
A.7.7.2.2.2	Test Parameters	
A.7.7.2.2.3	Test Requirements	
	A intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell	
A.7.7.3.1.1	Test Purpose and Environment	
A.7.7.3.1.2	Test Parameters	
A.7.7.3.1.3	Test Requirements	
	A Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell	
A.7.7.3.2.1	Test Purpose and Environment	
A.7.7.3.2.2	Test Parameters	1033
A.7.7.3.2.3	Test Requirements	1034
A.7.7.4.1 SS	SB based L1-RSRP measurement	1035
A.7.7.4.1.1	Test Purpose and Environment	
A.7.7.4.1.2	Test parameters	1035
A.7.7.4.1.3	Test Requirements	1036
A.7.7.4.2 C	SI-RS based L1-RSRP measurement on resource set with repetition off	1037
A.7.7.4.2.1	Test Purpose and Environment	1037
A.7.7.4.2.2	Test parameters	
A.7.7.4.2.3	Test Requirements	
	•	
	andalone tests for NR RRM	
	LE state mobility	
	RAT NR Cell re-selection	
A.8.2.1.1 E-	UTRA Cell reselection to higher priority NR target Cell in FR1	1040
A.8.2.1.1.1	Test Purpose and Environment	1040
A.8.2.1.1.2	Test Requirements	1043
A.8.3 RRC_CC	NNECTED state mobility	
	over	
	UTRAN - NR handover in FR1	
A.8.3.1.1.1	Test Purpose and Environment	
A.8.3.1.1.2	Test Requirements	
	nent procedure	
	UTRA – NR Inter-RAT SFTD Measurement Delay in non-DRX	
A.8.4.1.1.1	Test Purpose and Environment	
A.8.4.1.1.1 A 8 4 1 1 2	Test Requirements	1050

A.8.4.1.2	E-UTRA – NR Inter-RAT SFTD Measurement Delay in DRX	
A.8.4.1.2.1	Test Purpose and Environment	1050
A.8.4.1.2.2	Test Requirements	
A.8.4.2	E-UTRA – NR Inter-RAT Measurements	.1051
A.8.4.2.1	NR Inter-RAT event triggered reporting tests for FR1 without SSB time index detection when	
	DRX is not used	1051
A.8.4.2.1.1	Test Purpose and Environment	1051
A.8.4.2.1.2	Test Requirements	
A.8.4.2.2	NR Inter-RAT event triggered reporting tests for FR1 without SSB time index detection when	
	DRX is used	1055
A.8.4.2.2.1	Test Purpose and Environment	
A.8.4.2.2.2	Test Requirements	
A.8.4.2.3	NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX	1050
1.0.4.2.3	is not used	1050
A.8.4.2.3.1	Test Purpose and Environment.	
A.8.4.2.3.1 A.8.4.2.3.2	Test Requirements	
A.8.4.2.3.2 A.8.4.2.4	NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX	1002
A.6.4.2.4		1062
A 0 4 2 4 1	is used	
A.8.4.2.4.1	Test Purpose and Environment	
A.8.4.2.4.2	Test Requirements	1066
A.8.4.2.5	NR Inter-RAT event triggered reporting tests for FR2 without SSB time index detection when	
	DRX is not used	
A.8.4.2.5.1	Test Purpose and Environment	
A.8.4.2.5.2	Test Requirements	1068
A.8.4.2.6	NR Inter-RAT event triggered reporting tests for FR2 without SSB time index detection when	
	DRX is used	
A.8.4.2.6.1	Test Purpose and Environment	.1069
A.8.4.2.6.2	Test Requirements	.1071
A.8.4.2.7	NR Inter-RAT event triggered reporting tests for FR2 with SSB time index detection when DRX	
	is not used	1072
A.8.4.2.7.1	Test Purpose and Environment	1072
A.8.4.2.7.2	Test Requirements	
A.8.4.2.8	NR Inter-RAT event triggered reporting tests for FR2 with SSB time index detection when DRX	
	is used	1074
A.8.4.2.8.1	Test Purpose and Environment	
A.8.4.2.8.2	Test Requirements	
	easurement performance	
A.8.5.1.1	SFTD accuracy	
A.8.5.1.1	Test Purpose	
A.8.5.1.1.2	Test Environment	
A.8.5.1.1.3		
	Test Requirements	
A.8.5.2	E-UTRA – NR Inter-RAT Measurement Performance requirements	
A.8.5.2.1	SS-RSRP	
A.8.5.2.1.1	E-UTRAN – NR inter-RAT measurements with FR1 target cell	
A.8.5.2.1.2	E-UTRAN – NR inter-RAT measurements with FR2 target cell	
A.8.5.2.1.2.1	Test Purpose and Environment	
A.8.5.2.1.2.2		
A.8.5.2.1.2.3	Test Requirements	
A.8.5.2.2	SS-RSRQ	
A.8.5.2.2.1	E-UTRAN – NR inter-RAT measurements with FR1 target cell	
A.8.5.2.2.2	E-UTRAN – NR inter-RAT measurements with FR2 target cell	
A.8.5.2.2.2.1	Test Purpose and Environment	.1090
A.8.5.2.2.2.2	Test Parameters	
A.8.5.2.2.2.3	Test Requirements	
A.8.5.2.3	SS-SINR	
A.8.5.2.3.1	E-UTRAN – NR inter-RAT measurements with FR1 target cell	
A.8.5.2.3.2	E-UTRAN – NR inter-RAT measurements with FR2 target cell	
A.8.5.2.3.2.1	Test Purpose and Environment	
A.8.5.2.3.2.2		
A.8.5.2.3.2.3	Test Requirements	
	- 100 100 data to 100 t	1001

Annex B (normative): Conditions for RRM requirements applicability for operating bands .1098

B.1	Conditions for NR RRC_IDLE state mobility	1098
B.1.1	Introduction	
B.1.2	Conditions for measurements on NR intra-frequency cells for cell re-selection	
B.1.3	Conditions for measurements on NR inter-frequency cells for cell re-selection	1099
B.2	Conditions for UE measurements procedures and performance requirements in	
	RRC CONNECTED state	1099
B.2.1	Introduction	
B.2.1.1		
B.2.1.2		
B.2.1.3		
B.2.1.3		
B.2.1.4	· · · · · · · · · · · · · · · · · · ·	
B.2.1.5	<u> •</u>	
B.2.1.5	Gain to SS-RSRP measurement point for Rx Beam Peak angle of arrival	1101
B.2.1.5	Gain to SS-RSRP measurement point for different frequency	1102
B.2.1.5	Alignment of Rough beam to Rx beam Peak	1102
B.2.2	Conditions for NR intra-frequency measurements	1103
B.2.3	Conditions for NR inter-frequency measurements	1104
B.2.4	Conditions for NR L1-RSRP reporting	1105
B.2.4.1	Conditions for SSB based L1-RSRP reporting	1105
B.2.4.2		
B.2.5	Conditions for RRC connection release with redirection to NR	
B.2.6	Void	
B.2.6.1	Void	1108
B.2.6.2	2 Void	1108
B.3	RRM Requirements Exceptions	1108
B.3.1	Introduction	
B.3.2	Receiver sensitivity relaxation for CA	
B.3.2.1		
B.3.2.2	8 · · · · · · · · · · · · · · · · · · ·	
B.3.2.2	66 6	
B.3.2.2	· · · · · · · · · · · · · · · · · · ·	
B.3.2.2		
B.3.2.3	Tr 8	
B.3.2.4	6 · · · · · · · · · · · · · · · · · · ·	
B.3.2.4	6	
B.3.2.4	6 66 6	
B.3.3	Receiver sensitivity relaxation for DC	
B.3.3.1	J	
B.3.3.2	•	
B.3.4	Receiver sensitivity relaxation for SUL	
B.3.4.1		
B.3.4.2		
B.3.4.2	2.1 Reference sensitivity exceptions due to UL harmonic interference for SUL	1110
Anne	x C (informative): Change history	1111
Histor	y	1119

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

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- x the first digit:
 - 1 presented to TSG for information;
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- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document specifies requirements for support of Radio Resource Management for the FDD and TDD modes of New Radio (NR). These requirements include requirements on measurements in NR and the UE as well as requirements on node dynamical behaviour and interaction, in terms of delay and response characteristics.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1]	3GPP TS 38.304: "NR; User Equipment (UE) procedures in idle mode".
[2]	3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".
[3]	3GPP TS 38.213: "NR; Physical layer procedures for control".
[4]	3GPP TS 38.215: "NR; Physical layer measurements".
[5]	3GPP TS 38.533: "NR; User Equipment (UE) conformance specification; Radio Resource Management (RRM)".
[6]	3GPP TS 38.211: "NR; Physical channels and modulation".
[7]	3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification".
[8]	3GPP TS 38.212 "NR; Multiplexing and channel coding".
[9]	3GPP TS 38.202: "NR; Physical layer services provided by the physical layer".
[10]	3GPP TS 38.300: "NR; Overall description; Stage-2".
[11]	3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
[12]	3GPP TS 38.423: "NG-RAN; Xn Application Protocol (XnAP)".
[13]	3GPP TS 38.104: "NR; Base Station (BS) radio transmission and reception".
[14]	3GPP TS 38.306: "NR; User Equipment (UE) radio access capabilities".
[15]	3GPP TS 36.133: "Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management".
[16]	3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC) protocol specification".
[17]	3GPP TS 37.340: "Evolved Universal Terrestrial Radio Access (E-UTRA) and NR; Multiconnectivity", Stage 2.
[18]	3GPP TS 38.101-1: "NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone".
[19]	3GPP TS 38.101-2: "NR; User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone".

[20]	3GPP TS 38.101-3: "NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and Range 2 Interworking operation with other radios".
[21]	3GPP TS 38.101-4: "NR; User Equipment (UE) radio transmission and reception; Part 4: Performance requirements".
[22]	3GPP TS 38.305: "NG Radio Access Network (NG-RAN); Stage 2 functional specification of User Equipment (UE) positioning in NG-RAN".
[23]	3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation".
[24]	3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA); Overall description".
[25]	3GPP TS 36.101: "Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception".
[26]	3GPP TS 38.214: "NR; Physical layer procedures for data".
[27]	3GPP TS 36.355: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol (LPP)".
[28]	Void.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 21.905 [11] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [11].

Active DL BWP: Active DL bandwidth part as defined in TS 38.213 [3].

Blackbox Approach: Testing methodology, in which the UE internal implementation of certain specific UE functionality involved in the test, is unknown.

Control Resource Set: As defined in TS 38.213 [3].

DL BWP: DL bandwidth part as defined in TS 38.213 [3].

EN-DC: E-UTRA-NR Dual Connectivity as defined in clause 4.1.2 of TS 37.340 [17].

en-gNB: As defined in TS 37.340 [17].

FR1: Frequency range 1 as defined in clause 5.1 of TS 38.104 [13].

FR2: Frequency range 2 as defined in clause 5.1 of TS 38.104 [13].

gNB: as defined in TS 38.300 [10].

Master Cell Group: As defined in TS 38.331 [2].

Multi-Radio Dual Connectivity: Dual Connectivity between E-UTRA and NR nodes, or between two NR nodes, as defined in TS 37.340 [17].

ng-eNB: As defined in TS 38.300 [10].

NE-DC: NR-E-UTRA Dual Connectivity as defined in clause 4.1.3.2 of TS 37.340 [17].

NGEN-DC: NG-RAN E-UTRA-NR Dual Connectivity as defined in clause 4.1.3.1 of TS 37.340 [17].

NR-DC: NR-NR Dual Connectivity as defined in clause 4.1.3.3 of TS 37.340 [17].

Primary Cell: As defined in TS 38.331 [2].

Quasi Co-Location: As defined in TS 38.214 [26].

RLM-RS resource: A resource out of the set of resources configured for RLM by higher layer parameter RLM-RS-List [2] as defined in TS 38.213 [3].

SA operation mode: Operation mode when the UE is configured with at least PCell and not any MR-DC.

Secondary Cell: As defined in TS 38.331 [2].

Secondary Cell Group: As defined in TS 38.331 [2].

Serving Cell: As defined in TS 38.331 [2].

SMTC: An SSB-based measurement timing configuration configured by *SSB-MeasurementTimingConfiguration* as specified in TS 38.331 [2].

Special Cell: As defined in TS 38.331 [2].

SSB: SS/PBCH block as defined in clause 7.8.3 of TS 38.211 [6].

Timing Advance Group: As defined in TS 38.331 [2].

3.2 Symbols

 $P_{CMAX.c}$

SSB_RP

Srxlev

Squal

Sintrasearch

For the purposes of the present document, the following symbols apply:

101-2 and 38.101-3

BW _{Channel}	Channel bandwidth, defined in TS 38.101-1, 38.101-2 and 38.101-3 subclause 3.2
Ês	Received energy per RE (power normalized to the subcarrier spacing) during the useful part of the symbol, i.e. excluding the cyclic prefix, at the UE antenna connector or radiated interface
E	boundary
F_{C} $F_{C,low}$	RF reference frequency on the channel raster, given in table 5.4.2.2-1 in TS 38.101-1 and 38.101-2. The Fc of the lowest carrier, expressed in MHz
Io	The total received power density, including signal and interference, as measured at the UE antenna connector or radiated interface boundary.
Ioc	The power spectral density (integrated in a noise bandwidth equal to the chip rate and normalized
	to the chip rate) of a band limited noise source (simulating interference from cells, which are not
	defined in a test procedure) as measured at the UE antenna connector or radiated interface
	boundary.
Iot	The received power spectral density of the total noise and interference for a certain RE (power
	integrated over the RE and normalized to the subcarrier spacing) as measured at the UE antenna
	connector or radiated interface boundary
N_{oc}	The power spectral density of a white noise source (average power per RE normalised to the
	subcarrier spacing), simulating interference from cells that are not defined in a test procedure, as measured at the UE antenna connector or radiated interface boundary
n_{PRB}	Physical Resource Block number as defined in clause 3.2 in TS 38.211.
N_{TA}	Timing offset between uplink and downlink radio frames at the UE, as defined in clause 4.2 in TS
171	38.213.
$N_{\mathrm{TA~offset}}$	Fixed timing advance offset, as defined in clause 7.1.2 in TS 38.133.
	11xed thining advance offset, as defined in clause 7.1.2 in 15 36.133.
$P_{ m CMAX}$	Configured UE transmitted power as defined in clause 6.2.4 in TS 38.101-1, 38-101-2 and 38.101-3.

Cell Selection Criterion defined in TS 38.304, subclause 5.2.3.2 for NR

measured at the UE antenna connector or radiated interface boundary

Cell selection RX level, defined in TS 38.304, subclause 5.2.3.2

Cell selection quality, defined in TS 38.304, subclause 5.2.3.2

Configured UE transmitted power on a serving cell c as defined in clause 6.2.4 in TS 38.101-1, 38-

Received (linear) average power of the resource elements that carry NR synchronisation burst,

Defined in TS 38.304, subclause 5.2.4.7 for E-UTRAN amd 38.304 subclause 5.2.4.7 for NR

Snonintrasearch Defined in TS 38.304, subclause 5.2.4.7

T_c Basic time unit, defined in clause 4.1 of TS 38.211 [6].

 $\begin{array}{lll} T_{reselection} & Defined in TS \ 25.304, subclause \ 5.2.6.1.5 \\ T_{reselectionRAT} & Defined in TS \ 36.304 \ , subclause \ 5.2.4.7 \\ T_{reselectionUTRA} & Defined in TS \ 36.304 \ , subclause \ 5.2.4.7 \\ T_{reselectionGERAN} Defined in TS \ 36.304 \ , subclause \ 5.2.4.7 \\ T_{reselectionGERAN} Defined in TS \ 36.304 \ , subclause \ 5.2.4.7 \\ T_{resh_{x, high}} & Defined in TS \ 38.304 \ , subclause \ 5.2.4.7 \\ T_{resh_{serving, low}} & Defined in TS \ 38.304 \ , subclause \ 5.2.4.7 \\ T_{resh_{serving, low}} & Defined in TS \ 38.304 \ , subclause \ 5.2.4.7 \\ D_{reselectionGERAN} & D_{reselectionGERAN}$

T_s Reference time unit, defined in clause 4.1 of TS 38.211 [6].

 $\Gamma_{\text{UE re-establish delay}}$ Time between the moments when any of the conditions requiring RRC re-establishment as defined

in clause 5.3.7 in TS 38.331 [2] is detected by the UE and when the UE sends PRACH to the

target PCell.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [11] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [11].

BFD Beam Failure Detection
BFD-RS BFD Reference Signal
BLER Block Error Rate

BM-RS Beam Management Reference Signal

BWP Bandwidth Part
CA Carrier Aggregation
CBD Candidate Beam Detection
CC Component Carrier
CORESET Control Resource Set

CP Cyclic Prefix

CSI Channel-State Information
CSI-RS CSI Reference Signal
DC Dual Connectivity

DCI Downlink Control Information

DL Downlink

DMRS Demodulation Reference Signal DRX Discontinuous Reception E-CID Enhanced Cell ID

E-UTRA Evolved UTRA
E-UTRAN Evolved UTRAN

EN-DC E-UTRA-NR Dual Connectivity
FDD Frequency Division Duplex

FR Frequency Range

HARQ Hybrid Automatic Repeat Request

HO Handover L1-RSRP Layer 1 RSRP

MAC Medium Access Control
MCG Master Cell Group
MG Measurement Gap
MGL Measurement Gap Length

MGRP Measurement Gap Repetition Period

MIB Master Information Block

MN Master Node

MR-DC Multi-Radio Dual Connectivity
NE-DC NR-E-UTRA Dual Connectivity

NGEN-DC NG-RAN E-UTRA-NR Dual Connectivity

NR New Radio

NR-DC NR-NR Dual Connectivity

OFDM Orthogonal Frequency Division Multiplexing
OFDMA Orthogonal Frequency Division Multiple Access

OTDOA Observed Time Difference Of Arrival

PBCH Physical Broadcast Channel PCC Primary Component Carrier

PCell Primary Cell

PDCCH Physical Downlink Control Channel
PDSCH Physical Downlink Shared Channel
PLMN Public Land Mobile Network

PRACH Physical RACH PSCell Primary SCell

PSS Primary Synchronization Signal pTAG Primary Timing Advance Group PUCCH Physical Uplink Control Channel PUSCH Physical Uplink Shared Channel

QCL Quasi Co-Location
RACH Random Access Channel
RAT Radio Access Technology
RLM Radio Link Monitoring
RLM-RS Reference Signal for RLM

RMSI Remaining Minimum System Information

RRC Radio Resource Control
RRM Radio Resource Management
RSSI Received Signal Strength Indicator
RSTD Reference Signal Time Difference
SA Standalone operation mode
SCC Secondary Component Carrier

SCell Secondary Cell
SCG Secondary Cell Group
SCS Subcarrier Spacing
SCS_{SSB} SSB subcarrier spacing
SDL Supplementary Downlink
SFN System Frame Number

SFTD SFN and Frame Timing Difference

SI System Information
SIB System Information Block

SMTC SSB-based Measurement Timing configuration

SpCell Special Cell

SRS Sounding Reference Signal

SS-RSRP Synchronization Signal based Reference Signal Received Power SS-RSRQ Synchronization Signal based Reference Signal Received Quality SS-SINR Synchronization Signal based Signal to Noise and Interference Ratio

SSB Synchronization Signal Block

SSB_RP Received (linear) average power of the resource elements that carry NR SSB signals and channels,

measured at the UE antenna connector or radiated interface boundary.

SSS Secondary Synchronization Signal sTAG Secondary Timing Advance Group

SUL Supplementary Uplink
TA Timing Advance
TAG Timing Advance Group

TCI Transmission Configuration Indicator

TDD Time Division Duplex
TTI Transmission Time Interval

UE User Equipment

UL Uplink

3.4 Test tolerances

The requirements given in the present document make no allowance for measurement uncertainty. The test specification 38.533 [5] defines the test tolerances.

3.5 Frequency bands grouping

3.5.1 Introduction

The intention with the frequency band grouping below is to increase the readability of the specification.

The frequency bands grouping is derived based on UE REFSENS requirements specified in [18, 19, 20] and assuming 0.5 dB step between the neighbour groups. The groups are defined in the order of increasing REFSENS, i.e., the group A has the smallest REFSENS among the groups. For the same SCS and a given bandwidth, the bands within the same group have the same Io conditions in a corresponding requirement in this specification, provided the bands support this SCS. For different SCSs supported by a frequency band and the same bandwidth, different Io conditions may apply for the frequency band in the requirements, while the band group is the same, based on the lowest REFSENS requirement normalized by the number of subcarriers among its supported SCSs for this bandwidth. For the same SCS but different supported bandwidths, the group for a band is determined based on the lowest REFSENS requirement normalized by the number of subcarriers among its supported bandwidths.

3.5.2 NR operating bands in FR1

NR frequency bands grouping for FR1 is specified in Table 3.5.2-1.

Table 3.5.2-1: NR frequency band groups for FR1

Group	NR FDD		NR TDD		NR SDL	
	Band group notation	Operating bands	Band group notation	Operating bands	Band group notation	Operating bands
Α	NR_FDD_FR1_A	n1, n70, n74 ⁴	NR_TDD_FR1_A	n34, n38, n39, n40, n50, n51	NR_SDL_FR1_A	n75, n76
В	NR_FDD_FR1_B	n66, n74 ³	NR_TDD_FR1_B	-	NR_SDL_FR1_B	-
С	NR_FDD_FR1_C	-	NR_TDD_FR1_C	n77 ¹ , n78, n79	NR_SDL_FR1_C	-
D	NR_FDD_FR1_D	n28	NR_TDD_FR1_D	n77 ²	NR_SDL_FR1_D	-
Е	NR_FDD_FR1_E	n2, n5, n7	NR_TDD_FR1_E	n41	NR_SDL_FR1_E	-
F	NR_FDD_FR1_F	-	NR_TDD_FR1_F	-	NR_SDL_FR1_F	-
G	NR_FDD_FR1_G	n3, n8, n12, n20,	NR_TDD_FR1_G	-	NR_SDL_FR1_G	-
		n71				
Н	NR_FDD_FR1_H	n25	NR_TDD_FR1_H	-	NR_SDL_FR1_H	-

NOTE 1: Except 3.8 GHz to 4.2 GHz.

NOTE 2: Only 3.8 GHz to 4.2 GHz.

NOTE 3: Except 1475.9 MHz to 1510.9 MHz.

NOTE 4: Only when the band is confined in 1475.9 MHz to 1510.9 MHz.

NOTE 5: These bands are used only in NR carrier aggregation with other NR bands according to NR CA band combinations specified in TS 38.101-1 [18] and TS 38.101-3 [20].

3.5.3 NR operating bands in FR2

NR frequency bands grouping for FR2 is specified in Table 3.5.3-1.

Table 3.5.3-1: NR frequency band groups for FR2

Group	Band group notation	Operating bands
Α	NR_TDD_FR2_A	n257 ¹ , n258 ¹ , n261 ¹
В	NR_TDD_FR2_B	n257 ⁴ , n258 ⁴ , n261 ⁴
С	NR_TDD_FR2_C	
D	NR_TDD_FR2_D	
Е	NR_TDD_FR2_E	
F	NR_TDD_FR2_F	n260 ⁴

G	NR_TDD_	FR2_G	n260 ¹
Н	NR_TDD_	FR2_H	
I	NR_TDD	_FR2_I	
J	NR_TDD_	_FR2_J	
K	NR_TDD_	_FR2_K	
L	NR_TDD_	_FR2_L	n257 ² , n258 ² , n261 ²
M	NR_TDD_	FR2_M	
N	NR_TDD_	_FR2_N	
0	NR_TDD_	FR2_O	
Р	NR_TDD_	_FR2_P	
Q	NR_TDD_		
R	NR_TDD_	FR2_R	
S	NR_TDD_	_FR2_S	
Т	NR_TDD_	_FR2_T	n257³, n258³, n261³
U	NR_TDD_	FR2_U	
V	NR_TDD_	_FR2_V	
W	NR_TDD_	FR2_W	
X	NR_TDD_	_FR2_X	
Υ	NR_TDD_	_FR2_Y	n260 ³
	UE power class 1.		
	UE power class 2.		
	UE power class 3.		
NOTE 4:	UE power class 4.		

3.6 Applicability of requirements in this specification version

In this specification,

- 'cell', 'PCell', 'PSCell' and 'SCell' refer to NR cell, NR PCell, NR PSCell, and NR SCell,
- E-UTRA cells are referred to as 'E-UTRA cell', 'E-UTRA PCell', 'E-UTRA PSCell', and 'E-UTRA SCell',
- E-UTRA-NR dual connectivity where E-UTRA is the master is referred to as 'E-UTRA-NR dual connectivity' or 'EN-DC'.
- NR-NR dual connectivity which involves two gNB acting as Master gNB and Secondary gNB is referred to as "NR-NR dual connectivity" or "NR-DC". NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG in FR1 and all serving cells in SCG in FR2.
- 'active serving cell' refers to PCell, PSCell and activated SCells

For UE configured with supplementary UL, the requirements in clause 7.1 and 7.3 shall also apply to uplink transmissions on supplementary UL.

3.6.1 RRC connected state requirements in DRX

For the requirements in RRC connected state specified in this version of the specification, the UE shall assume that no DRX is used provided the following conditions are met:

- DRX parameters are not configured or
- DRX parameters are configured and
 - drx-InactivityTimer is running or
 - drx-RetransmissionTimerDL is running or
 - drx-RetransmissionTimerUL is running or
 - ra-ContentionResolutionTimer is running or
 - a Scheduling Request sent on PUCCH is pending or

 a PDCCH indicating a new transmission addressed to the C-RNTI of the MAC entity has not been received after successful reception of a Random Access Response for the preamble not selected by the MAC entity

Otherwise the UE shall assume that DRX is used.

3.6.2 Number of serving carriers

3.6.2.1 Number of serving carriers for SA

Requirements for standalone NR with NR PCell are applicable for the UE configured with the following number of serving NR CCs:

- up to 8 NR DL CCs in total, with 1 UL (or 2 UL if SUL is configured) in PCell and up to 7 UL (or 8 UL if SUL is configured) in SCell.
- SUL may be configured together with one of the UL

3.6.2.2 Number of serving carriers for EN-DC

Requirements for EN-DC operation of E-UTRA and NR with E-UTRA PCell and NR PSCell are applicable for the UE configured with the following number of serving NR CCs:

- up to 8 NR DL CCs in total, with 1 UL (or 2 UL if SUL is configured) in PSCell and up to 1 UL (or 2 UL if SUL is configured) in SCell in different FR with PSCell.
- SUL may be configured together with one of the UL

The applicable number of E-UTRA CC for EN-DC in the MCG for both UL and DL is specified in TS 36.133 [15].

3.6.2.3 Number of serving carriers for NE-DC

Requirements for NE-DC operation of NR and E-UTRA with NR PCell and E-UTRA PSCell are applicable for the UE configured with the following number of serving NR CCs:

- up to 7 NR DL CCs in total, with 1 UL (or 2 UL if SUL is configured) in PCell and up to 1 UL (or 2 UL if SUL is configured) in SCell.
- SUL may be configured together with one of the UL

The applicable number of E-UTRA CC for NE-DC in the SCG for both UL and DL is specified in TS 36.133 [15].

3.6.2.4 Number of serving carriers for NR-DC

Requirements for NR-DC are applicable for the UE configured with the following number of serving NR CCs:

- up to 2 NR DL CCs in total in FR1, up to 8 NR DL CCs in total in FR2, with 1 UL in PCell, 1 UL in PSCell.

3.6.3 Applicability for intra-band FR2

For the requirements in RRC connected state specified in this version of the specification, UE shall assume that the transmitted signals from the serving cells should have the same downlink spatial domain transmission filter on one OFDM symbol in the same band in FR2. Otherwise, the UE is not supposed to satisfy any requirements for SCell.

3.6.4 Applicability for FR2 UE power classes

For the requirements of each FR2 power class specified in this version of the specification, certain UE types with specific device architectures are assumed. The UE types can be found in TS 38.101-2 [19].

3.6.5 Applicability for SDL bands

The measurements accuracy requirements for SDL bands in this version of specification in clause 10.1 shall apply for NR intra-frequency measurements on SCC (SS-RSRP, SS-RSRQ, SS-SINR, and L1-RSRP) and inter-frequency measurements (SS-RSRP, SS-RSRQ, and SS-SINR).

3.6.6 Applicability of requirements for NGEN-DC operation

All the requirements in this specification applicable for EN-DC are also applicable for NGEN-DC.

3.6.7 Applicability of QCL

For the requirements specified in this version of the specification, a reference signal is considered to be QCLed to another reference signal if it is in the same TCI chain as the other reference signal, provided that the number of Reference Signals in the chain is no more than 4. It is assumed there is single QCL type per TCI chain.

A TCI chain consists of an SSB, and one or more CSI-RS resources, and the TCI state of each Reference Signal includes another Reference Signal in the same TCI chain.

DMRS of PDCCH or PDSCH is QCLed with the reference signal in its active TCI state and any other reference signal that is QCLed, based on above criteria, with the reference signal in the active TCI state.

4 SA: RRC_IDLE state mobility

4.1 Cell Selection

After a UE has switched on and a PLMN has been selected, the cell selection process takes place, as described in TS 38.304 [1]. This process allows the UE to select a suitable cell where to camp on in order to access available services. In this process, the UE can use stored information (*Stored information cell selection*) or not (*Initial cell selection*).

4.2 Cell Re-selection

4.2.1 Introduction

The cell reselection procedure allows the UE to select a more suitable cell and camp on it.

When the UE is in either *Camped Normally* state or *Camped on Any Cell* state on a cell, the UE shall attempt to detect, synchronise, and monitor intra-frequency, inter-frequency and inter-RAT cells indicated by the serving cell. For intra-frequency and inter-frequency cells the serving cell may not provide explicit neighbour list but carrier frequency information and bandwidth information only. UE measurement activity is also controlled by measurement rules defined in TS 38.304 [1], allowing the UE to limit its measurement activity.

In the requirements of clause 4.2, the exceptions for side conditions apply as follows:

- for the UE capable of CA, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.1, B.3.2.3, or B.3.2.5 for UE supporting CA in FR1, CA in FR2 and CA between FR1 and FR2, respectively;
- for the UE capable of SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.1 for UE supporting SUL in FR1.

4.2.2 Requirements

4.2.2.1 UE measurement capability

For idle mode cell re-selection purposes, the UE shall be capable of monitoring at least:

- Intra-frequency carrier, and
- Depending on UE capability, 7 NR inter-frequency carriers, and
- Depending on UE capability, 7 FDD E-UTRA inter-RAT carriers, and
- Depending on UE capability, 7 TDD E-UTRA inter-RAT carriers.

In addition to the requirements defined above, a UE supporting E-UTRA measurements in RRC_IDLE state shall be capable of monitoring a total of at least 14 carrier frequency layers, which includes serving layer, comprising of any above defined combination of E-UTRA FDD, E-UTRA TDD and NR layers.

4.2.2.2 Measurement and evaluation of serving cell

The UE shall measure the SS-RSRP and SS-RSRQ level of the serving cell and evaluate the cell selection criterion S defined in TS 38.304 [1] for the serving cell at least once every M1*N1 DRX cycle; where:

M1=2 if SMTC periodicity (T_{SMTC}) > 20 ms and DRX cycle ≤ 0.64 second,

otherwise M1=1.

The UE shall filter the SS-RSRP and SS-RSRQ measurements of the serving cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by, at least DRX cycle/2.

If the UE has evaluated according to Table 4.2.2.2-1 in N_{serv} consecutive DRX cycles that the serving cell does not fulfil the cell selection criterion S, the UE shall initiate the measurements of all neighbour cells indicated by the serving cell, regardless of the measurement rules currently limiting UE measurement activities.

If the UE in RRC_IDLE has not found any new suitable cell based on searches and measurements using the intra-frequency, inter-frequency and inter-RAT information indicated in the system information for 10 s, the UE shall initiate cell selection procedures for the selected PLMN as defined in TS 38.304 [1].

DRX cycle length [s] Scaling Factor (N1) N_{serv} [number of DRX cycles] FR2Note1 FR1 0.32 8 M1*N1*4 5 0.64 M1*N1*4 1 1.28 4 N1*2 2.56 3 N1*2 Note 1: Applies for UE supporting power class 2&3&4. For UE supporting power class

Table 4.2.2.2-1: N_{serv}

1, N1 = 8 for all DRX cycle length.

4.2.2.3 Measurements of intra-frequency NR cells

The UE shall be able to identify new intra-frequency cells and perform SS-RSRP and SS-RSRQ measurements of the identified intra-frequency cells without an explicit intra-frequency neighbour list containing physical layer cell identities.

The UE shall be able to evaluate whether a newly detectable intra-frequency cell meets the reselection criteria defined in TS38.304[1] within $T_{\text{detect},NR_Intra}$ when that Treselection= 0. An intra frequency cell is considered to be detectable according to the conditions defined in Annex B.1.2 for a corresponding Band.

The UE shall measure SS-RSRP and SS-RSRQ at least every $T_{measure,NR_Intra}$ (see table 4.2.2.3-1) for intra-frequency cells that are identified and measured according to the measurement rules.

The UE shall filter SS-RSRP and SS-RSRQ measurements of each measured intra-frequency cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{measure,NR\ Intra}/2$.

The UE shall not consider a NR neighbour cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

For an intra-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the intra-frequency cell has met reselection criterion defined in TS38.304 [1] within $T_{\text{evaluate},NR_\text{Intra}}$ when $T_{\text{reselection}} = 0$ as specified in table 4.2.2.3-1 provided that:

when rangeToBestCell is not configured:

- the cell is at least 3 dB better ranked in FR1 or 4.5 dB better ranked in FR2.

when rangeToBestCell is configured:

- the cell has the highest number of beams above the threshold *absThreshSS-BlocksConsolidation* among all detected cells whose cell-ranking criterion R value in TS38.304 [1] is within *rangeToBestCell* of the cell-ranking criterion R value of the highest ranked cell.
 - if there are multiple such cells, the cell has the highest rank among them.
 - the cell is at least 3dB better ranked in FR1 or 4.5dB better ranked in FR2 if the current serving cell is among them.

When evaluating cells for reselection, the SSB side conditions apply to both serving and non-serving intra-frequency cells.

If $T_{reselection}$ timer has a non zero value and the intra-frequency cell is satisfied with the reselection criteria which are defined in TS38.304 [1], the UE shall evaluate this intra-frequency cell for the $T_{reselection}$ time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

Table 4.2.2.3-1: T_{detect,NR} Intra, T_{measure,NR} Intra and T_{evaluate,NR} Intra

DRX cycle	Scaling Factor (N1)		Tdetect,NR_Intra [S]	Tmeasure,NR_Intra [S]	Tevaluate,NR_Intra
length [s]	FR1	FR2 ^{Note1}	(number of DRX cycles)	(number of DRX cycles)	[s] (number of DRX cycles)
0.32		8	11.52 x N1 x M2 (36 x	1.28 x N1 x M2 (4 x N1	5.12 x N1 x M2 (16 x
			N1 x M2)	x M2)	N1 x M2)
0.64	1	5	17.92 x N1 (28 x N1)	1.28 x N1 (2 x N1)	5.12 x N1 (8 x N1)
1.28		4	32 x N1 (25 x N1)	1.28 x N1 (1 x N1)	6.4 x N1 (5 x N1)
2.56		3	58.88 x N1 (23 x N1)	2.56 x N1 (1 x N1)	7.68 x N1 (3 x N1)

Note 1: Applies for UE supporting power class 2&3&4. For UE supporting power class 1, N1 = 8 for all DRX cycle length.

Note 2: M2 = 1.5 if SMTC periodicity of measured intra-frequency cell > 20 ms; otherwise M2=1.

4.2.2.4 Measurements of inter-frequency NR cells

The UE shall be able to identify new inter-frequency cells and perform SS-RSRP or SS-RSRQ measurements of identified inter-frequency cells if carrier frequency information is provided by the serving cell, even if no explicit neighbour list with physical layer cell identities is provided.

If $Srxlev > S_{nonIntraSearchP}$ and $Squal > S_{nonIntraSearchQ}$ then the UE shall search for inter-frequency layers of higher priority at least every $T_{higher_priority_search}$ where $T_{higher_priority_search}$ is described in clause 4.2.2.7.

If $Srxlev \leq S_{nonIntraSearchP}$ or $Squal \leq S_{nonIntraSearchQ}$ then the UE shall search for and measure inter-frequency layers of higher, equal or lower priority in preparation for possible reselection. In this scenario, the minimum rate at which the UE is required to search for and measure higher priority layers shall be the same as that defined below in this clause.

The UE shall be able to evaluate whether a newly detectable inter-frequency cell meets the reselection criteria defined in TS38.304 [1] within $K_{carrier} * T_{detect,NR_Inter}$ if at least carrier frequency information is provided for inter-frequency neighbour cells by the serving cells when $T_{reselection} = 0$ provided that the reselection criteria is met by a margin of at least 5 dB in FR1 or 6.5 dB in FR2 for reselections based on ranking or 6 dB in FR1 or 7.5 dB in FR2 for SS-RSRP reselections based on absolute priorities or 4 dB in FR1 and 4 dB in FR2 for SS-RSRQ reselections based on absolute priorities. The parameter $K_{carrier}$ is the number of NR inter-frequency carriers indicated by the serving cell. An inter-frequency cell is considered to be detectable according to the conditions defined in Annex B.1.3 for a corresponding Band.

When higher priority cells are found by the higher priority search, they shall be measured at least every $T_{measure,NR_Inter}$. If, after detecting a cell in a higher priority search, it is determined that reselection has not occurred then the UE is not

required to continuously measure the detected cell to evaluate the ongoing possibility of reselection. However, the minimum measurement filtering requirements specified later in this clause shall still be met by the UE before it makes any determination that it may stop measuring the cell. If the UE detects on a NR carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

The UE shall measure SS-RSRP or SS-RSRQ at least every $K_{carrier} * T_{measure,NR_Inter}$ (see table 4.2.2.4-1) for identified lower or equal priority inter-frequency cells. If the UE detects on a NR carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

The UE shall filter SS-RSRP or SS-RSRQ measurements of each measured higher, lower and equal priority interfrequency cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{measure,NR\ Inter}/2$.

The UE shall not consider a NR neighbour cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

For an inter-frequency cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that the inter-frequency cell has met reselection criterion defined TS 38.304 [1] within $K_{carrier} * T_{evaluate,NR_Inter}$ when $T_{reselection} = 0$ as specified in table 4.2.2.4-1 provided that the reselection criteria is met by

- the condition when performing equal priority reselection and

when rangeToBestCell is not configured:

- the cell is at least 5dB better ranked in FR1 or 6.5dB better ranked in FR2 or.

when rangeToBestCell is configured:

- the cell has the highest number of beams above the threshold *absThreshSS-BlocksConsolidation* among all detected cells whose cell-ranking criterion R value in TS38.304 [1] is within *rangeToBestCell* of the cell-ranking criterion R value of the highest ranked cell.
 - if there are multiple such cells, the cell has the highest rank among them
 - the cell is at least 5dB better ranked in FR1 or 6.5dB better ranked in FR2 if the current serving cell is among them. Or
- 6dB in FR1 or 7.5dB in FR2 for SS-RSRP reselections based on absolute priorities or
- 4dB in FR1 or 4dB in FR2 for SS-RSRQ reselections based on absolute priorities.

When evaluating cells for reselection, the SSB side conditions apply to both serving and inter-frequency cells.

If $T_{reselection}$ timer has a non zero value and the inter-frequency cell is satisfied with the reselection criteria, the UE shall evaluate this inter-frequency cell for the $T_{reselection}$ time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

The UE is not expected to meet the measurement requirements for an inter-frequency carrier under DRX cycle=320 ms defined in Table 4.2.2.4-1 under the following conditions:

- $T_{SMTC_intra} = T_{SMTC_inter} = 160$ ms; where T_{SMTC_intra} and T_{SMTC_inter} are periodicities of the SMTC occasions configured for the intra-frequency carrier and the inter-frequency carrier respectively, and
- SMTC occasions configured for the inter-frequency carrier occur up to 1 ms before the start or up to 1 ms after the end of the SMTC occasions configured for the intra-frequency carrier, and
- SMTC occasions configured for the intra-frequency carrier and for the inter-frequency carrier occur up to 1 ms before the start or up to 1 ms after the end of the paging occasion in TS38.304 [1].

Table 4.2.2.4-1: T_{detect,NR} Inter, T_{measure,NR} Inter and T_{evaluate,NR} Inter

Scaling Factor (N1)	
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DRX cycle length [s]	FR1	FR2 ^{Note1}	T _{detect,NR_Inter} [s] (number of DRX cycles)	T _{measure,NR_Inter} [s] (number of DRX cycles)	T _{evaluate,NR_Inter} [s] (number of DRX cycles)
0.32		8	11.52 x N1 x 1.5 (36 x	1.28 x N1 x 1.5 (4 x N1	5.12 x N1 x 1.5 (16 x
			N1 x 1.5)	x 1.5)	N1 x 1.5)
0.64	1	5	17.92x N1 (28 x N1)	1.28 x N1 (2 x N1)	5.12 x N1 (8 x N1)
1.28		4	32 x N1 (25 x N1)	1.28 x N1 (1 x N1)	6.4 x N1 (5 x N1)
2.56		3	58.88 x N1 (23 x N1)	2.56 x N1 (1 x N1)	7.68 x N1 (3 x N1)
Note 1: Applies for UE supporting power class 2&3&4. For UE supporting power class 1, N1 = 8 for all DRX cycle length.					

4.2.2.5 Measurements of inter-RAT E-UTRAN cells

If $Srxlev > S_{nonIntraSearchP}$ and $Squal > S_{nonIntraSearchQ}$ then the UE shall search for inter-RAT E-UTRAN layers of higher priority at least every $T_{higher_priority_search}$ where $T_{higher_priority_search}$ is described in clause 4.2.2

If $Srxlev \leq S_{nonIntraSearchQ}$ or $Squal \leq S_{nonIntraSearchQ}$ then the UE shall search for and measure inter-RAT E-UTRAN layers of higher, lower priority in preparation for possible reselection. In this scenario, the minimum rate at which the UE is required to search for and measure higher priority inter-RAT E-UTRAN layers shall be the same as that defined below for lower priority RATs.

The requirements in this clause apply for inter-RAT E-UTRAN FDD measurements and E-UTRA TDD measurements. When the measurement rules indicate that inter-RAT E-UTRAN cells are to be measured, the UE shall measure RSRP and RSRQ of detected E-UTRA cells in the neighbour frequency list at the minimum measurement rate specified in this clause. The parameter $N_{EUTRA_carrier}$ is the total number of configured E-UTRA carriers in the neighbour frequency list. The UE shall filter RSRP and RSRQ measurements of each measured E-UTRA cell using at least 2 measurements. Within the set of measurements used for the filtering, at least two measurements shall be spaced by at least $T_{measure,EUTRAN}/2$.

An inter-RAT E-UTRA cell is considered to be detectable provided the following conditions are fulfilled:

- the same conditions as for inter-frequency RSRP measurements specified in TS 36.133 [15, Annex B.1.2] are fulfilled for a corresponding Band, and
- the same conditions as for inter-frequency RSRQ measurements specified in TS 36.133 [15, Annex B.1.2] are fulfilled for a corresponding Band.
- SCH conditions specified in TS 36.133 [15, Annex B.1.2] are fulfilled for a corresponding Band

The UE shall be able to evaluate whether a newly detectable inter-RAT E-UTRAN cell meets the reselection criteria defined in TS38.304 [1] within ($N_{EUTRA_carrier}$) * $T_{detect,EUTRAN}$ when $Srxlev \leq S_{nonIntraSearchP}$ or $Squal \leq S_{nonIntraSearchP}$ when $T_{reselection} = 0$ provided that the reselection criteria is met by a margin of at least 6dB for RSRP reselections based on absolute priorities or 4dB for RSRQ reselections based on absolute priorities.

Cells which have been detected shall be measured at least every ($N_{EUTRA_carrier}$) * $T_{measure,EUTRAN}$ when $Srxlev \leq S_{nonIntraSearchP}$ or $Squal \leq S_{nonIntraSearchP}$.

When higher priority cells are found by the higher priority search, they shall be measured at least every $T_{\text{measure}, \text{EUTRAN}}$. If, after detecting a cell in a higher priority search, it is determined that reselection has not occurred then the UE is not required to continuously measure the detected cell to evaluate the ongoing possibility of reselection. However, the minimum measurement filtering requirements specified later in this clause shall still be met by the UE before it makes any determination that it may stop measuring the cell.

If the UE detects on an inter-RAT E-UTRAN carrier a cell whose physical identity is indicated as not allowed for that carrier in the measurement control system information of the serving cell, the UE is not required to perform measurements on that cell.

The UE shall not consider an inter-RAT E-UTRA cell in cell reselection, if it is indicated as not allowed in the measurement control system information of the serving cell.

For a cell that has been already detected, but that has not been reselected to, the filtering shall be such that the UE shall be capable of evaluating that an already identified inter-RAT E-UTRA cell has met reselection criterion defined in TS 38.304 [1] within (N_{EUTRA_carrier}) * T_{evaluate,EUTRAN} when T_{reselection} = 0 as speficied in table 4.2.2.5-1 provided that the

reselection criteria is met by a margin of at least 6dB for RSRP reselections based on absolute priorities or 4dB for RSRQ reselections based on absolute priorities.

If $T_{reselection}$ timer has a non zero value and the inter-RAT E-UTRA cell is satisfied with the reselection criteria which are defined in TS 38.304 [1], the UE shall evaluate this E-UTRA cell for the $T_{reselection}$ time. If this cell remains satisfied with the reselection criteria within this duration, then the UE shall reselect that cell.

T_{measure,EUTRAN} [S] DRX T_{detect,EUTRAN} [S] T_{evaluate,EUTRAN} [s] (number of DRX (number of DRX cycle (number of DRX cycles) length cycles) cycles) [s] 11.52 (36) 1.28 (4) 5.12 (16) 0.32 0.64 17.92 (28) 1.28 (2) 5.12 (8) 1.28 32(25) 1.28 (1) 6.4 (5) 7.68 (3) 2.56 58.88 (23) 2.56(1)

Table 4.2.2.5-1: T_{detect,EUTRAN}, T_{measure,EUTRAN}, and T_{evaluate,EUTRAN}

4.2.2.6 Maximum interruption in paging reception

UE shall perform the cell re-selection with minimum interruption in monitoring downlink channels for paging reception.

At intra-frequency and inter-frequency cell re-selection, the UE shall monitor the downlink of serving cell for paging reception until the UE is capable to start monitoring downlink channels of the target intra-frequency and inter-frequency cell for paging reception. The interruption time shall not exceed $T_{SI-NR} + 2*T_{target_cell_SMTC_period}$ ms.

At inter-RAT cell re-selection, the UE shall monitor the downlink of serving cell for paging reception until the UE is capable to start monitoring downlink channels for paging reception of the target inter-RAT cell. For NR to E-UTRAN cell re-selection the interruption time must not exceed $T_{SI-EUTRA} + 55$ ms.

 T_{SI-NR} is the time required for receiving all the relevant system information data according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 38.331 [2] for an NR cell.

T_{SI-EUTRA} is the time required for receiving all the relevant system information data according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 36.331 [16] for an E-UTRAN cell.

These requirements assume sufficient radio conditions, so that decoding of system information can be made without errors and does not take into account cell re-selection failure.

4.2.2.7 General requirements

The UE shall search every layer of higher priority at least every $T_{higher_priority_search} = (60 * N_{layers})$ seconds, where N_{layers} is the total number of higher priority NR and E-UTRA carrier frequencies broadcasted in system information.

5 SA: RRC_INACTIVE state mobility

5.1 Cell Re-selection

5.1.1 Introduction

The cell reselection procedure allows the UE to select a more suitable cell and camp on it.

When the UE is in *Camped Normally* state on a cell, the UE shall attempt to detect, synchronise, and monitor intra-frequency, inter-frequency and inter-RAT cells indicated by the serving cell. For intra-frequency and inter-frequency cells the serving cell may not provide explicit neighbour list but carrier frequency information and bandwidth information only. UE measurement activity is also controlled by measurement rules defined in TS38.304 [1], allowing the UE to limit its measurement activity.

5.1.2 Requirements

5.1.2.1 UE measurement capability

The requirements in sub-clause 4.2.2.1 shall apply.

5.1.2.2 Measurement and evaluation of serving cell

The requirements in sub-clause 4.2.2.2 shall apply.

5.1.2.3 Measurements of intra-frequency NR cells

The requirements in sub-clause 4.2.2.3 shall apply.

5.1.2.4 Measurements of inter-frequency NR cells

The requirements in sub-clause 4.2.2.4 shall apply.

5.1.2.5 Measurements of inter-RAT E-UTRAN cells

The requirements in sub-clause 4.2.2.5 shall apply.

5.1.2.6 Maximum interruption in paging reception

The requirements in sub-clause 4.2.2.6 shall apply.

5.1.2.7 General requirements

The requirements in sub-clause 4.2.2.7 shall apply.

5.2 Void

6 RRC_CONNECTED state mobility

6.1 Handover

6.1.1 NR Handover

6.1.1.1 Introduction

The purpose of NR handover is to change the NR PCell to another NR cell. The requirements in this clause are applicable to SA NR, NE-DC and NR-DC.

6.1.1.2 NR FR1 - NR FR1 Handover

The requirements in this clause are applicable to both intra-frequency and inter-frequency handovers from NR FR1 cell to NR FR1 cell.

6.1.1.2.1 Handover delay

When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within $D_{handover}$ msec from the end of the last TTI containing the RRC command.

Where:

D_{handover} equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.2.2.

6.1.1.2.2 Interruption time

The interruption time is the time between end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH, excluding the RRC procedure delay.

When intra-frequency or inter-frequency handover is commanded, the interruption time shall be less than $T_{\text{interrupt}}$

$$T_{interrupt} = T_{search} + T_{IU} + T_{processing} \ + T_{\Delta} + T_{margin} \ ms$$

Where:

 T_{search} is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then $T_{search} = 0$ ms. If the target cell is an unknown intra-frequency cell and the target cell Es/Iot \geqslant -2 dB, then $T_{search} = T_{rs}$ ms. If the target cell is an unknown interfrequency cell and the target cell Es/Iot \geqslant -2 dB, then $T_{search} = 3*T_{rs}$ ms. Regardless of whether DRX is in use by the UE, T_{search} shall still be based on non-DRX target cell search times.

T_{processing} is time for UE processing. T_{processing} can be up to 20ms.

 T_{margin} is time for SSB post-processing. $T_{\text{margin}} \, \text{can}$ be up to 2ms.

 T_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta} = T_{rs}$ for both known and unknown target cell.

 T_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 T_{rs} is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cellin the handover command, otherwise Trs is the SMTC configured in the measObjectNR having the

same SSB frequency and subcarrier spacing. If the measObjectNRs having the same SSB frequency and subcarrier spacing configured by MN and SN have different SMTC, Trs is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with T_{rs} =5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms. If the UE has been provided with higher layer in TS 38.331 [2] signaling of *smtc2* prior to the handover command, T_{rs} follows *smtc1* or *smtc2* according to the physical cell ID of the target cell.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant cell identification requirements are described in Clause 9.2.5 for intra-frequency handover and Clause 9.3.4 for inter-frequency handover.

6.1.1.3 NR FR2- NR FR1 Handover

The requirements in this clause are applicable to inter-frequency handovers from NR FR2 cell to NR FR1 cell.

6.1.1.3.1 Handover delay

When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within $D_{handover}$ ms from the end of the last TTI containing the RRC command.

Where:

D_{handover} equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.3.2.

6.1.1.3.2 Interruption time

The interruption time is the time between the end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH, excluding the RRC procedure delay.

When inter-frequency handover is commanded, the interruption time shall be less than Tinterrupt

$$T_{interrupt} \equiv T_{search} + T_{IU} + T_{processing} + T_{\Delta} + T_{margin} \ ms$$

Where:

 T_{search} is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then $T_{search} = 0$ ms. If the target cell is an unknown inter-frequency cell and the target cell Es/Iot \geq -2 dB, then $T_{search} = 3*T_{rs}$ ms. Regardless of whether DRX is in use by the UE, T_{search} shall still be based on non-DRX target cell search times.

 T_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta} = T_{rs}$ for both known and unknown target cell.

T_{processing} is time for UE processing. T_{processing} can be up to 40ms.

 T_{margin} is time for SSB post-processing. T_{margin} can be up to 2ms.

 T_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 T_{rs} is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in the handover command, otherwise T_{rs} is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If such measObjectNRs configured by MN and SN have different SMTC, T_{rs} is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with T_{rs} =5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant cell identification requirements are described in Clause 9.2.5 for intra-frequency handover and Clause 9.3.4 for inter-frequency handover.

6.1.1.4 NR FR2- NR FR2 Handover

The requirements in this clause are applicable to both intra-frequency and inter-frequency handovers from NR FR2 cell to NR FR2 cell.

6.1.1.4.1 Handover delay

When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within $D_{handover}$ ms from the end of the last TTI containing the RRC command.

Where:

 $D_{handover}$ equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.4.2.

6.1.1.4.2 Interruption time

The interruption time is the time between end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH, excluding the RRC procedure delay.

When intra-frequency or inter-frequency handover is commanded, the interruption time shall be less than $T_{interrupt}$

$$T_{interrupt} = T_{search} + T_{IU} + T_{processing} + T_{\Delta} + T_{margin} \ ms$$

Where:

 T_{search} is the time required to search the target cell when the handover command is received by the UE. If the target cell is a known cell, then $T_{search} = 0$ ms. If the target cell is an unknown intra-frequency cell and the target cell $Es/Iot \ge -2$ dB, then $T_{search} = 8*T_{rs}$ ms. If the target cell is an unknown inter-frequency cell and the target cell $Es/Iot \ge -2$ dB, then $T_{search} = 8*3*T_{rs}$ ms. Regardless of whether DRX is in use by the UE, T_{search} shall still be based on non-DRX target cell search times.

T_{processing} is time for UE processing. T_{processing} can be up to 20ms.

T_{margin} is time for SSB post-processing. T_{margin} can be up to 2ms.

 T_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta} = T_{rs}$ for both known and unknown target cell.

 T_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 T_{rs} is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in the handover command, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If such measObjectNRs configured by MN and SN have different SMTC, Trs is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with T_{rs} =5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms. If the UE has been provided with higher layer in TS 38.331 [2] signaling of *smtc2* prior to the handover command, T_{rs} follows *smtc1* or *smtc2* according to the physical cell ID of the target cell.

In FR2, the target cell is known if it has been meeting the following conditions:

- During the last 5 seconds before the reception of the handover command:
 - the UE has sent a valid measurement report for the target cell and

- One of the SSBs measured from the NR target cell being configured remains detectable according to the cell identification conditions specified in clause 9.3,
- One of the SSBs measured from the target cell also remains detectable during the handover delay according to the cell identification conditions specified in clause 9.3.

otherwise it is unknown.

6.1.1.5 NR FR1- NR FR2 Handover

The requirements in this clause are applicable to inter-frequency handovers from NR FR1 cell to NR FR2 cell.

6.1.1.5.1 Handover delay

When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within $D_{handover}$ ms from the end of the last TTI containing the RRC command.

Where:

 $D_{handover}$ equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.5.2.

6.1.1.5.2 Interruption time

The interruption time is the time between end of the last TTI containing the RRC command on the old PDSCH and the time the UE starts transmission of the new PRACH, excluding the RRC procedure delay.

When inter-frequency handover is commanded, the interruption time shall be less than T_{interrupt}

$$T_{interrupt} = T_{search} + T_{IU} + T_{processing} + T_{\Delta} + T_{margin} \ ms$$

Where:

 T_{search} is the time required to search the target cell when the handover command is received by the UE. If the target cell is a known cell, then $T_{search} = 0$ ms. . If the target cell is an unknown inter-frequency cell and the target cell Es/Iot \geq -2 dB, then $T_{search} = 8*3* T_{rs}$ ms. Regardless of whether DRX is in use by the UE, T_{search} shall still be based on non-DRX target cell search times.

 $T_{processing}$ is time for UE processing. $T_{processing}$ can be up 40ms.

T_{margin} is time for SSB post-processing. T_{margin} can be up to 2ms.

 T_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta} = T_{rs}$ for both known and unknown target cell.

 T_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 T_{rs} is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in the handover command, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If such measObjectNRs configured by MN and SN have different SMTC, Trs is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with T_{rs} =5ms assuming the SSB transmission periodicity is 5ms. There is no requirement if the SSB transmission periodicity is not 5ms.

In FR2, the target cell is known if it has been meeting the following conditions:

- During the last 5 seconds before the reception of the handover command:
 - the UE has sent a valid measurement report for the target cell and

- One of the SSBs measured from the NR target cell being configured remains detectable according to the cell identification conditions specified in clause 9.3,
- One of the SSBs measured from the target cell also remains detectable during the handover delay according to the cell identification conditions specified in clause 9.3.

otherwise it is unknown.

6.1.2 NR Handover to other RATs

6.1.2.1 NR – E-UTRAN Handover

6.1.2.1.1 Introduction

The purpose of inter-RAT handover from NR to E-UTRAN is to change the radio access mode of PCell from NR to E-UTRAN. The handover procedure is initiated from NR with a RRC message that implies a handover as described in TS 38.331 [2]. The requirements in this clause are applicable to SA NR, NE-DC and NR-DC.

6.1.2.1.2 Handover delay

When the UE receives a RRC message implying handover to E-UTRAN the UE shall be ready to start the transmission of the uplink PRACH channel in E-UTRA within $D_{handover}$ ms from the end of the last TTI containing the RRC command. $D_{handover}$ is defined as

$$D_{handover} = T_{RRC_procedure_delay} + T_{interrupt}$$

Where:

T_{RRC_procedure_delay}: it is the RRC procedure delay, which is 50ms

 $T_{interrupt}$: it is the time between end of the last TTI containing the RRC command on the NR PDSCH and the time the UE starts transmission of the PRACH in E-UTRAN, excluding $T_{RRC_procedure_delay}$. $T_{interrupt}$ is defined in clause 6.1.2.1.3.

6.1.2.1.3 Interruption time

When the inter-RAT handover to E-UTRAN is commanded, the interruption time shall be less than T_{interrupt}

$$T_{interrupt} = T_{search} + T_{IU} + 20 ms$$

Where:

 T_{search} is the time required to search the target cell when the target cell is not already known when the handover command is received by the UE. If the target cell is known, then $T_{search} = 0$ ms. If the target cell is unknown and signal quality is sufficient for successful cell detection on the first attempt, then $T_{search} = 80$ ms. Regardless of whether DRX is in use by the UE, T_{search} shall still be based on non-DRX target cell search times.

 T_{IU} is the interruption uncertainty in acquiring the first available PRACH occasion in the new cell. T_{IU} can be up to 30 ms.

NOTE: The actual value of T_{IU} shall depend upon the PRACH configuration used in the target cell.

In the interruption requirement a cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown. Relevant E-UTRAN cell identification requirements are described in clause 9.4.1.

6.2 RRC Connection Mobility Control

6.2.1 SA: RRC Re-establishment

6.2.1.1 Introduction

This clause contains requirements on the UE regarding RRC connection re-establishment procedure. RRC connection re-establishment is initiated when a UE in RRC_CONNECTED state loses RRC connection due to any of failure cases, including radio link failure, handover failure, and RRC connection reconfiguration failure. The RRC connection re-establishment procedure is specified in clause 5.3.7 of TS 38.331 [2].

The requirements in this clause are applicable for RRC connection re-establishment to NR cell.

6.2.1.2 Requirements

In RRC_CONNECTED state the UE shall be capable of sending RRCReestablishmentRequest message within $T_{re-establish_delay}$ seconds from the moment it detects a loss in RRC connection. The total RRC connection delay ($T_{re-establish_delay}$) shall be less than:

$$T_{re-establish delay} = T_{UE re-establish delay} + T_{UL grant}$$

 T_{UL_grant} : It is the time required to acquire and process uplink grant from the target PCell. The uplink grant is required to transmit RRCReestablishmentRequest message.

The UE re-establishment delay (T_{UE_re-establish_delay}) is specified in clause 6.2.1.2.1.

6.2.1.2.1 UE Re-establishment delay requirement

The UE re-establishment delay ($T_{UE_re-establish_delay}$) is the time between the moments when any of the conditions requiring RRC re-establishment as defined in clause 5.3.7 in TS 38.331 [2] is detected by the UE and when the UE sends PRACH to the target PCell. The UE re-establishment delay ($T_{UE_re-establish_delay}$) requirement shall be less than:

$$T_{UE_re-establish_delay} = 50 \text{ ms} + T_{identify_intra_NR} + \sum_{i=1}^{N_{freq}-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

The intra-frequency target NR cell shall be considered detectable if each relevant SSB can satisfy that:

- SS-RSRP related side conditions given in clause 10.1.2 and 10.1.3 are fulfilled for a corresponding NR Band for FR1 and FR2, respectively, and
- the conditions of SSB RP and SSB Ês/Iot according to Annex B.2.2 for a corresponding NR Band are fulfilled.

The inter-frequency target NR cell shall be considered detectable when for each relevant SSB:

- SS-RSRP related side conditions given in clause 10.1.4 and 10.1.5 are fulfilled for a corresponding NR Band for FR1 and FR2, respectively, and
- the conditions of SSB_RP and SSB Ês/Iot according to Annex B.2.3 for a corresponding NR Band are fulfilled.

 $T_{identify_intra_NR}$: It is the time to identify the target intra-frequency NR cell and it depends on whether the target NR cell is known cell or unknown cell and on the FR of the target NR cell. If the UE is not configured with intra-frequency NR carrier for RRC re-establishment then $T_{identify_intra_NR}$ =0; otherwise $T_{identify_intra_NR}$ shall not exceed the values defined in Table 6.2.1.2.1-1.

 $T_{identify_inter_NR,i}$: It is the time to identify the target inter-frequency NR cell on inter-frequency carrier *i* configured for RRC re-establishment and it depends on whether the target NR cell is known cell or unknown cell and on the FR of the target NR cell. $T_{identify_inter_NR,i}$ shall not exceed the values defined in Table 6.2.1.2.1-2.

 T_{SMTC} : It is the periodicity of the SMTC occasion configured for the intra-frequency carrier. If the UE has been provided with higher layer in TS 38.331 [2] signaling of *smtc2*, T_{smtc} follows *smtc1* or *smtc2* according to the physical cell ID of the target cell.

 $T_{SMTC,i}$: It is the periodicity of the SMTC occasion configured for the inter-frequency carrier *i*. If it is not configured, the UE may assume that the target SSB periodicity is no larger than 20 ms.

T_{SI-NR}: It is the time required for receiving all the relevant system information according to the reception procedure and the RRC procedure delay of system information blocks defined in TS 38.331 [2] for the target NR cell.

T_{PRACH}: It is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell. T_{PRACH} can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 N_{freq} : It is the total number of NR frequencies to be monitored for RRC re-establishment; $N_{\text{freq}} = 1$ if the target intra-frequency NR cell is known, else $N_{\text{freq}} = 2$ and $T_{\text{identify_intra_NR}} = 0$ if the target inter-frequency NR cell is known.

There is no requirement if the target cell does not contain the UE context.

In the requirement defined in the below tables, the target FR1 cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown.

Table 6.2.1.2.1-1: Time to identify target NR cell for RRC connection re-establishment to NR intrafrequency cell

Serving cell	FR of target NR	Tidentif	fy_intra_NR [MS]			
SSB Ês/lot (dB)	cell	Known NR cell	Unknown NR cell			
≥ -8	FR1	MAX (200 ms, 5 x T _{SMTC})	MAX (800 ms, 10 x T _{SMTC})			
≥ -8	FR2	N/A	MAX (1000 ms, 80 x T _{SMTC}))			
< -8	FR1	N/A	800 ^{Note1}			
< -8	FR2	N/A	3520 ^{Note1}			

Table 6.2.1.2.1-2: Time to identify target NR cell for RRC connection re-establishment to NR interfrequency cell

Serving cell SSB	FR of target NR	T _{identify}	y_inter_NR, i [ms]			
Ês/lot (dB)	cell	Known NR cell	Unknown NR cell			
≥ -8	FR1	MAX (200 ms, 6 x T _{SMTC, i})	MAX (800 ms, 13 x Т _{SMTC, і})			
≥ -8	FR2	N/A	MAX (1000 ms, 104 x T _{SMTC, i}))			
< -8	FR1	N/A	800 ^{Note1}			
< -8	FR2	N/A	4000 ^{Note1}			
	100					

6.2.2 Random access

6.2.2.1 Introduction

This clause contains requirements on the UE regarding random access procedure. The random access procedure is initiated to establish uplink time synchronization for a UE which either has not acquired or has lost its uplink synchronization, or to convey UE's request Other SI, or for beam failure recovery. The random access is specified in clause 8 of TS 38.213 [3] and the control of the RACH transmission is specified in clause 5.1 of TS 38.321 [7].

6.2.2.2 Requirements

The UE shall have capability to calculate PRACH transmission power according to the PRACH power formula defined in TS 38.213 [3] and apply this power level at the first preamble or additional preambles. The absolute power applied to the first preamble shall have an accuracy as specified in Table 6.3.4.2-1 of TS 38.101-1 [18] for FR1 and in Table 6.3.4.2-1 of TS 38.101-2 [19] for FR2. The relative power applied to additional preambles shall have an accuracy as specified in Table 6.3.4.3-1 of TS 38.101-1 [18] for FR1 and clause 6.3.4.3 of TS38.101-2 [19] for FR2.

The UE shall indicate a random access problem to upper layers if the maximum number of preamble transmission counter has been reached for the random access procedure on PCell or PSCell as specified in clause 5.1.4 in TS 38.321 [7].

The requirements in this clause apply for UE in SA operation mode or any MR-DC operation mode.

6.2.2.2.1 Contention based random access

6.2.2.2.1.1 Correct behaviour when transmitting Random Access Preamble

With the UE selected SSB with SS-RSRP above *rsrp-ThresholdSSB*, UE shall have the capability to select a Random Access Preamble randomly with equal probability from the Random Access Preambles associated with the selected SSB if the association between Random Access Preambles and SSB is configured, as specified in clause 5.1.2 in TS 38.321 [7].

With the UE selected SSB with SS-RSRP above *rsrp-ThresholdSSB*, UE shall have the capability to transmit Random Access Preamble on the next available PRACH occasion from the PRACH occasions corresponding to the selected SSB permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex* if configured, if the association between PRACH occasions and SSBs is configured, and PRACH occasion shall be randomly selected with equal probability amongst the selected SSB associated PRACH occasions occurring simultaneously but on different subcarriers, as specified in clause 5.1.2 in TS 38.321 [7].

6.2.2.2.1.2 Correct behaviour when receiving Random Access Response

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

6.2.2.2.1.3 Correct behaviour when not receiving Random Access Response

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window defined in clause 5.1.4 in TS 38.321 [7].

6.2.2.2.1.4 Correct behaviour when receiving an UL grant for msg3 retransmission

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

6.2.2.2.1.5 SA: Correct behaviour when receiving a message over Temporary C-RNTI

The UE shall send ACK if the Contention Resolution is successful.

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

6.2.2.2.1.6 Correct behaviour when contention Resolution timer expires

The UE shall re-select a preamble and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

6.2.2.2.2 Non-Contention based random access

6.2.2.2.2.1 Correct behaviour when transmitting Random Access Preamble

If the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs is configured, with the UE selected SSB with SS-RSRP above *rsrp-ThresholdSSB* amongst the associated SSBs, UE shall have the capability to select the Random Access Preamble corresponding to the selected SSB, and to transmit Random Access Preamble on the next available PRACH occasion from the PRACH occasions corresponding to the selected SSB permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex* if configured, and PRACH occasion shall be randomly selected with equal probability amongst the selected SSB associated PRACH occasions occurring simultaneously but on different subcarriers, as specified in clause 5.1.2 in TS 38.321 [7].

If the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs is configured, with the UE selected CSI-RS with CSI-RSRP above *rsrp-ThresholdCSI-RS* amongst the associated CSI-RSs, UE shall have the capability to select the Random Access Preamble corresponding to the selected CSI-RS, and to transmit Random Access Preamble on the next available PRACH occasion from the PRACH occasions in *ra-OccasionList* corresponding to the selected CSI-RS, and PRACH occasion shall be randomly selected with equal probability amongst the selected CSI-RS associated PRACH occasions occurring simultaneously but on different subcarriers, as specified in clause 5.1.2 in TS 38.321 [7].

If the random access procedure is initialized for beam failure recovery and if the contention-free Random Access Resources and the contention-free PRACH occasions for beam failure recovery request associated with any of the SSBs and/or CSI-RSs is configured, UE shall have the capability to select the Random Access Preamble corresponding to the selected SSB with SS-RSRP above *rsrp-ThresholdSSB* amongst the associated SSBs or the selected CSI-RS with CSI-RSRP above *rsrp-ThresholdCSI-RS* amongst the associated CSI-RSs, and to transmit Random Access Preamble on the next available PRACH occasion from the PRACH occasions corresponding to the selected SSB permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex* if configured, or from the PRACH occasions in *ra-OccasionList* corresponding to the selected CSI-RS, and PRACH occasion shall be randomly selected with equal probability amongst the selected SSB assocated PRACH occasions or the selected CSI-RS associated PRACH occasions occurring simultaneously but on different subcarriers, as specified in clause 5.1.2 in TS 38.321 [7].

6.2.2.2.2.2 Correct behaviour when receiving Random Access Response

The UE may stop monitoring for Random Access Response(s), if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble, unless the random access procedure is initialized for Other SI request from UE.

The UE may stop monitoring for Random Access Response(s) and shall monitor the Other SI transmission if the Random Access Response only contains a Random Access Preamble identifier which is corresponding to the transmitted Random Access Preamble and the random access procedure is initialized for SI request from UE, as specified in clause 5.1.4 in TS 38.321 [7].

The UE may stop monitoring for Random Access Response(s), if the contention-free Random Access Preamble for beam failure recovery request was transmitted and if the PDCCH addressed to UE's C-RNTI is received, as specified in clause 5.1.4 in TS 38.321 [7].

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [7] for the next available PRACH occasion, and transmit the preamble with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

6.2.2.2.2.3 Correct behaviour when not receiving Random Access Response

The UE shall again perform the Random Access Resource selection procedure defined in clause 5.1.2 in TS 38.321 [7] for the next available PRACH occasion, and transmit the preamble with the calculated PRACH transmission power, if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon* or if no PDCCH addressed to UE's C-RNTI is received within the RA Response window configured in *BeamFailureRecoveryConfig*, as defined in clause 5.1.4 in TS 38.321 [7].

6.2.2.2.3 UE behaviour when configured with supplementary UL

In addition to the requirements defined in clause 6.2.2.2.1 and 6.2.2.2.2, a UE configured with supplementary UL carrier shall use RACH configuration for the supplementary UL carrier contained in RMSI and RRC dedicated signalling. If the cell for the random access procedure is configured with supplementary UL, the UE shall transmit or retransmit PRACH preamble on the supplementary UL carrier if the SS-RSRP measured by the UE on the DL carrier is lower than the *rsrp-ThresholdSSB-SUL* as defined in TS 38.331 [2].

6.2.3 SA: RRC Connection Release with Redirection

6.2.3.1 Introduction

This clause contains requirements on the UE regarding RRC connection release with redirection procedure. RRC connection release with redirection is initiated by the *RRCRelease* message with redirection to E-UTRAN or NR from NR specified in TS 38.331 [2]. The RRC connection release with redirection procedure is specified in clause 5.3.8 of TS 38.331 [2].

6.2.3.2 Requirements

6.2.3.2.1 RRC connection release with redirection to NR

The UE shall be capable of performing the RRC connection release with redirection to the target NR cell within $T_{\text{connection release redirect NR}}$.

The time delay ($T_{connection_release_redirect_NR}$) is the time between the end of the last slot containing the RRC command, "RRCRelease" (TS 38.331 [2]) on the NR PDSCH and the time the UE starts to send random access to the target NR cell. The time delay ($T_{connection_release_redirect_NR}$) shall be less than:

$$T_{connection_release_redirect_NR} = T_{RRC_procedure_delay} + T_{identify_NR} + T_{SI_NR} + T_{RACH}$$

The target NR cell shall be considered detetable when for each relevant SSB, the side conditions should be met that,

- the conditions of SSB_RP and SSB Es/Iot according to Annex B.2.5 for a corresponding NR Band are fulfilled.

 $T_{RRC_procedure_delay}$: It is the RRC procedure delay for processing the received message "RRCRelease" as defined in clause 6.2.2 of TS 38.331 [2].

 $T_{identify-NR}$: It is the time to identify the target NR cell and depends on the FR of the target NR cell. It is defined in Table 6.2.3.2.1-1. Note that $T_{identify-NR} = T_{PSS/SSS-sync} + T_{meas}$, in which $T_{PSS/SSS-sync}$ is the cell search time and T_{meas} is the measurement time due to cell selection criteria evaluation.

 T_{SI-NR} : It is the time required for acquiring all the relevant system information of the target NR cell. This time depends upon whether the UE is provided with the relevant system information of the target NR cell or not by the old NR cell before the RRC connection is released.

T_{RACH}: It is the delay uncertainty in acquiring the first available PRACH occasion in the target NR cell. T_{RACH} can be up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213 [3].

 T_{rs} is the SMTC periodicity of the target NR cell if the UE has been provided with an SMTC configuration for the target cell in the redirection command, otherwise T_{rs} is the SMTC periodicity configured in the measObjectNR having the same SSB frequency and subcarrier spacing configured for the RRC connection release with redirection. If the measObjectNRs having the same SSB frequency and subcarrier spacing configured by MN and SN have different SMTC, T_{rs} is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided with SMTC configuration or measurement object for the frequency which is also configured for the RRC connection release with redirection then:

- the requirement in this clause is applied with $T_{rs} = 20$ ms if the SSB transmission periodicity is not larger than 20 ms; otherwise,
- there is no requirement if the SSB transmission periodicity is larger than 20ms.

Table 6.2.3.2.1-1: Time to identify target NR cell for RRC connection release with redirection to NR

	FR of target NR cell	Tidentify-NR
FR1		MAX (680 ms, 11 x T _{rs})
FR2		MAX (880 ms, 8x11 x T _{rs})
Note:	If the UE has been provided with h	higher layer signaling of smtc2 specified in TS 38.331 [2] prior to the
	redirection command, Trs follows s	smtc1 or smtc2 according to the physical cell ID of the target cell.

6.2.3.2.2 RRC connection release with redirection to E-UTRAN

The UE shall be capable of performing the RRC connection release with redirection to the target E-UTRAN cell within $T_{connection_release_redirect_E-UTRAN}$.

The time delay (T_{connection_release_redirect_E-UTRA}) is the time between the end of the last slot containing the RRC command, "RRCRelease" (TS 38.331 [2]) on the PDSCH and the time the UE starts to send random access to the target E-UTRA cell. The time delay (T_{connection_release_redirect_E-UTRA}) shall be less than:

$$T_{connection_release_redirect_E_UTRA} = T_{RRC_procedure_delay} + T_{identify_E_UTRA} + T_{SI_E_UTRA} + T_{RACH}$$

The target E-UTRA FDD or TDD cell shall be considered detectable provided the following conditions are fulfilled:

- the same conditions as for inter-frequency RSRP measurements specified in annex B.1.2 of TS 36.133 [15] are fulfilled for a corresponding Band, and
- the same conditions as for inter-frequency RSRQ measurements specified in annex B.1.2 of TS 36.133 [15] are fulfilled for a corresponding Band, and
- SCH conditions specified in annex B.1.2 of TS 36.133 [15] are fulfilled for a corresponding Band.

T_{RRC_procedure_delay}: It is the RRC procedure delay for processing the received message "*RRCRelease*" as defined in clause 6.2.2 of TS 38.331 [2].

 $T_{identify-E-UTRA}$: It is the time to identify the target E-UTRA cell. It shall be less than 320 ms.

 $T_{SI\text{-}E\text{-}UTRA}$: It is the time required for acquiring all the relevant system information of the target E-UTRA cell. This time depends upon whether the UE is provided with the relevant system information (SI) of the target E-UTRA cell or not by the old NR cell before the RRC connection is released.

T_{RACH}: It is the delay caused due to the random access procedure when sending random access to the target E-UTRA

7 Timing

7.1 UE transmit timing

7.1.1 Introduction

The UE shall have capability to follow the frame timing change of the reference cell in connected state. The uplink frame transmission takes place $(N_{TA} + N_{TA} \text{ offset}) \times T_c$ before the reception of the first detected path (in time) of the corresponding downlink frame from the reference cell. For serving cell(s) in pTAG, UE shall use the SpCell as the reference cell for deriving the UE transmit timing for cells in the pTAG. For serving cell(s) in sTAG, UE shall use any of the activated SCells as the reference cell for deriving the UE transmit timing for the cells in the sTAG. UE initial transmit timing accuracy and gradual timing adjustment requirements are defined in the following requirements.

7.1.2 Requirements

The UE initial transmission timing error shall be less than or equal to $\pm T_e$ where the timing error limit value T_e is specified in Table 7.1.2-1. This requirement applies:

- when it is the first transmission in a DRX cycle for PUCCH, PUSCH and SRS or it is the PRACH transmission.

The UE shall meet the Te requirement for an initial transmission provided that at least one SSB is available at the UE during the last 160 ms. The reference point for the UE initial transmit timing control requirement shall be the downlink timing of the reference cell minus $(N_{\text{TA}} + N_{\text{TA offset}}) \times T_{\text{c}}$. The downlink timing is defined as the time when the first detected path (in time) of the corresponding downlink frame is received from the reference cell. N_{TA} for PRACH is defined as 0.

 $(N_{\rm TA} + N_{\rm TA~offset}) \times T_{\rm c}$ (in T_c units) for other channels is the difference between UE transmission timing and the downlink timing immediately after when the last timing advance in clause 7.3 was applied. $N_{\rm TA}$ for other channels is not changed until next timing advance is received. The value of $N_{\rm TA~offset}$ depends on the duplex mode of the cell in which the uplink transmission takes place and the frequency range (FR). $N_{\rm TA~offset}$ is defined in Table 7.1.2-2.

Frequency Range	SCS of SSB signals (kHz)	SCS of uplink signals (kHz)	Te	
		15	12*64*T _c	
	15	30	10*64*T _c	
1		60	10*64*T _c	
I	30	15	8*64*T _c	
		30	8*64*T _c	
		60	7*64*T _c	
	120 240	60	3.5*64*T _c	
2		120	3.5*64*T _c	
2		60	3*64*T _c	
		120	3*64*T _c	
Note 1: T _c is the basic timing unit defined in TS 38.211 [6]				

Table 7.1.2-1: Te Timing Error Limit

Table 7.1.2-2: The Value of $N_{\mathrm{TA~offset}}$

Freque	ncy range and band of cell used for uplink transmission	N _{TA offset} (Unit: T _C)			
	band without LTE-NR coexistence case or	25600 (Note 1)			
FR1 TDD	band without LTE-NR coexistence case				
FR1 FDD	band with LTE-NR coexistence case	0 (Note 1)			
FR1 TDD	band with LTE-NR coexistence case	39936 (Note 1)			
FR2		13792			
Note 1:	The UE identifies $N_{ m TA~offset}$ based on the infor	mation n-			
	TimingAdvanceOffset as specified in TS 38.331 [2]. If UE is not provided with the information n-TimingAdvanceOffset, the default value of $N_{\rm TA~offset}$				
is set as 25600 for FR1 band. In case of multiple UL carriers in the same TAG, UE expects that the same value of n-TimingAdvanceOffset is provided for all the UL carriers according to clause 4.2 in TS 38.213 [3] at the value 39936 of $N_{\mathrm{TA~offset}}$ can also be provided for a FDD serving cel					
Note 2:	Void				

When it is not the first transmission in a DRX cycle or there is no DRX cycle, and when it is the transmission for PUCCH, PUSCH and SRS transmission, the UE shall be capable of changing the transmission timing according to the received downlink frame of the reference cell except when the timing advance in clause 7.3 is applied.

Table 7.1.2-3: void

7.1.2.1 Gradual timing adjustment

When the transmission timing error between the UE and the reference timing exceeds $\pm T_e$ then the UE is required to adjust its timing to within $\pm T_e$. The reference timing shall be $(N_{TA} + N_{TA \text{ offset}}) \times T_c$ before the downlink timing of the reference cell. All adjustments made to the UE uplink timing shall follow these rules:

1) The maximum amount of the magnitude of the timing change in one adjustment shall be $T_{q\cdot}$

- 2) The minimum aggregate adjustment rate shall be T_p per second.
- 3) The maximum aggregate adjustment rate shall be T_q per 200 ms.

where the maximum autonomous time adjustment step T_q and the aggregate adjustment rate T_p are specified in Table 7.1.2.1-1.

Table 7.1.2.1-1: T_q Maximum Autonomous Time Adjustment Step and T_p Minimum Aggregate Adjustment rate

Frequency Range	SCS of uplink signals (kHz)	Tq	Тр		
	15	5.5*64*T _c	5.5*64*Tc		
1	30	5.5*64*T _c	5.5*64*Tc		
	60	5.5*64*T _c	5.5*64*T _c		
2	60	2.5*64*T _c	2.5*64*T _c		
2	120	2.5*64*T _c	2.5*64*T _c		
NOTE: T _c is the basic timing unit defined in TS 38.211 [6]					

7.1.2.2 Void

Table 7.1.2.2-1: Void

7.2 UE timer accuracy

7.2.1 Introduction

UE timers are used in different protocol entities to control the UE behaviour.

7.2.2 Requirements

For UE timers specified in TS 38.331 [2], the UE shall comply with the timer accuracies according to Table 7.2.2-1.

The requirements are only related to the actual timing measurements internally in the UE. They do not include the following:

- Inaccuracy in the start and stop conditions of a timer (e.g. UE reaction time to detect that start and stop conditions of a timer is fulfilled), or
- Inaccuracies due to restrictions in observability of start and stop conditions of a UE timer (e.g. slot alignment when UE sends messages at timer expiry).

Table 7.2.2-1

Timer value [s]	Accuracy
timer value < 4	± 0.1s
timer value ≥ 4	± 2.5%

7.3 Timing advance

7.3.1 Introduction

The timing advance is initiated from gNB to UE in EN-DC, NR-DC, NE-DC and NR SA operation modes, with MAC message that implies the adjustment of the timing advance, as defined in clause 5.2 of TS 38.321 [7].

7.3.2 Requirements

7.3.2.1 Timing Advance adjustment delay

UE shall adjust the timing of its uplink transmission timing at time slot n+k+1 for a timing advance command received in time slot n, and the value of k is defined in clause 4.2 in TS 38.213 [3]. The same requirement applies also when the UE is not able to transmit a configured uplink transmission due to the channel assessment procedure.

7.3.2.2 Timing Advance adjustment accuracy

The UE shall adjust the timing of its transmissions with a relative accuracy better than or equal to the UE Timing Advance adjustment accuracy requirement in Table 7.3.2.2-1, to the signalled timing advance value compared to the timing of preceding uplink transmission. The timing advance command step is defined in TS 38.213 [3].

Table 7.3.2.2-1: UE Timing Advance adjustment accuracy

UL Sub Carrier Spacing(kHz)	15	30	60	120
UE Timing Advance adjustment accuracy	±256 T _c	±256 T _c	±128 T _c	±32 T _c

7.4 Cell phase synchronization accuracy

7.4.1 Definition

Cell phase synchronization accuracy for TDD is defined as the maximum absolute deviation in frame start timing between any pair of cells on the same frequency that have overlapping coverage areas.

7.4.2 Minimum requirements

The cell phase synchronization accuracy measured at BS antenna connectors or radiated interface boundaries shall be better than 3 µs.

7.5 Maximum Transmission Timing Difference

7.5.1 Introduction

A UE shall be capable of handling a relative transmission timing difference between subframe timing boundary of E-UTRA PCell and the closest slot timing boundary of PSCell to be aggregated for EN-DC operation.

A UE shall be capable of handling a relative transmission timing difference among the closest slot timing boundaries of different carriers to be aggregated in NR carrier aggregation.

A UE shall be capable of handling a relative transmission timing difference between slot timing boundary of PCell and subframe timing boundary of E-UTRA PSCell to be aggregated for NE-DC operation.

A UE shall be capable of handling a relative transmission timing difference between slot timing boundaries of PCell and the closest slot timing boundary of PSCell to be aggregated in NR DC operation.

7.5.2 Minimum Requirements for inter-band EN-DC

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell as shown in Table 7.5.2-1.

Table 7.5.2-1 Maximum uplink transmission timing difference requirement for asynchronous EN-DC

Sub-carrier spacing in E-UTRA PCell (kHz)	UL Sub-carrier spacing for data in PSCell (kHz)	Maximum uplink transmission timing difference (µs)	
15	15	500	
15	30	250	
15	60	125	
15	120 ^{Note1}	62.5	
NOTE 4. For ELITEA FED NE FED intro band EN DC for which the			

NOTE 1: For E-UTRA FDD-NR FDD intra-band EN-DC, for which the requirement is defined in clause 7.5.3 and this Table 7.5.2-1 is also applicable, the scenario with 120kHz PSCell does not exist.

Table 7.5.2-2 Void

7.5.2.1 Minimum Requirements for inter-band synchronous EN-DC

The requirements in this clause apply as a reference for inter-band synchronous EN-DC.

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell for inter-band synchronous EN-DC as shown in Table 7.5.2.1-1 1. The requirements for synchronous EN-DC are applicable for E-UTRA TDD-NR TDD, E-UTRA FDD-NR FDD, E-UTRA TDD-NR FDD and E-UTRA FDD-NR TDD inter-band EN-DC.

Table 7.5.2.1-1 Maximum uplink transmission timing difference requirement for inter-band synchronous EN-DC

Sub-carrier spacing in E- UTRA PCell (kHz)	UL Sub-carrier spacing for data in PSCell (kHz)	Maximum uplink transmission timing difference (µs)
15	15	35.21
15	30	35.21
15	60	35.21
15	120	35.21

7.5.3 Minimum Requirements for intra-band EN-DC

For intra-band EN-DC, only co-located deployment is applied.

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell as shown in Table 7.5.2-1 for E-UTRA FDD-NR FDD intra-band EN-DC provided the UE indicates that it is capable of asynchronous EN-DC operation [2].

The UE shall be capable of handling a maximum uplink transmission timing difference between E-UTRA PCell and PSCell as shown in Table 7.5.3-1 for E-UTRA TDD-NR TDD and E-UTRA FDD-NR FDD intra-band EN-DC provided the UE does not indicate that it is capable of asynchronous FDD-FDD EN-DC operation [16].

Table 7.5.3-1: Maximum uplink transmission timing difference requirement for intra-band synchronous EN-DC

Sub-carrier spacing in E-UTRA PCell (kHz)	UL Sub-carrier spacing for data in PSCell (kHz)	Maximum uplink transmission timing difference (µs)
15	15	5.21 ^{Note1,Note 2}
15	30	5.21 ^{Note 2}
15	60	5.21 Note 2

NOTE 1: This is not applicable for a UE which indicates the capability of only supporting single UL timing (*ul-TimingAlignmentEUTRA-NR* is signalled). Single UL timing for E-UTRA and NR cell is assumed for this UE.

NOTE 2: If the transmission timing difference exceeds the cyclic prefix length of the UL Sub-carrier spacing for data in PSCell, NR UE Tx EVM degradation is expected for the symbol that is overlapping the LTE subframe boundary

7.5.4 Minimum Requirements for NR Carrier Aggregation

The UE shall be capable of handling at least a relative transmission timing difference between slot timing of all pairs of TAGs as shown in Table 7.5.4-1, provided that the UE is:

- configured with the pTAG and the sTAG for inter-band NR carrier aggregation in SA or NR-DC mode, or
- configured with more than one sTAG for inter-band NR carrier aggregation in EN-DC or NE-DC mode.

Table 7.5.4-1: Maximum uplink transmission timing difference requirement for inter-band NR carrier aggregation

Frequency Range of the pair of TAGs	Maximum uplink transmission timing difference (µs)
FR1	34.6
FR2	8.5
Between FR1 and FR2	26.1

7.5.5 Minimum Requirements for inter-band NE-DC

The UE shall be capable of handling a maximum uplink transmission timing difference between PCell and E-UTRA PSCell as shown in Table 7.5.5-1 for inter-band asynchronous NE-DC.

Table 7.5.5-1: Maximum uplink transmission timing difference requirement for inter-band asynchronous NE-DC

Sub-carrier spacing in PCell (kHz)	UL Sub-carrier spacing for data in E-UTRA PSCell (kHz)	Maximum uplink transmission timing difference (µs)
15	15	500
30	15	250
60	15	125
120	15	62.5
NOTE 1: Void		

Table 7.5.5-2: Void

7.5.5.1 Minimum Requirements for inter-band synchronous NE-DC

The requirements in this clause apply as a reference for inter-band synchronous NE-DC.

The UE shall be capable of handling a maximum uplink transmission timing difference between PCell and E-UTRA PSCell for inter-band synchronous NE-DC as shown in Table 7.5.5.1-1. The requirements for synchronous NE-DC are applicable for NR TDD- E-UTRA TDD, NR FDD- E-UTRA FDD, NR TDD- E-UTRA FDD and NR FDD- E-UTRA TDD inter-band NE-DC.

Table 7.5.5.1-1: Maximum uplink transmission timing difference requirement for inter-band synchronous NE-DC

Sub-carrier spacing in PCell (kHz)	UL Sub-carrier spacing for data in E-UTRA PSCell (kHz)	Maximum uplink transmission timing difference (μs)
15	15	35.21

30	15	35.21
60	15	35.21
120	15	35.21

7.5.6 Minimum Requirements for inter-band NR DC

The UE shall be capable of handling a maximum uplink transmission timing difference between PCell and PSCell as shown in Table 7.5.6-1 provided that the UE indicates that it is capable of synchronous NR DC [16].

Table 7.5.6-1: Maximum uplink transmission timing difference requirement for inter-band synchronous NR DC

Frequency Range		Maximum uplink transmission
PCell	PSCell	timing difference (µs)
FR1	FR2	34.1

7.6 Maximum Receive Timing Difference

7.6.1 Introduction

A UE shall be capable of handling a relative receive timing difference between subframe timing boundary of an E-UTRA cell belonging to the MCG and the closest slot timing boundary of a cell belonging to SCG to be aggregated for EN-DC operation.

A UE shall be capable of handling a relative receive timing difference between subframe timing boundary of an E-UTRA cell belonging to the SCG to be aggregated for NE-DC operation and the closest slot timing boundary of a cell belonging to MCG.

A UE shall be capable of handling a relative receive timing difference between slot timing boundary of a cell belonging to MCG and the closest slot timing boundary of a cell belonging to the SCG to be aggregated for NR DC operation. A UE shall be capable of handling a relative receive timing difference among the closest slot timing boundaries of different carriers to be aggregated in NR carrier aggregation.

7.6.2 Minimum Requirements for inter-band EN-DC

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from a E-UTRA cell belonging to the MCG and slot timing of signal from a cell belonging to SCG at the UE receiver as shown in Table 7.6.2-1.

Table 7.6.2-1: Maximum receive timing difference requirement for asynchronous EN-DC

of E-UTRA cell in MCG (kHz)	spacing of cell in SCG (kHz) (Note 1)	difference (µs)	
15	15	500	
15	30	250	
15	60	125	
15	120 ^{Note2}	62.5	
NOTE 1: DL Sub-carrier spacing is min{SCS _{SS} , SCS _{DATA} }.			
NOTE 2: For E-UTRA FDD-NR FDD intra-band EN-DC, for which the			

requirement is defined in clause 7.6.3 and this Table 7.6.2-1 is also

Table 7.6.2-2: Void

applicable, the scenario with 120 kHz does not exit.

Table 7.6.2-3 Void

7.6.2.1 Minimum Requirements for inter-band synchronous EN-DC

The requirements in this clause apply as a reference for inter-band synchronous EN-DC.

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from an E-UTRA cell belonging to the MCG and slot timing of signal from a cell belonging to SCG at the UE receiver for inter-band synchronous EN-DC as shown in Table 7.6.2.1-1. The requirements for synchronous EN-DC are applicable for E-UTRA TDD-NR TDD, E-UTRA FDD-NR FDD, E-UTRA TDD-NR FDD and E-UTRA FDD-NR TDD inter-band EN-DC.

Table 7.6.2.1-1: Maximum receive timing difference requirement for inter-band synchronous EN-DC

Sub-carrier spacing of E-UTRA cell in MCG (kHz)	DL Sub-carrier spacing of cell in SCG (kHz) (Note1)	Maximum receive timing difference (µs)
15	15	
15	30	33
15	60	33
15	120	
Note 1: DL Sub-carrier spacing is min{SCS _{SS} , SCS _{DATA} }.		

7.6.3 Minimum Requirements for intra-band EN-DC

For intra-band EN-DC, only co-located deployment is applied.

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from a E-UTRA cell belonging to the MCG and slot timing of signal from a cell belonging to the SCG as shown in Table 7.6.2-1 for E-UTRA FDD-NR FDD intra-band EN-DC provided the UE indicates that it is capable of asynchronous EN-DC operation [2].

The UE shall be capable of handling at least a relative receive timing difference between subframe timing of signal from a E-UTRA cell belonging to the MCG and slot timing of signal from a cell belonging to the SCG as shown in Table 7.6.3-1 for E-UTRA FDD-NR FDD and E-UTRA TDD-NR TDD intra-band EN-DC provided the UE does not indicate that it is capable of asynchronous FDD-FDD EN-DC operation [16].

Table 7.6.3-1 Maximum receive timing difference requirement for intra-band synchronous EN-DC

Sub-carrier spacing of E-UTRA cell in MCG (kHz)	DL Sub-carrier spacing of cell in SCG (kHz) ^{Note1}	Maximum receive timing difference (µs)
15	15	3
15	30	3
15	60	3
NOTE 1: DL Sub-carrier spacing is min{SCSss, SCSDATA}.		

Table 7.6.3-2 Void

7.6.4 Minimum Requirements for NR Carrier Aggregation

For intra-band CA, only co-located deployment is applied. For intra-band non-contiguous NR carrier aggregation, the UE shall be capable of handling at least a relative receive timing difference between slot timing of different carriers to be aggregated at the UE receiver as shown in Table 7.6.4-1 below.

Table 7.6.4-1: Maximum receive timing difference requirement for intra-band non-contiguous NR carrier aggregation

Frequ	uency Range	Maximum receive timing difference (µs)
	FR1	3 ¹
	FR2	0.26
Note 1:	In the case of different SCS on different CCs, if the receive time difference exceeds the cyclic prefix length of that SCS, demodulation performance degradation is expected for the first symbol of the slot.	

For inter-band NR carrier aggregation, the UE shall be capable of handling at least a relative receive timing difference between slot timing of all pairs of carriers to be aggregated at the UE receiver as shown in Table 7.6.4-2 below.

Table 7.6.4-2: Maximum receive timing difference requirement for inter-band NR carrier aggregation

Frequency Range of the pair of carriers	Maximum receive timing difference (µs)
FR1	33
FR2	8
Between FR1 and FR2	25

7.6.5 Minimum Requirements for inter-band NE-DC

The UE shall be capable of handling at least a relative receive timing difference between slot timing of signal from a cell belonging to the MCG and subframe timing of signal from an E-UTRA cell belonging to the SCG at the UE receiver for asynchronous NE-DC as shown in Table 7.6.5-1.

Table 7.6.5-1: Maximum receive timing difference requirement for asynchronous NE-DC

Sub-carrier spacing of cell in MCG (kHz)	DL Sub-carrier spacing of EUTRA cell in SCG (kHz) (Note 1)	Maximum receive timing difference (μs)
15	15	500
30	15	250
60	15	125
120	15	62.5
NOTE 1: DL Sub-carrier spacing is min{SCSss, SCSDATA}. NOTE 2: Void		

Table 7.6.5-2: Void

7.6.5.1 Minimum Requirements for inter-band synchronous NE-DC

The requirements in this clause apply as a reference for inter-band synchronous NE-DC.

The UE shall be capable of handling at least a relative receive timing difference between slot timing of signal from a cell belonging to the MCG and subframe timing of signal from a E-UTRA cell belonging to the SCG at the UE receiver for inter-band synchronous NE-DC as shown in Table 7.6.5.1-1. The requirements for synchronous NE-DC are applicable for NR TDD- E-UTRA TDD, NR FDD- E-UTRA FDD, NR TDD- E-UTRA FDD and NR FDD- E-UTRA TDD inter-band NE-DC.

Table 7.6.5.1-1: Maximum receive timing difference requirement for inter-band synchronous NE-DC

Sub-carrier spacing of cell in MCG (kHz)	DL Sub-carrier spacing of EUTRA cell in SCG (kHz)	Maximum receive timing difference (µs)
	(Note1)	

15	15	
30	15	33
60	15	
120	15	

7.6.6 Minimum Requirements for inter-band NR DC

The UE shall be capable of handling at least a relative receive timing difference between slot timing of signal from a cell belonging to the MCG and slot timing of signal from a cell belonging to the SCG at the UE receiver as shown in Table 7.6.6-1 provided that the UE indicates that it is capable of synchronous NR DC [16].

Table 7.6.6-1: Maximum receive timing difference requirement for inter-band synchronous NR DC

Frequency Range		Maximum receive timing
Cell in	Cell in	difference (µs)
MCG	SCG	
FR1	FR2	33

7.7 deriveSSB-IndexFromCell tolerance

7.7.1 Minimum requirements

When *deriveSSB-IndexFromCell* is enabled, the UE assumes frame boundary alignment (including half frame, subframe and slot boundary alignment) across cells on the same frequency carrier is within a tolerance not worse than min(2 SSB symbols, 1 PDSCH symbol) and the SFNs of all cells on the same frequency carrier are the same.

7.8 Void

8 Signalling characteristics

8.1 Radio Link Monitoring

8.1.1 Introduction

The requirements in clause 8.1 apply for radio link monitoring on:

- PCell in SA NR, NR-DC and NE-DC operation mode,
- PSCell in NR-DC and EN-DC operation mode.

The UE shall monitor the downlink radio link quality based on the reference signal configured as RLM-RS resource(s) in order to detect the downlink radio link quality of the PCell and PSCell as specified in TS 38.213 [3]. The configured RLM-RS resources can be all SSBs, or all CSI-RSs, or a mix of SSBs and CSI-RSs. UE is not required to perform RLM outside the active DL BWP.

On each RLM-RS resource, the UE shall estimate the downlink radio link quality and compare it to the thresholds Q_{out} and Q_{in} for the purpose of monitoring downlink radio link quality of the cell.

The threshold Q_{out} is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to the out-of-sync block error rate (BLER_{out}) as defined in Table 8.1.1-1. For SSB based radio link monitoring, Q_{out_SSB} is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.1.2.1-1. For CSI-RS based radio link monitoring, Q_{out_CSI-RS} is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.1.3.1-1.

The threshold Q_{in} is defined as the level at which the downlink radio link quality can be received with significantly higher reliability than at Q_{out} and shall correspond to the in-sync block error rate (BLER_{in}) as defined in Table 8.1.1-1. For SSB based radio link monitoring, Q_{in_SSB} is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.1.2.1-2. For CSI-RS based radio link monitoring, Q_{in_CSI-RS} is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.1.3.1-2.

The out-of-sync block error rate (BLER_{out}) and in-sync block error rate (BLER_{in}) are determined from the network configuration via parameter *rlmInSyncOutOfSyncThreshold* signalled by higher layers. When UE is not configured with *rlmInSyncOutOfSyncThreshold* from the network, UE determines out-of-sync and in-sync block error rates from Configuration #0 in Table 8.1.1-1 by default. All requirements in clause 8.1 are applicable for BLER Configuration #0 in Table 8.1.1-1.

Table 8.1.1-1: Out-of-sync and in-sync block error rates

Configuration	BLERout	BLERin
0	10%	2%

UE shall be able to monitor up to N_{RLM} RLM-RS resources of the same or different types in each corresponding carrier frequency range, depending on a maximum number L_{max} of SSBs per half frame according to TS 38.213 [3], where N_{RLM} is specified in Table 8.1.1-2 according TS 38.213 [3], and meet the requirements as specified in clause 8.1. UE is not required to meet the requirements in clause 8.1 if RLM-RS is not configured and no TCI state for PDCCH is activated.

Table 8.1.1-2: Maximum number of RLM-RS resources N_{RLM}

Carrier frequency range of PCell/PSCell	$L_{ m max}$	Maximum number of RLM-RS resources, N _{RLM}
FR1, ≤ 3 GHz ^{Note}	4	2
FR1, > 3 GHz ^{Note}	8	4
FR2	64	8
NOTE: For unpaired spectrum operation with Case C - 30 kHz SCS, 3GHz is replaced by 1.88GHz, as specified in		
clause 4.1 in TS 38 213 [3]		

8.1.2 Requirements for SSB based radio link monitoring

8.1.2.1 Introduction

The requirements in this clause apply for each SSB based RLM-RS resource configured for PCell or PSCell, provided that the SSB configured for RLM is actually transmitted within UE active DL BWP during the entire evaluation period specified in clause 8.1.2.2.

Table 8.1.2.1-1: PDCCH transmission parameters for out-of-sync evaluation

Attribute	Value for BLER Configuration #0
DCI format	1-0
Number of control OFDM symbols	2
Aggregation level (CCE)	8
Ratio of hypothetical PDCCH RE energy to average SSS RE energy	4dB
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	4dB
Bandwidth (PRBs)	24
Sub-carrier spacing (kHz)	SCS of the active DL BWP
DMRS precoder granularity	REG bundle size
REG bundle size	6
CP length	Normal
Mapping from REG to CCE	Distributed

Value for BLER Configuration #0 **Attribute** DCI payload size Number of control OFDM 2 symbols Aggregation level (CCE) 4 Ratio of hypothetical PDCCH RE energy to average SSS 0dB RE energy Ratio of hypothetical PDCCH DMRS energy to average 0dB SSS RE energy Bandwidth (PRBs) 24 SCS of the active DL BWP Sub-carrier spacing (kHz) DMRS precoder granularity REG bundle size REG bundle size 6 CP length Normal Mapping from REG to CCE Distributed

Table 8.1.2.1-2: PDCCH transmission parameters for in-sync evaluation

8.1.2.2 Minimum requirement

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last $T_{Evaluate_out_SSB}$ ms period becomes worse than the threshold Q_{out_SSB} within $T_{Evaluate_out_SSB}$ [ms] evaluation period.

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last $T_{\text{Evaluate_in_SSB}}$ ms period becomes better than the threshold $Q_{\text{in_SSB}}$ within $T_{\text{Evaluate_in_SSB}}$ [ms] evaluation period.

T_{Evaluate out SSB} and T_{Evaluate in SSB} are defined in Table 8.1.2.2-1 for FR1.

 $T_{\text{Evaluate_out_SSB}}$ and $T_{\text{Evaluate_in_SSB}}$ are defined in Table 8.1.2.2-2 for FR2 with scaling factor N=8.

For FR1,

- $P = \frac{1}{1 \frac{T_{SSB}}{MGRP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, and these measurement gaps are overlapping with some but not all occasions of the SSB; and
- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

For FR2,

- $P = \frac{1}{1 \frac{T_{SSB}}{T_{SMTCperiod}}}$, when RLM-RS resource is not overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$).
- P is $P_{sharing\ factor}$, when the RLM-RS resource is not overlapped with measurement gap and RLM-RS resource is fully overlapped with SMTC period ($T_{SSB} = T_{SMTCperiod}$).
- $P = \frac{1}{1 \frac{T_{SSB}}{MGRP} \frac{T_{SSB}}{T_{SMTCopried}}}$, when the RLM-RS resource is partially overlapped with measurement gap and the

RLM-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and

- $T_{SMTCperiod} \neq MGRP$ or
- $T_{SMTCperiod} = MGRP \text{ and } T_{SSB} < 0.5 \times T_{SMTCperiod}$

- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MGRP}}$, when the RLM-RS is partially overlapped with measurement gap and the RLM-RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{SSB} = 0.5 \times T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{SSB}}{Min(MGRP,T_{SMTCperiod})}},$ when the RLM-RS resource is partially overlapped with measurement gap and the

RLM-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap

- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MGRP}}$, when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- $P_{\text{sharing factor}} = 1$, if the RLM-RS resource outside measurement gap is
 - not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each
 consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB
 symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure
 is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same
 serving carrier, and,
 - not overlapped by the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured.
- P_{sharing factor} = 3, otherwise.

where,

If the high layer in TS 38.331 [2] signaling of smtc2 is present, $T_{SMTCperiod}$ follows smtc2; Otherwise $T_{SMTCperiod}$ follows smtc1. $T_{SMTCperiod}$ is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Longer evaluation period would be expected if the combination of RLM-RS resource, SMTC occasion and measurement gap configurations does not meet previous conditions.

Table 8.1.2.2-1: Evaluation period T_{Evaluate_out_SSB} and T_{Evaluate_in_SSB} for FR1

Configuration	T _{Evaluate_out_SSB} (ms)	T _{Evaluate_in_} SSB (ms)
no DRX	Max(200, Ceil(10 \times P) \times T _{SSB})	Max(100, Ceil(5 \times P) \times T _{SSB})
DRX cycle≤320ms	Max(200, Ceil(15 \times P) \times	$Max(100, Ceil(7.5 \times P) \times Max(T_{DRX}, T_{SSB}))$
·	Max(T _{DRX} ,T _{SSB}))	
DRX cycle>320ms	Ceil($10 \times P$) $\times T_{DRX}$	$Ceil(5 \times P) \times T_{DRX}$
NOTE: TssB is the periodicity of the SSB configured for RLM. TDRX is the DRX cycle length.		

Table 8.1.2.2-2: Evaluation period T_{Evaluate_out_SSB} and T_{Evaluate_in_SSB} for FR2

Configuration	T _{Evaluate_out_SSB} (ms)	T _{Evaluate_in_SSB} (ms)
no DRX	Max(200, Ceil($10 \times P \times N$) $\times T_{SSB}$)	Max(100, Ceil($5 \times P \times N$) $\times T_{SSB}$)
DRX cycle≤320ms	Max(200, Ceil(15 \times P \times N) \times	Max(100, Ceil(7.5 \times P \times N) \times Max(T _{DRX} ,T _{SSB}))
	$Max(T_{DRX},T_{SSB}))$	
DRX cycle>320ms	Ceil($10 \times P \times N$) $\times T_{DRX}$	Ceil(5 \times P \times N) \times T _{DRX}
NOTE: T _{SSB} is the periodicity of the SSB configured for RLM. T _{DRX} is the DRX cycle length.		

8.1.2.3 Measurement restrictions for SSB based RLM

The UE is required to be capable of measuring SSB for RLM without measurement gaps. The UE is required to perform the SSB measurements with measurement restrictions as described in the following clauses.

For FR1, when the SSB for RLM is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement.

- If SSB and CSI-RS have same SCS, UE shall be able to measure the SSB for RLM without any restriction;
- If SSB and CSI-RS have different SCS,
 - If UE supports *simultaneousRxDataSSB-DiffNumerology*, UE shall be able to measure the SSB for RLM without any restriction;
 - If UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both SSB for RLM and CSI-RS. Longer measurement period for SSB based RLM is expected, and no requirements are defined.

For FR2, when the SSB for RLM measurement on one CC is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both SSB for RLM and CSI-RS. Longer measurement period for SSB based RLM is expected, and no requirements are defined.

8.1.3 Requirements for CSI-RS based radio link monitoring

8.1.3.1 Introduction

The requirements in this clause apply for each CSI-RS based RLM-RS resource configured for PCell or PSCell, provided that the CSI-RS configured for RLM is actually transmitted within UE active DL BWP during the entire evaluation period specified in clause 8.1.3.2. UE is not expected to perform radio link monitoring measurements on the CSI-RS configured as RLM-RS if the CSI-RS is not in the active TCI state of any CORESET configured in the UE active BWP.

Table 8.1.3.1-1: PDCCH transmission parameters for out-of-sync evaluation

Attribute	Value for BLER Configuration #0
DCI format	1-0
Number of control OFDM symbols	2
Aggregation level (CCE)	8
Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	4dB
Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	4dB
Bandwidth (PRBs)	48
Sub-carrier spacing (kHz)	SCS of the active DL BWP
DMRS precoder granularity	REG bundle size
REG bundle size	6
CP length	Normal
Mapping from REG to CCE	Distributed

Table 8.1.3.1-2: PDCCH transmission parameters for in-sync evaluation

Attribute	Value for BLER Configuration #0
DCI payload size	1-0
Number of control OFDM symbols	2
Aggregation level (CCE)	4
Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	0dB
Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	0dB
Bandwidth (PRBs)	48

Sub-carrier spacing (kHz)	SCS of the active DL BWP
DMRS precoder granularity	REG bundle size
REG bundle size	6
CP length	Normal
Mapping from REG to CCE	Distributed

8.1.3.2 Minimum requirement

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last $T_{\text{Evaluate_out_CSI-RS}}$ ms period becomes worse than the threshold $Q_{\text{out_CSI-RS}}$ within $T_{\text{Evaluate_out_CSI-RS}}$ [ms] evaluation period.

UE shall be able to evaluate whether the downlink radio link quality on the configured RLM-RS resource estimated over the last $T_{\text{Evaluate_in_CSI-RS}}$ ms period becomes better than the threshold $Q_{\text{in_CSI-RS}}$ within $T_{\text{Evaluate_in_CSI-RS}}$ [ms] evaluation period.

- T_{Evaluate out CSI-RS} and T_{Evaluate in CSI-RS} are defined in Table 8.1.3.2-1 for FR1.
- $T_{Evaluate_out_CSI-RS}$ and $T_{Evaluate_in_CSI-RS}$ are defined in Table 8.1.3.2-2 for FR2 with scaling factor N=1.

The requirements of T_{Evaluate_out_CSI-RS} and T_{Evaluate_in_CSI-RS} apply provided that the CSI-RS for RLM is not in a resource set configured with repetition ON. The requirements do not apply when the CSI-RS resource in the active TCI state of CORESET is the same CSI-RS resource for RLM and the TCI state information of the CSI-RS resource is not given, wherein the TCI state information means QCL Type-D to SSB for L1-RSRP or CSI-RS with repetition ON.

For FR1,

- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, and these measurement gaps are overlapping with some but not all occasions of the CSI-RS; and
- P = 1, when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

For FR2,

- P = 1, when the RLM-RS resource is not overlapped with measurement gap and also not overlapped with SMTC occasion.
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP}}$, when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is not overlapped with SMTC occasion ($T_{CSI-RS} < MGRP$)
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when the RLM-RS resource is not overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$).
- $P = P_{sharing factor}$, when the RLM-RS resource is not overlapped with measurement gap and RLM-RS resource is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$).
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP} \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when the RLM-RS resource is partially overlapped with measurement gap and the

RLM-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and

- $T_{SMTCperiod} \neq MGRP$ or
- $T_{SMTCperiod} = MGRP \text{ and } T_{CSI-RS} < 0.5 \times T_{SMTCperiod}$
- $P = \frac{P_{\text{sharing factor}}}{1 \frac{T_{CSI-RS}}{MGRP}}$, when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is partially overlapped with SMTC occasion ($T_{\text{CSI-RS}} < T_{\text{SMTCperiod}}$) and SMTC occasion is not overlapped with measurement gap and $T_{\text{SMTCperiod}} = MGRP$ and $T_{\text{CSI-RS}} = 0.5 \times T_{\text{SMTCperiod}}$

 $-P = \frac{1}{1 - \frac{T_{CSI-RS}}{Min(MGRP,T_{SMTCperiod})}},$ when the RLM-RS resource is partially overlapped with measurement gap and the

RLM-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap

- $P = \frac{P_{\text{sharing factor}}}{1 \frac{T_{CSI-RS}}{MGRP}}$, when the RLM-RS resource is partially overlapped with measurement gap and the RLM-RS resource is fully overlapped with SMTC occasion ($T_{\text{CSI-RS}} = T_{\text{SMTCperiod}}$) and SMTC occasion is partially overlapped with measurement gap ($T_{\text{SMTCperiod}} < MGRP$)
- $P_{\text{sharing factor}} = 1$, if the RLM-RS resource outside measurement gap is
 - not overlapped with the SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol before each consecutive SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol after each consecutive SSB symbols indicated by *SSB-ToMeasure*, given that *SSB-ToMeasure* is configured, where the *SSB-ToMeasure* is the union set of *SSB-ToMeasure* from all the configured measurement objects merged on the same serving carrier, and,
 - not overlapped by the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement* is configured.
- $P_{\text{sharing factor}} = 3$, otherwise.

where,

If the high layer in TS 38.331 [2] signaling of smtc2 is present, $T_{SMTCperiod}$ follows smtc2; Otherwise $T_{SMTCperiod}$ follows smtc1. $T_{SMTCperiod}$ is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Note: The overlap between CSI-RS for RLM and SMTC means that CSI-RS based RLM is within the SMTC window duration.

Longer evaluation period would be expected if the combination of RLM-RS resource, SMTC occasion and measurement gap configurations does not meet previous conditions.

The values of M_{out} and M_{in} used in Table 8.1.3.2-1 and Table 8.1.3.2-2 are defined as:

- $M_{out} = 20$ and $M_{in} = 10$, if the CSI-RS resource configured for RLM is transmitted with higher layer CSI-RS parameter *density* [6, clause 7.4.1] set to 3 and over the bandwidth \geq 24 PRBs.

Table 8.1.3.2-1: Evaluation period T_{Evaluate_out_CSI-RS} and T_{Evaluate_in_CSI-RS} for FR1

Configuration	T _{Evaluate_out_} CSI-RS (ms)	T _{Evaluate_in_} CSI-RS (ms)		
no DRX	Max(200, Ceil(M _{out} ×P)×T _{CSI-RS})	$Max(100, Ceil(M_{in} \times P) \times T_{CSI-RS})$		
DRX ≤ 320ms	Max(200, Ceil(1.5×Mout×P)×	Max(100, Ceil(1.5×Min×P)× Max(TDRX, TCSI-		
	Max(T _{DRX} , T _{CSI-RS}))	rs))		
DRX > 320ms	Ceil(M _{out} ×P) × T _{DRX}	$Ceil(M_{in} \times P) \times T_{DRX}$		
NOTE: T _{CSI-RS} is the periodicity of the CSI-RS resource configured for RLM. The requirements in this table				
apply for Toslas e	gual to 5 ms, 10ms, 20 ms or 40 ms, The	x is the DRX cycle length.		

Table 8.1.3.2-2: Evaluation period T_{Evaluate out CSI-RS} and T_{Evaluate in CSI-RS} for FR2

	Configuration	T _{Evaluate_out_CSI-RS} (ms)	T _{Evaluate_in_CSI-RS} (ms)		
	no DRX	Max(200, Ceil(Mout×PxN)xTcsi-Rs)	Max(100, Ceil(M _{in} ×P×N) × T _{CSI-RS})		
	DRX ≤ 320ms	Max(200, Ceil(1.5×Mout×P×N)×	Max(100, Ceil(1.5×M _{in} ×P×N)×		
		Max(T _{DRX} , T _{CSI-RS}))	Max(T _{DRX} , T _{CSI-RS}))		
	DRX > 320ms	$Ceil(M_{out} \times P \times N) \times T_{DRX}$	$Ceil(M_{in} \times P \times N) \times T_{DRX}$		
NOTE:	NOTE: T _{CSI-RS} is the periodicity of the CSI-RS resource configured for RLM. The requirements in this table apply for				
	T _{CSI-RS} equal to 5 ms, 10 ms, 20 ms or 40 ms. T _{DRX} is the DRX cycle length.				

8.1.3.3 Measurement restrictions for CSI-RS based RLM

The UE is required to be capable of measuring CSI-RS for RLM without measurement gaps. The UE is required to perform the CSI-RS measurements with measurement restrictions as described in the following clauses.

For both FR1 and FR2, when the CSI-RS for RLM is in the same OFDM symbol as SSB for RLM, BFD, CBD or L1-RSRP measurement, UE is not required to receive CSI-RS for RLM in the PRBs that overlap with an SSB.

For FR1, when the SSB for RLM, BFD, CBD, or L1-RSRP measurement is within the active BWP and has same SCS than CSI-RS for RLM, the UE shall be able to perform CSI-RS measurement without restrictions.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has different SCS than CSI-RS for RLM, the UE shall be able to perform CSI-RS measurement with restrictions according to its capabilities:

- If the UE supports *simultaneousRxDataSSB-DiffNumerology* the UE shall be able to perform CSI-RS for RLM measurement without restrictions.
- If the UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both CSI-RS for RLM and SSB. Longer measurement period for CSI-RS based RLM is expected, and no requirements are defined.

For FR1, when the CSI-RS for RLM is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement, UE shall be able to measure the CSI-RS for RLM without any restriction.

For FR2, when the CSI-RS for RLM measurement on one CC is in the same OFDM symbol as SSB for RLM, BFD, or L1-RSRP measurement on the same CC or different CCs in the same band, or in the same symbol as SSB for CBD measurement on the same CC or different CCs in the same band when beam failure is detected, UE is required to measure one of but not both CSI-RS for RLM and SSB. Longer measurement period for CSI-RS based RLM is expected, and no requirements are defined.

For FR2, when the CSI-RS for RLM measurement on one CC is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band,

- In the following cases, UE is required to measure one of but not both CSI-RS for RLM and the other CSI-RS. Longer measurement period for CSI-RS based RLM is expected, and no requirements are defined.
 - The CSI-RS for RLM or the other CSI-RS in a resource set configured with repetition ON, or
 - The other CSI-RS is configured in q1 and beam failure is detected, or
 - The two CSI-RS-es are not QCL-ed w.r.t. QCL-TypeD, or the QCL information is not known to UE,
- Otherwise, UE shall be able to measure the CSI-RS for RLM without any restriction.

8.1.4 Minimum requirement at transitions

When the UE transitions between DRX and no DRX or when DRX cycle periodicity changes, for each RLM-RS resource, for a duration of time equal to the evaluation period corresponding to the second mode after the transition occurs, the UE shall use an evaluation period that is no less than the minimum of evaluation period corresponding to the first mode and the second mode. Subsequent to this duration, the UE shall use an evaluation period corresponding to the second mode for each RLM-RS resource. This requirement shall be applied to both out-of-sync evaluation and in-sync evaluation of the monitored cell.

When the UE transitions from a first configuration of RLM resources to a second configuration of RLM resources that is different from the first configuration, for each RLM resource present in the second configuration, for a duration of time equal to the evaluation period corresponding to the second configuration after the transition occurs, the UE shall use an evaluation period that is no less than the minimum of evaluation periods corresponding to the first configuration and the second configuration. Subsequent to this duration, the UE shall use an evaluation period corresponding to the second configuration for each RLM resource present in the second configuration. This requirement shall be applied to both out-of-sync evaluation and in-sync evaluation of the monitored cell.

When the UE transitions from a first configuration of active TCI state of the CORESET to a second configuration of active TCI state of the CORESET, for each CSI-RS for RLM present in the second configuration, the UE shall use an

evaluation period corresponding to the second configuration from the time of transition. This requirement shall be applied to both out-of-sync evaluation and in-sync evaluation of the monitored cell.

8.1.5 Minimum requirement for UE turning off the transmitter

The transmitter power of the UE in the monitored cell shall be turned off within 40ms after expiry of T310 timer as specified in TS 38.331 [2].

8.1.6 Minimum requirement for L1 indication

When the downlink radio link quality on all the configured RLM-RS resources is worse than Q_{out} , layer 1 of the UE shall send an out-of-sync indication for the cell to the higher layers. A layer 3 filter shall be applied to the out-of-sync indications as specified in TS 38.331 [2].

When the downlink radio link quality on at least one of the configured RLM-RS resources is better than Q_{in}, layer 1 of the UE shall send an in-sync indication for the cell to the higher layers. A layer 3 filter shall be applied to the in-sync indications as specified in TS 38.331 [2].

The out-of-sync and in-sync evaluations for the configured RLM-RS resources shall be performed as specified in clause 5 in TS 38.213 [3]. Two successive indications from layer 1 shall be separated by at least $T_{Indication_interval}$.

When DRX is not used $T_{Indication_interval}$ is max(10ms, $T_{RLM-RS,M}$), where $T_{RLM,M}$ is the shortest periodicity of all configured RLM-RS resources for the monitored cell, which corresponds to T_{SSB} specified in clause 8.1.2 if the RLM-RS resource is SSB, or T_{CSI-RS} specified in clause 8.1.3 if the RLM-RS resource is CSI-RS.

In case DRX is used, $T_{Indication_interval}$ is Max(10ms, $1.5 \times DRX_cycle_length$, $1.5 \times T_{RLM-RS,M}$) if DRX cycle_length is less than or equal to 320ms, and $T_{Indication_interval}$ is DRX_cycle_length if DRX cycle_length is greater than 320ms. Upon start of T310 timer as specified in TS 38.331 [2], the UE shall monitor the configured RLM-RS resources for recovery using the evaluation period and layer 1 indication interval corresponding to the no DRX mode until the expiry or stop of T310 timer.

8.1.7 Scheduling availability of UE during radio link monitoring

When the reference signal to be measured for RLM has different subcarrier spacing than PDSCH/PDCCH or is on frequency range 2, there are restrictions on the scheduling availability as described in the following clauses.

8.1.7.1 Scheduling availability of UE performing radio link monitoring with a same subcarrier spacing as PDSCH/PDCCH on FR1

There are no scheduling restrictions due to radio link monitoring performed with a same subcarrier spacing as PDSCH/PDCCH on FR1.

8.1.7.2 Scheduling availability of UE performing radio link monitoring with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UEs which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to radio link monitoring based on SSB as RLM-RS. For UEs which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to radio link monitoring based on SSB as RLM -RS.

- The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on SSB symbols to be measured for radio link monitoring.

When intra-band carrier aggregation in FR1 is performed, the scheduling restrictions on FR1 serving PCell or PSCell applies to all serving cells in the same band on the symbols that fully or partially overlap with the restricted symbols. When inter-band carrier aggregation within FR1 is performed, there are no scheduling restrictions on FR1 serving cell(s) in the bands due to radio link monitoring performed on FR1 serving PCell or PSCell in different bands.

8.1.7.3 Scheduling availability of UE performing radio link monitoring on FR2

The following scheduling restriction applies due to radio link monitoring on an FR2 serving PCell and/or PSCell.

- If the RLM-RS is CSI-RS which is type-D QCLed with active TCI state for PDCCH or PDSCH, and the CSI-RS is not in a CSI-RS resource set with repetition ON,
 - There are no scheduling restrictions due to radio link monitoring based on the CSI-RS.
- Otherwise
 - The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on RLM-RS symbols to be measured for radio link monitoring.

When intra-band carrier aggregation in FR2 is performed, the scheduling restrictions on FR2 serving PCell or PSCell applies to all serving cells in the same band on the symbols that fully or partially overlap with restricted symbols.

For FR2, if following conditions are met,

- UE has been notified about system information update through paging,
- The gap between UE's reception of PDCCH that UE monitors in the Type2-PDCCH CSS set and that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots,

For the SSB for RLM and CORESET for RMSI scheduling multiplexing patterns 3, UE is expected to receive the PDCCH that UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured for RLM; and

For the SSB for RLM and CORESET for RMSI scheduling multiplexing patterns 2, UE is expected to receive PDSCH that corresponds to the PDCCH that UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured for RLM.

8.1.7.4 Scheduling availability of UE performing radio link monitoring on FR1 or FR2 in case of FR1-FR2 inter-band CA and NR-DC

There are no scheduling restrictions on FR1 serving cell(s) due to radio link monitoring performed on FR2 serving PCell and/or PSCell.

There are no scheduling restrictions on FR2 serving cell(s) due to radio link monitoring performed on FR1 serving PCell and/or PSCell.

NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG are in FR1 and all serving cells in SCG are in FR2.

8.2 Interruption

8.2.1 EN-DC Interruption

8.2.1.1 Introduction

This clause contains the requirements related to the interruptions on PSCell, and SCell, when

E-UTRA PCell transitions between active and non-active during DRX, or

E-UTRA PCell transitions from non-DRX to DRX, or

E-UTRA SCell in MCG or SCell in SCG is added or released, or

E-UTRA SCell in MCG or SCell in SCG is activated or deactivated, or

measurements on SCC with deactivated SCell in either E-UTRA MCG or NR SCG, or

a supplementary UL carrier or an UL carrier is configured or de-configured, or

UL/DL BWP is switched on PSCell or SCell in SCG.

The requirements shall apply for E-UTRA-NR DC with an E-UTRA PCell.

This clause contains interruptions where victim cell is PSCell or SCell belonging to SCG. Requirements for interruptions requirements when the victim cell is E-UTRA PCell or E-UTRA SCell belonging to MCG are specified in TS 36.133 [15].

For a UE which does not support per-FR measurement gaps, interruptions to the PSCell or activated SCG SCells may be caused by EUTRA PCell, EUTRA SCells or SCells on any frequency range. For UE which support per-FR gaps, interruptions to the PSCell or activated SCG SCells may be caused by EUTRA PCell, EUTRA SCells or SCells on the same frequency range as the victim cell.

8.2.1.2 Requirements

8.2.1.2.1 Interruptions at transitions between active and non-active during DRX

Interruption on PSCell and the activated SCell if configured due to E-UTRA PCell transitions between active and non-active druing DRX when PSCell or SCell is in non-DRX are allowed with up to 1% probability of missed ACK/NACK when the configured E-UTRA PCell DRX cycle is less than 640 ms, and 0.625% probability of missed ACK/NACK is allowed when the configured E-UTRA PCell DRX cycle is 640 ms or longer. Each interruption shall not exceed X slot as defined in table 8.2.1.2.1-1.

Table 8.2.1.2.1-1: Interruption length X at transition between active and non-active during DRX

11	NR Slot	Interruption le	ength X (slots
μ	length (ms)	Sync	Async
0	1	1	2
1	0.5	1	2
2	0.25	3	3
3	0.125	5	5

When both E-UTRA PCell and PSCell are in DRX, no interruption is allowed.

8.2.1.2.2 Interruptions at transitions from non-DRX to DRX

Interruption on PSCell and the activated SCell if configured due to E-UTRA PCell transitions from non-DRX to DRX when PSCell or SCell is in non-DRX shall not exceed X slot as defined in table 8.2.1.2.1-1.

When PSCell and the activated SCell are in DRX, no interruption due to E-UTRA PCell transitions from non-DRX to DRX is allowed.

8.2.1.2.3 Interruptions at SCell addition/release

The requirements in this clause shall apply for the UE configured with PSCell.

When one E-UTRA SCell in MCG is added or released:

- the UE is allowed an interruption on any active serving cell in SCG:
- of up to X1 slot, if the active serving cell is not in the same band as the E-UTRA SCell being added or released, or
- of up to max{Y1 slot + T_{SMTC_duration}, 5ms} if the active serving cells are in the same band as the E-UTRA SCell being added or released, provided the cell specific reference signals from the active serving cells and the E-UTRA SCell being added or released are available in the same slot, where T_{SMTC_duration} is the longest SMTC duration among all above active serving cells in SCG;

Where X1 and Y1 are specified in Table 8.2.1.2.3-1.

When one SCell in SCG is added or released:

- the UE is allowed an interruption on any active serving cell in SCG:
 - of up to X1 slot, if the active serving cell is not in the same band as any of the SCells being added or released, or
 - of up to Y1 slot + $T_{SMTC_duration}$ if the active serving cells are in the same band as any of the SCells being added or released, provided the cell specific reference signals from the active serving cells and the SCells being added or released are available in the same slot, where, $T_{SMTC_duration}$ is
 - the longest SMTC duration among all above active serving cells in SCG and the SCell being added when one SCell is added. If SSB configuration (absoluteFrequencySSB) but no SMTC configuration is provided for the SCell being added, the SSB transmission periodicity is assumed to be 5ms and T_{SMTC} duration for the SCell being added is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being added. If no SSB configuration (absoluteFrequencySSB) nor SMTC configuration is provided for the SCell being added, T_{SMTC duration} for the SCell being added is 0 ms;
 - the longest SMTC duration among all above active serving cells in SCG when one SCell is released.

Where X1 and Y1 are specified in Table 8.2.1.2.3-2.

Table 8.2.1.2.3-1: Interruption length X1 and Y1 at E-UTRA SCell addition/Release

μ	NR Slot length		n length X1 ots)	Interruption le	ngth Y1 (slots)
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	2	3	2	3
2	0.25		5	4	5
3	0.125	9	9	N/A	N/A

Table 8.2.1.2.3-2: Interruption length X1 and Y1 at SCell addition/Release

μ	NR Slot length (ms) of victim cell	Interruption length X1 (slots)		Interruption length Y1 (slots)
0	1	1		1
1	0.5	2		2
2	0.25	Both aggressor cell and 4 victim cell are on FR2		4
		Either aggressor cell or victim cell is on FR1	5	
3	0.125	Aggressor cell is on FR2	8	8
		Aggressor cell is on FR1	9	

8.2.1.2.4 Interruptions at SCell activation/deactivation

The requirements in this clause shall apply for the UE configured with PSCell and one SCell.

When one E-UTRA SCell in MCG is activated or deactivated:

- the UE is allowed an interruption on any active serving cell in SCG:
 - of up to X2 slot, if the active serving cell is not in the same band as the E-UTRA SCell being activated or deactivated, or
 - of up to $max\{Y2\ slot + T_{SMTC_duration}, 5ms\}$ if the active serving cells are in the same band as the E-UTRA SCell being activated or deactivated, provided the cell specific reference signals from the active serving cells and the E-UTRA SCell being activated or deactivated are available in the same slot, where $T_{SMTC_duration}$ is the longest SMTC duration among all above active serving cells in SCG.

Where X2 and Y2 are specified in Table 8.2.1.2.4-1.

When one SCell in SCG is activated or deactivated:

- an interruption on any serving cell in SCG:
 - of up to X2 slot, if the active serving cell is not in the same band as the SCell being activated or deactivated, or
 - of up to Y2 slot + T_{SMTC_duration} if the active serving cells are in the same band as the SCell being activated or deactivated, provided the cell specific reference signals from the active serving cells and the SCell being activated or deactivated are available in the same slot, where, T_{SMTC_duration} is
 - the longest SMTC duration among all above active serving cells in SCG and the SCell being activated when one SCell is activated. If SSB configuration (*absoluteFrequencySSB*) but no SMTC configuration is provided for the SCell being activated, the SSB transmission periodicity is assumed to be 5ms and T_{SMTC} duration for the SCell being activated is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being activated. If no SSB configuration (*absoluteFrequencySSB*) nor SMTC configuration is provided for the SCell being activated, T_{SMTC duration} for the SCell being activated is 0ms;
 - the longest SMTC duration among all above active serving cells in SCG when one SCell is deactivated.

Where X2 and Y2 are specified in Table 8.2.1.2.4-2.

Table 8.2.1.2.4-1: Interruption length X2 and Y2 at E-UTRA SCell activation/deactivation

μ	NR Slot length		n length X2 ots)	Interruption le	ngth Y2 (slots)
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	1	2	1	2
2	0.25	;	3	2	3
3	0.125		5	N/A	N/A

Table 8.2.1.2.4-2: Interruption length X2 and Y2 at SCell activation/deactivation

μ	NR Slot length (ms) of victim cell	Interruption length X2 (slots)		Interruption length Y2 (slots)
0	1	1		1
1	0.5	1		1
2	0.25	Both aggressor cell and victim 2 cell are on FR2		2
		Either aggressor cell or victim cell is on FR1	3	
3	0.125	Aggressor cell is on FR2	4	4
		Aggressor cell is on FR1	5	

8.2.1.2.5 Interruptions during measurements on SCC

8.2.1.2.5.1 Interruptions during measurements on deactivated NR SCC

Interruption on PSCell and other activated NR SCell(s) during measurement on the deactivated NR SCC shall meet requirements in clause 8.2.2.2.3, where the term PCell in clause 8.2.2.2.3 shall be deemed to be replaced with PSCell.

8.2.1.2.5.2 Interruptions during measurements on deactivated E-UTRAN SCC

When one E-UTRA SCell in MCG is deactivated, the UE is allowed due to measurements on the E-UTRA SCC with the deactivated E-UTRA SCell:

- an interruption on PSCell or any activated SCell with up to 0.5% probability of missed ACK/NACK when any of the configured *measCycleSCell* [15] for the deactivated E-UTRA SCells is 640 ms or longer.
- an interruption on PSCell or any activated SCell with up to 0.5% probability of missed ACK/NACK regardless of the configured *measCycleSCell* [15] for the deactivated E-UTRA SCells if indicated by the network using IE *allowInterruptions* [15].

Each interruption shall not exceed

- X3 slot, if the PSCell or activated SCell is not in the same band as the E-UTRA deactivated SCC being measured, or
- Y3 slot + SMTC duration, if the PSCell or activated SCell is in the same band as the E-UTRA deactivated SCC being measured, provided the cell specific reference signals from the PSCell or activated SCell and the E-UTRA deactivated SCC being measured are available in the same slot.

Table 8.2.1.2.5.2-1: Interruption length X3 and Y3 at measurements on deactivated E-UTRA SCC

μ	NR Slot length	Interruption length X3 (slots)		Interruption le	ngth Y3 (slots)
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	1	2	1	2
2	0.25		3	2	3
3	0.125		5	N/A	N/A

8.2.1.2.6 Interruptions at UL carrier RRC reconfiguration

The requirements in this clause shall apply when a supplementary UL carrier or an UL carrier is configured or deconfigured in NR non-standalone operation as defined in TS 38.331 [2].

When an UL carrier or supplementary UL carrier is configured or de-configured, an interruption of up to X4 slot, is allowed during the RRC reconfiguration procedure [2] on E-UTRA PCell, all activated E-UTRA SCells, PSCell and all activated SCells within the same FR as the reconfigured uplink carrier. The interruption is for both uplink and downlink of E-UTRA PCell, all activated E-UTRA SCells, PSCell and all activated SCells within the same FR as the configured or de-configured UL.

Table 8.2.1.2.6-1: Interruption length X4 at UL carrier RRC reconfiguration

μ	NR Slot length (ms)	Interruption length X4 (slots)	
		Sync	Async
0	1	1	2
1	0.5	2	3
2	0.25	Į.	5
3	0.125	Ç	9

8.2.1.2.7 Interruptions due to Active BWP switching Requirement

The requirements for DCI-based and timer-based BWP switches in this clause only apply to the case that the BWP switch is performed on a single CC.

When UE receives a DCI indicating UE to switch its active BWP involving changes in any of the parameters listed in Table 8.2.1.2.7-2, the UE is allowed to cause interruption of up to X slot to other active serving cells if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.1.2.7-2 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 8.2.1.2.7-1. The starting time of interruption is only allowed within the BWP switching delay $T_{BWPswitchDelay}$ as defined in clause 8.6.2. Interruptions are not allowed during BWP switch involving any other parameter change.

When a BWP timer *bwp-InactivityTimer* defined in TS 38.331 [2] expires, UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active BWP involving changes in any of the parameters listed in Table 8.2.1.2.7-2 if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.1.2.7-2 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 8.2.1.2.7-1. The starting time of interruption is only allowed within the BWP switching delay $T_{\text{BWPswitchDelay}}$ as defined in clause 8.6.2. Interruptions are not allowed during BWP switch involving any other parameter change.

When UE receives an RRC reconfiguration that only requests UE to switch its active BWP on one single CC, the UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active BWP involving changes in any of the parameters listed in Table 8.2.1.2.7-2 if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.1.2.7-2 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 8.2.1.2.7-1. The interruption is only allowed within the delay $T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}$ defined in clause 8.6.3.

 μ
 NR Slot length (ms)
 Interruption length X (slots)

 0
 1
 1

 1
 0.5
 1

 2
 0.25
 3

 3
 0.125
 5

 Note1:
 void

Table 8.2.1.2.7-1: interruption length X

Table 8.2.1.2.7-2: Parameters which cause interruption other than SCS

Parameters	Comment
locationAndBandwidth	From TC 20 224 [2]
nrofSRS-Ports	From TS 38.331 [2]

8.2.2 SA: Interruptions with Standalone NR Carrier Aggregation

8.2.2.1 Introduction

This clause contains the requirements related to the interruptions on PCell and activated SCell if configured, when

up to 7 SCells are configured, de-configured, activated or deactivated, or

a supplementary UL carrier or an UL carrier is configured or de-configured, or

measurements on SCC with deactivated SCell in NR SCG, or

UL/DL BWP is switched on PCell or SCell.

Note: interruptions at SCell addition/release, activation/deactivation and during measurements on SCC may not be required by all UEs.

The interruptions shall not interrupt RRC signalling or ACK/NACKs related to RRC reconfiguration procedure [2] for SCell addition/release or MAC control signalling [17] for SCell activation/deactivation command.

This clause additionally contains requirements related to interruptions at inter-frequency SFTD between PCell in FR1 and neighbour cell in FR2.

For a UE which does not support per-FR measurement gap, interruptions to the PCell and activated SCell may be caused by SCells on any frequency range. For a UE which supports per-FR gap, interruptions to PCell and activated SCell may be caused by SCells on the same frequency range as the victim cell.

8.2.2.2 Requirements

8.2.2.2.1 Interruptions at SCell addition/release

When any number of SCells between one and 7 is added or released using the same *RRCConnectionReconfiguration* message as defined in TS 38.331 [2], the UE is allowed an interruption on any active serving cell during the RRC reconfiguration procedure as follows:

- an interruption on any active serving cell:
 - of up to the duration shown in table 8.2.2.2.1-1, if the active serving cell is not in the same band as the SCell being added or released, or
 - of up to the duration shown in table 8.2.2.2.1-2, if the active serving cells are in the same band as the SCell being added or released, provided the cell specific reference signals from the active serving cells and the SCell being added or released are available in the same slot.

Table 8.2.2.2.1-1: Interruption duration for SCell addition/release for inter-band CA

μ	NR Slot length (ms) of victim cell	Interruption length (slots)		
0	1	1		
1	0.5	2		
2	0.25	Both aggressor cell and victim cell are on FR2	4	
		Either aggressor cell or victim cell is on FR1	5	
3	0.125	Aggressor cell is on FR2	8	
		Aggressor cell is on FR1	9	

Table 8.2.2.2.1-2: Interruption duration for SCell addition/release for intra-band CA

	NR Slot length (ms)	Interruption length (slot)
μ		
0	1	1 + T _{SMTC_duration} * $N_{\text{slot}}^{\text{subframe},\mu}$
1	0.5	2 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$
2	0.25	$4 + T_{\text{SMTC_duration}} * N_{\text{slot}}^{\text{subframe}, \mu}$
3	0.125	8 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$

NOTE 1: T_{SMTC_duration} measured in subframes is

- the longest SMTC duration among all above active serving cells and the SCell being added when one SCell is added. If SSB configuration (*absoluteFrequencySSB*) but no SMTC configuration is provided for the SCell being added, the SSB transmission periodicity is assumed to be 5ms and T_{SMTC duration} for the SCell being added is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being added. If no SSB configuration (*absoluteFrequencySSB*) nor SMTC configuration is provided for the SCell being added, T_{SMTC duration} for the SCell being added is 0ms; - the longest SMTC duration among all active serving cells in the same band when one SCell is released.

NOTE 2: $N_{\text{slot}}^{\text{subframe},\mu}$ is as defined in TS 38.211 [6].

8.2.2.2.2 Interruptions at SCell activation/deactivation

When an intra-band SCell is activated or deactivated as defined in TS 37.340 [17], the UE is allowed

- an interruption on any active serving cell:
 - of up to the duration shown in table 8.2.2.2.1, if the active serving cell is not in the same band as the SCell being activated or deactivated, or

- of up to the duration shown in table 8.2.2.2.2-2, if the active serving cells are in the same band as the SCell being activated or deactivated provided the cell specific reference signals from the active serving cells and the SCell being activated or deactivated are available in the same slot.

Table 8.2.2.2.2-1: Interruption duration for SCell activation/deactivation for inter-band CA

μ	NR Slot length (ms) of victim cell	Interruption length (slots)			
0	1		1		
1	0.5		1		
2	0.25	Both aggressor cell and victim cell are on FR2	2		
		Either aggressor cell or victim cell is on FR1	3		
3	0.125	Aggressor cell is on FR2	4		
		Aggressor cell is on FR1	5		

Table 8.2.2.2.2: Interruption duration for SCell activation/deactivation for intra-band CA

μ	NR Slot length (ms)	Interruption length (slots)
0	1	1 + Tsmtc_duration $*N_{ m slot}^{ m subframe, \mu}$
1	0.5	1 + T _{SMTC_duration} $*N_{\mathrm{slot}}^{\mathrm{subframe},\mu}$
2	0.25	$2 + T_{\text{SMTC_duration}} * N_{\text{slot}}^{\text{subframe}, \mu}$
3	0.125	4 + T _{SMTC_duration} * $N_{\text{slot}}^{\text{subframe},\mu}$

NOTE 1: T_{SMTC_duration} measured in subframes is

- the longest SMTC duration among all above active serving cells and the SCell being activated when one SCell is activated. If SSB configuration (*absoluteFrequencySSB*) but no SMTC configuration is provided for the SCell being activated, the SSB transmission periodicity is assumed to be 5ms and T_{SMTC duration} for the SCell being activated is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being activated. If no SSB configuration (*absoluteFrequencySSB*) nor SMTC configuration is provided for the SCell being activated, T_{SMTC duration} for the SCell being activated is 0ms:

- the longest SMTC duration among all active serving NOTE 2: $N_{\text{clot}}^{\text{subframe},\mu}$ is as defined in TS 38.211 [6].

8.2.2.2.3 Interruptions during measurements on deactivated SCC

Interruptions on PCell or activated SCell(s) due to measurements when an SCell is deactivated are allowed with up to 0.5% probability of missed ACK/NACK when the configured *measCycleSCell* [2] is 640 ms or longer.

- If the PCell or activated SCell(s) is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on PCell or activated SCell(s) immediately before and immediately after an SMTC. Each interruption shall not exceed requirement in Table 8.2.2.2.2-1.
- If the PCell or activated SCell(s) is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PCell or activated SCell(s) no earlier than X slots before T_{SMTC_duration} and no later than X slots after T_{SMTC_duration}, provided the cell specific reference signals from the active serving cells and the deactivated SCell are available in the same slot, where X and T_{SMTC_duration} are given by Table 8.2.2.2.3-1. The interruption shall not exceed requirements in Table 8.2.2.2.3-1.

Table 8.2.2.2.3-1: Interruption duration for measurement on deactivated SCell for intra-band CA

μ	NR Slot length (ms)	X (slots)	Interruption length (slots)
0	1	1	2 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$
1	0.5	1	$2 + T_{SMTC_duration} * N_{slot}^{subframe, \mu}$

2	0.25	2	4 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$			
3	0.125	4	8 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$			
NOTE 1: T _{SMTC_duration} measured in subframes is the longest SMTC duration among all above active serving cells and the deactivated SCell to be measured;						
NOTE 2: N ^{subframe, \mu} is as defined in TS 38 211 [6]						

8.2.2.2.4 Interruptions at UL carrier RRC reconfiguration

The requirements in this clause shall apply when a supplementary UL carrier or an UL carrier is configured or deconfigured in NR standalone carrier aggregation as defined in TS 38.331 [2].

When an UL carrier or supplementary UL carrier is configured or de-configured, an interruption of up to the duration shown in table 8.2.2.2.4-1, is allowed during the RRC reconfiguration procedure [2] on PCell and all activated SCells within the same FR as the reconfigured uplink carrier. The interruption is for both uplink and downlink of PCell and all the activated SCells within the same FR as the configured or de-configured UL.

Table 8.2.2.2.4-1: Interruption duration for UL carrier RRC reconfiguration

μ	NR Slot length (ms)	Interruption length (slots)
0	1	1
1	0.5	2
2	0.25	4
3	0.125	8

8.2.2.2.5 Interruptions due to Active BWP switching Requirement

The requirements for DCI-based and timer-based BWP switches in this clause only apply to the case that the BWP switch is performed on a single CC.

When UE receives a DCI indicating UE to switch its active BWP involving changes in any of the parameters listed in Table 8.2.2.2.5-2, the UE is allowed to cause interruption of up to X slot to other active serving cells if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.2.2.5-2 and the UE is capable of per-FR gap the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 8.2.2.2.5-1. The starting time of interruption is only allowed within the BWP switching delay $T_{\text{BWPswitchDelay}}$ as defined in clause 8.6.2. Interruptions are not allowed during BWP switch involving any other parameter change.

When a BWP timer *bwp-InactivityTimer* defined in TS 38.331 [2] expires, UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active BWP involving changes in any of the parameters listed in Table 8.2.2.2.5-2 if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.2.2.5-2 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 8.2.2.2.5-1. The starting time of interruption is only allowed within the BWP switching delay $T_{\rm BWPswitchDelay}$ as defined in clause 8.6.2. Interruptions are not allowed during BWP switch involving any other parameter change.

When UE receives an RRC reconfiguration that only requests UE to switch its active BWP on one single CC, the UE is allowed to cause interruption of up to X slot to other active serving cells due to switching its active BWP involving changes in any of the parameters listed in Table 8.2.2.2.5-2 if the UE is not capable of per-FR gap, or if the BWP switching involves SCS changing. When the BWP switch imposes changes in any of the parameters listed in Table 8.2.2.2.5-2 and the UE is capable of per-FR gap, the UE is allowed to cause interruption of up to X slot to other active serving cells in the same frequency range wherein the UE is performing BWP switching. X is defined in Table 8.2.2.2.5-1. The interruption is only allowed within the delay $T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}$ defined in clause 8.6.3.

Table 8.2.2.2.5-1: Interruption length X

μ	NR Slot length (ms)	Interruption length X (slots)
0	1	1
1	0.5	1
2	0.25	3
3	0.125	5
Note1:	void	

Table 8.2.2.2.5-2: Parameters which cause interruption other than SCS

Parameters	Comment	
locationAndBandwidth	From TS 38.331 [2]	
nrofSRS-Ports	F10111 13 36.331 [2]	

8.2.2.2.6 Interruptions at inter-frequency SFTD measurement

The requirements in this clause concern interruptions on PCell, as well as on activated SCells in MCG, when the UE is performing SFTD measurements on inter-frequency neighbour cell(s). The following requirements apply when no PSCell is configured.

For a UE with per-FR gap capability:

- for neighbour cell in FR1:
 - the percentage of interrupted slots on uplink and downlink on FR1 serving cells during the SFTD measurement period T_{measure_SFTD1} specified in Clause 9.3.8 shall not exceed the percentages specified in Table 8.2.2.2.6-1. No interruption is allowed on FR2 serving cells.
 - the length of each interruption on FR1 serving cells shall not exceed the number of slots specified in Table 8.2.2.2.6-2.
- for neighbour cell in FR2:
 - the percentage of interrupted slots on uplink and downlink on FR2 serving cells during the SFTD measurement period T_{measure_SFTD1} specified in Clause 9.3.8 shall not exceed the percentages specified in Table 8.2.2.2.6-1. No interruption is allowed on FR1 serving cells.
 - the length of each interruption on FR2 serving cells shall not exceed the number of slots specified in Table 8.2.2.2.6-2.

For a UE with per-UE gap capability:

- for neighbour cell in FR1 or FR2:
 - the percentage of interrupted slots on uplink and downlink on FR1 and FR2 serving cells during the SFTD measurement period T_{measure_SFTD1} specified in Clause 9.3.8 shall not exceed the percentages specified in Table 8.2.2.2.6-1.
 - the length of each interruption on FR1 and FR2 serving cells shall not exceed the number of slots specified in Table 8.2.2.2.6-2.

Table 8.2.2.2.6-1: Requirements on maximum percentage of interrupted slots in serving cell in interfrequency SFTD

SFTD	Serving	Neighbour cell SMTC periodicity					
configuration	cell µ	5ms	10ms	20ms	40ms	80ms	160ms
With RSRP	0						
report	1	0.40/	6.20/	8.4%	6.20/	F 20/	4.7%
	2	8.4%	6.3%	0.4%	6.3%	5.3%	4.7%
	3						

Without RSRP	0						
report	1	44 40/	0.60/	7.00/	6.00/	6.20/	6.00/
	2	11.4%	8.6%	7.9%	6.8%	6.3%	6.0%
	3						

Table 8.2.2.2.6-2: Interruption duration for FR1 serving cell in inter-frequency SFTD with neighbour cell in FR1

μ	NR Slot length (ms)	Interruption length (slots)
0	1	1
1	0.5	2
2	0.25	4
3	0.125	8

Table 8.2.2.2.6-3: Void

Table 8.2.2.2.6-4: Void

8.2.3 NE-DC Interruptions

8.2.3.1 Introduction

This clause contains the requirements related to the interruptions on PCell and SCell, when

E-UTRA PSCell transitions between active and non-active during DRX, or

E-UTRA PSCell transitions from non-DRX to DRX, or

E-UTRA PSCell/SCell in SCG or SCell in MCG is added or released, or

E-UTRA PSCell/SCell in SCG or SCell in MCG is activated or deactivated, or

measurements on SCC with deactivated SCell in either E-UTRA SCG or NR MCG or

PUSCH/PUCCH carrier configuration and deconfiguration in NR MCG, or

UL/DL BWP is switched on PCell or SCell in MCG.

The requirements shall apply for NE-DC with an NR PCell.

This clause contains interruptions where victim cell is PCell or SCell belonging to MCG. Requirements for interruptions requirements when the victim cell is E-UTRA PSCell or E-UTRA SCell belonging to SCG are specified in TS 36.133 [15].

For a UE which does not support per-FR measurement gap, interruptions to the PCell, E-UTRA PSCell or activated MCG SCells may be caused by EUTRA PSCell, EUTRA SCells or SCells on any frequency range. For UE which support per-FR gap, interruptions to the PCell, E-UTRA PSCell or activated MCG SCells may be caused by EUTRA PSCell, EUTRA SCells or SCells on the same frequency range as the victim cell.

8.2.3.2 Requirements

8.2.3.2.1 Interruptions at transitions between active and non-active during DRX

Interruption on PCell and the activated SCell if configured due to E-UTRA PSCell transitions between active and non-active druing DRX when PCell or SCell is in non-DRX are allowed with up to 1% probability of missed ACK/NACK when the configured E-UTRA PSCell DRX cycle is less than 640 ms, and 0.625% probability of missed ACK/NACK is allowed when the configured E-UTRA PCell DRX cycle is 640 ms or longer. Each interruption shall not exceed X slot as defined in table 8.2.3.2.1-1.

Table 8.2.3.2.1-1: Interruption length X at transition between active and non-active during DRX

μ	NR slot length (ms)	Interruption length X (slots)		
		Sync	Async	
0	1	1	2	
1	0.5	1	2	
2	0.25	3		
3	0.125	5		

When both PCell and E-UTRA PSCell are in DRX, no interruption is allowed.

8.2.3.2.2 Interruptions at transitions from non-DRX to DRX

Interruption on PCell and the activated SCell if configured due to E-UTRA PSCell transitions from non-DRX to DRX when PCell or SCell is in non-DRX shall not exceed X slot as defined in table 8.2.3.2.1-1.

8.2.3.2.3 Interruptions at PSCell/SCell addition/release

The requirements in this clause shall apply for the UE configured with E-UTRA PSCell.

When one E-UTRA PSCell/SCell in SCG is added or released:

- the UE is allowed an interruption on any active serving cell in MCG:
 - of up to X1 slots, if the active serving cell is not in the same band as the E-UTRA PSCell/SCell being added or released, or
 - of up to max{Y1 slots+ T_{SMTC_duration}, 5ms} if the active serving cells are in the same band as the E-UTRA PSCell/SCell being added or released, provided the cell specific reference signals from the active serving cells and the E-UTRA PSCell/SCell being added or released are available in the same slot, where T_{SMTC_duration} is the longest SMTC duration among all above activated serving cells in MCG;

Where X1 and Y1 are specified in Table 8.2.3.2.3-1.

When one SCell in MCG is added or released:

- the UE is allowed an interruption on any activated serving cell in MCG:
 - of up to X1 slots, if the active serving cell is not in the same band as the SCell being added or released, or
 - of up to Y1 slots + T_{SMTC_duration} if the active serving cells are in the same band as the SCell being added or released, provided the cell specific reference signals from the active serving cells and the SCell being added or released are available in the same slot, where, T_{SMTC duration} is
 - the longest SMTC duration among all above active serving cells in MCG and the SCell being added when one SCell is added. If SSB configuration (absoluteFrequencySSB) but no SMTC configuration is provided for the SCell being added, the SSB transmission periodicity is assumed to be 5ms and T_{SMTC} duration for the SCell being added is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being added. If no SSB configuration (absoluteFrequencySSB) nor SMTC configuration is provided for the SCell being added, T_{SMTC duration} for the SCell being added is 0ms;
 - the longest SMTC duration among all above active serving cells in MCG when one SCell is released.

Where X1 and Y1 are specified in Table 8.2.3.2.3-2.

Table 8.2.3.2.3-1: Interruption length X1 and Y1 at E-UTRA PSCell/SCell addition/release

μ	NR Slot length	Interruption length X1 (slots)		Interruption length Y1 (slots)	
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	2	3	2	3

2	0.25	5	4	5
3	0.125	9	N/A	N/A

Table 8.2.3.2.3-2: Interruption length X1 and Y1 at SCell addition/Release

μ	NR Slot length (ms) of victim cell	Interruption length X1 (slots)		Interruption length Y1 (slots)
0	1	1		1
1	0.5	2		2
2	0.25	Both aggressor cell and victim cell are on FR2	4	4
		Either aggressor cell or victim cell is on FR1	5	
3	0.125	Aggressor cell is on FR2	8	8
		Aggressor cell is on FR1	9	

8.2.3.2.4 Interruptions at SCell activation/deactivation

The requirements in this clause shall apply for the UE configured with E-UTRA PSCell and one SCell.

When one E-UTRA SCell in SCG is activated or deactivated:

- the UE is allowed an interruption on any active serving cell in MCG:
 - of up to X2 slots, if the active serving cell is not in the same band as the E-UTRA SCell being activated or deactivated, or
 - of up to max{Y2 slots + T_{SMTC_duration}, 5ms} if the active serving cells are in the same band as the E-UTRA SCell being activated or deactivated, provided the cell specific reference signals from the active serving cells and the E-UTRA SCell being activated or deactivated are available in the same slot, where T_{SMTC_duration} is the longest SMTC duration among all above active serving cells in MCG.

Where X2 and Y2 are specified in Table 8.2.3.2.4-1.

When one SCell in MCG is activated or deactivated:

- the UE is allowed an interruption on any serving cell in MCG:
 - of up to X2 slots, if the active serving cell is not in the same band as the SCell being activated or deactivated, or
 - of up to Y2 slots + T_{SMTC_duration} if the active serving cells are in the same band as the SCell being activated or deactivated, provided the cell specific reference signals from the active serving cells and the SCell being activated or deactivated are available in the same slot, where, T_{SMTC duration} is
 - the longest SMTC duration among all above active serving cells in MCG and the SCell being activated when one SCell is activated, If SSB configuration (*absoluteFrequencySSB*) but no SMTC configuration is provided for the SCell being activated, the SSB transmission periodicity is assumed to be 5ms and T_{SMTC} duration for the SCell being activated is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being activated. If no SSB configuration (*absoluteFrequencySSB*) nor SMTC configuration is provided for the SCell being activated, T_{SMTC} duration for the SCell being activated is 0ms;
 - the longest SMTC duration among all above active serving cells in MCG when one SCell is deactivated.

Where X2 and Y2 are specified in Table 8.2.3.2.4-2.

Table 8.2.3.2.4-1: Interruption length X2 and Y2 at E-UTRA SCell activation/deactivation

//	Interruption length X2	Interruption length Y2 (slots)
μ.	(slots)	

	NR Slot length (ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	1	2	1	2
2	0.25	•	3	2	3
3	0.125	;	5	N/A	N/A

Table 8.2.3.2.4-2: Interruption length X2 and Y2 at SCell activation/deactivation

μ	NR Slot length (ms) of victim cell	Interruption len	gth X2 (slots)	Interruption length Y2 (slots)
0	1	1	1	
1	0.5	1		1
2	0.25	Both aggressor cell and victim cell are on FR2	2	2
		Either aggressor cell or victim cell is on FR1	3	
3	0.125	Aggressor cell is on FR2	4	4
		Aggressor cell is on FR1	5	

8.2.3.2.5 Interruptions during measurements on SCC

8.2.3.2.5.1 Interruptions during measurements on deactivated NR SCC

Interruption on PCell and other activated SCell(s) during measurement on the deactivated NR SCC shall meet requirements in clause 8.2.2.2.3.

8.2.3.2.5.2 Interruptions during measurements on deactivated E-UTRAN SCC

When one E-UTRA SCell in SCG is deactivated, the UE is allowed due to measurements on the E-UTRA SCC with the deactivated E-UTRA SCell:

- an interruption on PCell or any activated SCell with up to 0.5% probability of missed ACK/NACK when any of the configured *measCycleSCell* [15] for the deactivated E-UTRA SCells is 640 ms or longer.
- an interruption on PCell or any activated SCell with up to 0.5% probability of missed ACK/NACK regardless of the configured *measCycleSCell* [15] for the deactivated E-UTRA SCells if indicated by the network using IE *allowInterruptions* [15].

Each interruption shall not exceed

- X3 slots, if the PCell or activated SCell is not in the same band as the E-UTRA deactivated SCC being measured, or
- Y3 slots + SMTC duration, if the PCell or activated SCell is in the same band as the E-UTRA deactivated SCC being measured, provided the cell specific reference signals from the PCell or activated SCell and the E-UTRA deactivated SCC being measured are available in the same slot.

Where X3 and Y3 are specified in Table 8.2.3.2.5-1

Table 8.2.3.2.5-1: Interruption length X3 and Y3 at measurements on deactivated E-UTRA SCC

μ	NR Slot length	Interruption length X3 (slots)		Interruption le	ength Y3 (slot)
	(ms)	Sync	Async	Sync	Async
0	1	1	2	1	2
1	0.5	1	2	1	2
2	0.25		3	2	3

3	0.125	5	N/A	N/A

8.2.3.2.6 Interruptions at UL carrier RRC reconfiguration

The requirements in this clause shall apply when a supplementary UL carrier or an UL carrier is configured or deconfigured in NE-DC.

When an UL carrier or supplementary UL carrier is configured or deconfigured, an interruption of up to X4 slot as specified in Table 8.2.3.2.6-1, is allowed during the RRC reconfiguration procedure in TS 38.331 [2] on PCell, all activated SCells within the same FR as the reconfigured uplink carrier. The interruption is for both uplink and downlink of PCell, all activated E-UTRA SCells, E-UTRA PSCell and all activated SCells within the same FR as the configured or de-configured UL.

Table 8.2.3.2.6-1: Interruption length X4 at UL carrier RRC reconfiguration

μ	NR Slot length (ms)	Interruption length X4 (slots)	
		Sync	Async
0	1	1	2
1	0.5	2	3
2	0.25	;	5
3	0.125	9	

8.2.3.2.7 Interruptions due to Active BWP switching Requirement

The requirements for DCI-based and timer-based BWP switches in this clause only apply to the case that the BWP switch is performed on a single CC.

When UE receives a DCI indicating the UE to switch its active BWP, or when a BWP timer *bwp-InactivityTimer* defined in TS 38.331 [2] expires, or when the UE receives an RRC command indicating the UE to switch its active BWP, the UE is allowed an interruption on PCell and any activated SCells as defined in clause 8.2.2.2.5.

8.2.4 NR-DC: Interruptions

8.2.4.1 Introduction

This clause contains the requirements related to the interruptions on PCell, PSCell and activated SCell if configured, when

SCells are configured, de-configured, activated or deactivated or,

a supplementary UL carrier or an UL carrier is configured or de-configured, or

measurements on SCC with deactivated SCell in NR SCG, or

UL/DL BWP is switched on PCell, PSCell or SCell.transitions between active and non-active during DRX, or transitions from non-DRX to DRX.

Note: interruptions at SCell addition/release, activation/deactivation and during measurements on SCC may not be required by all UEs.

The interruptions shall not interrupt RRC signalling or ACK/NACKs related to RRC reconfiguration procedure [2] for SCell addition/release or MAC control signalling [17] for SCell activation/deactivation command. How to specify this is FFS

The requirements shall apply for NR-DC with an NR PCell, PSCell or SCell.

For a UE which does not support per-FR measurement gap, interruptions to the PCell and activated SCell may be caused by SCells on any frequency range. For a UE which supports per-FR gaps, interruptions to PCell, PSCell and activated SCell may be caused by SCells on the same frequency range as the victim cell.

8.2.4.2 Requirements

8.2.4.2.1 Interruptions at PSCell/SCell addition/release

When PSCell or one or more SCells is added or released using the same *RRCConnectionReconfiguration* message as defined in TS 38.331 [2], the UE is allowed an interruption on any activated serving cell during the RRC reconfiguration procedure as follows:

- an interruption on any active serving cell:
 - of up to the duration shown in table 8.2.4.2.1-1, if the active serving cell is not in the same band as the SCell being added or released, or
 - of up to the duration shown in table 8.2.4.2.1-2, if the active serving cells are in the same band as the SCell being added or released, provided the cell specific reference signals from the active serving cells and the SCell being added or released are available in the same slot.

Table 8.2.4.2.1-1: Interruption duration for PSCell/SCell addition/release for inter-band DC/CA

μ	NR Slot length (ms) of victim cell	Interruptio	n length (slots)		
0	1	1			
1	0.5	2			
2	0.25	Both aggressor cell and victim cell are on FR2	4		
		Either aggressor cell or victim cell is on FR1	5		
3	0.125	Aggressor cell is on FR2 8			
		Aggressor cell is on FR1	9		

Table 8.2.4.2.1-2: Interruption duration for SCell addition/release for intra-band DC/CA

μ	NR Slot length (ms)	Interruption length (slots)
,		2016
0	1	1 + $T_{SMTC_duration} * N_{slot}^{subframe, \mu}$
1	0.5	2 + T _{SMTC_duration} * $N_{ m slot}^{ m subframe, }\mu$
2	0.25	4 + $T_{SMTC_duration} * N_{slot}^{subframe, \mu}$
3	0.125	8 + T _{SMTC_duration} * $N_{\rm slot}^{\rm subframe, \mu}$

NOTE 1: T_{SMTC_duration} measured in subframes is

- the longest SMTC duration among all above activeserving cells and the SCell being added when one SCell is added. If SSB configuration (absoluteFrequencySSB) but no SMTC configuration is provided for the SCell being added, the SSB transmission periodicity is assumed to be 5ms and $T_{SMTC\ duration}$ for the SCell being added is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being added. If no SSB configuration (absoluteFrequencySSB) nor SMTC configuration is provided for the SCell being added, $T_{SMTC\ duration}$ for the SCell being added is 0ms;

- the longest SMTC duration among all active serving cells in the same band when one SCell is released.

NOTE 2: $N_{\text{slot}}^{\text{subframe},\mu}$ is as defined in TS 38.211 [6].

8.2.4.2.2 Interruptions at SCell activation/deactivation

When a SCell is activated or deactivated as defined in TS 37.340 [17], the UE is allowed

- an interruption on any active serving cell:
 - of up to the duration shown in table 8.2.4.2.2-1, if the active serving cell is not in the same band as the SCell being activated or deactivated, or

- of up to the duration shown in table 8.2.4.2.2-2, if the active serving cells are in the same band as the SCell being activated or deactivated provided the cell specific reference signals from the active serving cells and the SCell being activated or deactivated are available in the same slot.

Table 8.2.4.2.2-1: Interruption duration for SCell activation/deactivation for inter-band DC/CA

μ	NR Slot length (ms) of victim cell	Interruption le	ngth (slots)	
0	1	1		
1	0.5	1		
2	0.25	Both aggressor cell and 2 victim cell are on FR2		
		Either aggressor cell or 3 victim cell is on FR1		
3	0.125	Aggressor cell is on FR2	4	
		Aggressor cell is on FR1	5	

Table 8.2.4.2.2-2: Interruption duration for SCell activation/deactivation for intra-band DC/CA

μ	NR Slot length (ms)	Interruption length (slots)
0	1	1 + T _{SMTC_duration} * $N_{\text{slot}}^{\text{subframe},\mu}$
1	0.5	1 + T _{SMTC_duration} * N _{slot} ^{subframe, μ}
2	0.25	2 + T _{SMTC_duration} * $N_{\text{slot}}^{\text{subframe}, \mu}$
3	0.125	$4 + T_{\text{SMTC_duration}} * N_{\text{slot}}^{\text{subframe}, \mu}$

NOTE 1: T_{SMTC_duration} measured in subframes is

- the longest SMTC duration among all above active serving cells and the SCell being activated when one SCell is activated. If SSB configuration (absoluteFrequencySSB) but no SMTC configuration is provided for the SCell being activated, the SSB transmission periodicity is assumed to be 5ms and $T_{\text{SMTC duration}}$ for the SCell being activated is x ms, where x = the number of consecutive subframes containing all SSBs in one SSB burst transmitted by the SCell being activated. If no SSB configuration (absoluteFrequencySSB) nor SMTC configuration is provided for the SCell being activated, $T_{\text{SMTC duration}}$ for the SCell being activated is 0ms;
- the longest SMTC duration among all active serving cells in the same band when one SCell is deactivated.

NOTE 2: $N_{\rm slot}^{\rm subframe, \mu}$ is as defined in TS 38.211 [6].

8.2.4.2.3 Interruptions during measurements on SCC

Interruption on PCell, PSCell and other activated SCell(s) during measurement on the deactivated NR SCC shall meet requirements in clause 8.2.2.2.3, where the term PCell in clause 8.2.2.2.3 shall be deemed to be replaced with SpCell.

8.2.4.2.4 Interruptions at UL carrier RRC reconfiguration

The requirements in this clause shall apply when a supplementary UL carrier or an UL carrier is configured or deconfigured in NR-DC as defined in TS 38.331 [2].

When an UL carrier or supplementary UL carrier is configured or de-configured, an interruption of up to the duration shown in table 8.2.4.2.4-1, is allowed during the RRC reconfiguration procedure in TS 38.331 [2] on all the other activated serving cells within the same FR as the reconfigured uplink carrier. The interruption is for both uplink and downlink of all the other serving cells within the same FR as the configured or de-configured UL.

Table 8.2.4.2.4-1: Interruption duration for UL carrier RRC reconfiguration

μ	NR Slot length (ms)	Interruption length (slots)
0	1	1

1	0.5	2
2	0.25	4
3	0.125	8

8.2.4.2.5 Interruptions due to Active BWP switching Requirement

The requirements for DCI-based and timer-based BWP switches in this clause only apply to the case that the BWP switch is performed on a single CC.

When UE receives a DCI indicating the UE to switch its active BWP, or when a BWP timer bwp-InactivityTimer defined in TS 38.331 [2] expires, or when the UE receives an RRC command indicating the UE to switch its active BWP, the UE is allowed to cause an interruption on any other serving cells as defined in clause 8.2.2.2.5.

8.2.4.2.6 Interruptions at transitions between active and non-active during DRX

When PCell is in non-DRX and PSCell is in DRX, interruptions on PCell and the activated SCell in MCG if configured due to transitions from active to non-active and from non-active to active during PSCell DRX are allowed with up to 1% probability of missed ACK/NACK when the configured PSCell DRX cycle is less than 640 ms, and 0.625% probability of missed ACK/NACK is allowed when the configured PSCell DRX cycle is 640 ms or longer. Each interruption shall not exceed X slot as defined in table 8.2.4.2.6-1.

When PSCell is in non-DRX and PCell is in DRX, interruptions on PSCell on the activated SCell in SCG if configured due to transitions from active to non-active and from non-active to active during PCell DRX are allowed with up to 1 % probability of missed ACK/NACK when the configured PCell DRX cycle is less than 640 ms, and 0.625% probability of missed ACK/NACK is allowed when the configured PCell DRX cycle is 640 ms or longer. Each interruption shall not exceed X slot as defined in table 8.2.4.2.6-1.

Table 8.2.4.2.6-1: Interruption length X at transition between active and non-active during DRX

μ	NR Slot length (ms)	Interruption length X (slots)	
		Sync	Async
0	1	1	2
1	0.5	1	2
2	0.25	3	3
3	0.125		5

When both PCell and PSCell are in DRX, no interruption is allowed.

8.2.4.2.7 Interruptions at transitions from non-DRX to DRX

Interruption on PCell and the activated SCell in MCG if configured due to PSCell transitions from non-DRX to DRX when PCell is in non-DRX shall not exceed X slots as defined in table 8.2.4.2.6-1.

Interruption on PSCell and the activated SCell in SCG if configured due to PCell transitions from non-DRX to DRX when PSCell is in non-DRX shall not exceed X slots as defined in table 8.2.4.2.6-1.

8.3 SCell Activation and Deactivation Delay

8.3.1 Introduction

This clause defines requirements for the delay within which the UE shall be able to activate a deactivated SCell and deactivate an activated SCell in EN-DC, or in standalone NR carrier aggregation, or in NE-DC, or in NR-DC.

The requirements shall apply for EN-DC, standalone NR carrier aggregation, NE-DC, and NR-DC.

8.3.2 SCell Activation Delay Requirement for Deactivated SCell

The requirements in this clause shall apply for the UE configured with one downlink SCell in EN-DC, or in standalone NR carrier aggregation or in NE-DC or in NR-DC and when one SCell is being activated.

The delay within which the UE shall be able to activate the deactivated SCell depends upon the specified conditions.

Upon receiving SCell activation command in slot n, the UE shall be capable to transmit valid CSI report and apply actions related to the activation command for the SCell being activated no later than in slot n + $\frac{T_{HARQ} + T_{activation_time} + T_{CSI_Reporting}}{NR \ slot \ length}$, where:

T_{HARO} (in ms) is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3]

T_{activation_time} is the SCell activation delay in millisecond.

If the SCell is known and belongs to FR1, Tactivation_time is:

- $T_{FirstSSB}$ + 5ms, if the measurement period of the SCell being activated is equal to or smaller than 2400ms.
- T_{FirstSSB_MAX} + T_{rs} + 5ms, if the measurement period of the SCell being activated is larger than 2400ms.

If the SCell being activated belongs to FR1 and if there is at least one active serving cell contiguous to the SCell on that FR1 band, if the UE is not provided with SSB configuration (*absoluteFrequencySSB*) nor SMTC configuration for the target SCell, T_{activation_time} is 3 ms for UE supporting *scellWithoutSSB*, provided

- The RTD between the target SCell and the contiguous active serving cell is within within ±260ns, and
- The difference of the reception power with the contiguous active serving cell is <= 6dB, and
- The RS(s) of SCell being activated is (are) QCL-TypeA with TRS(s) of the SCell being activated, and the TRS(s) of the SCell being activated is (are) further QCL-TypeC with SSB(s) of any active serving cell that is contiguous to the SCell being activated on that FR1 band.

If the SCell is unknown and belongs to FR1, provided that the side condition $\hat{E}s/Iot \ge -2dB$ is fulfilled, then $T_{activation_time}$ is:

- $T_{FirstSSB\ MAX} + T_{SMTC\ MAX} + 2*T_{rs} + 5ms$

If the SCell being activated belongs to FR2 and if there is at least one active serving cell on that FR2 band, then $T_{activation_time}$ is $T_{FirstSSB}$ + 5ms provided:

- The UE is provided with SMTC for the target SCell, and
- The SSBs in the serving cell(s) and the SSBs in the SCell fulfil the condition defined in clause 3.6.3.
- The parameter *ssb-PositionsInBurst* is same for the serving cell(s) and the SCell.
- SSB is in the same half-frame on the SCell and the contiguous FR2 active serving cell

If the SCell being activated belongs to FR2 and if there is at least one active serving cell on that FR2 band, if the UE supporting *scellWithoutSSB* is not provided with any SMTC for the target SCell, T_{activation_time} is 3 ms, provided

- the RS (s) of SCell being activated is (are) QCL-TypeD with RS (s) of one active serving cell on that FR2 band.

If the SCell being activated belongs to FR2 and if there is no active serving cell on that FR2 band provided that PCell or PSCell is FR1:

If the target SCell is known to UE and semi-persistent CSI-RS is used for CSI reporting, then Tactivation_time is:

3ms + max(T_{uncertainty_MAC} + T_{FineTiming} + 2ms, T_{uncertainty_SP}), where T_{uncertainty_MAC}=0 and T_{uncertainty_SP}=0 if UE receives the SCell activation command, semi-persistent CSI-RS activation command and TCI state activation command at the same time.

If the target SCell is known to UE and periodic CSI-RS is used for CSI reporting, then Tactivation_time is:

- $max(T_{uncertainty_MAC} + 5ms + T_{FineTiming}, T_{uncertainty_RRC} + T_{RRC_delay} - T_{HARQ})$, where $T_{uncertainty_MAC} = 0$ if UE receives the SCell activation command and TCI state activation commands at the same time.

If the target SCell is unknown to UE and semi-persistent CSI-RS is used for CSI reporting, provided that the side condition \hat{E} s/Iot \geq -2dB is fulfilled, then $T_{activation time}$ is:

 $-6ms + T_{FirstSSB_MAX} + 15*T_{SMTC_MAX} + 8*T_{rs} + T_{L1\text{-RSRP, measure}} + T_{L1\text{-RSRP, report}} + T_{HARQ} + \\ max(T_{uncertainty_MAC} + T_{FineTiming} + 2ms, T_{uncertainty_SP}).$

If the target SCell is unknown to UE and periodic CSI-RS is used for CSI reporting, provided that the side condition \hat{E} s/Iot \geq -2dB is fulfilled, then $T_{activation time}$ is:

 $-3ms + T_{FirstSSB_MAX} + 15*T_{SMTC_MAX} + 8*T_{rs} + T_{L1\text{-RSRP, measure}} + T_{L1\text{-RSRP, report}} + max \{(T_{HARQ} + T_{uncertainty_MAC} + 5ms + T_{FineTiming}), (T_{uncertainty_RRC} + T_{RRC_delay})\}.$

where,

T_{SMTC MAX}:

- In FR1, in case of intra-band SCell activation, T_{SMTC_MAX} is the longer SMTC periodicity between active serving cells and SCell being activated provided the cell specific reference signals from the active serving cells and the SCells being activated or released are available in the same slot; in case of inter-band SCell activation, T_{SMTC_MAX} is the SMTC periodicity of SCell being activated.
- In FR2, T_{SMTC_MAX} is the longer SMTC periodicity between active serving cells and SCell being activated provided that in Rel-15 only support FR2 intra-band CA.
- T_{SMTC_MAX} is bounded to a minimum value of 10ms.

 T_{rs} is the SMTC periodicity of the SCell being activated if the UE has been provided with an SMTC configuration for the SCell in SCell addition message, otherwise T_{rs} is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If the measObjectNRs having the same SSB frequency and subcarrier spacing configured by MN and SN have different SMTC, Trs is the periodicity of one of the SMTC which is up to UE implementation. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement which involves T_{rs} is applied with T_{rs} = 5ms assuming the SSB transmission periodicity is 5ms. There are no requirements if the SSB transmission periodicity is not 5ms.

 $T_{FirstSSB}$: is the time to the end of the first complete SSB burst indicated by the SMTC, or within 5ms if SMTC is not configured, after slot $n + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$.

 $T_{FirstSSB_MAX}$: Is the time to the end of the first complete SSB burst indicated by the SMTC, or within 5ms if SMTC is not configured, after slot $n + \frac{T_{HARQ} + 3ms}{NR \, slot \, leng \, th}$, further fulfilling:

- In FR1, in case of intra-band SCell activation, the occasion when all active serving cells and SCells being activated or released are transmitting SSB bursts in the same slot; in case of inter-band SCell activation, the first occasion when the SCell being activated is transmitting SSB burst.
- In FR2, the occasion when all active serving cells and SCells being activated or released are transmitting SSB bursts in the same slot.

 $T_{\text{FineTiming}}$ is the time period between UE finish processing the last activation command for PDCCH TCI, PDSCH TCI (when applicable) and the timing of first complete available SSB corresponding to the TCI state.

 $T_{L1\text{-RSRP, measure}}$ is L1-RSRP measurement delay $T_{L1\text{-RSRP_Measurement_Period_CSI-RS}}$ ms or $T_{L1\text{-RSRP_Measurement_Period_CSI-RS}}$ based on applicability as defined in clause 9.5 assuming M=1 and T_{Report} =0.

T_{L1-RSRP, report} is delay of acquiring CSI reporting resources.

 $T_{uncertainty_MAC}$ is the time period between reception of the last activation command for PDCCH TCI, PDSCH TCI (when applicable) relative to

- SCell activation command for known case:
- First valid L1-RSRP reporting for unknown case.

T_{uncertainty_SP} is the time period between reception of the activation command for semi-persistent CSI-RS resource set for CQI reporting relative to

- SCell activation command for known case:
- First valid L1-RSRP reporting for unknown case.

 $T_{uncertainty_RRC}$ is the time period between reception of the RRC configuration message for TCI of periodic CSI-RS for CQI reporting (when applicable) relative to

- SCell activation command for known case;
- First valid L1-RSRP reporting for unknown case.

 T_{RRC_delay} is the RRC procedure delay as specified in TS 38.331 [2].

Longer delays for RRM measurement requirements, and in case of FR2 also SSB based RLM/BFD/CBD/L1-RSRP measurement requirements, can be expected during the cell detection time for unknown SCell activation.

When absoluteFrequencySSB is not configured in DownlinkConfigCommon for target SCell but SMTC for target SCell is configured, no requirement would be applied.

T_{CSI_reporting} is the delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2].

SCell in FR1 is known if it has been meeting the following conditions:

- During the period equal to max(5*measCycleSCell, 5*DRX cycles) for FR1 before the reception of the SCell activation command:
 - the UE has sent a valid measurement report for the SCell being activated and
 - the SSB measured remains detectable according to the cell identification conditions specified in clause 9.2 and 9.3.
- the SSB measured during the period equal to max(5*measCycleSCell, 5*DRX cycles) also remains detectable during the SCell activation delay according to the cell identification conditions specified in clause 9.2 and 9.3.

Otherwise SCell in FR1 is unknown.

The requirements for FR1 unknown SCell activation specified in this clause apply when one of the following conditions is met

- 'ssb-PositionInBurst' indicates only one SSB is being actually transmitted, or
- 'ssb-PositionInBurst' indicates multiple SSBs and TCI indication is provided in same MAC PDU with SCell activation.

For the first SCell activation in FR2 bands, the SCell is known if it has been meeting the following conditions:

- During the period equal to 4s for UE supporting power class 1 and 3s for UE supporting power class 2/3/4 before UE receives the last activation command for PDCCH TCI, PDSCH TCI (when applicable) and semi-persistent CSI-RS for CQI reporting (when applicable):
 - the UE has sent a valid L3-RSRP measurement report with SSB index
 - SCell activation command is received after L3-RSRP reporting and no later than the time when UE receives MAC-CE command for TCI activation

- During the period from L3-RSRP reporting to the valid CQI reporting, the reported SSBs with indexes remain detectable according to the cell identification conditions specified in clauses 9.2 and 9.3, and the TCI state is selected based on one of the latest reported SSB indexes.

Otherwise, the first SCell in FR2 band is unknown. The requirement for unknown SCell applies provided that the activation commands for PDCCH TCI, PDSCH TCI (when applicable), semi-persistent CSI-RS for CQI reporting (when applicable), and configuration message for TCI of periodic CSI-RS for CQI reporting (when applicable) are based on the latest valid L1-RSRP reporting.

If the UE has been provided with higher layer in TS 38.331 [2] signaling of *smtc2* prior to the activation command, T_{SMTC_Scell} follows *smtc1* or *smtc2* according to the physical cell ID of the target cell being activated. T_{SMTC_MAX} follows *smtc1* or *smtc2* according to the physical cell IDs of the target cells being activated and the active serving cells.

In addition to CSI reporting defined above, UE shall also apply other actions related to the activation command specified in TS 38.331 [2] for a SCell at the first opportunities for the corresponding actions once the SCell is activated.

The starting point of an interruption window on spCell or any activated SCell, as specified in clause 8.2, shall not occur before slot $n+1+\frac{T_{HARQ}}{NR\,slot\,\,length}$ and not occur after slot $n+1+\frac{T_{HARQ}+3ms+T_X}{NR\,slot\,\,length}$, where NR slot length is with respect to the numerology used in the SCell being activated, and T_X is:

- 0, if T_{activation time} is 3ms
- T_{FirstSSB}, for any scenario where T_{activation_time} includes T_{FirstSSB};
- T_{FirstSSB_MAX}, for any scenario where T_{activation_time} includes T_{FirstSSB_MAX};
- $T_{uncertainty_MAC} + T_{FineTiming}$, for any scenario where $T_{activation_time}$ includes only $T_{FineTiming}$ and no $T_{FirstSSB_MAX}$.

The length of the interruption window may be different for different victim cells, and depends on the applicable scenario and on the frequency band relation between the aggressor cell and the victim cell.

The requirements in this clause and requriements on interruption due to SCell activation in clause 8.2 apply provided that the SSB of the to-be-activated SCell is within the first active DL BWP of the SCell.

Starting from the slot specified in clause 4.3 of TS 38.213 [3] (timing for secondary Cell activation/deactivation) and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

Starting from the slot specified in clause 4.3 of TS 38.213 [3] (timing for secondary Cell activation/deactivation) and until the UE has completed the SCell activation, the UE shall report out of range if the UE has available uplink resources to report CQI for the SCell.

Starting from the slot specified in clause 4.3 of TS 38.213 [3] (timing for secondary Cell activation/deactivation) and until the UE has completed a first L1-RSRP measurement, the UE shall report lowest valid L1 SS-RSRP range if the UE has available uplink resources to report L1-RSRP for the SCell.

8.3.3 SCell Deactivation Delay Requirement for Activated SCell

The requirements in this clause shall apply for the UE configured with one downlink SCell in EN-DC, or in standalone NR carrier aggregation, or in NE-DC, or in NR-DC.

Upon receiving SCell deactivation command in slot n, the UE shall accomplish the deactivation actions for the SCell being deactivated no later than in slot $n + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$. The starting point of an interruption window on spCell or any activated SCell, as specified in clause 8.2, shall not occur before slot $n+1+\frac{T_{HARQ}}{NR \ slot \ length}$ and not occur after slot $n+1+\frac{T_{HARQ} + 3ms}{NR \ slot \ length}$, where NR slot length is with respect to the numerology used in the SCell being deactivated.

Upon expiry of the *sCellDeactivationTimer* in slot n, the UE shall accomplish the deactivation actions for the SCell being deactivated no later than in slot $n + \frac{3ms}{NR \, slot \, length}$. The starting point of an interruption window on spCell or any activated SCell, as specified in clause 8.2, shall not occur before slot n+1 and not occur after slot n+1+ $\frac{3ms}{NR \, slot \, length}$, where NR slot length is with respect to the numerology used in the SCell being deactivated.

The length of the interruption window may be different for different victim cells, and depends on the applicable scenario and on the frequency band relation between the aggressor cell and the victim cell.

8.4 UE UL carrier RRC reconfiguration delay

8.4.1 Introduction

The requirements in this clause apply for a UE being configured or deconfigured with a supplementary UL carrier or NR UL carrier.

8.4.2 UE UL carrier configuration delay requirement

When the UE receives a RRC message implying NR UL or supplementary UL carrier configuration, the UE shall be ready to start transmission on the newly configured carrier within $T_{UL\ carrier\ config}$ from the end of the slot n..

Where

- Slot n is the last slot overlapping with the PDSCH containing the RRC command.
- T_{UL_carrier_config} equals the maximum RRC procedure delay defined in clause 11.2 in TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it equals the maximum RRC procedure delay defined in clause 12 in TS 38.331 [2].

8.4.3 UE UL carrier deconfiguration delay requirement

When the UE receives a RRC message implying NR UL or supplementary UL carrier deconfiguration RRC signalling, the UE shall stop UL signalling on the deconfigured UL carrier within $T_{UL_carrier_deconfig}$ from the end of the slot n.

Where

- Slot n is the last slot overlapping with the PDSCH containing the RRC command.
- T_{UL_carrier_deconfig} equals the maximum RRC procedure delay defined in clause 11.2 in TS 36.331 [16] if the
 corresponding RRC message is embedded in E-UTRA RRC message, otherwise it equals the maximum RRC
 procedure delay defined in clause 12 in TS 38.331 [2].

8.5 Link Recovery Procedures

8.5.1 Introduction

The UE shall assess the downlink radio link quality of a serving cell based on the reference signal in the set \overline{q}_0 as specified in TS 38.213 [3] in order to detect beam failure on:

- PCell in SA, NR-DC, or NE-DC operation mode,
- PSCell in NR-DC and EN-DC operation mode.

The RS resource configurations in the set Q_0 can be periodic CSI-RS resources and/or SSBs. UE is not required to perform beam failure detection outside the active DL BWP. UE is not required to meet the requirements in clause 8.5.2 and 8.5.3 if UE does not have set \bar{Q}_0 .

On each RS resource configuration in the set \overline{Q}_0 , the UE shall estimate the radio link quality and compare it to the threshold $Q_{\text{out LR}}$ for the purpose of accessing downlink radio link quality of the serving cell beams.

The threshold Q_{out_LR} is defined as the level at which the downlink radio level link of a given resource configuration on set \overline{Q}_0 cannot be reliably received and shall correspond to the BLER_{out} = 10% block error rate of a hypothetical PDCCH transmission. For SSB based beam failure detection, $Q_{out_LR_SSB}$ is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.5.2.1-1. For CSI-RS based beam failure detection, $Q_{out_LR_CSI-RS}$ is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.5.3.1-1.

Upon request the UE shall deliver configuration indexes from the set \emph{Q}_{l} as specified in TS 38.213 [3], to higher layers, and the corresponding L1-RSRP measurement provided that the measured L1-RSRP is equal to or better than the threshold Q_{in_LR} , which is indicated by higher layer parameter rsrp-ThresholdSSB. The UE applies the Q_{in_LR} threshold to the L1-RSRP measurement obtained from an SSB. The UE applies the Q_{in_LR} threshold to the L1-RSRP measurement obtained for a CSI-RS resource after scaling a respective CSI-RS reception power with a value provided by higher layer

parameter powerControlOffsetSS. The RS resource configurations in the set Q_I can be periodic CSI-RS resources or SSBs or both SSB and CSI-RS resources. UE is not required to perform candidate beam detection outside the active DL BWP.

8.5.2 Requirements for SSB based beam failure detection

8.5.2.1 Introduction

The requirements in this clause apply for each SSB resource in the set \overline{Q}_0 configured for a serving cell, provided that the SSB configured for beam failure detection is actually transmitted within the UE active DL BWP during the entire evaluation period specified in clause 8.5.2.2.

Attribute	Value for BLER
DCI format	1-0
Number of control OFDM symbols	2
Aggregation level (CCE)	8
Ratio of hypothetical PDCCH RE energy to average SSS RE energy	0dB
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	0dB
Bandwidth (PRBs)	24
Sub-carrier spacing (kHz)	Same as the SCS of RMSI CORESET
DMRS precoder granularity	REG bundle size
REG bundle size	6
CP length	Normal
Mapping from REG to CCE	Distributed

Table 8.5.2.1-1: PDCCH transmission parameters for beam failure instance

8.5.2.2 Minimum requirement

UE shall be able to evaluate whether the downlink radio link quality on the configured SSB resource in set \overline{q}_0 estimated over the last $T_{\text{Evaluate_BFD_SSB}}$ ms period becomes worse than the threshold $Q_{\text{out_LR_SSB}}$ within $T_{\text{Evaluate_BFD_SSB}}$ ms period.

The value of $T_{\text{Evaluate_BFD_SSB}}$ is defined in Table 8.5.2.2-1 for FR1.

The value of $T_{\text{Evaluate_BFD_SSB}}$ is defined in Table 8.5.2.2-2 for FR2 with scaling factor N=8

For FR1.

- $P = \frac{1}{1 - \frac{T_{SSB}}{MGRP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB.

- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

For FR2,

- $P = \frac{1}{1 \frac{T_{SSB}}{T_{SMTCperiod}}}$, when BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$).
- $P = P_{sharing factor}$, when the BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC period ($T_{SSB} = T_{SMTCperiod}$).
- $P = \frac{1}{1 \frac{T_{SSB}}{MGRP} \frac{T_{SSB}}{T_{SMTCperiod}}}$, when the BFD-RS resource is partially overlapped with measurement gap and the

BFD-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and

- $T_{SMTCperiod} \neq MGRP$ or
- $T_{SMTCperiod} = MGRP \text{ and } T_{SSB} < 0.5 \times T_{SMTCperiod}$
- $P = \frac{P_{sharing \, factor}}{1 \frac{T_{SSB}}{MGRP}}$, when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{SSB} = 0.5 * T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{SSB}}{Min(MGRP, T_{SMTCperiod})}}, \text{ when the BFD-RS resource is partially overlapped with measurement gap } (T_{SSB})$
 - <MGRP) and the BFD-RS resource is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap.
- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MGRP}}$, when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)

P_{sharing factor} = 1, if the BFD-RS resource outside measurement gap is

- not overlapped with the SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol before each consecutive SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol after each consecutive SSB symbols indicated by *SSB-ToMeasure*, given that *SSB-ToMeasure* is configured, where the *SSB-ToMeasure* is the union set of *SSB-ToMeasure* from all the configured measurement objects merged on the same serving carrier, and;
- not overlapped with the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured.
- $P_{\text{sharing factor}} = 3$, otherwise.

where,

If the high layer in TS 38.331 [2] signaling of *smtc2* is configured, T_{SMTCperiod} corresponds to the value of higher layer parameter *smtc2*; Otherwise T_{SMTCperiod} corresponds to the value of higher layer parameter *smtc1*. T_{SMTCperiod} is the shortest SMTC period among all CCs in the same FR2 band, given the SMTC offset of all CCs in FR2 provided the same offset.

Longer evaluation period would be expected if the combination of BFD-RS resource, SMTC occasion and measurement gap configurations does not meet pervious conditions.

Table 8.5.2.2-1: Evaluation period T_{Evaluate_BFD_SSB} for FR1

Configuration	T _{Evaluate_BFD_SSB} (ms)
no DRX	Max(50, Ceil(5 \times P) \times T _{SSB})
DRX cycle ≤ 320ms	Max(50, Ceil(7.5 \times P) \times Max(T _{DRX} ,T _{SSB}))
DRX cycle > 320ms	Ceil(5 \times P) \times T _{DRX}

Note: T_{SSB} is the periodicity of SSB in the set \overline{q}_0 . T_{DRX} is the DRX cycle length.

Table 8.5.2.2-2: Evaluation period T_{Evaluate BFD SSB} for FR2

Configuration	T _{Evaluate_BFD_SSB} (ms)
no DRX	Max(50, Ceil(5 \times P \times N) \times T _{SSB})
DRX cycle ≤ 320ms	$Max(50, Ceil(7.5 \times P \times N) \times Max(T_{DRX}, T_{SSB}))$
DRX cycle > 320ms	Ceil(5 \times P \times N) \times T _{DRX}
Note: T_{SSB} is the periodicity of SSB in the set \overline{q}_0 . T_{DRX} is the DRX cycle length.	

8.5.2.3 Measurement restriction for SSB based beam failure detection

The UE is required to be capable of measuring SSB for BFD without measurement gaps. The UE is required to perform the SSB measurements with measurement restrictions as described in the following clauses.

For FR1, when the SSB for BFD measurement is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement.

- If SSB and CSI-RS have same SCS, UE shall be able to measure the SSB for BFD measurement without any restriction;
- If SSB and CSI-RS have different SCS,
 - If UE supports *simultaneousRxDataSSB-DiffNumerology*, UE shall be able to measure the SSB for BFD measurement without any restriction;
 - If UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both SSB for BFD measurement and CSI-RS. Longer measurement period for SSB based BFD measurement is expected, and no requirements are defined.

For FR2, when the SSB for BFD measurement on one CC is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both SSB for BFD measurement and CSI-RS. Longer measurement period for SSB based BFD measurement is expected, and no requirements are defined.

8.5.3 Requirements for CSI-RS based beam failure detection

8.5.3.1 Introduction

The requirements in this clause apply for each CSI-RS resource in the set \overline{q}_0 of resource configurations for a serving cell, provided that the CSI-RS resource(s) in set \overline{q}_0 for beam failure detection are actually transmitted within the UE active DL BWP during the entire evaluation period specified in clause 8.5.3.2. UE is not expected to perform beam failure detection measurements on the CSI-RS configured for BFD if the CSI-RS is not QCL-ed, with QCL-TypeD when applicable, with the RS in the active TCI state of any CORESET configured in the UE active BWP.

Table 8.5.3.1-1: PDCCH transmission parameters for beam failure instance

Attribute	Value for BLER
DCI format	1-0
Number of control OFDM	2
symbols	2
Aggregation level (CCE)	8
Ratio of hypothetical PDCCH	
RE energy to average CSI-RS	0dB
RE energy	
Ratio of hypothetical PDCCH	
DMRS energy to average	0dB
CSI-RS RE energy	
Bandwidth (PRBs)	48

Sub-carrier spacing (kHz)	SCS of the active DL BWP
DMRS precoder granularity	REG bundle size
REG bundle size	6
CP length	Normal
Mapping from REG to CCE	Distributed

8.5.3.2 Minimum requirement

UE shall be able to evaluate whether the downlink radio link quality on the CSI-RS resource in set \overline{q}_0 estimated over the last $T_{\text{Evaluate_BFD_CSI-RS}}$ ms period becomes worse than the threshold $Q_{\text{out_LR_CSI-RS}}$ within $T_{\text{Evaluate_BFD_CSI-RS}}$ ms period.

The value of T_{Evaluate BFD CSI-RS} is defined in Table 8.5.3.2-1 for FR1.

The value of T_{Evaluate_BFD_CSI-RS} is defined in Table 8.5.3.2-2 for FR2 with N=1. The requirements of T_{Evaluate_BFD_CSI-RS} apply provided that the CSI-RS for BFD is not in a resource set configured with repetition ON. The requirements shall not apply when the CSI-RS resource in the active TCI state of CORESET is the same CSI-RS resource for BFD and the TCI state information of the CSI-RS resource is not given, wherein the TCI state information means QCL Type-D to SSB for L1-RSRP or CSI-RS with repetition ON.

For FR1,

- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the CSI-RS.
- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

For FR2,

- P = 1, when the BFD-RS resource is not overlapped with measurement gap and also not overlapped with SMTC occasion.
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP}}$, when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is not overlapped with SMTC occasion ($T_{CSI-RS} < MGRP$)
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when the BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$).
- $P = P_{sharing \ factor}$, when the BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$).
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP} \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when the BFD-RS resource is partially overlapped with measurement gap and the

BFD-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and

- $T_{SMTCperiod} \neq MGRP$ or
- $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} < 0.5 \times T_{SMTCperiod}$
- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{CSI-RS}}{MGRP}}$, when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} = 0.5 \times T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{Min(MGRP, T_{SMTCperiod})}}$, when the BFD-RS resource is partially overlapped with measurement gap ($T_{CSI-RS} < \frac{1}{1 \frac{T_{CSI-RS}}{Min(MGRP, T_{SMTCperiod})}}$)

MGRP) and the BFD-RS resource is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap.

- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{CSI-RS}}{MGRP}}$, when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- $P_{\text{sharing factor}} = 1$, if the BFD-RS resource outside measurement gap is
 - not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same serving carrier, and;
 - not overlapped with the RSSI symbols indicated by ss-RSSI-Measurement and 1 data symbol before each RSSI symbol indicated by ss-RSSI-Measurement and 1 data symbol after each RSSI symbol indicated by ss-RSSI-Measurement, given that ss-RSSI-Measurement is configured,
- $P_{\text{sharing factor}} = 3$, otherwise.

where,

If the high layer in TS 38.331 [2] signaling of smtc2 is configured, $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc2; Otherwise $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc1. $T_{SMTCperiod}$ is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Note: The overlap between CSI-RS for BFD and SMTC means that CSI-RS for BFD is within the SMTC window duration.

Longer evaluation period would be expected if the combination of the BFD-RS resource, SMTC occasion and measurement gap configurations does not meet pervious conditions.

The values of M_{BFD} used in Table 8.5.3.2-1 and Table 8.5.3.2-2 are defined as

- $M_{BFD} = 10$, if the CSI-RS resource(s) in set \overline{q}_0 used for BFD is transmitted with Density = 3 and over the bandwidth ≥ 24 PRBs.

Table 8.5.3.2-1: Evaluation period T_{Evaluate BFD CSI-RS} for FR1

Configuration	T _{Evaluate_BFD_CSI-RS} (ms)	
no DRX	$Max(50, Ceil(M_{BFD} \times P) \times T_{CSI-RS})$	
DRX cycle ≤ 320ms	$Max(50, Ceil(1.5 \times M_{BFD} \times P) \times Max(T_{DRX}, T_{CSI-RS}))$	
DRX cycle > 320ms	$Ceil(M_{BFD} \times P) \times T_{DRX}$	
Note: T _{CSI-RS} is the periodicity of CSI-RS resource in the set \overline{q}_{0} . T _{DRX} is the		
DRX cycle length.		

Table 8.5.3.2-2: Evaluation period T_{Evaluate_BFD_CSI-RS} for FR2

Configuration	T _{Evaluate_BFD_CSI-RS} (ms)	
no DRX	$Max(50, Ceil(M_{BFD} \times P \times N) \times T_{CSI-RS})$	
DRX cycle ≤ 320ms	$Max(50, Ceil(1.5 \times M_{BFD} \times P \times N) \times Max(T_{DRX}, T_{CSI-RS}))$	
DRX cycle > 320ms	$Ceil(M_{BFD} \times P \times N) \times T_{DRX}$	
Note: T _{CSI-RS} is the periodicity of CSI-RS resource in the set \overline{q}_0 . T _{DRX} is the		
DRX cycle length.		

8.5.3.3 Measurement restrictions for CSI-RS beam failure detection

The UE is required to be capable of measuring CSI-RS for BFD without measurement gaps. The UE is required to perform the CSI-RS measurements with measurement restrictions as described in the following clauses.

For both FR1 and FR2, when the CSI-RS for BFD measurement is in the same OFDM symbol as SSB for RLM, BFD, CBD or L1-RSRP measurement, UE is not required to receive CSI-RS for BFD measurement in the PRBs that overlap with an SSB.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has same SCS than CSI-RS for BFD measurement, the UE shall be able to perform CSI-RS measurement without restrictions.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has different SCS than CSI-RS for BFD measurement, the UE shall be able to perform CSI-RS measurement with restrictions according to its capabilities:

- If the UE supports *simultaneousRxDataSSB-DiffNumerology* the UE shall be able to perform CSI-RS measurement without restrictions.
- If the UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both CSI-RS for BFD measurement and SSB. Longer measurement period for CSI-RS based BFD measurement is expected, and no requirements are defined.

For FR1, when the CSI-RS for BFD measurement is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement, UE shall be able to measure the CSI-RS for BFD measurement without any restriction.

For FR2, when the CSI-RS for BFD measurement on one CC is in the same OFDM symbol as SSB for RLM, BFD or L1-RSRP measurement on the same CC or different CCs in the same band, or in the same symbol as SSB for CBD measurement on the same CC or different CCs in the same band when beam failure is detected, UE is required to measure one of but not both CSI-RS for BFD measurement and SSB. Longer measurement period for CSI-RS based BFD measurement is expected, and no requirements are defined.

For FR2, when the CSI-RS for BFD measurement on one CC is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band,

- In the following cases, UE is required to measure one of but not both CSI-RS for BFD measurement and the other CSI-RS. Longer measurement period for CSI-RS based BFD measurement is expected, and no requirements are defined.
 - The CSI-RS for BFD measurement or the other CSI-RS in a resource set configured with repetition ON, or
 - The other CSI-RS is configured in set \overline{q}_1 and beam failure is detected, or
 - The two CSI-RS-es are not QCL-ed w.r.t. QCL-TypeD, or the QCL information is not known to UE,
- Otherwise, UE shall be able to measure the CSI-RS for BFD measurement without any restriction.

8.5.4 Minimum requirement for L1 indication

When the radio link quality on all the RS resources in set \overline{q}_0 is worse than $Q_{\text{out_LR}}$, layer 1 of the UE shall send a beam failure instance indication to the higher layers.

The beam failure instance evaluation for the RS resources in set \bar{q}_0 shall be performed as specified in clause 6 in TS 38.213 [3]. Two successive indications from layer 1 shall be separated by at least $T_{Indication interval BFD}$.

When DRX is not used, $T_{Indication_interval_BFD}$ is max(2ms, $T_{SSB-RS,M}$) or max(2ms, $T_{CSI-RS,M}$), where $T_{SSB-RS,M}$ and $T_{CSI-RS,M}$ is the shortest periodicity of all RS resources in set \overline{q}_0 for the accessed cell, corresponding to either the shortest periodicity of the SSB in the set \overline{q}_0 or CSI-RS resource in the set \overline{q}_0 .

When DRX is used, for SSB based link quality measurement,

- $T_{Indication\ interval\ BFD} = Max(1.5 \times DRX_cycle_length, 1.5 \times T_{SSB-RS,M})$, if DRX_cycle_length ≤ 320 ms,
- T_{Indication interval BFD} = DRX_cycle_length, if DRX_cycle_length > 320ms.

When DRX is used, for CSI-RS based link quality measurement,

- T_{Indication_interval_BFD} = Max(1.5 × DRX_cycle_length, 1.5 × T_{CSI-RS,M}), if DRX_cycle_length ≤ 320ms,
- T_{Indication interval BFD} = DRX_cycle_length, if DRX_cycle_length > 320ms.

8.5.5 Requirements for SSB based candidate beam detection

8.5.5.1 Introduction

The requirements in this clause apply for each SSB resource in the set \bar{q}_1 configured for a serving cell, provided that the SSBs configured for candidate beam detection are actually transmitted within UE active DL BWP during the entire evaluation period specified in clause 8.5.5.2.

8.5.5.2 Minimum requirement

Upon request the UE shall be able to evaluate whether the L1-RSRP measured on the configured SSB resource in set \bar{q}_1 estimated over the last $T_{\text{Evaluate_CBD_SSB}}$ ms period becomes better than the threshold $Q_{\text{in_LR}}$ provided SSB_RP and SSB $\hat{\text{Es/Iot}}$ are according to Annex Table B.2.4.1 for a corresponding band.

The UE shall monitor the configured SSB resources using the evaluation period in table 8.5.5.2-1 and 8.5.5.2-2 corresponding to the non-DRX mode, if the configured DRX cycle ≤ 320 ms.

The value of T_{Evaluate CBD SSB} is defined in Table 8.5.5.2-1 for FR1.

The value of T_{Evaluate_CBD_SSB} is defined in Table 8.5.5.2-2 for FR2 with scaling factor N=8.

where,

For FR1,

- $P = \frac{1}{1 \frac{T_{SSB}}{MGRP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB,
- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

For FR2,

- $P = \frac{1}{1 \frac{T_{SSB}}{T_{SMTCperiod}}}$, when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$).
- P is $P_{sharing\ factor}$, when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC period ($T_{SSB} = T_{SMTCperiod}$).
- $P = \frac{1}{1 \frac{T_{SSB}}{MGRP} \frac{T_{SSB}}{T_{SMTCperiod}}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion (T_{SSR} < T_{SMTCperiod}) and SMTC.

candidate beam detection RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and

- $T_{SMTCperiod} \neq MGRP$ or
- $T_{SMTCperiod}$ = MGRP and T_{SSB} < $0.5 \times T_{SMTCperiod}$
- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MGRP}}, \text{ when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{SSB} = 0.5 \times T_{SMTCperiod}$$
- $P = \frac{1}{1 \frac{T_{SSB}}{Min(MGRP,T_{SMTCperiod})}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap

- $P = \frac{P_{sharing\ factor}}{1 \frac{T_{SSB}}{MGRP}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- $P_{\text{sharing factor}} = 1$, if the candidate beam detection RS outside measurement gap is
 - not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each
 consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB
 symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure
 is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same serving
 carrier, and;
 - not overlapped with the RSSI symbols indicated by ss-RSSI-Measurement and 1 data symbol before each RSSI symbol indicated by ss-RSSI-Measurement and 1 data symbol after each RSSI symbol indicated by ss-RSSI-Measurement, given that ss-RSSI-Measurement is configured
- $P_{\text{sharing factor}} = 3$, otherwise.

where,

If the high layer in TS 38.331 [2] signaling of smtc2 is present, $T_{SMTCperiod}$ follows smtc2; Otherwise $T_{SMTCperiod}$ follows smtc1. $T_{SMTCperiod}$ is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Longer evaluation period would be expected if the combination of the CBD-RS resource, SMTC occasion and measurement gap configurations does not meet pervious conditions.

Table 8.5.5.2-1: Evaluation period T_{Evaluate CBD SSB} for FR1

Configuration		T _{Evaluate_CBD_SSB} (ms)
non-DRX, DRX cycle		Max(25, Ceil(3 \times P) \times T _{SSB})
≤ 320ms		
DRX cycle > 320ms		$Ceil(3 \times P) \times T_{DRX}$
Note:		
	length.	

Table 8.5.5.2-2: Evaluation period T_{Evaluate CBD SSB} for FR2

Configuration		TEvaluate_CBD_SSB (ms)
non-DF	RX, DRX cycle	Max(25, Ceil($3 \times P \times N$) $\times T_{SSB}$)
\$	≤ 320ms	
DRX cycle > 320ms		$Ceil(3 \times P \times N) \times T_{DRX}$
Note: T_{SSB} is the periodicity of SSB in the set \overline{q}_1 . T_{DRX} is the DRX cycle length.		

8.5.5.3 Measurement restriction for SSB based candidate beam detection

For FR1, when the SSB for CBD measurement is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement,

- If SSB and CSI-RS have same SCS, UE shall be able to measure the SSB for CBD measurement without any restrictions;
- If SSB and CSI-RS have different SCS-es,
 - If UE supports *simultaneousRxDataSSB-DiffNumerology*, UE shall be able to measure the SSB for CBD measurement without any restriction;
 - If UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both SSB for CBD measurement and CSI-RS. Longer measurement period for SSB based CBD measurement is expected, and no requirements are defined.

For FR2, when the SSB for CBD measurement on one CC is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both SSB for CBD measurement and CSI-RS. Longer measurement period for SSB based CBD measurement is expected, and no requirements are defined.

8.5.6 Requirements for CSI-RS based candidate beam detection

8.5.6.1 Introduction

The requirements in this clause apply for each CSI-RS resource in the set \bar{q}_1 configured for a serving cell, provided that the CSI-RS resources configured for candidate beam detection are actually transmitted within UE active DL BWP during the entire evaluation period specified in clause 8.5.6.2.

8.5.6.2 Minimum requirement

Upon request the UE shall be able to evaluate whether the L1-RSRP measured on the configured CSI-RS resource in set \bar{q}_1 estimated over the last $T_{\text{Evaluate_CBD_CSI-RS}}$ [ms] period becomes better than the threshold $Q_{\text{in_LR}}$ within $T_{\text{Evaluate_CBD_CSI-RS}}$ [ms] period provided CSI-RS $\hat{\text{Es/Iot}}$ is according to Annex Table B.2.4.2 for a corresponding band.

The UE shall monitor the configured CSI-RS resources using the evaluation period in table 8.5.6.2-1 and 8.5.6.2-2 corresponding to the non-DRX mode, if the configured DRX cycle ≤ 320 ms.

The value of $T_{Evaluate_CBD_CSI-RS}$ is defined in Table 8.5.6.2-1 for FR1.

The value of T_{Evaluate CBD CSI-RS} is defined in Table 8.5.6.2-2 for FR2 with scaling factor N=8.

For FR1,

- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the CSI-RS; and
- P = 1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

For FR2,

- P = 1, when candidate beam detection RS is not overlapped with measurement gap and also not overlapped with SMTC occasion.
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is not overlapped with SMTC occasion (T_{CSI-RS} < MGRP)
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when candidate beam detection RS is not overlapped with measurement gap and candidate

beam detection RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$).

- $P = P_{sharing factor}$, when candidate beam detection RS is not overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$).
- $P = \frac{1}{1 \frac{T_{\text{CSI-RS}}}{MGRP} \frac{T_{\text{CSI-RS}}}{T_{\text{SMTCperiod}}}}, \text{ when candidate beam detection RS is partially overlapped with measurement gap}$ and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{\text{CSI-RS}} < T_{\text{SMTCperiod}}$) and SMTC occasion is not overlapped with measurement gap and
 - $T_{SMTCperiod} \neq MGRP$ or
 - $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} < 0.5 \times T_{SMTCperiod}$

- $P = \frac{P_{sharing\,factor}}{1 \frac{T_{CSI-RS}}{MGRP}}, \text{ when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} = 0.5 \times T_{SMTCperiod}$). }$
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{Min(MGRP,T_{SMTCperiod})}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap
- $P = \frac{3}{1 \frac{T_{CSI-RS}}{MGRP}}$, when candidate beam detection RS is partially overlapped with measurement gap and candidate beam detection RS is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- P_{sharing factor} = 1, if the candidate beam detection RS outside measurement gap is
 - not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each
 consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB
 symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure
 is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same serving
 carrier, and;
 - not overlapped with the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured.
- $P_{\text{sharing factor}} = 3$, otherwise.

where,

If the high layer in TS 38.331 [2] signaling of smtc2 is present, $T_{SMTCperiod}$ follows smtc2; Otherwise $T_{SMTCperiod}$ follows smtc1. $T_{SMTCperiod}$ is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Note: The overlap between CSI-RS for CBD and SMTC means that CSI-RS for CBD is within the SMTC window duration.

Longer evaluation period would be expected if the combination of the CBD-RS resource, SMTC occasion and measurement gap configurations does not meet pervious conditions.

Longer evaluation period would be expected if the CSI-RS is on the same OFDM symbols with RLM, BFD, BM-RS, or other CBD-RS, according to the measurement restrictions defined in clause 8.5.6.3.

The values of M_{CBD} used in Table 8.5.6.2-1 and Table 8.5.6.2-2 are defined as

- $M_{CBD} = 3$, if the CSI-RS resource configured in the set \bar{q}_1 is transmitted with Density = 3 and over the bandwidth ≥ 24 PRBs.

Table 8.5.6.2-1: Evaluation period T_{Evaluate_CBD_CSI-RS} for FR1

Configuration		T _{Evaluate} C_CBD_CSI-RS (ms)
non-DRX, DRX cycle		$Max(25, Ceil(M_{CBD} \times P) \times T_{CSI-RS})$
≤ 320ms		
DRX cycle > 320ms		$Ceil(M_{CBD} \times P) \times T_{DRX}$
Note:	$T_{\text{CSI-RS}}$ is the periodicity of CSI-RS resource in the set $\; \overline{q}_{\text{I}}$. T_{DRX} is the	
DRX cycle length.		

Table 8.5.6.2-2: Evaluation period T_{Evaluate CBD CSI-RS} for FR2

Configuration	T _{Evaluate_CBD_CSI-RS} (ms)
non-DRX, DRX cycle	Max(25, Ceil(M _{CBD} \times P \times N) \times T _{CSI-RS})
≤ 320ms	

DRX cycle > 320ms		$Ceil(M_{CBD} \times P \times N) \times T_{DRX}$
Note:	T _{CSI-RS} is the	periodicity of CSI-RS resource in the set $\ \overline{q}_{\mathrm{l}}$. T_{DRX} is the
	DRX cycle ler	ngth.

8.5.6.3 Measurement restriction for CSI-RS based candidate beam detection

For both FR1 and FR2, when the CSI-RS for CBD measurement is in the same OFDM symbol as SSB for RLM, BFD, CBD or L1-RSRP measurement, UE is not required to receive CSI-RS for CBD measurement in the PRBs that overlap with an SSB.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has same SCS than CSI-RS for CBD measurement, the UE shall be able to perform CSI-RS based CBD measurement without restrictions.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has different SCS than CSI-RS for CBD measurement, the UE shall be able to perform CSI-RS based CBD measurement with restrictions according to its capabilities:

- If the UE supports *simultaneousRxDataSSB-DiffNumerology* the UE shall be able to perform CSI-RS based CBD measurement for without restrictions.
- If the UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both CSI-RS for CBD measurement and SSB. Longer measurement period for CSI-RS based CBD measurement is expected, and no requirements are defined.

For FR1, when the CSI-RS for CBD measurement is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement, UE shall be able to measure the CSI-RS for CBD measurement without any restriction.

For FR2, when the CSI-RS for CBD measurement on one CC is in the same OFDM symbol as SSB for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both CSI-RS for CBD measurement and SSB. Longer evaluation period for CSI-RS based CBD measurement is expected, and no requirements are defined.

For FR2, when the CSI-RS for CBD measurement on one CC is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both CSI-RS for CBD measurement and the other CSI-RS. Longer evaluation period for CSI-RS based CBD measurement is expected, and no requirements are defined.

8.5.7 Scheduling availability of UE during beam failure detection

Scheduling availability restrictions when the UE is performing beam failure detection are described in the following clauses.

8.5.7.1 Scheduling availability of UE performing beam failure detection with a same subcarrier spacing as PDSCH/PDCCH on FR1

There are no scheduling restrictions due to beam failure detection performed on SSB and CSI-RS configured for BFD with the same SCS as PDSCH or PDCCH in FR1.

8.5.7.2 Scheduling availability of UE performing beam failure detection with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UEs which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to beam failure detection when SSB is configured as BFD. For UEs which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to beam failure detection when SSB is configured as BFD.

- The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on SSB symbols to be measured for beam failure detection.

When intra-band carrier aggregation in FR1 is configured, the scheduling restrictions on FR1 serving PCell or PSCell apply to all serving cells in the same band on the symbols that fully or partially overlap with restricted symbols. When inter-band carrier aggregation within FR1 is configured, there are no scheduling restrictions on FR1 serving cell(s) configured in other bands than the bands in which PCell or PSCell is configured.

8.5.7.3 Scheduling availability of UE performing beam failure detection on FR2

The following scheduling restriction applies due to beam failure detection.

- For the case where no RSs are provided for BFD, or when CSI-RS is configured for BFD is explicitly configured and is type-D QCLed with active TCI state for PDCCH or PDSCH, and the CSI-RS is not in a CSI-RS resource set with repetition ON
 - There are no scheduling restrictions due to beam failure detection performed based on the CSI-RS.
- Otherwise
 - The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on BFD-RS resource symbols to be measured for beam failure detection.

When intra-band carrier aggregation in FR2 is performed, the scheduling restrictions on FR2 serving PCell or PSCell apply to all serving cells in the same band on the symbols that fully or partially overlap with restricted symbols.

For FR2, if following conditions are met,

- UE has been notified about system information update through paging,
- The gap between UE's reception of PDCCH that UE monitors in the Type2-PDCCH CSS set and that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots.

For the SSB and CORESET for RMSI scheduling multiplexing patterns 3, UE is expected to receive the PDCCH that UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured for BFD measurement; and

For the SSB and CORESET for RMSI scheduling multiplexing patterns 2, UE is expected to receive PDSCH that corresponds to the PDCCH that UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured for BFD measurement.

8.5.7.4 Scheduling availability of UE performing beam failure detection on FR1 or FR2 in case of FR1-FR2 inter-band CA and NR DC

There are no scheduling restrictions on FR1 serving cell(s) due to beam failure detection performed on FR2 serving PCell and/or PSCell.

There are no scheduling restrictions on FR2 serving cell(s) due to beam failure detection performed on FR1 serving PCell and/or PSCell.

NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG are in FR1 and all serving cells in SCG are in FR2.

8.5.8 Scheduling availability of UE during candidate beam detection

Scheduling availability restrictions when the UE is performing L1-RSRP measurement for candidate beam detection are described in the following clauses.

8.5.8.1 Scheduling availability of UE performing L1-RSRP measurement with a same subcarrier spacing as PDSCH/PDCCH on FR1

There are no scheduling restrictions due to L1-RSRP measurement performed on SSB and CSI-RS configured as link recovery detection resource with the same SCS as PDSCH or PDCCH in FR1.

8.5.8.2 Scheduling availability of UE performing L1-RSRP measurement with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UEs which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to L1-RSRP measurement based on SSB as link recovery detection resource. For UEs which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to L1-RSRP measurement based on SSB configured as link recovery detection resource.

- The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH, TRS, CSI-RS for tracking or CSI-RS for CQI on SSB symbols to be measured for L1-RSRP.

When intra-band carrier aggregation in FR1 is configured, the scheduling restrictions on one serving cell apply to all other serving cells in the same band on the symbols that fully or partially overlap with the restricted symbols. When inter-band carrier aggregation within FR1 is configured, there are no scheduling restrictions on FR1 serving cell(s) configured in other bands.

8.5.8.3 Scheduling availability of UE performing L1-RSRP measurement on FR2

The following scheduling restriction applies due to candidate beam detection

- The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH, CSI-RS for tracking or CSI-RS for CQI on reference symbols to be measured for candidate beam detection.

When intra-band carrier aggregation in FR2 is configured, the scheduling restrictions on to one serving cell apply to all serving cells in the same band on the symbols that fully or partially overlap with restricted symbols.

For FR2, if following conditions are met,

- UE has been notified about system information update through paging,
- The gap between UE's reception of PDCCH that UE monitors in the Type2-PDCCH CSS set and that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots,

For the SSB and CORESET for RMSI scheduling multiplexing patterns 3, UE is expected to receive the PDCCH that UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured for CBD mesurement; and

For the SSB and CORESET for RMSI scheduling multiplexing patterns 2, UE is expected to receive PDSCH that corresponds to the PDCCH that UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured for CBD measurement.

8.5.8.4 Scheduling availability of UE performing L1-RSRP measurement on FR1 or FR2 in case of FR1-FR2 inter-band CA and NR-DC

There are no scheduling restrictions on FR1 serving cell(s) due to L1-RSRP measurement performed on FR2 serving cell(s).

There are no scheduling restrictions on FR2 serving cell(s) due to L1-RSRP measurement performed on FR1 serving cell(s).

NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG are in FR1 and all serving cells in SCG are in FR2.

8.5.9 Minimum requirement at transitions for beam failure detection

When the UE transitions between DRX and no DRX or when DRX cycle periodicity changes, for each BFD-RS resource, for a duration of time equal to the evaluation period corresponding to the second mode after the transition occurs, the UE shall use an evaluation period that is no less than the minimum of evaluation period corresponding to the first mode and the second mode. Subsequent to this duration, the UE shall use an evaluation period corresponding to the second mode for each BFD-RS resource.

When the UE transitions from a first configuration of BFD resources to a second configuration of BFD resources that is different from the first configuration, for each BFD resource present in the second configuration, for a duration of time equal to the evaluation period corresponding to the second configuration after the transition occurs, the UE shall use an evaluation period that is no less than the minimum of evaluation periods corresponding to the first configuration and the second configuration. Subsequent to this duration, the UE shall use an evaluation period corresponding to the second configuration for each BFD resource present in the second configuration.

When the UE transitions from a first configuration of active TCI state of the CORESET to a second configuration of active TCI state of the CORESET, for each CSI-RS for BFD present in the second configuration, the UE shall use an evaluation period corresponding to the second configuration from the time of transition.

8.6 Active BWP switch delay

8.6.1 Introduction

The requirements in this clause apply for a UE configured PCell or any activated SCell in standalone NR or NE-DC, PCell, PSCell or any activated SCell in MCG or SCG in NR-DC, or PSCell or any activated SCell in SCG in EN-DC. UE shall complete the switch of active DL and/or UL BWP within the delay defined in this clause.

8.6.2 DCI and timer based BWP switch delay

The requirements in this clause only apply to the case that the BWP switch is performed on a single CC with more than one BWP configurations configured.

For DCI based BWP switch, if the serving cell where UE receives DCI for BWP switch request is different from the serving cell on which BWP switch occurs, the UE is not required to follow the requirements specified in this clause.

For DCI-based BWP switch, after the UE receives BWP switching request at DL slot n on a serving cell, UE shall be able to receive PDSCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell on which BWP switch on the first DL or UL slot occurs right after a time duration of $T_{BWPswitchDelay}$ which starts from the beginning of DL slot n.

The UE is not required to transmit UL signals or receive DL signals until the first DL or UL slot occurs right after a time duration of $T_{BWPswitchDelay}$ which starts from the beginning of DL slot n except DCI triggering BWP switch on the cell where DCI-based BWP switch occurs. The UE is not required to follow the requirements defined in this clause when performing a DCI-based BWP switch between the BWPs in disjoint channel bandwidths or in partially overlapping channel bandwidths.

For timer-based BWP switch, the UE shall start BWP switch at DL slot n, where slot n is the first slot of a DL subframe (FR1) or DL half-subframe (FR2) immediately after a BWP-inactivity timer *bwp-InactivityTimer* [2] expires on a serving cell, and the UE shall be able to receive PDSCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell on which BWP switch on the first DL or UL slot occurs right after a time duration of T_{BWPswitchDelay} which starts from the beginning of DL slot n.

The UE is not required to transmit UL signals or receive DL signals during time duration T_{BWPswitchDelay} after *bwp-InactivityTimer* [2] expires on the cell where timer-based BWP switch occurs.

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration T_{BWPswitchDelay} defined in Table 8.6.2-1.

NR Slot BWP switch delay TBWPswitchDelay (slots) μ length Type 2Note 1 Type 1Note 1 (ms) 0 3 0.5 1 2 5 2 0.25 3 9 0.125 18 Depends on UE capability. Note 1:

Table 8.6.2-1: BWP switch delay

Note 2:	If the BWP switch involves changing of SCS, the BWP
	switch delay is determined by the smaller SCS between
	the SCS before BWP switch and the SCS after BWP
	switch.

Provided the UE does not have the required TCI-state information to receive PDCCH and PDSCH in the new BWP, the UE shall use old TCI-states before the BWP switch until a new MAC CE updating the required TCI-state information for PDCCH and PDSCH is received after the BWP switch.

If UE has the information on the required TCI-state information to receive PDCCH and PDSCH in the new BWP,

- UE shall be able to receive PDCCH and PDSCH with old TCI-states before the delay as specified in Clause 8.10 in the new BWP.
- UE shall be able to receive PDCCH and PDSCH with new TCI-states after the delay as specified in Clause 8.10 in the new BWP

8.6.3 RRC based BWP switch delay

The requirements in this clause only apply to the case that the BWP switch is performed on a single CC with one or more than one BWP configuration(s) configured, with

- Active BWP switch or parameter change of its active BWPs for SpCell
- Parameter change of its active BWPs except parameter *firstActiveDownlinkBWP-Id* and *firstActiveUplinkBWP-Id* for SCell

For RRC-based BWP switch, after the UE receives RRC reconfiguration involving active BWP switching or parameter change of its active BWP, UE shall be able to receive PDSCH/PDCCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell on which BWP switch occurs on the first DL or UL slot right after a time duration of $\frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR Slot \ length}$ slots which begins from the beginning of DL slot n, where

DL slot n is the last slot overlapping with the PDSCH containing the RRC command, and

NR Slot length is determined by the smaller SCS between the SCS before BWP switch and the SCS after BWP switch if the BWP switch involves changing of SCS.

 $T_{RRCprocessing\,Delay}$ is the length of the RRC procedure delay in ms as defined in clause 11.2 in TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the length of the RRC procedure delay in ms as defined in clause 12 in TS 38.331 [2], and

 $T_{BWPswitchDelayRRC} = 6ms$ is the time used by the UE to perform BWP switch.

The UE is not required to transmit UL signals or receive DL signals during the time defined by $T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}$ on the cell where RRC-based BWP switch occurs. When $T_{HARQ} > T_{RRCprocessingDelay}$ a longer switching delay is allowed. Where T_{HARQ} is the time between DL data transmission and acknowledgement as specified in TS 38.213 [3].

8.7 Void

8.8 NE-DC: E-UTRAN PSCell Addition and Release Delay

8.8.1 Introduction

This clause defines requirements for the delay within which the UE shall be able to configure an E-UTRAN PSCell in NR - E-UTRA dual connectivity. The requirements are applicable to an NR - E-UTRA dual connectivity capable UE.

8.8.2 E-UTRAN PSCell Addition Delay Requirement

The requirements in this clause shall apply for the UE, which is configured with PCell, and may also be configured with one or more SCells.

Upon receiving E-UTRAN PSCell addition in subframe n, the UE shall be capable to transmit PRACH preamble towards E-UTRAN PSCell no later than in subframe $n + T_{\text{config EUTRAN-PSCell}}$:

Where:

 $T_{config_EUTRAN-PSCell} = T_{RRC_delay} + T_{activation_time} + 50ms + T_{E-UTRAN-PSCell_DU}$

T_{RRC delay} is the RRC procedure delay as specified in TS 38.331 [2].

 $T_{activation_time}$ is the E-UTRAN PSCell activation delay. If the E-UTRAN PSCell is known, then $T_{activation_time}$ is 20ms. If the E-UTRAN PSCell is unknown, then $T_{activation_time}$ is 30ms provided the E-UTRAN PSCell can be successfully detected on the first attempt.

 $T_{\text{E-UTRAN-PSCell_DU}}$ is the delay uncertainty in acquiring the first available PRACH occasion in the E-UTRAN PSCell. $T_{\text{E-UTRAN-PSCell_DU}}$ is up to 30ms.

E-UTRAN PSCell is known if it has been meeting the following conditions:

- During the last 5 seconds before the reception of the E-UTRAN PSCell configuration command:
 - the UE has sent a valid measurement report for the E-UTRAN PSCell being configured and
 - the E-UTRAN PSCell being configured remains detectable according to the cell identification conditions specified in clause 8.8 of TS 36.133 [15],
- E-UTRAN PSCell being configured also remains detectable during the E-UTRAN PSCell configuration delay T_{config_EUTRAN-PSCell} according to the cell identification conditions specified in clause 8.8 of TS 36.133 [15].

otherwise it is unknown.

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

8.8.3 E-UTRAN PSCell Release Delay Requirement

The requirements in this clause shall apply for a UE which is configured with PCell and E-UTRAN PSCell and may also be configured with one or more SCells and/or E-UTRAN SCells.

Upon receiving E-UTRAN PSCell release in subframe n, the UE shall accomplish the release actions specified in TS 38.331 [2] no later than in subframe n+ T_{RRC_delay} :

Where

T_{RRC_delay} is the RRC procedure delay as specified in TS 38.331 [2].

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

8.9 NR-DC: PSCell Addition and Release Delay

8.9.1 Introduction

This clause defines requirements for the delay within which the UE shall be able to configure an PSCell in NR dual connectivity. The requirements are applicable to an NR dual connectivity capable UE.

8.9.2 PSCell Addition Delay Requirement

The requirements in this clause shall apply for the UE configured with only PCell in FR1.

Upon receiving PSCell addition in subframe n, the UE shall be capable to transmit PRACH preamble towards PSCell in FR2 no later than in slot n + $\frac{T_{config_PSCell}}{NR \ slot \ length}$.

where:

$$T_{config}$$
 PSCell = T_{RRC} delay + $T_{processing}$ + T_{search} + T_{Δ} + T_{PSCell} DU + 2 ms

T_{RRC_delay} is the RRC procedure delay as specified in TS 38.331 [2].

T_{processing} is the SW processing time needed by UE, including RF warm up period. T_{processing} = 40 ms.

 T_{search} is the time for AGC settling and PSS/SSS detection. If the target cell is known, $T_{search} = 0$ ms. If the target cell is unknown and the target cell $\hat{E}_s/Iot \ge -2dB$, $T_{search} = 24*$ Trs ms.

 T_{Δ} is time for fine time tracking and acquiring full timing information of the target cell. $T_{\Delta} = 1*Trs$ ms for a known or unknown PSCell.

T_{PSCell_DU} is the delay uncertainty in acquiring the first available PRACH occasion in the PSCell. T_{PSCell_DU} is up to the summation of SSB to PRACH occasion associated period is defined in Table 8.1-1 of TS 38.213 [3].

Trs is the SMTC periodicity of the target cell if the UE has been provided with an SMTC configuration for the target cell in PSCell addition message, otherwise Trs is the SMTC configured in the measObjectNR having the same SSB frequency and subcarrier spacing. If the UE is not provided SMTC configuration or measurement object on this frequency, the requirement in this clause is applied with Trs = 5 ms assuming the SSB transmission periodicity is 5 ms. There is no requirement if the SSB transmission periodicity is not 5 ms.

In FR1 and FR2, the PSCell is known if it has been meeting the following conditions:

During the last 5 seconds before the reception of the PSCell configuration command:

- the UE has sent a valid measurement report for the PSCell being configured and
- One of the SSBs measured from the PSCell being configured remains detectable according to the cell identification conditions specified in clause 9.3.
- One of the SSBs measured from PSCell being configured also remains detectable during the PSCell
 configuration delay T_{config_PSCell} according to the cell identification conditions specified in clause 9.3.

otherwise it is unknown.

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

8.9.3 PSCell Release Delay Requirement

The requirements in this clause shall apply for a UE which is configured with PCell and one PSCell.

Upon receiving PSCell release in subframe n, the UE shall accomplish the release actions specified in TS 38.331 [2] no later than in slot n + $\frac{T_{RRC_delay}}{NR \ slot \ length}$:

where

T_{RRC} delay is the RRC procedure delay as specified in TS 38.331 [2].

The PCell interruption specified in clause 8.2 is allowed only during the RRC reconfiguration procedure [2].

8.10 Active TCI state switching delay

8.10.1 Introduction

The requirements in this clause apply for a UE configured with one or more TCI state configurations on serving cell in MR-DC or standalone NR. UE shall complete the switch of active TCI state within the delay defined in this clause.

8.10.2 Known conditions for TCI state

The TCI state is known if the following conditions are met:

- During the period from the last transmission of the RS resource used for the L1-RSRP measurement reporting
 for the target TCI state to the completion of active TCI state switch, where the RS resource for L1-RSRP
 measurement is the RS in target TCI state or QCLed to the target TCI state
 - TCI state switch command is received within 1280 ms upon the last transmission of the RS resource for beam reporting or measurement
 - The UE has sent at least 1 L1-RSRP report for the target TCI state before the TCI state switch command
 - The TCI state remain detectable during the TCI state switching period
 - The SSB associated with the TCI state remain detectable during the TCI switching period
 - SNR of the TCI state > -3dB

Otherwise, the TCI state is unknown.

8.10.3 MAC-CE based TCl state switch delay

If the target TCI state is known, upon receiving PDSCH carrying MAC-CE activation command in slot n, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs at the first slot that is after slot n+ T_{HARQ} + $3N_{slot}^{subframe,\mu}$ + $TO_k*(T_{first-SSB} + T_{SSB-proc})$ / NR slot length. The UE shall be able to receive PDCCH with the old TCI state until slot n+ T_{HARQ} + $3N_{slot}^{subframe,\mu}$.

Where T_{HARO} is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3];

T_{first-SSB} is time to first SSB transmission after MAC CE command is decoded by the UE;

 $T_{SSB-proc} = 2 \text{ ms};$

 $TO_k = 1$ if target TCI state is not in the active TCI state list for PDSCH, 0 otherwise.

If the target TCI state is unknown, upon receiving PDSCH carrying MAC-CE activation command in slot n, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs at the first slot that is after slot n+ T_{HARQ} +3 $N_{slot}^{subframe,\mu}$ + $T_{L1-RSRP}$ +TO_{uk}*($T_{first-SSB}$ + $T_{SSB-proc}$) / NR slot length. The UE shall be able to receive PDCCH with the old TCI state until slot n+ T_{HARQ} + 3 $N_{slot}^{subframe,\mu}$.

Where

T_{L1-RSRP} = 0 in FR1 or when the TCI state switching not involving QCL-TypeD in FR2. Otherwise,

 $T_{\text{L1-RSRP}}$ is the time for Rx beam refinement in FR2, defined as

- TL1-RSRP_Measurement_Period_SSB for SSB as specified in clause 9.5.4.1,
 - with the assumption of M=1
 - with $T_{Report} = 0$
- TL1-RSRP_Measurement_Period_CSI-RS for CSI-RS as specified in clause 9.5.4.2
 - configured with higher layer parameter repetition set to ON
 - with the assumption of M=1 for periodic CSI-RS
 - for aperiodic CSI-RS if number of resources in resource set at least equal to MaxNumberRxBeam
 - with $T_{Report} = 0$
- $TO_{uk} = 1$ for CSI-RS based L1-RSRP measurement, and 0 for SSB based L1-RSRP measurement when TCI state switching involves QCL-TypeD

- $TO_{uk} = 1$ when TCI state switching involves other QCL types only
- T_{first-SSB} is time to first SSB transmission after L1-RSRP measurement when TCI state switching involves QCL-TypeD;
- T_{first-SSB} is time to first SSB transmission after MAC CE command is decoded by the UE for other QCL types;
 - The SSB shall be the QCL-TypeA or QCL-TypeC to target TCI state

8.10.4 DCI based TCI state switch delay

If the target TCI state is known, when a UE is configured with the higher layer parameter *tci-PresentInDCI* which is set as 'enabled' for the CORESET scheduling PDSCH at slot n, UE shall be able to receive PDSCH with target TCI state of the serving cell on which TCI state switch occurs at the first slot that is after slot n+*timeDurationForQCL*, where, *timeDurationForQCL* is the time required by the UE to perform PDCCH reception and applying spatial QCL information received in DCI for PDSCH processing as described in TS 38.214 [26], the value of *timeDurationForQCL* is defined in TS 38.331 [2].

The known condition for TCI state defined in clause 8.10.2 is applied.

8.10.5 RRC based TCI state switch delay

If the target TCI state is known, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs at the first slot that is after slot $n+(T_{RRC_processing}+TO_k*(T_{first_SSB}+T_{SSB_proc})) / NR slot length$, The UE is not required to receive PDCCH/PDSCH/CSI-RS or transmit PUCCH/PUSCH until the end of switching period.

Where

- Slot n is the last slot overlapping with the PDSCH carrying RRC activation command.
- T_{RRC_processing} is the RRC processing delay defined in Clause 11.2 of TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the RRC processing delay defined in Clause 12 of TS 38.331 [2].
- T_{first-SSB} is time to first SSB transmission after RRC processing by the UE; The SSB shall be the QCL-TypeA or QCL-TypeC to target TCI state.
- $T_{SSB-proc}$ and TO_k are defined in clause 8.10.3.

If the target TCI state is unknown, UE shall be able to receive PDCCH with target TCI state of the serving cell on which TCI state switch occurs at the first slot that is after slot n+ $(T_{RRC_processing} + T_{L1-RSRP} + TO_{uk}*(T_{first-SSB} + T_{SSB-proc})) / NR slot length, The UE is not required to receive PDCCH/PDSCH/CSI-RS or transmit PUCCH/PUSCH until the end of switching period.$

Where

- Slot n is the last slot overlapping with the PDSCH carrying RRC activation command.
- T_{RRC_processing} is the RRC processing delay defined in Clause 11.2 of TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the RRC processing delay defined in Clause 12 of TS 38.331 [2].
- T_{first-SSB} is time to first SSB transmission after L1-RSRP measurement when TCI state switching involves QCL-TypeD;
- T_{first-SSB} is time to first SSB transmission after RRC processing time at the UE for other QCL types;
 - The SSB shall be the QCL-TypeA or QCL-TypeC to target TCI state
- T_{L1-RSRP}, TO_{uk} and T_{SSB-proc} are defined in clause 8.10.3.

The requirements for RRC based TCI state switch delay apply when only 1 TCI state is configured in RRC TCI state list. When $T_{HARQ} > T_{RRC_processing}$ a longer switching delay is allowed. Where T_{HARQ} is the time between DL data transmission and acknowledgement as specified in TS 38.213 [3].

8.10.6 Active TCI state list update delay

If the target TCI state is known, upon receiving PDSCH carrying MAC-CE active TCI state list update at slot n, UE shall be able to receive PDCCH to schedule PDSCH with the new target TCI state at the first slot that is after n+ T_{HARQ} +3 $N_{slot}^{subframe,\mu}$ +TO_k*($T_{first-SSB}$ + $T_{SSB-proc}$) / NR slot length. Where T_{HARQ} , $T_{first-SSB}$, $T_{SSB-proc}$ and TO_k are defined in clause 8.10.3.

8.11 PSCell Change

This clause defines requirements for the delay within which the UE shall be able to change PSCell to other cell in ENDC or NR-DC. The requirements in this clause are applicable to EN-DC and NR-DC.

The UE shall be capable of transmitting PRACH preamble towards the target PSCell no later than specified in clause 8.9.2 for the case of NR-DC and in TS 36.133 clause 7.31.2 for the case of EN-DC,, where the following values for slot n, $T_{processing}$ and T_{RRC_delay} shall override the existing ones:

- Slot n is the last slot overlapping with the PDSCH containing PSCell change,
- T_{processing} = 20 ms when source and target cells are in the same FR,
- $T_{processing} = 40$ ms when source and target cells are in different FRs.
- T_{RRC_delay} is the RRC procedure delay as specified in TS 36.331 [16] if the corresponding RRC message is embedded in E-UTRA RRC message, otherwise it is the RRC procedure delay as specified in TS 38.331 [2].

If the SMTC periodicity of the target cell is not provided within the PSCell change message, and measObjectNRs having the same SSB frequency and subcarrier spacing configured by MN and SN have different SMTC, T_{rs} is the periodicity of one of the SMTC which is up to UE implementation.

The target PSCell is known if it has been meeting the conditions in clause 8.9.2 for the case of NR-DC and in TS36.133 clause 7.31.2 for the case of EN-DC.

The interruption on PCell and other serving cells specified in TS36.133 clause 7.32.2.1 for EN-DC and in TS38.133 clause 8.2.4.2.1 for NR-DC is allowed only during the RRC reconfiguration procedure [2].

9 Measurement Procedure

9.1 General measurement requirement

9.1.1 Introduction

This clause contains general requirements on the UE regarding measurement reporting in RRC_CONNECTED state. The requirements are split in intra-frequency, inter-frequency, inter-RAT E-UTRAN FDD, inter-RAT E-UTRAN TDD, and L1-RSRP measurements requirements. These measurements may be used by the NG-RAN. The measurement quantities are defined in TS38.215 [4], the measurement model is defined in TS38.300 [10], TS37.340 [17] and measurement accuracies are specified in clause 10. Control of measurement reporting is specified in TS 38.331 [2].

In the requirements of clause 9, the exceptions for side conditions apply as follows:

- for the UE capable of CA but not configured with any SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.1 for UE supporting CA in FR1, and clause B.3.2.3 for UE supporting CA in FR2, respectively;

- for the UE capable of CA and configured with at least one SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.2 for UE configured with CA in FR1, and clause B.3.2.4 for UE supporting CA in FR2, respectively;
- for the UE capable of SUL but not configured with SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.1 for UE supporting SUL in FR1;
- for the UE capable of SUL and configured with at least one SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.2 for UE configured with SUL in FR1.

9.1.2 Measurement gap

If the UE requires measurement gaps to identify and measure intra-frequency cells and/or inter-frequency cells and/or inter-RAT E-UTRAN cells, and the UE does not support independent measurement gap patterns for different frequency ranges as specified in Table 5.1-1 in [18, 19, 20], in order for the requirements in the following clauses to apply the network must provide a single per-UE measurement gap pattern for concurrent monitoring of all frequency layers.

If the UE requires measurement gaps to identify and measure intra-frequency cells and/or inter-frequency cells and/or inter-RAT E-UTRAN cells, and the UE supports independent measurement gap patterns for different frequency ranges as specified in Table 5.1-1 in [18, 19, 20], in order for the requirements in the following clauses to apply the network must provide either per-FR measurement gap patterns for frequency range where UE requires per-FR measurement gap for concurrent monitoring of all frequency layers of each frequency range independently, or a single per-UE measurement gap pattern for concurrent monitoring of all frequency layers of all frequency ranges.

During the per-UE measurement gaps the UE:

- is not required to conduct reception/transmission from/to the corresponding E-UTRAN PCell, E-UTRAN SCell(s) and NR serving cells for E-UTRA-NR dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to TS38.321 [7].
- is not required to conduct reception/transmission from/to the corresponding NR serving cells for SA (with single carrier or CA configured) except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to TS38.321 [7].
- is not required to conduct reception/transmission from/to the corresponding PCell, SCell(s) and E-UTRAN serving cells for NR-E-UTRA dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to TS38.321 [7].
- is not required to conduct reception/transmission from/to the corresponding NR serving cells for NR-DC except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to TS38.321 [7].

During the per-FR measurement gaps the UE:

- is not required to conduct reception/transmission from/to the corresponding E-UTRAN PCell, E-UTRAN SCell(s) and NR serving cells in the corresponding frequency range for E-UTRA-NR dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to [7].
- is not required to conduct reception/transmission from/to the corresponding NR serving cells in the corresponding frequency range for SA (with single carrier or CA configured) except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to TS38.321 [7].
- is not required to conduct reception/transmission from/to the corresponding PCell, SCell(s) and E-UTRAN serving cells in the corresponding frequency range for NR-E-UTRA dual connectivity except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to TS38.321 [7].
- is not required to conduct reception/transmission from/to the corresponding NR serving cells in the corresponding frequency range for NR-DC except the reception of signals used for RRM measurement(s) and the signals used for random access procedure according to TS38.321 [7].

UEs shall support the measurement gap patterns listed in Table 9.1.2-1 based on the applicability specified in table 9.1.2-2 and 9.1.2-3. UE determines measurement gap timing based on gap offset configuration and measurement gap timing advance configuration provided by higher layer signalling as specified in TS 38.331 [2] and TS 36.331 [16].

Table 9.1.2-1: Gap Pattern Configurations

Gap Pattern Id	Measurement Gap Length (MGL, ms)	Measurement Gap Repetition Period (MGRP, ms)
0	6	40
1	6	80
2	3 3	40
3		80
4	6	20
5	6	160
6	4	20
7	4	40
8	4	80
9	4	160
10	3	20
11	3	160
12	5.5	20
13	5.5	40
14	5.5	80
15	5.5	160
16	3.5	20
17	3.5	40
18	3.5	80
19	3.5	160
20	1.5	20
21	1.5	40
22	1.5	80
23	1.5	160

Table 9.1.2-2: Applicability for Gap Pattern Configurations supported by the E-UTRA-NR dual connectivity UE or NR-E-UTRA dual connectivity UE

Measurement gap pattern configuration	Serving cell	Measurement Purpose	Applicable Gap Pattern Id
	E-UTRA + FR1, or	non-NR RAT Note1,2	0,1,2,3
Per-UE	E-UTRA + FR2, or	FR1 and/or FR2	0-11
measurement	E-UTRA + FR1 +	non-NR RAT ^{Note1,2}	0, 1, 2, 3, 4, 6, 7, 8,10
gap	FR2	and FR1 and/or FR2	
	E-UTRA and, FR1 if configured	non-NR RAT Note1,2	0,1,2,3
	FR2 if configured		No gap
	E-UTRA and, FR1 if configured	FR1 only	0-11
	FR2 if configured		No gap
	E-UTRA and, FR1 if configured	FR2 only	No gap
Per-FR	FR2 if configured		12-23
measurement gap	E-UTRA and, FR1 if configured	non-NR RAT Note1,2 and FR1	0, 1, 2, 3, 4, 6, 7, 8,10
	FR2 if configured		No gap
	E-UTRA and, FR1 if configured	FR1 and FR2	0-11
	FR2 if configured		12-23
	E-UTRA and, FR1 if configured	non-NR RAT Note1,2 and FR2	0, 1, 2, 3, 4, 6, 7, 8,10
	FR2 if configured		12-23

		E-UTRA and, FR1 if	non-NR RAT Note1,2	0, 1, 2, 3, 4, 6, 7, 8,10
		configured	and FR1 and FR2	
		FR2 if configured		12-23
Note:	In E-UT	RA-NR dual connectivity	mode, if GSM or UTF	RA TDD or UTRA FDD inter-RAT
				easurement gap pattern #0 and #1 can
	be used	I for per-FR gap in E-UTF	RA and FR1 if configu	red, or for per-UE gap.
NOTE 1:			•	ncludes E-UTRA, UTRA and/or GSM.
	In NR-E-UTRA dual connectivity mode, non-NR RAT means E-UTRA.			means E-UTRA.
NOTE 2:	· · · · · ·			
NOTE 3:		' '		are configured and the UE requires
	measure	ement gaps for performir	ng such measurement	s, only Gap Pattern #0 can be used.

In E-UTRA-NR dual connectivity mode,

- if per-UE measurement gap is configured with MG timing advance of T_{MG} ms, the measurement gap starts at time T_{MG} ms advanced to the end of the latest E-UTRA subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- if per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest E-UTRA subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- if per-FR measurement gap for FR2 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR2 starts at time T_{MG} ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among SCG serving cells subframes in FR2.

In NR-E-UTRA dual connectivity mode,

- if per-UE measurement gap is configured with MG timing advance of T_{MG} ms, the measurement gap starts at time T_{MG} ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- if per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms and UE has NR serving cell in FR1, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among MCG serving cells subframes in FR1.
- if per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms and UE doesn't have NR serving cell in FR1, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest E-UTRA subframe occurring immediately before the configured measurement gap among SCG serving cells subframes.
- if per-FR measurement gap for FR2 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR2 starts at time T_{MG} ms advanced to the end of the latest NR subframe occurring immediately before the configured measurement gap among MCG serving cells subframes in FR2.

In NR-NR dual connectivity mode,

- If per-UE measurement gap is configured with MG timing advance of T_{MG} ms, the measurement gap starts at time T_{MG} ms advanced to the end of the latest MCG subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- If per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest MCG subframe occurring immediately before the configured measurement gap among MCG serving cells subframes.
- If per-FR measurement gap for FR2 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR2 starts at time T_{MG} ms advanced to the end of the latest SCG subframe occurring immediately before the configured measurement gap among SCG serving cells subframes in FR2.

T_{MG} is the MG timing advance value provided in *mgta* according to TS38.331 [2].

In determining the measurement gap starting point, UE shall use the DL timing of the latest E-UTRA or NR subframe occurring immediately before the configured measurement gap among E-UTRA or NR serving cells.

NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG in FR1 and all serving cells in SCG in FR2.

For per-FR measurement gap capable UE configured with E-UTRA-NR dual connectivity or NR-E-UTRA dual connectivity, when serving cells are in E-UTRA and FR1, measurement objects are in both E-UTRA/FR1 and FR2,

- If MN indicates UE that the measurement gap from MN applies to E-UTRA/FR1/FR2 serving cells, UE fulfils the per-UE measurement requirements for both E-UTRA/FR1 and FR2 measurement objects based on the measurement gap pattern configured by MN;
- If MN indicates UE that the measurement gap from MN applies to only LTE/FR1 serving cell(s),
 - UE fulfils the measurement requirements for FR1/LTE measurement objects based on the configured measurement gap pattern;
 - UE fulfils the requirements for FR2 measurement objects based on effective MGRP=20ms;

For per-FR measurement gap capable configured with E-UTRA-NR dual connectivity, NR-E-UTRA dual connectivity or NR-NR dual connectivity, when serving cells are in E-UTRA, FR1 and FR2, or in E-UTRA and FR2, or in FR1 and FR2, measurement objects are in both E-UTRA /FR1 and FR2.

- If MN indicates UE that the measurement gap from MN applies to E-UTRA/FR1/FR2 serving cells, UE fulfils the per-UE measurement requirements for both E-UTRA/FR1 and FR2 measurement objects based on the measurement gap pattern configured by MN.

Table 9.1.2-3: Applicability for Gap Pattern Configurations supported by the UE with NR standalone operation (with single carrier, NR CA and NR-DC configuration)

Measurement gap pattern configuration	Serving cell	Measurement Purpose NOTE 2	Applicable Gap Pattern Id
		E-UTRA only ^{NOTE3}	0,1,2,3
	FR1 NOTE5, or	FR1 and/or FR2	0-11
	FR1 + FR2	E-UTRAN and	0, 1, 2, 3, 4, 6, 7, 8,10
Day I I E		FR1 and/or FR2	
Per-UE measurement		E-UTRA only NOTE3	0,1,2,3
gap		FR1 only	0-11
gap		FR1 and FR2	0-11
	FR2 NOTE5	E-UTRAN and	0, 1, 2, 3, 4, 6, 7, 8,10
		FR1 and/or FR2	
		FR2 only	12-23
	FR1 if configured	E-UTRA only NOTE3	0,1,2,3
	FR2 if configured		No gap
	FR1 if configured	FR1 only	0-11
	FR2 if configured		No gap
	FR1 if configured	FR2 only	No gap
Per-FR	FR2 if configured		12-23
measurement	FR1 if configured	E-UTRA and FR1	0, 1, 2, 3, 4, 6, 7, 8,10
gap	FR2 if configured	NOTE3	No gap
9-1-	FR1 if configured	FR1 and FR2	0-11
	FR2 if configured		12-23
	FR1 if configured	E-UTRA and FR2	0, 1, 2, 3, 4, 6, 7, 8,10
	FR2 if configured	NOTE3	12-23
	FR1 if configured	E-UTRA and FR1	0, 1, 2, 3, 4, 6, 7, 8,10
	FR2 if configured	and FR2 NOTE3	12-23

NOTE 1: When E-UTRA inter-RAT RSTD measurements are configured and the UE requires measurement gaps for performing such measurements, only Gap Pattern #0 can be used.

NOTE 2: Measurement purpose which includes E-UTRA measurements includes also inter-RAT E-UTRA RSRP and RSRQ measurements for E-CID

NOTE 3: Void

NOTE4: If per-UE measurement gap is configured with MG timing advance of T_{MG} ms, the measurement gap starts at time T_{MG} ms advanced to the end of the latest subframe occurring immediately before the configured measurement gap among all serving cells subframes. If per-FR measurement gap for FR1 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR1 starts at time T_{MG} ms advanced to the end of the latest subframe occurring immediately before the configured measurement gap among serving cells subframes in FR1.

If per-FR measurement gap for FR2 is configured with MG timing advance of T_{MG} ms, the measurement gap for FR2 starts at time T_{MG} ms advanced to the end of the latest subframe occurring immediately before the configured measurement gap among serving cells subframes in FR2.

 T_{MG} is the MG timing advance value provided in *mgta* according to [2]. In determining the measurement gap starting point, UE shall use the DL timing of the latest subframe occurring immediately before the configured measurement gap among serving cells.

NOTE 5: NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG in FR1 and all serving cells in SCG in FR2.

For per-FR measurement gap capable UE in NR standalone operation (with single carrier, NR CA and NR-DC configuration), for per-FR gap based measurement, when there is no serving cell in a particular FR, where measurement objects are configured, regardless if explicit per-FR measurement gap is configured in this FR, the effective MGRP in this FR is used to determine requirements;

- 20 ms for FR2 NR measurements
- 40 ms for FR1 NR measurements
- 40 ms for LTE measurements
- 40 ms for FR1+LTE measurements

For per-FR measurement gap capable UE in NR standalone operation (with single carrier, NR CA and NR-DC configuration), when serving cells are in FR1 or FR2, measurement objects are in both E-UTRA /FR1 and FR2,

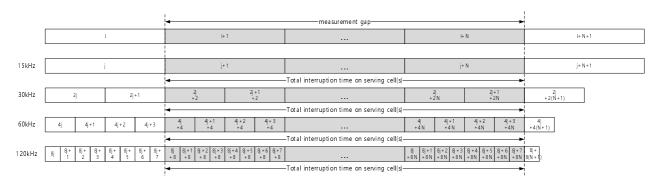
- If MN indicates UE that the measurement gap from MN applies to E-UTRA/FR1/FR2 serving cells, UE fulfils the per-UE measurement requirements for both E-UTRA/FR1 and FR2 measurement objects based on the measurement gap pattern configured by MN;

If measurement gap is configured in one FR but measurement object is not configured in the FR, the scheduling opportunity in the FR depends on the configured measurement gap pattern.

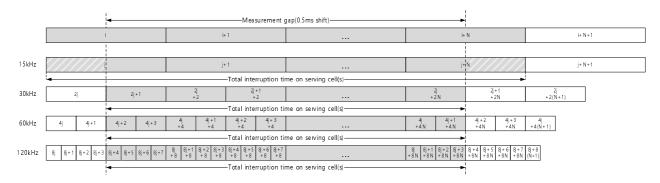
For E-UTRA-NR dual connectivity, if UE is not capable of per-FR-gap, total interruption time on SCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms. And if UE is capable of per-FR-gap, total interruption time on FR1 serving cells in SCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms, and total interruption time on FR2 serving cells in SCG during MGL is defined only when MGL(N) = 5.5ms, 3.5ms and 1.5ms.

For NR standalone operation (with single carrier, NR CA and NR-DC configuration), if UE is not capable of per-FR-gap, total interruption time on a serving cell during MGL is defined when MGL(N) = 6ms, 5.5ms, 4ms, 3.5ms, 3ms, and 1.5ms. And if UE is capable of per-FR-gap, total interruption time on FR1 serving cells during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms, and total interruption time on FR2 serving cells during MGL is defined only when MGL(N) = 5.5ms, 3.5ms and 1.5ms.

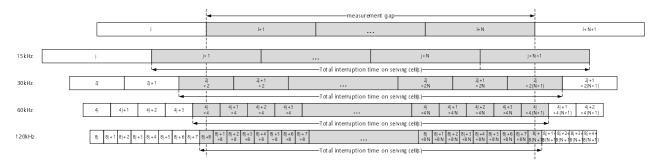
For NR-E-UTRA dual connectivity, if UE is not capable of per-FR-gap, total interruption time on MCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms. And if UE is capable of per-FR-gap, total interruption time on FR1 serving cells in MCG during MGL is defined only when MGL(N) = 6ms, 4ms and 3ms, and total interruption time on FR2 serving cells in MCG during MGL is defined only when MGL(N) = 5.5ms, 3.5ms and 1.5ms.



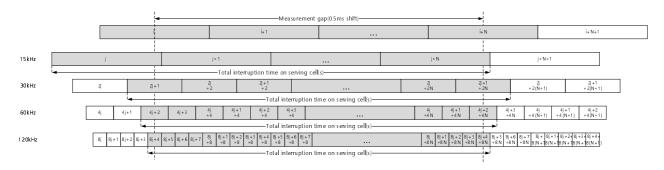
(a) Measurement gap with MGL = N(ms) with MG timing advance of 0ms for synchronous EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and synchronous NE-DC



(b) Measurement gap with MGL = N(ms) with MG timing advance of 0.5ms for synchronous EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and synchronous NE-DC



(c) Measurement gap with MGL = N(ms) with MG timing advance of 0ms for asynchronous EN-DC and asynchronous NE-DC



(d) Measurement gap with MGL = N(ms) with MG timing advance of 0.5ms for asynchronous EN-DC and asynchronous NE-DC

Figure 9.1.2-1: Measurement GAP and total interruption time on serving cells for EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and NE-DC

The corresponding total number of interrupted slots on serving cells is listed in Table 9.1.2-4 for synchronous EN-DC, NR standalone and NE-DC, and in Table 9.1.2-4a for asynchronous EN-DC respectively.

Table 9.1.2-4: Total number of interrupted slots on serving cells during MGL for Synchronous EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and NE-DC with per-UE measurement gap or per-FR measurement gap for FR1

NR	Total number of interrupted slots on serving cells					
SCS (kHz)	When MG timing advance of 0ms is applied			When MG t	iming advand is applied	ce of 0.5ms
	MGL=6ms	MGL=4ms	MGL=3ms	MGL=6ms	MGL=4ms	MGL=3ms
15	6	4	3	7 ^{Note3}	5 ^{Note3}	4 ^{Note3}
30	12	8	6	12	8	6
60	24	16	12	24	16	12
120	48	32	24	48	32	24

NOTE 1: For Gap Pattern ID 0, 1, 2 and 3, total number of interrupted subframes on MCG is MGL subframes when MG timing advance of 0ms is applied, and (MGL+1) subframes when MG timing advance of 0.5ms is applied.

NOTE 2: NR SCS of 120 kHz is only applicable to the case with per-UE measurement gap.

NOTE 3: Non-overlapped half-slots occur before and after the measurement gap.
Whether a Rel-15 UE can receive and/or transmit in those half-slots is up to
UE implementation.

Table 9.1.2-4a: Total number of interrupted slots on serving cells during MGL for Asynchronous EN-DC with per-UE measurement gap or per-FR measurement gap for FR1

NR		Total number of interrupted slots on serving cells					
SCS	When MG t	iming advanc	e of 0ms is	When MG t	iming advanc	ce of 0.5ms	
(kHz)	applied			is applied			
	MGL=6ms	MGL=4ms	MGL=3ms	MGL=6ms	MGL=4ms	MGL=3ms	
15	7	5	4	7	5	4	
30	13	9	7	13	9	7	
60	25	17	13	25	17	13	
120	49	33	25	49	33	25	

NOTE 1: For Gap Pattern ID 0, 1, 2 and 3, total number of interrupted subframes on MCG is MGL subframes when MG timing advance of 0ms is applied, and (MGL+1) subframes when MG timing advance of 0.5ms is applied.

NOTE 2: NR SCS of 120 kHz is only applicable to the case with per-UE measurement gap.

In case that UE capable of per-FR measurement gap is configured with per-FR measurement gap for FR2 serving cells, total number of interrupted slots on FR2 serving cells during MGL is listed in Table 9.1.2-4b.

Table 9.1.2-4b: Total number of interrupted slots on FR2 serving cells during MGL for EN-DC, NR standalone operation (with single carrier, NR CA and NR-DC configuration) and NE-DC with per-UE measurement gap or per-FR measurement gap for FR2

NR	Total number of interrupted slots on FR2 serving cells					
SCS (kHz)	When MG	timing advance applied	e of 0ms is	When MG ti	ming advance applied	of 0.25ms is
	MGL=5.5ms	MGL=3.5ms	MGL=1.5ms	MGL=5.5ms	MGL=3.5ms	MGL=1.5ms
60	22	14	6	22	14	6
120	44	28	12	44	28	12

NOTE 1: The total number of interrupted slots is based on that SFN and subframe reference for per-FR gap in FR2 indicated by high layer parameter *refServCellIndicator* is an FR2 serving cell.

NOTE 2: Slot occurs before or after the measurement gap may be interrupted additionally if SFN and subframe reference for per-FR gap in FR2 indicated by high layer parameter refServCellIndicator is an FR1 serving cell.

It is up to UE implementation whether or not the UE is able to conduct transmission in the following slot(s),

- when MGTA is not applied, in the L consecutive UL slots with respect to the SCS of the UL carrier with the same slot indices as the DL slots occurring immediately after measurement gap

- when MGTA is applied and the SCS of the UL carrier is other than 15kHz, in the L consecutive UL slots with respect to the SCS of the UL carrier with the same slot indices as the DL slots occurring immediately after measurement gap
- when MGTA is applied and the SCS of the UL carrier is 15kHz, in the L consecutive UL slots with respect to the SCS of the UL carrier with the same slot indices as the DL slots occurring immediately after the slot partially overlapped with measurement gap

where UL slot denotes that all the symbols in the slot are uplink symbols, and L=1 if $(N_{\text{TA}} + N_{\text{TA offset}}) \times T_{\text{c}}$ for the UL transmission is less than the length of one slot; L=2 otherwise.

Note: Network is supposed to take into account the possible difference between the estimated TA at network and actual TA at UE when scheduling UE in the above slot(s).

Table 9.1.2-5: (Void)

9.1.2.1 EN-DC: Measurement Gap Sharing

For E-UTRA-NR dual connectivity UE configured with per-UE measurement gap, measurement gap sharing shall be applies when UE requires measurement gaps to identify and measure cells on intra-frequency carriers or when SMTC configured for intra-frequency measurement are fully overlapping with per-UE measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, E-UTRA gap-needed inter-frequency carriers and inter-RAT UTRAN carriers and/or inter-RAT GSM carriers.

For E-UTRA-NR dual connectivity UE configured with per-FR1 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR1 intra-frequency carriers or when SMTC configured for FR1 intra-frequency measurement are fully overlapping with per-FR1 measurement gaps, and when UE is configured to identify and measure cells on FR1 inter-frequency carriers, E-UTRA gap-needed inter-frequency carriers, inter-RAT UTRAN carriers and/or inter-RAT GSM carriers.

For E-UTRA-NR dual connectivity UE configured with per-FR2 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR2 intra-frequency carriers or when SMTC configured for FR2 intra-frequency measurement are fully overlapping with per-FR2 measurement gaps, and when UE is configured to identify and measure cells on FR2 inter-frequency carriers.

When network signals "01", "10" or "11" with RRC parameter *MeasGapSharingScheme* [2][16]and the value of X is defined as in Table 9.1.2.1-1, and

- $K_{intra} = 1 / X * 100$,
- $K_{inter} = 1 / (100 X) * 100,$

When network signals "00" indicating equal splitting gap sharing, X is not applied.

The RRC parameter *MeasGapSharingScheme* shall be applied to the calculation of carrier specific scaling factor as specified in clause 9.1.5.2.1.

Table 9.1.2.1-1: Value of parameter X for EN-DC measurement gap sharing

measGa	apSharingScheme	Value of X (%)
	'00'	Equal splitting
	'01'	25
	'10'	50
	'11'	75
which measureme the table <i>to be ap</i> <i>MeasGapSharing</i>		lementation to determine ent gap sharing scheme in olied, when Scheme is absent and value in the field.

9.1.2.1a SA: Measurement Gap Sharing

For NR standalone UE without NR-DC operation and configured with per-UE measurement gap, measurement gap sharing shall be applies when UE requires measurement gaps to identify and measure cells on intra-frequency carriers or when SMTC configured for intra-frequency measurement are fully overlapping with per-UE measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, and/or inter-RAT E-UTRAN carriers.

For NR standalone UE without NR-DC operation and configured with per-FR1 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR1 intra-frequency carriers or when SMTC configured for FR1 intra-frequency measurement are fully overlapping with per-FR1 measurement gaps, and when UE is configured to identify and measure cells on FR1 inter-frequency carriers and/or inter-RAT E-UTRAN carriers.

For NR standalone UE without NR-DC operation and configured with per-FR2 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR2 intra-frequency carriers or when SMTC configured for FR2 intra-frequency measurement are fully overlapping with per-FR2 measurement gaps, and when UE is configured to identify and measure cells on FR2 inter-frequency carriers.

When network signals "01", "10" or "11" with RRC parameter *MeasGapSharingScheme* [2] and the value of X is defined as in Table 9.1.2.1a-1, and

- $K_{intra} = 1 / X * 100$,
- $K_{inter} = 1 / (100 X) * 100,$

When network signals "00" indicating equal splitting gap sharing, X is not applied.

The RRC parameter *MeasGapSharingScheme* shall be applied to the calculation of carrier specific scaling factor as specified in clause 9.1.5.2.2.

Table 9.1.2.1a-1: Value of parameter X for NR standalone measurement gap sharing

measGapS	SharingScheme	Value of X (%)
	'00'	Equal splitting
	'01'	25
	'10'	50
'11'		75
1	which measureme the table <i>to be ap</i>	Scheme is absent and

9.1.2.1b NE-DC: Measurement Gap Sharing

For NR-E-UTRA dual connectivity UE configured with per-UE measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on intra-frequency carriers or when SMTC configured for intra-frequency measurement are fully overlapping with per-UE measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, E-UTRA gap-needed inter-frequency carriers, and/or inter-RAT E-UTRA carriers.

For NR-E-UTRA dual connectivity UE configured with per-FR1 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR1 intra-frequency carriers or when SMTC configured for FR1 intra-frequency measurement are fully overlapping with per-FR1 measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, E-UTRA gap-needed inter-frequency carriers, and/or inter-RAT E-UTRA carriers.

For NR-E-UTRA dual connectivity UE configured with per-FR2 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR2 intra-frequency carriers or when SMTC configured for FR2 intra-frequency measurement are fully overlapping with per-FR2 measurement gaps, and when UE is configured to identify and measure cells on FR2 inter-frequency carriers.

When network signals "01", "10" or "11" with RRC parameter measGapSharingConfig [2][16] and the value of X is defined as in Table 9.1.2.1b-1, and

- $K_{intra} = 1 / X * 100,$
- $K_{inter} = 1 / (100 X) * 100,$

When network signals "00" indicating equal splitting gap sharing, X is not applied.

The RRC parameter *MeasGapSharingScheme* shall be applied to the calculation of carrier specific scaling factor as specified in clause 9.1.5.2.3.

Table 9.1.2.1b-1: Value of parameter X for NE-DC measurement gap sharing

measG	apSharingScheme	Value of X (%)	
	'00'	Equal splitting	
	'01'	25	
	'10'	50	
'11'		75	
Note:	It is left to UE implementation to determine which measurement gap sharing scheme in the table to be applied, when MeasGapSharingScheme is absent and there is no stored value in the field.		

9.1.2.1c NR-DC: Measurement Gap Sharing

For UE with NR-DC operation and configured with per-UE measurement gap, measurement gap sharing shall be applies when UE requires measurement gaps to identify and measure cells on intra-frequency carriers or when SMTC configured for intra-frequency measurement are fully overlapping with per-UE measurement gaps, and when UE is configured to identify and measure cells on inter-frequency carriers, and/or inter-RAT E-UTRAN carriers.

For UE with NR-DC operation and configured with per-FR1 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR1 intra-frequency carriers or when SMTC configured for FR1 intra-frequency measurement are fully overlapping with per-FR1 measurement gaps, and when UE is configured to identify and measure cells on FR1 inter-frequency carriers and/or inter-RAT E-UTRAN carriers.

For UE with NR-DC operation and configured with per-FR2 measurement gap, measurement gap sharing shall be applied when UE requires measurement gaps to identify and measure cells on FR2 intra-frequency carriers or when SMTC configured for FR2 intra-frequency measurement are fully overlapping with per-FR2 measurement gaps, and when UE is configured to identify and measure cells on FR2 inter-frequency carriers.

When network signals "01", "10" or "11" with RRC parameter *measGapSharingConfig* [2] and the value of X is defined as in Table 9.1.2.1c-1, and

- $K_{intra} = 1 / X * 100,$
- $K_{inter} = 1 / (100 X) * 100,$

When network signals "00" indicating equal splitting gap sharing, X is not applied.

The RRC parameter *MeasGapSharingScheme* shall be applied to the calculation of carrier specific scaling factor as specified in clause 9.1.5.2.4.

Table 9.1.2.1c-1: Value of parameter X for NR-DC measurement gap sharing

measGapShai	ringConfig	Value of X (%)		
'00'		Equal splitting		
'01'		25		
'10'		50		
'11'		75		
	It is left to UE implementation to determine which measurement gap sharing scheme in			

the table to be applied, when MeasGapSharingScheme is absent and there is no stored value in the field.

9.1.3 UE Measurement capability

9.1.3.1 EN-DC: Monitoring of multiple layers using gaps

The requirements in this clause are applicable for UE capable of and configured with the EN-DC operation mode.

When monitoring of multiple inter-frequency E-UTRAN, inter-RAT NR, GSM, UTRA FDD and UTRA TDD carriers as configured by E-UTRA PCell, and inter-frequency NR carriers as configured by PSCell using gaps (or without using gaps provided the UE supports such capability or the effective MGRP is applied for per-FR measurement gap capable UE) is configured, the UE shall be capable of performing one measurement of the configured measurement type (SS-RSRP, SS-RSRQ, SS-SINR, SFTD, E-UTRAN RSRP, E-UTRAN RSRQ, E-UTRAN RS-SINR measurements, UTRAN TDD P-CCPCH RSCP, UTRAN FDD CPICH measurements, GSM carrier RSSI, etc.) of detected cells on all the layers.

For UE configured with the EN-DC operation, the effective total number of frequencies excluding the frequencies of the PSCell, SCells, E-UTRA PCell, and E-UTRA SCells being monitored is $N_{freq, EN-DC}$, which is defined as:

$$N_{\text{freq, EN-DC}} = N_{\text{freq, EN-DC, NR}} + N_{\text{freq, EN-DC, E-UTRA}} + N_{\text{freq, EN-DC, UTRA}} + M_{\text{EN-DC, GSM}},$$

where

N_{freq, EN-DC, E-UTRA} is the number of E-UTRA inter-frequency carriers being monitored (FDD and TDD) as configured by E-UTRA PCell or via LPP [22],

 $N_{\text{freq, EN-DC, NR}} \leq N_{\text{freq, EN-DC, NR, inter-RAT}} + N_{\text{freq, EN-DC, NR, inter-freq}}$

where

 $N_{\text{freq, EN-DC, NR, inter-RAT}}$ is the number of NR inter-RAT carriers excluding NR serving carrier(s) being monitored as configured by E-UTRA PCell [15],

 $N_{\text{freq, EN-DC, NR, inter-freq}}$ is the number of NR inter-frequency carriers being monitored as configured by PSCell.

 $N_{\text{freq, EN-DC, UTRA}}$ is the number of UTRA inter-RAT carriers being monitored as configured by E-UTRA PCell (FDD and TDD).

 $M_{EN\text{-DC, GSM}}$ is an integer which is a function of the number of GSM inter-RAT carriers as configured by E-UTRA PCell on which measurements are being performed. $M_{EN\text{-DC, GSM}}$ is equal to 0 if no GSM carrier is being monitored. For a MGRP of 40 ms, $M_{EN\text{-DC, GSM}}$ is equal to 1 if cells on up to 32 GSM carriers are being measured. For a MGRP of 80 ms, $M_{EN\text{-DC, GSM}}$ is equal to ceil($N_{carriers,GSM}/20$) where $N_{carriers,GSM}$ is the number of GSM carriers on which cells are being measured.

9.1.3.1a SA: Monitoring of multiple layers using gaps

The requirements in this clause are applicable for UE configured with SA NR operation mode.

When monitoring of multiple inter-RAT E-UTRAN carriers and inter-frequency NR carriers using gaps (or without using gaps provided the UE supports such capability or the effective MGRP is applied for per-FR measurement gap capable UE) is configured by PCell, the UE shall be capable of performing one measurement of the configured measurement type (SS-RSRP, SS-RSRQ, SS-SINR, E-UTRAN RSRP, E-UTRAN RSRQ, E-UTRAN RS-SINR measurements, etc.) of detected cells on all the layers.

For UE configured with the NR SA operation, the effective total number of frequencies, excluding the frequencies of the PCell, PSCell and SCells being monitored, is $N_{freq, SA}$, which is defined as:

$$N_{\text{freq, SA}} = N_{\text{freq, SA, NR}} + N_{\text{freq, SA, E-UTRA}}$$

where

N_{freq, SA, E-UTRA} is the number of E-UTRA inter-RAT carriers being monitored (FDD and TDD) as configured by PCell or via LPP [22],

N_{freq, SA, NR} is the number of NR inter-frequency carriers being monitored as configured by PCell.

9.1.3.1b NE-DC: Monitoring of multiple layers using gaps

The requirements in this clause are applicable for UE capable of and configured with the NE-DC operation mode.

When monitoring of multiple inter-frequency E-UTRAN carriers as configured by E-UTRA PSCell, inter-RAT E-UTRAN carriers as configured by PCell, and inter-frequency NR carriers as configured by PCell using gaps (or without using gaps provided the UE supports such capability or the effective MGRP is applied for per-FR measurement gap capable UE) is configured, the UE shall be capable of performing one measurement of the configured measurement type (SS-RSRP, SS-RSRQ, SS-SINR, SFTD, E-UTRAN RSRP, E-UTRAN RSRQ, and E-UTRAN RS-SINR measurements, etc.) of detected cells on all the layers.

For UE configured with the NE-DC operation, the effective total number of frequencies excluding the frequencies of the PCell, SCells, E-UTRA PSCell, and E-UTRA SCells being monitored is $N_{freq, \, NE-DC}$, which is defined as:

 $N_{\text{freq, NE-DC}} = N_{\text{freq, NE-DC, NR}} + N_{\text{freq, NE-DC, E-UTRA}},$

where

N_{freq, NE-DC, NR} is the number of NR inter-frequency carriers being monitored as configured by PCell,

 $N_{\text{freq, NE-DC, E-UTRA}} \leq N_{\text{freq, NE-DC, E-UTRA, inter-RAT}} + N_{\text{freq, NE-DC, E-UTRA, inter-freq}}$

where

N_{freq, NE-DC, E-UTRA, inter-RAT} is the number of E-UTRA inter-RAT carriers (FDD and TDD) excluding E-UTRA serving carrier(s) being monitored as configured by PCell or via LPP [22],

N_{freq, NE-DC, E-UTRA, inter-freq} is the number of E-UTRA inter-frequency carriers (FDD and TDD) being monitored as configured by E-UTRA PSCell [15] or via LPP [22].

9.1.3.1c NR-DC: Monitoring of multiple layers using gaps

The requirements in this clause are applicable for UE configured with NR-DC operation mode.

When monitoring of multiple inter-RAT E-UTRAN carriers and inter-frequency NR carriers using gaps (or without using gaps provided the UE supports such capability) as configured by PCell, and inter-frequency NR carriers as configured by PSCell is configured, the UE shall be capable of performing one measurement of the configured measurement type (SS-RSRP, SS-RSRQ, SS-SINR, E-UTRAN RSRP, E-UTRAN RSRQ, E-UTRAN RS-SINR measurements, etc.) of detected cells on all the layers.

For UE configured with the NR-DC operation, the effective total number of frequencies, excluding the frequencies of the PCell, PSCell and SCells being monitored, is $N_{freq, NR-DC}$, which is defined as:

 $N_{\text{freq, NR-DC}} = N_{\text{freq, NR-DC, NR}} + N_{\text{freq, NR-DC, E-UTRA}}$

where

 $N_{\text{freq, NR-DC, E-UTRA}}$ is the number of E-UTRA inter-RAT carriers being monitored (FDD and TDD) as configured by PCell or via LPP [22].

N_{freq, NR-DC, NR} is the number of NR inter-frequency carriers being monitored as configured by PCell and PSCell.

9.1.3.2 EN-DC: Maximum allowed layers for multiple monitoring

If a UE is configured with EN-DC operation, the UE shall be capable of monitoring at least:

- Depending on UE capability, 7 NR inter-frequency carriers configured by PSCell, and
- Depending on UE capability, 7 NR inter-RAT carriers excluding NR serving carrier(s) configured by E-UTRA PCell [15], and

- Depending on UE capability, 6 E-UTRA TDD inter-frequency carriers configured by E-UTRA PCell [15], and
- Depending on UE capability, 6 E-UTRA FDD inter-frequency carriers configured by E-UTRA PCell [15], and
- Depending on UE capability, 3 FDD UTRA carriers, and
- Depending on UE capability, 3 TDD UTRA carriers, and
- Depending on UE capability, 32 GSM carriers (one GSM layer corresponds to 32 carriers), and
- Depending on UE capability, 1 E-UTRA FDD inter-frequency carrier for RSTD measurements configured via LPP [22], and
- Depending on UE capability, 1 E-UTRA TDD inter-frequency carrier for RSTD measurements configured via LPP [22].

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 13 effective carrier frequency layers comprising of any above defined combination of NR, E-UTRA FDD, E-UTRA TDD, UTRA FDD, UTRA TDD and GSM (one GSM layer corresponds to 32 carriers) layers. The UE shall be capable of monitoring a total of at least 7 effective NR carrier frequency layers excluding NR serving carrier(s), comprising of any above defined combination of NR inter-RAT carriers excluding NR serving carrier(s) configured by E-UTRA PCell and NR inter-frequency carriers configured by PSCell.

When the E-UTRA PCell and PSCell configures the same NR carrier frequency layer to be monitored by the UE in synchronous intra-band EN-DC, this layer shall be counted only once to the total number of effective carrier frequency layers provided that the SFN-s and slot boundaries are aligned, unless the configured NR carrier frequency layers to be monitored have

- different RSSI measurement resources or
- different deriveSSB-IndexFromCell indications or
- different SMTC configurations.

Note 1: The E-UTRA-NR dual connectivity capable UE configured with PSCell shall fulfil the requirements defined in only one of clause 9.1.3.2 and clause 8.1.2.1.1b.1 of TS 36.133 [15].

9.1.3.2a SA: Maximum allowed layers for multiple monitoring

If a UE is configured with SA NR operation mode, the UE shall be capable of monitoring at least:

- Depending on UE capability, 7 NR inter-frequency carriers configured by PCell, and
- Depending on UE capability, 7 E-UTRA TDD inter-RAT carriers configured by PCell, and
- Depending on UE capability, 7 E-UTRA FDD inter-RAT carriers configured by PCell, and
- Depending on UE capability, 1 E-UTRA FDD inter-RAT carrier for RSTD measurements configured via LPP [22], and
- Depending on UE capability, 1 E-UTRA TDD inter-RAT carrier for RSTD measurements configured via LPP [22].

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 13 effective carrier frequency layers comprising of any above defined combination of NR, E-UTRA FDD and E-UTRA TDD layers.

9.1.3.2b NE-DC: Maximum allowed layers for multiple monitoring

If a UE is configured with NE-DC operation mode, the UE shall be capable of monitoring at least:

- Depending on UE capability, 7 NR inter-frequency carriers configured by PCell, and
- Depending on UE capability, 6 E-UTRA TDD inter-RAT carriers excluding E-UTRA serving carriers configured by PCell, and

- Depending on UE capability, 6 E-UTRA FDD inter-RAT carriers excluding E-UTRA serving carriers configured by PCell, and
- Depending on UE capability, 6 E-UTRA TDD inter-frequency carriers configured by E-UTRA PSCell [15], and
- Depending on UE capability, 6 E-UTRA FDD inter-frequency carriers configured by E-UTRA PSCell [15], and
- Depending on UE capability, 1 E-UTRA FDD inter-frequency carrier for RSTD measurements configured via LPP [22], and
- Depending on UE capability, 1 E-UTRA TDD inter-frequency carrier for RSTD measurements configured via LPP [22].

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 13 effective carrier frequency layers comprising of any above defined combination of NR, E-UTRA FDD, and E-UTRA TDD layers. The UE shall be capable of monitoring a total of at least 6 effective E-UTRA carrier frequency layers, excluding E-UTRA serving carrier(s), comprising of any above defined combination of E-UTRA inter-RAT carriers excluding E-UTRA serving carrier(s) configured by PCell and E-UTRA inter-frequency carriers configured by E-UTRA PSCell.

9.1.3.2c NR-DC: Maximum allowed layers for multiple monitoring

If a UE is configured with NR-DC operation, the UE shall be capable of monitoring at least:

- Depending on UE capability, 7 NR inter-frequency carriers configured by PCell, and
- Depending on UE capability, 7 NR inter-frequency carriers configured by PSCell, and
- Depending on UE capability, 7 E-UTRA TDD inter-RAT carriers configured by PCell, and
- Depending on UE capability, 7 E-UTRA FDD inter-RAT carriers configured by PCell, and
- Depending on UE capability, 1 E-UTRA FDD inter-RAT carrier for RSTD measurements configured via LPP [22], and
- Depending on UE capability, 1 E-UTRA TDD inter-RAT carrier for RSTD measurements configured via LPP [22].

In addition to the requirements defined above, the UE shall be capable of monitoring a total of at least 13 effective carrier frequency layers comprising of any above defined combination of NR, E-UTRA FDD and E-UTRA TDD layers. The UE shall be capable of monitoring a total of at least 7 effective NR carrier frequency layers excluding NR serving carrier(s), which are configured by PCell and PSCell.

When PCell and PSCell configures the same NR carrier frequency layer to be monitored by the UE in NR-DC, this layer shall be counted only once to the total number of effective carrier frequency layers provided that the SFN-s and slot boundaries are aligned, unless the configured NR carrier frequency layers to be monitored have

- different RSSI measurement resources or
- different deriveSSB-IndexFromCell indications or
- different SMTC configurations.

9.1.4 Capabilities for Support of Event Triggering and Reporting Criteria

9.1.4.1 Introduction

This clause contains requirements on UE capabilities for support of event triggering and reporting criteria. As long as the measurement configuration does not exceed the requirements stated in clause 9.1.4.2, the UE shall meet all other performance requirements defined in clause 9 and clause 10.

The UE can be requested to make measurements under different measurement identities defined in TS 38.331 [2]. Each measurement identity corresponds to either event-based reporting, periodic reporting, or no reporting. In case of event-based reporting, each measurement identity is associated with an event triggering criterion. In case of periodic

reporting, a measurement identity is associated with one periodic reporting criterion. In case of no reporting, a measurement identity is associated with one no reporting criterion.

The purpose of this clause is to set some limits on the number of different event triggering, periodic, and no reporting criteria the UE may be requested to track in parallel.

9.1.4.2 Requirements

In this clause a reporting criterion corresponds to either one event (in the case of event-based reporting), or one periodic reporting criterion (in case of periodic reporting), or one no reporting criterion (in case of no reporting). For event-based reporting, each instance of event, with the same or different event identities, is counted as separate reporting criterion in Table 9.1.4.2-1.

The UE shall be able to support in parallel per category up to E_{cat} reporting criteria according to Table 9.1.4.2-1. For the measurement categories belonging to intra-frequency, inter-frequency, and inter-RAT measurements (i.e. without counting other categories that the UE shall always support in parallel), the UE need not support more than the total number of reporting criteria as follows:

- For UE configured with EN-DC: $E_{cat,EN-DC,NR} + E_{cat,EN-DC,E-UTRA}$, where

 $E_{cat,EN-DC,NR} = 10 + 9 \times n$ is the total number of NR reporting criteria configured by PSCell (NR intra- and inter-frequency reporting criteria) and by E-UTRA PCell on NR serving frequencies (NR intra-frequency reporting criteria) applicable for UE configured with EN-DC according to Table 9.1.4.2-1, and n is the number of configured NR serving frequencies, including PSCell and SCells carrier frequencies,

 $E_{cat,EN-DC,E-UTRA}$ is the total number of reporting criteria configured by E-UTRA PCell except PSCell and SCells carrier frequencies, as specified in TS 36.133 [15] for UE configured with EN-DC.

- For UE configured with NE-DC: $E_{cat,NE-DC,NR} + E_{cat,NE-DC,E-UTRA}$, where

 $E_{cat,NE-DC,NR} = 10 + 9 \times n$ is the total number of NR reporting criteria according to Table 9.1.4.2-1, and n is the number of configured NR serving frequencies, including PCell, and SCells carrier frequencies,

$$E_{cat,NE-DC,E-UTRA} = E_{cat,NE-DC,E-UTRA,inter-RAT} + E_{cat,NE-DC,E-UTRA,intra-RAT}$$
, where

 $E_{cat,NE-DC,E-UTRA,inter-RAT}$ is the total number of inter-RAT E-UTRA reporting criteria configured by PCell except E-UTRA PSCell and E-UTRA SCells carrier frequencies, according to Table 9.1.4.2-1,

 $E_{cat,NE-DC,E-UTRA,intra-RAT}$ is the total number of E-UTRA reporting criteria including E-UTRA PSCell and E-UTRA SCells carrier frequencies as specified in TS 36.133 [15] for UE configured with NE-DC.

- For UE configured with SA operation mode: $E_{cat,SA,NR} + E_{cat,SA,E-UTRA}$, where

 $E_{cat,SA,NR} = 10 + 9 \times n$ is the total number of NR reporting criteria according to Table 9.1.4.2-1, and n is the number of configured NR serving frequencies, including PCell, and SCells carrier frequencies,

 $E_{cat,SA,E-UTRA}$ is the total number of inter-RAT E-UTRA reporting criteria according to Table 9.1.4.2-1.

- For UE configured with NR-DC: $E_{cat.NR-DC.NR} + E_{cat.NR-DC.E-UTRA}$, where

 $E_{cat,NR-DC,NR} = 10 + 9 \times n$ is the total number of NR reporting criteria according to Table 9.1.4.2-1, and n is the number of configured NR serving frequencies, including PCell, PSCell and SCells carrier frequencies,

 $E_{cat,NR-DC,E-UTRA}$ is the total number of inter-RAT E-UTRA reporting criteria according to Table 9.1.4.2-1.

Table 9.1.4.2-1: Requirements for reporting criteria per measurement category

Measurement category	Ecat	Note
Intra-frequency Note 1,2,3,4,5	9	Events for any one or a combination of intra-
		frequency SS-RSRP, SS-RSRQ, and SS-SINR
		for NG-RAN intra-frequency cells

Inter-frequency Note 2,3,4,5	10	Events for any one or a combination of inter- frequency SS-RSRP, SS-RSRQ, and SS-SINR for NG-RAN inter-frequency cells		
Inter-RAT (E-UTRA FDD, E-UTRA TDD) Note 2,4,5	10	Only applicable for UE with this (inter-RAT) capability. These reporting criteria apply for any E-UTRA carrier frequencies other than the carrier frequency of the E-UTRA PSCell or E-UTRA SCell.		
Inter-RAT (E-UTRA FDD, E-UTRA TDD) RSTD Note 2,4,5	1	Inter-RAT RSTD measurement reporting for UE supporting OTDOA; 1 report capable of minimum 16 inter-RAT cell measurements. Only applicable for UE with this (inter-RAT RSTD via LPP [22]) capability. These reporting criteria apply for any E-UTRA carrier frequencies other than the carrier frequency of the E-UTRA PSCell or E-UTRA SCell.		
Inter-RAT (E-UTRA FDD, E-UTRA TDD) RSRP and RSRQ measurements for E-CID Note 2,4,5	1	Inter-RAT RSRP and RSRQ measurements for E-CID reported to E-SMLC via LPP [22]. One report capable of at least in total 10 inter-RAT RSRP and RSRQ measurements. Applicable to UE capable of reporting inter-RAT RSRP and RSRQ to E-SMLC via LPP. These reporting criteria apply for any E-UTRA carrier frequencies other than the carrier frequency of the E-UTRA PSCell or E-UTRA SCell.		
NOTE 1: When the UE is configured with PSCell and SCell carrier frequencies, E _{cat} for Intra-frequency is applied per corresponding NR serving frequency.				

- NOTE 2: Applicable for UE configured with SA NR operation mode.
- NOTE 3: Applicable for UE configured with EN-DC operation mode.
- NOTE 4: Applicable for UE configured with NE-DC operation mode.
- NOTE 5: Applicable for UE configured with NR-DC operation mode.

9.1.5 Carrier-specific scaling factor

This clause specifies the derivation of carrier-specific scaling factor (CSSF) values, which scales the measurement delay requirements given in clause 9.2, 9.3 and 9.4 when UE is configured to monitor multiple measurement objects. The CSSF values are categorized into CSSF_{outside_gap,i} and CSSF_{within_gap,i}, for the measurements conducted outside measurement gaps and within measurement gaps, respectively.

9.1.5.1 Monitoring of multiple layers outside gaps

The carrier-specific scaling factor CSSF_{outside_gap,i} for measurement object i derived in this chapter is applied to following measurement types:

- Intra-frequency measurement with no measurement gap in clause 9.2.5, when none of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.
- Intra-frequency measurement with no measurement gap in clause 9.2.5, when part of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.
- For a UE in E-UTRA-NR dual connectivity operation, NR inter-RAT measurement object configured by the E-UTRAN PCell on an NR serving carrier
 - the SSB is completely contained in the active BWP of the UE, and
 - none or part of the SMTC occasions of this inter-RAT measurement object are overlapped by the measurement gap;

UE is expected to conduct the measurement of this measurement object i only outside the measurement gaps.

For a UE in E-UTRA-NR dual connectivity operation, if a measurement object configured by PSCell and an NR inter-RAT measurment object configured by E-UTRAN PCell are on the same serving carrier, they shall be counted as one intra-frequency measurement object, provided that they meet the measurement object merging conditions [in clause 9.1.3.2].

If the higher layer signaling in TS 38.331 [2] of *smtc2* is present and *smtc1* is fully overlapping with measurement gaps and *smtc2* is partially overlapping with measurement gaps, CSSF_{outside_gap,i} and requirements derived from CSSF_{outside_gap,i} are not specified.

The UE cell identification and measurement periods derived based on $CSSF_{outside_gap,i}$ in clauses 9.2.5.1, 9.2.5.2 may be extended for measurement objects of which the cell identification and measurement periods are overlapped with $T_{measure_SFTD1}$ specified in clause 9.3.8 when no measurement gaps are provided.

The requirements in this clause apply provided that

- The SMTC on all CCs in FR2 have the same offset, and one of following conditions is met
 - If *smtc*2 is configured on any FR2 CC,
 - All CCs have the same configuration for *smtc1*, and
 - All CCs configured with *smtc2* have the same configuration for *smtc2*
- If *smtc2* is not configured on any FR2 CC,
 - The total number of different SMTC periodicities on all serving CCs does not exceed 4

Note: Longer delays for cell identification and measurement periods derived based on $CSSF_{outside_gap,i}$ in clauses 9.2.5.1, 9.2.5.2, can be expected, if the UE is configured with more than 4 different SMTC periodicities on FR2 serving carriers. The longer delay applies for the FR2 intra-frequency measurement objects with the longest SMTC periodicity/periodicities.

9.1.5.1.1 EN-DC mode: carrier-specific scaling factor for SSB-based measurements performed outside gaps

For UE configured with the E-UTRA-NR dual connectivity operation, the carrier-specific scaling factor CSSF_{outside_gap,i} for intra-frequency SSB-based measurements performed outside measurements gaps will be as specified in Table 9.1.5.1.1-1.

Table 9.1.5.1.1-1: CSSF_{outside_gap,i} scaling factor for EN-DC mode

Scenario	CSSF _{outside_ga} _{p,i} for FR1 PSCC	CSSF _{outside_gap} , i for FR1 SCC	CSSF _{outside_gap,} i for FR2 PSCC	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is required Note 2	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is not required
EN-DC with FR1 only CA	1	Number of configured FR1 SCell(s)	N/A	N/A	N/A
EN-DC with FR2 only intra band CA	N/A	N/A	1	N/A	Number of configured FR2 SCells
EN-DC with FR1 +FR2 CA (FR1 PSCell) Note	1	2x(Number of configured SCell(s)-1)	N/A	2 ^{Note 5}	2x(Number of configured SCell(s)-1)
EN-DC with FR1 +FR2 CA (FR2 PSCell) Note 1	N/A	Number of configured SCell(s)	1	N/A	Number of configured SCell(s)

Note 1: Only one NR FR1 operating band and one NR FR2 operating band are included for FR1+FR2 inter-band EN-DC.

Note 2: Selection of FR2 SCC where neighbour cell measurement is required follows clause 9.2.3.2.

Note 3: Void Note 4: Void

Note 5: CSSF_{outside_gap,i} =1 if only one SCell is configured.

Note 6: If a measurement object configured by PSCell and an NR inter-RAT measurement object configured by E-UTRAN PCell are on the same serving carrier, they shall be counted as one intra-frequency measurement object, provided that they meet the measurement object merging conditions [in clause 9.1.3.2], otherwise they are counted separately as two measurement objects.

9.1.5.1.2 SA mode: carrier-specific scaling factor for SSB-based measurements performed outside gaps

For UE in SA operation mode, the carrier-specific scaling factor CSSF_{outside_gap,i} for intra-frequency SSB-based measurements performed outside measurements gaps will be as specified in Table 9.1.5.1.2-1, which shall also be applied for a UE configured with NE-DC operation.

Table 9.1.5.1.2-1: CSSF_{outside_gap,i} scaling factor for SA mode

Scenario	CSSF _{outside_gap} , i for FR1 PCC	CSSF _{outside_gap} ,i for FR1 SCC	CSSF _{outside_ga} _{p,i} for FR2 PCC	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is required	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is not required
FR1 only CA	1	Number of configured FR1 SCell(s)	N/A	N/A	N/A
FR2 only intra band CA	N/A	N/A	1	N/A	Number of configured FR2 SCell(s)
FR1 +FR2 CA (FR1 PCeII) Note 1	1	2x(Number of configured SCell(s)-1)	N/A	2 Note 5	2x(Number of configured SCell(s)-1)
FR1 +FR2 CA (FR2 PCeII) Note 1	N/A	Number of configured SCell(s)	1	N/A	Number of configured SCell(s)

Note 1: Only one FR1 operating band and one FR2 operating band are included for FR1+FR2 inter-band CA.

Note 2: Selection of FR2 SCC where neighbour cell measurement is required follows clause 9.2.3.2.

Note 3: Void

Note 4: Void

Note 5: CSSF_{outside_gap,i} =1 if only one SCell is configured.

9.1.5.1.3 NR-DC mode: carrier-specific scaling factor for SSB-based measurements performed outside gaps

For UE configured with NR-DC operation, the carrier-specific scaling factor $CSSF_{outside_gap,i}$ for intra-frequency SSB-based measurements performed outside measurements gaps will be as specified in Table 9.1.5.1.3-1.

Table 9.1.5.1.3-1: CSSF_{outside_gap,i} scaling factor for NR-DC mode

Scenario	CSSF _{outside_gap} ,i for FR1 PCC	CSSF _{outside_gap,i} for FR1 SCC	CSSF _{outside_gap,i} for FR2 PSCC	CSSF _{outside_gap,i} for FR2 SCC where neighbour cell measurement is not required
FR1 + FR2 NR- DC (FR1 PCell and FR2 PScell)	1	2×(Number of configured SCell(s))	2 Note 3	2×(Number of configured SCell(s))

Note 1: NR-DC in Rel-15 only includes the scenarios where all serving cells in MCG in FR1 and all serving cells in SCG

in FR2.

Note 2: Void

Note 3: CSSF_{outside_gap,i} =1 if no SCell is configured.

9.1.5.1.4 NE-DC mode: carrier-specific scaling factor for SSB-based measurements performed outside gaps

For UE configured with NE-DC operation, the carrier-specific scaling factor CSSF_{outside_gap,i} for intra-frequency SSB-based measurements performed outside measurements gaps will be as specified in Table 9.1.5.1.4-1.

Table 9.1.5.1.4-1: CSSF_{outside_gap,i} scaling factor for NE-DC mode

Scenario		CSSF _{outside_gap}	_	CSSF _{outside_gap,i} for FR2 SCC where	CSSF _{outside_gap,i} for FR2 SCC where
	,	,	PCC	neighbour cell	neighbour cell

				measurement is required	measurement is not required
NE-DC with FR1 only CA	1	Number of configured FR1 SCell(s)	N/A	N/A	N/A
NE-DC with FR2 only intra band CA	N/A	N/A	1	N/A	Number of configured FR2 SCell(s)
NE-DC with FR1 +FR2 CA (FR1 PCell) Note 1	1	2x(Number of configured SCell(s)-1)	N/A	2 Note 3	2x(Number of configured SCell(s)-1)

Note 1: Only one FR1 operating band and one FR2 operating band are included for FR1+FR2 inter-band CA.

Note 2: Selection of FR2 SCC where neighbour cell measurement is required follows clause 9.2.3.2.

Note 3: CSSF_{outside_gap,i} =1 if only one SCell is configured.

9.1.5.2 Monitoring of multiple layers within gaps

The carrier-specific scaling factor $CSSF_{within_gap,i}$ for measurement object i derived in this chapter is applied to following measurement types:

- Intra-frequency measurement object with no measurement gap in clause 9.2.5, when all of the SMTC occasions of this intra-frequency measurement object are overlapped by the measurement gap.
- Intra-frequency measurement object with measurement gap in clause 9.2.6.
- Inter-frequency measurement object in clause 9.3.
- E-UTRA Inter-RAT measurement object in clauses 9.4.2 and 9.4.3.
- E-UTRA Inter-RAT RSTD and E-CID measurements in clauses 9.4.4 and 9.4.5.
- For a UE in E-UTRA-NR dual connectivity operation, NR Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.4) on an NR serving carrier
 - the SSB is not completely contained in the active BWP of the UE, or
 - all of the SMTC occasions of this inter-RAT measurement object are overlapped by the measurement gap;
- NR Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.4) on an NR non-serving carrier.
- E-UTRAN Inter-frequency measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.3) and by the E-UTRAN PSCell (TS 36.133 [15] clause 8.19.3).
- E-UTRAN Inter-frequency RSTD measurement configured by the E-UTRAN PCell (TS 36.133 [15] clause 8.17.15).
- UTRA Inter-RAT measurement object configured by the E-UTRAN PCell (TS 36.133 [15] clauses 8.17.5 to 8.17.12).
- GSM Inter-RAT measurements configured by the E-UTRAN PCell (TS 36.133 [15] clauses 8.17.13 and 8.17.14).

UE is expected to conduct the measurement of this measurement object *i* only within the measurement gaps.

If the higher layer signaling in TS 38.331 [2] of *smtc2* is present and *smtc1* is fully overlapping with measurement gaps and *smtc2* is partially overlapping with measurement gaps, CSSF_{within_gap,i} and requirements derived from CSSF_{outside_gap,i} are not specified.

9.1.5.2.1 EN-DC mode: carrier-specific scaling factor for SSB-based measurements performed within gaps

The scaling value CSSF_{within_gap,i} below has been derived without considering GSM inter-RAT carriers.

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as $CSSF_{within_gap,i}$ and is derived as described in this clause.

For a UE in E-UTRA-NR dual connectivity operation, if a measurement object configured by PSCell and an NR inter-RAT measurement object configured by E-UTRAN PCell are on the same carrier, they shall be counted as one measurement object in M_{tot,i,j}, provided that they meet the measurement object merging conditions [in clause 9.1.3.2].

If measurement object *i* refers to an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured, CSSF_{within_gap,i}=1. Otherwise, the CSSF_{within_gap,i} for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition are derived as below.

For each measurement gap j not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and interfrequency/interRAT measurement objects which are candidates to be measured within the gap j.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR carriers, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*
- An inter-RAT UTRA measurement object configured by E-UTRA PCell [15] is a candidate to be measured in all measurement gaps.
- An inter-frequency E-UTRA measurement object configured by E-UTRA PCell [15] is a candidate to be measured in all measurement gaps.
- For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis.
- $M_{intra,i,j}$: Number of intra-frequency measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{intra,i,j}$ equals 0.
- M_{inter,i,j}: Number of NR inter-frequency measurement objects or NR inter-RAT measurement objects configured by E-UTRA PCell, EUTRA inter-frequency measurement objects configured by E-UTRA PCell, UTRA inter-RAT measurement objects configured by E-UTRA PCell which are candidates to be measured in gap *j* where the measurement object *i* is also a candidate. Otherwise M_{inter,i,j} equals 0.
- $M_{\text{tot,i,j}} = M_{\text{intra,i,j}} + M_{\text{inter,i,j}}$: Total number of intra-frequency, inter-frequency and inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{\text{tot,i,j}}$ equals 0.

For each measurement gap j used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, $M_{intra,i,j} = M_{inter,i,j} = M_{tot,i,j} = 0$.

The carrier specific scaling factor CSSF_{within_gap,i} is given by:

If measGapSharingScheme is equal sharing, CSSF_{within_gap,i}= $\max(\text{ceil}(R_i \times M_{\text{tot,i,j}}))$, where j=0...(160/MGRP)-1

If measGapSharingScheme is not equal sharing and

- measurement object i is an intra-frequency measurement object, CSSF_{within_gap,i} is the maximum among
 - ceil($R_i \times K_{intra} \times M_{intra,i,j}$) in gaps where $M_{inter,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - ceil($R_i \times M_{intra,i,j}$) in gaps where $M_{inter,i,j}=0$, where j=0...(160/MGRP)-1
- measurement object i is an inter-frequency or inter-RAT measurement object, $CSSF_{within_gap,i}$ is the maximum among
 - ceil($R_i \times K_{inter} \times M_{inter,i,j}$) in gaps where $M_{intra,i,j} \neq 0$, where j=0...(160/MGRP)-1

Where R_i is the maximal ratio of the number of measurement gap where measurement object i is a candidate to be measured over the number of measurement gap where measurement object i is a candidate and not used for

RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 1280ms period.

Note: In this release of specification, longer delays for cell identification and measurement periods derived based on CSSF_{within_gap,i} can be expected, if the UE is configured with inter-RAT MO on NR serving CC by E-UTRAN PCell in EN-DC mode.

9.1.5.2.2 SA mode: carrier-specific scaling factor for SSB-based measurements performed within gaps

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as $CSSF_{within_gap,i}$ and is derived as described in this clause.

If measurement object i refers to an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured, CSSF_{within_gap,i}=1. Otherwise, the the CSSF_{within_gap,i} for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition and the CSSF_{within_gap,i} are derived as below.

For each measurement gap j not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and interfrequency/interRAT measurement objects which are candidates to be measured within the gap j.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR measurement objects, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.
- An inter-RAT measurement object is a candidate to be measured in all meausrement gaps.
- An inter-frequency SFTD measurement object, if to be measured with measurement gaps, is a candidate to be measured in all measurement gaps.
- For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis.
- $M_{intra,i,j}$: Number of intra-frequency measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{intra,i,j}$ equals 0.
- $M_{inter,i,j}$: Number of NR inter-frequency and EUTRA inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{inter,i,j}$ equals 0.
- $M_{\text{tot,i,j}} = M_{\text{intra,i,j}} + M_{\text{inter,i,j}}$: Total number of intra-frequency, inter-frequency and inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{\text{tot,i,j}}$ equals 0.

For each measurement gap j used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, $M_{intra,i,j} = M_{inter,i,j} = M_{tot,i,j} = 0$.

The carrier specific scaling factor CSSF_{within_gap,i} is given by:

- If measGapSharingScheme is equal sharing, CSSF_{within_gap,i}= max(ceil(R_i×M_{tot,i,j})), where j=0...(160/MGRP)-1
- If measGapSharingScheme is not equal sharing and
 - measurement object i is an intra-frequency measurement object, CSSF_{within_gap,i} is the maximum among
 - $ceil(R_i \times K_{intra} \times M_{intra,i,j})$ in gaps where $M_{inter,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{intra,i,j})$ in gaps where $M_{inter,i,j}=0$, where j=0...(160/MGRP)-1
 - measurement object i is an inter-frequency or inter-RAT measurement object, $CSSF_{within_gap,i}$ is the maximum among

- ceil($R_i \times K_{inter} \times M_{inter,i,j}$) in gaps where $M_{intra,i,j} \neq 0$, where j=0...(160/MGRP)-1
- $ceil(R_i \times M_{inter,i,j})$ in gaps where $M_{intra,i,j}=0$, where j=0...(160/MGRP)-1
- Where R_i is the maximal ratio of the number of measurement gap where measurement object *i* is a candidate to be measured over the number of measurement gap where measurement object *i* is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 1280ms period.

 $CSSF_{within_gap,k}=1$ during $T_{Detect, E-UTRAN FDD}$ specified in clause 9.4.4.1.2.2 and $T_{Detect, E-UTRAN TDD}$ specified in clause 9.4.4.2.2.2, where k is the carrier frequency where the UE is performing cell detection of the inter-RAT E-UTRA OTDOA assistance data reference cell when acquiring the subframe and slot timing of the cell according to clause 9.4.4. In this case, the UE cell identification and measurement periods derived based on $CSSF_{within_gap,i}$ in clauses 9.2.5.1, 9.2.5.2, 9.2.6.3, 9.3.4, 9.3.5, 9.4.2.2, and 9.4.2.3 may be extended for measurement objects of which the cell identification and measurement periods are overlapped with $T_{Detect, E-UTRAN FDD}$ and $T_{Detect, E-UTRAN TDD}$.

9.1.5.2.3 NE-DC: carrier-specific scaling factor for SSB-based measurements performed within gaps

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as CSSF_{within_gap,i} and is derived as described in this clause.

If measurement object i refers to an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured, CSSF_{within_gap,i}=1. Otherwise, the CSSF_{within_gap,i} for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition are derived as below.

For each measurement gap j not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and interfrequency/interRAT measurement objects which are candidates to be measured within the gap j.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR measurement objects, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.
- An inter-RAT measurement object is a candidate to be measured in all measurement gaps.
- An inter-frequency E-UTRA measurement object is a candidate to be measured in all measurement gaps.
- For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis.
- If the number of configured inter-frequency and inter-RAT measurement objects is non-zero and the UE is configured with per UE gaps, or if the UE is configured with per FR gaps:
 - FR1 and FR2 intra-frequency measurement objects belong to group A
 - Inter-frequency and inter-RAT measurement objects belong to group B
 - M_{groupA,i,j}: Sum of the number of FR1 intra-frequency measurement objects M_{intra-FR1,i,j} and the number of FR2 intra-frequency measurement objects M_{intra-FR2,i,j} which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise M_{groupA,i,j} equals 0.
 - $M_{groupBi,j}$: Number of NR inter-frequency and EUTRA inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupB,i,j}$ equals 0.
- If the number of configured inter-frequency and inter-RAT measurement objects is zero and the UE is configured with per UE gaps:
 - FR1 intra-frequency measurement objects belong to group A
 - FR2 intra-frequency measurement objects belong to group B

- $M_{groupA,i,j}$: The number of FR1 intra-frequency measurement objects $M_{intra-FR1,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupA,i,j}$ equals 0.
- $M_{groupBi,j}$: The number of FR2 intra-frequency measurement objects $M_{intra-FR2,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupB,i,j}$ equals 0.
- $M_{\text{tot,i,j}} = M_{\text{groupA,i,j}} + M_{\text{groupB,i,j}}$: Total number of group A and group B measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{\text{tot,i,j}}$ equals 0.

For each measurement gap j used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, $M_{intra,i,j} = M_{inter,i,j} = M_{tot,i,j} = 0$.

- The carrier specific scaling factor CSSF_{within_gap,i} is given by:
- If measGapSharingScheme is equal sharing, CSSF_{within_gap,i}= max(ceil(R_i×M_{tot,i,i})), where j=0...(160/MGRP)-1
- If measGapSharingScheme is not equal sharing and
 - measurement object i is a group A measurement object, CSSF_{within_gap,i} is the maximum among
 - ceil($R_i \times K_{intra} \times M_{groupA,i,j}$) in gaps where $M_{groupB,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{groupA,i,j})$ in gaps where $M_{groupB,i,j}=0$, where j=0...(160/MGRP)-1
 - measurement object i is an group B measurement object, CSSF_{within_gap,i} is the maximum among
 - $ceil(R_i \times K_{inter} \times M_{groupBi,j})$ in gaps where $M_{groupA,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{groupB,i,j})$ in gaps where $M_{groupA,i,j}=0$, where j=0...(160/MGRP)-1
- Where R_i is the maximal ratio of the number of measurement gap where measurement object *i* is a candidate to be measured over the number of measurement gap where measurement object *i* is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 1280ms period.

9.1.5.2.4 NR-DC: carrier-specific scaling factor for SSB-based measurements performed within gaps

When one or more measurement objects are monitored within measurement gaps, the carrier specific scaling factor for a target measurement object with index i is designated as CSSF_{within gap,i} and is derived as described in this clause.

If measurement object i refers to an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured, CSSF_{within_gap,i}=1. Otherwise, the CSSF_{within_gap,i} for other measurement objects (including RSTD measurement with periodicity Tprs=160ms) participate in the gap competition and the CSSF_{within_gap,i} are derived as below.

For each measurement gap j not used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, count the total number of intrafrequency measurement objects and inter-frequency/interRAT measurement objects which are candidates to be measured within the gap j.

- An NR measurement object is a candidate to be measured in a gap if its SMTC duration is fully covered by the MGL excluding RF switching time. For intra-frequency NR measurement objects, if the higher layer in TS 38.331 [2] signaling of *smtc2* is configured, the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc2*; otherwise the assumed periodicity of SMTC occasions corresponds to the value of higher layer parameter *smtc1*.
- An inter-RAT measurement object is a candidate to be measured in all measurement gaps.

For UEs which support and are configured with per FR gaps, the counting is done on a per FR basis, and for UEs which are configured with per UE gaps the counting is done on a per UE basis.

If the number of configured inter-frequency and inter-RAT measuerement objects is non-zero and the UE is configured with per UE gaps, or if the UE is configured with per FR gaps:

FR1 and FR2 intra-frequency measurement objects belong to group A

Inter-frequency and inter-RAT measurement objects belong to group B

 $M_{groupA,i,j}$: Sum of the number of FR1 intra-frequency measurement objects $M_{intra-FR1,i,j}$ and the number of FR2 intra-frequency measurement objects $M_{intra-FR2,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupA,i,j}$ equals 0.

 $M_{groupBi,j}$: Number of NR inter-frequency and EUTRA inter-RAT measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupB,i,j}$ equals 0.

If the number of configured inter-frequency and inter-RAT measurement objects is zero and the UE is configured with per UE gaps:

FR1 intra-frequency measurement objects belong to group A

FR2 intra-frequency measurement objects belong to group B

 $M_{groupA,i,j}$: The number of FR1 intra-frequency measurement objects $M_{intra-FR1,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupA,i,j}$ equals 0.

 $M_{groupBi,j}$: The number of FR2 intra-frequency measurement objects $M_{intra-FR2,i,j}$ which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{groupB,i,j}$ equals 0.

 $M_{\text{tot,i,j}} = M_{\text{groupA,i,j}} + M_{\text{groupB,i,j}}$: Total number of group A and group B measurement objects which are candidates to be measured in gap j where the measurement object i is also a candidate. Otherwise $M_{\text{tot,i,j}}$ equals 0.

For each measurement gap j used for an RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but prs-MutingInfo-r9 is configured within an arbitrary 160ms period, $M_{intra,i,j} = M_{inter,i,j} = M_{tot,i,j} = 0$.

The carrier specific scaling factor CSSF_{within_gap,i} is given by:

If measGapSharingScheme is equal sharing, CSSF_{within_gap,i}= $\max(\text{ceil}(R_i \times M_{\text{tot,i,j}}))$, where j=0...(160/MGRP)-1

If measGapSharingScheme is not equal sharing and

- measurement object *i* is a group A measurement object, CSSF_{within gap,i} is the maximum among
 - ceil($R_i \times K_{intra} \times M_{groupA,i,j}$) in gaps where $M_{groupB,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{groupA,i,j})$ in gaps where $M_{groupB,i,j}=0$, where j=0...(160/MGRP)-1
- measurement object i is an group B measurement object, CSSF_{within_gap,i} is the maximum among
 - $ceil(R_i \times K_{inter} \times M_{groupBi,j})$ in gaps where $M_{groupA,i,j} \neq 0$, where j=0...(160/MGRP)-1
 - $ceil(R_i \times M_{groupB,i,j})$ in gaps where $M_{groupA,i,j}=0$, where j=0...(160/MGRP)-1

R_i is the maximal ratio of the number of measurement gap where measurement object *i* is a candidate to be measured over the number of measurement gap where measurement object *i* is a candidate and not used for RSTD measurement with periodicity Tprs>160ms or with periodicity Tprs=160ms but *prs-MutingInfo-r9* is configured within an arbitrary 1280ms period.

9.1.6 Minimum requirement at transitions

When the measurement on one intra-frequency measurement object transitions from measurements performed outside gaps to measurements performed within gaps or vice versa during one measurement period, the cell identification and measurement period requirements with the longer delay apply.

The carrier-specific scaling factor specified in clause 9.1.5 that applies to the other impacted measurement objects will also apply based on the longer measurement or cell identification delay before or after the transition.

When the UE transitions between DRX and non-DRX or when DRX cycle periodicity changes, the cell identification and measurement period requirements apply based on the longer delay before or after the transition.

Subsequent to this measurement period, the cell identification and measurement period requirements on each measurement object are corresponding to the second mode after transition.

9.2 NR intra-frequency measurements

9.2.1 Introduction

A measurement is defined as a SSB based intra-frequency measurement provided the centre frequency of the SSB of the serving cell indicated for measurement and the centre frequency of the SSB of the neighbour cell are the same, and the subcarrier spacing of the two SSBs are also the same.

The UE shall be able to identify new intra-frequency cells and perform SS-RSRP, SS-RSRQ, and SS-SINR measurements of identified intra-frequency cells if carrier frequency information is provided by PCell or the PSCell, even if no explicit neighbour list with physical layer cell identities is provided.

The UE can perform intra-frequency SSB based measurements without measurement gaps if

- the SSB is completely contained in the active BWP of the UE, or
- the active downlink BWP is initial BWP[3].

For intra-frequency SSB based measurements without measurement gaps, UE may cause scheduling restriction as specified in clause 9.2.5.3.

SSB based measurements are configured along with one or two measurement timing configuration(s) (SMTC(s)) which provides periodicity, duration and offset information on a window of up to 5ms where the measurements are to be performed. For intra-frequency connected mode measurements, up to two measurement window periodicities may be configured. A single measurement window offset and measurement duration are configured per intra-frequency measurement object.

When measurement gaps are needed, the UE is not expected to detect SSB and measure RSSI of RSRQ which start earlier than the gap starting time + switching time, nor detect SSB and measure RSSI of RSRQ which end later than the gap end – switching time. Switching time is 0.5ms for frequency range FR1 and 0.25ms for frequency range FR2.

9.2.2 Requirements applicability

The requirements in clause 9.2 apply, provided:

- The cell being identified or measured is detectable.

An intra-frequency cell shall be considered detectable when for each relevant SSB:

- SS-RSRP related side conditions given in clauses 10.1.2 and 10.1.3 for FR1 and FR2, respectively, for a corresponding Band,
- SS-RSRQ related side conditions given in clauses 10.1.7 and 10.1.8 for FR1 and FR2, respectively, for a corresponding Band,
- SS-SINR related side conditions given in clauses 10.1.12 and 10.1.13 for FR1 and FR2, respectively, for a corresponding Band,
- SSB_RP and SSB Ês/Iot according to Annex B.2.2 for a corresponding Band.

9.2.3 Number of cells and number of SSB

9.2.3.1 Requirements for FR1

For each intra-frequency layer, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 8 identified cells, and

- 14 SSBs with different SSB index and/or PCI on the intra-frequency layer, where the number of SSBs in the serving cell (except for the SCell) is not smaller than the number of configured RLM-RS SSB resources.

9.2.3.2 Requirements for FR2

For one single intra-frequency layer in a band, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 6 identified cells, and
- 24 SSBs with different SSB index and/or PCI,

where this single intra-frequency layer shall be:

- PCC when UE is configured with SA NR operation mode with PCC in the band; or
- PSCC when UE is configured with EN-DC with PSCC in the band; or
- PSCC when UE is configured with NR-DC with PSCC in the band; or
- One of the SCCs on which UE is configured to report SSB based measurements when neither PCC nor PSCC is
 in the same band, so that the selected SCC shall be an SCC where the UE is configured with SS-RSRP
 measurement reporting if such SCC exists, otherwise the selected SCC is determined by UE implementation.

The UE shall also be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least 2 SSBs on serving cell for each of the other intra-frequency layer(s) in the same band.

9.2.4 Measurement Reporting Requirements

9.2.4.1 Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in periodic measurement reports shall meet the requirements in clauses 10.1.2.1 (RSRP for FR1), 10.1.3.1 (RSRP for FR2), 10.1.7.1 (RSRQ for FR1), 10.1.8.1 (RSRQ for FR2), 10.1.12.1 (RS-SINR for FR1) and 10.1.13.1 (RS-SINR for FR2).

9.2.4.2 Event-triggered Periodic Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event-triggered periodic measurement reports shall meet the requirements in clauses 10.1.2.1 (RSRP for FR1), 10.1.3.1 (RSRP for FR2), 10.1.7.1 (RSRQ for FR1), 10.1.8.1 (RSRQ for FR2), 10.1.12.1 (RS-SINR for FR1) and 10.1.13.1 (RS-SINR for FR2).

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 9.2.4.3.

9.2.4.3 Event Triggered Reporting

Reported RSRP, RSRQ, and RS-SINR measurements contained in event triggered measurement reports shall meet the requirements in clauses 10.1.2.1 (RSRP for FR1), 10.1.3.1 (RSRP for FR2), 10.1.7.1 (RSRQ for FR1), 10.1.8.1 (RSRQ for FR2), 10.1.12.1 (RS-SINR for FR1) and 10.1.13.1 (RS-SINR for FR2).

The UE shall not send any event triggered measurement reports as long as no reporting criteria is fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources being available for UE to send the measurement report on.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than T $_{identify\ intra\ with\ index}$ or T $_{identify\ intra\ without\ index}$ defined in clause 9.2.5.1 or clause 9.2.6.2. When L3 filtering is used an additional delay can be expected.

A cell is detectable only if at least one SSBs measured from the Cell being configured remains detectable during the time period T $_{identify_intra_with_index}$ or T $_{identify_intra_with_index}$ as defined in clause 9.2.5.1 or clause 9.2.6.2. If a cell which has been detectable at least for the time period T $_{identify_intra_with_untex}$ or T $_{identify_intra_with_index}$ defined in clause 9.2.5.1 or clause 9.2.6.2 becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again with the same spatial reception parameter and triggers an event, the event triggered measurement reporting delay shall be less than TSSB_measurement_period_intra_provided the timing to that cell has not changed more than \pm 3200/2 $^{\mu}$ Tc while the measurement gap has not been available and L3 filtering has not been used, where μ is the SCS configuration as defined in clause 4.2 of TS 38.211 [3]. When L3 filtering is used, an additional delay can be expected.

9.2.5 Intrafrequency measurements without measurement gaps

9.2.5.1 Intrafrequency cell identification

The UE shall be able to identify a new detectable intra-frequency cell within T_{identify_intra_without_index} if UE is not indicated to report SSB based RRM measurement result with the associated SSB index(reportQuantityRsIndexes or maxNrofRSIndexesToReport is not configured), or the UE is indicated that the neighbour cell is synchronous with the serving cell (deriveSSB-IndexFromCell is enabled). Otherwise UE shall be able to identify a new detectable intra frequency cell within T_{identify_intra_with_index}. The UE shall be able to identify a new detectable intra frequency SS block of an already detected cell within T_{identify_intra_without_index}. It is assumed that deriveSSB-IndexFromCell is always enabled for FR1 TDD and FR2.

$$T_{identify_intra_without_index} = (T_{PSS/SSS_sync_intra} + T_{SSB_measurement_period_intra}) \ ms$$

$$T_{identify_intra_with_index} = (T_{PSS/SSS_sync_intra} + T_{SSB_measurement_period_intra} + T_{SSB_time_index_intra}) \ ms$$

Where:

T_{PSS/SSS_sync_intra}: it is the time period used in PSS/SSS detection given in table 9.2.5.1-1, 9.2.5.1-2, 9.2.5.1-4 (deactivated SCell) or 9.2.5.1-5 (deactivated SCell)

 $T_{SSB_time_index_intra}$: it is the time period used to acquire the index of the SSB being measured given in table 9.2.5.1-3 or 9.2.5.1-6 (deactivated SCell)

 $T_{SSB_measurement_period_intra}$: equal to a measurement period of SSB based measurement given in table 9.2.5.2-1, table 9.2.5.2-2 table 9.2.5.2-3 (deactivated SCell) or 9.2.5.2-4(deactivated SCell)

CSSF_{intra}: it is a carrier specific scaling factor and is determined

according to $CSSF_{outside_gap,i}$ in clause 9.1.5.1 for measurement conducted outside measurement gaps, i.e. when intra-frequency SMTC is fully non overlapping or partially overlapping with measurement gaps, or according to $CSSF_{within_gap,i}$ in clause 9.1.5.2 for measurement conducted within measurement gaps, i.e. when intra-frequency SMTC is fully overlapping with measurement gaps.

if the high layer in TS 38.331 [2] signalling of *smtc2* is configured, the assumed periodicity of intra-frequency SMTC occasions corresponds to the value of higher layer parameter *smtc2*; Otherwise the assumed periodicity of intra-frequency SMTC occasions corresponds to the value of higher layer parameter *smtc1*.

 $M_{pss/sss_sync_w/o_gaps}: For \ a \ UE \ supporting \ FR2 \ power \ class \ 1, \ M_{pss/sss_sync_w/o_gaps} = 40. \ For \ a \ UE \ supporting \ FR2 \ power \ class \ 3, \ M_{pss/sss_sync_w/o_gaps} = 24. \ For \ a \ UE \ supporting \ FR2 \ power \ class \ 3, \ M_{pss/sss_sync_w/o_gaps} = 24. \ For \ a \ UE \ supporting \ FR2 \ power \ class \ 4, \ M_{pss/sss_sync_w/o_gaps} = 24.$

 $M_{meas_period_w/o_gaps}: For \ a \ UE \ supporting \ power \ class \ 1, \ M_{meas_period_w/o_gaps} = 40. \ For \ a \ UE \ supporting \ FR2 \ power \ class \ 2, \ M_{meas_period_w/o_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 3, \ M_{meas_period_w/o_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{meas_period_w/o_gaps} = 24.$

When intra-frequency SMTC is fully non overlapping with measurement gaps or intra-frequency SMTC is fully overlapping with MGs, Kp=1

When intra-frequency SMTC is partially overlapping with measurement gaps, Kp = 1/(1-(SMTC period /MGRP)), where SMTC period < MGRP. For calculation of Kp, if the high layer signalling (TS 38.331 [2]) of smtc2 is configured, for cells indicated in the pci-List parameter in smtc2, the SMTC periodicity corresponds to the value of higher layer parameter smtc2; for the other cells, the SMTC periodicity corresponds to the value of higher layer parameter smtc1.

If the higher layer signaling in TS38.331 [2] signalling of smtc2 is present and smtc1 is fully overlapping with measurement gaps and smtc2 is partially overlapping with measurement gaps, requirements are not specified for $T_{identify_intra_with_index}$ or $T_{identify_intra_with_index}$

For FR2,

$K_{layer1_measurement}=1$,

- if all of the reference signals configured for RLM, BFD, CBD or L1-RSRP for beam reporting on any FR2 serving frequency in the same band outside measurement gap are not fully overlapped by intrafrequency SMTC occasions, or
- if all of the reference signal configured for RLM, BFD, CBD or L1-RSRP for beam reporting on any FR2 serving frequency in the same band outside measurement gap and fully-overlapped by intra-frequency SMTC occasions are not overlapped with any of the SSB symbols and the RSSI symbols, and 1 symbol before each consecutive SSB symbols and the RSSI symbols, and 1 symbol after each consecutive SSB symbols and the RSSI symbols, given that SSB-ToMeasure and SS-RSSI-Measurement are configured, where SSB symbols are indicated by the union set of SSB-ToMeasure from all the configured measurement objects on the same serving carrier which can be merged and RSSI symbols are indicated by SS-RSSI-Measurement;

 $K_{layer1_measurement} = 1.5$, otherwise.

If the above-mentioned reference signal configured for L1-RSRP measurement is aperiodic CSI-RS resource, longer cell identification delay would be expected.

If MCG DRX is in use, cell identification requirements for intra-frequency measurement in MCG specified in Table 9.2.5.1-1, Table 9.2.5.1-2, Table 9.2.5.1-3, Table 9.2.5.1-4, Table 9.2.5.1-5 and Table 9.2.5.1-6 shall depend on the MCG DRX cycle. If SCG DRX is in use, cell identification requirements for intra-frequency measurement in SCG specified in Table 9.2.5.1-1, Table 9.2.5.1-2, Table 9.2.5.1-3, Table 9.2.5.1-4, Table 9.2.5.1-5 and Table 9.2.5.1-6 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 9.2.5.1-1: Time period for PSS/SSS detection, (Frequency range FR1)

DRX cycle	TPSS/SSS_sync_intra
No DRX	max(600ms, ceil(5 x K _p) x SMTC period) ^{Note 1} x
	CSSF _{intra}
DRX cycle≤ 320ms	max(600ms, ceil(1.5x 5 x K _p) x max(SMTC
·	period,DRX cycle)) x CSSF _{intra}
DRX cycle>320ms	ceil(5] x K _p) x DRX cycle x CSSF _{intra}
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is	
the one used by the cell being identified	

Table 9.2.5.1-2: Time period for PSS/SSS detection, (Frequency range FR2)

DRX cycle	TPSS/SSS_sync_intra
No DRX	max(600ms, ceil(M _{pss/sss_sync_w/o_gaps} x K _p x
	K _{layer1_measurement}) x SMTC period) ^{Note 1} x CSSF _{intra}
DRX cycle≤ 320ms	max(600ms, ceil(1.5 x M _{pss/sss_sync_w/o_gaps} x K _p x
	K _{layer1_measurement}) x max(SMTC period,DRX cycle)) x
	CSSFintra
DRX cycle>320ms	ceil(M _{pss/sss_sync_w/o_gaps} x K _p x K _{layer1_measurement}) x DRX
	cycle x CSSF _{intra}
NOTE 1: If different SMTC periodicities are configured	for different cells, the SMTC period in the requirement is
the one used by the cell being identified	

Table 9.2.5.1-3: Time period for time index detection (FR1)

DRX cycle	Tssb_time_index_intra
No DRX	max(120ms, ceil(3 x K _p) x SMTC period) ^{Note 1} x
	CSSF _{intra}

DRX cycle≤ 320ms	max(120ms, ceil (1.5 x 3 x K _p) x max(SMTC
•	period,DRX cycle)) x CSSF _{intra}
DRX cycle>320ms	Ceil(3 x K _p) x DRX cycle x CSSF _{intra}
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is	
the one used by the cell being identified	

Table 9.2.5.1-4: Time period for PSS/SSS detection, deactivated SCell (FR1)

DRX cycle	T _{PSS/SSS_sync_intra}
No DRX	Ceil(5 x K _p) x measCycleSCell x CSSF _{intra}
DRX cycle ≤ 320ms	Ceil(5 x K _p) x max(measCycleSCell, 1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	Ceil(5 x K _p) x max(measCycleSCell, DRX cycle) x CSSF _{intra}

Table 9.2.5.1-5: Time period for PSS/SSS detection, deactivated SCell (FR1)

DRX cycle	Tpss/sss_sync_intra
No DRX	Ceil(M _{pss/sss_sync_w/o_gaps} x K _p) x measCycleSCell x
	CSSFintra
DRX cycle≤ 320ms	Ceil(M _{pss/sss_sync_w/o_gaps} x K _p) x max(measCycleSCell,
	1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	Ceil(M _{pss/sss_sync_w/o_gaps} x K _p) x max(measCycleSCell,
•	DRX cycle) x CSSF _{intra}

Table 9.2.5.1-6: Time period for time index detection, deactivated SCell (FR1)

DRX cycle	T _{SSB_time_index_intra}
No DRX	Ceil(3 x K _p) x measCycleSCell x CSSF _{intra}
DRX cycle ≤ 320ms	Ceil(3 x K _p) x max(measCycleSCell, 1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	Ceil(3 x K _p)x max(measCycleSCell, DRX cycle) x CSSF _{intra}

Table 9.2.5.1-7: Void

Table 9.2.5.1-8: Void

9.2.5.2 Measurement period

The measurement period for intrafrequency measurements without gaps is as shown in table 9.2.5.2-1, 9.2.5.2-2, 9.2.5.2-3 (deactivated SCell) or 9.2.5.2-4(deactivated SCell). If the higher layer signaling in TS38.331 [2] signalling of *smtc2* is present and smtc1 is fully overlapping with measurement gaps and smtc2 is partially overlapping with measurement gaps, requirements are not specified for T_{SSB_measurement_period_intra}

If MCG DRX is in use, measurement period requirements for intra-frequency measurement in MCG specified in Table 9.2.5.2-1, Table 9.2.5.2-2, Table 9.2.5.2-3 and Table 9.2.5.2-4 shall depend on the MCG DRX cycle. If SCG DRX is in use, measurement period requirements for intra-frequency measurement in SCG specified in Table 9.2.5.2-1, Table 9.2.5.2-2, Table 9.2.5.2-3 and Table 9.2.5.2-4 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

For FR2, a longer measurement period is allowed, if aperiodic CSI-RS resource is measured for L1-RSRP measurement on any FR2 serving frequency in the same band, and the CSI-RS resource is outside measurement gap and overlapped with any of the SSB symbols and the RSSI symbols, and 1 symbol before each consecutive SSB symbols and the RSSI symbols, and 1 symbol after each consecutive SSB symbols and the RSSI symbols. If SSB-ToMeasure or SS-RSSI-Measurement is configured, the SSB symbols are indicated by the union set of SSB-ToMeasure from all the configured measurement objects on the same band which can be merged and the RSSI symbols are indicated by SS-RSSI-Measurement.

Table 9.2.5.2-1: Measurement period for intrafrequency measurements without gaps(FR1)

DRX cycle	T SSB_measurement_period_intra
No DRX	max(200ms, ceil(5 x K _p) x SMTC period) ^{Note 1} x
	CSSF _{intra}
DRX cycle≤ 320ms	max(200ms, ceil(1.5x 5 x K _p) x max(SMTC period,DRX
,	cycle)) x CSSFintra
DRX cycle>320ms	ceil(5 x K _p) x DRX cycle x CSSF _{intra}
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is	
the one used by the cell being identified	j

Table 9.2.5.2-2: Measurement period for intra-frequency measurements without gaps(FR2)

DRX cycle	T SSB_measurement_period_intra
No DRX	max(400ms, ceil(M _{meas_period_w/o_gaps} x K _p x
	K _{layer1_measurement}) x SMTC period) ^{Note 1} x CSSF _{intra}
DRX cycle≤ 320ms	max(400ms, ceil(1.5x M _{meas_period_w/o_gaps} x K _p x
	K _{layer1_measurement}) x max(SMTC period,DRX cycle)) x
	CSSF _{intra}
DRX cycle>320ms	ceil(M _{meas_period_w/o_gaps} xK _p x K _{layerl_measurement}) x DRX
	cycle x CSSF _{intra}
NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is	
the one used by the cell being identifie	ed

Table 9.2.5.2-3: Measurement period for intra-frequency measurements without gaps (deactivated SCell) (FR1)

DRX cycle	T SSB_measurement_period_intra
No DRX	Ceil(5 x K _p) x measCycleSCell x CSSF _{intra}
DRX cycle≤ 320ms	Ceil(5 x K _p) x max(measCycleSCell, 1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	Ceil(5 x K _p)x max(measCycleSCell, DRX cycle) x
Drak oyolor ozollo	CSSF _{intra}

Table 9.2.5.2-4: Measurement period for intra-frequency measurements without gaps (deactivated SCell) FR2)

DRX cycle	T SSB_measurement_period_intra
No DRX	Ceil(M _{meas_period_w/o_gaps} x K _p) x measCycleSCell x
	CSSFintra
DRX cycle≤ 320ms	Ceil(M _{meas_period_w/o_gaps} x K _p) x max(measCycleSCell,
·	1.5xDRX cycle) x CSSF _{intra}
DRX cycle> 320ms	Ceil(M _{meas_period_w/o_gaps} x K _p) x max(measCycleSCell,
	DRX cycle) x CSSF _{intra}

9.2.5.3 Scheduling availability of UE during intra-frequency measurements

UE are required to be capable of measuring without measurement gaps when the SSB is completely contained in the active bandwidth part of the UE. When any of the conditions in the following clauses is met, there are restrictions on the scheduling availability; otherwise, there is no scheduling restriction. Note that the SSB symbols to be measured in the following clauses are the SSB symbols indicated by the union set of *SSB-ToMeasure* from all the configured measurement objects on the same serving carrier which can be merged [2], if it is configured; otherwise, all *L* SSB symbols within SMTC window duration defined in clause 4.1 of TS 38.213 [3] are included.

9.2.5.3.1 Scheduling availability of UE performing measurements in TDD bands on FR1

When the UE performs intra-frequency measurements in a TDD band, the following restrictions apply due to SS-RSRP or SS-SINR measurement

- The UE is not expected to transmit PUCCH/PUSCH/SRS on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration. If the high layer in TS 38.331 [2] signalling of *smtc2* is configured, the SMTC periodicity follows *smtc2*; Otherwise SMTC periodicity follows *smtc1*.

When the UE performs intra-frequency measurements in a TDD band, the following restrictions apply due to SS-RSRQ measurement

- The UE is not expected to transmit PUCCH/PUSCH/SRS on SSB symbols to be measured, RSSI measurement symbols, and on 1 data symbol before each consecutive SSB to be measured/RSSI symbols and 1 data symbol after each consecutive SSB to be measured/RSSI symbols within SMTC window duration. If the high layer signalling of *smtc2* is configured in TS 38.331 [2], the SMTC periodicity follows *smtc2*; Otherwise the SMTC periodicity follows *smtc1*

When TDD intra-band carrier aggregation is performed, the scheduling restrictions due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with aforementioned restricted symbols.

9.2.5.3.2 Scheduling availability of UE performing measurements with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UE which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to SS-RSRP/RSRQ/SINR measurement

- If *deriveSSB_IndexFromCell* is enabled the UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration. If the high layer signalling of *smtc2* is configured in TS 38.331 [2], the SMTC periodicity follows *smtc2*; Otherwise the SMTC periodicity follows *smtc1*.
- If *deriveSSB_IndexFromCell* is not enabled the UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on all symbols within SMTC window duration. If the high layer signalling of *smtc2* is configured in TS 38.331 [2], the SMTC periodicity follows *smtc2*; Otherwise the SMTC periodicity follows *smtc1*.

If the following conditions are met:

- The UE has been notified about system information update through paging,
- The gap between the UE's reception of PDCCH that UE monitors in the Type 2-PDCCH CSS set that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots

The UE is expected to receive the PDCCH that the UE monitors in the Type0-PDCCH CSS set, and/or the corresponding PDSCH, on SSB symbols to be measured.

When intra-band carrier aggregation is performed, the scheduling restrictions due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with aforementioned restricted symbols.

9.2.5.3.3 Scheduling availability of UE performing measurements on FR2

The following scheduling restriction applies due to SS-RSRP or SS-SINR measurement on an FR2 intra-frequency cell

The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, and on 1 data symbol before each consecutive SSB symbols to be measured and 1 data symbol after each consecutive SSB symbols to be measured within SMTC window duration (The signaling *deriveSSB_IndexFromCell* is always enabled for FR2). If the high layer signalling of *smtc2* is configured in TS 38.331 [2], the SMTC periodicity follows *smtc1*:

The following scheduling restriction applies to SS-RSRQ measurement on an FR2 intra-frequency cell

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on SSB symbols to be measured, RSSI measurement symbols, and on 1 data symbol before each consecutive SSB

to be measured/RSSI symbols and 1 data symbol after each consecutive SSB to be measured/RSSI symbols within SMTC window duration (The signaling *deriveSSB_IndexFromCellc* is always enabled for FR2). If the high layer signalling of *smtc2* is configured in TS 38.331 [2], the SMTC periodicity follows *smtc2*; Otherwise the SMTC periodicity follows *smtc1*.

When intra-band carrier aggregation is performed, the scheduling restrictions due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with aforementioned restricted symbols.

If following conditions are met:

- The UE has been notified about system information update through paging,
- The gap between the UE's reception of PDCCH that UE monitors in the Type 2-PDCCH CSS set that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots.

For the SSB and CORESET for RMSI scheduling multiplexing patterns 3, the UE is expected to receive the PDCCH that the UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured; and

For the SSB and CORESET for RMSI scheduling multiplexing patterns 2, the UE is expected to receive PDSCH that corresponds to the PDCCH that the UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured.

9.2.5.3.4 Scheduling availability of UE performing measurements on FR1 or FR2 in case of FR1-FR2 inter-band CA

There are no scheduling restrictions on FR1 serving cell(s) due to measurements performed on FR2 serving cell frequency layer.

There are no scheduling restrictions on FR2 serving cell(s) due to measurements performed on FR1 serving cell frequency layer.

9.2.5.4 SFTD Measurements between PCell and PSCell

9.2.5.4.1 Introduction

This clause contains SFTD measurement requirements for UE which supports NR-DC and is configured with a PSCell in RRC_CONNECTED state. The UE shall perform SFTD measurement between PCell and PSCell, and report the SFTD result with/without SS-RSRP after the network requests with *reportType* for the associated *reportConfig* set to *reportSFTD*. The overall delay includes RRC procedure delay defined in clause 12 in TS 38.331 [2], and SFTD measurement reporting delay in clause 9.2.5.4.3.

9.2.5.4.2 SFTD Measurement delay

When no DRX is used in either of PCell and PSCell, the physical layer measurement period of the SFTD measurement shall be $T_{measure_SFTD1} = max(200, 5 \text{ x SMTC period})$ ms, where the SMTC period refers to the maximum between the configured SMTC period in PCell and PSCell.

When DRX is used in either of the PCell or the PSCell, or in both PCell and PSCell, the physical layer measurement period (T_{measure} _{SFTD1}) of the SFTD measurement shall be as specified in Table 9.2.5.4.2-1.

Table 9.2.5.4.2-1: SFTD measurement requirement when DRX is used

DRX cycle length (s) Note 3	T _{measure_} SFTD1 (S)
≤0.04	max(0.2, 5 x SMTC period) (Note2)
0.04 <drx cycle≤0.32<="" th=""><th>8 x max(DRX cycle, SMTC period)</th></drx>	8 x max(DRX cycle, SMTC period)
0.32 <drx cycle≤10.24<="" th=""><th>5 x DRX cycle</th></drx>	5 x DRX cycle

Note 1:	SMTC period in this table refers to the maximum between the
	configured SMTC period in PCell and PSCell.
Note 2:	Number of DRX cycles depends upon the DRX cycle in use
Note 3:	DRX cycle length in this table refers to the DRX cycle length
	configured for PCell or PSCell. When DRX is used in both PCell and
	PSCell, DRX cycle length in this table refers to the longer of the DRX
	cycle lengths for PCell and PSCell.

If PSCell is changed without changing carrier frequency of PSCell, while the UE is performing SFTD measurements, the UE shall still meet SFTD measurement and accuracy requirements for the new PSCell. In this case the UE shall restart the SFTD measurement, and the total physical layer measurement period shall not exceed $T_{measure_SFTD2}$ as defined by the following expression:

$$T_{measure_SFTD2} = (M+1)*(T_{measure_SFTD1}) + M*T_{PSCell_change_NRDC}$$

where:

M is the number of times the NR PSCell is changed over the measurement period (T_{measure SFTD2}), and

T_{PSCell_change_NRDC} is the time necessary to change the PSCell; it can be up to 25 ms.

If PCell is changed, or if PSCell is changed with different carrier frequency from PSCell, the UE shall terminate SFTD measurements.

The measurement accuracy for the SFTD measurement when DRX is used as well as when no DRX is used shall be as specified in the sub-clause 10.1.21.

9.2.5.4.3 SFTD Measurement Reporting Delay

The SFTD measurement reporting delay is defined as the time between a command that will trigger an SFTD measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x TTI_{DCCH}. This measurement reporting delay excludes any delay caused by no UL resources available for UE to send the measurement report.

The SFTD measurement reporting delay shall be less than measurement period defined in clause 9.2.5.4.2 plus the RRC procedure delay defined in TS 38.331 [2].

9.2.6 Intra-frequency measurements with measurement gaps

9.2.6.1 Void

9.2.6.2 Intra-frequency cell identification

The UE shall be able to identify a new detectable intra-frequency cell within T_{identify_intra_without_index} if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (*reportQuantityRsIndexes* or *maxNrofRsIndexesToReport* is not configured), or the UE has been indicated that the neighbour cell is synchronous with the serving cell (*deriveSSB-IndexFromCell* is enabled). Otherwise UE shall be able to identify a new detectable intra frequency cell within T_{identify_intra_with_index}. The UE shall be able to identify a new detectable intra frequency SS block of an already detected cell within T_{identify_intra_without_index}. It is assumed that *deriveSSB-IndexFromCell* is always enabled for FR1 TDD and FR2.

$$T_{identify_intra_without_index} = T_{PSS/SSS_sync_intra} + T_{SSB_measurement_period_intra} \ ms$$

$$T_{identify_intra_with_index} = T_{PSS/SSS_sync_ntra} + T_{SSB_measurement_period_intra} + T_{SSB_time_index_intra}$$

Where:

T_{PSS/SSS_sync_intra}: it is the time period used in PSS/SSS detection given in table 9.2.6.2-1 or 9.2.6.2-2.

 $T_{SSB_time_index_intra}$: it is the time period used to acquire the index of the SSB being measured given in table 9.2.6.2-3.

T _{SSB_measurement_period_intra}: equal to a measurement period of SSB based measurement given in table 9.2.6.3-1 or 9.2.6.3-2.

 $CSSF_{intra}$: it is a carrier specific scaling factor and is determined according to $CSSF_{within_gap,i}$ in clause 9.1.5.2 for measurement conducted within measurement gaps.

 $M_{pss/sss_sync_with_gaps}: For \ a \ UE \ supporting \ FR2 \ power \ class \ 1, \ M_{pss/sss_sync_with_gaps} = 40. \ For \ a \ UE \ supporting \ FR2 \ power \ class \ 2, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ FR2 \ power \ class \ 3, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ class \ 4, \ M_{pss/sss_sync_with_gaps} = 24. \ For \ a \ UE \ supporting \ power \ supporting \ power \ supportin$

 $M_{meas_period_with_gaps}$: For a UE supporting power class 1, $M_{meas_period_with_gaps}$ =40. For a UE supporting power class 2, $M_{meas_period_with_gaps}$ =24. For a UE supporting power class 3, $M_{meas_period_with_gaps}$ =24. For a UE supporting power class 4, $M_{meas_period_with_gaps}$ =24.

If the higher layer signaling in TS 38.331 [2] of smtc2 is present and smtc1 is fully overlapping with measurement gaps and smtc2 is partially overlapping with measurement gaps, requirements are not specified for $T_{identify_intra_without_index}$ or $T_{identify_intra_with}$ interaction with index.

If MCG DRX is in use, cell identification requirements for intra-frequency measurement in MCG specified in Table 9.2.6.2-1, Table 9.2.6.2-2, and Table 9.2.6.2-3 shall depend on the MCG DRX cycle. If SCG DRX is in use, cell identification requirements for intra-frequency measurement in SCG specified in Table 9.2.6.2-1, Table 9.2.6.2-2, and Table 9.2.6.2-3 shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 9.2.6.2-1: Time period for PSS/SSS detection (FR1)

DRX cycle	T _{PSS/SSS_sync_intra}
No DRX	max(600ms, 5 x max(MGRP, SMTC period)) x
	CSSFintra
DRX cycle≤ 320ms	max(600ms, ceil(1.5x 5) x max(MGRP, SMTC
·	period,DRX cycle)) x CSSF _{intra}
DRX cycle>320ms	5 x max(MGRP, DRX cycle) x CSSF _{intra}

Table 9.2.6.2-2: Time period for PSS/SSS detection (FR2)

DRX cycle	Tpss/sss_sync_intra
No DRX	max(600ms, Mpss/sss_sync_with_gaps x max(MGRP, SMTC
	period)) x CSSF _{intra}
DRX cycle≤ 320ms	max(600ms, ceil(1.5x Mpss/sss_sync_with_gaps) x
·	max(MGRP, SMTC period, DRX cycle)) x CSSF _{intra}
DRX cycle>320ms	Mpss/sss_sync_with_gaps x max(MGRP, DRX cycle) x
·	CSSF _{intra}

Table 9.2.6.2-3: Time period for time index detection (FR1)

DRX cycle	T _{SSB_time_index_intra}
No DRX	max(120ms, 3 x max(MGRP, SMTC period)) x
	CSSFintra
DRX cycle≤ 320ms	max(120ms, ceil(1.5x 3) x max(MGRP, SMTC period,DRX cycle) x CSSF _{intra})
DRX cycle>320ms	3 x max(MGRP, DRX cycle) x CSSF _{intra}

Table 9.2.6.2-7: Void

Table 9.2.6.2-8: Void

9.2.6.3 Intra-frequency Measurement Period

The measurement period for FR1 intra-frequency measurements with gaps is as shown in table 9.2.6.3-1.

The measurement period for FR2 intra-frequency measurements with gaps is as shown in table 9.2.6.3-2.

If MCG DRX is in use, measurement period requirements for intra-frequency measurement in MCG specified in Table 9.2.6.3-1 and Table 9.2.6.3-2, shall depend on the MCG DRX cycle. If SCG DRX is in use, measurement period requirements for intra-frequency measurement in SCG specified in Table 9.2.6.3-1 and Table 9.2.6.3-2, shall depend on the SCG DRX cycle. Otherwise, the requirements for when DRX is not in use shall apply.

Table 9.2.6.3-1: Measurement period for intra-frequency measurements with gaps(FR1)

DRX cycle	T SSB_measurement_period_intra
No DRX	max(200ms, 5 x max(MGRP, SMTC period)) x
	CSSF _{intra}
DRX cycle≤ 320ms	max(200ms, ceil(1.5x 5) x max(MGRP, SMTC
	period,DRX cycle)) x CSSF _{intra}
DRX cycle>320ms	5 x max(MGRP, DRX cycle) x CSSF _{intra}

Table 9.2.6.3-2: Measurement period for intra-frequency measurements with gaps(FR2)

DRX cycle	T SSB_measurement_period_intra
No DRX	max(400ms, M _{meas_period with_gaps} x max(MGRP, SMTC
	period)) x CSSF _{intra}
DRX cycle≤ 320ms	max(400ms, ceil(1.5 x M _{meas_period with_gaps}) x max(MGRP, SMTC period, DRX cycle)) Note 1 x
	• • • • • • • • • • • • • • • • • • • •
	CSSF _{intra}
DRX cycle>320ms	M _{meas_period with_gaps} x max(MGRP, DRX cycle) x
	CSSFintra

9.3 NR inter-frequency measurements

9.3.1 Introduction

A measurement is defined as an SSB based inter-frequency measurement provided it is not defined as an intra-frequency measurement according to clause 9.2.

The UE shall be able to identify new inter-frequency cells and perform SS-RSRP, SS-RSRQ, and SS-SINR measurements of identified inter-frequency cells if carrier frequency information is provided by PCell or PSCell, even if no explicit neighbour list with physical layer cell identities is provided.

SSB based measurements are configured along with a measurement timing configuration (SMTC) per carrier, which provides periodicity, duration and offset information on a window of up to 5ms where the measurements on the configured inter-frequency carrier are to be performed. For inter-frequency connected mode measurements, one measurement window periodicity may be configured per inter-frequency measurement object.

When measurement gaps are needed, the UE is not expected to detect SSB and measure RSSI of RSRQ on an interfrequency measurement object which starts earlier than the gap starting time + switching time, nor detect SSB and measure RSSI of RSRQ which ends later than the gap end – switching time. When the inter-frequency cells are in FR2 and the per-FR gap is configured to the UE in EN-DC, SA NR, NE-DC and NR-DC, or the serving cells are in FR2, the inter-frequency cells are in FR2 and the per-UE gap is configured to the UE in SA NR and NR-DC, the switching time is 0.25ms. Otherwise the switching time is 0.5ms.

9.3.2 Requirements applicability

The requirements in clause 9.3 apply, provided:

- The cell being identified or measured is detectable.

An inter-frequency cell shall be considered detectable when for each relevant SSB:

- SS-RSRP related side conditions given in clauses 10.1.4 and 10.1.5 for FR1 and FR2, respectively, for a corresponding Band,
- SS-RSRQ related side conditions given in clauses 10.1.9 and 10.1.10 for FR1 and FR2, respectively, for a corresponding Band,
- SS-SINR related side conditions given in clauses 10.1.14 and 10.1.15 for FR1 and FR2, respectively, for a corresponding Band,
- SSB_RP and SSB Ês/Iot according to Annex B.2.3 for a corresponding Band.

9.3.2.1 Void

9.3.2.2 Void

9.3.3 Number of cells and number of SSB

9.3.3.1 Requirements for FR1

For each inter-frequency layer, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 4 identified cells, and
- 7 SSBs with different SSB index and/or PCI on the inter-frequency layer.

9.3.3.2 Requirements for FR2

For each inter-frequency layer, during each layer 1 measurement period, the UE shall be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least:

- 4 identified cells, and
- 10 SSBs with different SSB index and/or PCI on the inter-frequency layer, and
- 1 SSB per identified cell.

9.3.4 Inter-frequency cell identification

When measurement gaps are provided, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable inter frequency cell within $T_{identify_inter_without_index}$ if UE is not indicated to report SSB based RRM measurement result with the associated SSB index (reportQuantityRsIndexes or maxNrofRSIndexesToReport is not configured). Otherwise UE shall be able to identify a new detectable inter frequency cell within $T_{identify_inter_with_index}$. The UE shall be able to identify a new detectable inter frequency SS block of an already detected cell within $T_{identify_inter_without_index}$.

$$T_{identify_inter_without_index} = (T_{PSS/SSS_sync_inter} + T_{SSB_measurement_period_inter}) \ ms$$

$$T_{identify_inter_with_index} = (T_{PSS/SSS_sync_inter} + T_{SSB_measurement_period_inter} + T_{SSB_time_index_inter}) \ ms$$

Where:

T_{PSS/SSS sync inter}: it is the time period used in PSS/SSS detection given in table 9.3.4-1 and table 9.3.4-2.

 $T_{SSB_time_index_inter}$: it is the time period used to acquire the index of the SSB being measured given in table 9.3.4-3 and table 9.3.4-4.

T_{SSB_measurement_period_inter}: equal to a measurement period of SSB based measurement given in table 9.3.5-1 and table 9.3.5-2.

Mpss/sss_sync_inter: For a UE supporting FR2 power class 1, Mpss/sss_sync_inter = 64 samples. For a UE supporting FR2 power class 2, $M_{pss/sss}$ sync inter = 40 samples. For a UE supporting FR2 power class 3, $M_{pss/sss}$ sync inter = 40 samples. For a UE supporting FR2 power class 4, $M_{pss/sss\ sync\ inter} = 40$ samples.

 $M_{SSB_index_inter}$: For a UE supporting FR2 power class 1, $M_{SSB_index_inter} = 40$ samples. For a UE supporting FR2 power class 2, M_{SSB_index_inter} = 24 samples. For a UE supporting FR2 power class 3, M_{SSB_index_inter} = 24 samples. For a UE supporting FR2 power class 4, $M_{SSB index inter} = 24$ samples.

M_{meas_period_inter}: For a UE supporting FR2 power class 1, M_{meas_period_inter} =64 samples. For a UE supporting FR2 power class 2, M_{meas period inter}=40 samples. For a UE supporting FR2 power class 3, M_{meas period inter}=40 samples. For a UE supporting FR2 power class 4, $M_{\text{meas period inter}} = 40$ samples.

CSSF_{inter}: it is a carrier specific scaling factor and is determined according to CSSF_{within_gap,i} in clause 9.1.5.2 for measurement conducted within measurement gaps.

Table 9.3.4-1: Time period for PSS/SSS detection, (Frequency range FR1)

Condition NOTE1,2	TPSS/SSS_sync_inter
No DRX	Max(600ms, 8 × Max(MGRP, SMTC period)) × CSSF _{inter}
DRX cycle ≤ 320ms	Max(600ms, Ceil(8*1.5) × Max(MGRP, SMTC period, DRX cycle)) × CSSF _{inter}
DRX cycle > 320ms	8 × DRX cycle × CSSF _{inter}
NOTE 1: DRY or non DRY requirements apply according to the conditions described in clause 3.6.1	

RX requirements apply according to the conditions described in clause

NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group

Table 9.3.4-2: Time period for PSS/SSS detection, (Frequency range FR2)

Condition NOTE1,2	T _{PSS/SSS_sync_inter}
No DRX	Max(600ms, M _{pss/sss_sync_inter} × Max(MGRP, SMTC period)) × CSSF _{inter}
DRX cycle ≤ 320ms	Max(600ms, (1.5 × M _{pss/sss_sync_inter}) × Max(MGRP, SMTC period, DRX cycle)) ×
	CSSF _{inter}
DRX cycle > 320ms	$M_{pss/sss_sync_inter} imes DRX \ cycle imes CSSF_{inter}$
NOTE 1. DDV or non DDV requirements apply according to the conditions described in clause 2.6.1	

NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1

NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.

Table 9.3.4-3: Time period for time index detection (Frequency range FR1)

Condition NOTE1,2	T _{SSB_time_index_inter}	
No DRX	Max(120ms, 3 × Max(MGRP, SMTC period)) × CSSF _{inter}	
DRX cycle ≤ 320ms	$Max(120ms, Ceil(3 \times 1.5) \times Max(MGRP, SMTC period, DRX cycle)) \times CSSF_{inter}$	
DRX cycle > 320ms	3 × DRX cycle × CSSF _{inter}	
NOTE 1: DRX or non DI	RX requirements apply according to the conditions described in clause 3.6.1	
NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are fo		
the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.		

Table 9.3.4-4: Time period for time index detection (Frequency range FR2)

Condition NOTE1,2	T _{SSB_time_index_inter}
No DRX	$Max(200ms, M_{SSB_index_inter} \times Max(MGRP, SMTC period)) \times CSSF_{inter}$
DRX cycle ≤ 320ms	Max(200ms, (1.5 × MssB_index_inter) × Max(MGRP, SMTC period, DRX cycle)) ×
	CSSFinter
DRX cycle > 320ms	$M_{SSB_index_inter} \times DRX \ cycle \times CSSF_{inter}$
NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1	

NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group

9.3.4.1 Void

Void 9.3.4.2

9.3.5 Inter-frequency measurements

When measurement gaps are provided for inter frequency measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting SS-RSRP, SS-RSRO and SS-SINR measurements to higher layers with measurement accuracy as specified in sub-clauses 10.1.4, 10.1.5, 10.1.9, 10.1.10, 10.1.14 and 10.1.15, respectively, as shown in table 9.3.5-1 and 9.3.5-2:

Table 9.3.5-1: Measurement period for inter-frequency measurements with gaps (Frequency FR1)

Condition NOTE1,2	T SSB_measurement_period_inter
No DRX	$Max(200ms,8\times Max(MGRP,SMTCperiod))\times CSSF_{inter}$
DRX cycle ≤ 320ms	Max(200ms, Ceil(8 \times 1.5) \times Max(MGRP, SMTC period, DRX cycle)) \times CSSF _{inter}
DRX cycle > 320ms	8 × DRX cycle × CSSF _{inter}

NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1

NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.

Table 9.3.5-2: Measurement period for inter-frequency measurements with gaps (Frequency FR2)

Condition NOTE1,2	T _{SSB_measurement_period_inter}
No DRX	Max(400ms, M _{meas_period_inter} × Max(MGRP, SMTC period)) × CSSF _{inter}
DRX cycle ≤ 320ms	Max(400ms, (1.5 × M _{meas_period_inter}) × Max(MGRP, SMTC period, DRX cycle)) × CSSF _{inter}
DRX cycle > 320ms	M _{meas_period_inter} × DRX cycle × CSSF _{inter}
NOTE 1: DRY or non DRY requirements apply according to the conditions described in clause 3.6.1	

non DRX requirements apply according to the conditions described in clause 3.6.1

NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group.

9.3.5.1 Void

9.3.5.2 Void

9.3.5.3 Void

9.3.6 Inter-frequency measurements reporting requirements

9.3.6.1 Periodic Reporting

Reported SS-RSRP, SS-RSRQ, and SS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.1.4.1, 10.1.5.1, 10.1.9.1, 10.1.10.1, 10.1.14.1 and 10.1.15.1, respectively.

9.3.6.2 **Event-triggered Periodic Reporting**

Reported SS-RSRP, SS-RSRQ, and SS-SINR measurements contained in event triggered periodic measurement reports shall meet the requirements in clauses 10.1.4.1, 10.1.5.1, 10.1.9.1, 10.1.10.1, 10.1.14.1 and 10.1.15.1, respectively.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 9.3.6.3.

9.3.6.3 Event-triggered Reporting

Reported SS-RSRP, SS-RSRQ, and SS-SINR measurements contained in event triggered measurement reports shall meet the requirements in clauses 10.1.4.1, 10.1.5.1, 10.1.9.1, 10.1.10.1, 10.1.14.1 and 10.1.15.1, respectively.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be within $T_{identify_inter_without_index}$ if UE is not indicated to report SSB based RRM measurement result with the associated SSB index. Otherwise UE shall be able to identify a new detectable inter frequency cell within $T_{identify_inter_with_index}$. Both $T_{identify_inter_without_index}$ and $T_{identify_inter_with_index}$ are defined in clause 9.3.4. When L3 filtering is used an additional delay can be expected.

A cell is detectable only if at least one SSB measured from the cell being configured remains detectable during the time period $T_{identify_inter_without_index}$ or $T_{identify_inter_with_index}$ defined in clause 9.3.4. If a cell which has been detectable at least for the time period $T_{identify_inter_without_index}$ or $T_{identify_inter_with_index}$ defined in clause 9.3.4 becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again with the same spatial reception parameter and then triggers the measurement report as per TS 38.331 [2], the event triggered measurement reporting delay shall be less than $T_{SSB_measurement_period_inter}$ defined in clause 9.3.5 provided the timing to that cell has not changed more than \pm 3200/2 $^{\mu}$ Tc while measurement gap has not been available and the L3 filtering has not been used, where μ is the SCS configuration as defined in clause 4.2 of TS 38.211 [3]. When L3 filtering is used an additional delay can be expected.

9.3.7 Void

9.3.8 Inter-frequency SFTD measurement requirements

9.3.8.1 Introduction

This clause contains requirements for a UE supporting NR inter-frequency SFTD measurement and is applicable in RRC_CONNECTED state. The UE shall, depending on network request, perform inter-frequency SFTD measurement and report SFTD result with or without SS-RSRP. The overall delay includes RRC procedure delay defined in clause 12 in TS 38.331 [2] and SFTD measurement reporting delay in clause 9.3.8.3.

UE which fulfils the requirements in clause 9.3.8 is not supposed to fulfil the requirements defined in clause 9.2.5.4.

9.3.8.2 SFTD Measurement delay

The requirements on SFTD measurement delay defined in this clause are applicable under the side condition SCH $\hat{E}s/Iot \ge -3$ dB for the inter-frequency neighbour cell. Depending on configuration, the SFTD measurement may be carried out with or without the support of configured measurement gaps. In the current release, indication on whether to carry out the SFTD measurement with or without measurement gaps is implicit and depending on whether measurement gaps are configured.

The UE shall be able to detect, identify and measure SFTD of up to 3 of the strongest applicable inter-frequency neighbour cells on the carrier frequency provided in the SFTD measurement configuration. Further depending on the SFTD measurement configuration, the UE shall additionally report SS-RSRP for the one or more strongest cells. The UE may or may not be configured with *cellsForWhichToReportSFTD*. The UE does not expect *cellsForWhichToReportSFTD* to change during an ongoing SFTD measurement.

When no measurement gaps are provided, the UE shall be capable of finding the inter-frequency neighbour cell regardless of its SSB position in the SMTC period, provided that the carrier frequency where SFTD measurement is configured and the serving carrier(s) form a supported CA or NR-DC band combination of the UE. The SFTD measurement shall be conducted with sustained connection to the PCell and activated SCell(s) in MCG. Depending on capability, the UE may be allowed to cause a certain amount of interruptions for reconfiguration of the radio receiver, as specified in clause 8.2.2.2.6.

When measurement gaps are provided, the UE shall be capable of finding the inter-frequency neighbour cell under the additional condition that the SSB at least occasionally falls within the measurement gap.

157

When no DRX is used, the UE shall be capable of determining SFTD within a physical layer measurement period of $T_{measure\ SFTD1}$ as follows:

- For SFTD measurements without measurement gaps, and without additional SS-RSRP reporting:
 - For carrier frequency in FR1: T_{measure_SFTD1} = 14 SMTC periods
 - For carrier frequency in FR2: $T_{\text{measure SFTD1}} = 112 \text{ SMTC periods}$
- For SFTD measurements in measurement gaps, and without additional SS-RSRP reporting:
 - For carrier frequency in FR1: T_{measure_SFTD1} = CSSF_{inter} × 8 × Max(MGRP, SMTC period)
 - For carrier frequency in FR2: T_{measure_SFTD1} = CSSF_{inter} × 64 × Max(MGRP, SMTC period)
- For SFTD measurements without measurement gaps, and with additional SS-RSRP reporting:
 - For carrier frequency in FR1: T_{measure_SFTD1} = 19 SMTC periods
 - For carrier frequency in FR2: T_{measure_SFTD1} = 152 SMTC periods
- For SFTD measurements in measurement gaps, and with additional SS-RSRP reporting:
 - For carrier frequency in FR1: T_{measure SFTD1} = CSSF_{inter} × 13 × Max(MGRP, SMTC period)
 - For carrier frequency in FR2: T_{measure_SFTD1} = CSSF_{inter} × 104 × Max(MGRP, SMTC period)

where CSSF_{inter} is a carrier specific scaling factor and is determined according to CSSF_{within_gap,i} in clause 9.1.5.2 for measurement conducted within measurement gaps.

When DRX is used, the same $T_{measure_SFTD1}$ as for non-DRX applies, but the reporting delay depends on the DRX cycle length in use.

In case PCell is changed due to handover, the UE shall terminate the inter-frequency SFTD measurement.

The measurement accuracy for the SFTD measurement shall fulfil the requirement in clause 10.1.21.3. The measurement accuracy for additionally reported SS-RSRP shall fulfil the requirement in clauses 10.1.4.1 and 10.1.5.1 for neighbour cell in FR1 and FR2, respectively.

9.3.8.3 SFTD Measurement reporting delay

The SFTD measurement reporting delay is defined as the time between a command that will trigger an SFTD measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty of $2 \times TTI_{DCCH}$ resulting when inserting the measurement report to the TTI of the uplink DCCH. This measurement reporting delay excludes any delay caused by lack of UL resources for UE to send the measurement report.

The SFTD measurement reporting delay shall be less than $T_{measure_SFTD1}$ defined in clause 9.3.8.2 plus the RRC procedure delay defined in TS 38.331 [2].

9.4 Inter-RAT measurements

9.4.1 Introduction

The requirements in this clause are specified for NR–E-UTRAN FDD and NR–E-UTRAN TDD measurements and are applicable without an explicit E-UTRAN neighbour cell list containing physical layer cell identities, for a UE:

- in RRC_CONNECTED state, and

- configured with SA or NR-DC operation mode or configured in NE-DC operation mode by PCell with NR-E-UTRAN FDD or TDD measurement (RSRP, RSRQ, RS-SINR, RSTD, or E-CID) on E-UTRA non-serving frequency carrier, and
- configured with an appropriate measurement gap pattern according to Table 9.1.2-3.

When the UE is in NE-DC operation mode and an NR-E-UTRAN FDD or TDD measurement (RSRP, RSRQ, RS-SINR, or E-CID RSRP and RSRQ) configured by NR PCell is on a E-UTRA serving frequency carrier, then the corresponding E-UTRA intra-frequency measurements requirements specified in clause 8.19 of TS 36.133 [15] shall apply.

Parameter T_{Inter1} used in inter-RAT requirements in clause 9.4 is specified in Table 9.4.1-1.

Table 9.4.1-1: Minimum available time for inter-RAT measurements

Gap Pattern Id	Measurement Gap Length (MGL, ms)	Measurement Gap Repetition Period (MGRP, ms)	Minimum available time for inter- frequency and inter- RAT measurements during 480 ms period (Tinter1, ms)
0	6	40	60
1	6	80	30
2	3	40	24 ^{Note 1}
3	3	80	12 ^{Note 1}
4	6	20	120 Note 1
6	4	20	72 Note 1,3,6
7	4	40	36 Note 1,4,6
8	4	80	18 ^{Note 1,5,6}
10	3	20	48 Note 1
		tern IDs 2, 4, 6, 7,	gap pattern IDs 2, 3, 4, 10, and Tinter1 = 30 for

- NOTE 2: Measurement gaps pattern configurations applicability is as specified in Table 9.1.2-1.
- NOTE 3: When this gap pattern is used, the T_{inter} for E-UTRA inter-frequency measurements is 48 ms corresponding to the first 3 ms of the 4 ms gap.
- NOTE 4: When this gap pattern is used, the T_{inter} for E-UTRA inter-frequency measurements is 24 ms corresponding to the first 3 ms of the 4 ms gap.
- NOTE 5: When this gap pattern is used, the T_{inter} for E-UTRA inter-frequency measurements is 12 ms corresponding to the first 3 ms of the 4 ms gap.
- NOTE 6: This gap pattern is applicable for E-UTRA inter-frequency measurements only if gap based NR measurements are also configured.

A UE configured with gap pattern ID 2, 3 or 10 shall be able to detect a target cell, provided that

- the E-UTRA subframe #0 or #5 of the target E-UTRAN cell begins not earlier than 500 μs from the start of the measurement gap, and
- the E-UTRA subframe #0 or #5 of the target E-UTRAN cell ends not later than 500 μs before the end of the measurement gap in case of FDD and not later than 750 μs before the end of measurement gap in case of TDD.

A UE configured with gap pattern ID 6, 7 or 8 shall be able to detect a target cell, provided that

- the E-UTRA subframe #0 or #5 of the target E-UTRAN cell begins not earlier than 500 μ s from the start of the measurement gap, and
- the E-UTRA subframe #0 or #5 of the target E-UTRAN cell ends no later than 1500 μ s before the end of the measurement gap in case of FDD and no later than 1750 μ s before the end of measurement gap in case of TDD.

9.4.2 NR – E-UTRAN FDD measurements

9.4.2.1 Introduction

The requirements are applicable for NR-E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements.

In the requirements, an E-UTRAN FDD cell is considered to be detectable when:

- RSRP related conditions in the accuracy requirements in clause 10.2.2 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],
- RSRQ related conditions in the accuracy requirements in clause 10.2.3 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],
- RS-SINR related conditions in the accuracy requirements in clause 10.2.5 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.19 of TS 36.133 [15].

9.4.2.2 Requirements when no DRX is used

When the UE requires measurement gaps to identify and measure inter-RAT cells and an appropriate measurement gap pattern is scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable FDD cell within T_{Identify}, E-UTRAN FDD according to the following expression:

$$T_{\text{Identify,E-UTRAN FDD}} = T_{\text{BasicIdentify}} \cdot \frac{480}{T_{\text{Intert}}} \cdot \text{CSSF}_{\text{interRAT}} \quad ms.$$

where:

 $T_{BasicIdentify} = 480 \text{ ms},$

T_{Inter1} is defined in clause 9.4.1,

 $CSSF_{interRAT} = CSSF_{within_gap,i}$ is the scaling factor for the measured inter-RAT E-UTRA carrier *i* which is calculated as specified in clause 9.1.5.2.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{Measure, E-UTRAN \, FDD}$ defined in Table 9.4.2.2-1.

Table 9.4.2.2-1: Measurement period and measurement bandwidth

Configuration	Physical Layer Measurement period: T _{Measure} , E-UTRAN FDD [ms]	Measurement bandwidth [RB]
0	480 x CSSF _{interRAT}	6
1 (Note 1)	240 x CSSF _{interRAT}	50
NOTE 1: This co	nfiguration is optional.	

When measurement gaps are scheduled for E-UTRAN FDD inter-RAT measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with measurement period $T_{\text{Measure}, E-UTRAN FDD}$ given by table 9.4.2.2-1.

The UE shall be capable of identifying and performing NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN FDD cells per E-UTRA FDD carrier frequency layer during each layer 1 measurement period, for up to 7 E-UTRA FDD carrier frequency layers.

If higher layer filtering is used, an additional cell identification delay can be expected.

 $The \ NR-E-UTRAN\ FDD\ RSRP\ measurement\ accuracy\ for\ all\ measured\ cells\ shall\ be\ as\ specified\ in\ clause\ 10.2.2.$

The NR – E-UTRAN FDD RSRQ measurement accuracy for all measured cells shall be as specified in clause 10.2.3.

The NR – E-UTRAN FDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.

9.4.2.3 Requirements when DRX is used

When DRX is in use and measurement gaps are configured, the UE shall be able to identify a new detectable E-UTRAN FDD cell within $T_{Identify, E-UTRAN \, FDD}$ specified in Table 9.4.2.3-1.

Table 9.4.2.3-1: Requirement to identify a newly detectable E-UTRAN FDD cell

DRX cycle length (s)	Tidentify, E-UTRAN FDD (S) (DRX cycles)			
	Gap period = 40 ms, 20 ms	Gap period = 80 ms		
≤0.16	Non-DRX requirements in	Non-DRX requirements in		
	clause 9.4.2.2 apply	clause 9.4.2.2 apply		
0.256	5.12* CSSF _{interRAT}	7.68* CSSF _{interRAT}		
	(20*CSSF _{interRAT})	(30*CSSF _{interRAT})		
0.32	6.4* CSSFinterRAT	7.68* CSSFinterRAT		
	(20*CSSF _{interRAT})	(24*CSSF _{interRAT})		
0.32< DRX-cycle ≤	Note1 (20*CSSF _{interRAT})	Note1 (20*CSSF _{interRAT})		
10.24				
NOTE 1: The time depends on the DRX cycle length.				
NOTE 2: CSSF _{interRAT} is	as defined in clause 9.4.2.2.			

When DRX is in use, the UE shall be capable of performing NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN FDD cells per E-UTRA FDD frequency layer during each layer 1 measurement period, for up to 7 E-UTRA FDD carrier frequency layers, and the UE physical layer shall be capable of reporting NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period $T_{\text{measure}, E-UTRAN FDD}$ specified in Table 9.4.2.3-2.

Table 9.4.2.3-2: Requirement to measure E-UTRAN FDD cells

DRX cycle length (s)	T _{measure, E-UTRAN FDD} (s) (DRX cycles)	
≤0.08	Non-DRX requirements in clause 9.4.2.2 apply	
0.08< DRX-cycle ≤10.24	Note1 (5* CSSF _{interRAT})	
NOTE 1: The time depends on the DRX cycle length. NOTE 2: CSSF _{interRAT} is as defined in clause 9.4.2.2.		

If higher layer filtering is used, an additional cell identification delay can be expected.

The NR – E-UTRAN FDD RSRP measurement accuracy for all measured cells shall be as specified in clause 10.2.2.

The NR – E-UTRAN FDD RSRQ measurement accuracy for all measured cells shall be as specified in clause 10.2.3.

The NR – E-UTRAN FDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.

9.4.2.4 Measurement reporting requirements

9.4.2.4.1 Periodic Reporting

The reported NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

9.4.2.4.2 Event-Triggered Periodic Reporting

The reported NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements contained in event-triggered periodic measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

The first report in event-triggered periodic measurement reporting shall meet the requirements specified in clause 9.4.2.4.3.

9.4.2.4.3 Event-Triggered Reporting

The reported NR – E-UTRAN FDD RSRP, RSRQ, and RS-SINR measurements contained in event-triggered measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

The UE shall not send any event-triggered measurement reports as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x TTI_{DCCH} where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than T $_{\text{Identify, E-UTRAN FDD}}$ defined in clauses 9.4.2.2 and 9.4.2.3 without DRX and with DRX, respectively. When L3 filtering is used, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{Identify, E-UTRAN\,FDD}$ becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again and triggers an event as per TS 38.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measure, E-UTRAN\,FDD}$ provided the timing to that cell has not changed more than \pm 50 Ts while measurement gap has not been available and the L3 filter has not been used.

9.4.3 NR – E-UTRAN TDD measurements

9.4.3.1 Introduction

The requirements are applicable for NR-E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements.

In the requirements, an E-UTRAN TDD cell is considered to be detectable when:

- RSRP related conditions in the accuracy requirements in clause 10.2.2 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],
- RSRQ related conditions in the accuracy requirements in clause 10.2.3 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.3 of TS 36.133 [15],

RS-SINR related conditions in the accuracy requirements in clause 10.2.5 are fulfilled for a corresponding Band, together with the corresponding side conditions in Annex B.2.3 and Annex B.3.19 of TS 36.133 [15].

9.4.3.2 Requirements when no DRX is used

When the UE requires measurement gaps to identify and measure inter-RAT cells and an appropriate measurement gap pattern is scheduled, or the UE supports capability of conducting such measurements without gaps, the UE shall be able to identify a new detectable TDD cell within T_{Identify, E-UTRAN TDD} according to the following expression:

- When configuration 0 or configuration 1 in Table 9.4.3.2-1 is applied,

$$T_{\text{Identify,E-UTRAN TDD}} = T_{\text{BasicIdentify}} \cdot \frac{480}{T_{\text{Inter1}}} \cdot \text{CSSF}_{\text{interRAT}} \quad ms,$$

When configuration 2 or configuration 3 in Table 9.4.3.2-1 is applied,

$$T_{\rm Identify,E-UTRAN\ TDD} = T_{\rm BasicIdentify} \cdot \frac{_{480}}{_{T_{\rm Inter1}}} \cdot {\rm CSSF}_{\rm interRAT} + 240 \cdot {\rm CSSF}_{\rm interRAT} \quad ms,$$

where:

 $T_{BasicIdentify} = 480 \text{ ms},$

T_{Inter1} is defined in clause 9.4.1,

 $CSSF_{interRAT} = CSSF_{within_gap,i}$ is the scaling factor for the measured inter-RAT E-UTRA carrier *i* which is calculated as specified in clause 9.1.5.2.

Identification of a cell shall include detection of the cell and additionally performing a single measurement with measurement period of $T_{\text{Measure, E-UTRAN TDD}}$ defined in Table 9.4.3.2-1.

CSSFinterRAT

720 x

CSSFinterRAT

480 x

CSSF_{interRAT}

Configuration	Measurement bandwidth	Number of UL/DL sub- frames per half frame (5 ms)		Dwl	PTS	T _{Measure} , E-UTRAN TDD (ms)
	(RB)	DL	UL	Normal CP	Extende d CP	
0	6	2	2	$19760 \cdot T_{\rm s}$	20480· <i>T</i> _s	480 x CSSF _{interRAT}
1 (Note 1)	50	2	2	$19760 \cdot T_{s}$	$20480 \cdot T_{\rm s}$	240 x

 $19760 \cdot T_{a}$

 $19760 \cdot T_{c}$

20480·T

 $20480 \cdot T_{c}$

3

3

Table 9.4.3.2-1: T_{Measure, E-UTRAN TDD} for different configurations

NOTE 1: This configuration is optional.

6

50

NOTE 2: Void

2

3 (Note 1)

When measurement gaps are scheduled for E-UTRAN TDD inter-RAT measurements, or the UE supports capability of conducting such measurements without gaps, the UE physical layer shall be capable of reporting RSRP, RSRQ, and RS-SINR measurements to higher layers with measurement period T_{measure}, E-UTRAN TDD given by table 9.4.3.2-1.

The UE shall be capable of identifying and performing NR - E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN TDD cells per E-UTRA TDD carrier frequency layer during each layer 1 measurement period, for up to 7 E-UTRA TDD carrier frequency layers.

If higher layer filtering is used, an additional cell identification delay can be expected.

1

The NR – E-UTRAN TDD RSRP measurement accuracy for all measured cells shall be as specified in clause 10.2.2.

The NR – E-UTRAN TDD RSRQ measurement accuracy for all measured cells shall be as specified in clause 10.2.3.

The NR - E-UTRAN TDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.

9.4.3.3 Requirements when DRX is used

When DRX is in use and measurement gaps are configured, the UE shall be able to identify a new detectable E-UTRAN TDD cell within $T_{\text{Identify, E-UTRAN TDD}}$ specified in Table 9.4.3.3-1.

Table 9.4.3.3-1: Requirement to identify a newly detectable E-UTRAN TDD cell

DRX cycle length (s)	T _{Identify} , E-UTRAN TDD (s) (DRX cycles)			
	Gap period = 40 ms, 20	Gap period = 80 ms		
	ms			
≤0.16	Non-DRX requirements in	Non-DRX requirements in		
	clause 9.4.3.2 apply	clause 9.4.3.2 apply		
0.256	5.12* CSSFinterRAT	7.68* CSSFinterRAT		
	(20*CSSFinterRAT)	(30*CSSF _{interRAT})		
0.32	6.4* CSSFinterRAT	7.68* CSSFinterRAT		
	(20*CSSF _{interRAT})	(24*CSSF _{interRAT})		
0.32< DRX-cycle ≤10.24	Note1 (20*CSSF _{interRAT})	Note1 (20*CSSF _{interRAT})		
NOTE 1: The time depends on the DRX cycle length.				
NOTE 2: CSSFinterRAT is as defined in clause 9.4.3.2.				

When DRX is in use, the UE shall be capable of performing NR - E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements of at least 4 identified E-UTRAN TDD cells per E-UTRA TDD frequency layer during each layer 1 measurement period, for up to 7 E-UTRA TDD carrier frequency layers, and the UE physical layer shall be capable of reporting NR - E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements to higher layers with the measurement period T_{measure}, E-UTRAN TDD specified in Table 9.4.3.3-2.

Table 9.4.3.3-2: Requirement to measure E-UTRAN TDD cells

DRX cycle length (s)	T _{measure} , E-UTRAN TDD (s) (DRX cycles)
≤0.08	Non-DRX Requirements in clause 9.4.3.2 apply

0.128	For configuration 2 Note3, non-DRX requirements		
	in clause 9.4.3.2 apply,		
	Otherwise: Note1 (5*CSSF _{interRAT})		
0.128 <drx-cycle≤ (5*cssf<sub="" note1="">interRAT)</drx-cycle≤>			
10.24			
NOTE 1: The time depends on the DRX cycle length.			
NOTE 2: CSSFinterRAT is	SSF _{interRAT} is as defined in clause 9.4.3.2.		
NOTE 3: See Table 9.4.3	E 3: See Table 9.4.3.2-1.		

If higher layer filtering is used, an additional cell identification delay can be expected.

The NR – E-UTRAN TDD RSRP measurement accuracy for all measured cells shall be as specified in clause 10.2.2.

The NR – E-UTRAN TDD RSRQ measurement accuracy for all measured cells shall be as specified in clause 10.2.3.

The NR – E-UTRAN TDD RS-SINR measurement accuracy for all measured cells shall be as specified in clause 10.2.5.

9.4.3.4 Measurement reporting requirements

9.4.3.4.1 Periodic Reporting

The reported NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

9.4.3.4.2 Event-Triggered Periodic Reporting

The reported NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements contained in event-triggered periodic measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

The first report in event-triggered periodic measurement reporting shall meet the requirements specified in clause 9.4.3.4.3.

9.4.3.4.3 Event-Triggered Reporting

The reported NR – E-UTRAN TDD RSRP, RSRQ, and RS-SINR measurements contained in event-triggered measurement reports shall meet the requirements in clauses 10.2.2, 10.2.3, and 10.2.5, respectively.

The UE shall not send any event-triggered measurement reports as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than T $_{\text{Identify, E-UTRAN TDD}}$ defined in clauses 9.4.3.2 and 9.4.3.3 without DRX and with DRX, respectively. When L3 filtering is used, an additional delay can be expected.

If a cell which has been detectable at least for the time period $T_{Identify, E-UTRAN \, TDD}$ becomes undetectable for a period ≤ 5 seconds and then the cell becomes detectable again and triggers an event as per TS 38.331 [2], the event triggered measurement reporting delay shall be less than $T_{Measure, E-UTRAN \, TDD}$ provided the timing to that cell has not changed more than $\pm 50 \, \text{Ts}$ while measurement gap has not been available and the L3 filter has not been used.

9.4.4 Inter-RAT RSTD measurements

9.4.4.1 NR – E-UTRAN FDD RSTD measurements

9.4.4.1.1 Introduction

The requirements are applicable for NR-E-UTRAN FDD RSTD measurements requested via LPP [22, 27].

When the UE is in NE-DC operation mode and an NR-E-UTRAN FDD RSTD measurement configured by NR PCell is on a E-UTRA serving frequency carrier, then the corresponding E-UTRA intra-frequency measurements requirements as follows shall apply.

- Measurements configured on E-UTRA PSCC shall meet E-UTRAN OTDOA intra-frequency measurements requirements in clause 8.1.2.5. The applicable measurement accuracy requirements are in clause 9.1.10.
- Measurements configured on E-UTRA SCC shall meet all applicable requirements in clause 8.4, except that the terms PCell and primary component carrier shall be deemed to be swapped with PSCell and PSCC. The applicable measurement accuracy requirements are in clause 9.1.12, except that the terms PCell and primary component carrier shall be deemed to be swapped with PSCell and PSCC.

The requirements in clause 9.4.4.1 apply when:

- the UE is provided with the LTE timing information via LPP [27], including both *nr-LTE-SFN-Offset* and *nr-LTE-fineTiming-Offset*, or
- the UE is not provided with nr-LTE-SFN-Offset or nr-LTE-fineTiming-Offset, or
- the UE is provided with *nr-LTE-SFN-Offset* but not with *nr-LTE-fineTiming-Offset*.

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE may be using When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE may be using autonomous gaps to acquire SFN of the OTDOA assistance data reference cell prior to requesting measurement gaps for performing the requested E-UTRA RSTD measurements before the $T_{\rm RSTD\ InterRAT,\ E-UTRAN\ FDD}$ time period starts while meeting all the requirements in clause 9.4.4.1.2, provided that the OTDOA assistance data is provided to allow sufficient time for the UE to acquire the SFN before the $T_{\rm RSTD\ InterRAT,\ E-UTRAN\ FDD}$ starts.

When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps to perform cell detection for the OTDOA assistance data reference cell prior to requesting measurement gaps for performing the requested E-UTRA RSTD measurements before the $T_{\text{RSTD InterRAT, E-UTRAN FDD}}$ time period starts while meeting all the requirements in clause 9.4.4.1.2, provided that the OTDOA assistance data is provided to allow sufficient time for the UE to detect the cell before the $T_{\text{RSTD InterRAT, E-UTRAN FDD}}$ starts.

9.4.4.1.2 Requirements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-RAT E-UTRAN FDD RSTD, specified in TS 38.215 [4], for at least n=16 cells, including the reference cell, within $T_{RSTD\ InterRAT\ E-UTRAN\ FDD}$ ms as given below:

$$T_{RSTD\ InterRAT,\ E-UTRAN\ FDD} = T_{PRS} \cdot (M-1) + \Delta \qquad ms$$
,

where

 $T_{RSTD\ InterRAT,\ E-UTRAN\ FDD}$ is the total time for detecting and measuring at least n cells,

 $T_{\rm PRS}$ is the largest value of the cell-specific positioning subframe configuration period, defined in TS 36.211 [23], among the measured n cells including the reference cell,

M is the number of PRS positioning occasions as defined in Table 9.4.4.1.2-1, where each PRS positioning occasion comprises of N_{PRS} (1 \leq N_{PRS} \leq 6) consecutive downlink positioning subframes defined in TS 36.211 [23],

 $CSSF_{interRAT} = CSSF_{within_gap,i}$ is the scaling factor determined by the gap sharing scheme for the RSTD measurements on the carrier frequency i as defined in clause 9.1.5.2,

$$\Delta = 160 \cdot \left[\frac{n}{M} \right]$$
 ms is the measurement time for a single PRS positioning occasion which includes the sampling time

and the processing time, and

the n cells are distributed on up to two E-UTRAN FDD carrier frequencies.

Table 9.4.4.1.2-1: Number of PRS positioning occasions within $T_{RSTD\ InterRAT,\ E-UTRAN\ FDD}$

Positioning subframe	Number of PRS positioning occasions ${\it M}$		
configuration period $T_{ m PRS}$	f2 Note1	f1 and f2 Note2	
160 ms	16 x CSSFinterRAT	32 x CSSFinterRAT	
>160 ms	8 x CSSFinterRAT	16 x CSSFinterRAT	
NOTE 1: When inter-RAT E-UTRAN FDD RSTD measurements are performed over the reference cell and neighbour cells, which belong to the E-UTRAN FDD carrier frequency f2.			
	NOTE 2: When inter-RAT E-UTRAN FDD RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the E-UTRAN FDD carrier frequency f1 and the E-		

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells i out of at least (n-1) neighbor cells within $T_{RSTD InterRAT, E-UTRAN FDD}$ provided:

UTRAN FDD carrier frequency f2 respectively.

$$(PRS \, \hat{E}_s / Iot)_{ref} \ge -6 \, dB$$
 for all Frequency Bands for the reference cell, $(PRS \, \hat{E}_s / Iot)_i \ge -13 \, dB$ for all Frequency Bands for neighbour cell i ,

$$\left(\text{PRS } \hat{\mathbf{E}}_{s} / \text{Iot} \right)_{ref}$$
 and $\left(\text{PRS } \hat{\mathbf{E}}_{s} / \text{Iot} \right)_{i}$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning occasions,

PRP 1,2|dBm according to TS 36.133 [15, Annex B.2.6] for a corresponding Band,

 $PRS\,\hat{E}_s$ / Iot is defined as the ratio of the average received energy per PRS resource element during the useful part of the symbol to the average received power spectral density of the total noise and interference for this resource element, where the ratio is measured over all resource elements which carry PRS.

The time $T_{RSTD\ InterRAT,\ E-UTRAN\ FDD}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message via LPP as specified in TS 38.305 [22], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in clause 10.2.4.

9.4.4.1.2.1 RSTD Measurement Reporting Delay

This requirement assumes that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

9.4.4.1.2.2 Requirements for acquiring the timing of the E-UTRA OTDOA reference cell

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE supporting per-FR gaps may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells in FR1 for acquiring SFN of the reference cell in the E-UTRA OTDOA assistance data, while no autonomous gaps in downlink reception or uplink transmission are allowed in any of the UE serving cells in FR2. The UE, which are only supporting per-UE gaps, may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells for acquiring the SFN of the reference cell in the E-UTRA OTDOA assistance data.

When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps while indicating *eutra-FineTimingDetection* according to TS 38.331 [2] for detecting the reference cell in the E-UTRA OTDOA assistance data.

When the UE is performing one or both of SFN acquisition or cell detection as specified above, the UE shall be able to determine the timing of the E-UTRA OTDOA assistance data reference cell during the time period

 $T_{RefCell,E-UTRAN} = T_{Detect, E-UTRAN FDD} + T_{MIB} + T_{ECGI}$,

where

 $T_{Detect, E-UTRAN \, FDD} = T_{Identify, E-UTRAN \, FDD}$ - $T_{measure, E-UTRAN \, FDD}$ is according to clause 9.4.2 assuming CSSF_{interRAT}=1 and it is the time needed to detect the E-UTRA OTDOA assistance data reference cell when the UE needs to acquire the subframe and slot timing of the cell, provided the UE is configured with measurement gaps ($T_{Detect, E-UTRAN \, FDD}$ =0 when both nr-LTE-SFN-Offset and nr-LTE-fineTiming-Offset are provided in the E-UTRA OTDOA assistance data or the E-UTRA OTDOA assistance data reference cell is known to the UE), and

 $T_{MIB} = 50$ ms is the time required to acquire SFN and/or PHICH configuration of the E-UTRA OTDOA assistance data reference cell provided the OTDOA assistance data reference cell is decodable and at least all E-UTRA subframes #0 during T_{MIB} are available at the UE receiver ($T_{MIB}=0$ when nr-LTE-SFN-Offset is provided in the E-UTRA OTDOA assistance data and ECGI acquisition is not needed), and

 $T_{ECGI} = 100$ ms is the time required to acquire ECGI of the E-UTRA OTDOA assistance data reference cell when *cellGlobalId* is included in *OTDOA-ReferenceCellInfo* and the UE is not aware of the ECGI of this cell ($T_{ECGI} = 0$ when *cellGlobalId* is not included in *OTDOA-ReferenceCellInfo* or the UE is aware of the ECGI of the E-UTRA OTDOA assistance data reference cell).

When detecting the E-UTRAN OTDOA reference cell, the requirements in this clause shall be met, provided the conditions for the detectable cell are fulfilled according to clause 9.4.2.1. In addition, the MIB of the E-UTRA OTDOA reference cell whose SFN is acquired shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to TS 36.101 [25].

The requirement for acquiring the timing of the E-UTRA OTDOA reference cell within $T_{RefCell,E-UTRAN}$ is applicable when no DRX is used as well as when any of the DRX cycles specified in TS 38.331 [2] is used.

When $T_{MIB}>0$ and UE is using autonomous gaps during T_{MIB} , the UE shall transmit at least $N_{ACK/NACK, MIB, FDD}$ ACK/NACKs on PCell, PSCell, and each of activated SCell(s) in the frequency range where the autonomous gaps are created, specified in Table 9.4.4.1.2.2-1. When both $T_{MIB}>0$ and $T_{ECGI}>0$ and UE is using autonomous gaps during $T_{MIB}+T_{ECGI}$, the UE shall transmit on PCell, PSCell, and each of activated SCell(s) in the frequency range where autonomous gaps are created at least $N_{ACK/NACK, MIB+ECGI, FDD}$ ACK/NACKs specified in Table 9.4.4.1.2.2-3, provided the OTDOA reference cell bandwidth is configured in the OTDOA assistance data [22, 27]. The requirements in Tables 9.4.4.1.2.2-1, 9.4.4.1.2.2-2, and 9.4.4.1.2.2-3 apply, provided that:

- there is continuous DL data allocation,
- no DRX cycle is used,
- no measurement gaps are configured,
- only one code word is transmitted in each slot,
- 2 slot ACK/NACK feedback is configured,
- 20 ms SMTC period is configured,
- SSBs are transmitted in one slot within SMTC window.

Table 9.4.4.1.2.2-1: Number of ACK/NACKs transmitted by the UE during T_{MIB}

Nack/nack, mib, fdd	Configuration of the serving cell in which the transmitted ACF are counted		
	Duplex mode configuration	SCS	
15	FDD	15 kHz	
39	FDD	30 kHz	
85	FDD	60 kHz	
0	TDD Note 1	15 kHz	
4	TDD Note 1	30 kHz	
12	TDD Note 1	60 kHz	
46	TDD Note 2	60 kHz	
104	TDD Note 2	120 kHz	
	uration is as specified in Table A.3.3.1-1 of uration is as specified in Table A.3.3.1-1 of		

Table 9.4.4.1.2.2-2: Void

Table 9.4.4.1.2.2-3: Number of ACK/NACKs transmitted by the UE during T_{MIB}+T_{ECGI}

Nack/nack, mib+ecgi, fdd	Configuration of the serving cell in which the transmitted AC are counted	
	Duplex mode configuration	SCS
84	FDD	15 kHz
193	FDD	30 kHz
402	FDD	60 kHz
28	TDD Note 1	15 kHz
81	TDD Note 1	30 kHz
159	TDD Note 1	60 kHz
233	TDD Note 2	60 kHz
491	TDD Note 2	120 kHz
	ration is as specified in Table A.3.3.1-1 of T ration is as specified in Table A.3.3.1-1 of T	

9.4.4.2 NR – E-UTRAN TDD RSTD measurements

9.4.4.2.1 Introduction

The requirements are applicable for NR-E-UTRAN TDD RSTD measurements requested via LPP [22, 27].

When the UE is in NE-DC operation mode and an NR-E-UTRAN TDD RSTD measurement configured by NR PCell is on a E-UTRA serving frequency carrier, then the corresponding E-UTRA intra-frequency measurements requirements as follows shall apply.

- Measurements configured on E-UTRA PSCC shall meet E-UTRAN OTDOA intra-frequency measurements requirements in clause 8.1.2.5. The applicable measurement accuracy requirements are in clause 9.1.10.
- Measurements configured on E-UTRA SCC shall meet all applicable requirements in clause 8.4, except that the terms PCell and primary component carrier shall be deemed to be swapped with PSCell and PSCC. The applicable measurement accuracy requirements are in clause 9.1.12, except that the terms PCell and primary component carrier shall be deemed to be swapped with PSCell and PSCC.

The requirements in clause 9.4.4.1 apply when:

- the UE is provided with the LTE timing information via LPP [27], including both *nr-LTE-SFN-Offset* and *nr-LTE-fineTiming-Offset*, or
- the UE is not provided with nr-LTE-SFN-Offset or nr-LTE-fineTiming-Offset, or

- the UE is provided with nr-LTE-SFN-Offset but not with nr-LTE-fineTiming-Offset.

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE may be using autonomous gaps to acquire SFN of the OTDOA assistance data reference cell prior to requesting measurement gaps for performing the requested E-UTRA RSTD measurements before the $T_{\rm RSTD\,InterRAT,E-UTRAN\,TDD}$ time period starts while meeting all the requirements in clause 9.4.4.2.2, provided that the OTDOA assistance data is provided to allow sufficient time for the UE to acquire the SFN before the $T_{\rm RSTD\,InterRAT,E-UTRAN\,TDD}$ starts. When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps to perform cell detection for the OTDOA assistance data reference cell prior to requesting measurement gaps for performing the requested E-UTRA RSTD measurements before the $T_{\rm RSTD\,InterRAT,E-UTRAN\,TDD}$ time period starts while meeting all the requirements in clause 9.4.4.2.2, provided that the OTDOA assistance data is provided to allow sufficient time for the UE to detect the cell before the $T_{\rm RSTD\,InterRAT,E-UTRAN\,TDD}$ starts.

9.4.4.2.2 Requirements

When the physical layer cell identities of neighbour cells together with the OTDOA assistance data are provided, the UE shall be able to detect and measure inter-RAT -UTRAN TDD RSTD, specified in TS 38.215 [4], for at least n=16 cells, including the reference cell, within $T_{\rm RSTD\ InterRAT,E-UTRAN\ TDD}$ ms as given below:

$$T_{RSTD InterRAT, E-UTRAN TDD} = T_{PRS} \cdot (M-1) + \Delta$$
 ms

where

 $T_{RSTD InterRAT, E-UTRAN TDD}$ is the total time for detecting and measuring at least n cells,

 $T_{\rm PRS}$ is the largest value of the cell-specific positioning subframe configuration period, defined in TS 36.211 [23], among the measured n cells including the reference cell,

M is the number of PRS positioning occasions as defined in Table 9.4.4.2.2-1, where a PRS positioning occasion is as defined in clause 9.4.4.1.2,

 $CSSF_{interRAT} = CSSF_{within_gap,i}$ is the scaling factor determined by the gap sharing scheme for the RSTD measurements on the carrier frequency i as defined in clause 9.1.5.2,

 $\Delta = 160 \cdot \left[\frac{n}{M} \right]$ ms is the measurement time for a single PRS positioning occasion which includes the sampling time

and the processing time, and

the n cells are distributed on up to two E-UTRAN TDD carrier frequencies.

Table 9.4.4.2.2-1: Number of PRS positioning occasions within $T_{RSTD\ InterRAT,E-UTRAN\ TDD}$

Positioning subframe	Number of PRS positioning occasions ${\it M}$		
configuration period $T_{ m PRS}$	f2 Note1	f1 and f2 Note2	
160 ms	16 x CSSFinterRAT	32 x CSSFinterRAT	
>160 ms	8 × CSSFinterRAT	16 × CSSFinterRAT	

NOTE 1: When inter-RAT E-UTRAN TDD RSTD measurements are performed over the reference cell and neighbour cells, which belong to the E-UTRAN TDD carrier frequency f2.

NOTE 2: When inter-RAT E-UTRAN TDD RSTD measurements are performed over the reference cell and the neighbour cells, which belong to the E-UTRAN TDD carrier frequency f1 and the E-UTRAN TDD carrier frequency f2 respectively.

The requirements in this clause shall apply for all TDD special subframe configurations specified in TS 36.211 [23] and for the TDD uplink-downlink configurations as specified in Table 9.4.4.2.2-2 for UE requiring measurement gaps for these measurements. For UEs capable of performing inter-RAT RSTD measurements without measurement gaps, TDD uplink-downlink subframe configurations as specified in Table 9.4.4.2.2-3 shall apply.

Table 9.4.4.2.2-2: TDD uplink-downlink subframe configurations applicable for inter-RAT RSTD requirements

PRS Transmission Bandwidth (RB)	Applicable TDD uplink-downlink configurations	
6, 15	3, 4 and 5	
25	1, 2, 3, 4, 5 and 6	
50, 75, 100	0, 1, 2, 3, 4, 5 and 6	
NOTE 1: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [23].		

Table 9.4.4.2.2-3: TDD uplink-downlink subframe configurations applicable for inter-RAT RSTD requirements without gaps

PRS Transmission Bandwidth (RB)	Applicable TDD uplink-downlink configurations	
6, 15	1, 2, 3, 4 and 5	
25, 50, 75, 100	0, 1, 2, 3, 4, 5 and 6	
NOTE 1: Uplink-downlink configurations are specified in Table 4.2-2 in TS 36.211 [23].		

The UE physical layer shall be capable of reporting RSTD for the reference cell and all the neighbor cells i out of at least (n-1) neighbor cells within $T_{\text{RSTD InterRAT, E-UTRAN TDD}}$ provided:

 $(PRS \hat{E}_s / Iot)_{ref} \ge -6 dB$ for all Frequency Bands for the reference cell, $(PRS \hat{E}_s / Iot)_i \ge -13 dB$ for all Frequency Bands for neighbour cell i, $(PRS \hat{E}_s / Iot)_{ref}$ and $(PRS \hat{E}_s / Iot)_i$ conditions apply for all subframes of at least $L = \frac{M}{2}$ PRS positioning

PRP 1,2|_{dBm} according to TS 36.133 [15, Annex B.2.6] for a corresponding Band,

PRS \hat{E}_s / Iot is as defined in clause 9.4.4.1.2.

occasions,

The time $T_{\text{RSTD InterRAT,E-UTRAN TDD}}$ starts from the first subframe of the PRS positioning occasion closest in time after both the OTDOA-RequestLocationInformation message and the OTDOA assistance data in the OTDOA-ProvideAssistanceData message via LPP as specified in TS 38.305 [22], are delivered to the physical layer of the UE.

The RSTD measurement accuracy for all measured neighbor cells *i* shall be fulfilled according to the accuracy as specified in clause 10.2.4.

9.4.4.2.2.1 RSTD Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

9.4.4.2.2.2 Requirements for acquiring the timing of the E-UTRA OTDOA reference cell

When the UE is not aware of the SFN of at least one LTE cell in the OTDOA assistance data, the UE supporting per-FR gaps may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells in FR1 for acquiring SFN of the reference cell in the E-UTRA OTDOA assistance data, while no autonomous gaps in downlink reception or uplink transmission are allowed in any of the UE serving cells in FR2. The UE, which are only supporting per-UE gaps, may make autonomous gaps in downlink reception and uplink transmission of the PCell, PSCell, and each of the SCells for acquiring the SFN of the reference cell in the E-UTRA OTDOA assistance data.

When the UE is not aware of and cannot derive the subframe timing difference between the NR serving cell and the OTDOA assistance data reference cell, the UE may need to request measurement gaps while indicating *eutra*-

FineTimingDetection according to TS 38.331 [2] for detecting the reference cell in the E-UTRA OTDOA assistance data

When the UE is performing one or both of SFN acquisition or cell detection as specified above, the UE shall be able to determine the timing of the E-UTRA OTDOA assistance data reference cell during the time period

$$T_{RefCell,E-UTRAN} = T_{Detect, E-UTRAN TDD} + T_{MIB} + T_{ECGI}$$
,

where

 $T_{Detect, E-UTRAN \ TDD} = T_{Identify, E-UTRAN \ TDD}$ - $T_{measure, E-UTRAN \ TDD}$ is according to clause 9.4.3 assuming CSSF_{interRAT}=1 and it is the time needed to detect the E-UTRA OTDOA assistance data reference cell when the UE needs to acquire the subframe and slot timing of the cell, provided the UE is configured with measurement gaps ($T_{Detect, E-UTRAN \ TDD}=0$ when both nr-LTE-SFN-Offset and nr-LTE-fineTiming-Offset are provided in the E-UTRA OTDOA assistance data or the E-UTRA OTDOA assistance data reference cell is known to the UE), and

 $T_{MIB} = 50$ ms is the time required to acquire SFN and/or PHICH configuration of the E-UTRA OTDOA assistance data reference cell provided the OTDOA assistance data reference cell is decodable and at least all E-UTRA subframes #0 during T_{MIB} are available at the UE receiver ($T_{MIB}=0$ when nr-LTE-SFN-Offset is provided in the E-UTRA OTDOA assistance data and ECGI acquisition is not needed), and

 $T_{ECGI} = 100$ ms is the time required to acquire ECGI of the E-UTRA OTDOA assistance data reference cell when cellGlobalId is included in OTDOA-ReferenceCellInfo and the UE is not aware of the ECGI of this cell ($T_{ECGI} = 0$ when cellGlobalId is not included in OTDOA-ReferenceCellInfo or the UE is aware of the ECGI of the E-UTRA OTDOA assistance data reference cell).

When detecting the E-UTRAN OTDOA reference cell, the requirements in this clause shall be met, provided the conditions for the detectable cell are fulfilled according to clause 9.4.3.1. In addition, the MIB of the E-UTRA OTDOA reference cell whose SFN is acquired shall be considered decodable by the UE provided the PBCH demodulation requirements are met according to TS 36.101 [25].

The requirement for acquiring the timing of the E-UTRA OTDOA reference cell within $T_{RefCell,E-UTRAN}$ is applicable when no DRX is used as well as when any of the DRX cycles specified in TS 38.331 [2] is used.

When $T_{MIB}>0$ and UE is using autonomous gaps during T_{MIB} , the UE shall transmit at least $N_{ACK/NACK, MIB, TDD}$ ACK/NACKs on PCell, PSCell, and each of activated SCell(s) in the frequency range where the autonomous gaps are created, specified in Table 9.4.4.2.2.2-1. When both $T_{MIB}>0$ and $T_{ECGI}>0$ and UE is using autonomous gaps during $T_{MIB}+T_{ECGI}$, the UE shall transmit on PCell, PSCell, and each of activated SCell(s) in the frequency range where autonomous gaps are created at least $N_{ACK/NACK, MIB+ECGI, TDD}$ ACK/NACKs specified in Table 9.4.4.2.2.2-3, provided the OTDOA reference cell bandwidth is configured in the OTDOA assistance data [22, 27]. The requirements in Tables 9.4.4.2.2.2-1, 9.4.4.2.2.2-2 and 9.4.4.2.2.2-3 apply, provided that:

- there is continuous DL data allocation,
- no DRX cycle is used,
- no measurement gaps are configured,
- only one code word is transmitted in each slot,
- 2 slot ACK/NACK feedback is configured,
- 20 ms SMTC period is configured,
- SSBs are transmitted in one slot within SMTC window.

Table 9.4.4.2.2.2-1: Minimum number of ACK/NACKs transmitted by the UE during T_{MIB}

Nack/nack, mib, tdd	Configuration of the serving cell in which the transmitted ACK/NACKs are counted		
	Duplex mode configuration	scs	
15	FDD	15 kHz	
39	FDD	30 kHz	
85	FDD	60 kHz	
0	TDD Note 1	15 kHz	

4	TD	D Note 1	30 kHz
12	TD	D Note 1	60 kHz
46	TD	D Note 2	60 kHz
104	TD	D Note 2	120 kHz
NOTE 1: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-1 [18].			
NOTE 2: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-2 [19].			

Table 9.4.4.2.2.2-2: Void

Table 9.4.4.2.2.2-3: Minimum number of ACK/NACKs transmitted by the UE during TMIB+TEGGI

Nack/nack, mib+ecgi, tdd	Configuration of the serving cell in which the transmitted ACK/NACKs are counted	
	Duplex mode configuration	SCS
84	FDD	15 kHz
193	FDD	30 kHz
402	FDD	60 kHz
28	TDD Note 1	15 kHz
81	TDD Note 1	30 kHz
159	TDD Note 1	60 kHz
233	TDD Note 2	60 kHz
491	TDD Note 2	120 kHz

NOTE 1: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-1 [18]. NOTE 2: TDD UL-DL configuration is as specified in Table A.3.3.1-1 of TS 38.101-2 [19].

9.4.5 Inter-RAT E-CID measurements

9.4.5.1 NR-E-UTRAN FDD E-CID RSRP and RSRQ measurements

9.4.5.1.1 Introduction

The requirements in clause 9.4.5.1. shall apply provided the UE has received *ECID-RequestLocationInformation* message from LMF via LPP requesting the UE to report inter-RAT E-UTRAN FDD E-CID RSRP and RSRQ measurements [22, 27].

9.4.5.1.2 Requirements

The requirements in clause 9.4.2 also apply for this clause except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in clause 9.4.5.1.3.

9.4.5.1.3 Measurement Reporting Delay

This requirement assumes that that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2 and 10.2.3, respectively.

9.4.5.2 NR-E-UTRAN TDD E-CID RSRP and RSRQ measurements

9.4.5.2.1 Introduction

The requirements in clause 9.4.5.2. shall apply provided the UE has received *ECID-RequestLocationInformation* message from LMF via LPP requesting the UE to report inter-RAT E-UTRAN TDD E-CID RSRP and RSRQ measurements [22, 27].

9.4.5.2.2 Requirements

The requirements in clause 9.4.3 also apply for this clause except the measurement reporting requirements. The measurement reporting requirements for E-CID RSRP and RSRQ are defined in clause 9.4.5.2.3.

9.4.5.2.3 Measurement Reporting Delay

This requirement assumes that the measurement report is not delayed by other LPP signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: $2 \times TTI_{DCCH}$ where TTI_{DCCH} is the duration of subframe or slot or subslot when the measurement report is transmitted on the PUSCH with subframe or slot or subslot duration. This measurement reporting delay excludes any delay caused by no UL resources for UE to send the measurement report.

Reported RSRP and RSRQ measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.2.2 and 10.2.3, respectively.

9.5 L1-RSRP measurements for Reporting

9.5.1 Introduction

When configured by the network, the UE shall be able to perform L1-RSRP measurements of configured CSI-RS, SSB or CSI-RS and SSB resources for L1-RSRP. The measurements shall be performed for a serving cell, including PCell, PSCell, or SCell, on the resources configured for L1-RSRP measurements within the active BWP.

The UE shall be able to measure all CSI-RS resources and/or SSB resources of the *nzp-CSI-RS-ResourceSet* and/or *csi-SSB-ResourceSet* within the CSI-Resource*Config* settings configured for L1-RSRP for the active BWP, provided that the number of resources does not exceed the UE capability indicated by *beamManagementSSB-CSI-RS*.

The UE shall report the measurement quantity (*reportQuantity*) and send periodic, semi-persistent or aperiodic reports, according to the *reportConfigType* according to the CSI reporting configuration(s) (*CSI-ReportConfig*) for the active BWP.

9.5.2 Requirements applicability

The requirements in clause 9.5 apply, provided:

- The CSI-RS or SSB or CSI-RS and SSB resources configured for L1-RSRP measurements are measurable.

An SSB resource configured for L1-RSRP shall be considered measurable when for each relevant SSB the following conditions are met:

- L1-RSRP related side conditions given in clauses 10.1.19.1 and 10.1.20.1 for FR1 and FR2, respectively, for a corresponding band,
- SSB_RP and SSB Ês/Iot according to Annex B.2.4.1 for a corresponding band.

A CSI-RS resource configured for L1-RSRP shall be considered measurable when for each relevant CSI-RS the following conditions are met:

- L1-RSRP related side conditions given in clauses 10.1.19.2 and 10.1.20.2 for FR1 and FR2, respectively, for a corresponding band,
- CSI-RS RP and CSI-RS Ês/Iot according to Annex B.2.4.2 for a corresponding band.

A CSI-RS and SSB resource configured for L1-RSRP shall be considered measurable when the measurable resource conditions are met for both CSI-RS resource and SSB resource.

Requirements are defined for periodic, semi-persistent and aperiodic resources.

9.5.3 Measurement Reporting Requirements

The UE shall send L1-RSRP reports only for report configurations configured for the active BWP.

The UE shall report the L1-RSRP value as a 7-bit value in the range [-140, -44] dBm with 1dB step size according to clause 10.1.19 for FR1 and 10.1.20 for FR2 if *nrofReportedRS* is configured to one. If *nrofReportedRS* is configured to be larger than one, or if *groupBasedBeamReporting* is enabled, the UE shall use differential L1-RSRP based reporting as defined in clause 10.1.19 for FR1 and 10.1.20 for FR2. The differential L1-RSRP is quantized to a 4-bit value with 2dB step size. The mapping between the reported L1-RSRP value and the measured quantity is described in 10.1.6.

9.5.3.1 Periodic Reporting

Reported L1-RSRP measurements contained in periodic L1-RSRP measurement reports shall meet the requirements in clauses 10.1.19 for FR1 and 10.1.20 for FR2, respectively.

The UE shall only send periodic L1-RSRP measurement reports for an active BWP.

The UE shall transmit the periodic L1-RSRP reporting on PUCCH over the air interface according to the periodicity defined in clause 5.2.1.4 in TS 38.214 [26].

9.5.3.2 Semi-Persistent Reporting

Reported L1-RSRP measurements contained in a Semi-Persistent L1-RSRP measurement report shall meet the requirements in clauses 10.1.19 for FR1 and 10.1.20 for FR2, respectively. This requirement applies for semi-persistent L1-RSRP reports send on PUSCH or PUCCH.

The UE shall only send semi-persistent L1-RSRP measurement reports on PUSCH, if a DCI request has been received.

The UE shall only send semi-persistent L1-RSRP measurement reports on PUCCH, if an activation command [7] has been received.

The UE shall transmit the semi-persistent L1-RSRP reporting on PUSCH or PUCCH over the air interface according to the periodicity defined in clause 5.2.1.4 in TS 38.214 [26].

9.5.3.3 Aperiodic Reporting

Reported L1-RSRP measurements contained in aperiodic triggered, aperiodic triggered periodic and aperiodic triggered semi-persistent L1-RSRP reports shall meet the requirements in clauses 10.1.19 for FR1 and 10.1.20 for FR2, respectively.

The UE shall only send aperiodic L1-RSRP measurement reports, if a DCI trigger has been received.

After the UE receives CSI request in DCI, the UE shall transmit the aperiodic L1-RSRP reporting on PUSCH over the air interface at the time specified according to clause 6.1.2.1 in TS 38.214 [26].

9.5.4 L1-RSRP measurement requirements

9.5.4.1 SSB based L1-RSRP Reporting

The UE shall be capable of performing L1-RSRP measurements based on the configured SSB resource for L1-RSRP computation, and the UE physical layer shall be capable of reporting L1-RSRP measured over the measurement period of $T_{L1-RSRP_Measurement_Period_SSB}$.

The value of $T_{L1\text{-RSRP_Measurement_Period_SSB}}$ is defined in Table 9.5.4.1-1 for FR1 and Table 9.5.4.1-2 for FR2, where

- M=1 if higher layer parameter timeRestrictionForChannelMeasurement is configured, and M=3 otherwise
- N= 8.

For FR1,

- $P = \frac{1}{1 \frac{T_{SSB}}{MGRP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the SSB; and
- P=1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the SSB.

For FR2,

- $P = \frac{1}{1 \frac{T_{SSB}}{T_{SMTCperiod}}}$, when SSB is not overlapped with measurement gap and SSB is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$).
- P is $P_{sharing factor}$, when SSB is not overlapped with measurement gap and SSB is fully overlapped with SMTC period ($T_{SSB} = T_{SMTCperiod}$).
- $P = \frac{1}{1 \frac{T_{SSB}}{MGRP} \frac{T_{SSB}}{T_{SMTCperiod}}}$, when SSB is partially overlapped with measurement gap and SSB is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and
 - $T_{SMTCperiod} \neq MGRP$ or
 - $T_{SMTCperiod} = MGRP \text{ and } T_{SSB} < 0.5*T_{SMTCperiod}$
- P is $\frac{1}{1-\frac{T_{SSB}}{M\,GRP}}*P_{sharing\,factor}$, when SSB is partially overlapped with measurement gap and SSB is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP$ and $T_{SSB} = 0.5*T_{SMTCperiod}$
- $P = \frac{1}{1 \frac{T_{SSB}}{\min(T_{SMTCperiod}, MGRP)}}$, when SSB is partially overlapped with measurement gap ($T_{SSB} < MGRP$) and SSB is partially overlapped with SMTC occasion ($T_{SSB} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap.
- P is $\frac{1}{1-\frac{T_{SSB}}{MRGP}}$ * P_{sharing factor}, when SSB is partially overlapped with measurement gap and SSB is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- P is $\frac{1}{1-\frac{T_{SSB}}{MGRP}}$ * $P_{sharing\ factor}$, when SSB is partially overlapped with measurement gap and SSB is fully overlapped with SMTC occasion ($T_{SSB} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$) $P_{sharing\ factor} = 1$
 - not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each
 consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB
 symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure
 is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same serving
 carrier, and,
 - not overlapped with the RSSI symbols indicated by ss-RSSI-Measurement and 1data symbol before each RSSI symbol indicated by ss-RSSI-Measurement and 1 data symbol after each RSSI symbol indicated by ss-RSSI-Measurement, given that ss-RSSI-Measurement is configured,
- $P_{\text{sharing factor}} = 3$, otherwise.

Where:

 $T_{SSB} = ssb\text{-periodicityServingCell}$

 $T_{SMTCperiod}$ = the configured SMTC period

If the high layer in TS 38.331 [2] signaling of smtc2 is configured, $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc2; Otherwise $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc1. $T_{SMTCperiod}$ is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Longer evaluation period would be expected if the combination of SSB, SMTC occasion and measurement gap configurations does not meet pervious conditions.

Table 9.5.4.1-1: Measurement period T_{L1-RSRP_Measurement_Period_SSB} for FR1

Con	figuration	T _{L1-RSRP_Measurement_Period_SSB} (ms)
no	on-DRX	max(T _{Report} , ceil(M*P)*T _{SSB})
DRX cy	rcle ≤ 320ms	max(T _{Report} , ceil(1.5*M*P)*max(T _{DRX} ,T _{SSB}))
DRX cy	/cle > 320ms	ceil(M*P)*T _{DRX}
Note: T _{SSB} = ssb-periodicityServingCell is the periodicity of the SSB-Index		
configured for L1-RSRP measurement. T _{DRX} is the DRX cycle length.		
T _{Report} is configured periodicity for reporting.		

Table 9.5.4.1-2: Measurement period T_{L1-RSRP_Measurement_Period_SSB} for FR2

Configuration T _{L1-RSRP_Measurement_Period_SSB} (ms)		
non-DRX	max(T _{Report} , ceil(M*P*N)*T _{SSB})	
DRX cycle ≤ 320ms	max(T _{Report} , ceil(1.5*M*P*N)*max(T _{DRX} ,T _{SSB}))	
DRX cycle > 320ms ceil(1.5*M*P*N)*T _{DRX}		
Note: T _{SSB} = ssb-periodicityServingCell is the periodicity of the SSB-Index configured for L1-RSRP measurement. T _{DRX} is the DRX cycle length. T _{Report} is configured periodicity for reporting.		

9.5.4.2 CSI-RS based L1-RSRP Reporting

The UE shall be capable of performing L1-RSRP measurements based on the configured CSI-RS resource for L1-RSRP computation, and the UE physical layer shall be capable of reporting L1-RSRP measured over the measurement period of $T_{L1-RSRP_Measurement_Period_CSI-RS}$.

The value of T_{L1-RSRP} Measurement Period CSI-RS is defined in Table 9.5.4.2-1 for FR1 and in Table 9.5.4.2-2 for FR2, where

- For periodic and semi-persistent CSI-RS resources, M=1 if higher layer parameter *timeRestrictionForChannelMeasurement* is configured, and M=3 otherwise
- For aperiodic CSI-RS resources M=1
- For periodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON, N=ceil(*maxNumberRxBeam* / N_{res_per_set}), where N_{res_per_set} is number of resources in the resource set. The requirements apply provided *qcl-InfoPeriodicCSI-RS* is configured for all resources in the resource set.
 - SSB for L1-RSRP measurement, or
 - another CSI-RS in resource set configured with repetition ON.
- For periodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON, N=ceil(*maxNumberRxBeam* / N_{res_per_set}), where N_{res_per_set} is number of resources in the resource set. The requirements apply provided *qcl-InfoPeriodicCSI-RS* is configured for with QCL-TypeD all resources in the resource set.
- For semi-persistent CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to OFF, N=1. The requirements apply provided TCI state is provided for all resources in the resource set in the MAC CE activating the resource set and for each resource one RS has QCL-TypeD with
 - SSB for L1-RSRP measurement, or
 - another CSI-RS in resource set configured with repetition ON.
- For semi-persistent CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON, N=ceil(*maxNumberRxBeam* / N_{res_per_set}), where N_{res_per_set} is number of resources in the resource set. The requirements apply provided TCI state is provided with QCL-TypeD for all resources in the resource set in the MAC CE activating the resource set.

- For aperiodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to OFF, N=1. The requirements apply provided *qcl-info* is configured for all resources in the resource set and for each resource one RS has QCL-TypeD with
 - SSB for L1-RSRP measurement, or
 - another CSI-RS in resource set configured with repetition ON.
- For aperiodic CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON, N=1. UE is not required to meet the accuracy requirements in clause 10.1.19.2 and 10.1.20.2 if number of resources in the resource set is smaller than *maxNumberRxBeam*. The requirements apply provided *qcl-info* is configured with QCL-TypeD for all resources in the resource set.

For FR1.

- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP}}$, when in the monitored cell there are measurement gaps configured for intra-frequency, interfrequency or inter-RAT measurements, which are overlapping with some but not all occasions of the CSI-RS; and
- P=1 when in the monitored cell there are no measurement gaps overlapping with any occasion of the CSI-RS.

For FR2,

- P=1, when CSI-RS is not overlapped with measurement gap and also not overlapped with SMTC occasion.
- $P=\frac{1}{1-\frac{T_{CSI-RS}}{MGRP}}$, when CSI-RS is partially overlapped with measurement gap and CSI-RS is not overlapped with SMTC occasion ($T_{CSI-RS} < MGRP$)
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when CSI-RS is not overlapped with measurement gap and CSI-RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$).
- $P=P_{sharing\ factor}$, when CSI-RS is not overlapped with measurement gap and CSI-RS is fully overlapped with SMTC occasion ($T_{CSI-RS}=T_{SMTCperiod}$).
- P=1, when aperiodic CSI-RS resource is not overlapped with measurement gap.
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{MGRP} \frac{T_{CSI-RS}}{T_{SMTCperiod}}}$, when CSI-RS is partially overlapped with measurement gap and CSI-RS is partially overlapped with SMTC occasion (TCSI-RS < $T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and
 - $T_{SMTCperiod} \neq MGRP$ or
 - $T_{SMTCperiod} = MGRP$ and $T_{CSI-RS} < 0.5*T_{SMTCperiod}$
- $P = \frac{3}{1 \frac{T_{CSI-RS}}{MGRP}}, \text{ when CSI-RS is partially overlapped with measurement gap and CSI-RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is not overlapped with measurement gap and $T_{SMTCperiod} = MGRP and $T_{CSI-RS} = 0.5*T_{SMTCperiod}$$
- $P = \frac{1}{1 \frac{T_{CSI-RS}}{\min(T_{SMTCperiod},MGRP)}}$, when CSI-RS is partially overlapped with measurement gap ($T_{CSI-RS} < MGRP$) and CSI-RS is partially overlapped with SMTC occasion ($T_{CSI-RS} < T_{SMTCperiod}$) and SMTC occasion is partially or fully overlapped with measurement gap.
- $P = \frac{3}{1 \frac{T_{CSI-RS}}{MGRP}}$, when CSI-RS is partially overlapped with measurement gap and CSI-RS is fully overlapped with SMTC occasion ($T_{CSI-RS} = T_{SMTCperiod}$) and SMTC occasion is partially overlapped with measurement gap ($T_{SMTCperiod} < MGRP$)
- P_{sharing factor} = 1, if the CSI-RS configured for L1-RSRP measurement outside measurement gap is

- not overlapped with the SSB symbols indicated by SSB-ToMeasure and 1 data symbol before each consecutive SSB symbols indicated by SSB-ToMeasure and 1 data symbol after each consecutive SSB symbols indicated by SSB-ToMeasure, given that SSB-ToMeasure is configured, where the SSB-ToMeasure is the union set of SSB-ToMeasure from all the configured measurement objects merged on the same serving carrier, and,
- not overlapped with the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured
- $P_{\text{sharing factor}} = 3$, otherwise.

Where:

 $T_{SMTCperiod}$ = the configured SMTC period.

T_{CSI-RS} = the periodicity of CSI-RS configured for L1-RSRP measurement

If the high layer in TS 38.331 [2] signaling of smtc2 is configured, $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc2; Otherwise $T_{SMTCperiod}$ corresponds to the value of higher layer parameter smtc1. $T_{SMTCperiod}$ is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.

Note: The overlap between CSI-RS for L1-RSRP measurement and SMTC means that CSI-RS for L1-RSRP measurement is within the SMTC window duration.

Longer evaluation period would be expected if the combination of CSI-RS, SMTC occasion and measurement gap configurations does not meet pervious conditions.

Table 9.5.4.2-1: Measurement period T_{L1-RSRP Measurement Period CSI-RS} for FR1

Conf	iguration	T _{L1-RSRP_Measurement_Period_CSI-RS} (ms)
no	n-DRX	max(T _{Report} , ceil(M*P)*T _{CSI-RS})
DRX cyc	cle ≤ 320ms	max(T _{Report} , ceil(1.5*M*P)*max(T _{DRX} ,T _{CSI-RS}))
DRX cy	cle > 320ms	ceil(M*P)*T _{DRX}
Note 1:	T _{CSI-RS} is the periodicity of CSI-RS configured for L1-RSRP	
Note 2:	measurement. T _{DRX} is the DRX cycle length. T _{Report} is configured periodicity for reporting.	

Table 9.5.4.2-2: Measurement period T_{L1-RSRP Measurement Period CSI-RS} for FR2

Conf	iguration	T _{L1-RSRP_Measurement_Period_CSI-RS} (ms)
nc	n-DRX max(T _{Report} , ceil(M*P*N)*T _{CSI-RS})	
DRX cyc	ycle \leq 320ms max(T _{Report} , ceil(1.5*M*P*N)*max(T _{DRX} ,T _{CSI-RS}	
DRX cy	cle > 320ms	ceil(M*P*N)*T _{DRX}
Note 1:	T _{CSI-RS} is the periodicity of CSI-RS configured for L1-RSRP	
Note 2:	measurement. T _{DRX} is the DRX cycle length. T _{Report} is configured periodicity for reporting. the requirements are applicable provided that the CSI-RS resource configured for L1-RSRP measurement is transmitted with Density = 3.	

9.5.5 Measurement restriction for CSI-RS and SSB for L1-RSRP measurement

The UE is required to be capable of measuring SSB and CSI-RS for L1-RSRP without measurement gaps. The UE is required to perform the SSB and CSI-RS measurements with measurement restrictions as described in the following clauses.

9.5.5.1 Measurement restriction for SSB based L1-RSRP

For FR1, when the SSB for L1-RSRP measurement is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement,

- If SSB and CSI-RS have same SCS, UE shall be able to measure the SSB for L1-RSRP measurement without any restriction;
- If SSB and CSI-RS have different SCS,
 - If UE supports simultaneousRxDataSSB-DiffNumerology, UE shall be able to measure the SSB for L1-RSRP measurement without any restriction;
 - If UE does not support simultaneousRxDataSSB-DiffNumerology, UE is required to measure one of but not both SSB for L1-RSRP measurement and CSI-RS. Longer measurement period for SSB based L1-RSRP measurement is expected, and no requirements are defined.

For FR2, when the SSB for L1-RSRP measurement on one CC is in the same OFDM symbol as CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both SSB for L1-RSRP measurement and CSI-RS. Longer measurement period for SSB based L1-RSRP measurement is expected, and no requirements are defined.

9.5.5.2 Measurement restriction for CSI-RS based L1-RSRP

For both FR1 and FR2, when the CSI-RS for L1-RSRP measurement is in the same OFDM symbol as SSB for RLM, BFD, CBD or L1-RSRP measurement, UE is not required to receive CSI-RS for L1-RSRP measurement in the PRBs that overlap with an SSB.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has same SCS than CSI-RS for L1-RSRP measurement, the UE shall be able to perform CSI-RS measurement without restrictions.

For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has different SCS than CSI-RS for L1-RSRP measurement, the UE shall be able to perform CSI-RS measurement with restrictions according to its capabilities:

- If the UE supports *simultaneousRxDataSSB-DiffNumerology* the UE shall be able to perform CSI-RS measurement without restrictions.
- If the UE does not support *simultaneousRxDataSSB-DiffNumerology*, UE is required to measure one of but not both CSI-RS for L1-RSRP measurement and SSB. Longer measurement period for CSI-RS based L1-RSRP measurement is expected, and no requirements are defined.

For FR1, when the CSI-RS for L1-RSRP measurement is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement, UE shall be able to measure the CSI-RS for L1-RSRP measurement without any restriction.

For FR2, when the CSI-RS for L1-RSRP measurement on one CC is in the same OFDM symbol as SSB for RLM, BFD or L1-RSRP measurement on the same CC or different CCs in the same band, or in the same symbol as SSB for CBD measurement on the same CC or different CCs in the same band when beam failure is detected, UE is required to measure one of but not both CSI-RS for L1-RSRP measurement and SSB. Longer measurement period for CSI-RS based L1-RSRP measurement is expected, and no requirements are defined.

For FR2, when the CSI-RS for L1-RSRP measurement on one CC is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band,

- In the following cases, UE is required to measure one of but not both CSI-RS for L1-RSRP measurement and the
 other CSI-RS. Longer measurement period for CSI-RS based L1-RSRP measurement is expected, and no
 requirements are defined.
 - The CSI-RS for L1-RSRP measurement or the other CSI-RS in a resource set configured with repetition ON,
 - The other CSI-RS is configured in q1 and beam failure is detected, or
 - The two CSI-RS-es are not QCL-ed w.r.t. QCL-TypeD, or the QCL information is not known to UE,

- Otherwise, UE shall be able to measure the CSI-RS for L1-RSRP measurement without any restriction.

9.5.6 Scheduling availability of UE during L1-RSRP measurement

Scheduling availability restrictions when the UE is performing L1-RSRP measurement are described in the following clauses.

9.5.6.1 Scheduling availability of UE performing L1-RSRP measurement with a same subcarrier spacing as PDSCH/PDCCH on FR1

There are no scheduling restrictions due to L1-RSRP measurement performed on SSB and CSI-RS configured as RS for L1-RSRP measurement with the same SCS as PDSCH/PDCCH in FR1.

9.5.6.2 Scheduling availability of UE performing L1-RSRP measurement with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UEs which support *simultaneousRxDataSSB-DiffNumerology* [14] there are no restrictions on scheduling availability due to L1-RSRP measurement based on SSB as RS for L1-RSRP measurement. For UEs which do not support *simultaneousRxDataSSB-DiffNumerology* [14] the following restrictions apply due to L1-RSRP measurement based on SSB configured for L1-RSRP measurement.

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on symbols corresponding to the SSB indexes configured for L1-RSRP measurement.

When intra-band carrier aggregation in FR1 is configured, the scheduling restrictions on serving cell where L1-RSRP measurement is performed apply to all serving cells in the same band on the symbols that fully or partially overlap with restricted symbols. When inter-band carrier aggregation within FR1 is configured, there are no scheduling restrictions on FR1 serving cell(s) configured in other bands than the bands in which the serving cell where L1-RSRP measurement is performed is configured.

9.5.6.3 Scheduling availability of UE performing L1-RSRP measurement on FR2

The following scheduling restriction applies due to L1-RSRP measurement.

- For the case where RS for L1-RSRP measurement is CSI-RS which is QCLed with active TCI state for PDCCH/PDSCH and not in a CSI-RS resource set with repetition ON, and N=1 applies as specified in clause 9.5.4.2
 - There are no scheduling restrictions due to L1-RSRP measurement performed based on the CSI-RS.
- Otherwise
 - The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on
 - symbols corresponding to the SSB indexes configured for L1-RSRP measurement, and/or
 - symbols corresponding to the periodic CSI-RS resource configured for L1-RSRP measurement, and/or
 - symbols corresponding to the semi-perssitent CSI-RS resource configured for L1-RSRP measurement when the resource is activated, and/or
 - symbols corresponding to the aperiodic CSI-RS resource configured for L1-RSRP measurement when the reporting is triggered.

When intra-band carrier aggregation is performed, the scheduling restrictions on serving cell where L1-RSRP measurement is performed apply to all serving cells in the band on the symbols that fully or partially overlap with restricted symbols.

If following conditions are met,

- UE has been notified about system information update through paging,

- The gap between UE's reception of PDCCH that UE monitors in the Type 2-PDCCH CSS set and that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots.

For the SSB and CORESET for RMSI scheduling multiplexing patterns 3, UE is expected to receive the PDCCH that UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured for L1-RSRP measurement; and

For the SSB and CORESET for RMSI scheduling multiplexing patterns 2, UE is expected to receive PDSCH that corresponds to the PDCCH that UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured for L1-RSRP measurement.

9.5.6.4 Scheduling availability of UE performing L1-RSRP measurement on FR1 or FR2 in case of FR1-FR2 inter-band CA

There are no scheduling restrictions on FR1 serving cell(s) due to L1-RSRP measurement performed on FR2 serving cell(s).

There are no scheduling restrictions on FR2 serving cell(s) due to L1-RSRP measurement performed on FR1 serving cell(s).

9.6 NE-DC: Measurements

9.6.1 Introduction

This clause contains requirements for UE supporting dual connectivity with NR PCell and E-UTRA FDD or TDD PSCell. The requirements apply to UEs that have been configured with NE-DC.

9.6.2 SFTD Measurements

9.6.2.1 Introduction

This clause contains requirements on UE capabilities for reporting of SFN and frame time difference between NR PCell and E-UTRA PSCell in RRC_CONNECTED state. The requirements comprise measurement reporting delay and measurement accuracy. The overall measurement reporting delay includes a RRC procedure delay specified in TS 38.331 [2], and the SFTD measurement reporting delay specified below.

9.6.2.2 SFTD Measurement requirements

When no DRX is used in either of the NR PCell and E-UTRA PSCell, the physical layer measurement period of the SFTD measurement shall be $T_{measure_SFTD1} = max(0.2, 5 * SMTC period)$ s.

When DRX is used in either of the NR PCell or the E-UTRA PSCell, or in both PCell and PSCell, the physical layer measurement period ($T_{measure_SFTD1}$) of the SFTD measurement shall be as specified in Table 9.6.2.2-1.

Table 9.6.2.2-1: SFTD measurement requirement when DRX is used

DR	X cycle length (s)Note2	Tmeasure_SFTD1 (S)
	DRX cycle≤0.04	max(0.2,5 x SMTC period) (Note1)
0	.04 <drx cycle≤0.32<="" td=""><td>8 x max(DRX cycle, SMTC period)</td></drx>	8 x max(DRX cycle, SMTC period)
0.3	32 <drx cycle≤10.24<="" td=""><td>5 x DRX cycle</td></drx>	5 x DRX cycle
Note1: Note2:	DRX cycle length in this tab configured for PCell or PSC	ends upon the DRX cycle in use le refers to the DRX cycle length ell. When DRX is used in both PCell and this table refers to the longer of the DRX PSCell.

If PSCell is changed without changing carrier frequency of PSCell while the UE is performing SFTD measurements, the UE shall still meet SFTD measurement and accuracy requirements for the new PSCell. In this case the UE shall

restart the SFTD measurement, and the total physical layer measurement period shall not exceed $T_{measure_SFTD2}$ as defined by the following expression:

$$T_{measure_SFTD2} = (M+1)*(T_{measure_SFTD1}) + M*T_{PSCell_change_NEDC}$$

where:

M is the number of times the E-UTRA PSCell is changed over the measurement period (T_{measure SFTD2}), and

T_{PSCell change NEDC} is the time necessary to change the PSCell; it can be up to 25 ms.

If PCell is changed, or if PSCell is changed to a different carrier frequency, the UE shall terminate the SFTD measurement.

The measurement accuracy for the SFTD measurement when DRX is used as well as when no DRX is used shall be as specified in clause 10.1.21.1.

10 Measurement Performance requirements

10.1 NR measurements

10.1.1 Introduction

The requirements in clause 10.1 apply as follows:

- intra-frequency requirements apply for PCell measurements in SA, NR-DC, or NE-DC operaion mode,
- intra-frequency requirements apply for PSCell measurements in NR-DC or EN-DC operation mode,
- intra-frequency requirements apply for SCell measurements in SA operation mode with NR CA or any MR-DC operation mode with NR CA,
- inter-frequency requirements apply for non-serving cell measurements on NR carrier frequencies,
- inter-frequency requirements apply for measurements from one cell on a frequency compared to the measurement from another cell on a different frequency.

In the requirements of clause 10.1, the exceptions for side conditions apply as follows:

- for the UE capable of CA but not configured with any SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.1 for UE supporting CA in FR1, and clause B.3.2.3 for UE supporting CA in FR2, respectively;
- for the UE capable of CA and configured with at least one SCell, the applicable exceptions for side conditions are specified in Annex B, clause B.3.2.2 for UE configured with CA in FR1, and clause B.3.2.4 for UE supporting CA in FR2 respectively;
- for the UE capable of SUL but not configured with SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.1 for UE supporting SUL in FR1;
- for the UE capable of SUL and configured with at least one SUL, the applicable exceptions for side conditions are specified in Annex B, clause B.3.4.2 for UE configured with SUL in FR1.

10.1.2 Intra-frequency RSRP accuracy requirements for FR1

10.1.2.1 Intra-frequency SS-RSRP accuracy requirements

10.1.2.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on the same frequency as that of the serving cell in FR1.

The accuracy requirements in Table 10.1.2.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

Table 10.1.2.1.1-1: SS-RSRP Intra frequency absolute accuracy in FR1

Accuracy				Condition			
Normal	Extreme	SSB		lo ^{Note}	¹ range		
condition	condition	Ês/lot	NR operating band groups Note 2		Minimur	n lo	Maximum lo
	dB			dBm / SCS _{SSB}			
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-70
	±9	≥-6 dB	NR_FDD_FR1_B	-120.5	-117.5	N/A	-70
			NR_TDD_FR1_C	-120	-117	N/A	-70
±4.5			NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-70
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-70
			NR_FDD_FR1_G	-118	-115	N/A	-70
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-70
±8	±11	≥-6 dB	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_B, NR_FDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_E, NR_FDD_FR1_H	N/A	N/A	-70	-50

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.

NOTE 2: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.2.1.2 Relative SS-RSRP Accuracy

The relative accuracy of SS-RSRP is defined as the SS-RSRP measured from one cell compared to the SS-RSRP measured from another cell on the same frequency, or between any two SS-RSRP levels measured on the same cell in EP1

The accuracy requirements in Table 10.1.2.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

Table 10.1.2.1.2-1: SS-RSRP Intra frequency relative accuracy in FR1

Accı	ıracy			Condit	ions			
Normal	Extreme	SSB	SSB Io Note 1 range					
condition	condition	Ês/lot Note 2	NR operating band groups Note 4		Minimum	lo	Maximum lo	
		dB		dBm /	SCS _{SSB}			
dB	dB			SCS _{SSB} = SCS _{SSB} 15 kHz 30 kH		dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50	
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50	
			NR_TDD_FR1_C	-120	-117	N/A	-50	
±2	±3	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50	
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50	
			NR_FDD_FR1_G	-118	-115	N/A	-50	
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50	
±3	±3	≥-6 dB	Note 3	Note 3	Note 3	N/A	Note 3	

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
- NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.
- NOTE 3: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
- NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.2.2 Void

10.1.3 Intra-frequency RSRP accuracy requirements for FR2

10.1.3.1 Intra-frequency SS-RSRP accuracy requirements

10.1.3.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on the same frequency as that of the serving cell in FR2.

The accuracy requirements in Table 10.1.3.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.3.1.1-1: SS-RSRP Intra frequency absolute accuracy in FR2

Accı	Accuracy		Conditions				
Normal	Extreme	SSB		I	o ^{Note 2} range	Note 2 range	
condition	condition	Ês/lot		Minimum	lo	Maximum Io	
			dBm / SCS _{SSB} Note 1 SCS _{SSB} = SCS _{SSB} = 120kHz 240kHz				
dB	dB	dB			dBm/BW _{Channel}	dBm/BW _{Channel}	
			Same value as SSB_RP in Table B.2.2-2, according to UE Power				
±6	±9	≥-6			N/A	-70	

			class, operating band and angle of arrival				
±8	±11		N/A	-70	-50		
Note 1:	1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of						
		S 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.					
Note 2:	Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.						
Note 3:	In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure						
	Ês/lot at UE bas	seband is abov	e the value defined in this ta	ıble.			

10.1.3.1.2 Relative SS-RSRP Accuracy

The relative accuracy of SS-RSRP is defined as the SS-RSRP measured from one cell compared to the SS-RSRP measured from another cell on the same frequency, or between any two SS-RSRP levels measured on the same cell in FR2.

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.3.1.2-1: SS-RSRP Intra frequency relative accuracy in FR2

Acci	uracy		Co	nditions			
Normal	Extreme	SSB		lo ^{Note 2} ra	nge		
condition	condition	Ês/lot	Minimum Io		Minimum Io		Maximum lo
			dBm / SCS _{SSB} Note 1				
dB	dB	dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}		
±6	±9	≥-6	Same value as SSB_RP in Table B.2.2-2, according to UE Power class, operating band and angle of arrival		-50		
С	alues based o lauses 7.3.2 ar elected depend	nd 7.3.4 of TS	38.101-2 [19]				
	specified at the cross the band		point, and ass	sumed to have	e constant EPRE		
a th	3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.						
	he parameter thich the require			SSB Ês/lot of	the pair of cells to		

10.1.3.2 Void

10.1.4 Inter-frequency RSRP accuracy requirements for FR1

10.1.4.1 Inter-frequency SS-RSRP accuracy requirements

10.1.4.1.1 Absolute Accuracy of SS-RSRP in FR1

The requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on a frequency in FR1 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.4.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.

Table 10.1.4.1.1-1: SS-RSRP Inter frequency Absolute accuracy in FR1

Accuracy				Condit			
Normal	Extreme	SSB		lo ^N	^{ote 1} range		
condition	condition	Ês/lot Note 2	NR operating band groups Note 3		Minimum	lo	Maximum lo
		dB		dBm /	SCS _{SSB}		
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-70
		NR_FDD_FR1_B	-120.5	-117.5	N/A	-70	
			NR_TDD_FR1_C	-120	-117	N/A	-70
±4.5	<u>±</u> 9	≥-6 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-70
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-70
			NR_FDD_FR1_G	-118	-115	N/A	-70
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-70
±8	±11	≥-6 dB	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_G, NR_FDD_FR1_G, NR_FDD_FR1_H	N/A	N/A	-70	-50

NOTE 2: Void

NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.4.1.2 Relative Accuracy of SS-RSRP in FR1

The relative accuracy of SS-RSRP in inter frequency case is defined as the RSRP measured from one cell on a frequency in FR1compared to the RSRP measured from another cell on a different frequency in FR1.

The accuracy requirements in Table 10.1.4.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] Clause 7.3 for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \le 27 \text{ dB}$
- | Channel 1_Io -Channel 2_Io | \leq 20 dB

Table 10.1.4.1.2-1: SS-RSRP Inter frequency relative accuracy in FR1

Accı	ıracy		Conditions				
Normal Evtromo		SSB		lo ^{Note 1} range			
condition	condition	Ês/lot Note 2	NR operating band groups Note 3	Minimum Io Maximum Io			
dB	dB	dB	dBm / SCS _{SSB} dBm/BW _{Channel} dBm/BW			dBm/BW _{Channel}	

				SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz		
		NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50	
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50
			NR_TDD_FR1_C	-120	-117	N/A	-50
±4.5	5 ±6 ≥-6 dB	≥-6 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50
			NR_FDD_FR1_G	-118	-115	N/A	-50
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50

NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.

NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.4.2 Void

10.1.5 Inter-frequency RSRP accuracy requirements for FR2

10.1.5.1 Inter-frequency SS-RSRP accuracy requirements

10.1.5.1.1 Absolute SS-RSRP Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRP in this clause apply to a cell on a frequency in FR2 that is on a different frequency than the serving cell.

The accuracy requirements in Table 10.1.5.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.5.1.1-1: SS-RSRP Inter frequency absolute accuracy in FR2

Accı	ıracy			Condit	ions	
Normal	Extreme	SSB		I	o ^{Note 2} range	
condition	condition	Ês/lot		Minimum	lo	Maximum lo
			dBm / SCS _{SSB} Note 1 SCS _{SSB} = SCS _{SSB} =			
dB	dB	dB			dBm/BW _{Channel}	dBm/BW _{Channel}
			120kHz	240kHz		
			Same value	as SSB_RP		
			in Table			
±6	±9	±9 ≥-4	according to UE Power		N/A	-70
			class, operating band			
			and angle of arrival			
±8	±11		N/	/A	-70	-50

Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.

Note 3: In the test cases, the SSB Es/lot and related parameters may need to be adjusted to ensure Es/lot at UE baseband is above the value defined in this table.

10.1.5.1.2 Relative SS-RSRP Accuracy

The relative accuracy of SS-RSRP is defined as the SS-RSRP measured from one cell on a frequency in FR2 compared to the SS-RSRP measured from another cell on another frequency in FR2.

The accuracy requirements in Table 10.1.5.1.2-1 are valid under the following conditions:

- Conditions defined in 38.101-2 [19] Clause 7.3 for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- $|SSB RP1_{dBm} SSB RP2_{dBm}| \leq 27dB$
- | Channel 1_Io -Channel 2_Io | \leq 20 dB
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.5.1.2-1: SS-RSRP Inter frequency relative accuracy in FR2

Acc	uracy		Co	nditions		
Normal	Extreme	SSB		lo Note 2 rang	е	
condition	condition	Ês/lot	Minim	um lo	Maximum lo	
			dBm / SCS _{SSB} Note 1			
dB	dB	dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}	
±6	±9	≥-4	Same value as SSB_RP in Table B.2.3-2, according to UE Power class, operating band and angle of arrival		-50	
		and 7.3.4 of	and EIS spherio TS 38.101-2 [19	al coverage as		
Note 2:		the Referen		sumed to have	constant EPRE	
;	Note 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.					
	The paramete which the req			SSB Ês/lot of	the pair of cells to	

10.1.5.2 Void

10.1.6 RSRP Measurement Report Mapping

The reporting range of SS-RSRP for L3 reporting is defined from -156 dBm to -31 dBm with 1 dB resolution. The reporting range of SS-RSRP and CSI-RSRP for L1 reporting is defined from -140 to -44 dBm with 1 dB resolution.

The mapping of measured quantity is defined in Table 10.1.6.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

The reporting range of differential SS-RSRP and CSI-RSRP for L1 reporting is defined from 0 dBm to -30 dB with 2 dB resolution.

The mapping of measured quantity is defined in Table 10.1.6.1-2. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.6.1-1: SS-RSRP and CSI-RSRP measurement report mapping

Reported value	Measured quantity value (L3 SS-RSRP)	Measured quantity value (L1 SS-RSRP and	Unit
	,	CSI-RSRP)	

RSRP_0	SS-RSRP<-156	Not valid	dBm				
RSRP_1	-156≤ SS-RSRP<-155	Not valid	dBm				
RSRP_2	-155≤ SS-RSRP<-154	Not valid	dBm				
RSRP_3	-154≤ SS-RSRP<-153	Not valid	dBm				
RSRP_4	-153≤ SS-RSRP<-152	Not valid	dBm				
RSRP_5	-152≤ SS-RSRP<-151	Not valid	dBm				
RSRP_6	-151≤ SS-RSRP<-150	Not valid	dBm				
RSRP_7	-150≤ SS-RSRP<-149	Not valid	dBm				
RSRP_8	-149≤ SS-RSRP<-148	Not valid	dBm				
RSRP_9	-148≤ SS-RSRP<-147	Not valid	dBm				
RSRP_10	-147≤ SS-RSRP<-146	Not valid	dBm				
RSRP_11	-146≤ SS-RSRP<-145	Not valid	dBm				
RSRP_12	-145≤ SS-RSRP<-144	Not valid	dBm				
RSRP_13	-144≤ SS-RSRP<-143	Not valid	dBm				
RSRP_14	-143≤ SS-RSRP<-142	Not valid	dBm				
RSRP_15	-142≤ SS-RSRP<-141	Not valid	dBm				
RSRP_16	-141≤ SS-RSRP<-140	RSRP<-140	dBm				
RSRP_17	-140≤ SS-RSRP<-139	-140≤RSRP<-139	dBm				
RSRP_18	-139≤ SS-RSRP<-138	-139≶ RSRP<-138	dBm				
RSRP_111	-46≤ SS-RSRP<-45	-46≤ RSRP<-45	dBm				
RSRP_112	-45≤ SS-RSRP<-44	-45≤ RSRP<-44	dBm				
RSRP_113	-44≤ SS-RSRP<-43	-44≤ RSRP	dBm				
RSRP_114	-43≤ SS-RSRP<-42	Not valid	dBm				
RSRP_115	-42≤ SS-RSRP<-41	Not valid	dBm				
RSRP_116	-41≤ SS-RSRP<-40	Not valid	dBm				
RSRP_117	-40≤ SS-RSRP<-39	Not valid	dBm				
RSRP_118	-39≤ SS-RSRP<-38	Not valid	dBm				
RSRP_119	-38≤ SS-RSRP<-37	Not valid	dBm				
RSRP_120	-37≤ SS-RSRP<-36	Not valid	dBm				
RSRP_121	-36≤ SS-RSRP<-35	Not valid	dBm				
RSRP_122	-35≤ SS-RSRP<-34	Not valid	dBm				
RSRP_123	-34≤ SS-RSRP<-33	Not valid	dBm				
RSRP_124	-33≶ SS-RSRP<-32	Not valid	dBm				
RSRP_125	-32≶ SS-RSRP<-31	Not valid	dBm				
RSRP_126	-31≤ SS-RSRP	Not valid	dBm				
RSRP_127 (Note)	Infinity	Infinity	dBm				
	ı ıe of RSRP_127 is applicab	l ble for RSRP threshold config	gured				
by the network as defined in TS 38.331 [2], but not for the purpose of							

measurement reporting.

Table 10.1.6.1-2: Differential SS-RSRP and CSI-RSRP measurement (for L1 reporting) report mapping

Reported value	Measured quantity value (difference in measured RSRP from strongest RSRP)	Unit
DIFFRSRP_0	0 ≥ ∆ RSRP>-2	dB

DIFFRSRP_1	-2 ≥ ∆ RSRP>-4	dB
DIFFRSRP_2	-4≥ ∆ RSRP>-6	dB
DIFFRSRP_3	-6≥ ∆ RSRP>-8	dB
DIFFRSRP_4	-8≥ ∆ RSRP>-10	dB
DIFFRSRP_5	-10≫ ∆ RSRP>-12	dB
DIFFRSRP_6	-12≫ ∆ RSRP>-14	dB
DIFFRSRP_7	-14≥ ∆ RSRP>-16	dB
DIFFRSRP_8	-16≫ ∆ RSRP>-18	dB
DIFFRSRP_9	-18 ≥ △ RSRP>-20	dB
DIFFRSRP_10	-20 ≥ ∆ RSRP>-22	dB
DIFFRSRP_11	-22≥ ∆ RSRP>-24	dB
DIFFRSRP_12	-24≥ ∆ RSRP>-26	dB
DIFFRSRP_13	-26 ≥ △ RSRP>-28	dB
DIFFRSRP_14	-28 ≥ △ RSRP>-30	dB
DIFFRSRP_15	-30 ≥ △ RSRP	dB

10.1.7 Intra-frequency RSRQ accuracy requirements for FR1

10.1.7.1 Intra-frequency SS-RSRQ accuracy requirements in FR1

10.1.7.1.1 Absolute SS-RSRQ Accuracy in FR1

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on the same frequency as that of the serving cell in FR1.

The accuracy requirements in Table 10.1.7.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.

Table 10.1.7.1.1-1: SS-RSRQ Intra frequency absolute accuracy in FR1

Accı	ıracy	Conditions					
Normal Extreme		SSB	lo Note 1 range				
condition	condition	Ês/lot	. ND operating band		Minimum	lo	Maximum lo
		dB		dBm/	SCS _{SSB}		dBm/BW _{Channel}
dB dB				SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50
			NR_TDD_FR1_C	-120	-117	N/A	-50
±2.5	±4	±4 ≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50
			NR_FDD_FR1_G	-118	-115	N/A	-50
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50
±3.5	±4	≥-6 dB	Note 2	Note 2	Note 2	Note 2	Note 2

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.

NOTE 2: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.

NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.8 Intra-frequency RSRQ accuracy requirements for FR2

10.1.8.1 Intra-frequency SS-RSRQ accuracy requirements in FR2

10.1.8.1.1 Absolute SS-RSRQ Accuracy in FR2

Unless otherwise specified, the requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on the same frequency as that of the serving cell in FR2.

The accuracy requirements in Table 10.1.8.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.8.1.1-1: SS-RSRQ Intra frequency absolute accuracy in FR2

Accı	ıracy			Conditions			
Normal	Extreme	SSB		lo ^{Note 2} range			
condition	condition	Ês/lot	Minim	um lo	Maximum Io		
	dB		dBm / SCS _{SSB} Note 1				
dB		dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}		
±2.5	±4	≥-3		Same value as SSB_RP in Table B.2.2-2, according to UE Power			
±3.5	±4	≥-6	class, operating ba arrival	-50			

- Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.
- Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.
- Note 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

10.1.9 Inter-frequency RSRQ accuracy requirements for FR1

10.1.9.1 Inter-frequency SS-RSRQ accuracy requirements in FR1

10.1.9.1.1 Aboslute Accuracy of SS-RSRQ in FR1

The requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on a frequency in FR1 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.9.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.

Table 10.1.9.1.1-1: SS-RSRQ Inter frequency absolute accuracy in FR1

Accuracy Conditions		Conditions
		lo ^{Note 1} range

Normal condition	Extreme condition	SSB Ês/lot	NR operating band groups Note 3	Minimum Io			Maximum Io		
		dB		dBm /	SCS _{SSB}				
dB	dB dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50		
						NR_FDD_FR1_B	-120.5	-117.5	N/A
			NR_TDD_FR1_C	-120	-117	N/A	-50		
±2.5	±2.5 ±4	±4 ≥-3 dB	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50	
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50		
			NR_FDD_FR1_G	-118	-115	N/A	-50		
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50		
±3.5	±4	≥-6 dB	Note 2	Note 2	Note 2	Note 2	Note 2		

NOTE 2: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.

NOTE 3: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.9.1.2 Relative Accuracy of SS-RSRQ in FR1

The relative accuracy of SS-RSRQ in inter frequency case is defined as the RSRQ measured from one cell on a frequency in FR1 compared to the RSRP measured from another cell on a different frequency in FR1.

The accuracy requirements in Table 10.1.9.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \le 27 \text{ dB}$
- | Channel 1_Io -Channel 2_Io | \leq 20 dB

Table 10.1.9.1.2-1: SS-RSRQ Inter frequency relative accuracy in FR1

Accı	ıracy	Conditions						
Normal	Extreme	SSB		lo ^l	lo Note 1 range			
condition			NR operating band groups Note 4	Minimum Io			Maximum Io	
		dB		dBm /	dBm / SCS _{SSB}			
dB	dB dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50	
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50	
			NR_TDD_FR1_C	-120	-117	N/A	-50	
±3	±4	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50	
		NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50		
			NR_FDD_FR1_G	-118	-115	N/A	-50	
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50	
±4	±4	≥-6 dB	Note 3	Note 3	Note 3	Note 3	Note 3	

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.

NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.

NOTE 3: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.

NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.10 Inter-frequency RSRQ accuracy requirements for FR2

10.1.10.1 Inter-frequency SS-RSRQ accuracy requirements in FR2

10.1.10.1.1 Aboslute Accuracy of SS-RSRQ in FR2

The requirements for absolute accuracy of SS-RSRQ in this clause apply to a cell on a frequency in FR2 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.10.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.10.1.1-1: SS-RSRQ Inter frequency absolute accuracy in FR2

Accı	ıracy		Conditions				
Normal	Extreme	SSB		lo ^{Note 2} rang	je		
condition	condition	Ês/lot	Minim		Maximum Io		
			dBm / SCS _{SSB} Note 1				
dB	dB	dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}		
±2.5	±4	≥-3	Same value as SS B.2.2-2, according	to UE Power	-50		
±3.5	±4	≥-4	class, operating ba	and and angle of	-50		
Note 1: V	alues based or	n Refsens and	d EIS spherical cover	rage as defined in cl	auses 7.3.2 and 7.3.4 of		

- Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.
- Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.
- Note 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

10.1.10.1.2 Relative Accuracy of SS-RSRQ in FR2

The relative accuracy of SS-RSRQ in inter frequency case is defined as the RSRQ measured from one cell on a frequency in FR2 compared to the RSRP measured from another cell on a different frequency in FR2.

The accuracy requirements in Table 10.1.10.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band for each relevant SSB.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \le 27 \text{ dB}$
- | Channel 1_Io -Channel 2_Io | \leq 20 dB
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.10.1.2-1: SS-RSRQ Inter frequency relative accuracy in FR2

Accuracy	Conditions
Accuracy	Conditions

Normal	Extreme	SSB	lo ^{Note 2} range			
conditio	n condition	Ês/lot	Minim	num lo	Maximum Io	
			dBm / SC	S _{SSB} Note 1		
dB	dB	dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}	
±3	±4	≥-3	B.2.2-2, according to UE Power class, operating band and angle of		-50	
±4	±4	≥-4			-50	
Note 1:			I EIS spherical coverside condition select		auses 7.3.2 and 7.3.4 of gle of arrival.	
Note 2:					RE across the bandwidth.	
Note 3: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.						
Note 4: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.						

10.1.11 RSRQ report mapping

10.1.11.1 SS-RSRQ measurement report mapping

The reporting range of SS-RSRQ is defined from -43 dB to 20 dB with 0.5 dB resolution. The mapping of measured quantity is defined in Table 10.1.11.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.11.1-1: SS-RSRQ measurement report mapping

value dΒ SS-RSRQ_0 SS-RSRQ<-43 -43 ≤ SS-RSRQ<-42.5 SS-RSRQ_1 dB -42.5≤ SS-RSRQ<-42 SS-RSRQ_2 dB

Reported value Measured quantity Unit SS-RSRQ_3 -42 ≤ SS-RSRQ<-41.5 dΒ -41.5≤ SS-RSRQ<-41 SS-RSRQ_4 dΒ . . . SS-RSRQ_122 17.5≤ SS-RSRQ<18 dΒ 18≤ SS-RSRQ<18.5 SS-RSRQ_123 dB SS-RSRQ_124 18.5 ≤ SS-RSRQ<19 dB SS-RSRQ_125 19≤ SS-RSRQ<19.5 dΒ SS-RSRQ_126 19.5 ≤ SS-RSRQ<20 dB $20 \leq SS\text{-RSRQ}$ SS-RSRQ_127 dΒ

10.1.12 Intra-frequency SINR accuracy requirements for FR1

10.1.12.1 Intra-frequency SS-SINR accuracy requirements in FR1

10.1.12.1.1 Absolute SS-SINR Accuracy in FR1

Unless otherwise specified, the requirements for absolute accuracy of SS-SINR in this clause apply to a cell on the same frequency as that of the serving cell in FR1.

The accuracy requirements in Table 10.1.12.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band.

Table 10.1.12.1.1-1: SS-SINR Intra frequency absolute accuracy in FR1

Accı	ıracy			Condi				
Normal	Extreme	SSB		lo ^{Note 1} range				
condition condition		Ês/lot Note 3	NR operating band groups Note 4		Minimum Io			
		dB		dBm /	SCS _{SSB}			
dB dB				SCS _{SSB} = SCS _{SSB} = 30 kHz		dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50	
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50	
			NR_TDD_FR1_C	-120	-117	N/A	-50	
±3.0	±4	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50	
		NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50		
			NR_FDD_FR1_G	-118	-115	N/A	-50	
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50	
±3.5	±4	≥-6 dB	Note 2	Note 2	Note 2	Note 2	Note 2	

NOTE 2: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.

NOTE 3: The requirements apply for SSB Ês/lot ≤ 25 dB.

NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.13 Intra-frequency SINR accuracy requirements for FR2

10.1.13.1 Intra-frequency SS-SINR accuracy requirements in FR2

10.1.13.1.1 Absolute SS-SINR Accuracy in FR2

Unless otherwise specified, the requirements for absolute accuracy of SS-SINR in this clause apply to a cell on the same frequency as that of the serving cell in FR2.

The accuracy requirements in Table 10.1.13.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for intra-frequency measurements are fulfilled according to Annex B.2.2 for a corresponding Band.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.13.1.1-1: SS-SINR Intra frequency absolute accuracy in FR2

Accı	ıracy			Conditions	
Normal	Extreme	SSB		lo ^{Note 2} rang	e
condition	condition	Ês/lot	Minim	um lo	Maximum lo
			dBm / SC	S _{SSB} Note 1	
dB	dB	dB	dB SCS _{SSB} = SCS _{SSB} = 240kHz		dBm/BW _{Channel}
±3	<u>±</u> 4	≥-3	Same value as SS B.2.2-2, according	-	-50
±3.5	±4	≥-6	class, operating band and angle of arrival		-50
Note 1: V	alues based o	n Refsens and	FIS spherical cover	rage as defined in cl	auses 7.3.2 and 7.3.4 of

Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 or TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.

Note 3: In the test cases, the SSB Es/lot and related parameters may need to be adjusted to ensure Es/lot at UE baseband is above the value defined in this table.

Note 4: The requirements apply for SSB Ês/lot ≤ 25 dB.

10.1.14 Inter-frequency SINR accuracy requirements for FR1

10.1.14.1 Inter-frequency SS-SINR accuracy requirements in FR1

10.1.14.1.1 Aboslute Accuracy of SS-SINR in FR1

The requirements for absolute accuracy of SS-SINR in this clause apply to a cell on a frequency in FR1 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.14.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.

Table 10.1.14.1.1-1: SS-SINR Inter frequency absolute accuracy in FR1

Accı	ıracy			Condit				
Normal Extreme		SSB		lo ^{Note 1} range				
condition	condition	Ês/lot Note 3	NR operating band groups Note 4		Minimum	lo	Maximum lo	
		dB		dBm /	SCS _{SSB}			
dB dB				SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50	
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50	
			NR_TDD_FR1_C	-120	-117	N/A	-50	
±3.0	±4	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50	
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50	
			NR_FDD_FR1_G	-118	-115	N/A	-50	
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50	
±3.5	±4	≥-6 dB	Note 2	Note 2	Note 2	Note 2	Note 2	

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
- NOTE 2: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.
- NOTE 3: The requirements apply for SSB \hat{E} s/lot \leq 25 dB.
- NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.14.1.2 Relative Accuracy of SS-SINR in FR1

The relative accuracy of SS-SINR in inter frequency case is defined as the SS-SINR measured from one cell on a frequency in FR1 compared to the SS-SINR measured from another cell on a different frequency in FR1.

The accuracy requirements in Table 10.1.14.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \le 27 \text{ dB}$
- | Channel 1_Io -Channel 2_Io | \leq 20 dB

Table 10.1.14.1.2-1: SS-SINR Inter frequency relative accuracy in FR1

Accı	ıracy			Condit					
Normal	Extreme	SSB	Io Note 1 range						
condition	condition	Ês/lot Note 2,4	NR operating band groups Note 5		Minimum	lo	Maximum lo		
		dB		dBm/S	SCS _{SSB}				
dB	dB			SCS _{SSB} = SCS _{SSB} 120 kHz 240 kH		dBm/BW _{Channel}	dBm/BW _{Channel}		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50		
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50		
			NR_TDD_FR1_C	-120	-117	N/A	-50		
±3.5	±4	≥-3 dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50		
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50		
			NR_FDD_FR1_G	-118	-115	N/A	-50		
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50		
±4	±4	≥-6 dB	Note 3	Note 3	Note 3	Note 3	Note 3		

NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of cells to which the requirement applies.

NOTE 3: The same bands and the same lo conditions for each band apply for this requirement as for the corresponding highest accuracy requirement.

NOTE 4: The requirements apply for SSB Ês/lot ≤ 25 dB.

NOTE 5: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.15 Inter-frequency SINR accuracy requirements for FR2

10.1.15.1 Inter-frequency SS-SINR accuracy requirements in FR2

10.1.15.1.1 Aboslute Accuracy of SS-SINR in FR2

The requirements for absolute accuracy of SS-SINR in this clause apply to a cell on a frequency in FR2 that has different carrier frequency from the serving cell.

The accuracy requirements in Table 10.1.15.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.15.1.1-1: SS-SINR Inter frequency absolute accuracy in FR2

Accı	ıracy		Conditions		
Normal	Extreme	SSB		lo ^{Note 2} rang	je
condition	condition	Ês/lot		num lo	Maximum Io
			dBm / SC	Sss Note 1	
dB	dB	dB	SCS _{SSB} = SCS _{SSB} = 240kHz		dBm/BW _{Channel}
±3	±4	≥-3	Same value as SS B.2.2-2, according		-50
±3.5	±4	≥-4	class, operating ba arrival	and and angle of	-30

Note 1: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

Note 2: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.

Note 3:	In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure
	Ês/lot at UE baseband is above the value defined in this table.
Note 4:	The requirements apply for SSB Ês/lot ≤ 25 dB.

10.1.15.1.2 Relative Accuracy of SS-SINR in FR2

The relative accuracy of SS-SINR in inter frequency case is defined as the SS-SINR measured from one cell on a frequency in FR2 compared to the SS-SINR measured from another cell on a different frequency in FR2.

The accuracy requirements in Table 10.1.15.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for inter-frequency measurements are fulfilled according to Annex B.2.3 for a corresponding Band.
- $|SSB_RP1_{dBm} SSB_RP2_{dBm}| \le 27 \text{ dB}$
- | Channel 1_Io -Channel 2_Io | ≤ 20 dB
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.15.1.2-1: SS-SINR Inter frequency relative accuracy in FR2

Acc	curacy			Conditions	
Normal	Extreme	SSB		lo ^{Note 2} rang	je
condition condition		Ês/lot		ium lo	Maximum Io
			dBm / SC	S _{SSB} Note 1	
dB	dB	dB	SCS _{SSB} = 120kHz	SCS _{SSB} = 240kHz	dBm/BW _{Channel}
±3.5	±4	≥-3	Same value as SSB_RP in Table B.2.2-2, according to UE Power		-50
±4	±4 ≥-6 class, operating band and angle of arrival		and and angle of	-50	
					auses 7.3.2 and 7.3.4 of
			side condition select		
					PRE across the bandwidth.
Note 3:	The parameter S	SSB Ës/lot is t	he minimum SSB Ê:	s/lot of the pair of ce	ells to which the
requirement applies.					
Note 4: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ens				be adjusted to ensure	
			e the value defined	in this table.	
Note 5:	The requiremen	ts apply for SS	SB Ês/lot ≤ 25 dB.		

10.1.16 SINR report mapping

10.1.16.1 SS-SINR measurement report mapping

The reporting range of SS-SINR is defined from -23 dB to 40 dB with 0.5 dB resolution. The mapping of measured quantity is defined in Table 10.1.16.1-1. The range in the signalling may be larger than the guaranteed accuracy range.

Table 10.1.16.1-1: SS-SINR measurement report mapping

Reported value	Measured quantity value	Unit
SS-SINR_0	SS-SINR<-23	dB
SS-SINR_1	-23≤ SS-SINR<-22.5	dB
SS-SINR_2	-22.5≤ SS-SINR<-22	dB
SS-SINR_3	-22≤ SS-SINR<-21.5	dB
SS-SINR 4	-21.5≤ SS-SINR<-21	dB

		•••
SS-SINR_123	38≤ SS-SINR<38.5	dB
SS-SINR_124	38.5≤ SS-SINR<39	dB
SS-SINR_125	39≤ SS-SINR<39.5	dB
SS-SINR_126	39.5≤ SS-SINR<40	dB
SS-SINR_127	40≤ SS-SINR	dB

10.1.17 Power Headroom

10.1.17.1 Power Headroom Report

10.1.17.1.1 Power Headroom Report Mapping

The power headroom reporting range is from -32 ...+38 dB. Table 10.1.17.1-1 defines the report mapping.

Reported value POWER_HEADROOM_0 PH < -32

Table 10.1.17.1-1: Power headroom report mapping

Measured quantity value (dB) POWER_HEADROOM_1 -32 ≤ PH < -31 POWER_HEADROOM_2 -31 ≤ PH < -30 POWER HEADROOM 3 -30 ≤ PH < -29 20 ≤ PH < 21 POWER_HEADROOM_53 POWER_HEADROOM_54 21 ≤ PH < 22 POWER_HEADROOM_55 22 ≤ PH < 24 POWER_HEADROOM_56 $24 \le PH < 26$ POWER_HEADROOM_57 26 ≤ PH < 28 POWER_HEADROOM_58 $28 \le PH < 30$ POWER HEADROOM 59 $30 \le PH < 32$ POWER_HEADROOM_60 $32 \le PH < 34$ POWER_HEADROOM_61 34 ≤ <u>PH < 36</u> POWER_HEADROOM_62 $36 \le PH < 38$ POWER_HEADROOM_63 PH ≥ 38

10.1.18 PCMAX c f

The UE is required to report the UE configured maximum output power (P_{CMAX,c,f}) together with the power headroom. This clause defines the requirements for the P_{CMAX,c,f} reporting.

10.1.18.1 Report Mapping

The P_{CMAX,c,f} reporting range is defined from -29 dBm to 33 dBm with 1 dB resolution. Table 10.1.18.1-1 defines the reporting mapping.

Reported value Measured quantity value Unit PCMAX_C_00 dBm $P_{CMAX,c,f} < -29$ PCMAX_C_01 dBm $-29 \le P_{CMAX,c,f} < -28$ PCMAX_C_02 dBm -28 ≤ Pcmax,c,f < -27 PCMAX_C_61 dBm $31 \le P_{CMAX,c,f} < 32$ PCMAX_C_62 dBm $32 \le P_{CMAX,c,f} < 33$ PCMAX_C_63 $33 \le P_{CMAX,c,f}$ dBm

Table 10.1.18.1-1 Mapping of P_{CMAX.c.f}

10.1.19 L1-RSRP accuracy requirements for FR1

10.1.19.1 SSB based L1-RSRP accuracy requirements

10.1.19.1.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SSB based L1-RSRP in this clause apply to all SSBs of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.19.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.

Table 10.1.19.1.1-1: SSB based L1-RSRP absolute accuracy in FR1

Acci	uracy	Conditions							
Normal	Extreme	SSB		lo	^{Note 1} range				
condition	condition	Ês/lot	NR operating band groups Note 2		Minimum	lo	Maximum lo		
		dB		dBm /	SCSssb				
dB	dB			SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-70		
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-70		
			NR_TDD_FR1_C	-120	-117	N/A	-70		
±5.0	±9.5	±9.5 ≥-3dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-70		
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-70		
			NR_FDD_FR1_G	-118	-115	N/A	-70		
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-70		
±8.5	±11.5	≥-3dB	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_G, NR_FDD_FR1_G, NR_FDD_FR1_H,	N/A	N/A	-70	-50		

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.

NOTE 2: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.19.1.2 Relative Accuracy

The relative accuracy of SSB based L1-RSRP is defined as the L1-RSRP measured from one SSB compared to the largest measured value of L1-RSRP among all SSBs of the serving cell.

The accuracy requirements in Table 10.1.19.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.

Table 10.1.19.1.2-1: SSB based L1-RSRP relative accuracy in FR1

Accı	ıracy			Condit					
Normal	Extreme	SSB	lo ^{Note 1} range						
condition condition		Ês/lot Note 2	NR operating band groups Note 4	Minimum Io			Maximum lo		
				dBm /	SCS _{SSB}				
dB dB		dB		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	N/A	-50		
			NR_FDD_FR1_B	-120.5	-117.5	N/A	-50		
			NR_TDD_FR1_C	-120	-117	N/A	-50		
±3	±4	±4 ≥-3dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	N/A	-50		
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	N/A	-50		
			NR_FDD_FR1_G	-118	-115	N/A	-50		
			NR_FDD_FR1_H	-117.5	-114.5	N/A	-50		

NOTE 2: The parameter SSB Ês/lot is the minimum SSB Ês/lot of the pair of SSBs to which the requirement applies.

10.1.19.2 CSI-RS based L1-RSRP accuracy requirements

10.1.19.2.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RS based L1-RSRP in this clause apply to all CSI-RS resources of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.19.2.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.
- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.19.2.1-1.

Table 10.1.19.2.1-1: CSI-RS based L1-RSRP absolute accuracy in FR1

Accuracy			Conditions							
Normal	Extreme	CSI-		lo ^{Note 1} range						
condition	condition	RS Ês/lot	NR operating band groups ^{Note 2}		Minimum Io					
				dB	m / SCS _{CS}	SI-RS				
dB	dB	dB		SCS _{CSI-} RS = 15 kHz	SCS _{CSI-} RS = 30 kHz	SCScsi- RS = 60 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}		
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	-115	N/A	-70		
±5.0	±9.5	±9.5 ≥-3dB	NR_FDD_FR1_B	-120.5	-117.5	-114.5	N/A	-70		
			NR_TDD_FR1_C	-120	-117	-114	N/A	-70		
			NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-113.5	N/A	-70		

NOTE 3: Void

NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2..

			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-113	N/A	-70
			NR_FDD_FR1_G	-118	-115	-112	N/A	-70
			NR_FDD_FR1_H	-117.5	-114.5	-111.5	N/A	-70
±8.5	±11.5	≥-3dB	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A, NR_FDD_FR1_B, NR_TDD_FR1_C, NR_FDD_FR1_D, NR_TDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_G, NR_FDD_FR1_H	N/A	N/A	N/A	-70	-50

NOTE 2: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.19.2.2 Relative Accuracy

The relative accuracy of CSI-RS based L1-RSRP is defined as the L1-RSRP measured from one CSI-RS compared to the largest measured value of L1-RSRP among all CSI-RS resources of the serving cell.

The accuracy requirements in Table 10.1.19.2.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.
- The bandwidth of CSI-RS is 48 PRBs and the density is 3.

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.19.2.2-1.

Table 10.1.19.2.2-1: CSI-RS based L1-RSRP relative accuracy in FR1

Accuracy			Conditions						
		CSI-	lo ^{Note 1} range						
Normal condition	Extreme condition	RS Ês/lot Note 2	NR operating band groups ^{Note 4}		Minimum Io			Maximum Io	
		dB		dB	m / SCScs	SI-RS			
dB	dB			SCS _{CSI-} RS = 15 kHz	SCS _{CSI-} RS = 30 kHz	SCS _{CSI-} RS = 60 kHz	dBm/BW _{Channel}	dBm/BW _{Channel}	
			NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-121	-118	-115	N/A	-50	
			NR_FDD_FR1_B	-120.5	-117.5	-114.5	N/A	-50	
			NR_TDD_FR1_C	-120	-117	-114	N/A	-50	
±3	±4	±4 ≥-3dB	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-113.5	N/A	-50	
			NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-113	N/A	-50	
			NR_FDD_FR1_G	-118	-115	-112	N/A	-50	
			NR_FDD_FR1_H	-117.5	-114.5	-111.5	N/A	-50	

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.

NOTE 2: The parameter CSI-RS Ês/lot is the minimum CSI-RS Ês/lot of the pair of CSI-RS resources to which the requirement applies.

NOTE 3: Void

NOTE 4: NR operating band groups in FR1 are as defined in clause 3.5.2.

10.1.20 L1-RSRP accuracy requirements for FR2

10.1.20.1 SSB based L1-RSRP accuracy requirements

10.1.20.1.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of SSB based L1-RSRP in this clause apply to all SSBs of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.20.1.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.20.1.1-1: SSB based L1-RSRP absolute accuracy in FR2

Accı	ıracy	Conditions											
Normal	Extreme	SSB	lo ^{Note 1} range										
condition	condition	Ês/lot		Minimum	lo	Maximum Io							
			dBm / SCS _{SSB} Note 2										
dB	dB	dB	SCS _{SSB} =	SCS _{SSB} =	dBm/BW _{Channel}	dBm/BW _{Channel}							
			120kHz	240kHz									
			Same value	as SSB_RP									
			in Table I	3.2.4.1-2,									
±6.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	≥-3	according to UE Power		N/A	-70
			class, oper	ating band									
			and angle of arrival										
±8.5	±11.5	≥-3	N.	/A	-70	-50							

NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.

NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

NOTE 3: In the test cases, the SSB £s/lot and related parameters may need to be adjusted to ensure £s/lot at UE baseband is above the value defined in this table.

10.1.20.1.2 Relative Accuracy

The relative accuracy of SSB based L1-RSRP is defined as the L1-RSRP measured from one SSB compared to the largest measured value of L1-RSRP among all SSBs of the serving cell.

The accuracy requirements in Table 10.1.20.1.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.1 for a corresponding Band for each relevant SSB.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.20.1.2-1: SSB based L1-RSRP relative accuracy in FR2

Accuracy		Conditions			
Normal	Extreme	SSB	SSB Io Note 1 range		
condition	condition	Ês/lot	ot Minimum Io		Maximum Io
	dB dB		dBm / SCS _{SSB} Note 3		
dB		dB	SCS _{SSB} =	SCS _{SSB} =	dBm/BW _{Channel}
			120kHz	240kHz	

±6.5	±9.5	≥-3	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	-50			
	NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE						
	across the ba						
NOTE 2:	The paramete	er SSB Ës/lot	is the minimum SSB Es/lot of t	he pair of SSBs			
1	to which the requirement applies.						
			and EIS spherical coverage as	defined in			
			TS 38.101-2 [19]. Applicable si				
				de condition			
	selected depending on angle of arrival.						
	In the test cases, the SSB Ês/lot and related parameters may need to be						
	adjusted to ensure Ês/lot at UE baseband is above the value defined in						
	this table.						

10.1.20.2 CSI-RS based L1-RSRP accuracy requirements

10.1.20.2.1 Absolute Accuracy

Unless otherwise specified, the requirements for absolute accuracy of CSI-RS based L1-RSRP in this clause apply to all CSI-RS resources of the serving cell configured for L1-RSRP measurement.

The accuracy requirements in Table 10.1.20.2.1-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.
- The bandwidth of CSI-RS is 48 PRBs and the density is 3.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.20.2.1-1.

Table 10.1.20.2.1-1: CSI-RS based L1-RSRP absolute accuracy in FR2

Accuracy		Conditions						
Normal	Extreme	CSI-RS		lo ^{Note 1} range				
condition	condition	Ês/lot		Minimum	lo	Maximum Io		
			dBm / SCS _{CSI-RS} Note 2					
dB	dB	dB	SCS _{CSI-RS}	SCS _{CSI-RS}	dBm/BW _{Channel}	dBm/BW _{Channel}		
			= 60kHz	= 120kHz				
±6.5	±9.5	≥-3	Same value as CSI- RS_RP in Table B.2.4.2- 2, according to UE Power class, operating band and angle of arrival		N/A	-70		
±8.5	±11.5	≥-3	N.	/A	-70	-50		

NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE across the bandwidth.

NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.

NOTE 3: In the test cases, the CSI-RS Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

10.1.20.2.2 Relative Accuracy

The relative accuracy of CSI-RS based L1-RSRP is defined as the L1-RSRP measured from one CSI-RS compared to the largest measured value of L1-RSRP among all CSI-RS resources of the serving cell.

The accuracy requirements in Table 10.1.20.2.2-1 are valid under the following conditions:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Conditions for L1-RSRP measurements are fulfilled according to Annex B.2.4.2 for a corresponding Band for each relevant CSI-RS.
- The bandwidth of CSI-RS is 48 PRBs and the density is 3.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

The performance with larger bandwidth of CSI-RS is equal to or better than the accuracy requirements in Table 10.1.20.2.2-1.

Table 10.1.20.2.2-1: CSI-RS based L1-RSRP relative accuracy in FR2

Accı	ıracy		Conditions				
Normal	Extreme	CSI-RS		lo Note 1 range	е		
condition	condition	Ês/lot	Minim	ium lo	Maximum Io		
			dBm/S	CS _{CSI-RS}			
dB	dB	dB	SCScsi-RS = SCScsi-RS	SCScsi-Rs =	dBm/BW _{Channel}		
			60kHz	120kHz			
			Same value a				
			in Table I	in Table B.2.4.2-2,			
±6.5	±9.5	≥-3	according to UE Power		-50		
			class, operat	ing band and			
			angle o				
NOTE 1: Io specified at the Reference point, and assumed to have constant EPRE							
across the bandwidth.							
NOTE 2: The parameter CSI-RS Ês/lot is the minimum CSI-RS Ês/lot of the pair of							
CSI-RS resources to which the requirement applies.							

- NOTE 3: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.
- NOTE 4: In the test cases, the CSI-RS Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

10.1.21 SFTD accuracy requirements

10.1.21.1 SFTD acuracy requirements for NE-DC

The SFN and frame timing difference (SFTD) is measured between PCell and E-UTRAN PSCell under NE-DC.

The accuracy requirements in Table 10.1.21.1-4 are applicable under the following conditions:

For FR1 PCell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.1-1.

Table 10.1.21.1-1: PCell lo range conditions in FR1

	lo ^{Note 1} range						
	NR operating band groups Note 4, 5	Minimun	Minimum Io Note 2, 3				
Parameter		dBm/	dBm/ SCS _{SSB}				
		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}			
	NR_FDD_FR1_A, NR_TDD_FR1_A	-121	-118	-50			
Conditions	NR_FDD_FR1_B	-120.5	-117.5	-50			
Conditions	NR_TDD_FR1_C	-120	-117	-50			
	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-50			

NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-50
NR_FDD_FR1_G	-118	-115	-50
NR FDD FR1 H	-117.5	-114.5	-50

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth.
- NOTE 2: The condition level is increased by ΔR_{IB,c} as defined in clause 7.3B in TS 38.101-3 [20], depending on E-UTRA NR band combination.
- NOTE 3: The condition level is increased by MSD as defined in clause 7.3B in TS 38.101-3 [20], if applicable depending on E-UTRA NR band combination.
- NOTE 4: NR operating band groups are as defined in clause 3.5.
- NOTE 5: Only NR bands within EN-DC band combinations as specified in clause 5.5B in TS 38.101-3 [20] are applicable.

For FR2 PCell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.1-2.

Table 10.1.21.1-2: PCell lo range conditions in FR2

	lo ^{Note 1} range						
Parameter	Minimum	Maximum lo					
Farailletei	dBm/ \$	dBm/ SCS _{SSB}					
	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}				
Conditions	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	-50				

- NOTE 1: Io is assumed to have constant EPRE across the bandwidth and specified at the Reference point.
- NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-2 [19]. Applicable side condition selected depending on angle of arrival.
- NOTE 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.

For E-UTRA PSCell SFN and frame timing measurement:

- Cell specific reference signals are transmitted either from one, two or four antenna ports.
- Conditions defined in TS 36.101 [25] Clause 7.3 for reference sensitivity are fulfilled.
- No changes to the uplink transmission timing are applied during the measurement period.
- RSRP $|_{dBm}$ according to Annex B.3.5 in TS 36.101 [25] for a corresponding Band.
- Io range deifined in Table 10.1.21.1-3.

Table 10.1.21.1-3: E-UTRA PSCell lo range conditions

Boromotor	lo ^{Note 1} range					
Parameter	E-UTRA operating band groups Note 3	Minimum Io	Maximum Io			
		dBm/15kHz Note 2	dBm/BW _{Channel}			
	FDD_A, TDD_A	-121	-50			
	FDD_C, TDD_C	-120	-50			
	FDD_D	-119.5	-50			
Conditions	FDD_E, TDD_E	-119	-50			
	FDD_F	-118.5	-50			
	FDD_G	-118	-50			
	FDD_H	-117.5	-50			
	FDD_N	-114.5	-50			

- NOTE 1: When in dBm/15kHz, the minimum lo condition is expressed as the average lo per RE over all REs in that symbol. Io may be different in different symbols within a subframe.
- NOTE 2: The condition level is increased by Δ >0, when applicable, as described in clauses B.4.2 and B.4.3 in TS36.133 [15].
- NOTE 3: E-UTRA operating band groups are as defined in clause 3.5 in TS 36.133 [15].

Table 10.1.21.1-4: SFTD measurement accuracy

	Conditions		
Accuracy	Ês/lot Note 2	Frequency range	
Ts Note 1	dB		
40*64*Tc	> 2 dD	FR1	
40*64*Tc	≥-3 dB	FR2	

NOTE 1: Tc is the basic timing unit defined in TS 38.211 [6].

NOTE 2: The parameter Ês/lot is the minimum Ês/lot of the pair of cells to which the requirement applies.

10.1.21.2 SFTD acuracy requirements for NR-DC

The SFN and frame timing difference (SFTD) is measured between PCell in FR1 and PSCell in FR2 under NR dual connectivity.

The accuracy requirements in Table 10.1.21.2-3 are applicable under the following conditions:

For FR1 PCell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.2-1.

Table 10.1.21.2-1: PCell lo range conditions in FR1

	lo Note 1 range					
	NR operating band groups Note 2	Minin	Maximum lo			
Parameter		dBm/	SCS _{SSB}			
		SCS _{SSB} = 15	SCS _{SSB} = 30	dBm/BW _{Channel}		
		kHz	kHz			
	NR_FDD_FR1_A, NR_TDD_FR1_A	-121	-118	-50		
	NR_FDD_FR1_B	-120.5	-117.5	-50		
	NR_TDD_FR1_C	-120	-117	-50		
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-50		
	NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-50		
	NR_FDD_FR1_G	-118	-115	-50		
	NR_FDD_FR1_H	-117.5	-114.5	-50		

NOTE 1: Io is assumed to have constant EPRE across the bandwidth.

NOTE 2: NR operating band groups are as defined in clause 3.5.2.

For FR2 PSCell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.2-2.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.21.2-2: PSCell lo range conditions in FR2

		lo ^{Note 1} range					
Parameter	Minimum	Minimum Io Note 2, 3					
Farailleter	dBm/ \$	dBm/ SCS _{SSB}					
	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}				

Conditions	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	-50				
NOTE 2: Va 2 NOTE 3: In	NOTE 1: Io is assumed to have constant EPRE across the bandwidth and specified at the Reference point. NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101- 2 [19]. Applicable side condition selected depending on angle of arrival. NOTE 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.						

Table 10.1.21.2-3: SFTD measurement accuracy

	Conditions				
Accuracy	Ês/lot Note 2	Frequency range			
Ts Note 1	dB				
40*64*Tc	≥ - 3 dB	Between FR1 and FR2			
NOTE 1: To is the basic timing unit defined in TS 38.211 [6]. NOTE 2: The parameter Ês/lot is the minimum Ês/lot of the pair of cells to which the requirement applies					

10.1.21.3 Inter frequency SFTD acuracy requirements

The SFN and frame timing difference (SFTD) is measured between PCell and inter-frequency neighbour cell.

The accuracy requirements in Table 10.1.21.3-3 are applicable under the following conditions:

For FR1 PCell, inter frequency neighbour cell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-1 [18] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.3-1.

Table 10.1.21.3-1: PCell, inter frequency neighbour cell lo range conditions in FR1

	lo	Note 1 range						
	NR operating band groups Note 2	Minim	Minimum Io					
Parameter		dBm/	SCS _{SSB}					
		SCS _{SSB} = 15	SCS _{SSB} = 30	dBm/BW _{Channel}				
		kHz	kHz					
	NR_FDD_FR1_A, NR_TDD_FR1_A	-121	-118	-50				
	NR_FDD_FR1_B	-120.5	-117.5	-50				
	NR_TDD_FR1_C	-120	-117	-50				
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-119.5	-116.5	-50				
	NR_FDD_FR1_E, NR_TDD_FR1_E	-119	-116	-50				
	NR_FDD_FR1_G	-118	-115	-50				
	NR_FDD_FR1_H	-117.5	-114.5	-50				
NOTE 1: lo is	s assumed to have constant EPRE across the bar	ndwidth.						
NOTE 2: NR operating band groups are as defined in clause 3.5.2								

For FR2 PCell, inter frequency neighbour cell SFN and frame timing measurement:

- Conditions defined in clause 7.3 of TS 38.101-2 [19] for reference sensitivity are fulfilled.
- Io range deifined in Table 10.1.21.3-2.
- The measured signals are in the directions covered by the percentile EIS spherical coverage of the UE, defined in clause 7.3.4 of TS 38.101-2 [19].

Table 10.1.21.3-2: PCell, inter frequency neighbour cell lo range conditions in FR2

	Minimum	Maximum Io					
	dBm/ \$	dBm/ SCS _{SSB}					
	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dBm/BW _{Channel}				
Conditions	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	Same value as SSB_RP in Table B.2.4.1-2, according to UE Power class, operating band and angle of arrival	-50				
NOTE 1: Io is assumed to have constant EPRE across the bandwidth and specified at the Reference point.							
NOTE 2: Values based on Refsens and EIS spherical coverage as defined in clauses 7.3.2 and 7.3.4 of TS 38.101-							
NOTE 3: In	2 [19]. Applicable side condition selected depending on angle of arrival. NOTE 3: In the test cases, the SSB Ês/lot and related parameters may need to be adjusted to ensure Ês/lot at UE baseband is above the value defined in this table.						

Table 10.1.21.3-3: Inter frequency SFTD measurement accuracy

	Conditions				
Accuracy	Ês/lot Note 2	Frequency range			
Ts Note 1	dB				
40*64*Tc	≥ -3 dB	FR1, FR2			
NOTE 1: Tc is the basic timing unit defined in TS 38.211 [6]. NOTE 2: The parameter Ês/lot is the minimum Ês/lot of the pair of cells to which the requirement applies.					

10.2 E-UTRAN measurements

10.2.1 Introduction

Accuracy requirements for measurements on E-UTRAN carrier frequencies are specified in clause 10.2 and apply for UE in SA or NR-DC or NE-DC operation mode.

The requirements in clause 10.2 are applicable for a UE:

- in RRC_CONNECTED state
- performing measurements with appropriate measurement gaps according to clause 9.1.2.
- that is synchronised to the cell that is measured.

The reported measurement result after layer 1 filtering shall be an estimate of the average value of the measured quantity over the measurement period. The reference point for the measurement result after layer 1 filtering is referred to as point B in the measurement model described in TS 36.300 [24].

The accuracy requirements of E-UTRA measurements in this clause are valid for the reported measurement result after layer 1 filtering. The accuracy requirements are verified from the measurement report at point D in the measurement model having the layer 3 filtering disabled.

If the UE needs measurement gaps to perform the inter-RAT NR — E-UTRAN FDD and NR — E-UTRAN TDD measurements, the relevant measurement procedure and measurement gap patterns stated in clause 9.1.2 shall apply.

10.2.2 E-UTRAN RSRP measurements

NOTE: This measurement is for handover between NR and E-UTRAN.

The measurement period of E-UTRA RSRP in RRC_CONNECTED state is specified in clause 9.4.2 and 9.4.3.

The accuracy requirements of E-UTRA RSRP measurements in RRC_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RSRP Accuracy Requirements in clause 9.1.3 of TS 36.133 [15].

The reporting range and mapping specified for RSRP measurements in clause 9.1.4 of TS 36.133 [15] shall apply.

10.2.3 E-UTRAN RSRQ measurements

NOTE: This measurement is for handover between NR and E-UTRAN.

The measurement period of E-UTRA RSRQ in RRC_CONNECTED state is specified in clause 9.4.2 and 9.4.3.

The accuracy requirements of E-UTRA RSRQ measurements in RRC_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RSRQ Accuracy Requirements in clause 9.1.6 of TS 36.133 [15].

The requirements for accuracy of E-UTRA RSRQ measurements in RRC_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RSRQ Accuracy Requirements in clause 9.1.6 of TS 36.133 [15].

The reporting range and mapping specified for RSRQ measurements in clause 9.1.7 of TS 36.133 [15] shall apply.

10.2.4 E-UTRAN RSTD measurements

The requirements in this clause are valid for UE supporting this capability.

The measurement period is specified in clauses 9.4.4.1 and 9.4.4.2 for inter-RAT NR — E-UTRAN FDD and inter-RAT NR — E-UTRAN TDD RSTD measurements, respectively.

The accuracy requirements and the corresponding side conditions shall be the same as the inter-frequency measurement accuracy requirements for RSTD measurements in RRC_CONNECTED in clause 9.1.10.2 of TS 36.133 [15].

If the UE needs measurement gaps to perform the inter-RAT NR — E-UTRAN FDD and NR — E-UTRAN TDD RSTD measurements, the relevant measurement procedure and measurement gap patterns stated in clause 9.1.2 shall apply.

The reporting range and mapping for the inter-RAT NR — E-UTRAN FDD and NR — E-UTRAN TDD RSTD measurements is the same as specified for RSTD measurements in TS 36.133 [15, clauses 9.1.10.3 and 9.1.10.4].

10.2.5 E-UTRAN RS-SINR measurements

NOTE: This measurement is for handover between NR and E-UTRAN.

The measurement period of E-UTRA RS-SINR in RRC_CONNECTED state is specified in clause 9.4.2 and 9.4.3.

The accuracy requirements of E-UTRA RS-SINR measurements in RRC_CONNECTED state and the corresponding side conditions shall be the same as the inter-frequency RS-SINR Accuracy Requirements in clause 9.1.17.3 of TS 36.133 [15].

The reporting range and mapping for E-UTRA RS-SINR measurements shall be the same as specified for RS-SINR measurements in clause 9.1.17.1 of TS 36.133 [15].

11 Void

Annex A (normative): Test Cases

A.1 Purpose of annex

A.2 Requirement classification for statistical testing

Requirements in this specification are either expressed as absolute requirements with a single value stating the requirement, or expressed as a success rate. There are no provisions for the statistical variations that will occur when the parameter is tested.

Annex A outlines the tests in more detail and lists the test parameters needed. The test will result in an outcome of a test variable value for the device under test (DUT) inside or outside the test limit. Overall, the probability of a "good" DUT being inside the test limit(s) and the probability of a "bad" DUT being outside the test limit(s) should be as high as possible. For this reason, when selecting the test variable and the test limit(s), the statistical nature of the test is accounted for.

The statistical nature depends on the type of requirement. Some have large statistical variations, while others are not statistical in nature at all. When testing a parameter with a statistical nature, a confidence level is set. This establishes the probability that a DUT passing the test actually meets the requirements and determines how many times a test has to be repeated and what the pass and fail criteria are. Those aspects are not covered by TS 38.133. The details of the tests on how many times to run it and how to establish confidence in the tests are described in TS 38.533 [5]. This Annex establishes the variable to be used in the test and whether it can be viewed as statistical in nature or not.

A.2.1 Types of requirements in TS 38.133

A.2.1.1 Time and delay requirements on UE higher layer actions

A very large part of the RRM requirements are delay requirements:

- In RRC_IDLE state mobility (clause A.6.1 and A.7.1) there is cell re-selection delay.
- In RRC_CONNECTED state mobility (clauses A.4.3, A.4.6, A.5.3, A.5.6, A.6.3, A.6.6, A.7.3 and A.7.6) there is handover delay, cell search delay and measurement reporting delay.
- In RRC Connection Control (clauses A.4.3.2, A.5.3.2, A.6.3.2 and A.7.3.2) there is RRC re-establishment delay.

All have in common that the UE is required to perform an action observable in higher layers (e.g. camp on the correct cell) within a certain time after a specific event (e.g. when a new strong pilot or reference signal appears). The delay time is statistical in nature for several reasons, among others that several of the measurements are performed by the UE in a fading radio environment.

The variations make a strict limit unsuitable for a test. Instead there is a condition set for a correct action by the UE, e.g. that the UE shall camp on the correct cell within X seconds. Then the rate of correct events is observed during repeated tests and a limit is set on the rate of correct events, usually 90% correct events are required. How the limit is applied in the test depends on the confidence required, further detailed are in TS 38.533 [5].

A.2.1.2 Measurements of power levels, relative powers and time

A very large number of requirements are on measurements that the UE performs:

- In RRC_CONNECTED state mobility (clauses A.4.3, A.5.3, A.6.3 and A.7.3) there are measurement reports.
- In Measurement Performance Requirements (clauses A.4.7, A.5.7, A.6.7 and A.7.7) there are requirements for all type of measurements.

The accuracy requirements on measurements are expressed in this specification as a fixed limit (e.g. +/-X dB), but the measurement error will have a distribution that is not easily confined in fixed limits. Assuming a Gaussian distribution of the error, the limits will have to be set at +/-3.29 σ if the probability of failing a "good DUT" in a single test is to be kept at 0.1%. It is more reasonable to set the limit tighter and test the DUT by counting the rate of measurements that are within the limits, in a way similar to the requirements on delay.

A.2.1.3 Implementation requirements

A few requirements are strict actions the UE should take or capabilities the UE should have, without any allowance for deviations. These requirements are absolute and should be tested as such. Examples are:

- "Event triggered report rate" in RRC_CONNECTED state mobility (clauses A.4.3, A.4.6, A.5.3, A.5.6, A.6.3, A.6.6, A.7.3 and A.7.6)
- "Correct behaviour at time-out" in RRC connection control (clauses A.4.3.2, A.5.3.2, A.6.3.2 and A.7.3.2)

A.2.1.4 Physical layer timing requirements

There are requirements on Timing (clauses A.4.4, A.5.4, A.6.4 and A.7.4). There are both absolute and relative limits on timing accuracy depending upon the type of requirement. Examples are:

- Initial Transmit Timing (clauses A.4.4.1, A.5.4.1, A.6.4.1 and A.7.4.1) has an absolute limit on timing accuracy.
- Timing Advance (clauses A.4.4.2, A.5.4.2, A.6.4.2 and A.7.4.2) has a relative limit on timing accuracy.

A.3 RRM test configurations

A.3.1 Reference measurement channels

A.3.1.1 PDSCH

A.3.1.1.1 FDD

Table A.3.1.1.1-1: PDSCH Reference Measurement Channels for SCS=15kHz

Parameter	Unit			Value		
Reference channel		SR.1.1 FDD				
Channel bandwidth	MHz	Defined in test case				
Number of transmitter antennas		1				

Allocated resource blocks for PDSCH Note 1		24			
Allocated slots per Radio Frame		10			
Radio frame containing SSB	slots	Note 5			
Radio frame not containing SSB	slots	10			
MCS index		4			
Modulation		QPSK			
Target Coding Rate		1/3			
Number of control		2			
symbols					
PDSCH mapping type		Type A			
Information Bit Payload					
For slots with RMSI Note 2	bits	1608			
For slots without RMSI	bits	1864			
Number of Code Blocks per slot		1			
Binary Channel Bits Per					
slot					
For slots with RMSI Note 2, Note 4	bits	5184			
For slots without RMSI	bits	6048			

- Note 1: Allocated outside the SMTC duration in time and in resource blocks which do not overlap with the resource blocks allocated for SS/PBCH block.
- Note 2: PDSCH is scheduled on the slots with RMSI.
- Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 38.213 [3].
- Note 4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditionalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 2.
- Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause A.3.10.
- Note 6: When DRX is configured, PDCCH can be scheduled both for downlink assignment and/or UL grant only during ([10]ms drx-lnactivityTimer) from timing when drx-onDurationTimer starts, unless otherwise specified in the test case

A.3.1.1.2 TDD

Table A.3.1.1.2-1: PDSCH Reference Measurement Channels for SCS=15kHz

Parameter	Unit			Value		
Reference channel		SR.1.1 TDD	SR.1.2 TDD			
Channel bandwidth	MHz	Defined in test case	Defined in test case			
Number of transmitter antennas		1	1			
Allocated resource blocks for PDSCH Note 1		24	24			
Allocated slots per Radio Frame						
Radio frame containing SSB	slots	Note 5	Note 5			
Radio frame not containing SSB	slots	4	6			

				 		1
MCS table		64QAM	64QAM			
MCS index		4	4			
Modulation		QPSK	QPSK			
Target Coding Rate		1/3	1/3			
Number of control symbols		2	2			
PDSCH mapping type		Type A	Type A			
Information Bit Payload						
For slots with RMSI Note 2	bits	1608	1608			
For slots without RMSI	bits	1864	1864			
For special slots	bits	N/A	1128			
Number of Code Blocks		1	1			
per slot						
Binary Channel Bits Per slot						
For slots with RMSI Note 2, Note 4	bits	5184	5184			
For slots without RMSI	bits	6048	6048			
For special slots Note 6	bits	-	3744			

- Note 1: Allocated outside the SMTC duration in time and in resource blocks which do not overlap with the resource blocks allocated for SS/PBCH block.
- Note 2: PDSCH is scheduled on the slots with RMSI.
- Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 38.213 [3].
- Note 4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 2.
- Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause A.3.10.
- Note 6: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1.
- Note 7: When DRX is configured, PDCCH can be scheduled both for downlink assignment and/or UL grant only during ([10]ms drx-lnactivityTimer) from timing when drx-onDurationTimer starts, unless otherwise specified in the test case

Table A.3.1.1.2-2: PDSCH Reference Measurement Channels for SCS=30kHz

Parameter	Unit		Value
Reference channel		SR.2.1 TDD	
Channel bandwidth	MHz	Defined in test case	
Number of transmitter antennas		1	
Allocated resource blocks for PDSCH Note 1		24	
Allocated slots per Radio Frame			
Radio frame containing SSB	slots	Note 5	
Radio frame not containing SSB	slots	10	
MCS table		64QAM	
MCS index		4	
Modulation		QPSK	
Target Coding Rate		1/3	

Number of control symbols		2			
PDSCH mapping type		Type A			
Information Bit Payload					
For slots with RMSI Note 2	bits	1608			
For slots without RMSI	bits	1864			
Number of Code Blocks per slot		1			
Binary Channel Bits Per slot					
For slots with RMSI Note 2, Note 4	bits	6048			

- Note 1: Allocated outside the SMTC duration in time and in resource blocks which do not overlap with the resource blocks allocated for SS/PBCH block.
- Note 2: PDSCH is scheduled on the slots with RMSI.
- Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 38.213 [3].
- Note 4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 2.
- Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause A.3.10.
- Note 6: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditonalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1.
- Note 7: When DRX is configured, PDCCH can be scheduled both for downlink assignment and/or UL grant only during ([10]ms drx-InactivityTimer) from timing when drx-onDurationTimer starts, unless otherwise specified in the test case

Table A.3.1.1.2-3: PDSCH Reference Measurement Channels for SCS=120kHz

Parameter	Unit				Value
Reference channel		SR.3.1	SR.3.2	SR.3.3	
		TDD	TDD	TDD	
Channel bandwidth	MHz	100	100	100	
Number of transmitter		1	1	1	
antennas		a d Note d	5 (No. 7	4.5 No. 1. 7	
Allocated resource blocks for PDSCH		24 Note 1	24 ^{Note 7}	48 ^{Note 7}	
Allocated slots per Radio Frame					
Radio frame containing SSB	slots	Note 5	Note 5	Note 5	
Radio frame not containing SSB	slots	48	48	48	
MCS table		64QAM	64QAM	64QAM	
MCS index		4	4	4	
Modulation		QPSK	QPSK	QPSK	
Target Coding Rate		1/3	1/3	1/3	
Number of control		2	2	2	
symbols					
PDSCH mapping type		Type A	Type A	Type A	
Information Bit Payload					
For slots with RMSI	bits	1608	1608	3104	
For slots without RMSI	bits	1864	1864	3624	
Number of Code Blocks		1	1	1	
per slot					
Binary Channel Bits Per slot					

For slots	with RMSI Note 4	bits	5184	5184	10368				
For slots	s without RMSI	bits	6048	6048	12096				
Note 1: Note 2:									BCH block
Note 3:	Note 3: If necessary the information bit payload size can be adjusted to facilitate the test implementation. The payload sizes are defined in TS 38.213 [3].								
Note 4:	4: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditionalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 2.								
Note 5:	Note 5: PDSCH is not scheduled in slots containing SSB according to the SSB configuration used in the test. SSB configurations are defined in clause A.3.10.								
Note 6: Derived based on the PDSCH DMRS assumption: dmrs-TypeA-Position=2, dmrs-Type=1, dmrs-AdditionalPositions=2, maxLength=1, Antenna port index: 1000, and Number of PDSCH DMRS CDM group(s) without data: 1.									
Note 7:	Allocated in the same resource blocks as the CORESET.								
Note 8:	When DRX is configured, PDSCH is scheduled only while <i>drx-onDurationTimer</i> is running, unless otherwise specified in the test case.								

A.3.1.2 CORESET for RMSI scheduling

A.3.1.2.1 FDD

Table A.3.1.2.1-1: RMSI CORESET Reference Channel for FDD with SCS=15KHz

Parameter	Unit		Value			
Reference channel		CR.1.1 FDD				
Channel bandwidth	MHz	Defined in test case				
Subcarrier spacing for RMSI CORESET	kHz	15				
Allocated resource blocks for RMSI CORESET Note 7		24				
Subcarrier spacing for SSB	kHz	15				
SSB and RMSI CORESET multiplexing configuration Note 7		Pattern 1				
Offset between SSB and RMSI CORESET Note 3, 7	RB	0 (Note8)				
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4				
Number of transmitter antennas		1				
Duration of RMSI CORESET Note 7	symbols	2				
DCI Format Note 1		Note 2				
Aggregation level	CCE	8				
DMRS precoder granularity		6				
REG bundle size		6				
Mapping from REG to CCE		Distributed				
Cell ID		Note 5				
Payload (without CRC)	bits	Note 6				
Note 1: DCI formats are defined in TS 38.212.						

Note 2:	DCI format shall depend upon the test configuration.
Note 3:	The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index
	of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the
	SS/PBCH block.
Note 4:	The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-11 in
	TS 38.213 [3].
Note 5:	Cell ID shall depend upon the test configuration.
Note 6:	Payload size shall depend upon the test configuration.
Note 7:	The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH
	search space corresponds to index 0 in Table 13-1 in TS 38.213 [3]
Note 8:	Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC.

A.3.1.2.2 TDD

Table A.3.1.2.2-1: RMSI CORESET Reference Channel for TDD with SCS=15KHz

Parameter	Unit		Value
Reference channel		CR.1.1 TDD	
Channel bandwidth	MHz	Defined in test case	
Subcarrier spacing	kHz	15	
Allocated resource blocks for RMSI CORESET Note 7		24	
SSB and RMSI CORESET multiplexing configuration Note 7		Pattern 1	
Offset between SSB and RMSI CORESET Note 3, 7	RB	0 (Note 8)	
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4	
Number of transmitter antennas		1	
Duration of RMSI CORESET Note 7	symbols	2	
DCI Format Note 1		Note 2	
Aggregation level	CCE	8	
DMRS precoder granularity		6	
REG bundle size		6	
Mapping from REG to CCE		Distributed	
Cell ID		Note 5	
Payload (without CRC)	bits	Note 6	

- Note 1: DCI formats are defined in TS 38.212.
- Note 2: DCI format shall depend upon the test configuration.
- Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.
- Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-11 in TS 38.213 [3].
- Note 5: Cell ID shall depend upon the test configuration.
- Note 6: Payload size shall depend upon the test configuration.
- Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-1 in TS 38.213 [3].
- Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC.

Table A.3.1.2.2-2: RMSI CORESET Reference Channel for TDD with SCS=30KHz

Parameter	Unit		Value		
Reference channel		CR.2.1 TDD			
Channel bandwidth	MHz	Defined in test case			
Subcarrier spacing	kHz	30			
Allocated resource blocks for RMSI CORESET Note 7		24			
SSB and RMSI CORESET multiplexing configuration Note 7		Pattern 1			
Offset between SSB and RMSI CORESET Note 3, 7	RB	0 (Note 8)			
Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4			
Number of transmitter antennas		1			
Duration of RMSI CORESET Note 7	symbols	2			
DCI Format Note 1		Note 2			
Aggregation level	CCE	8			
DMRS precoder granularity		6			
REG bundle size		6			
Mapping from REG to CCE		Distributed			
Cell ID		Note 5			
Payload (without CRC)	bits	Note 6			

- Note 1: DCI formats are defined in TS 38.212.
- Note 2: DCI format shall depend upon the test configuration.
- Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.
- Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-11 in TS 38.213 [3].
- Note 5: Cell ID shall depend upon the test configuration.
- Note 6: Payload size shall depend upon the test configuration.
- Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-6 in TS 38.213 [3].
- Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC.

Table A.3.1.2.2-3: RMSI CORESET Reference Channel for TDD with SCS=120KHz

Parameter	Unit			٧	'alue		
Reference channel		CR.3.1	CR.3.2				
		TDD	TDD				
Channel bandwidth	MHz	100	100				
Subcarrier spacing	kHz	120	120				
Allocated resource		24 Note 7	48 Note 9				
blocks for RMSI							
CORESET							
SSB and RMSI		Pattern 1	Pattern 1				
CORESET multiplexing		Note 7	Note 9				
configuration							
Offset between SSB and	RB	0 (Note 8)	0 (Note 8)				
RMSI CORESET Note 3		Note 7	Note 9				

Configuration of PDCCH monitoring occasions for RMSI CORESET Note 4		Index 4	Index 4			
Number of transmitter antennas		1	1			
Duration of RMSI CORESET	symbols	2 Note 7	2 Note 9			
DCI Format Note 1		Note 2	Note 2			
Aggregation level	CCE	8	8			
DMRS precoder granularity		6	6			
REG bundle size		6	6			
Mapping from REG to CCE		Distributed	Distributed			
Cell ID		Note 5	Note 5			
Payload (without CRC)	bits	Note 6	Note 6			

- Note 1: DCI formats are defined in TS 38.212.
- Note 2: DCI format shall depend upon the test configuration.
- Note 3: The offset is defined with respect to the subcarrier spacing of the CORESET from the smallest RB index of RMSI CORESET to the smallest RB index of the common RB overlapping with the first RB of the SS/PBCH block.
- Note 4: The configuration of PDCCH monitoring occasions for RMSI CORESET is defined in Table 13-12 in TS 38.213 [3].
- Note 5: Cell ID shall depend upon the test configuration.
- Note 6: Payload size shall depend upon the test configuration.
- Note 7: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 0 in Table 13-8 in TS 38.213 [3].
- Note 8: Other values can be used to align with GSCN [13] as long as SSB does not overlap the RMC.
- Note 9: The configuration of set of resource blocks and slot symbols of control resource set for Type0-PDCCH search space corresponds to index 2 in Table 13-10 in TS 38.213 [3].

A.3.1.3 CORESET for RMC scheduling

A.3.1.3.1 FDD

Table A.3.1.3.1-1: Control Channel RMC for FDD with SCS=15KHz

Parameter	Unit			Valu	ie		
Reference channel		CCR.1.1	CCR.1.2	CCR.1.3	CCR.1.4		
		FDD	FDD	FDD	FDD		
Channel bandwidth	MHz	Defined in	Defined in	Defined in	Defined in		
		test case	test case	test case	test case		
Subcarrier spacing	kHz	15	15	15	15		
Allocated resource blocks for CORESET Note 3		24	18	24	18		
Number of transmitter		1	1	1	1		
antennas							
Duration of CORESET	symbols	2	2	2	2		
REG bundle size		6	6	6	6		
DMRS precoder granularity		Same as REG bundle	Same as REG bundle	Same as REG bundle	Same as REG bundle		
		size	size	size	size		
CCE to REG mapping		Interleaved	Interleaved	Interleaved	Interleaved		
Interleave n_shift		0	0	0	0		
Interleave size		2	2	2	2		

Beamforming Pre- Coder		N/A	N/A	N/A	N/A		
Aggregation level	CCE	4	2	8	4		
DCI formats		Note 1	Note 1	Note 1	Note 1		
Payload size (without CRC)	bits	Note 2	Note 2	Note 2	Note 2		

Note 1: DCI format shall depend upon the test configuration.

Note 2: Payload size shall depend upon the test configuration

Note 3: Allocated in the resource blocks where the associated RMC is scheduled.

A.3.1.3.2 TDD

Table A.3.1.3.2-1: Control Channel RMC for TDD with SCS=15KHz

Parameter	Unit			Valu	ie		
Reference channel		CCR.1.1	CCR.1.2	CCR.1.3	CCR.1.4		
		TDD	TDD	TDD	TDD		<u> </u>
Channel bandwidth	MHz	Defined in	Defined in	Defined in	Defined in		
		test case	test case	test case	test case		<u> </u>
Subcarrier spacing	kHz	15	15	15	15		<u></u>
Allocated resource blocks for CORESET		24	18	24	18		
Note 3							
Number of transmitter		1	1	1	1		
antennas							<u></u>
Duration of CORESET	symbols	2	2	2	2		
REG bundle size		6	6	6	6		
		Same as	Same as	Same as	Same as		
DMRS precoder		REG	REG	REG	REG		
granularity		bundle	bundle	bundle	bundle		
		size	size	size	size		
CCE to REG mapping		Interleaved	Interleaved	Interleaved	Interleaved		
Interleave n_shift		0	0	0	0		
Interleave size		2	2	2	2		<u> </u>
Beamforming Pre-		N/A	N/A	N/A	N/A		
Coder							
Aggregation level	CCE	4	2	8	4		
DCI formats		Note 1	Note 1	Note 1	Note 1		
Payload size (without CRC)	bits	Note 2	Note 2	Note 2	Note 2		

Note 1: DCI format shall depend upon the test configuration.

Note 2: Payload size shall depend upon the test configuration

Note 3: Allocated in the resource blocks where the associated RMC is scheduled.

Table A.3.1.3.2-2: Control Channel RMC for TDD with SCS=30KHz

Parameter	Unit			V	alue		
Reference channel		CCR.2.1	CCR.2.2	CCR.2.3	CCR.2.4		
		TDD	TDD	TDD	TDD		
Channel bandwidth	MHz	Defined in	Defined in	Defined in	Defined in		
		test case	test case	test case	test case		
Subcarrier spacing	kHz	30	30	30	30		
Allocated resource blocks for CORESET Note 3		24	24	18	18		
Number of transmitter antennas		1	1	1	1		

Duration of CORESET	symbols	2	2	2	2		
REG bundle size		6	6	6	6		
DMRS precoder		Same as REG	Same as REG	Same as REG	Same as REG		
granularity		bundle size		bundle	bundle		
			size	size	size		
CCE to REG mapping		Interleaved	Interleaved	Interleaved	Interleaved		
Interleave n_shift		0	0	0	0		
Interleave size		2	2	2	2		
Beamforming Pre- Coder		N/A	N/A	N/A	N/A		
Aggregation level	CCE	4	8	4	2		
DCI formats		Note 1	Note 1	Note 1	Note 1		
Payload size (without CRC)	bits	Note 2	Note 2	Note 2	Note 2		

Note 1: DCI format shall depend upon the test configuration.

Note 2: Payload size shall depend upon the test configuration.

Note 3: Allocated in the same resource blocks where the associated RMC is scheduled.

Table A.3.1.3.2-3: Control Channel RMC for TDD with SCS=120KHz

Parameter	Unit				Value			
Reference channel		CCR.3.1	CCR.3.2	CCR.3.3	CCR.3.4	CCR.3.5	CCR.3.6	CCR.3.7
		TDD	TDD	TDD	TDD	TDD	TDD	TDD
Channel bandwidth	MHz	100	100	100	100	100	100	100
Subcarrier spacing	kHz	120	120	120	120	120	120	120
Allocated resource blocks for CORESET Note 3		24	24	24	24	24	24	48
Number of transmitter antennas		1	1	1	1	1	1	1
monitoringSlotPeriodicityAndOffset		sl160	sl160	sl160	sl160	sl160	sl160	sl160
Note 4		0	0	80	0	0	80	0
monitoringSymbolsWithinSlot		1100000	0011000	1100000	1000000	0010000	1000000	1100000
		0000000	0000000	0000000	0000000	0000000	0000000	0000000
Duration of CORESET	slot	1	1	1	2	2	2	1
REG bundle size		6	6	6	6	6	6	6
		Same as	Same as	Same as	Same as	Same as	Same as	Same as
DMRS precoder granularity		REG	REG	REG	REG	REG	REG	REG
Divirto precoder grandianty		bundle size	bundle	bundle	bundle	bundle size	bundle size	bundle
			size	size	size			size
CCE to REG mapping		Interleaved	Interleave	Interleave	Interleave	Interleaved	Interleaved	Interleav
CCL to NEO mapping			d	d	d			ed
Interleave n_shift		0	0	0	0	0	0	0
Interleave size		2	2	2	2	2	2	2
Beamforming Pre-Coder		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aggregation level	CCE	4	4	4	8	8	8	4
DCI formats		Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
Payload size (without CRC)	bits	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2

Note 1: DCI format shall depend upon the test configuration.

Note 2: Payload size shall depend upon the test configuration.

Note 3: Allocated in the same resource blocks where the associated PDSCH RMC is scheduled.

Note 4: monitoringSlotPeriodicityAndOffet is set to "sl1 0" if it is specifically stated that cell(s) configured with one of the control channel RMCs above shall transmit PDCCHs continuously.

A.3.1.4 TDD UL/DL configuration

Table A.3.1.4-1: TDD UL/DL configuration for SCS=15kHz

Parameter	Unit		Value	
Reference channel		TDDConf.1.1		
referenceSubcarrierSpacing	kHz	15		
TDD UL/DL pattern 1 Note 2		'DSUU' S='10DL:2GP:2UL'		
dl-UL-	ms	4		
TransmissionPeriodicity				
nrofDownlinkSlots		1		
nrofDownlinkSymbols		10		
nrofUplinkSlot		2		
nrofUplinkSymbols		2		
TDD UL/DL pattern 2 Note 2		'D'		
dI-UL-	ms	1		
TransmissionPeriodicity				
nrofDownlinkSlots		1		
nrofDownlinkSymbols		0		
nrofUplinkSlot		0		
nrofUplinkSymbols		0		

Note 2: For information

Table A.3.1.4-2: TDD UL/DL configuration for SCS=30kHz

Parameter	Unit	Value	
Reference channel		TDDConf.2.1	
referenceSubcarrierSpacing	kHz	30	
TDD UL/DL pattern 1 Note 2		'3D1S4U'	
		S='6DL:4GP:4UL'	
dl-UL-	ms	4	
TransmissionPeriodicity			
nrofDownlinkSlots		3	
nrofDownlinkSymbols		6	
nrofUplinkSlot		4	
nrofUplinkSymbols		4	
TDD UL/DL pattern 2 Note 2		'DD'	
dI-UL-	ms	1	
TransmissionPeriodicity			
nrofDownlinkSlots		2	
nrofDownlinkSymbols		0	
nrofUplinkSlot		0	
nrofUplinkSymbols		0	
Note 1: As specified in TS 38.213	3 [3] and TS 3	38.331 [2].	<u> </u>

Note 1: As specified in TS 38.213 [3] and TS 38.331 [2].

Note 2: For information

Table A.3.1.4-3: TDD UL/DL configuration for SCS=120kHz

Parameter	Unit		Value	
Reference channel		TDDConf.3.1		
referenceSubcarrierSpacing	kHz	120		
TDD UL/DL pattern 1 Note 2		'DDDSU'		

		S='10DL:2GP:2UL'	
dl-UL-	ms	0.625	
TransmissionPeriodicity			
nrofDownlinkSlots		3	
nrofDownlinkSymbols		10	
nrofUplinkSlot		1	
nrofUplinkSymbols		2	
TDD UL/DL pattern 2 Note 2		Not configured	
dl-UL-	ms	Not configured	
TransmissionPeriodicity			
nrofDownlinkSlots		Not configured	
nrofDownlinkSymbols		Not configured	
nrofUplinkSlot		Not configured	
nrofUplinkSymbols		Not configured	

As specified in TS 38.213 [3] and TS 38.331 [2].

Note 2: For information

A.3.2 OFDMA channel noise generator (OCNG)

Generic OFDMA Channel Noise Generator (OCNG) A.3.2.1

The OCNG pattern is used in a test for modelling allocations of unused resources in the channel bandwidth to virtual UEs (which are not under test). The OCNG pattern comprises PDCCH and PDSCH transmissions to the virtual UEs.

A.3.2.1.1 OCNG pattern 1: Generic OCNG pattern for all unused REs

Table A.3.2.1.1-1: OP.1: Generic OCNG pattern for all unused REs

OCNG Parameters	Control Region	Data Region
Resource allocation	Unused REs (Note 1)	Unused REs (Note 2)
Channel	PDCCH	PDSCH
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK modulated data
Antenna transmission scheme	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Subcarrier spacing Same as used in PDCCH RMC		Same as used in PDSCH RMC
Aggregation level Same as used in PDCCH RMC		N/A
Code rate Same as used in PDCCH RMC		Same as used in PDSCH RMC
Transmit Power	Same as used in PDCCH RMC	Same as used in PDSCH RMC
CP length	CP length Same as used in PDCCH RMC Same as used in PDSCH RMC	
Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the UE under test.		

REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the channel bandwidth of the cell, confined to BWoccupied where specified in the test case.

A.3.2.1.2 OCNG pattern 2: Generic OCNG pattern for all unused REs for 2AoA setup

Table A.3.2.1.2-2: OP.2: Generic OCNG pattern for all unused REs for 2AoA setup

OCNG Parameters	Control Region	Data Region
Probe	Transmitting the serving beam	

Resource allocation Unused REs (Note 1) in the		Unused REs (Note 2) in the symbols where	
	symbols where SSB/CSI-RS are not	SSB/CSI-RS are not transmitted from both	
	transmitted from both the serving	the serving beam probe and non-serving	
	beam probe and non-serving beam	beam probe.	
	probe.		
Channel	PDCCH	PDSCH	
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK	
		modulated data	
Antenna transmission	Same as used in PDCCH RMC	Same as used in PDSCH RMC	
scheme			
Subcarrier spacing	Same as used in PDCCH RMC	Same as used in PDSCH RMC	
Aggregation level	Same as used in PDCCH RMC	N/A	
Code rate	Same as used in PDCCH RMC	Same as used in PDSCH RMC	
Transmit Power	Same as used in PDCCH RMC	Same as used in PDSCH RMC	
CP length Same as used in PDCCH RMC		Same as used in PDSCH RMC	
Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the UE under test.			
Note 2: REs not allocated	Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the		

- Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the channel bandwidth of the cell, confined to BW_{occupied} where specified in the test case
- Note 3: No OCNG is transmitted from the probe transmitting non-serving beam.

A.3.2.1.3 OCNG pattern 3: Generic OCNG pattern for unused REs in the same bandwidth as CORESET

Table A.3.2.1.3-1: OP.3: Generic OCNG pattern for unused REs in the same BW as CORESET

OCNG Parameters	Control Region	Data Region
Resource allocation	Unused REs (Note 1)	Unused REs (Note 2)
Channel	PDCCH	PDSCH
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK modulated data
Antenna transmission scheme	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Subcarrier spacing	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Aggregation level	Same as used in PDCCH RMC	N/A
Code rate	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Transmit Power	Same as used in PDCCH RMC	Same as used in PDSCH RMC
CP length	Same as used in PDCCH RMC	Same as used in PDSCH RMC

- Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the UE under test. REs for OCNG shall not be allocated outside the allocated bandwidth of the CORESET of the serving cell.
- Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the allocated bandwidth of the CORESET of the serving cell. REs for OCNG shall not be allocated outside the allocated bandwidth of the CORESET of the serving cell.

A.3.2.1.4 OCNG pattern 4: Generic OCNG pattern for all unused REs outside SSB slot(s)

Table A.3.2.1.4-1: OP.4: Generic OCNG pattern for all unused REs outside SSB slot(s)

OCNG Parameters	Control Region	Data Region
Resource allocation	Unused REs (Note 1)	Unused REs (Note 2)
Channel	PDCCH	PDSCH
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK modulated data

Antenna transmission scheme	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Subcarrier spacing	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Aggregation level	Same as used in PDCCH RMC	N/A
Code rate	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Transmit Power	Same as used in PDCCH RMC	Same as used in PDSCH RMC
CP length	Same as used in PDCCH RMC	Same as used in PDSCH RMC

- Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the UE under test. REs for OCNG shall not be allocated in the slot(s) containing SSB of the respective cell.
- Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the channel bandwidth of the cell. REs for OCNG shall not be allocated in the slot(s) containing SSB of the respective cell.

A.3.2.1.5 OCNG pattern 5: Generic OCNG pattern for unused REs in the same bandwidth as CORESET for 2AoA setup

Table A.3.2.1.5-1: OP.5: Generic OCNG pattern for unused REs in the same BW as CORESET for 2AoA setup

OCNG Parameters	Control Region	Data Region
Probe	Transmitting the serving beam	
Resource allocation	Unused REs (Note 1) in the symbols where SSB/CSI-RS are not transmitted from both the serving beam probe and non-serving beam probe.	Unused REs (Note 2) in the symbols where SSB/CSI-RS are not transmitted from both the serving beam probe and non-serving beam probe.
Channel	PDCCH	PDSCH
Contents	Virtual UE IDs	Uncorrelated pseudo random QPSK modulated data
Antenna transmission scheme	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Subcarrier spacing	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Aggregation level	Same as used in PDCCH RMC	N/A
Code rate	Same as used in PDCCH RMC	Same as used in PDSCH RMC
Transmit Power	Same as used in PDCCH RMC	Same as used in PDSCH RMC
CP length	Same as used in PDCCH RMC	Same as used in PDSCH RMC

- Note 1: REs not used in the active CORESETs where PDCCH is scheduled for the UE under test. REs for OCNG shall not be allocated outside the allocated bandwidth of the CORESET of the serving cell.
- Note 2: REs not allocated to any physical channels, CORESET, SSB or any other reference signal within the allocated bandwidth of the CORESET of the serving cell. REs for OCNG shall not be allocated outside the allocated bandwidth of the CORESET of the serving cell.
- Note 3: No OCNG is transmitted from the probe transmitting non-serving beam.

A.3.2.2 Void

Reference DRX configurations A.3.3

DRX Configuration 1: DRX cycle = 40 ms and TAT = 500 ms A.3.3.1

Table A.3.3.1-1: DRX.1: DRX cycle = 40 ms and time alignment timer (TAT) = 500 ms

Field	Value
drx-onDurationTimer	1 ms
drx-InactivityTimer	1 ms
drx-RetransmissionTimerDL	1 slot
drx-RetransmissionTimerUL	1 slot
drx-LongCycleStartOffset	40 ms
shortDRX	disable
TimeAlignmentTimer	500 ms
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment	
timer parameters are specified in clause 6.3.2 in TS 38.331 [2]	

A.3.3.2 DRX Configuration 2: DRX cycle = 640 ms and TAT = 500 ms

Table A.3.3.2-1: DRX.2: DRX cycle = 640 ms and time alignment timer (TAT) = 500 ms

Field	Value
drx-onDurationTimer	1 ms
drx-InactivityTimer	1 ms
drx-RetransmissionTimerDL	1 slot
drx-RetransmissionTimerUL	1 slot
drx-LongCycleStartOffset	640 ms
shortDRX	disable
TimeAlignmentTimer 500 ms	
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment	
timer parameters are specified in clause 6.3.2 in TS 38.331 [2]	

A.3.3.3 DRX Configuration 3: DRX cycle = 40 ms and TAT = Infinity

Table A.3.3.3-1: DRX.3: DRX cycle = 40 ms and time alignment timer (TAT) = Infinity

Field	Value		
drx-onDurationTimer	6 ms		
drx-InactivityTimer	1 ms		
drx-RetransmissionTimerDL	1 slot		
drx-RetransmissionTimerUL	1 slot		
drx-LongCycleStartOffset 40 ms			
shortDRX disable			
TimeAlignmentTimer Infinity			
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment			
timer parameters are specified in clause 6.3.2 in TS 38.331 [2]			

A.3.3.4 DRX Configuration 4: DRX cycle = 160 ms and TAT = Infinity

Table A.3.3.4-1: DRX.4: DRX cycle = 160 ms and time alignment timer (TAT) = Infinity

Field	Value		
drx-onDurationTimer	psf2		
drx-InactivityTimer	psf2		
drx-RetransmissionTimer	Psf16		
longDRX-CycleStartOffset	sf160, 0		
shortDRX disable			
TimeAlignmentTimer Infinity			
Note: This DRX configuration is applicable for E-UTRA serving cell. For further information see			
clause 6.3.2 in TS 36.331 [16].			

A.3.3.5 DRX Configuration 5: DRX cycle = 320 ms and TAT = Infinity

Table A.3.3.5-1: DRX.5: DRX cycle = 320 ms and time alignment timer (TAT) = Infinity

Field	Value		
drx-onDurationTimer	psf6		
drx-InactivityTimer	psf1920		
drx-RetransmissionTimer psf16			
longDRX-CycleStartOffset sf320, 0			
shortDRX disable			
TimeAlignmentTimer Infinity			
Note: This DRX configuration is applicable for E-UTRA serving cell. For further information see			
clause 6.3.2 in TS 36.331 [16].			

A.3.3.6 DRX Configuration 6: DRX cycle = 320 ms and TAT = 500 ms

Table A.3.3.6-1: DRX.6: DRX cycle = 320 ms and time alignment timer (TAT) = 500 ms

Field	Value		
drx-onDurationTimer	1 ms		
drx-InactivityTimer	1 ms		
drx-RetransmissionTimerDL	1 slot		
drx-RetransmissionTimerUL	1 slot		
drx-LongCycleStartOffset	320 ms		
shortDRX	disable		
TimeAlignmentTimer 500 ms			
Note: This DRX configuration is applicable	e for NR serving cell. The DRX cycle and time alignment		
timer parameters are specified in cla	ause 6.3.2 in TS 38.331 [2]		

A.3.3.7 DRX Configuration 7: DRX cycle = 640 ms and TAT = Infinity

Table A.3.3.7-1: DRX.7: DRX cycle = 640 ms and time alignment timer (TAT) = Infinity

Field	Value		
drx-onDurationTimer	6 ms		
drx-InactivityTimer	1 ms		
drx-RetransmissionTimerDL 1 slot			
drx-RetransmissionTimerUL	1 slot		
drx-LongCycleStartOffset	640 ms		
shortDRX	disable		
TimeAlignmentTimer Infinity			
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment timer parameters are specified in clause 6.3.2 in TS 38.331 [2]			

A.3.3.8 DRX Configuration 8: DRX cycle = 320 ms and TAT = Infinity

Table A.3.3.8-1: DRX.8: DRX cycle = 320 ms and time alignment timer (TAT) = Infinity

Field	Value			
drx-onDurationTimer	6 ms			
drx-InactivityTimer	1 ms			
drx-RetransmissionTimerDL	1 slot			
drx-RetransmissionTimerUL	1 slot			
drx-LongCycleStartOffset	320 ms			
shortDRX	disable			
TimeAlignmentTimer Infinity				
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment timer parameters are specified in clause 6.3.2 in TS 38.331 [2]				

A.3.3.9 DRX Configuration 9: DRX cycle = 40 ms and TAT = 500 ms

Table A.3.3.9-1: DRX.9: DRX cycle = 40 ms and time alignment timer (TAT) = 500 ms

Field	Value		
drx-onDurationTimer	psf2		
drx-InactivityTimer	psf2		
drx-RetransmissionTimer	psf16		
longDRX-CycleStartOffset	sf40, 0		
shortDRX disable			
TimeAlignmentTimer 500 ms			
Note: This DRX configuration is applicable for E-UTRA serving cell. For further information see			
clause 6.3.2 in TS 36.331 [16].			

A.3.3.10 DRX Configuration 10: DRX cycle = 640 ms and TAT = 500 ms

Table A.3.3.10-1: DRX.10: DRX cycle = 640 ms and time alignment timer (TAT) = 500 ms

Field	Value		
drx-onDurationTimer	psf6		
drx-InactivityTimer	psf2		
drx-RetransmissionTimer	psf16		
longDRX-CycleStartOffset	sf640, 0		
shortDRX	disable		
TimeAlignmentTimer 500 ms			
Note: This DRX configuration is applicable for E-UTRA serving cell. For further information see clause 6.3.2 in TS 36.331 [16].			

A.3.3.11 DRX Configuration 11: DRX cycle = 20 ms and TAT = Infinity

Table A.3.3.11-1: DRX.11: DRX cycle = 20 ms and time alignment timer (TAT) = Infinity

Field	Value		
drx-onDurationTimer	6 ms		
drx-InactivityTimer	1 ms		
drx-RetransmissionTimerDL 1 slot			
drx-RetransmissionTimerUL	1 slot		
drx-LongCycleStartOffset 20 ms			
shortDRX disable			
TimeAlignmentTimer Infinity			
Note: This DRX configuration is applicable for NR serving cell. The DRX cycle and time alignment			
timer parameters are specified in clause 6.3.2 in TS 38.331 [2]			

A.3.3.12 DRX Configuration 12: DRX cycle = 640 ms and TAT = Infinity

Table A.3.3.12-1: DRX.12: DRX cycle = 640 ms and time alignment timer (TAT) = Infinity

Field	Value		
drx-onDurationTimer	psf6		
drx-InactivityTimer	psf2		
rx-RetransmissionTimer psf16			
longDRX-CycleStartOffset	sf640, 0		
shortDRX	disable		
TimeAlignmentTimer Infinity			
Note: This DRX configuration is applica clause 6.3.2 in TS 36.331 [16].	ble for E-UTRA serving cell. For further information see		

A.3.4 Test Cases with Different Channel Bandwidths

A.3.4.1 Test Cases with Different E-UTRA Channel Bandwidths

A.3.4.1.1 Introduction

In Annex A test cases involving E-UTRA cell(s) may be defined with different E-UTRA channel bandwidths to verify the same type of RRM requirement.

A.3.4.1.2 Principle of testing

If multiple test cases involving E-UTRA cell(s) are defined with different E-UTRA channel bandwidths to verify the same type of RRM requirement that is E-UTRA channel bandwidth independent, then the UE needs to be tested with only one channel bandwidth in each E-UTRA cell and with the same bandwidth in all the E-UTRA cells used in the test case.

A.3.5 Test Cases for Synchronous and Asynchronous DC Operations

A.3.5.1 EN-DC Test Cases for Synchronous and Asynchronous EN-DC Operations

A.3.5.1.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements for EN-DC operation in synchronous and asynchronous scenarios.

In Annex A test cases may be defined in both synchronous EN-DC and asynchronous EN-DC scenarios to verify the same type of RRM requirement.

A.3.5.1.2 Principle of Testing

If EN-DC test cases are defined in both synchronous and asynchronous EN-DC scenarios to verify the same type of RRM requirement then the UE capable of both synchronous and asynchronous EN-DC operations needs to be tested with one of the tests in either synchronous or asynchronous EN-DC scenarios.

A.3.6 Antenna configurations

A.3.6.1 Antenna configurations for FR1

Unless otherwise specified, NR FDD or NR TDD cells in all RRM Test cases in AWGN propagation condition are configured with Antenna Configuration 1x2.

A.3.6.1.1 Antenna connection for 4 Rx capable UEs

A.3.6.1.1.1 Introduction

All tests in clause A.4 and A.6 are specified for UEs supporting 2RX. In this clause, the antenna connection method for applying 2RX tests to UEs supporting 4RX antenna ports is specified. No tests are currently specified in clause A.4 or A.6 which are applicable only to 4RX antenna ports, so 4RX capable UEs are always tested by reusing tests which were originally specified for 2RX UEs.

A.3.6.1.1.2 Principle of testing

A.3.6.1.1.2.1 Single carrier tests

For 4RX capable UEs supporting at least one band where 2RX is supported and 4RX is not supported, all single carrier tests specified in clause A.4 and A.6 except those in A.4.7 and A.6.7 shall be tested on any band where 2RX is supported and 4RX is not supported with the antenna connection specified in A.3.6.1.1.2.4. For single carrier tests specified in clause A.4.7 or A.6.7, all tests shall be tested with the antenna connection specified in A.3.6.1.1.2.4 for bands where 2RX is supported and 4RX is not supported, and the antenna connection specified in A.3.6.1.1.2.5 for bands where 4RX is supported.

For 4RX capable UEs which do not support any band where 2RX is supported and 4RX is not supported, all tests specified in clauses A.4 and A.6 shall be tested using the antenna connection specified in clause A.3.6.1.1.2.5. For radio link monitoring tests, the SNR levels are modified according to table A.3.6.1.1.2.1-1 and table A.3.6.1.1.2.1-2.

Table A.3.6.1.1.2.1-1: Modified parameters for RLM out of sync testing with 4 RX antenna connection

Test case	SNR during T3 (dB)			
	Test 1	Test 2	Test 3	Test 4
A.4.5.1.1	-18	N/A	N/A	N/A
A.4.5.1.3	-18	N/A	N/A	N/A
A.4.5.1.5	-18	N/A	N/A	N/A
A.4.5.1.7	-18	N/A	N/A	N/A
A.5.5.1.1	-18	N/A	N/A	N/A
A.5.5.1.3	-18	N/A	N/A	N/A
A.5.5.1.5	-18	N/A	N/A	N/A
A.5.5.1.7	-18	N/A	N/A	N/A
A.6.5.1.1	-18	N/A	N/A	N/A
A.6.5.1.3	-18	N/A	N/A	N/A
A.6.5.1.5	-18	N/A	N/A	N/A
A.6.5.1.7	-18	N/A	N/A	N/A
A.7.5.1.1	-18	N/A	N/A	N/A
A.7.5.1.3	-18	N/A	N/A	N/A
A.7.5.1.5	-18	N/A	N/A	N/A
A.7.5.1.7	-18	N/A	N/A	N/A

Table A.3.6.1.1.2.1-2: Modified parameters for RLM in sync single carrier testing with 4 RX antenna connection

Test case	SNR dur	SNR during T3 (dB)		g T4 (dB)
	Test 1	Test 2	Test 1	Test 2
A.4.5.1.2	-18	N/A	-8	N/A
A.4.5.1.4	-18	N/A	-8	N/A
A.4.5.1.6	-18	N/A	-8	N/A

A.4.5.1.8	-18	N/A	-8	N/A
A.5.5.1.2	-18	N/A	-8	N/A
A.5.5.1.4	-18	N/A	-8	N/A
A.5.5.1.6	-18	N/A	-8	N/A
A.5.5.1.8	-18	N/A	-8	N/A
A.6.5.1.2	-18	N/A	-8	N/A
A.6.5.1.4	-18	N/A	-8	N/A
A.6.5.1.6	-18	N/A	-8	N/A
A.6.5.1.8	-18	N/A	-8	N/A
A.7.5.1.2	-18	N/A	-8	N/A
A.7.5.1.4	-18	N/A	-8	N/A
A.7.5.1.6	-18	N/A	-8	N/A
A.7.5.1.8	-18	N/A	-8	N/A

Table A.3.6.1.1.2.1-3: Modified parameters for Beam Failure Detection and Link Recovery testing with 4 RX antenna connection

Test case	SNR for RS in set q ₀ during T3, T4 and T5 (dB)
	Test 1
A.4.5.5.1	-15
A.4.5.5.2	-15
A.4.5.5.3	-15
A.4.5.5.4	-15
A.5.5.5.1	-15
A.5.5.5.2	-15
A.5.5.5.3	-15
A.5.5.5.4	-15
A.6.5.5.1	-15
A.6.5.5.2	-15
A.6.5.5.3	-15
A.6.5.5.4	-15
A.7.5.5.1	-15
A.7.5.5.2	-15
A.7.5.5.3	-15
A.7.5.5.4	-15

A.3.6.1.1.2.2 Carrier aggregation tests

All carrier aggregation tests are performed using the antenna connection in clause A.3.6.1.1.2.4 for the PCell antenna connection if the PCell is on a band where 2RX is supported and 4RX is not supported, or using the antenna connection in A.3.6.1.1.2.5 for the PCell antenna connection if the PCell is on a band where 4RX is supported.

All carrier aggregation tests are performed using the antenna connection in clause A.3.6.1.1.2.4 for the SCell antenna connection if an SCell is on band where 2RX is supported and 4RX is not supported, or using the antenna connection in A.3.6.1.1.2.5 for the SCell antenna connection if an SCell is on a band where 4RX is supported.

A.3.6.1.1.2.3 EN-DC tests

All EN-DC tests are performed using the antenna connection in clause A.3.6.1.1.2.6 for the PCell antenna connection if the PCell is on a band where 2RX is supported and 4RX is not supported, or using the antenna connection in A.3.6.1.1.2.7 for the PCell antenna connection if the PCell is on a band where 4RX is supported.

All EN-DC tests are performed using the antenna connection in clause A.3.6.1.1.2.4 for the PSCell or SCell antenna connection if an SCell is on band where 2RX is supported and 4RX is not supported, or using the antenna connection in A.3.6.1.1.2.5 for the SCell antenna connection if an SCell or PSCell is on a band where 4RX is supported.

A.3.6.1.1.2.4 Antenna connection for bands where 2RX is supported

For bands where 2RX is supported and 4RX is not supported, it is left to the UE declaration and antenna port configuration to decide which 2 of the 4 Rx ports are connected with data source from system simulator. The remaining 2 RX ports shall be connected with zero input. No test parameters or requirements are modified.

A.3.6.1.1.2.5 Antenna connection for bands where 4RX is supported

For bands where 4RX is supported, all 4 RX antennas are connected with data source from system simulator. The system simulator shall provide independent noise and fading (low correlation) for each antenna port. Except for the modifications to radio link monitoring thresholds described in clauses A.3.6.1.1.2.1 and A.3.6.1.1.2.2, no test parameters or requirements are modified.

A.3.6.1.1.2.6 EN-DC LTE Antenna connection for bands where 2RX is supported

For E-UTRAN bands where 2RX is supported and 4RX is not supported, it is left to the UE declaration and antenna port configuration to decide which 2 of the 4 Rx ports are connected with data source from system simulator. The remaining 2 RX ports shall be connected with zero input. No test parameters or requirements are modified.

A.3.6.1.1.2.7 EN-DC LTE Antenna connection for bands where 4RX is supported

For E-UTRAN bands where 4RX is supported, all 4 RX antennas are connected with data source from system simulator. The system simulator shall provide independent noise and fading (low correlation) for each antenna port. Except for the modifications to radio link monitoring thresholds described in clauses A.3.8.1.2.1 and A.3.8.1.2.2 of TS 36.133 [15], no test parameters or requirements are modified.

A.3.6.2 Antenna configurations for FR2

Unless otherwise specified, the default Downlink Antenna Configuration for NR FR2 cells is 1x2.

In case of Downlink Antenna Configuration 2x2 for NR FR2 cells, unless otherwise specified, the downlink signal is transmitted over the two polarizations (V and H) of the dual polarized antenna of the test equipment.

In both cases, the downlink signal is received assuming 2 UE baseband receivers. As the UE is tested following the Blackbox Approach with regard to the UE Rx antennas, the exact UE Rx antenna configuration is not relevant for the test configuration and has no impact on the test implementation.

A.3.7 EN-DC test setup

A.3.7.1 Introduction

A.3.7.2 E-UTRAN Serving Cell Parameters

A.3.7.2.1 E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR1

Table A.3.7.2.1-1 defines cell specific test parameters for E-UTRAN cell which can be used in EN-DC test cases or in any test case comprising at least one E-UTRA serving cell with all NR cells in FR1. Unless otherwise stated within the test, all measurements in Annex A.4 and A.5 are performed only on the NR carrier. The E-UTRA serving cell shall configured to not interfere with NR operation and the E-UTRA serving cell signal power shall not be critical to the test purpose.

Table A.3.7.2.1-1: E-UTRAN cell specific test parameters for tests with all NR cells in FR1

Parameter	Unit	E-UTRAN Cell
Duplex mode		FDD or TDD
TDD special subframe configuration ^{Note1}		
TDD special subtraine configuration Note1		6
TDD uplink-downlink configuration ^{Note1}		•
BW _{channel}		5 MHz: N _{RB,c} = 25
		10 MHz: N _{RB,c} = 50
DD00H		20 MHz: N _{RB,c} = 100
PDSCH parameters:		5 MHz: R.7 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.3 FDD
		20 MHz: R.6 FDD
		5 MHz: R.4 TDD
		10 MHz: R.0 TDD
DOCIOLI/DDOOLI/DLIIOLI		20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters:		5 MHz: R.11 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.6 FDD
		20 MHz: R.10 FDD
		5 MHz: R.11 TDD
		10 MHz: R.6 TDD
O CALLO D Note?		20 MHz: R.10 TDD
OCNG Patterns ^{Note2}		5 MHz: OP.20 FDD
		10 MHz: OP.10 FDD
		20 MHz: OP.17 FDD
		5 MHz: OP.9 TDD
		10 MHz: OP.1 TDD
		20 MHz: OP.7 TDD
PBCH_RA	dB	
PBCH_RB	dB	
PSS_RA	dB	
SSS_RA	dB	
PCFICH_RB	dB	
PHICH_RA	dB	
PHICH_RB	dB	0
PDCCH_RA	dB	
PDCCH_RB	dB	
PDSCH_RA	dB	
PDSCH_RB	dB	
OCNG_RA ^{Note3}	dB	
OCNG_RBNote3	dB	45.
NocNote4	dBm/15 kHz	-104
Ês/Noc	dB	17
Ê _s /I _{ot}	dB	17
RSRP Note5	dBm/15 kHz	-87
SCH_RP Note5	dBm/15 kHz	-87
Io Note5	dBm/Ch BW	-59.13+10log(N _{RB,c} /50)
Propagation Condition		AWGN
Antenna Configuration		1x2
1		

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211.

Note 5: E_s/I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

A.3.7.2.2 E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR2

Table A.3.7.2.2-1 defines cell specific test parameters for E-UTRAN cell which can be used in EN-DC test cases or in any test case comprising at least one E-UTRA serving cell with one or more NR cells in FR2.

Table A.3.7.2.2-1: E-UTRAN cell specific test parameters for tests with one or more NR cells in FR2

Parameter	Unit	E-UTRAN Cell
Duplex mode		FDD or TDD
TDD special subframe configuration ^{Note1}		6
TDD uplink-downlink configuration ^{Note1}		1
BW _{channel}	MHz	5 MHz: N _{RB,c} = 25
		10 MHz: N _{RB,c} = 50
		20 MHz: N _{RB,c} = 100
PDSCH parameters:		5 MHz: R.7 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.3 FDD
		20 MHz: R.6 FDD
		5 MHz: R.4 TDD
		10 MHz: R.0 TDD
		20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters:		5 MHz: R.11 FDD
DL Reference Measurement Channel ^{Note2}		10 MHz: R.6 FDD
		20 MHz: R.10 FDD
		5 MHz: R.11 TDD
		10 MHz: R.6 TDD
		20 MHz: R.10 TDD
OCNG Patterns ^{Note2}		5 MHz: OP.20 FDD
		10 MHz: OP.10 FDD
		20 MHz: OP.17 FDD
		5 MHz: OP.9 TDD
		10 MHz: OP.1 TDD
		20 MHz: OP.7 TDD
PBCH_RA	dB	
PBCH_RB	dB	
PSS_RA	dB	
SSS_RA	dB	
PCFICH_RB	dB	
PHICH_RA	dB	
PHICH_RB	dB	0
PDCCH_RA	dB	
PDCCH_RB	dB	
PDSCH_RA	dB	
PDSCH_RB	dB	
OCNG_RA ^{Note3}	dB	
OCNG_RB ^{Note3}	dB	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211.

Note 4: The E-UTRA signal is required only to ensure the E-UTRA link to the DUT in the EN-DC operation. The Test System shall provide a stable and noise-free E-UTRA signal without need of precise propagation modelling, path loss and polarization control. Further details of the E-UTRA signal configuration are not defined as part of the cell specific test parameters, since the E-UTRA link is not under performance verification and shall not affect the test result unless otherwise specifically stated in the test case.

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

A.3.7A NR FR1-FR2 test setup

Some Test cases in clause A.7 have NR cells in both FR1 and FR2. Unless otherwise stated within the test, the NR FR1 Cell signal is required only to provide a link to the UE under test. The Test System shall provide a stable and noise-free NR FR1 signal without need of precise propagation modelling, path loss and polarization control. Further details of the NR FR1 signal configuration are not defined as part of the cell specific test parameters, since the NR FR1 link is not under performance verification and shall not affect the test result unless otherwise specifically stated in the test case.

A.3.7B Void

A.3.7C LTE-FR1/FR2 test setup

Some Test cases in clause A.5 have LTE and FR2 NR cells. Unless otherwise stated within the test, the LTE Cell signal is required only to provide a link to the UE under test. The Test System shall provide a stable and noise-free LTE signal without need of precise propagation modelling, path loss and polarization control. Further details of the LTE signal configuration are not defined as part of the cell specific test parameters, since the LTE link is not under performance verification and shall not affect the test result unless otherwise specifically stated in the test case.

A.3.7D NE-DC test setup

A.3.7D.1 Introduction

A.3.7D.2 E-UTRAN Serving Cell Parameters

A.3.7D.2.1 E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR1

The parameters are same as as specified in clause A.3.7.2.1.

A.3.7D.2.2 E-UTRAN Serving Cell Parameters for Tests with NR Cell(s) in FR2

The parameters are same as as specified in clause A.3.7.2.2.

A.3.8 PRACH configurations

A.3.8.1 Introduction

This clause provides the typical PRACH configurations used for RRM test cases defined in Annex A. To note that for other parameters not listed in this clause, either it can be derived from the set up of each test or it is subjected to RAN5 specifications.

A.3.8.2 PRACH configurations in FR1

A.3.8.2.1 FR1 PRACH configuration 1

FR1 PRACH configuration 1 in this clause provides the typical PRACH configuration for SSB-based contention based random access in FR1.

Table A.3.8.2.1-1: Parameters for FR1 PRACH configuration 1

Field	Value	Comment	
prach-ConfigurationIndex	102	10ms PRACH periodicity, and other detailed	
		configuration defined in table 6.3.3.2-2 and table 6.3.3.2-	
		3 in TS 38.211 [6].	
msg1-SubcarrierSpacing	Same as UL		
	carrier SCS		
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based	
		and contention free random access	
numberOfRA-PreamblesGroupA	48	No group B.	
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence =	
		1.	
ssb-perRACH-OccasionAndCB-	oneFourth, n48	OneFourth: 1 SSB associated with 4 RACH occasions	
PreamblesPerSSB		n48: 48 contention based preambles per SSB	
msg1-FDM	One	One PRACH transmission occasions FDMed in one time	
		instance.	
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is -105dBm, as defined	
		in TS 38.331 [2].	
ra-ContentionResolutionTimer	sf48	48 sub-frames	
powerRampingStep	dB2		
preambleReceivedTargetPower	dBm-120		
preambleTransMax	n6	Max number of RA preamble transmission performed	
		before declaring a failure is 6	
ra-ResponseWindow	sl10	10 slots	
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 23	
Backoff Parameter Index	2	20ms, as defined in table 7.2-1 in TS 38.321 [7].	
Note: For further information see clause 6.3.2 in TS 38.331 [2].			

A.3.8.2.2 FR1 PRACH configuration 2

FR1 PRACH configuration 2 in this clause provides the typical PRACH configuration for SSB based non-contention based random access in FR1.

Table A.3.8.2.2-1: Parameters for FR1 PRACH configuration 2

Field	Value	Comment
prach-ConfigurationIndex	102	10ms PRACH periodicity, and other detailed configuration defined in table 6.3.3.2-2 and table 6.3.3.2-3 in TS 38.211 [6].
msg1-SubcarrierSpacing	Same as UL carrier SCS	
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based and contention free random access
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence = 1.

ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH occasions
msg1-FDM	One	One PRACH transmission occasions FDMed in one time instance.
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n6	Max number of RA preamble transmission performed before declaring a failure is 6
ra-ResponseWindow	sl10	10 slots
zeroCorrelationZoneConfig	11	N-CS configuration, Ncs = 23
Backoff Parameter Index	2	20ms, as defined in table 7.2-1 in TS 38.321 [7].
ssb-ResourceList	ra-PreambleIndex = 50	Associated with SSB index 0. UE doesn't use ssb-ResourceList and BFR-SSB-Resource IEs at the same time. UE doesn't use this field if is transmitting CFRA to convey BFR.
BFR-SSB-Resource	ra-PreambleIndex = 50	Associated with SSB index 0. UE doesn't use ssb-ResourceList and BFR-SSB-Resource IEs at the same time. UE uses this field only if is transmitting CFRA to convey BFR
ra-ssb-OccasionMaskIndex	1	PRACH occasion index 1 is allowed
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is - 105dBm, as defined in TS 38.331 [2].
Note: For further information se	ee clause 6.3.2 in TS 38.331 [2].

A.3.8.2.3 FR1 PRACH configuration 3

FR1 PRACH configuration 3 in this clause provides the typical PRACH configuration for CSI-RS based non-contention based random access in FR1.

Table A.3.8.2.3-1: Parameters for FR1 PRACH configuration 3

Field	Value	Comment
prach-ConfigurationIndex	102	10ms PRACH periodicity, and other detailed configuration defined in table 6.3.3.2-2 and table 6.3.3.2-3 in TS 38.211 [6].
msg1-SubcarrierSpacing	Same as UL carrier SCS	
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based and contention free random access
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence = 1.
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH occasions
msg1-FDM	One	One PRACH transmission occasions FDMed in one time instance.
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n6	Max number of RA preamble transmission performed before declaring a failure is 6
ra-ResponseWindow	sl10	10 slots
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 23
Backoff Parameter Index	2	20ms, as defined in table 7.2-1 in TS 38.321 [7].

csirs-ResourceList	ra-PreambleIndex = 50	Associated with CSI-RS configured
ra-OccasionList	1	RA occasions allowed corresponding to
		CSI-RS
rsrp-ThresholdCSI-RS	RSRP_51	The actual value of the threshold is -
		105dBm, as defined in TS 38.331 [2].
Note: For further information see clause 6.3.2 in TS 38.331 [2].		

A.3.8.2.4 FR1 PRACH configuration 4

FR1 PRACH configuration 4 in this clause provides the PRACH configuration for CSI-RS based non-contention based random access in FR1 to convey BFR.

Table A.3.8.2.4-1: Parameters for FR1 PRACH configuration 4

Field	Value	Comment	
prach-ConfigurationIndex	102	10ms PRACH periodicity, and other detailed configuration defined in table 6.3.3.2-2 and table 6.3.3.2-3 in TS 38.211 [6].	
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based and contention free random access	
numberOfRA-PreamblesGroupA	48	No group B.	
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence = 1.	
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH occasions	
msg1-FDM	One	One PRACH transmission occasions FDMed in one time instance.	
powerRampingStep	dB2		
preambleReceivedTargetPower	dBm-120		
preambleTransMax	n200	Max number of RA preamble transmission performed before declaring a failure is 200	
ra-ResponseWindow	sl1	1 slot	
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 93	
Backoff Parameter Index	2	20ms, as defined in table 7.2-1 in TS 38.321 [7].	
BFR-CSIRS-Resource	ra-PreambleIndex = 50	Associated with CSI-RS configured	
ra-OccasionList	1	RA occasions allowed corresponding to CSI-RS	
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is - 105dBm, as defined in TS 38.331 [2].	
Note: For further information see clause 6.3.2 in TS 38.331 [2].			

A.3.8.3 PRACH configurations in FR2

A.3.8.3.1 FR2 PRACH configuration 1

FR2 PRACH configuration 1 in this clause provides the typical PRACH configuration for SSB-based contention based random access in FR2.

Table A.3.8.3.1-1: Parameters for FR2 PRACH configuration 1

Field	Value	Comment
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prach-ConfigurationIndex	190	Preamble Format C2, with 10ms PRACH periodicity, and
		other detailed configuration defined in table 6.3.3.2-4 in
		TS 38.211 [6].
msg1-SubcarrierSpacing	Same as UL	
	carrier SCS	
totalNumberOfRA-Preambles	48	Total number of preambles used for contention based
		and contention free random access
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence =
		1.
ssb-perRACH-OccasionAndCB-	oneFourth, n48	OneFourth: 1 SSB associated with 4 RACH occasions
PreamblesPerSSB		n48: 48 contention based preambles per SSB
msg1-FDM	One	One PRACH transmission occasions FDMed in one time
		instance.
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is -105dBm, as defined
		in TS 38.331 [2].
ra-ContentionResolutionTimer	sf48	48 sub-frames
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n6	Max number of RA preamble transmission performed
		before declaring a failure is 6
ra-ResponseWindow	sl10	10 slots
zeroCorrelationZoneConfig	11	N-CS configuration, $N_{CS} = 23$
Backoff Parameter Index	2	20 ms, as defined in table 7.2-1 in TS 38.321 [7].
Note: For further information see clause 6.3.2 in TS 38.331 [2].		

A.3.8.3.2 FR2 PRACH configuration 2

FR2 PRACH configuration 2 in this clause provides the typical PRACH configuration for SSB based non-contention based random access in FR2.

Table A.3.8.3.2-1: Parameters for FR2 PRACH configuration 2

Field	Value	Comment
prach-ConfigurationIndex	190	Preamble Format C2, with 10ms PRACH
		periodicity, and other detailed configuration
		defined in table 6.3.3.2-4 in TS 38.211 [6].
msg1-SubcarrierSpacing	Same as UL carrier SCS	
totalNumberOfRA-Preambles	48	Total number of preambles used for
		contention based and contention free
		random access
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root
		sequence = 1.
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH
		occasions
msg1-FDM	One	One PRACH transmission occasions
		FDMed in one time instance.
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n6	Max number of RA preamble transmission
		performed before declaring a failure is 6
ra-ResponseWindow	sl10	10 slots
zeroCorrelationZoneConfig	11	N-CS configuration, N _{CS} = 23
Backoff Parameter Index	2	20 ms, as defined in table 7.2-1 in TS
		38.321 [7].

ssb-ResourceList	ra-PreambleIndex = 50	Associated with SSB index 0. UE doesn't
		use ssb-ResourceList and BFR-SSB-
		Resource IEs at the same time. UE doesn't
		use this field if is transmitting CFRA to
		convey BFR.
BFR-SSB-Resource	ra-PreambleIndex = 50	Associated with SSB index 0. UE doesn't
		use ssb-ResourceList and BFR-SSB-
		Resource IEs at the same time. UE uses
		this field only if is transmitting CFRA to
		convey BFR
ra-ssb-OccasionMaskIndex	1	PRACH occasion index 1 is allowed
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is -
		105dBm, as defined in TS 38.331 [2].
Note: For further information s	see clause 6.3.2 in TS 38.331 [2]:

A.3.8.3.3 FR2 PRACH configuration 3

FR2 PRACH configuration 3 in this clause provides the typical PRACH configuration for CSI-RS based non-contention based random access in FR2.

Table A.3.8.3.3-1: Parameters for FR2 PRACH configuration 3

Field	Value	Comment
prach-ConfigurationIndex	190	Preamble Format C2, with 10ms PRACH
		periodicity, and other detailed configuration
		defined in table 6.3.3.2-4 in TS 38.211 [6].
msg1-SubcarrierSpacing	Same as UL carrier SCS	
totalNumberOfRA-Preambles	48	Total number of preambles used for
		contention based and contention free
		random acces
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root
		sequence = 1.
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH
		occasions
msg1-FDM	One	One PRACH transmission occasions
		FDMed in one time instance.
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n6	Max number of RA preamble transmission
		performed before declaring a failure is 6
ra-ResponseWindow	sl10	10 slots
zeroCorrelationZoneConfig	11	N-CS configuration, Ncs = 23
Backoff Parameter Index	2	20 ms, as defined in table 7.2-1 in TS
		38.321 [7].
csirs-ResourceList	ra-PreambleIndex = 50	Associated with CSI-RS configured
ra-OccasionList	1	RA occasions allowed corresponding to CSI-RS
rsrp-ThresholdCSI-RS	RSRP_51	The actual value of the threshold is -
		105dBm, as defined in TS 38.331 [2].
Note: For further information se	ee clause 6.3.2 in TS 38.331 [2]	

A.3.8.3.4 FR2 PRACH configuration 4

FR2 PRACH configuration 4 in this clause provides the PRACH configuration for CSI-RS based non-contention based random access in FR2 to convey BFR.

Table A.3.8.3.4-1: Parameters for FR2 PRACH configuration 4

Field	Value	Comment
prach-ConfigurationIndex	190	Preamble Format C2, with 10ms PRACH
		periodicity, and other detailed configuration
		defined in table 6.3.3.2-4 in TS 38.211 [6].
msg1-SubcarrierSpacing	Same as UL carrier SCS	
totalNumberOfRA-Preambles	48	Total number of preambles used for
		contention based and contention free
		random access
numberOfRA-PreamblesGroupA	48	No group B.
prach-RootSequenceIndex	0	Logic sequence index = 0, resulting in root sequence = 1.
ssb-perRACH-Occasion	oneFourth	OneFourth: 1 SSB associated with 4 RACH
		occasions
msg1-FDM	One	One PRACH transmission occasions
		FDMed in one time instance.
powerRampingStep	dB2	
preambleReceivedTargetPower	dBm-120	
preambleTransMax	n200	Max number of RA preamble transmission
		performed before declaring a failure is 200.
ra-ResponseWindow	sl40	40 slots
zeroCorrelationZoneConfig	11	N-CS configuration, Ncs = 23
Backoff Parameter Index	2	20 ms, as defined in table 7.2-1 in TS
		38.321 [7].
BFR-CSIRS-Resource	ra-PreambleIndex = 50	Associated with CSI-RS configured
ra-OccasionList	1	RA occasions allowed corresponding to
		CSI-RS
rsrp-ThresholdSSB	RSRP_51	The actual value of the threshold is -
		105dBm, as defined in TS 38.331 [2].
Note: For further information s	ee clause 6.3.2 in TS 38.331 [2]].

A.3.9 BWP configurations

A.3.9.1 Introduction

This clause provides the typical BWP configurations used for RRM test cases defined in Annex A. For downlink BWP, both initial BWP and dedicated BWP configurations are specified in clause A.3.9.2 and for uplink BWP, both initial BWP and dedicated BWP configurations are specified in clause A.3.9.3. To note that for other parameters not listed in this clause, either it can be derived from the set up of each test or it is subjected to RAN5 specifications.

A.3.9.2 Downlink BWP configurations

A.3.9.2.1 Initial BWP

Table A.3.9.2.1-1: Downlink BWP patterns for initial BWP configuration

BWP Parameters	Unit		Values	
Reference BWP		DLBWP.0.1	DLBWP.0.2	

Starting PRB index		0	RB _c Note 1		
Bandwidth	RB	Same as RF channel defined in each test	same as RMSI CORESET (CORESET #0) defined in each test		
	e lowest PRB index to guarantee the BWP including CORESET #0 which d in Clause A.3.1.2.				

A.3.9.2.2 Dedicated BWP

Table A.3.9.2.2-1: Downlink BWP patterns for dedicated BWP configuration

BWP Parameters	Unit		Va	alues			
Reference BWP		DLBWP.1.1	DLBWP.1.2	DLBWP.1.3	DLBWP.1.4		
Starting PRB index		0	RB _b Note 1	RBa Note 2	0		
Bandwidth	RB	Same as RF	25 for SSB SCS =	25 for SSB SCS =	24 for SSB SCS =		
		channel defined	15KHz,	15KHz,	120KHz		
		in each test	51 for SSB SCS =	51 for SSB SCS =	24 for SSB SCS =		
			30KHz,	30KHz,	240KHz		
			32 for SSB SCS =	32 for SSB SCS =			
			120KHz	120KHz			
			48 for SSB SCS =	48 for SSB SCS =			
			240KHz	240KHz			
Note 1: RB _b is the	Note 1: RB _b is the lowest PRB index to guarantee the BWP not fully overlapped with SSB PRB index (RB _J ,						
RB _{J+1} ,,	RB _{J+19})	which is defined in Clause A.3.10.					
Note 2: RBa is the	RBa is the lowest PRB index to guarantee the BWP including SSB PRB index (RBJ, RBJ+1,, RBJ+19)						
which is d	efined in	Clause A.3.10.					

A.3.9.3 Uplink BWP configurations

A.3.9.3.1 Initial BWP

Table A.3.9.3.1-1: Uplink BWP patterns for initial BWP configuration

BWP Parameters	Unit	Values		
Reference BWP		ULBWP.0.1	ULBWP.0.2	
Starting PRB index		0	RB _c Note 1	
Bandwidth	RB	Same as RF channel defined in each test	same as RMSI CORESET (CORESET #0) defined in each test	

A.3.9.3.2 Dedicated BWP

Table A.3.9.3.2-1: Uplink BWP patterns for dedicated BWP configuration

BWP Parameters	Unit	Values			
Reference BWP		ULBWP.1.1	ULBWP.1.2	ULBWP.1.3	ULBWP.1.4
Starting PRB index		0	RB _b Note 1	RB _a Note 2	0

Bandwidt	n	RB	Same as RF channel defined in each test	25 for SSB SCS = 15KHz, 51 for SSB SCS = 30KHz, 32 for SSB SCS = 120KHz 48 for SSB SCS = 240KHz	25 for SSB SCS = 15KHz, 51 for SSB SCS = 30KHz, 32 for SSB SCS = 120KHz 48 for SSB SCS = 240KHz	24 for SSB SCS = 120KHz 24 for SSB SCS = 240KHz
Note 1: RB _b is same as RB _b for DLBWP.1.2 as defined in Table A.3.9.2.2-1.						
Note 2: RB _a is same as RB _a for DLBWP.1.3 as defined in Table A.3.9.2.2-1.						

A.3.10 SSB Configurations

A.3.10.1 SSB Configurations for FR1

A.3.10.1.1 SSB pattern 1 in FR1: SSB allocation for SSB SCS=15 kHz in 10 MHz

Table A.3.10.1.1-1: SSB.1 FR1: SSB Pattern 1 for SSB SCS=15 kHz in 10 MHz channel

SSB Parameters	Values			
Channel bandwidth	10 MHz			
SSB SCS	15 kHz			
SSB periodicity (T _{SSB})	20 ms			
Number of SSBs per SS-burst	1			
SS/PBCH block index	0			
Symbol numbers containing SSB Note 2	2-5			
Slot numbers containing SSB Note 2	0			
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$			
RB numbers containing SSB within channel BW	(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}			
Note 1: RBs containing SSB can be configured in any frequency location within the bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].				
Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves				

A.3.10.1.2 SSB pattern 2 in FR1: SSB allocation for SSB SCS=30 kHz in 40 MHz

Table A.3.10.1.2-1: SSB.2 FR1: SSB Pattern 2 for SSB SCS=30 kHz in 40 MHz channel

SSB Parameters	Values				
Channel bandwidth	40 MHz				
SSB SCS	30 kHz				
SSB periodicity (T _{SSB})	20 ms				
Number of SSBs per SS-burst	1				
SS/PBCH block index	0				
Symbol numbers containing SSB Note 3	4-7 or 2-5 Note 2				
Slot numbers containing SSB Note 3	0				
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$				
RB numbers containing SSB within channel BW	(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}				
Note 1: RBs containing SSB can be configured in any frequency location within the cell					
bandwidth according to the allowed synchronization raster defined in					
TS 38.104 [13].					

Note 2:	Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current
	band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; Otherwise, symbol 2-5 is
	chosen.

Note 3: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves.

A.3.10.1.3 SSB pattern 3 in FR1: SSB allocation for SSB SCS=15 kHz in 10 MHz

Table A.3.10.1.3-1: SSB.3 FR1: SSB Pattern 3 for SSB SCS=15 kHz in 10 MHz channel

	SSB Parameters	Valu	ies
Channel bandwidth		10 MHz	
SSB SCS		15 kHz	
SSB peri	iodicity (T _{SSB})	20 ms	
Number of SSBs per SS-burst		2	
SS/PBCI	H block index	0	1
Symbol r	numbers containing SSB Note 2	2-5	8-11
Slot numbers containing SSB Note 2		0	0
SFN containing SSB		SFN mod (max(Tssi	s,10ms)/10ms) = 0
RB numbers containing SSB within channel BW		(RB _J , RB _{J+1} ,, RB _s	J+19)Note 1
Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].			
Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves.			

A.3.10.1.4 SSB pattern 4 in FR1: SSB allocation for SSB SCS=30 kHz in 40 MHz

Table A.3.10.1.4-1: SSB.4 FR1: SSB Pattern 4 for SSB SCS=30 kHz in 40 MHz channel

SSB Parameters		Values	
Channel	bandwidth	40 MHz	
SSB SCS		30 kHz	
SSB periodicity (T _{SSB})		20 ms	
Number of	of SSBs per SS-burst	2	
SS/PBCF	l block index	0	1
Symbol n	numbers containing SSB Note 3	4-7 or 2-5 Note 2	8-11
Slot num	bers containing SSB Note 3	0	0
SFN containing SSB		SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSB within channel BW		(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}	
Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].			
Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; Otherwise, symbol 2-5 is chosen.			
Note 3: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves.			

A.3.10.1.5 SSB pattern 5 in FR1: SSB allocation for SSB SCS=15 kHz starting from odd SFN in 10 MHz

Table A.3.10.1.5-1: SSB.5 FR1: SSB Pattern 5 for SSB SCS=15 kHz in 10 MHz channel

SSB Parameters	Values	
Channel bandwidth	10 MHz	
SSB SCS	15 kHz	
SSB periodicity (T _{SSB})	20 ms	
Number of SSBs per SS-burst	1	
SS/PBCH block index	0	
Symbol numbers containing SSB Note 2	2-5	
Slot numbers containing SSB Note 2	0	
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 1$	
RB numbers containing SSB within channel BW	(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}	
Note 1: RBs containing SSB can be configured in any frequency location within the		
bandwidth according to the allowed synchronization raster defined in TS		
38.104 [13].		
Note 2: These values have been derived from other parameters for information		
purposes (as per TS 38.213 [3]). They are not settable parameters themselve		

A.3.10.1.6 SSB pattern 6 in FR1: SSB allocation for SSB SCS=30 kHz starting from odd SFN in 40 MHz

Table A.3.10.1.6-1: SSB.6 FR1: SSB Pattern 6 for SSB SCS=30 kHz in 40 MHz channel

SSB Parameters	Values	
Channel bandwidth	40 MHz	
SSB SCS	30 kHz	
SSB periodicity (T _{SSB})	20 ms	
Number of SSBs per SS-burst	1	
SS/PBCH block index	0	
Symbol numbers containing SSB Note 3	4-7 or 2-5 Note 2	
Slot numbers containing SSB Note 3	0	
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 1$	
RB numbers containing SSB within channel BW	(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}	
Note 1: RBs containing SSB can be configured in any frequency location within the cell bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].		
Note 2: Symbols 4-7 is chosen, if the SSB pattern Case B should be used for the current band as indicated by Table 5.4.3.3-1 of TS 38.104 [13]; Otherwise, symbol 2-5 is chosen.		

A.3.10.2 SSB Configurations for FR2

A.3.10.2.1 SSB pattern 1 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.1-1: SSB.1 FR2: SSB Pattern 1 for SSB SCS = 120 kHz in 100 MHz channel with 2 SSBs per SS-burst

SSB Parameters	Values
Channel bandwidth	100 MHz

SSB SCS	3	120 kHz	
SSB periodicity (T _{SSB})		20 ms	
Number of SSBs per SS-burst		2	
SS/PBCH block index		0	1
	umbers containing SSBs Note 2	4-7	8-11
Slot numbers containing SSB Note 2		0	0
SFN containing SSB		SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSBs within channel BW		(RBJ, RBJ+1,, RBJ+19) ^{Note 1}	
Note 1:	Note 1: RBs containing SSB can be configured in any frequency location within the cell		
	bandwidth according to the allowed synchronization raster defined in TS 38.104 [13]		
Note 2: These values have been derived from other parameters for information purposes			
per TS 38.213 [3]). They are not settable parameters themselves.			s.

A.3.10.2.2 SSB pattern 2 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.2-1: SSB.2 FR2: SSB Pattern 2 for SSB SCS = 240 kHz in 100 MHz channel with 2 SSBs per SS-burst

SSB Parameters		Values	3
Channel bandwidth	100 MHz	100 MHz	
SSB SCS	240 kHz	240 kHz	
SSB periodicity (T _{SSB})	20 ms	20 ms	
Number of SSBs per SS-burst	2		
SS/PBCH block index	0	1	
Symbol numbers containing SSBs Note 2	8-11	12-13	0-1
Slot numbers containing SSB Note 2	0	0	1
SFN containing SSB	SFN mod	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSBs within channel BW (RBJ, RBJ+1,, RBJ+39)Note 1			lote 1
Note 1: RBs containing SSB can be configured in any frequency location within the cell			
bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].			
Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves.			tion purposes (as

A.3.10.2.3 SSB pattern 3 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.3-1: SSB.3 FR2: SSB Pattern 3 for SSB SCS = 120 kHz in 100 MHz channel with 1 SSB per SS-burst

SSB Parameters	Values	
Channel bandwidth	100 MHz	
SSB SCS	120 kHz	
SSB periodicity (T _{SSB})	20 ms	
Number of SSBs per SS-burst	1	
SS/PBCH block index	0	
Symbol numbers containing SSBs Note 2	4-7	
Slot numbers containing SSB Note 2	0	
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSBs within channel BW	(RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}	
Note 1: RBs containing SSB can be configured in any frequency location within the cell		
bandwidth according to the allowed synchronization raster defined in TS 38.104 [13		
	ner parameters for information purposes (as	
per TS 38.213 [3]). They are not settable parameters themselves.		

A.3.10.2.4 SSB pattern 4 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.4-1: SSB.4 FR2: SSB Pattern 4 for SSB SCS = 240 kHz in 100 MHz channel with 1 SSB per SS-burst

SSB Parameters	Values	
Channel bandwidth	100 MHz	
SSB SCS	240 kHz	
SSB periodicity (T _{SSB})	20 ms	
Number of SSBs per SS-burst	1	
SS/PBCH block index	0	
Symbol numbers containing SSBs Note 2	8-11	
Slot numbers containing SSB Note 2	0	
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSBs within channel BW	(RB _J , RB _{J+1} ,, RB _{J+39}) ^{Note 1}	
Note 1: RBs containing SSB can be configured in		
bandwidth according to the allowed sync	hronization raster defined in TS 38.104 [13].	
Note 2: These values have been derived from other parameters for information purposes (a per TS 38.213 [3]). They are not settable parameters themselves.		

A.3.10.2.5 SSB pattern 5 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.5-1: SSB.5 FR2: SSB Pattern 5 for SSB SCS = 120 kHz in 100 MHz channel with 2 SSBs per SS-burst

SSB Parameters		Val	ues
Channel bandwidth		100 MHz	
SSB SCS		120 kHz	
SSB periodicity (T _{SSB})		20 ms	
Number of SSBs per SS-burst		2	
	block index	2	3
Symbol numbers containing SSBs Note 2		2-5	6-9
Slot numbers containing SSB Note 2		1	1
SFN containing SSB		SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSBs within channel BW (RB _J , RB _{J+1} ,, RB _{J+19}) ^{Note 1}		-19)Note 1	
	Note 1: RBs containing SSB can be configured in any frequency location within the cell		
bandwidth according to the allowed synchronization raster defined in TS 38.104 [1]			
Note 2: These values have been derived from other parameters for information purposes (rmation purposes (as	
per TS 38.213 [3]). They are not settable parameters themselves.			s.

A.3.10.2.6 SSB pattern 6 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.6-1: SSB.6 FR2: SSB Pattern 6 for SSB SCS = 240 kHz in 100 MHz channel with 2 SSBs per SS-burst

SSB Parameters	SSB Parameters Values		
Channel bandwidth	100 MHz		
SSB SCS	240 kHz	240 kHz	
SSB periodicity (T _{SSB})	20 ms	20 ms	
Number of SSBs per SS-burst	2		
SS/PBCH block index	2	3	
Symbol numbers containing SSBs Note 2	2-5	6-9	
Slot numbers containing SSB Note 2	1	1	
SFN containing SSB	SFN mod (max	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	

RB numb	pers containing SSBs within channel BW	(RB _J , RB _{J+1} ,, RB _{J+39}) ^{Note 1}
Note 1:	RBs containing SSB can be configured in bandwidth according to the allowed synch	any frequency location within the cell pronization raster defined in TS 38.104 [13].
Note 2:	Note 2: These values have been derived from other parameters for information purposes (as per TS 38.213 [3]). They are not settable parameters themselves.	

A.3.10.2.7 SSB pattern 7 in FR2: SSB allocation for SSB SCS=120 kHz in 100 MHz

Table A.3.10.2.7-1: SSB.7 FR2: SSB Pattern 7 for SSB SCS = 120 kHz in 100 MHz channel with 1 SSB per SS-burst

SSB Parameters	Values	
Channel bandwidth	100 MHz	
SSB SCS	120 kHz	
SSB periodicity (T _{SSB})	20 ms	
Number of SSBs per SS-burst	1	
SS/PBCH block index	1	
Symbol numbers containing SSBs Note 2	8-11	
Slot numbers containing SSB Note 2	0	
SFN containing SSB	SFN mod $(max(T_{SSB}, 10ms)/10ms) = 0$	
RB numbers containing SSBs within channel BW (RBJ, RBJ+1,, RBJ+19) ^{Note 1}		
Note 1: RBs containing SSB can be configured in any frequency location within the cell		
bandwidth according to the allowed synchronization raster defined in TS 38.104 [13] Note 2: These values have been derived from other parameters for information purposes (as		
		per TS 38.213 [3]). They are not settable parameters themselves.

A.3.10.2.8 SSB pattern 8 in FR2: SSB allocation for SSB SCS=240 kHz in 100 MHz

Table A.3.10.2.8-1: SSB.8 FR2: SSB Pattern 8 for SSB SCS = 240 kHz in 100 MHz channel with 1 SSB per SS-burst

SSB Parameters	Valu	ies	
Channel bandwidth	100 MHz		
SSB SCS	240 kHz		
SSB periodicity (T _{SSB})	20 ms	20 ms	
Number of SSBs per SS-burst 1			
SS/PBCH block index	1		
Symbol numbers containing SSBs Note 2	12-13	0-1	
Slot numbers containing SSB Note 2	0	1	
SFN containing SSB	SFN mod (max(T _{SSB} ,1	10ms)/10ms) = 0	
RB numbers containing SSBs within channel BW (RBJ, RBJ+1,, RBJ+39) ^{Note 1}		9)Note 1	
Note 1: RBs containing SSB can be configured in any frequency location within the cell			
bandwidth according to the allowed synchronization raster defined in TS 38.104 [13].			
Note 2: These values have been derived from other parameters for information purposes (as			
per TS 38.213 [3]). They are not settable parameters themselves.			

A.3.11 SMTC Configurations

A.3.11.1 SMTC pattern 1: SMTC period = 20 ms with SMTC duration = 1 ms

Table A.3.11.1-1: SMTC.1: SMTC Pattern 1 for SMTC period = 20 ms and duration = 1 ms

SMTC Parameters	Values
SMTC periodicity	20 ms
SMTC offset	0 ms
SMTC duration	1 ms

A.3.11.2 SMTC pattern 2: SMTC period = 20 ms with SMTC duration = 5 ms

Table A.3.11.2-1: SMTC.2: SMTC Pattern 2 for SMTC period = 20 ms and duration = 5 ms

SMTC Parameters	Values
SMTC periodicity	20 ms
SMTC offset	0 ms
SMTC duration	5 ms

A.3.11.3 SMTC pattern 3: SMTC period = 160 ms with SMTC duration = 1 ms

Table A.3.11.3-1: SMTC.3: SMTC Pattern 3 for SMTC period = 20 ms and duration = 5 ms

SMTC Parameters	Values
SMTC periodicity	160 ms
SMTC offset	0 ms
SMTC duration	1 ms

A.3.11.4 SMTC pattern 4: SMTC period = 20 ms with SMTC duration = 1 ms

Table A.3.11.4-1: SMTC.4: SMTC Pattern 4 for SMTC period = 20 ms and duration = 1 ms

SMTC Parameters	Values
SMTC periodicity	20 ms
SMTC offset	10 ms
SMTC duration	1 ms

A.3.11.5 SMTC pattern 5: SMTC period = 20 ms with SMTC duration = 5 ms

Table A.3.11.5-1: SMTC.5: SMTC Pattern 5 for SMTC period = 20 ms and duration = 5 ms

SMTC Parameters	Values
SMTC periodicity	20 ms
SMTC offset	10 ms
SMTC duration	5 ms

A.3.11.6 SMTC pattern 6: SMTC period = 20 ms with SMTC duration = 5 ms

Table A.3.11.6-1: SMTC.6: SMTC Pattern 6 for SMTC period = 20 ms and duration = 5 ms

SMTC Parameters	Values
SMTC periodicity	20 ms
SMTC offset	17 ms
SMTC duration	5 ms

A.3.12 Test Cases with Different CC Configurations

A.3.12.1 EN-DC Test Cases with Different EN-DC Configurations

A.3.12.1.1 Introduction

In Annex A EN-DC test cases may be defined for two component carriers (CCs) as well as for more than two CCs to verify the same RRM requirement.

A.3.12.1.2 Principle of testing

If multiple EN-DC test cases are defined for two CCs as well as for more than two CCs to verify the same type of RRM requirement, which depends on the number of CCs, then from the UE performance point of view the test coverage can be considered fulfilled by executing only the EN-DC test cases with the maximum number of CCs in EN-DC supported by the UE. Otherwise if the same type of RRM requirement is independent of the number of CCs then from the UE performance point of view the test coverage can be considered fulfilled by executing only the EN-DC test cases with two CCs in EN-DC supported by the UE.

Editor's: The maximum number of CCs that can be used in FR2 tests in EN-DC would depend on the test equipment capability.

A.3.12.2 Carrier Aggregation Test Cases with Different CA Configurations

A.3.12.2.1 Introduction

In Annex A carrier aggregation test cases may be defined for two CCs as well as for more than two CCs to verify the same RRM requirement.

A.3.12.2.2 Principle of testing

If multiple carrier aggregation test cases are defined for two CCs as well as for more than two CCs to verify the same RRM requirement, which depends on the number of CCs, then from the UE performance point of view the test coverage can be considered fulfilled by executing only the CA test cases with the maximum number of CCs in CA supported by the UE. Otherwise if the same type of RRM requirement is independent of the number of CCs then from the UE performance point of view the test coverage can be considered fulfilled by executing only the CA test cases with at least two CCs in CA supported by the UE.

Editor's: The maximum number of CCs that can be used in FR2 tests in CA would depend on the test equipment capability.

A.3.13 Test Cases in SA and EN-DC Operations

A.3.13.1 Introduction

This clause defines a principle which is applicable to test cases verifying RRM requirements in standalone (SA) or EN-DC operations.

In Annex A test cases may be defined in SA and EN-DC operations to verify the same RRM requirement.

Editor's note: this clause may need to define further for NE-DC and NR-DC test cases, which subjects to the test cases defined in the future.

A.3.13.2 Principle of Testing

If test cases are defined in both SA and EN-DC operations to verify the same RRM requirement then the UE capable of both SA and EN-DC operations needs to verify that RRM requirement by performing test case(s) in either SA operation or in EN-DC operation.

If test cases are defined in both SA and EN-DC operations to verify at least one common RRM requirement then the UE capable of both SA and EN-DC operations needs to verify RRM requirements by performing test case(s) in either SA operation or in EN-DC operation provided that the performed test case(s):

- verifies the largest number of RRM requirements and
- verifies at least all RRM requirements covered in the test case(s), which is not performed.

A.3.13A Test Cases involving E-UTRA/FR1 and FR2 carriers

A.3.13A.1 Introduction

The following applies to UE compliant to this version of the specification when undergoing tests with a mix of E-UTRA/NR FR1 and NR FR2 carriers in clauses A.5, A.7 and A.8.

A.3.13A.2 Principle of Testing in EN-DC

For test cases in clause A.5 listed in Table A.3.13A.2-1, the following applies:

- UE does not have to pass the test case

Table A.3.13A.2-1: Test cases UE does not have to pass in current version of specification (ENDC)

Clause	Test case slogan
A.5.5.3.2	SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle
A.5.5.3.5	SCell Activation and deactivation of SCell in FR2
A.5.7.1.3	EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

A.3.13A.3 Principle of Testing in SA

For test cases in clause A.7 listed in Table A.3.13A.3-1, the following applies:

UE does not have to pass the test case

Table A.3.13A.3-1: Test cases UE does not have to pass in current version of specification (SA)

Clause	Test case slogan
A.7.5.3.2	SCell Activation and deactivation for FR1+FR2 inter-band with target SCell in FR2
A.7.5.6.1.2	NR FR1- NR FR2 DL active BWP switch of PCell with non-DRX in SA
A.7.6.2.5	SA event triggered reporting tests for FR2 without SSB time index detection when DRX is not used (PCell in FR1)
A.7.6.2.6	SA event triggered reporting tests for FR2 without SSB time index detection when DRX is used (PCell in FR1)
A.7.6.2.7	SA event triggered reporting tests for FR2 with SSB time index detection when DRX is not used (PCell in FR1)
A.7.6.2.8	SA event triggered reporting tests for FR2 with SSB time index detection when DRX is used (PCell in FR1)
A.7.7.1.3	SA inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

A.3.13A.4 Principle of Testing in E-UTRA

For test cases in clause A.8 listed in Table A.3.13A.4-1, the following applies:

- UE does not have to pass the test case.

Table A.3.13A.4-1: Test cases UE does not have to pass in current version of specification (E-UTRA)

Clause	Test case slogan
A.8.4.2.5	NR Inter-RAT event triggered reporting tests for FR2 without SSB time
	index detection when DRX is not used
A.8.4.2.6	NR Inter-RAT event triggered reporting tests for FR2 without SSB time
	index detection when DRX is used
A.8.4.2.7	NR Inter-RAT event triggered reporting tests for FR2 with SSB time index
	detection when DRX is not used

A.8.4.2.8	NR Inter-RAT event triggered reporting tests for FR2 with SSB time index
	detection when DRX is used

A.3.13B Test Cases for EN-DC and NE-DC Operations

A.3.13B.1 Active BWP switch Test Cases for EN-DC and NE-DC Operations

A.3.13B.1.1 Introduction

This clause defines a principle which is applicable to test cases verifying active BWP switch requirements for EN-DC and NE-DC operations.

In Annex A test cases are defined for both EN-DC and NE-DC operations to verify the same type of RRM requirement.

A.3.13B.1.2 Principle of Testing

UE capable of both EN-DC and NE-DC operations needs to be tested with one of the tests in either EN-DC or NE-DC operations.

A.3.13B.2 SFTD accuracy Test Cases for EN-DC and NE-DC Operations

A.3.13B.2.1 Introduction

This clause defines a principle which is applicable to test cases verifying SFTD accuracy requirements for EN-DC and NE-DC operations.

In Annex A test cases are defined for both EN-DC and NE-DC operations to verify the same type of RRM requirement.

A.3.13B.2.2 Principle of Testing

UE capable of both EN-DC and NE-DC operations needs to be tested with one of the tests in either EN-DC or NE-DC operations.

A.3.14 CSI-RS configurations

A.3.14.1 FDD

Table A.3.14.1-1: CSI-RS Reference Measurement Channels for SCS=15kHz

	CSI-RS.1.1 FDD	CSI-RS.1.2 FDD	CSI-RS.1.3 FDD	CSI-RS.1.4 FDD
Resource Type	periodic	periodic	aperiodic	aperiodic
Resource Set Config				
nzp-CSI-ResourceSetId	0	0	0	0
repetition	n.a.	off	off	on
aperiodicTriggeringOffset	n.a.	n.a.	0	0

	T	1		
trs-Info	n.a.	n.a.	n.a.	n.a.
Resource Config				
				0 for resource #0
		0 for resource #0	0 for resource #0	1 for resource #1
		0 for resource #0	0 101 lesouice #0	2 for resource #2
nzp-CSI-RS-Resourceld	0 for resource #0			3 for resource #3
112p-001-10-10-0010eld	0 for resource #0			4 for resource #4
		1 for resource #1	1 for resource #1	5 for resource #5
		1 101 1630dice #1	1 101 16300106 #1	6 for resource #6
				7 for resource #7
powerControlOffset	0	0	0	0
powerControlOffsetSS	db0	db0	db0	db0
scramblingID	0	0	0	0
Period (slots)	slot5	slot10	n.a.	n.a.
Offset	1	1	n.a.	n.a.
qcl-InfoPeriodicCSI-RS	TCI.State.0	TCI.State.0	n.a.	n.a.
qci-illior ellodiccoi-No		TCI.State.1		II.a.
frequencyDomainAllocation	000001	0001	0001	0001
nrofPorts	2	1	1	1
			6 for resource #0	0 for resource #0
		6 for resource #0		1 for resource #1
		6 for resource #0		2 for resource #2
firstOFDMSymbolInTimeDo	4 for resource #0			3 for resource #3
main	4 for resource #0			4 for resource #4
		10 for resource #1	10 for resource #1	5 for resource #5
		10 101 lesouice #1	10 for resource #1	6 for resource #6
				7 for resource #7
cdm-Type	FD-CDM2	noCDM	noCDM	noCDM
density	1	3	3	3
startingRB	0	0	0	0
nrofRBs	276 (Note 1)	276 (Note 1)	276 (Note 1)	276 (Note 1)
N	(000		U D14/D	

Note 1: If the configured value of PRBs is larger than the width of the corresponding BWP relevant for the test case, the Test Equipment shall implement CSI-RS only in the width of that BWP.

A.3.14.2 TDD

Table A.3.14.2-1: CSI-RS Reference Measurement Channels for SCS=15kHz

	CSI-RS.1.1 TDD	CSI-RS.1.2 TDD	CSI-RS.1.3 TDD	CSI-RS.1.4 TDD
Resource Type	periodic	periodic	aperiodic	aperiodic
Resource Set Config				
nzp-CSI-ResourceSetId	0	0	0	0
repetition	n.a.	off	off	on
aperiodicTriggeringOffset	n.a.	n.a.	0	0
trs-Info	n.a.	n.a.	n.a.	n.a.
Resource Config				
	0 for resource #0			
				1 for resource #1
				2 for resource #2
nan CCI DC Decoursedd				3 for resource #3
nzp-CSI-RS-Resourceld				4 for resource #4
		1 for resource #1	1 for resource #1	5 for resource #5
		1 101 lesouice #1		6 for resource #6
				7 for resource #7
powerControlOffset	0	0	0	0
powerControlOffsetSS	db0	db0	db0	db0
scramblingID	0	0	0	0

Period (slots)	slot5	slot10	n.a.	n.a.	
Offset	1	1	n.a.	n.a.	
qcl-InfoPeriodicCSI-RS	TCI.State.0	TCI.State.0 TCI.State.1	n.a.	n.a.	
frequencyDomainAllocation	000001	0001	0001	0001	
nrofPorts	2	1	1	1	
firstOFDMSymbolInTimeDomain	4 for resource #0	6 for resource #0 10 for resource #1	6 for resource #0 10 for resource #1	0 for resource #0 1 for resource #1 2 for resource #2 3 for resource #3 4 for resource #4 5 for resource #5 6 for resource #6 7 for resource #7	
cdm-Type	FD-CDM2	noCDM	noCDM	noCDM	
density	1	3	3	3	
startingRB	0	0	0	0	
nrofRBs	276 (Note 1)	276 (Note 1)	276 (Note 1)	276 (Note 1)	
Note 1: If the configured value of PRBs is larger than the width of the corresponding BWP relevant for the test case, the Test Equipment shall implement CSI-RS only in the width of that BWP.					

Table A.3.14.2-2: CSI-RS Reference Measurement Channels for SCS=30kHz

	CSI-RS.2.1 TDD	CSI-RS.2.2 TDD	CSI-RS.2.3 TDD	CSI-RS.2.4 TDD
Resource Type	periodic	periodic	aperiodic	aperiodic
Resource Set Config				
nzp-CSI-ResourceSetId	0	0	0	0
repetition	n.a.	off	off	on
aperiodicTriggeringOffset	n.a.	n.a.	0	0
trs-Info	n.a.	n.a.	n.a.	n.a.
Resource Config				
		0 for resource #0	0 for resource #0	0 for resource #0 1 for resource #1 2 for resource #2
nzp-CSI-RS-ResourceId	0 for resource #0	1 for resource #1	1 for resource #1	3 for resource #3 4 for resource #4 5 for resource #5 6 for resource #6 7 for resource #7
powerControlOffset	0	0	0	0
powerControlOffsetSS	db0	db0	db0	db0
scramblingID	0	0	0	0
Period (slots)	slot10	slot20	n.a.	n.a.
Offset	2	2	n.a.	n.a.
qcl-InfoPeriodicCSI-RS	TCI.State.0	TCI.State.0 TCI.State.1	n.a.	n.a.
frequencyDomainAllocation	000001	0001	0001	0001
nrofPorts	2	1	1	1
			6 for resource #0	0 for resource #0
		6 for resource #0		1 for resource #1
		6 for resource #0	6 for resource #0	2 for resource #2
firstOFDMSymbolInTimeDomain	5 for resource #0			3 for resource #3
	5 for resource #0			4 for resource #4
		10 for resource #1	10 for recourse #1	5 for resource #5
		10 for resource #1	10 for resource #1	6 for resource #6
				7 for resource #7
cdm-Type	FD-CDM2	noCDM	noCDM	noCDM

density	1	3	3	3
startingRB	0	0	0	0
nrofRBs	276 (Note 1)	276 (Note 1)	276 (Note 1)	276 (Note 1)

Note 1: If the configured value of PRBs is larger than the width of the corresponding BWP relevant for the test case, the Test Equipment shall implement CSI-RS only in the width of that BWP.

Table A.3.14.2-3: CSI-RS Reference Measurement Channels for SCS=120kHz

	CSI-RS.3.1 TDD	CSI-RS.3.2 TDD	CSI-RS.3.3 TDD	CSI-RS.3.4 TDD
Resource Type	periodic	periodic	aperiodic	aperiodic
Resource Set Config				
nzp-CSI-ResourceSetId	0	0	0	0
repetition	n.a.	off	off	on
aperiodicTriggeringOffset	n.a.	n.a.	4	4
trs-Info	n.a.	n.a.	n.a.	n.a.
Resource Config				
		0 for resource #0	0 for resource #0	0 for resource #0 1 for resource #1 2 for resource
nzp-CSI-RS-Resourceld	0 for resource #0			#2 3 for resource #3
112p-001-110-11esouliceid	o for readding in o	1 for resource #1	1 for resource #1	4 for resource #4 5 for resource #5 6 for resource #6 7 for resource #7
powerControlOffset	0	0	0	0
powerControlOffsetSS	db0	db0	db0	db0
scramblingID	0	0	0	0
Period (slots)	slot40	slot80	n.a.	n.a.
Offset	8	16	 	
Offset	0		n.a.	n.a.
qcl-InfoPeriodicCSI-RS	TCI.State.0	TCI.State.0 TCI.State.1	n.a.	n.a.
frequencyDomainAllocation	000001	0001	0001	0001
nrofPorts	2	1	1	1
firstOFDMSymbolInTimeDomain	5 for resource #0	6 for resource #0	6 for resource #0	0 for resource #0 1 for resource #1 2 for resource #2 3 for resource #3
iiisiOFDivioyiiiboliii i iirieDomain	o for resource #0	10 for resource #1	10 for resource #1	4 for resource #4 5 for resource #5 6 for resource #6 7 for resource #7

cdm-Type	FD-CDM2	noCDM	noCDM	noCDM	
density	1	3	3	3	
startingRB	0	0	0	0	
nrofRBs	276 (Note 1)	276 (Note 1)	276 (Note 1)	276 (Note 1)	
Note 1: If the configured value of PRBs is larger than the width of the corresponding BWP relevant for the test					
case, the Test Equipment shall implement CSI-RS only in the width of that BWP.					

A.3.15 Angle of Arrival (AoA) for FR2 RRM test cases

This clause specifies the AoA setups for FR2 RRM test cases in clause A.5 and A.7. The applicable AoA setup is defined in each test case in clause A.5 and A.7.

A.3.15.1 Setup 1: Single AoA in Rx beam peak direction

There is only one active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, are aligned to the UE Rx beam peak direction (as defined in TS 38.101-2 [19]).

A.3.15.2 Setup 2: Single AoA in non Rx beam peak direction

A.3.15.2.1 Setup 2a: Single AoA in non Rx beam peak direction without change in direction

There is only one active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, align to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. The direction (AoA) of the signals shall not be changed between test iterations.

A.3.15.2.2 Setup 2b: Single AoA in non Rx beam peak direction with change in direction

There is only one active probe in the test. The DL signals, and noise if applicable, transmitted from the probe, align to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. For UE power class 3, the direction (AoA) of the signals shall be changed for each test iteration (for UE power classes other than 3, this is FFS).

A.3.15.3 Setup 3: 2 AoAs

There are 2 active probes in the test. The DL signals, and noise if applicable, transmitted from the two active probes, align to directions (AoAs) which are from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. The relative angular offset between the directions (AoAs) of the 2 active probes, shall be changed for each test iteration. The applicable set of relative angular offsets between the 2 active probes is given in Table 3.15.3-1 for each UE power class.

Editor Note: If RAN5 finds the changing of angular offset between the directions (AoAs) of the 2 active probes per test iteration to be infeasible from the perspectives of EIS spherical coverage and other impacts, e.g.: testing time, then the test setup will be revised.

Table 3.15.3-1: Set of relative angular offsets between active probes for each power class

UE Power class	Relative angular offset between active probes
1	FFS

2	FFS
3	30°, 60°, 90°, 120° and 150°
4	FFS

A.3.15.4 Setup 4: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak

A.3.15.4.1 Setup 4a: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak without change in direction

There are 2 active probes in the test. The DL signals, and noise if applicable, are transmitted from the two active probes. One probe is aligned to the UE Rx beam peak direction as defined in TS 38.101-2 [19]. The second is aligned to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class. The direction (AoA) of the non Rx beam peak signal shall not be changed between test iterations.

A.3.15.4.2 Setup 4b: 2 AoAs, 1 AoA in Rx beam peak direction, 1 in non Rx beam peak with change in direction

There are 2 active probes in the test. The DL signals, and noise if applicable, are transmitted from the two active probes. One probe is aligned to the UE Rx beam peak direction as defined in TS 38.101-2 [19]. The second is aligned to a direction (AoA) which is from the set of directions corresponding to the EIS spherical coverage percentile of the DUT as defined in clause 7.3.4 of TS 38.101-2 [19] for each UE power class.

For UE power class 3, the relative angular offset between the directions (AoAs) of the 2 active probes shall be changed for each test iteration, within the probe alignment described above. The applicable set of relative angular offsets between the 2 active probes is given in Table 3.15.3-1 for each UE power class.

A.3.16 TCI State Configuration

A.3.16.1 Introduction

This clause provides the configurations for TCI states towards either SSB or CSI-RS. The TCI states defined in this clause are configured in each test when applicable to indicate that certain DL signals are QCL'ed with the referenceSignal configured in the TCI states.

A.3.16.2 TCI states

Table A.3.16.2-1: TCI States

Parameter	TCI.State.0	TCI.State.1	TCI.State.2	TCI.State.3
tci-StateId	ld0	ld1	ld2	ld3
qcl-Type1	typeC	typeC	typeA	typeA
qcl-Type2 ^{Note1}	typeD	typeD	typeD	typeD
referenceSignal	SSB0	SSB1	Resource #4 in TRS	Resource #4 in TRS
_			resource set 1 Note3	resource set 2 Note3

Note 1: qcl-Type2 of typeD only where applicable. For RRM test cases, this will be only in FR2

Note 2: referenceSignal configurations towards which the TCI states are configured are defined in a test-

specific manner.

Note 3: Reference TRS resource sets are defined in A.3.17, and the applicable TRS resource set(s) are specified in each test case. When a single TRS resource set is configured in a test case, it is considered as resource set 1.

Table A.3.16.2-2: Void

A.3.17 Configurations of CSI-RS for tracking

A.3.17.1 Configuration of CSI-RS for tracking for FR1

A.3.17.1.1 FDD

Table A.3.17.1.1-1: CSI-RS for tracking for SCS=15kHz

Parameter	Unit	Value		
Reference channel		TRS.1.1 FDD		
Bandwidth		BW of Active BWP ^{Note 1}		
SCS	kHz	15		
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4		
First OFDM symbol in the slot used for		I ₀ = 5 for CSI-RS resource 1 and 3		
CSI-RS		I ₀ = 9 for CSI-RS resource 2 and 4		
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4		
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4		
Density (ρ)		3 for CSI-RS resource 1,2,3,4		
CSI-RS periodicity	slots	20 for CSI-RS resource 1,2,3,4		
CSI-RS offset	alata	10 for CSI-RS resource 1 and 2		
CSI-RS dilset	slots	11 for CSI-RS resource 3 and 4		
EPRE ratio to SSS	dB	0 ^{Note 2}		
TCI state		TCI.State.0		
Note 1: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases				
Note 2: Unless otherwise specified in the test case				

Table A.3.17.1.1-2: CSI-RS for tracking for SCS=30kHz

Parameter	Unit	Value
Reference channel		TRS.1.2 FDD
Bandwidth		BW of Active BWP ^{Note 1}
SCS	kHz	30
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4
First OFDM symbol in the slot used for		I ₀ = 5 for CSI-RS resource 1 and 3
CSI-RS		I ₀ = 9 for CSI-RS resource 2 and 4
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4
Density (ρ)		3 for CSI-RS resource 1,2,3,4
CSI-RS periodicity	slots	40 for CSI-RS resource 1,2,3,4
CSI-RS offset	slots	20 for CSI-RS resource 1 and 2 21 for CSI-RS resource 3 and 4
EPRE ratio to SSS	dB	O ^{Note 2}

TCI state			TCI.State.0
Note 1:	BW of TRS is configured same	as the	BW size of UE active BWP in the RRM test cases
Note 2:	Unless otherwise specified in the	ne test d	case

A.3.17.1.2 TDD

Table A.3.17.1.2-1: CSI-RS for tracking for SCS=15kHz

Parameter	Unit	Value		
Reference channel		TRS.1.1 TDD		
Bandwidth		BW of Active BWP ^{Note 1}		
SCS	kHz	15		
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4		
First OFDM symbol in the slot used for		l ₀ = 5 for CSI-RS resource 1 and 3		
CSI-RS		I ₀ = 9 for CSI-RS resource 2 and 4		
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4		
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4		
Density (ρ)		3 for CSI-RS resource 1,2,3,4		
CSI-RS periodicity	slots	20 for CSI-RS resource 1,2,3,4		
CSI-RS offset	-1-4-	10 for CSI-RS resource 1 and 2		
CSI-RS Oliset	slots	11 for CSI-RS resource 3 and 4		
EPRE ratio to SSS	dB	O ^{Note 2}		
TCI state		TCI.State.0		
Note 1 BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases Note 2: Unless otherwise specified in the test case				

Table A.3.17.1.2-2: CSI-RS for tracking for SCS=30kHz

Parameter	Unit	Value		
Reference channel		TRS.1.2 TDD		
Bandwidth		BW of Active BWP ^{Note 1}		
SCS	kHz	30		
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4		
First OFDM symbol in the slot used for		I ₀ = 5 for CSI-RS resource 1 and 3		
CSI-RS		I ₀ = 9 for CSI-RS resource 2 and 4		
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4		
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4		
Density (ρ)		3 for CSI-RS resource 1,2,3,4		
CSI-RS periodicity	slots	40 for CSI-RS resource 1,2,3,4		
CSI-RS offset	slots	20 for CSI-RS resource 1 and 2		
CSI-KS Oliset	51015	21 for CSI-RS resource 3 and 4		
EPRE ratio to SSS	dB	O ^{Note 2}		
TCI state		TCI.State.0		
Note 1: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases				
Note 2: Unless otherwise specified in t	Note 2: Unless otherwise specified in the test case			

BWP size.

A.3.17.2 Configuration of CSI-RS for tracking for FR2

A.3.17.2.1 TDD

Table A.3.17.2.1-1: CSI-RS for tracking for SCS=120kHz Set 1

Parameter	Unit	Value	
Reference channel		TRS.2.1 TDD	
Bandwidth		BW of Active BWP ^{Note 1, 3}	
SCS	kHz	120	
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4	
First OFDM symbol in the slot used for		I ₀ = 1 for CSI-RS resource 1 and 3	
CSI-RS		I ₀ = 5 for CSI-RS resource 2 and 4	
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4	
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4	
Density (ρ)		3 for CSI-RS resource 1,2,3,4	
CSI-RS periodicity	slots	80 for CSI-RS resource 1,2,3,4	
CSI-RS offset	slots	40 for CSI-RS resource 1 and 2 41 for CSI-RS resource 3 and 4	
EPRE ratio to SSS	dB	0 ^{Note 2}	
TCI state		TCI.State.0	
Note 1: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases Note 2: Unless otherwise specified in the test case Note 3: If active BWP is larger than 52RBs, BW of TRS is configured as 52RBs. Otherwise, same as active			

Table A.3.17.2.1-2: CSI-RS for tracking for SCS=120kHz Set 2

Parameter	Unit	Value
Reference channel		TRS.2.2 TDD
Bandwidth		BW of Active BWP ^{Note 1, 3}
SCS	kHz	120
First subcarrier index in the PRB used for CSI-RS		k ₀ =0 for CSI-RS resource 1,2,3,4
First OFDM symbol in the slot used for		I ₀ = 2 for CSI-RS resource 1 and 3
CSI-RS		I ₀ = 6 for CSI-RS resource 2 and 4
Number of CSI-RS ports (X)		1 for CSI-RS resource 1,2,3,4
CDM Type		'No CDM' for CSI-RS resource 1,2,3,4
Density (ρ)		3 for CSI-RS resource 1,2,3,4
CSI-RS periodicity	slots	80 for CSI-RS resource 1,2,3,4
CSI-RS offset	oloto	40 for CSI-RS resource 1 and 2
C31-R3 onset	slots	41 for CSI-RS resource 3 and 4
EPRE ratio to SSS	dB	O ^{Note 2}
TCI state		TCI.State.1

Note 1: BW of TRS is configured same as the BW size of UE active BWP in the RRM test cases

Note 2: Unless otherwise specified in the test case

Note 3: If active BWP is larger than 52RBs, BW of TRS is configured as 52RBs. Otherwise, same as active BWP size.

A.3.18 Additional definitions related to OTA testing for FR2 RRM test cases

A.3.18.1 Introduction

FR2 RRM test cases are performed over the air (OTA). This clause provides additional definitions and clarifications on the OTA measurements and metrics defined or refered in the test cases.

A.3.18.2 PRACH Power Measurement

PRACH power is measured as EIRP(Link=Link angle, Meas=Link angle) as defined in clause 3.1 of TS 38.101-2 [19].

A.4 EN-DC tests with all NR cells in FR1

- A.4.1 Void
- A.4.2 Void
- A.4.3 RRC_CONNECTED state mobility
- A.4.3.1 Void
- A.4.3.2 RRC Connection Mobility Control
- A.4.3.2.1 Void
- A.4.3.2.2 Random Access
- A.4.3.2.2.1 Contention based random access test in FR1 for PSCell in EN-DC

A.4.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in clause 6.2.2.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell in FR1. Supported test parameters are shown in Table A.4.3.2.2.1.1-1. UE capable of EN-DC with PSCell in FR1 needs to be tested by using the parameters in Table A.4.3.2.2.1.1-2.

Table A.4.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR1 for PSCell in EN-DC

	Config	Description			
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
	2	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4		LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note:	lote: The UE is only required to be tested in one of the supported test configurations depending on UE				
	capability				

Table A.4.3.2.2.1.1-2: General test parameters for contention based random access test in FR1 for PSCell in EN-DC

Parameter		Unit	Test-1	Comments	
SSB Configura	ation	Config 1,2		SSB pattern 3 in FR1	As defined in A.3.10
_		Config 3,4		SSB pattern 4 in FR1	
Duplex Mode for Cell 2		Config 1,2		FDD	
	Config 3,4			TDD	
TDD Configura		Config 3,4		TDDConf.2.1	
OCNG Pattern				OCNG pattern 1	As defined in A.3.2.1.
PDSCH paran	neters ^{Note}	Config 1,2		SR.1.1 FDD	As defined in A.3.1.1.
4		Config 3,4]	SR.2.1 TDD	
RMSI CORES Reference Ch		Config 1,2			CR.1.1 FDD
		Config 3,4			CR.2.1 TDD
Dedicated CO Reference Ch		Config 1,2			CCR.1.1 FDD
		Config 3,4			CCR.2.1 TDD
NR RF Chann	el Number			1	
EPRE ratio of	PSS to SS	S	dB		
EPRE ratio of	PBCH_DM	IRS to SSS	dB		
EPRE ratio of			dB		
EPRE ratio of			dB	0	
		PDCCH_DMRS	dB		
EPRE ratio of			dB		
EPRE ratio of		PDSCH_DMRS	dB		
SSB with	\hat{E}_s/I_{ot}		dB	3	Power of SSB with index 0 is setto be above
index 0	N_{oc}	Config 1,2	dBm/15kHz	-98	configured rsrp-
	1 oc	Config 3,4		-101	ThresholdSSB
	\hat{E}_s/N_{oc}		dB	3	
	SS-RSRF	Note 3	dBm/ SCS	-95	
SSB with	\hat{E}_s/I_{ot}		dB	-17	Power of SSB with index 1 is set to be below
index 1	N_{oc}	Config 1,2	dBm/15kHz	-98	configured rsrp-
	¹ voc	Config 3,4	1	-101	ThresholdSSB
\hat{E}_s/N_{oc} SS-RSRP Note 3			dB	-17	
		dBm/ SCS	-115		
Io Note 2		Config 1,2	dBm	-65.3/9.36MHz	For symbols without SSB
10		Config 3,4		-62.2/38.16MHz	index 1

ss-PBCH-BlockPower	dBm/ SCS	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured UE transmitted power ($P_{\mathrm{CMAX, f,c}}$)	dBm	23	As defined in clause 6.2.4 in TS 38.101-1.
PRACH Configuration		FR1 PRACH configuration 1	As defined in A.3.8.2.
Propagation Condition	-	AWGN	

- Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
- Note 2: SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not settable parameters.
- Note 3: Void
- Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

A.4.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.4.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4, the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission..

A.4.3.2.2.1.2.5 void

A.4.3.2.2.1.2.6 void

A.4.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.4.3.2.2.2 Non-contention based random access test in FR1 for PSCell in EN-DC

A.4.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in clause 6.2.2.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell in FR1. Supported test parameters are shown in Table A.4.3.2.2.2.1-1. UE capable of EN-DC with PSCell in FR1 needs to be tested by using the parameters in Table A.4.3.2.2.2.1-2 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2).

 $Test\ 2\ is\ only\ applicable\ to\ UE\ which\ supports\ csi-RSRP-AndRSRQ-MeasWithSSB\ or\ csi-RSRP-AndRSRQ-MeasWithoutSSB.$

Table A.4.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR1 for PSCell in EN-DC

	Config	Description	
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	2	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
	4	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note: The UE is only required to be tested in one of the supported test configurations depending on UE		equired to be tested in one of the supported test configurations depending on UE	
	capability		

Table A.4.3.2.2.1-2: General test parameters for non-contention based random access test in FR1 for PSCell in EN-DC

Parameter		Unit	Test-1	Test-2	Comments	
SSB Configuration	on	Config 1,2		SSB pattern 3 in FR1	SSB pattern 3 in FR1	As defined in A.3.10
		Config 3,4		SSB pattern 4 in FR1	SSB pattern 4 in FR1	
CSI-RS Configur	ation	Config 1,2		N/A	CSI-RS.1.1 FDD	As defined in
		Config 3,4			CSI-RS.2.1 TDD	A.3.1.4
Duplex Mode for	Cell 2	Config 1,2		FDD	FDD	
		Config 3,4		TDD	TDD	
TDD Configuration	on	Config 3,4		TDDConf.2.1	TDDConf.2.1	
OCNG Pattern No	ote 1			OCNG pattern 1	OCNG pattern 1	As defined in A.3.2.1.
PDSCH paramet	ers ^{Note}	Config 1,2		SR.1.1 FDD	SR.1.1 FDD	As defined in
4		Config 3,4	-	SR.2.1 TDD	SR.2.1 TDD	A.3.1.1.
RMSI CORESET Reference Chann		Config 1,2		CR.1.1 TDD	CR.1.1 TDD	
		Config 3,4		CR.2.1 TDD	CR.2.1 TDD	
Dedicated CORE Reference Chann		Config 1,2		CCR.1.1 TDD	CCR.1.1 TDD	
		Config 3,4		CCR.2.1 TDD	CCR.2.1 TDD	
NR RF Channel I	NR RF Channel Number			1	1	
EPRE ratio of PS			dB			
EPRE ratio of PE			dB			
EPRE ratio of PE			dB			
EPRE ratio of PD			dB	0	0	
EPRE ratio of PD			dB			
EPRE ratio of PD			dB			
	atio of PDSCH to PDSCH_DMRS		dB			
SSB with index 0	\hat{E}_s/I_{ot}		dB	3	3	Power of SSB with index 0 is set to be
	N_{oc}	Config 1,2	dBm/15kHz	-98	-98	above configured
	ου	Config 3,4		-101	-101	rsrp-ThresholdSSB
	\hat{E}_s/N_{oc}		dB	3	3	
	SS-RSRP Note 3		dBm/ SCS	-95	-95	
SSB with	\hat{E}_s/I_{ot}		dB	-17	-17	Power of SSB with
index 1		Config 1,2	dBm/15kHz	-98	-98	index 1 is set to be

	N_{oc}	Config 3,4		-101	-101	below configured rsrp-ThresholdSSB
	\hat{E}_s/N_{oc}	2	dB	-17	-17	,
	SS-RSF	RP Note 3	dBm/ SCS	-115	-115	
lo Note 2		Config 1,2	dBm	-65.3/9.36MHz	-65.3/9.36MHz	For symbols without
10 Note 2		Config 3,4		-62.2/38.16MHz	-62.2/38.16MHz	SSB index 1
ss-PBCH-Blo	ockPower		dBm/ SCS	-5	-5	As defined in clause 6.3.2 in TS 38.331 [2].
Configured UE transmitted power (dBm	23	23	As defined in clause	
$P_{\mathrm{CMAX, f,c}}$)					6.2.4 in TS 38.101- 1.	
PRACH Con	figuration			FR1 PRACH configuration 2	FR1 PRACH configuration 3	As defined in A.3.8.2.
Propagation	Condition		-	AWGN	AWGN	

- Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
- Note 2: SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not settable parameters.
- Note 3: Void
- Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

A.4.3.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.4.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for SSB-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2.. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-2, to test the UE behavior specified in Clause 6.2.2.2.2.1 for CSI-RS-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.4.3.2.3 Void

A.4.4 Timing

A.4.4.1 UE transmit timing

A.4.4.1.1 NR UE Transmit Timing Test for FR1

A.4.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2. Supported test configurations are shown in Table 4.4.1.1.1-1.

Table A.4.4.1.1.1-1: Supported test configurations for FR1 PSCell

Configuration	Description
1	LTE FDD, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	LTE FDD, NR TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	LTE FDD, NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
4	LTE TDD, NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
5	LTE TDD, NR TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
6	LTE TDD, NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
Note: The UE	is only required to be tested in one of the supported test configurations

The test consists of E-UTRA PCell and NR PSCell. The configuration for E-UTRA is given in A.3.7.2.1. Table A.4.4.1.1.1-2 defines the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.4.4.1.1.1-3.

Table A.4.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2	Band Group
SSB ARFCN		1,2,3,4,5,6	Freq1	Freq1	
Duplex Mode		1,4	F	DD	
Duplex Mode		2,3,5,6	TI	DD	
		1,4	Not Ap	plicable	
TDD configuration		2,5	TDDC	onf.1.1	
		3,6	TDDC	onf.2.1	
		1,4	10: N _R	B,c = 52	
BW _{channel}	MHz	2,5	10: N _R	B,c = 52	1
		3,6	40: N _{RB,c} = 106		
Initial BWP Configuration		1,2,3,4,5,6	DLBV	/P.0.1	
Illitial BVVF Corniguration		1,2,3,4,3,0	ULBV	/P.0.1	
Dedicated BWP		1,2,3,4,5,6		/P.1.1	
Configuration		1,2,0,4,0,0	ULBV	/P.1.1	
DRx Cycle	ms	1,2,3,4,5,6	N/A	DRX.8 ^{Note5}	
PDSCH Reference		1,4	SR.1.	1 FDD	
measurement channel		2,5	SR.1.	1 TDD	

	1	0.0	05.5	4 TDD	T
		3,6		1 TDD	
RMSI CORESET		1,4	CR.1.	1 FDD	
Reference Channel		2,5	CR.1.	1 TDD	
		3,6		1 TDD	
		1,4	CCR.1	.1 FDD	
Dedicated CORESET Reference Channel		2,5	CCR.1	.1 TDD	
		3,6	CCR.2	.1 TDD	
OCNG Patterns		1,2,3,4,5,6		P.1	
		1,4	SSB.	1 FR1	
SSB configuration		2,5	SSB.	1 FR1	
G		3,6	SSB.:	2 FR1	
SMTC configuration		1,2,3,4,5,6	SM	ΓC.2	
•		1,4	TRS.1	.1 FDD	
TRS configuration		2,5		.1 TDD	
Ĭ		3,6		.2 TDD	
PDSCH/PDCCH		1,2,4,5		5	
subcarrier spacing	kHz	3,6	3	0	
EPRE ratio of PSS to					
SSS					
EPRE ratio of PBCH	1				
DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH	1				
DMRS to SSS					
EPRE ratio of PDCCH to	dB	1,2,3,4,5,6	0	0	
PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to]				
PDSCH					
EPRE ratio of OCNG					
DMRS to SSS(Note 1)	-				
EPRE ratio of OCNG to					
OCNG DMRS (Note 1)					
$N_{oc}^{ m Note2}$	dBm/15 kHz	1,2,3,4,5,6	-98	-98	
N_{oc}^{Note2}	dBm/SCS	1,2,4,5	-98	-98	
oc 'oc	ubili/303	3,6	-95	-95	
\hat{E}_s/I_{ot}		1,2,3,4,5,6	3	3	
\hat{E}_s/N_{oc}		1,2,3,4,5,6	3	3	
SS-RSRP ^{Note3}	dBm/SCS	1,2,4,5	-95	-95	
	ubili/303	3,6	-92	-92	
Io ^{Note3}	dBm/9.36MHz	1,2,4,5	-65.2	-65.2	
	dBm/38.1MHz	3,6	-59.2	-59.2	
Propagation condition		1,2,3,4,5,6	AW		
SRS Config		1,2,4,5	SRSConf.1Note6	SRSConf.3 ^{Note6}	
, and the second		3, 6	SRSConf.1Note6	SRSConf.2 ^{Note6}	
	1	*	1		

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over
	subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\!oc}$ to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	DRx related parameters are given in Table A.3.3.8-1
Note 6:	SRS configs are given in Table A.4.4.1.1.1-3

Table A.4.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

	Field	SRSConf.1	SRSConf.2	SRSConf.3	Comments
SRS-	srs-ResourceSetId	0	0	0	
ResourceSet	srs-ResourceldList	0	0	0	
	resourceType	Periodic	Periodic	Periodic	
	Usage	Codebook	Codebook	Codebook	
SRS-	SRS-Resourceld	0	0	0	
Resource	nrofSRS-Ports	Port1	Port1	Port1	
	transmissionComb	n2	n2	n2	
	combOffset-n2	0	0	0	
	cyclicShift-n2	0	0	0	
	resourceMapping startPosition	0	0	0	
	resourceMapping nrofSymbols	n1	n1	n1	
	resourceMapping repetitionFactor	n1	n1	n1	
	freqDomainPosition	0	0	0	
	freqDomainShift	0	0	0	
	freqHopping c-SRS	14 for test configuration 1,2,4,5 25 for test configuration 3,6	25	14	Matches N _{RB,c}
	freqHopping b-SRS	0	0	0	
	freqHopping b-hop	0	0	0	
	groupOrSequenceHopping	Neither	Neither	Neither	
	resourceType	Periodic	Periodic	Periodic	
	periodicityAndOffset-p	sl1, 0	sl640, 5	sl320, 3	Offset to align with DRx periodicity
	sequenceld	0	0	0	Any 10 bit number

A.4.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test

- 1) Set up E-UTRA PCell according to parameters given in Table A.3.7.2.1-1 and setup NR PSCell according to parameters given in Table A.4.4.1.1.1-1.
- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within $(N_{TA} + N_{TA}) \times T_c \pm T_e$ of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 25600
 - b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-
- 3) The test system shall adjust the timing of the DL path by values given in Table A.4.4.1.1.2-1

Table A.4.4.1.1.2-1: Adjustment Value for DL Timing

SCS of SSB signals (kHz)	Adjustmo	Adjustment Value	
	Test1	Test2	
15	+64*64T _c	+32*64T _c	
30	+32*64T _c	+16*64T _c	

- 4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in Clause 7.1.2 Table 7.1.2.1-1 until the UE transmit timing offset is within ($N_{TA} + N_{TA_offset}$) ×T_c ± T_e respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.
- 5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

A.4.4.2 UE timer accuracy

A.4.4.3 Timing advance

A.4.4.3.1 EN-DC FR1 timing advance adjustment accuracy

A.4.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.4.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.4.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.4.4.3.1.2-2, A.4.4.3.1.2-3 and A.4.4.3.1.2-4. The configuration of Cell 1 (LTE PCell) is specified in clause A.3.7.2.1.

In all test cases, two cells are used. Cell 1 is the PCell in the primary Timing Advance Group (pTAG) and cell 2 is the PSCell is in the secondary Timing Advance Group (sTAG). Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands for sTAG are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.4.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured for PSCell in sTAG.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element for sTAG, as specified in clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance for sTAG used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value specified in table A.4.4.3.1.2-2. This value shall result in changes of the timing advance for sTAG used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in clause 5.2 in TS 38.321, shall be configured so that it does not expire in the duration of the test.

Config	Description	
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note: The UE is only required to be tested in one of the supported test configurations		

Table A.4.4.3.1.2-1: Timing advance supported test configurations

Table A.4.4.3.1.2-2: General test	parameters for timing advance
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Parameter	Unit	Value	Comment
RF channel number		Cell 1: 1	1 for E-UTRAN PCell
		Cell 2: 2	2 for NR PSCell
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T _A) value during T1		31	N _{TA_new =} N _{TA_old} for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T _A) value during T2		39	For 15 kHz SCS $N_{TA_new} = N_{TA_old} + 8192*T_c$ For 30 kHz SCS $N_{TA_new} = N_{TA_old} + 4096*T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	s	5	
T2	S	5	

Table A.4.4.3.1.2-3: Cell specific test parameters for timing advance

Parameter		Unit	Test1	
		Offic	T1	T2
Duplex mode	Config 1,4		FDD	

Config 2,3,5,6		
TDD configuration		
Config 3,6 TDDConf.2.1		
BWchannel Config 1,4 10: NRB,c = 52 10: NRB,c = 5		
BWChannel Config 2,5 Config 3,6 Config 1,4 10: N _{RB,c} = 52 40: N _{RB,c} = 52		
Config 3,6		
Dedicated CORESET Reference Channel		
BWP BW		
DRx Cycle		
DRx Cycle		
DRX Cycle		
PDSCH Reference measurement channel	-	
PDSCH Reference measurement channel		
RMSI CORESET Reference Channel Config 3,6 CR.1.1 FDD		
RMSI CORESET Config 1,4 CR.1.1 FDD Reference Channel Config 2,5 CR.1.1 TDD Dedicated CORESET Config 1,4 CCR.1.1 FDD Reference Channel Config 2,5 CCR.1.1 TDD Config 3,6 CCR.2.1 TDD Config 3,6 CCR.2.1 TDD TRS configuration Config 1,4 TRS.1.1 FDD TRS.1.1 FDD TRS.1.1 TDD Config 3,6 TRS.1.2 TDD OCNG Patterns OCNG pattern 1 SSB Configuration Config 1,2,4,5 SSB.1 FR1 SMTC configuration Config 1,2,4,5 SMTC.1 FR1 SMTC configuration Config 1,2,4,5 SMTC.2 FR1 PDSCH/PDCH Config 1,2,4,5 SMTC.2 FR1 PUCCH/PUSCH Config 3,6 SMTC.2 FR1 PUCCH/PUSCH Config 3,6 KHz 30 kHz EPRE ratio of PS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS		
Reference Channel		
Config 3,6 CR2.1 TDD		
Config 1,4 CCR.1.1 FDD		
Dedicated CORESET Reference Channel		
Config 2,5 CCR.1.1 TDD		
Config 1,4 TRS.1.1 FDD		
Config 1,4 TRS.1.1 FDD		
TRS configuration Config 2,5 TRS.1.1 TDD OCNG Patterns OCNG pattern 1 SSB Configuration Config 1,2,4,5 SSB.1 FR1 SMTC configuration Config 1,2,4,5 SMTC.1 FR1 SMTC.2 FR1 SMTC.2 FR1 PDSCH/PDCCH Config 1,2,4,5 KHz Subcarrier spacing Config 3,6 30 kHz PUCCH/PUSCH Config 1,2,4,5 KHz Subcarrier spacing Config 3,6 KHz EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS		
Config 3,6		
OCNG Patterns SSB Configuration Config 1,2,4,5 SSB.1 FR1 SMTC configuration Config 3,6 SSB.2 FR1 SMTC configuration Config 1,2,4,5 SMTC.1 FR1 PDSCH/PDCCH Config 3,6 SMTC.2 FR1 Subcarrier spacing Config 3,6 KHz PUCCH/PUSCH Config 1,2,4,5 KHz Subcarrier spacing Config 1,2,4,5 KHz SUBCARRIAN SUBCARR		
SSB Configuration Config 1,2,4,5 SSB.1 FR1 SMTC configuration Config 1,2,4,5 SMTC.1 FR1 SMTC configuration Config 3,6 SMTC.2 FR1 PDSCH/PDCCH subcarrier spacing Config 1,2,4,5 kHz 15 kHz PUCCH/PUSCH subcarrier spacing Config 1,2,4,5 kHz 15 kHz SUBCARRIER ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS KHz 30 kHz EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to PDCCH DMRS AB 0		
Config 3,6 SSB.2 FR1		
SMTC configuration Config 1,2,4,5 SMTC.1 FR1 PDSCH/PDCCH Config 1,2,4,5 SMTC.2 FR1 PDSCH/PDCCH Config 1,2,4,5 SMTC.2 FR1 Subcarrier spacing Config 3,6 SMTC.1 FR1 PUCCH/PUSCH Config 3,6 SMTC.1 FR1 SUBCARRIANT STATE S		
Config 3,6 PDSCH/PDCCH Subcarrier spacing Config 1,2,4,5 Subcarrier spacing Config 1,2,4,5 Subcarrier spacing Config 1,2,4,5 Subcarrier spacing Config 3,6 PUCCH/PUSCH Subcarrier spacing Config 3,6 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS		
PDSCH/PDCCH Config 1,2,4,5 subcarrier spacing Config 3,6 PUCCH/PUSCH Config 1,2,4,5 subcarrier spacing Config 3,6 Config 3,6 Subcarrier spacing Subcarrier spacing Config 3,6 Subcarrier spacing Subcarrier spacing Config 3,6 Subcarrier spacing Subcar		
subcarrier spacing Config 3,6 PUCCH/PUSCH Config 1,2,4,5 subcarrier spacing Config 3,6 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS		
PUCCH/PUSCH Config 1,2,4,5 subcarrier spacing Config 3,6 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS		
subcarrier spacing Config 3,6 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PDSCH DMRS to SSS		
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS(Note 1)		
EPRE ratio of OCNG to OCNG DMRS (Note		
1)		
N Note2 dBm/15kH -98		
2		
N Note2 Config 1,2,4,5 -98 -95 -95		
\hat{E}_s/I_{ot} dB 3		
\hat{E}_s/N_{oc} dB 3		
Config 1,2,4,5 dBm/ 9.36MHz -67.57		
Config 3,6 dBm/ 38.16MHz -62.58		
Propagation condition - AWGN		

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral
	density is achieved for all OFDM symbols.
Note O.	Interference from other cells and naise courses not enseified in the test is accumed to be constant aver

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.4.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

Field		Value	Comment	
Config 1,2,4,5		12		
c-SRS	Config 3,6	24	Fraguency hopping is disabled	
b-S	RS	0	Frequency hopping is disabled	
b-ł	пор	0		
freqDoma	inPosition	0	Frequency domain position of SRS	
freqDon	nainShift	0		
groupOrSequ	ienceHopping	neither	No group or sequence hopping	
		sl5=2 for SCS	Once every 5 slots	
SDS-Dariadi	cityAndOffset	15kHz		
SING-F enoug	CityAndOnset	sl5=4 for SCS		
		30kHz		
pathlossReferenceRS		ssb-Index=0	SSB #0 is used for SRS path loss estimation	
usage		Codebook	Codebook based UL transmission	
startP	osition	0	resourceMapping setting. SRS on last	
nrofSymbols		n1	symbol of slot, and 1symbols for SRS	
repetitionFactor		n1	without repetition.	
combOffset-n2		0	transmissionComb sotting	
cyclicShift-n2		0	transmissionComb setting	
nrofSR	S-Ports	port1	Number of antenna ports used for SRS	
			transmission	
Note: For further	er information see cla	use 6.3.2 in TS 38	3.331 [2].	

A.4.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value for PSCell in sTAG to the transmission timing at the designated activation time i.e. k+1 slots after the reception of the timing advance command, where k=5.

The Timing Advance adjustment accuracy for PSCell in sTAG shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.4.5 Signaling characteristics

A.4.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

For intra-band contiguous carrier aggregation, transmit OFF power is measured as the mean power per component carrier.

For UE with multiple transmit antennas, transmit OFF power is measured as the mean power at each transmit connector.

- UE output power higher than Transmit OFF power -50 dBm (as defined in TS 38.101-3 [20]) means uplink signal
- UE output power equal to or less than Transmit OFF power -50 dBm (as defined in TS 38.101-3 [20]) means no uplink signal.

A.4.5.1.1 Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with SSB-based RLM RS in non-DRX mode

A.4.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR1 PSCell radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.4.5.1.1.1-1. The test parameters are given in Tables A.4.5.1.1.1-2, A.4.5.1.1.1-3, and A.4.5.1.1.1-4 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.1.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.4.5.1.1.1-1: Supported test configurations for FR1 PSCell

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only	required to pass in one of the supported test configurations in FR1

Table A.4.5.1.1.1-2: General test parameters for FR1 out-of-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Chan	nel Number		1
Active PSCell			Cell 2
RF Channel Numb	er		2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
BW _{channel}	Config 1, 4	MHz	10: $N_{RB,c} = 52$
	Config 2, 5		10: N _{RB,c} = 52
	Config 3, 6		40: N _{RB,c} = 106
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1

		-	
DL dedicated	Config 1, 2, 3, 4, 5,		
BWP	6		DLBWP.1.1
configuration			
UL initial BWP	UL initial BWP Config 1, 2, 3, 4, 5,		LILDWD 0.4
configuration	6		ULBWP.0.1
UL dedicated	Config 1, 2, 3, 4, 5,		
BWP	6		ULBWP.1.1
configuration			025***
TDD	Config 1, 4		Not Applicable
Configuration	Config 2, 5		TDDConf.1.1
Corniguration			
	Config 3, 6		TDDConf.2.1
RMSI CORESET	Config 1, 4		CR.1.1 FDD
Reference	Config 2, 5		CR.1.1 TDD
Channel	Config 3, 6		CR.2.1 TDD
Dedicated	Config 1, 4		CCR.1.3 FDD
CORESET			
Reference			
Channel			
Onamor	Config 2, 5		CCR.1.3 TDD
			CCR.2.2 TDD
CCD	Config 3, 6		
SSB	Config 1, 4		SSB.1 FR1
Configuration	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC	Config 1, 2, 4, 5		SMTC.1
Configuration	Config 3, 6		SMTC.1
PDSCH/PDCCH	Config 1, 2, 4, 5		15 kHz
subcarrier	Config 3, 6		30 kHz
spacing	35g 5, 5		33=
PRACH	Config 1, 2, 4, 5		Table A.3.8.2.1-1
Configuration	Config 3, 6		Table A.3.8.2.1-1
	d as DLM DC		
SSB index assigned			0
	;		
OCNG parameters	•		OP.1
CP length			Normal
CP length Correlation Matrix			
CP length Correlation Matrix Configuration	and Antenna		Normal 2x2 Low
CP length Correlation Matrix Configuration Out of sync	and Antenna DCI format		Normal 2x2 Low 1-0
CP length Correlation Matrix Configuration	and Antenna		Normal 2x2 Low
CP length Correlation Matrix Configuration Out of sync	and Antenna DCI format		Normal 2x2 Low 1-0
CP length Correlation Matrix Configuration Out of sync transmission	and Antenna DCI format Number of Control OFDM symbols	CCE	Normal 2x2 Low 1-0 2
CP length Correlation Matrix Configuration Out of sync transmission	DCI format Number of Control OFDM symbols Aggregation level	CCE dB	Normal 2x2 Low 1-0
CP length Correlation Matrix Configuration Out of sync transmission	and Antenna DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical	CCE dB	Normal 2x2 Low 1-0 2
CP length Correlation Matrix Configuration Out of sync transmission	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy		Normal 2x2 Low 1-0 2
CP length Correlation Matrix Configuration Out of sync transmission	and Antenna DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE		Normal 2x2 Low 1-0 2
CP length Correlation Matrix Configuration Out of sync transmission	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy	dB	Normal 2x2 Low 1-0 2 8 4
CP length Correlation Matrix Configuration Out of sync transmission	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical		Normal 2x2 Low 1-0 2
CP length Correlation Matrix Configuration Out of sync transmission	and Antenna DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS	dB	Normal 2x2 Low 1-0 2 8 4
CP length Correlation Matrix Configuration Out of sync transmission	and Antenna DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average	dB	Normal 2x2 Low 1-0 2 8 4
CP length Correlation Matrix Configuration Out of sync transmission	and Antenna DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	Normal 2x2 Low 1-0 2 8 4
CP length Correlation Matrix Configuration Out of sync transmission	and Antenna DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder	dB	Normal 2x2 Low 1-0 2 8 4
CP length Correlation Matrix Configuration Out of sync transmission	and Antenna DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity	dB	Normal 2x2 Low 1-0 2 8 4
CP length Correlation Matrix Configuration Out of sync transmission	and Antenna DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder	dB	Normal 2x2 Low 1-0 2 8 4 REG bundle size 6
CP length Correlation Matrix Configuration Out of sync transmission parameters	and Antenna DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity	dB	Normal 2x2 Low 1-0 2 8 4 REG bundle size
CP length Correlation Matrix Configuration Out of sync transmission parameters	and Antenna DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity	dB	Normal 2x2 Low 1-0 2 8 4 REG bundle size 6
CP length Correlation Matrix Configuration Out of sync transmission parameters DRX Gap pattern ID	and Antenna DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity	dB	Normal 2x2 Low 1-0 2 8 4 REG bundle size 6 OFF
CP length Correlation Matrix Configuration Out of sync transmission parameters DRX Gap pattern ID Layer 3 filtering	and Antenna DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity	dB dB	Normal 2x2 Low 1-0 2 8 4 REG bundle size 6 OFF gp0 Enabled
CP length Correlation Matrix Configuration Out of sync transmission parameters DRX Gap pattern ID Layer 3 filtering T310 timer	and Antenna DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity	dB dB	Normal 2x2 Low 1-0 2 8 4 REG bundle size 6 OFF gp0 Enabled 0
CP length Correlation Matrix Configuration Out of sync transmission parameters DRX Gap pattern ID Layer 3 filtering T310 timer	and Antenna DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity	dB dB	Normal 2x2 Low 1-0 2 8 4 REG bundle size 6 OFF gp0 Enabled 0 1000
CP length Correlation Matrix Configuration Out of sync transmission parameters DRX Gap pattern ID Layer 3 filtering T310 timer N310	and Antenna DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity	dB dB	Normal 2x2 Low 1-0 2 8 4 REG bundle size 6 OFF gp0 Enabled 0 1000 1
CP length Correlation Matrix Configuration Out of sync transmission parameters DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size	dB dB	Normal 2x2 Low 1-0 2 8 4 4 REG bundle size 6 OFF gp0 Enabled 0 1000 1
CP length Correlation Matrix Configuration Out of sync transmission parameters DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311 CSI-RS for CSI	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size	dB dB	Normal 2x2 Low 1-0 2 8 4 4 REG bundle size 6 OFF gp0 Enabled 0 1000 1 1 CSI-RS.1.1 FDD
CP length Correlation Matrix Configuration Out of sync transmission parameters DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311	DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size	dB dB	Normal 2x2 Low 1-0 2 8 4 4 REG bundle size 6 OFF gp0 Enabled 0 1000 1

CSI-RS for Config 1, 4			TRS.1.1 FDD
tracking	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
T1		S	0.2
T2		S	0.48
T3		S	0.48
D1		S	0.44

Note 1: All configurations are assigned to the UE prior to the start of time

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.4.5.1.1.1-3: Cell specific test parameters for FR1 (Cell 2) for out-of-sync radio link monitoring tests in non-DRX mode

Parameter		Unit		Test 1	
			T1	T2	Т3
EPRE ratio of P	DCCH DMRS to SSS	dB		4	
EPRE ratio of P	PDCCH to PDCCH	dB		0	
EPRE ratio of P	BCH DMRS to SSS	dB			
EPRE ratio of P	BCH to PBCH DMRS	dB			
EPRE ratio of P	SS to SSS	dB			
EPRE ratio of P	DSCH DMRS to SSS	dB		0	
EPRE ratio of P	PDSCH to PDSCH	dB			
EPRE ratio of C	CNG DMRS to SSS	dB			
EPRE ratio of C	CNG to OCNG DMRS	dB			
SNR on RLM-	Config 1, 4	dB	1	-7	-15
RS	Config 2, 5		1	-7	-15
	Config 3, 6		1	-7	-15
M	Config 1, 4	dBm/		-98	
N_{oc}	Config 2, 5	15		-98	
	Config 3, 6	kHz		-98	
N_{oc}	Config 1, 4	dBm/		-98	
1 Voc	Config 2, 5	SCS		-98	
	Config 3, 6			-95	
Propagation condition			TDL-0	C 300ns 1	100Hz

Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density

is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under

test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS

REs.

Table A.4.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

Field	Test 1
rieiu	Value
gapOffset	0

Note 1: E-UTRAN PCell and PSCell are SFN-synchronous and frame boundary aligned. (Ensure that RLM RS is partially overlapped with measurement gap).

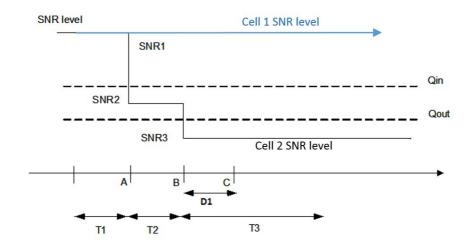


Figure A.4.5.1.1.1-1: SNR variation for out-of-sync testing

A.4.5.1.1.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.2 Radio Link Monitoring In-sync Test for FR1 PSCell configured with SSB-based RLM RS in non-DRX mode

A.4.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR1 PSCell radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.4.5.1.2.1-1. The test parameters are given in Tables A.4.5.1.2.1-2, and A.4.5.1.2.1-3 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.2.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the

start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

Table A.4.5.1.2.1-1: Supported test configurations for FR1 PSCell

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is onl	y required to pass in one of the supported test configurations in FR1

Table A.4.5.1.2.1-2: General test parameters for FR1 in-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PC		Cell 1	
E-UTRA RF Chann	nel Number		1
Active PSCell			Cell 2
RF Channel Numb	er		2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
BW _{channel}	Config 1, 4	MHz	10: N _{RB,c} = 52
	Config 2, 5		10: N _{RB,c} = 52
	Config 3, 6		40: N _{RB,c} =
			106
DL initial BWP	Config 1, 2, 3,		DLBWP.0.1
configuration	4, 5, 6		DEDWI .O.1
DL dedicated	Config 1, 2, 3,		
BWP	4, 5, 6		DLBWP.1.1
configuration	0 " 1 0 0		
UL initial BWP	Config 1, 2, 3,		ULBWP.0.1
configuration	4, 5, 6		
UL dedicated	Config 1, 2, 3,		LII D)MD 4 4
BWP	4, 5, 6		ULBWP.1.1
configuration TDD	Config 1, 4		Not Applicable
Configuration	Config 1, 4		TDDConf.1.1
Configuration	Config 3, 6		TDDConf.2.1
RMSI CORESET	Config 1, 4		CR.1.1 FDD
Reference	Config 2, 5		CR.1.1 TDD
Channel	Config 3, 6		CR.2.1 TDD
Dedicated	Config 1, 4		CCR.1.1 FDD
CORESET	Johns 1, 4		0011.11100
Reference			
Channel			
	Config 2, 5		CCR.1.1 TDD
	Config 3, 6		CCR.2.1 TDD
SSB	Config 1, 4		SSB.1 FR1
Configuration	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC	Config 1, 2, 4, 5		SMTC.1
Configuration	Config 3, 6		SMTC.1
PDSCH/PDCCH	Config 1, 2, 4, 5		15 kHz
subcarrier spacing	Config 3, 6		30 kHz

PRACH Configuration	Config 1, 2, 4, 5		Table A.3.8.2.1-1
J comigaration	Config 3, 6		Table
	Coming 5, 0		A.3.8.2.1-1
CCD index cosions	d oo DLM DC		
SSB index assigned	as klivi ko		0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix a	ind Antenna		2x2 Low
Configuration			
In sync	DCI format		1-0
transmission	Number of		2
parameters	Control OFDM		
	symbols		
	Aggregation	CCE	4
	level	COL	7
		40	0
	Ratio of	dB	0
	hypothetical		
	PDCCH RE		
	energy to		
	average SSS		
	RE energy		
	Ratio of	dB	0
	hypothetical		
	PDCCH DMRS		
	energy to		
	average SSS		
	•		
	RE energy		DEC bundle
	DMRS precoder		REG bundle
	granularity		size
	REG bundle		6
	size		
Out of sync	DCI format		1-0
transmission	Number of		2
parameters	Control OFDM		
	symbols		
	Aggregation	CCE	8
	level		
	Ratio of	dB	4
	hypothetical	uD	-
	PDCCH RE		
	energy to		
	average SSS		
	RE energy		
	Ratio of	dB	4
	hypothetical		
	PDCCH DMRS		
	energy to		
	average SSS		
	RE energy		
	DMRS precoder		REG bundle
	granularity		size
	REG bundle		6
	size		
DRX			OFF
			N.A.
Gap pattern ID			IN.A. Enabled
Layer 3 filtering			Enabled
T310 timer	ms	1000	
	T311 timer		
	ms	1000	
N310	-	1	
N311			1

		1
Config 1, 4		CSI-RS.1.1
reporting		FDD
Config 2, 5		CSI-RS.1.1
		TDD
Config 3, 6		CSI-RS.2.1
		TDD
Config 1, 4		TRS.1.1 FDD
Config 2, 5		TRS.1.1 TDD
Config 3, 6		TRS.1.2 TDD
	S	0.2
	S	0.2
T3		
T4		
T5		
D1		
	Config 3, 6 Config 1, 4 Config 2, 5	Config 2, 5 Config 3, 6 Config 1, 4 Config 2, 5 Config 3, 6 s

Note 1: All configurations are assigned to the UE prior to the

start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.4.5.1.2.1-3: Cell specific test parameters for FR1 (Cell 2) for in-sync radio link monitoring tests in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	Т3	T4	T5
EPRE ratio o	f PDCCH DMRS to SSS	dB			0		
EPRE ratio o	f PDCCH to PDCCH DMRS	dB			0		
EPRE ratio o	f PBCH DMRS to SSS	dB					
EPRE ratio o	f PBCH to PBCH DMRS	dB					
EPRE ratio o	f PSS to SSS	dB					
EPRE ratio o	f PDSCH DMRS to SSS	dB			0		
EPRE ratio o	f PDSCH to PDSCH DMRS	dB					
EPRE ratio o	f OCNG DMRS to SSS	dB					
EPRE ratio o	f OCNG to OCNG DMRS	dB					
SNR on	Config 1, 4	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2, 5		1	-7	-15	-4.5	1
	Config 3, 6		1	-7	-15	-4.5	1
NΙ	Config 1, 4	dBm/			-98		
N_{oc}	Config 2, 5	15	-98				
Config 3, 6		kHz	-98				
N Config 1, 4		dBm/	-98				
N_{oc} Config 1, 4 Config 2, 5		SCS			-98		
Config 3, 6					-95		
Propagation condition				TDL-C	300ns	100Hz	•

Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs. Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1,

4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.4.5.1.2.1-1.

Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6.

SNR level SNR1 SNR5 Qin SNR2 SNR4 Cell 2 SNR level A B C D E F D1

Table A.4.5.1.2.1-4: Void

Figure A.4.5.1.2.1-1: SNR variation for in-sync testing

T4

T5

T3

A.4.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

T2

A.4.5.1.3 Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with SSB-based RLM RS in DRX mode

A.4.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.4.5.1.3.1-1. The test parameters are given in Tables A.4.5.1.3.1-2 and A.4.5.1.3.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.3.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-

duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.4.5.1.3.1-1: Supported test configurations for FR1 PSCell

Configuration	Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is o	The UE is only required to pass in one of the supported test configurations in FR1			

Table A.4.5.1.3.1-2: General test parameters for FR1 out-of-sync testing in DRX mode

Parameter		Unit	Value	
			Test 1	
Active E-UTRA PCell			Cell 1	
E-UTRA RF Channe	el Number		1	
Active PSCell			Cell 2	
RF Channel Numbe	r		2	
Duplex mode	Config 1, 4		FDD	
	Config 2, 3, 5, 6		TDD	
BW _{channel}	Config 1, 4	MHz	10: N _{RB,c} = 52	
	Config 2, 5		10: N _{RB,c} = 52	
	Config 3, 6		40: N _{RB,c} = 106	
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1	
TDD Configuration	Config 1, 4		Not Applicable	
	Config 2, 5		TDDConf.1.1	
	Config 3, 6		TDDConf.2.1	
RMSI CORESET	Config 1, 4		CR.1.1 FDD	
Reference	Config 2, 5		CR.1.1 TDD	
Channel	Config 3, 6		CR.2.1 TDD	
Dedicated CORESET Reference Channel	Config 1, 4		CCR.1.3 FDD	
	Config 2, 5		CCR.1.3 TDD	
	Config 3, 6		CCR.2.2 TDD	
SSB Configuration	Config 1, 4		SSB.1 FR1	
9	Config 2, 5		SSB.1 FR1	
	Config 3, 6		SSB.2 FR1	
SMTC	Config 1, 2, 4, 5		SMTC.1	
Configuration	Config 3, 6		SMTC.1	
PDSCH/PDCCH	Config 1, 2, 4, 5		15 kHz	
subcarrier spacing	Config 3, 6		30 kHz	
PRACH	Config 1, 2, 4, 5		Table A.3.8.2.1-1	
Configuration	Config 3, 6		Table A.3.8.2.1-1	

SSB index assigned	as RLM RS		0
OCNG parameters			OP.1
CP length			Normal
	nd Antenna Configuration		2x2 Low
Out of sync	DCI format		1-0
transmission	Number of Control		2
parameters	OFDM symbols		
	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy to		
	average SSS RE		
	energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS energy		
	to average SSS RE		
	energy		
	DMRS precoder		REG bundle size
	granularity		
	REG bundle size		6
DRX Configuration			DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311	I -		1
CSI-RS for CSI	Config 1, 4		CSI-RS.1.1 FDD
reporting	Config 2, 5		CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
CSI-RS for	Config 1, 4		TRS.1.1 FDD
tracking	Config 2, 5		TRS.1.1 TDD
Config 3, 6			TRS.1.2 TDD
T1		S	0.2
T2		S	0.68
T3		S	0.68
D1		S	0.64

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.4.5.1.3.1-3: Cell specific test parameters for FR1 (Cell 2) for out-of-sync radio link monitoring tests in DRX mode

	Parameter	Unit	Test 1		
			T1	T2	T3
EPRE ratio	of PDCCH DMRS to SSS	dB		4	
EPRE ratio	of PDCCH to PDCCH DMRS	dB		0	
EPRE ratio	of PBCH DMRS to SSS	dB			
EPRE ratio	of PBCH to PBCH DMRS	dB			
EPRE ratio	of PSS to SSS	dB		0	
EPRE ratio of PDSCH DMRS to SSS		dB			
EPRE ratio	EPRE ratio of PDSCH to PDSCH DMRS				
EPRE ratio	EPRE ratio of OCNG DMRS to SSS				
EPRE ratio	of OCNG to OCNG DMRS	MRS dB			
SNR on	Config 1, 4	dB	1	-7	-15
RLM-RS	Config 2, 5		1	-7	-15
	Config 3, 6		1	-7	-15

M	Config 1, 4	dBm/15k	-98
N_{oc}	Config 2, 5	Hz	-98
	Config 3, 6		-98
M	Config 1, 4	dBm/SCS	-98
¹ V _{oc}	Config 2, 5		-98
	Config 3, 6		-95
Propagation	on condition		TDL-C 300ns 100Hz

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.4.5.1.3.1-1.
- Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.4.5.1.3.1-4: Void

Table A.4.5.1.3.1-5: Void

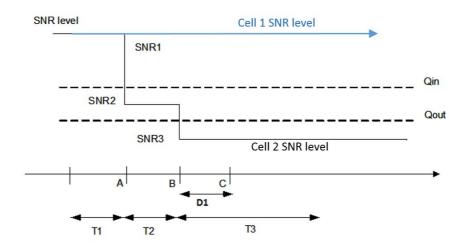


Figure A.4.5.1.3.1-1: SNR variation for out-of-sync testing

A.4.5.1.3.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.4 Radio Link Monitoring In-sync Test for FR1 PSCell configured with SSB-based RLM RS in DRX mode

A.4.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.4.5.1.4.1-1. The test parameters are given in Tables A.4.5.1.4.1-2, and A.4.5.1.4.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-1. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.4.1-1 shows the variation of the downlink SNR in the active Cell 2 to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Configuration Description LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 1 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode 2 3 LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 4 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 5 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 6 Note: The UE is only required to pass in one of the supported test configurations in FR1

Table A.4.5.1.4.1-1: Supported test configurations for FR1 PSCell

Table A.4.5.1.4.1-2: General test parameters for FR1 in-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active F LITDA DCell			Coll 4
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel N	Number		1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
BW _{channel}	Config 1, 4	MHz	10: N _{RB,c} = 52
	Config 2, 5		10: N _{RB,c} = 52
	Config 3, 6		40: N _{RB,c} = 106
DL initial BWP	Config 1, 2, 3, 4, 5,		DLBWP.0.1
configuration	6		DLBWF.U.1
DL dedicated BWP	Config 1, 2, 3, 4, 5,		DLBWP.1.1
configuration	6		DLBWF.1.1
UL initial BWP	Config 1, 2, 3, 4, 5,		ULBWP.0.1
configuration	6		OLBVVF.U. I
UL dedicated BWP	Config 1, 2, 3, 4, 5,		ULBWP.1.1
configuration	6		ULBWF.I.I

TDD Configuration	Config 1, 4		Not Applicable
122 Coringulation	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
RMSI CORESET	Config 1, 4		CR.1.1 FDD
Reference Channel	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
Dedicated	Config 1, 4		CCR.1.1 FDD
CORESET	J ,		
Reference Channel			
	Config 2, 5		CCR.1.1 TDD
	Config 3, 6		CCR.2.1 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
	Config 3, 6		SMTC.1
PDSCH/PDCCH	Config 1, 2, 4, 5		15 kHz
subcarrier spacing	Config 3, 6		30 kHz
PRACH	Config 1, 2, 4, 5		Table A.3.8.2.1-1
Configuration	Config 3, 6		Table A.3.8.2.1-1
SSB index assigned as			0
OCNG parameters	-		OP.1
CP length			Normal
Correlation Matrix and A	Antenna		2x2 Low
Configuration			
In sync transmission	DCI format		1-0
parameters	Number of Control		2
	OFDM symbols		
	Aggregation level	CCE	4
	Ratio of	dB	0
	hypothetical		
	PDCCH RE energy		
	to average SSS RE		
	energy Ratio of	dB	0
	hypothetical	иь	U
	PDCCH DMRS		
	energy to average		
	SSS RE energy		
	DMRS precoder		REG bundle size
	granularity		
	REG bundle size		6
Out of sync	DCI format		1-0
transmission	Number of Control		2
parameters	OFDM symbols		
	Aggregation level	CCE	8
	Ratio of	dB	4
	hypothetical	1	
1	DDCCH DE anarou	1	
	PDCCH RE energy		
	to average SSS RE		
_	to average SSS RE energy	dB	4
	to average SSS RE energy Ratio of	dB	4
	to average SSS RE energy Ratio of hypothetical	dB	4
	to average SSS RE energy Ratio of	dB	4
	to average SSS RE energy Ratio of hypothetical PDCCH DMRS	dB	4
	to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average	dB	4 REG bundle size
	to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	dB	·

DRX Configuration			DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	1000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI	Config 1, 4		CSI-RS.1.1 FDD
reporting	Config 2, 5		CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
T1		S	0.2
T2		S	0.2
T3		S	0.64
T4		S	0.2
T5		S	0.88
D1		S	0.84

Note 1: All configurations are assigned to the UE prior to the start of time period

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.4.5.1.4.1-3: Cell specific test parameters for FR1 (Cell 2) for in-sync radio link monitoring tests in DRX mode

Parameter		Unit			Test 1		
		-	T1	T2	Т3	T4	T5
EPRE ratio o	of PDCCH DMRS to SSS	dB			0		
EPRE ratio o	of PDCCH to PDCCH DMRS	dB			0		
EPRE ratio o	of PBCH DMRS to SSS	dB					
EPRE ratio o	of PBCH to PBCH DMRS	dB					
EPRE ratio o	of PSS to SSS	dB			0		
EPRE ratio o	of PDSCH DMRS to SSS	dB					
EPRE ratio o	of PDSCH to PDSCH DMRS	dB					
EPRE ratio o	of OCNG DMRS to SSS	dB					
EPRE ratio o	of OCNG to OCNG DMRS	dB					
SNR on	Config 1, 4	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2, 5		1	-7	-15	-4.5	1
	Config 3, 6		1	-7	-15	-4.5	1
N_{oc}	Config 1, 4	dBm/15	-98				
1 voc	Config 2, 5	kHz	-98				
	Config 3, 6		-98				
N_{oc} Config 1, 4 Config 2, 5 Config 3, 6		dBm/SCS	-98				
			-98				
					-95		
Propagation	condition			TDL-	-C 300ns 1	00Hz	

Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.4.5.1.4.1-1.

Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6.

Table A.4.5.1.4.1-4: Void

Table A.4.5.1.4.1-5: Void

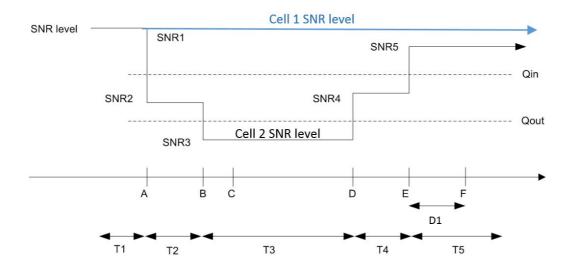


Figure A.4.5.1.4.1-1: SNR variation for in-sync testing

A.4.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.5 EN-DC Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with CSI-RS-based RLM in non-DRX mode

A.4.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.5.1-1, A.4.5.1.5.1-2, A.4.5.1.5.1-3, and A.4.5.1.5.1-3A below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.5.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. The UE is

configured to perform inter-frequency measurements using GP ID #0 (40ms). In the test, SSB0 is configured as the BFD-RS.

Table A.4.5.1.5.1-1: Supported test configurations for FR1 PSCell

Configuration	Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.4.5.1.5.1-2: General test parameters for FR1 PSCell for CSI-RS out-of-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
Bapiex made	Config 2, 3, 5, 6	1	TDD
TDD Configuration	Config 1, 4		Not Applicable
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
RMSI CORESET Reference Channel	Config 1, 4		CR.1.1 FDD
	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
Dedicated CORESET Reference	Config 1, 4		CCR.1.3 FDD
Channel	Config 2, 5		CCR.1.3 TDD
	Config 3, 6		CCR.2.2 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
	Config 3, 6		SMTC.1
PDSCH/PDCCH subcarrier	Config 1, 2, 4, 5		15 KHz
spacing	Config 3, 6		30 KHz
TRS configuration	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
001.00 (Config 1, 4		Resource #4 in TRS.1.1 FDD
CSI-RS for RLM	Config 2, 5		Resource #4 in TRS.1.1 TDD

	Config 3, 6		Resource #4 in TRS.1.2 TDD
TCI configuration for PDCCH	I/PDSCH		TCI.State.2
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and Anten	na Configuration		2x2 Low
Out of sync transmission	DCI format		1-0
parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for reporting	Config 1, 4		CSI-RS1.1 FDD
	Config 2, 5		CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
Τ1		S	0.2
T2		S	0.48
T3		S	0.48
D1		S	0.44

Note 2: E-UTRAN is in non-DRX mode under test.

Table A.4.5.1.5.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

Parameter	Unit	Test 1		
		T1	T2	T3
EPRE ratio of PDCCH DMRS to SSS	dB		4	
EPRE ratio of PDCCH to PDCCH DMRS	dB			
EPRE ratio of PBCH to PBCH DMRS	dB			
EPRE ratio of PSS to SSS	dB			
EPRE ratio of PBCH DMRS to SSS	dB		0	
EPRE ratio of PDSCH to PDSCH DMRS	dB			
EPRE ratio of PDSCH DMRS to SSS	dB			

EPRE rat	io of OCNG DMRS	dB			
EPRE rat	io of OCNG to MRS	dB			
SNR on	Config 1, 4	dB	1	-7	-15
RLM-RS	Config 2, 5		1	-7	-15
	Config 3, 6		1	-7	-15
N_{oc}	Config 1, 4	dBm/15K		-98	
00	Config 2, 5	Hz		-98	
	Config 3, 6			-98	
Propagat	ion condition		-	TDL-C 300ns 100Hz	<u>'</u>
Note 1:	OCNG shall be used total transmitted power.				
Note 2:	The uplink resource period T1.	s for CSI rep	orting are assigned	to the UE prior to the	ne start of time
Note 3:	NZP CSI-RS resour the start of time peri		uration for CSI repo	orting are assigned to	o the UE prior to
Note 4:	Measurement gap o	onfiguration	is assigned to the U	JE prior to the start o	of time period T1.
Note 5:	The timers and laye period T1.				
Note 6:	The signal contains	PDCCH for	UEs other than the o	device under test as	part of OCNG.
Note 7:	SNR levels correspond				
Note 8:	The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.1.5.1-1.				
Note 9:	The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in section A.3.6.1.1.				

Table A.4.5.1.5.1-3A: Measurement gap configuration for FR1 CSI-RS out-of-sync radio link monitoring in non-DRX mode

Field		Test 1	
		Value	
	gapOffset	0	
Note 1: E-UTRAN PCell and PSCell are SFN- synchronous and frame boundary aligned.			

Table A.4.5.1.5.1-4: Void

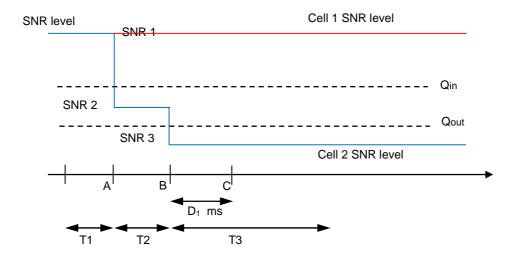


Figure A.4.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.4.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D_1 after the start of the time duration T3) on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.6 EN-DC Radio Link Monitoring In-sync Test for FR1 PSCell configured with CSI-RS-based RLM in non-DRX mode

A.4.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.6.1-1, A.4.5.1.6.1-2, and A.4.5.1.6.1-3 below. There are two cells, cell 1which is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.6.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. In the test, SSB0 is configured as the BFD-RS.

Table A.4.5.1.6.1-1: Supported test configurations for FR1 PSCell

Configuration	Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			

2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.4.5.1.6.1-2: General test parameters for FR1 PSCell for CSI-RS in-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
·	Config 2, 3, 5, 6		TDD
TDD Configuration	Config 1, 4		Not Applicable
, and the second	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
DI initial DWD configuration	Config 1, 2, 3, 4, 5,		DI DIMD 0.4
DL initial BWP configuration	6		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5,		DLBWP.1.1
DE dedicated DVV configuration	6		D25****
UL initial BWP configuration	Config 1, 2, 3, 4, 5,		ULBWP.0.1
	6		0 2 2 1 1 1 1 1 1
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
RMSI CORESET Reference	Config 1, 4		CR.1.1 FDD
Channel	33g ., .		01
	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
Dedicated CORESET Reference	Config 1, 4		CCR.1.1 FDD
Channel	Config 2, 5		CCR.1.1 TDD
	Config 3, 6		CCR.2.1 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
CCD Coringulation	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
SW10 Comigaration	Config 3, 6		SMTC.1
PDSCH/PDCCH subcarrier spacin	g Config 1, 2, 4, 5		15 KHz
1 Door in Door 1 subcamer spacin	Config 3, 6		30 KHz
TRS configuration	Config 1, 4		TRS.1.1 FDD
110 comiguration	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
	Config 1, 4		Resource #4 in TRS.1.1 FDD
CSI-RS for RLM	Config 1, 4		Resource #4 in TRS.1.1 TDD
CSI-RS IOI RLIVI	Config 2, 5		Resource #4 in TRS.1.1 TDD Resource #4 in TRS.1.2 TDD
TCI configuration for PDCCH/PDS			TCI.State.2
OCNG parameters	011		OP.1
CP length			Normal
Correlation Matrix and Antenna Co	unfiguration		2x2 Low
	I format		1-0
	mber of Control OFDM		2
	mbols		
Syl	IIIOII		

Out of sync transmission	Aggregation level	CCE	8
parameters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
	DCI format		1-0
In sync transmission	Number of Control OFDM symbols		2
parameters	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	1000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for reporting	Config 1, 4		CSI-RS.1.1 FDD
	Config 2, 5		CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	0.2
Т3		S	0.44
T4		S	0.2
T5		S	0.88
T6		S	0.84
	CH is not transmitted after T1 sta on-DRX mode under test.	rts.	

Table A.4.5.1.6.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter	Unit	Test 1				
		T1	T2	T3	T4	T5
EPRE ratio of PDCCH DMRS to SSS	dB			0		
EPRE ratio of PDCCH to PDCCH DMRS	dB					
EPRE ratio of PBCH DMRS to SSS	dB					
EPRE ratio of PSS to SSS	dB			0		
EPRE ratio of PBCH to PBCH DMRS	dB					

EPRE ratio of DMRS	of PDSCH to PDSCH	dB					
EPRE ratio o	of PDSCH DMRS to	dB					
EPRE ratio o	of OCNG DMRS to	dB					
EPRE ratio of DMRS	of OCNG to OCNG	dB					
SNR on	Config 1, 4	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2, 5		1	-7	-15	-4.5	1
	Config 3, 6		1	-7	-15	-4.5	1
M	Config 1, 4	dBm/15KHz			-98		
N_{oc}	Config 2, 5		-98				
	Config 3, 6		-98				
Propagation	condition			TD	L-C 300ns 10	0Hz	•

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5

respectively in figure A.4.5.1.6.1-1.

Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in section A.3.6.1.1.

Table A.4.5.1.6.1-3A: Void

Table A.4.5.1.6.1-4: Void

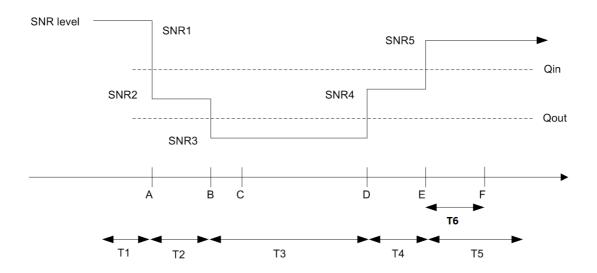


Figure A.4.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.4.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.7 EN-DC Radio Link Monitoring Out-of-sync Test for FR1 PSCell configured with CSI-RS-based RLM in DRX mode

A.4.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.7.1-1, A.4.5.1.7.1-2, and A.4.5.1.7.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.4.5.1.7.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when Onduration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. In the test, SSB0 is configured as the BFD-RS.

Table A.4.5.1.7.1-1: Supported test configurations for FR1 PSCell

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only r	equired to pass in one of the supported test configurations in FR1

Table A.4.5.1.7.1-2: General test parameters for FR1 PSCell for CSI-RS out-of-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Num	ber		1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
•	Config 2, 3, 5, 6		TDD
TDD Configuration	Config 1, 4		Not Applicable
	Config 2, 5		TDDConf.1.1

	Config 2 6	1	TDDConf 2.4
DI initial PWD configuration	Config 3, 6		TDDConf.2.1
DL initial BWP configuration DL dedicated BWP	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1
configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1
UL dedicated BWP			LII DWD 4.4
configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
RMSI CORESET Reference Channel	Config 1, 4		CR.1.1 FDD
	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
Dedicated CORESET	Config 1, 4		CCR.1.3 FDD
Reference Channel	Config 2, 5		CCR.1.3 TDD
000 0 1 1	Config 3, 6		CCR.2.2 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
	Config 2, 5		SSB.1 FR1 SSB.2 FR1
SMTC Configuration	Config 3, 6 Config 1, 2, 4, 5		SMTC.1
SWI'C Configuration	Config 3, 6	•	SMTC.1
PDSCH/PDCCH subcarrier	Config 1, 2, 4, 5		15 KHz
spacing	• , , ,		
. •	Config 3, 6		30 KHz
TRS configuration	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
	Config 1, 4		Resource #4 in TRS.1.1 FDD
CSI-RS for RLM	Config 2, 5		Resource #4 in TRS.1.1 TDD
	Config 3, 6		Resource #4 in TRS.1.2 TDD
TCI configuration for PDCCH/P	DSCH		TCI.State.2
OCNG parameters	20011		OP.1
CP length			Normal
Correlation Matrix and Antenna	Configuration		2x2 Low
Out of sync transmission	DCI format		1-0
parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for reporting	Config 1, 4		CSI-RS.1.1 FDD
	Config 2, 5		CSI-RS.1.1 TDD

	Config 3, 6		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	1.28
T3		S	1.28
D1		S	1.24
Note 1:	UE-specific PDCCH is not transmitted after T1 starts	3.	
Note 2:	E-UTRAN is in non-DRX mode under test.		

Table A.4.5.1.7.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in DRX mode

	Parameter	Unit	Test 1			
			T1	T2	T3	
	tio of PDCCH	dB		4		
DMRS to						
	tio of PDCCH to	dB				
PDCCH			=			
	tio of PBCH DMRS	dB				
to SSS	C (DDOLL)	ID.	-			
	tio of PBCH to	dB				
PBCH DI	tio of PBCH to	dB				
PBCH DI		иБ				
	tio of PDSCH	dB				
DMRS to		uБ		0		
	tio of PDSCH to	dB	=			
PDSCH						
EPRE ra	tio of OCNG DMRS	dB	=			
to SSS						
	tio of OCNG to	dB				
OCNG D	MRS				1	
SNR	Config 1, 4	dB	1	-7	-15	
	Config 2, 5		1	-7	-15	
	Config 3, 6		1	-7	-15	
N_{oc}	Config 1, 4	dBm/15KHz		-98		
'oc	Config 2, 5			-98		
	Config 3, 6			-98		
	tion condition			DL-C 300ns 100h		
Note 1:	OCNG shall be used					
Note 2:	total transmitted pov The uplink resource					
Note 2.	period T1.	s ioi Coi reportini	y are assigned to	the OE phot to th	e start or time	
Note 3:	NZP CSI-RS resour	ce set configuration	on for CSI reportir	na are assigned to	the LIE prior to	
Note 5.	the start of time peri		on for Cor reportin	ig are assigned to	o the OL phor to	
Note 4:	Measurement gap c		signed to the UE	orior to the start o	f time period	
	T1.	3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	5		- 1	
Note 5:	The timers and laye	r 3 filtering related	d parameters are	configured prior to	the start of	
	time period T1.	-				
Note 6:	The signal contains				part of OCNG.	
Note 7:	SNR levels correspo				ON ID O	
Note 8:	The SNR in time per			SNR1, SNR2 and	SNR3	

The SNR values are specified for testing a UE which supports 2RX on at least one

band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in section A.3.6.1.1.

respectively in figure A.4.5.1.7.1-1.

Note 9:

Table A.4.5.1.7.1-3A: Void

Table A.4.5.1.7.1-4: Void

Table A.4.5.1.7.1-5: Void

Table A.4.5.1.7.1-6: Void

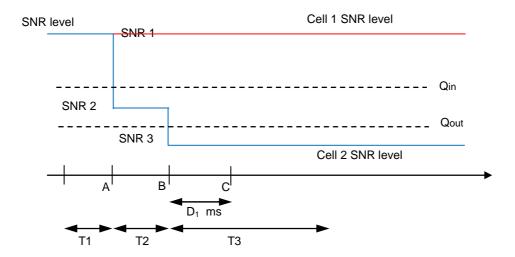


Figure A.4.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.4.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D_1 after the start of the time duration T3) on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.1.8 EN-DC Radio Link Monitoring In-sync Test for FR1 PSCell configured with CSI-RS-based RLM in DRX mode

A.4.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR1 PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.4.5.1.8.1-1, A.4.5.1.8.1-2, A.4.5.1.8.1-3 and A.4.5.1.8.1-3A below. There are two cells, cell 1which is the E-UTRAN PCell, and cell 2 is the NR PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.1.8.1-1 shows the

variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity defined in CSI-RS configuration. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms). In the test, SSB0 is configured as the BFD-RS.

Table A.4.5.1.8.1-1: Supported test configurations for FR1 PSCell

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only	required to pass in one of the supported test configurations in FR1

Table A.4.5.1.8.1-2: General test parameters for FR1 PSCell for CSI-RS in-sync testing in DRX mode

Parame	ter	Unit	Value
			Test 1
			2
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 4		FDD
	Config 2, 3, 5, 6		TDD
TDD Configuration	Config 1, 4		Not Applicable
	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1
RMSI CORESET Reference Channel	Config 1, 4		CR.1.1 FDD
	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
Dedicated CORESET	Config 1, 4		CCR.1.1 FDD
Reference Channel	Config 2, 5		CCR.1.1 TDD
	Config 3, 6		CCR.2.1 TDD
SSB Configuration	Config 1, 4		SSB.1 FR1
G	Config 2, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1
	Config 3, 6		SMTC.1
PDSCH/PDCCH subcarrier	Config 1, 2, 4, 5		15 KHz
spacing	Config 3, 6		30 KHz
TRS configuration	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD

	Config 3, 6		TRS.1.2 TDD
	Config 1, 4		Resource #4 in TRS.1.1 FDD
001 00 (0114	Config 2, 5		Resource #4 in TRS.1.1 TDD
CSI-RS for RLM	•		
	Config 3, 6		Resource #4 in TRS.1.2 TDD
TCI configuration for PDCC	CH/PDSCH		TCI.State.2
OCNG parameters			OP.1
CP length	ana Canfinunation		Normal
Correlation Matrix and Ante	enna Configuration		2x2 Low
Out of sync transmission	DCI format		1-0
parameters	Number of Control		2
	OFDM symbols		
	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy to average CSI-RS RE		
	energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS energy	uБ	7
	to average CSI-RS RE		
	energy		
	DMRS precoder		REG bundle size
	granularity		
	REG bundle size		6
	DCI format		1-0
n sync transmission parameters	Number of Control		2
	OFDM symbols Aggregation level	CCE	1
	Ratio of hypothetical	dB	0
	PDCCH RE energy to	uБ	
	average CSI-RS RE		
	energy		
	Ratio of hypothetical	dB	0
	PDCCH DMRS energy		
	to average CSI-RS RE		
	energy		2501 11 1
	DMRS precoder		REG bundle size
	granularity REG bundle size		6
DRX	NEO Buridie Size		DRX.3
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer			2000
T311 timer		ms ms	1000
N310		1113	1
N311			1
CSI-RS for reporting	Config 1, 4		CSI-RS.1.1 FDD
. 3	Config 2, 5		CSI-RS.1.1 TDD
	Config 3, 6		CSI-RS.2.1 TDD
T1		S	0.2
T2		S	0.2
T3		S	1.24
<u>T4</u>		S	0.2
T5		S	1.88
T6 Note 1: UE-specific PDC		S	1.84
	on-DRX mode under test.	ແເວ.	

Table A.4.5.1.8.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in DRX mode

Р	Parameter	Unit			Test 1		
			T1	T2	T3	T4	T5
EPRE ratio o	of PDCCH DMRS to	dB			0		
EPRE ratio of DMRS	of PDCCH to PDCCH	dB					
EPRE ratio o	of PBCH DMRS to	dB					
EPRE ratio o	of PBCH to PBCH	dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio o	of PDSCH DMRS to	dB			0		
EPRE ratio o	of PDSCH to PDSCH	dB					
EPRE ratio o	of OCNG DMRS to	dB					
EPRE ratio o	of OCNG to OCNG	dB					
SNR on	Config 1, 4	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2, 5		1	-7	-15	-4.5	1
	Config 3, 6		1	-7	-15	-4.5	1
N_{oc}	Config 1, 4	dBm/15KHz	-tz		-98		
00	Config 2, 5				-98		
	Config 3, 6			·	-98	·	
Propagation	condition			TD	L-C 300ns 10	0Hz	

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.4.5.1.8.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in section A.3.6.1.1.

Table A.4.5.1.8.1-3A: Measurement gap configuration for FR1 CSI-RS in-sync radio link monitoring in DRX mode

	Test 1 Value			
	Field			
	gapOffset	0		
Note 1:	E-UTRAN PCell and PSCell are SFN-			
	synchronous and frame boundary			
	aligned.			

Table A.4.5.1.8.1-4: Void

Table A.4.5.1.8.1-5: Void

Table A.4.5.1.8.1-6: Void

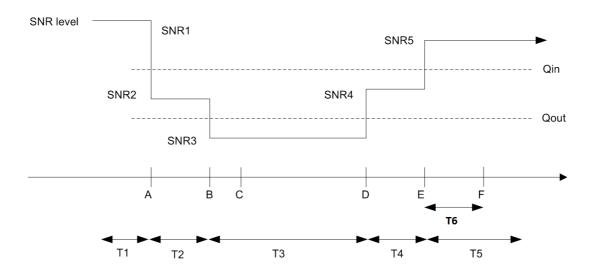


Figure A.4.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

A.4.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2 Interruption

A.4.5.2.1 E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

A.4.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that when LTE PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in TS38.133 clause 8. 2.1.2. Supported test configurations are shown in table A.4.5.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.1.1-2 and A.4.5.2.1.1-3. The E-UTRAN PCell DRX configuration parameters are given in Table A.4.5.2.1.1-4 below. And the E-UTRAN

cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell and Cell2 is NR FR1 PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell1 and Cell2. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. CORESET indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.4.5.2.1.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

	Config	Description	
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
	6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note:	ote: The UE is only required to be tested in one of the supported test configurations		

Table A.4.5.2.1.1-2: General test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to Cell1 and Cell2
DRX		DRX.4	DRX related parameters are defined in
		DRA.4	Table A.3.3.4-1
Measurement gap pattern		OFF	
Id		OFF	
T1	S	10	

Table A.4.5.2.1.1-3: NR cell specific test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Paran	neter	Unit	Cell2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BW _{channel}	Config 1,4		10: N _{RB,c} = 52
	Config 2,5		10: N _{RB,c} = 52
	Config 3,6		40: N _{RB,c} = 106
Initial DL BWP	Config 1,4		DLBWP.0.1
Configuration	Config 2,5		DLBWP.0.1
	Config 3,6		DLBWP.0.1

Dedicated DL BWP	Config 1 4		DLBWP.1.1
	Config 1,4		
Configuration	Config 2,5		DLBWP.1.1
	Config 3,6		DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1
Configuration	Config 2,5		ULBWP.0.1
	Config 3,6		ULBWP.0.1
Dedicated UL BWP	Config 1,4		ULBWP.1.1
Configuration	Config 2,5		ULBWP.1.1
	Config 3,6		ULBWP.1.1
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5	-	SR.1.1 TDD
	Config 3,6		SR.2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5		CR.1.1 TDD
	Config 3,6		CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD
	Config 3,6	1	CCR.2.1 TDD
OCNG Patterns			OP.1
SMTC Configuration			SMTC.1
TRS configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
Config 3,6			SSB.2 FR1
Correlation Matrix and Antenna			1x2 Low
Configuration			
EPRE ratio of PSS to SS			
EPRE ratio of PBCH DM			
EPRE ratio of PBCH to F			
EPRE ratio of PDCCH D			
EPRE ratio of PDCCH to			
EPRE ratio of PDSCH D		dB	0
EPRE ratio of PDSCH to		4	
EPRE ratio of OCNG DN	ARS to SSS(Note		
1)	OONO DMDO	4	
EPRE ratio of OCNG to	OCNG DMRS		
(Note 1) Noc ^{Note 2}		dDm/15	
INOC		dBm/15 kHz	-104
SS-RSRP Note 3		dBm/15	
33-N3NF		kHz	-87
Ês/lot		dB	17
Ês/Noc		dB	17
IoNote3		dBm/	
· · ·	Config 1,2,4,5	9.36MHz	-58.96
	0 " 0 "	dBm/	
	Config 3,6	38.16MHz	-52.86
Time offset to Cell1 Note 4		μs	3 for intra-band EN-DC,
		,	33 for inter-band EN-DC
Propagation Condition			AWGN

Note 1	: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power
	spectral density is achieved for all OFDM symbols.
Note 2	Interference from other cells and noise sources not specified in the test is assumed to be constant over
	subcarriers and time and shall be modeled as AWGN of appropriate power for N₀c to be fulfilled.
Note 3	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are
	not settable parameters themselvess.
Note 4	Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and
	slot timing boundary of PSCell at the UE antenna connector including time alignment error between the
	two cells

Table A.4.5.2.1.1-4: Void

A.4.5.2.1.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed X as defined in Table A.4.5.2.1.2-1.

Table A.4.5.2.1.2-1: Interruption length X at transition between active and non-active during DRX

//	NR Slot	Interruption length X	
<i></i>	length (ms)	Sync	
0	1	1	
1	0.5	1	

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.2 E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

A.4.5.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that when LTE PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1.2. Supported test configurations are shown in table A.4.5.2.2.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.2.1-2 and A.4.5.2.2.1-3. The E-UTRAN PCell DRX configuration parameters are given in Table A.4.5.2.2.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell and Cell2 is NR FR1 PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. PDCCH indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.4.5.2.2.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is or	Note: The UE is only required to be tested in one of the supported test configurations		

Table A.4.5.2.2.1-2: General test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to Cell1 and Cell2
DRX		DRX.4	DRX related parameters are defined in
		DNA.4	Table A.3.3.4-1
Measurement gap pattern		OFF	
Id		OFF	
T1	S	10	

Table A.4.5.2.2.1-3: NR cell specific test parameters for E-UTRAN – NR FR1 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter		Unit	Cell2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BW _{channel}	Config 1,4		10: N _{RB,c} = 52
	Config 2,5		10: N _{RB,c} = 52
	Config 3,6		40: N _{RB,c} = 106
Initial DL BWP	Config 1,4		DLBWP.0.1
Configuration	Config 2,5		DLBWP.0.1
	Config 3,6		DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1
Configuration	Config 2,5		DLBWP.1.1
	Config 3,6		DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1
Configuration	Config 2,5		ULBWP.0.1
	Config 3,6		ULBWP.0.1
Dedicated UL BWP	Config 1,4		ULBWP.1.1
Configuration	Config 2,5		ULBWP.1.1
	Config 3,6		ULBWP.1.1
	Config 1,4		SR.1.1 FDD

	0 " 0 5	Т	00.4.4.TDD
PDSCH Reference	Config 2,5	_	SR.1.1 TDD
measurement channel	Config 3,6		SR.2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5		CR.1.1 TDD
	Config 3,6		CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD
	Config 3,6	1	CCR.2.1 TDD
OCNG Patterns	-		OP.1
SMTC Configuration			SMTC.1
TRS configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
	Config 3,6		SSB.2 FR1
Correlation Matrix and Ar	•		1x2 Low
Configuration			
EPRE ratio of PSS to SS	S		
EPRE ratio of PBCH DM		1	
EPRE ratio of PBCH to F		1	
EPRE ratio of PDCCH D		1	
EPRE ratio of PDCCH to PDCCH DMRS		-	
EPRE ratio of PDSCH DMRS to SSS		dB	0
EPRE ratio of PDSCH to PDSCH		-	_
EPRE ratio of OCNG DMRS to SSS(Note		1	
1)			
EPRE ratio of OCNG to OCNG DMRS		1	
(Note 1)			
Noc ^{Note 2}		dBm/15	
1400		kHz	-104
SS-RSRP Note 3		dBm/15	
CO NOIN		kHz	-87
Ê _s /I _{ot}		dB	17
Ê _s /N _{oc}		dB	17
IoNote3		dBm/	17
10	Config 1,2,4,5	9.36MHz	-58.96
		dBm/	
	Config 3,6	38.16MHz	-52.86
Time offset to Cell1 Note	Config 1,2,4,5	+	500
4	Coming 1,2,4,5	μs	300
	Config 3,6	_	250
Dropogation Candities	Curing 3,6		
Propagation Condition		<u> </u>	AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.

Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells

Table A.4.5.2.2.1-4: Void

A.4.5.2.2.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed X as defined in Table A.4.5.2.2.2-1.

Table A.4.5.2.2.2-1: Interruption length X at transition between active and non-active during DRX

11	NR Slot	Interruption length X	
μ.	length (ms)	Async	
0	1	2	
1	0.5	2	

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.3 E-UTRAN – NR FR1 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

A.4.5.2.3.1 Test Purpose and Environment

T The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1.2. Supported test configurations for LTE PCell and NR PSCell are shown in table A.4.5.2.3.1-1. Supported test configurations for NR SCell are shown in table A.4.5.2.3.1-1A. Test configuration for LTE PCell and NR PSCell and test configuration for NR SCell are chosen independently.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.3.1-2, A.4.5.2.3.1-3 and A.4.5.2.3.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell3 is NR PSCell and NR deactivated SCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. During T1, LTE PCell and NR PSCell are continuously scheduled in DL

Table A.4.5.2.3.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations for LTE PCell and NR PSCell

	Config	Description
1		LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
2		LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
3		LTE FDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
4		LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
5		LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
6		LTE TDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations
Note 2:	The UE is only re	equired to be tested in one with smallest aggregated channel bandwidth from supported
	band combinatio	ns which is composed of CCs ≥ the bandwidth (BW _{channel}) defined in each test
	configuration,	

Table A.4.5.2.3.1-1A: Interruptions during measurements on deactivated NR SCC supported test configurations for NR SCell

Configscell		Description
1		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
3		NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
Note 1:	Note 1: The UE is only required to be tested in one of the supported test configurations	
Note 2:	2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BW _{channel}) defined in each test configuration	

Table A.4.5.2.3.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2, 3	One is E-UTRAN RF channel and the other two are NR RF channels
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Active PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated SCell		Cell3	Deactivated SCell on NR RF channel number 3.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

Table A.4.5.2.3.1-3: NR cell specific test parameters for NR PSCell for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Param	eter	Unit	Cell2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6	1	TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5	1	TDDConf.1.1
	Config 3,6	1	TDDConf.2.1
BW _{channel}	Config 1,4		Note 8
	Config 2,5		Note 8
	Config 3,6	1	Note 8
BW _{occupied}	Config 1,4	RB	52 Note 6
	Config 2,5	7	52 Note 6
	Config 3,6		106 Note 7
Initial DL BWP	Config 1,4		DLBWP.0.1
Configuration	Config 2,5	1	DLBWP.0.1
	Config 3,6	1	DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1
Configuration	Config 2,5	7	DLBWP.1.1
	Config 3,6	7	DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1
Configuration	Config 2,5		ULBWP.0.1

Dedicated UL BWP		Config 3,6	I	ULBWP.0.1
Configuration	Dadicated III DWD			
Description			-	_
PDSCH Reference measurement channel	Configuration	_	-	_
Measurement channel	DDCCII Deference	_		=
Config 3,6 SR.2.1 TDD			-	
RMSI CORESET	measurement channel		-	
Parameters	DMOLOODEOET			
Config 3,6				
PDCCH CORESET	parameters	•	<u> </u>	
Description Config 2,5 Config 3,6 CCR.1.1 TDD	DD COLL CODECET	_		
Config 3,6		-	=	
TRS configuration	parameters	•		
Config 2,5		_		
Config 3,6 Config 3,6 Config 1,2,4,5 Config 3,6 OP.1 Note 6 OP.1 Note 7 SMTC Configuration TCI state SSB Configuration Config 1,2,4,5 Config 3,6 SSB.1 FR1 SSB.2 FR1 Correlation Matrix and Antenna Configuration EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of PDSCH DMRS EPRE ratio of PDSCH DMRS BBM/15 kHz -104 BBM/15 kHz -104 BBM/15 kHz -58.96 Config 1,2,4,5 BBM/ 38.16MHz Time offset to Cell1 Note 4 ps 3 for intra-band EN-DC	TRS configuration			
Config 1,2,4,5		-		
Config 3,6		-		_
SMTC Configuration	OCNG Patterns	-		
TCI state		Config 3,6		
SSB Configuration				SMTC.1
Config 3,6				TCI.State.0
Correlation Matrix and Antenna Configuration EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH by PDSCH EPRE ratio of OCNG DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS EPRE ratio of PDSCH DMRS EPRE ratio of PDSCH DMRS	SSB Configuration	Config 1,2,4,5		SSB.1 FR1
Configuration EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Not		Config 3,6		SSB.2 FR1
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 EPRE ratio of PDCCH DMRS EPRE ratio of PDCCH DMRS	Correlation Matrix and An	itenna		1x2 Low
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Noc Note 2	Configuration			
EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 SS-RSRP Note 3 dBm/15 kHz -87 Ês/lot dB dB 17 IoNote3 dBm/9.36MHz Config 1,2,4,5 dBm/9.36MHz Config 3,6 dBm/38.16MHz Time offset to Cell1 Note 4 μs 3 for intra-band EN-DC	EPRE ratio of PSS to SS	S		
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG DMRS Note 1 Representation of OCNG to OCNG DMRS Note 1 Representation of OCNG DMRS Note	EPRE ratio of PBCH DMF	RS to SSS		
EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS EPRE ratio of PDSCH to PDSCH EPRE ratio of PDSCH DMRS to SSS EPRE ratio of OCNG DMRS to SSS	EPRE ratio of PBCH to P	BCH DMRS		
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 NocNote 2 dBm/15 kHz SS-RSRP Note 3 dBm/15 kHz Es/Iot dB 17 Ês/Noc dB 17 IoNote3 Config 1,2,4,5 dBm/9.36MHz Config 3,6 dBm/38.16MHz -52.86 Time offset to Cell1 Note 4 μs 3 for intra-band EN-DO	EPRE ratio of PDCCH DN	MRS to SSS		
EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Noc Note 2 dBm/15 kHz SS-RSRP Note 3 dBm/15 kHz -104 SS-RSRP Note 3 dBm/15 kHz -87 Ês/Not dB 17 in Note3 Config 1,2,4,5 Config 3,6 Time offset to Cell1 Note 4 μs 3 for intra-band EN-DC	EPRE ratio of PDCCH to	PDCCH DMRS	dB	0
EPRE ratio of OCNG DMRS to SSS Note 1 EPRE ratio of OCNG to OCNG DMRS Note 1 NocNote 2 dBm/15 kHz -104 SS-RSRP Note 3 dBm/15 kHz -87 Ês/lot dB 17 Ês/Noc dB 17 IoNote3 Config 1,2,4,5 Config 3,6 Time offset to Cell1 Note 4 μs 3 for intra-band EN-DC	EPRE ratio of PDSCH DN	MRS to SSS		
Noc Note 2 dBm/15	EPRE ratio of PDSCH to	PDSCH		
Noc Note 2 dBm/15	EPRE ratio of OCNG DM	RS to SSS Note 1		
KHz			1	
SS-RSRP Note 3 SS-RSRP Note 3 dBm/15 kHz Ês/Iot	Noc ^{Note 2}		dBm/15	404
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			kHz	-104
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	SS-RSRP Note 3		dBm/15	0.7
			kHz	-87
Config 1,2,4,5	Ê _s /I _{ot}		dB	17
Config 1,2,4,5 9.36MHz -58.96 Config 3,6 dBm/ 38.16MHz -52.86 Time offset to Cell1 Note 4 μs 3 for intra-band EN-DO	Ê _s /N _{oc}		dB	17
9.36MHz	Io ^{Note3}	0 " 1015	dBm/	50.00
Time offset to Cell1 Note 4 38.16MHz 38.16MHz -52.86 38 or intra-band EN-DC		Config 1,2,4,5	9.36MHz	-58.96
Time offset to Cell1 Note 4 38.16MHz 38.16MHz -52.86 38 or intra-band EN-DC		0		F0.00
		Config 3,6		
			μs	3 for intra-band EN-DC, 33 for inter-band EN-DC
Time offset to Cell2 Note 5 μs -	Time offset to Cell2 Note 5		μs	-
Propagation Condition AWGN	Propagation Condition			AWGN

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Table A.4.5.2.3.1-4: NR cell specific test parameters for NR SCell for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parame	ter	Unit	Cell3
Frequency Range			FR1
Duplex mode	Config _{SCell} 1		FDD
	Configscell 2,3]	TDD
TDD configuration	Configscell 1		Not Applicable
	Configscell 2		TDDConf.1.1
	Configscell 3]	TDDConf.2.1
BW _{channel}	Config _{SCell} 1		Note 8
	Configscell 2		Note 8
	Configscell 3		Note 8
BW _{occupied}	Configscell 1	RB	52 Note 6
	Configscell 2]	52 Note 6
	Configscell 3]	106 Note 7
Initial DL BWP	Config _{SCell} 1		DLBWP.0.1
Configuration	Configscell 2		DLBWP.0.1
	Configscell 3]	DLBWP.0.1
Dedicated DL BWP	Configscell 1		DLBWP.1.1
Configuration	Configscell 2]	DLBWP.1.1
	Configscell 3		DLBWP.1.1
Initial UL BWP	Configscell 1		ULBWP.0.1
Configuration	Configscell 2]	ULBWP.0.1
	Configscell 3]	ULBWP.0.1
Dedicated UL BWP	Configscell 1		ULBWP.1.1
Configuration	Configscell 2]	ULBWP.1.1
	Configscell 3		ULBWP.1.1
PDSCH Reference	Configscell 1		-
measurement channel	Configscell 2		-
	Config _{SCell} 3		-
RMSI CORESET	Config _{SCell} 1		CR.1.1 FDD
parameters	Configscell 2]	CR.1.1 TDD

		Caretia: 0		CD 2.4 TDD
DD OOLL O	ODESET	ConfigsCell 3		CR.2.1 TDD
PDCCH CORESET ConfigsCell 1			CCR.1.1 FDD	
parameter	rs .	Configscell 2		CCR.1.1 TDD
		Configscell 3		CCR.2.1 TDD
TRS confi	guration	Config _{SCell} 1		TRS.1.1 FDD
		Config _{SCell} 2		TRS.1.1 TDD
		Config _{SCell} 3		TRS.1.2 TDD
OCNG Pa	tterns	Configscell 1,2		OP.1 Note 6
		Configscell 3		OP.1 Note 7
SMTC Co	nfiguration			SMTC.1
TCI state				TCI.State.0
SSB Conf	iguration	Configscell 1,2		SSB.1 FR1
		Configscell 3		SSB.2 FR1
Correlation	n Matrix and Ar	ntenna		1x2 Low
Configurat	tion			
EPRE rati	o of PSS to SS	S		
EPRE rati	o of PBCH DM	RS to SSS		
EPRE rati	o of PBCH to P	BCH DMRS		
EPRE rati	o of PDCCH DI	MRS to SSS		
EPRE rati	o of PDCCH to	PDCCH DMRS	dB	0
EPRE rati	o of PDSCH DI	MRS to SSS		
EPRE rati	o of PDSCH to	PDSCH		
EPRE ratio of OCNG DMRS to SSS Note 1				
EPRE rati	o of OCNG to 0	OCNG DMRS Note 1		
N _{oc} Note 2			dBm/15 kHz	-104
SS-RSRP	Note 3		dBm/15 kHz	-87
Ês/lot			dB	17
Ês/Noc			dB	17
Io ^{Note3}		Configscell 1,2	dBm/9.36MHz	-58.96
		Configscell 3	dBm/38.16MHz	-52.86
Time offse	et to Cell1 Note 4		μs	3 + Time offset to Cell2 for intra-band EN-DC,
				33 + Time offset to Cell2
				for inter-band EN-DC
Time offse	et to Cell2 Note 5		μs	3
Propagation Condition			·	AWGN
Note 1: OCNG shall be used such that bo			th cells are fully allo	cated and a constant total
transmitted power spectral density is achieved for all OFDM symbols.				
Note 2:	Interference fr	om other cells and r	noise sources not sp	ecified in the test is
			carriers and time and shall be modeled as	
	AWGN of appr	ropriate power for N	Noc to be fulfilled within BWoccupied.	
Note 3: SS-RSRP and lo levels have been				-
			arameters themselv	·-
		-		
Note 4:	Receive time of	difference of signals	received between s	ubframe timing boundary
Note 4:		•	received between soundary of PSCell a	•

- connector including time alignment error between the two cells
- Note 5: Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.
- All UL/DL transmission shall be confined within BWoccupied (i.e. 10 MHz, 52 RBs) Note 6: from $F_{C,low}$, and lo is independent of the $BW_{channel}$ configured.
- All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs) Note 7: from F_{C,low}, and Io is independent of the BW_{channel} configured.
- Note 8: N_{RB,c}. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW_{channel}.

A.4.5.2.3.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell.

If the NR PSCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PSCell immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.3.2-1.

If the NR PSCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PSCell no earlier than 1 slot before an SMTC and no later than 1 slot after the SMTC. the interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.3.2-2.

Table A.4.5.2.3.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1
1	0.5	1

Table A.4.5.2.3.2-2: Interruption duration if the NR PSCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	2 + SMTC duration
1	0.5	2 + SMTC duration

For synchronous inter-band EN-DC, the UE is only allowed to cause interruptions on E-UTRA PCell immediately before and immediately after an SMTC. Each interruption on E-UTRA PCell shall not exceed 1 subframe.

For synchronous intra-band EN-DC, the UE is only allowed to cause an interruption on E-UTRA PCell no earlier than 1 subframe before an SMTC and no later than 1 subframe after the SMTC. The interruption on E-UTRA PCell shall not exceed SMTC duration + 2 subframes.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.4 E-UTRAN – NR FR1 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

A.4.5.2.4.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1. Supported test configurations for LTE PCell and NR PSCell are shown in table A.4.5.2.4.1-1. Supported test configuration for NR SCell are shown in table A.4.5.2.4.1-1. Test configuration for LTE PCell and NR PSCell and test configuration for NR SCell are chosen independently.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.4.1-2, A.4.5.2.4.1-3 and A.4.5.2.4.1-4 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell3 is NR PSCell and NR deactivated SCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.4.5.2.4.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations for LTE PCell and NR PSCell

	Config	Description
1		LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
2		LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
3		LTE FDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
4		LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
5		LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
6		LTE TDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations
Note 2:	The UE is only re	equired to be tested in one with smallest aggregated channel bandwidth from supported
	band combinatio configuration,	ns which is composed of CCs ≥ the bandwidth (BW _{channel}) defined in each test

Table A.4.5.2.4.1-1A: Interruptions during measurements on deactivated NR SCC supported test configurations for NR SCell

ConfigsCell		Description
1		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
3		NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
Note 1:	e 1: The UE is only required to be tested in one of the supported test configurations	
Note 2:	2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BW _{channel}) defined in each test configuration	

Table A.4.5.2.4.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2, 3	One is E-UTRAN RF channel and the
		1, 2, 3	other two are NR RF channels
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 3.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

Table A.4.5.2.4.1-3: NR cell specific test parameters for NR PSCell for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Paramete	r	Unit	Cell2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BWchannel	Config 1,4		Note 8
	Config 2,5		Note 8
	Config 3,6		Note 8
BW _{occupied}	Config 1,4	RB	52 Note 6
	Config 2,5		52 Note 6
	Config 3,6		106 Note 7
Initial BWP Configuration	Config 1,4		DLBWP.0.1
	Config 2,5		DLBWP.0.1
	Config 3,6		DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1
Configuration	Config 2,5		DLBWP.1.1
	Config 3,6		DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1
Configuration	Config 2,5		ULBWP.0.1
	Config 3,6		ULBWP.0.1
Dedicated UL BWP	Config 1,4		ULBWP.1.1
Configuration	Config 2,5		ULBWP.1.1
	Config 3,6		ULBWP.1.1
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
	Config 3,6		SR.2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5		CR.1.1 TDD
	Config 3,6		CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD
	Config 3,6		CCR.2.1 TDD
TRS configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
OCNG Patterns	Config 1,2,4,5		OP.1 Note 6
000 0 0	Config 3,6		OP.1 Note 7
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
21/72 2 2	Config 3,6		SSB.2 FR1
SMTC Configuration			SMTC.1
TCI state			TCI.State.0
Correlation Matrix and Ant	enna		1x2 Low
Configuration			
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH to PE			
EPRE ratio of PBCH to PE			
EPRE ratio of PDCCH DM		dB 0	
EPRE ratio of PDCCH to F			l 0
EPRE ratio of PDSCH DM			
EPRE ratio of PDSCH to F			
EPRE ratio of OCNG DMF	CNIC DATE Note 1		
EPRE ratio of OCNG to O	CING DIMRS NOTE I	dD/4 = 1.1-	404
N _{oc} Note 2		dBm/15 Hz	-104
SS-RSRP Note 3		dBm/15 kHz	-87

Ê _s /I _{ot}			dB	17
Ê _s /N _{oc}			dB	17
Io ^{Note3}		Config 1,2,4,5	dBm/9.36MHz	-58.96
		Config 3,6	dBm/38.16MHz	-52.86
Time offs	et to Cell1 Note 4	Config 1,2,4,5	μs	500
		Config 3,6		250
Time offs	et to Cell2 Note 5		μs	-
Propagat	ion Condition		·	AWGN
Note 1:	OCNG shall be	used such that bot	th cells are fully allo	cated and a constant
	total transmitted	power spectral de	ensity is achieved fo	r all OFDM symbols.
Note 2:				ecified in the test is
	assumed to be of	constant over subc	carriers and time and	d shall be modeled as
			oc to be fulfilled with	
Note 3:			n derived from other	
			t settable paramete	
Note 4:			received between s	
			ot timing boundary o	
			alignment error betv	
Note 5:				gnals received from
			nnector including tir	me alignment error
	between the two			
Note 6:				upied (i.e. 10 MHz, 52
	RBs) from F _{C,low} , and lo is independent of the BW _{channel} configured.			
Note 7:	All UL/DL transmission shall be confined within BW _{occupied} (i.e. 40 MHz, 106			
	RBs) from F _{C,low} , and Io is independent of the BW _{channel} configured.			<u> </u>
Note 8: N _{RB,c} . is derived from Table 5.3.2-1 in TS38.101-1[2] with configured			vith configured	
	BW _{channel} .			

Table A.4.5.2.4.1-4: NR cell specific test parameters for NR SCell for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Paramete	r	Unit	Cell3
Frequency Range			FR1
Duplex mode	Config _{SCell} 1		FDD
	Configscell 2,3		TDD
TDD configuration	Configscell 1		Not Applicable
	Configscell 2		TDDConf.1.1
	Configscell 3		TDDConf.2.1
BW _{channel}	Config _{SCell} 1		Note 8
	Config _{SCell} 2		Note 8
	Configscell 3		Note 8
BW _{occupied}	Configscell 1	RB	52 Note 6
	Configscell 2		52 Note 6
	Configscell 3		106 Note 7
Initial BWP Configuration	Config _{SCell} 1		DLBWP.0.1
	Config _{SCell} 2		DLBWP.0.1
	Configscell 3		DLBWP.0.1
Dedicated DL BWP	Configscell 1		DLBWP.1.1
Configuration	Configscell 2		DLBWP.1.1
	Configscell 3		DLBWP.1.1
Initial UL BWP	Config _{SCell} 1		ULBWP.0.1
Configuration	Config _{SCell} 2		ULBWP.0.1
	Configscell 3		ULBWP.0.1
Dedicated UL BWP	Configscell 1		ULBWP.1.1
Configuration	Configscell 2		ULBWP.1.1
	Configscell 3		ULBWP.1.1
PDSCH Reference	Config _{SCell} 1		-
measurement channel	Config _{SCell} 2		-
	Configscell 3		-

Note 6:

Note 7:

Note 8:

RMSI CC	DRESET	Configscell 1		CR.1.1 FDD
paramete	ers	Configscell 2		CR.1.1 TDD
		Configscell 3		CR.2.1 TDD
PDCCH (CORESET Configscell 1			CCR.1.1 FDD
paramete	ers	Configscell 2		CCR.1.1 TDD
i i		Configscell 3		CCR.2.1 TDD
TRS con	figuration	Configscell 1		TRS.1.1 FDD
		Configscell 2		TRS.1.1 TDD
		Configscell 3		TRS.1.2 TDD
OCNG P	atterns	Configscell 1,2		OP.1 Note 6
		Configscell 3		OP.1 Note 7
SSB Con	figuration	Configscell 1,2		SSB.1 FR1
	3	Configscell 3		SSB.2 FR1
SMTC C	onfiguration	Jees.		SMTC.1
TCI state		11		TCI.State.0
Correlation	on Matrix and Ante	enna		1x2 Low
Configura	ation			
EPRE ra	tio of PSS to SSS			
	tio of PBCH DMR	S to SSS		
	tio of PBCH to PB			
EPRE ra	tio of PDCCH DMI	RS to SSS		
	tio of PDCCH to P		dB	0
	tio of PDSCH DMI			
EPRE ratio of PDSCH to PDSCH				
EPRE ra	tio of OCNG DMR	S to SSS Note 1		
EPRE ra	tio of OCNG to OC	CNG DMRS Note 1		
N _{oc} Note 2			dBm/15 kHz	-104
SS-RSRP Note 3			dBm/15 kHz	-87
Ê _s /I _{ot}			dB	17
Ê _s /N _{oc}			dB	17
Io ^{Note3}		Configscell 1,2	dBm/ 9.36MHz	-58.96
		Configscell 3	dBm/ 38.16MHz	-52.86
Time offs	set to Cell1 Note 4	Configscell 1,2	μs	500 + Time offset to Cell2
		Configscell 3	,	250 + Time offset to Cell2
Time offs	set to Cell2 Note 5	J	μs	3
	tion Condition		, m	AWGN
Note 1:		used such that bo	th cells are fully allo	cated and a constant total
	transmitted pow	er spectral density	is achieved for all (OFDM symbols.
Note 2:	Interference from	n other cells and r	noise sources not sp	ecified in the test is
				d shall be modeled as
	AWGN of appro	priate power for N	oc to be fulfilled with	in BW _{occupied} .
Note 3: SS-RSRP and lo levels have been				•
			arameters themselv	
Note 4:				subframe timing boundary of
				he UE antenna connector
			ween the two cells	
Note 5:	Receive time difference between slot boundaries of signals received from the two			

cells at the UE antenna connector including time alignment error between the two

All UL/DL transmission shall be confined within BW_{occupied} (i.e. 10 MHz, 52 RBs)

All UL/DL transmission shall be confined within BWoccupied (i.e. 40 MHz, 106 RBs)

N_{RB,c}. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW_{channel}.

from $F_{C,low}$, and lo is independent of the $BW_{channel}$ configured.

from F_{C,low}, and Io is independent of the BW_{channel} configured.

A.4.5.2.4.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell.

If the NR PSCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PSCell immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.4.2-1.

If the NR PSCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PSCell no earlier than 1 slot before an SMTC and no later than 1 slot after the SMTC. the interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.4.2-2.

Table A.4.5.2.4.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1
1	0.5	1

Table A.4.5.2.4.2-2: Interruption duration if the NR PSCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	2 + SMTC duration
1	0.5	2 + SMTC duration

For asynchronous inter-band EN-DC, the UE is only allowed to cause interruptions on E-UTRA PCell immediately before and immediately after an SMTC. Each interruption on E-UTRA PCell shall not exceed 2 subframe.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.5 E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

A.4.5.2.5.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS38.133 clause 8. 2.1.2. Supported test configurations are shown in table A.4.5.2.5.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.5.1-2 and A.4.5.2.5.1-3 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 is E-UTRAN PCell and E-UTRAN deactivated SCell, Cell2 is NR FR1 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated E-UTRAN SCells is received at the UE antenna connector. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.4.5.2.5.1-1: Interruptions during measurements on deactivated E-UTRAN SCC supported test configurations

	Config	Description	
	_	LTE PCeII + NR PSCeII Note 2	
1		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3		LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
4		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
5		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
6		LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note 1:	The UE is or	lly required to be tested in one of the supported test configurations	
Note 2:	The duplex n	node of the LTE SCell is determined based on the band combination to be tested.	

Table A.4.5.2.5.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Active PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated SCell		Cell3	Deactivated SCell on E-UTRAN RF channel number 1.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

Table A.4.5.2.5.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

Parameter Frequency Range		Unit	Cell2
			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BW _{channel}	Config 1,4	MHz	10: N _{RB,c} = 52
	Config 2,5		10: N _{RB,c} = 52
	Config 3,6		40: N _{RB,c} = 106
Initial DL BWP	Config 1,4		DLBWP.0.1
Configuration	Config 2,5		DLBWP.0.1
	Config 3,6		DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1
Configuration	Config 2,5		DLBWP.1.1
	Config 3,6		DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1
Configuration	Config 2,5		ULBWP.0.1
	Config 3,6	1	ULBWP.0.1

Dedicated UL BWP	Config 1,4		ULBWP.1.1
Configuration	Config 2,5	1	ULBWP.1.1
Comiguration	Config 3,6		ULBWP.1.1
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel			
measurement channel	Config 2,5	_	SR.1.1 TDD
DMOLOODEOET	Config 3,6		SR.2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5		CR.1.1 TDD
	Config 3,6		CR.2.1 TDD
PDCCH CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD
	Config 3,6		CCR.2.1 TDD
TRS configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
OCNG Patterns			OP.1
SMTC Configuration			SMTC.1
TCI state			TCI.State.0
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
_	Config 3,6		SSB.2 FR1
Correlation Matrix and Ar	ntenna		1x2 Low
Configuration			
EPRE ratio of PSS to SS	S		
EPRE ratio of PBCH DM	RS to SSS		
EPRE ratio of PBCH to F	BCH DMRS		
EPRE ratio of PDCCH D			
EPRE ratio of PDCCH to			
EPRE ratio of PDSCH DI		dB	0
EPRE ratio of PDSCH to			
EPRE ratio of OCNG DM			
1)			
EPRE ratio of OCNG to 0	OCNG DMRS	_	
(Note 1)	30110 2111110		
Noc Note 2		dBm/15	
1100		kHz	-104
SS-RSRP Note 3		dBm/15	
		kHz	-87
Ê _s /l _{ot}		dB	17
É _s /N _{oc}		dB	17
IoNote3		dBm/	
	Config 1,2,4,5	9.36MHz	-58.96
		dBm/	
	Config 3,6	38.16MHz	-52.86
Time offset to Cell1 Note 4	Time offeet to Colld Note 4		3 for intra-band EN-DC,
Time offset to Cell'I 1996 4		μs	33 for inter-band EN-DC,
Propagation Condition			AWGN
77.3		1	•

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power
	spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over
	subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are
	not settable parameters themselvess.
Note 4:	Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and
	slot timing boundary of PSCell at the UE antenna connector including time alignment error between the
	two cells

A.4.5.2.5.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause one interruption on PCell and one interruption on PSCell. Each interruption on NR PSCell shall not exceed X defined in Table A.4.5.2.5.2-1 if the NR PSCell is not in the same band as the E-UTRAN deactivated SCell or Y in Table A.4.5.2.3.2-1 if the NR PSCell is in the same band as the E-UTRAN deactivated SCell.

Table A.4.5.2.5.2-1: Interruption length X and Y at measurements on deactivated E-UTRA SCC

μ	NR Slot	Interruption length X slot	Interruption length Y slot
μ μ	length (ms)	Sync	
0	1	1	1+SMTC duration
1	0.5	1	1+SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1 subframe if the PCell is not in the same band as the deactivated SCell, or 5 subframes if the PCell is in the same band as the deactivated SCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.6 E-UTRAN – NR FR1 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

A.4.5.2.6.1 Test Purpose and Environment

The purpose of this test is to verify E-UTRAN PCell and NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for E-UTRAN PCell and NR PSCell in EN-DC specified in TS 38.133 clause 8.2.1. Supported test configurations are shown in table A.4.5.2.6.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.4.5.2.6.1-1 and A.4.5.2.6.1-2 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.1-1. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 is E-UTRAN PCell and E-UTRAN deactivated SCell, Cell2 is NR FR1 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.4.5.2.6.1-1: Interruptions during measurements on deactivated E-UTRAN SCC supported test configurations

Config	Description
	LTE PCell + NR PSCell Note 2

1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only required to be tested in one of the supported test configurations
Note 2:	The duplex mode of the LTE SCell is determined based on the band combination to be tested.

Table A.4.5.2.6.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2, 3	One is NR RF channel and the other two
		1, 2, 3	are E-UTRAN RF channels
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on E-UTRAN RF
SCell			channel number 3.
CP length		Normal	Applicable to Cell1, Cell2 and Cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		011	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	S	10	

Table A.4.5.2.6.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

Parameter		Unit	Cell2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BW _{channel}	Config 1,4		10: N _{RB,c} = 52
	Config 2,5		10: N _{RB,c} = 52
	Config 3,6		40: N _{RB,c} = 106
Initial DL BWP	Config 1,4		DLBWP.0.1
Configuration	Config 2,5		DLBWP.0.1
	Config 3,6		DLBWP.0.1
Dedicated DL BWP	Config 1,4		DLBWP.1.1
Configuration	Config 2,5		DLBWP.1.1
	Config 3,6		DLBWP.1.1
Initial UL BWP	Config 1,4		ULBWP.0.1
Configuration	Config 2,5		ULBWP.0.1
	Config 3,6		ULBWP.0.1
Dedicated UL BWP	Config 1,4		ULBWP.1.1
Configuration	Config 2,5		ULBWP.1.1
	Config 3,6		ULBWP.1.1
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD

	Config 2.6		SD 2.1 TDD
DMOLOODEOET	Config 3,6		SR.2.1 TDD
RMSI CORESET	Config 1,4	_	CR.1.1 FDD
parameters	Config 2,5	_	CR.1.1 TDD
DDOOLL CODECET	Config 3,6		CR.2.1 TDD
PDCCH CORESET	Config 1,4	_	CCR.1.1 FDD
parameters	Config 2,5		CCR.1.1 TDD
	Config 3,6		CCR.2.1 TDD
TRS configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
OCNG Patterns			OP.1
SMTC Configuration			SMTC.1
TCI state			TCI.State.0
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
	Config 3,6		SSB.2 FR1
Correlation Matrix and A	ntenna		1x2 Low
Configuration			
EPRE ratio of PSS to SS	S		
EPRE ratio of PBCH DM	RS to SSS	1	
EPRE ratio of PBCH to F	BCH DMRS	1	
EPRE ratio of PDCCH D	MRS to SSS		
EPRE ratio of PDCCH to	PDCCH DMRS		
EPRE ratio of PDSCH D	MRS to SSS	dB	0
EPRE ratio of PDSCH to	PDSCH	1	
EPRE ratio of OCNG DM	IRS to SSS(Note	1	
1)	,		
EPRE ratio of OCNG to 0	OCNG DMRS		
(Note 1)			
N _{oc} Note 2		dBm/15	404
		kHz	-104
SS-RSRP Note 3		dBm/15	0.7
		kHz	-87
Ê _s /I _{ot}		dB	17
Ês/Noc		dB	17
Io ^{Note3}	Config 4 0 4 F	dBm/	F0.00
	Config 1,2,4,5	9.36MHz	-58.96
	Config 2.0	dBm/	F0.00
	Config 3,6	38.16MHz	-52.86
Time offset to Cell1 Note	Config 1,2,4,5	μs	500
4		·	
	Config 3,6		250
Propagation Condition	1		AWGN
N t t CONO I III	1 1 1 1		I

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modeled as AWGN of appropriate power for Noc to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselvess.

Note 4: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell at the UE antenna connector including time alignment error between the two cells

A.4.5.2.6.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on E-UTRAN PCell and NR PSCell. The UE is only allowed to cause one interruption on PCell and one interruption on PSCell. Each interruption on NR PSCell shall not exceed the value defined in Table A.4.5.2.4.2-1 and Table A.4.5.2.4.2-2.

Table A.4.5.2.6.2-1: Interruption duration if the NR PSCell is not in the same band as the E-UTRAN deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	2
1	0.5	2

Table A.4.5.2.6.2-2: Interruption duration if the NR PSCell is in the same band as the E-UTRAN deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	2 + SMTC duration
1	0.5	2 + SMTC duration

Each interruption on E-UTRAN PCell shall not exceed 1 subframe if the PCell is not in the same band as the deactivated SCell, or 5 subframes if the PCell is in the same band as the deactivated SCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.2.7 Void

A.4.5.3 SCell Activation and Deactivation Delay

A.4.5.3.1 SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle

A.4.5.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is known by the UE at the time of activation.

The supported test configurations for LTE PCell and NR PSCell are shown in table A.4.5.3.1.1-1 below. Supported test configurations for NR SCell are shown in table A.4.5.3.1.1-1A below. Test configuration for LTE PCell and NR PSCell and test configuration for NR SCell are chosen independently. The test parameters are given in Tables A.4.5.3.1.1-2 and cell-specific parameters in A.4.5.3.1.1-3 and A.4.5.3.1.1-4 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell, NR has two cells. All cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRA and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. The UE now starts monitoring the SCell. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in a slot # denoted m, defines the start of time period T2. The UE shall be able to report valid CSI in PSCell for the activated SCell at latest in slot

 $m + \frac{T_{\text{HARQ}} + T_{\text{activation_time}} + T_{\text{CSI_Reporting}}}{NR \, \text{slot length}}$, as defined in clause 8.3. The UE shall start reporting CSI in PSCell after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PSCell interruption due to activation of SCell shall occur in the slot $m + 1 + \frac{T_{\text{HARQ}}}{NR \, \text{slot length}}$ to slot $m + 1 + \frac{T_{\text{HARQ}} + 3ms + T_X}{NR \, \text{slot length}} + N_{\text{interruption}}$, as defined in clause 8.3, where $N_{\text{interruption}}$ is the interruption length given in section 8.2. Any E-UTRA PCell interruption due to activation of SCell shall occur in the subframe $m_1 + 1 + \frac{T_{\text{HARQ}}}{EUTRA \, \text{slot length}}$ to subframe $m_2 + 1 + \frac{T_{\text{HARQ}} + 3ms + T_X}{EUTRA \, \text{slot length}} + N_{\text{interruption}}$, where m_1 and m_2 are the index of the first and last subframe of E-UTRA PCell which overlaps with slot m, and $N_{\text{interruption}}$ is the interruption length given in TS 36.133 [14] section 7.32.

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot $n + \frac{T_{HARQ} + 3ms}{NR \, slot \, length}$, as defined in clause 8.3. The starting point of any PSCell interruption due to the deactivation shall occur in the slot $n + 1 + \frac{T_{HARQ}}{NR \, slot \, length}$ to $n + 1 + \frac{T_{HARQ} + 3ms}{NR \, slot \, length}$, as defined in clause 8.3. The starting point of any E-UTRA PCell interruption due to the deactivation shall occur in the subframe $n_1 + 1 + \frac{T_{HARQ}}{EUTRA \, subframe \, length}$ to subframe $n_2 + 1 + \frac{T_{HARQ} + 3ms}{EUTRA \, subframe \, length}$, where n_1 and n_2 are the index of the first and last subframe of E-UTRA PCell which overlaps with slot n.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PSCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CSI reporting for SCell is discontinued.

Table A.4.5.3.1.1-1: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations for LTE PCell and NR PSCell

Co	nfig	Description
1		LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
2		LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
3		LTE FDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
4		LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
5		LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
6		LTE TDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
Note 1:	The UE is	s only required to be tested in one of the supported test configurations
Note 2:	The UE is	s only required to be tested in one with smallest aggregated channel bandwidth from supported
	band com	nbinations which is composed of CCs ≥ the bandwidth (BW _{channel}) defined in each test
	configura	tion,

Table A.4.5.3.1.1-1A: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations for NR SCell

Configscell	Description	
1	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	
2	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	
3	NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	
Note 1: The UE is only required to be tested in one of the supported test configurations		

Note 2: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BW_{channel}) defined in each test configuration,

Table A.4.5.3.1.1-2: General test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Parameter	Unit	Value	Comment
RF Channel Number		1,2,3	One E-UTRAN radio channel (1) and two NR radio channel (2,3) are used for this test
Active PCell		Cell 1	Primary cell on E-UTRAN RF channel number 1. As specified in clause A.3.7.2.1
Active PSCell		Cell 2	Primary secondary cell on NR RF channel number 2.
Configured deactivated SCell		Cell 3	Configured deactivated secondary cell on NR RF channel number 3
CP length		Normal	
DRX		OFF	Continuous monitoring of primary cell
Cell-individual offset for cells on E-UTRA RF channel number	dB	0	Individual offset for cells on primary component carrier.
Cell-individual offset for cells on NR channel number	dB	0	Individual offset for cells on secondary component carrier.
SCell measurement cycle (measCycleSCell)	ms	160	
Cell3 timing offset to cell2	μs	0	
Time alignment error between cell3 and cell2	μs	≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.	The value of time alignment error depends upon the type of carrier aggregation.
T1	s	7	During this time the PSCell shall be known and the SCell configured and detected.
T2	S	1	During this time the UE shall activate the SCell.
Т3	S	1	During this time the UE shall deactivate the SCell.
Tharq	ms	k₁×NR slot length	k ₁ is a number of slots indicated by the PDSCH-to-HARQ_feedback timing indicator field in a corresponding DCI format or provided by <i>dl-DataToUL-ACK</i> if the PDSCH-to-HARQ feedback timing field is not present in the DCI format, the value is defined in 38.213 [3]
Tcsl_Reporting	ms	15	The delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing timefor CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2] As specified in clause 4.3 of TS 38.213 [3]
I.	slot	$k_1 + 3 \cdot N_{\text{slot}}^{\text{subframe},\mu} + 1$	73 Specified III clause 4.3 () 13 30.213 [3]

Table A.4.5.3.1.1-3: Cell specific test parameters for NR PSCell for known FR1 SCell activation case, 160ms SCell measurement cycle

SSB ARFCN	Parameter		Unit	Cell 2
Duplex mode				T1 T2 T3
TDD Config 2,3,5,6 TDD Not Applicable TDDConf.1.1	SSB ARFUN	Config 1 4		· · · · · · · · · · · · · · · · · · ·
TDD configuration	Duplex mode			
TDD configuration				
Config 3.6 TDDConf.2.1				
Config 1,4	TDD configuration	Config 2,5		TDDConf.1.1
BW Config 2,5		Config 3,6		TDDConf.2.1
Note 7		Config 1,4		Note 7
BWoccupied	BW _{channel}	Config 2,5	MHz	Note 7
Config 2,5 Config 3,6 DL initial BWP Config 1, 2, 3, 4,		Config 3,6		Note 7
Config 3,6	BWoccupied	Config 1,4	RB	52 Note 5
DL initial BWP Config 1, 2, 3, 4, DLBWP.0.1		Config 2,5		52 Note 5
DL initial BWP				106 Note 6
configuration 5, 6 DL BURP.1.1 DL declocated BWP configuration Config 1, 2, 3, 4, 5, 6 DLBWP.1.1 UL initial BWP configuration Config 1, 2, 3, 4, 5, 6 ULBWP.0.1 UL dedicated BWP configuration Config 1, 2, 3, 4, 5, 6 ULBWP.1.1 DRX Cycle ms Not Applicable PDSCH Reference measurement channel Config 1,4 SR.1.1 FDD RMSI CORESET Reference Channel Config 3,6 SR.2.1 TDD RMC CORESET Reference Channel Config 3,6 CR.2.1 TDD RMC CORESET Reference Channel Config 1,4 CCR.1.1 FDD TRS configuration Config 1,4 CCR.1.1 FDD TRS configuration Config 1,4 CCR.1.1 TDD TRS configuration Config 2,5 CCR.1.1 TDD TRS configuration Config 1,4 TRS.1.1 TDD CONG Patterns Config 1,4 TRS.1.1 TDD CONG Patterns Config 1,2,4,5 OP.1 Note 5 Config 3,6 TS.1.2 TDD OP.1 Note 6 SMTC configuration SSB configuration SSB.2 FR1 CSI-RS configuration for CSI reporting <td>DL initial BWP</td> <td>_</td> <td></td> <td></td>	DL initial BWP	_		
configuration 5, 6 UL initial BWP configuration Config 1, 2, 3, 4, 5, 6 UL dedicated BWP configuration Config 1, 2, 3, 4, 5, 6 DRX Cycle ms Not Applicable PDSCH Reference measurement channel Config 1,4 Config 2,5 SR.1.1 TDD SR.1.1 TDD RMSI CORESET Reference Channel Config 3,6 Config 3,6 CR.2.1 TDD CR.1.1 FDD RMC CORESET Reference Channel Config 1,4 Config 2,5 Config 3,6 CR.2.1 TDD CR.2.1 TDD RMC CORESET Reference Channel Config 1,4 COR.1.1 FDD CR.2.1 TDD TRS configuration TRS configuration Config 1,4 COR.1.1 FDD COR.1.1 FDD TRS configuration Config 3,6 COR.2.1 TDD COR.1.1 TDD TRS.1.1 TDD OCNG Patterns Config 3,6 COR.2.1 TDD TRS.1.1 TDD TRS.1.1 TDD OCNG Patterns Config 1,2,4,5 Config 3,6 Cor.2.1 TDD TRS.1.2 TDD OP.1 Note 5 OP.1 Note 6 OP.1 Note	configuration	5, 6		DLBWP.0.1
Configuration 5, 6 config 1, 2, 3, 4, configuration Config 1, 2, 3, 4, configuration UL BWP.0.1 DRX Cycle ms Not Applicable PDSCH Reference measurement channel Config 1,4 config 2,5 config 3,6 config 3,6 config 2,5 config 3,6 config				DI BWP.1.1
configuration 5, 6 OLBWP-0.1 UL dedicated BWP configuration Config 1, 2, 3, 4, 5.6 ULBWP.1.1 DRX Cycle ms Not Applicable PDSCH Reference measurement channel Config 1,4 SR.1.1 FDD RMSI CORESET Reference Channel Config 2,5 CR.1.1 FDD RMC CORESET Reference Channel Config 3,6 CR.2.1 TDD RMC CORESET Reference Channel Config 1,4 CCR.2.1 TDD RMC CORESET Reference Channel Config 1,4 CCR.2.1 TDD TRS configuration Config 1,4 CCR.2.1 TDD TRS configuration Config 3,6 CCR.2.1 TDD TRS configuration Config 2,5 TRS.1.1 TDD CONG Patterns Config 2,5 TRS.1.1 TDD CONG Patterns Config 3,6 TRS.1.2 TDD OCNG Patterns Config 3,6 TRS.1.2 TDD SBC configuration SSB configuration SSB.1 FR1 CSI-RS configuration Config 1,2,4,5 SSB.1 FR1 CSI-RS configuration for CSI reporting Config 1,2,4,5 CSI-RS.1.1 TDD COnfig 3,6 CSI-RS.1.1 TDD	configuration			
UL dedicated BWP				ULBWP.0.1
Configuration 5, 6 DRX Cycle ms Not Applicable PDSCH Reference measurement channel Config 1,4 SR.1.1 FDD RMSI CORESET Reference Channel Config 1,4 CR.1.1 FDD RMC CORESET Reference Channel Config 2,5 CR.1.1 TDD RMC CORESET Reference Channel Config 1,4 CCR.1.1 FDD Config 3,6 CCR.2.1 TDD TRS configuration Config 1,4 CCR.1.1 TDD TRS configuration Config 2,5 CCR.1.1 TDD Config 3,6 CCR.2.1 TDD CCR.2.1 TDD Config 1,4 TRS.1.1 FDD TRS.1.1 FDD Config 3,6 TRS.1.1 TDD TRS.1.1 TDD CONG Patterns Config 1,2,4,5 OP.1 Note 5 Config 3,6 OP.1 Note 6 SMTC configuration SMTC.1 SSB.1 FR1 CSI-RS configuration for CSI reporting Config 1,2,4,5 SSB.2 FR1 CSI-RS configuration for CSI reporting Config 3,6 CSI-RS.1.1 TDD PDSCH/PDCCH subcarrier spacing Config 1,2,4,5 AL CSI reporting periodicity Config 1		Config 1, 2, 3, 4,		LII DWD 4.4
PDSCH Reference measurement channel	configuration			ULBWP.1.1
PDSCH Reference Config 2.5 Config 3.6 SR.2.1 TDD	DRX Cycle		ms	Not Applicable
PDSCH Reference Config 2.5 Config 3.6 SR.2.1 TDD	DDCCII Deference	Config 1,4		SR.1.1 FDD
RMSI CORESET Reference Channel		Config 2,5		SR.1.1 TDD
Reference Channel Config 2,5 CR.1.1 TDD	measurement channel			SR.2.1 TDD
Reference Channel Config 2,5 CR.1.1 IDD RMC CORESET Reference Channel Config 1,4 CCR.1.1 FDD Config 3,6 CCR.1.1 TDD Config 3,6 CCR.2.1 TDD TRS configuration Config 1,4 TRS.1.1 FDD TRS configuration TRS.1.1 TDD TRS.1.2 TDD OCNG Patterns Config 3,6 TRS.1.2 TDD OCNG Patterns Config 1,2,4,5 OP.1 Note 5 Config 3,6 OP.1 Note 6 OP.1 Note 6 SMTC configuration SMTC.1 SSB.1 FR1 SSB configuration Config 1,2,4,5 SSB.1 FR1 CSI-RS configuration for CSI reporting Config 1,4 CSI-RS.1.1 FDD CSI-RS configuration for CSI reporting Config 3,6 CSI-RS.1.1 TDD PDSCH/PDCCH subcarrier spacing Config 3,6 CSI-RS.2.1 TDD PDSCH/PDCCH config 1,2,4,5 KHz 15 Subcarrier spacing Config 1-6 periodic reportConfigType Config 1-6 periodic reportQuantity Config 1,2,4,5 Slot 5	DMCI CODECET			CR.1.1 FDD
RMC CORESET Reference Channel		Config 2,5		CR.1.1 TDD
Config 2,5 CCR.1.1 TDD	Reference Chairner			CR.2.1 TDD
Reference Channel Config 2,5 CCR.1.1 IDD Config 3,6 CCR.2.1 TDD TRS configuration Config 1,4 TRS.1.1 FDD TRS configuration Config 2,5 TRS.1.1 TDD OCNG Patterns Config 1,2,4,5 OP.1 Note 5 Config 3,6 OP.1 Note 6 SMTC configuration SMTC.1 SSB configuration SSB.1 FR1 CSI-RS configuration for CSI reporting Config 1,4 CSI-RS.1.1 FDD Config 3,6 CSI-RS.1.1 TDD Config 3,6 CSI-RS.1.1 TDD PDSCH/PDCCH Config 1,2,4,5 KHz subcarrier spacing Config 1,2,4,5 KHz reportConfigType Config 1-6 periodic reportQuantity Config 1-6 periodic CSI reporting periodicity Config 3,6 10 CSI reporting offset Config 1,2,4,5 slot 2 Config 3,6 4 4	DMC CODESET	Config 1,4		CCR.1.1 FDD
Config 3,6 CCR.2.1 IDD		Config 2,5		CCR.1.1 TDD
TRS configuration Config 1,4 TRS.1.1 FDD Config 2,5 TRS.1.1 TDD Config 3,6 TRS.1.2 TDD OCNG Patterns Config 1,2,4,5 OP.1 Note 5 Config 3,6 OP.1 Note 6 OP.1 Note 6 SMTC configuration SMTC.1 SSB.1 FR1 SSB configuration Config 1,2,4,5 SSB.1 FR1 CSI-RS configuration for CSI reporting Config 1,4 CSI-RS.1.1 FDD CSI-RS configuration for CSI reporting Config 3,6 CSI-RS.1.1 TDD PDSCH/PDCCH subcarrier spacing Config 1,2,4,5 KHz 15 Subcarrier spacing Config 1,2,4,5 KHz 15 subcarrier spacing Config 1-6 periodic reportQuantity Config 1-6 cri-RI-PMI-CQI CSI reporting periodicity Config 3,6 5 Config 3,6 10 CSI reporting offset Config 1,2,4,5 Slot 2 Config 3,6 4 4	Reference Channel	Config 3,6		CCR.2.1 TDD
TRS configuration Config 2,5 TRS.1.1 TDD Config 3,6 TRS.1.2 TDD OCNG Patterns Config 1,2,4,5 OP.1 Note 5 Config 3,6 OP.1 Note 6 SMTC configuration SMTC.1 SSB configuration SSB.1 FR1 CSI-RS configuration for CSI reporting Config 1,4 CSI-RS.1.1 FDD CSI-RS configuration for CSI reporting Config 3,6 CSI-RS.1.1 TDD PDSCH/PDCCH subcarrier spacing Config 1,2,4,5 KHz 15 Subcarrier spacing reportConfigType Config 1-6 periodic reportQuantity Config 1-6 cri-RI-PMI-CQI CSI reporting periodicity Config 3,6 10 CSI reporting offset Config 1,2,4,5 slot 2 Config 3,6 4 4				TRS.1.1 FDD
Config 3,6	TRS configuration			TRS.1.1 TDD
Config 3,6				TRS.1.2 TDD
Config 3,6 OP.1 Note 6	OCNG Patterns	Config 1,2,4,5		
SMTC configuration SMTC.1 SSB configuration Config 1,2,4,5 SSB.1 FR1 CSI-RS configuration for CSI reporting Config 1,4 CSI-RS.1.1 FDD COnfig 2,5 CSI-RS.1.1 TDD COnfig 3,6 CSI-RS.2.1 TDD PDSCH/PDCCH subcarrier spacing Config 1,2,4,5 KHz subcarrier spacing Config 3,6 30 reportConfigType Config 1-6 periodic reportQuantity Config 1-6 cri-RI-PMI-CQI CSI reporting periodicity Config 1,2,4,5 slot 5 CSI reporting offset Config 1,2,4,5 slot 2 Config 3,6 4 4				OP.1 Note 6
Config 1,2,4,5 SSB.1 FR1 CSI-RS configuration for CSI reporting Config 1,4 CSI-RS.1.1 FDD COnfig 2,5 CSI-RS.1.1 TDD COnfig 3,6 CSI-RS.2.1 TDD PDSCH/PDCCH subcarrier spacing Config 1,2,4,5 kHz 15 subcarrier spacing reportConfigType Config 1-6 periodic reportQuantity Config 1-6 cri-RI-PMI-CQI CSI reporting periodicity Config 1,2,4,5 slot 5 CSI reporting offset Config 1,2,4,5 slot 2 Config 3,6 4 4	SMTC configuration			SMTC.1
Config 3,6 SSB.2 FR1		Config 1,2,4,5		SSB.1 FR1
Config 1,4 CSI-RS.1.1 FDD CSI-RS configuration for CSI reporting Config 2,5 CSI-RS.1.1 TDD PDSCH/PDCCH subcarrier spacing Config 1,2,4,5 KHz 15 subcarrier spacing reportConfigType Config 1-6 periodic reportQuantity Config 1-6 cri-RI-PMI-CQI CSI reporting periodicity Config 3,6 slot 5 CSI reporting offset Config 1,2,4,5 slot 2 Config 3,6 4 4	SSB configuration			
Configuration	001.00 (1 11			
Config 3,6 CSI-RS.2.1 TDD				
PDSCH/PDCCH subcarrier spacing Config 1,2,4,5 Config 3,6 kHz 15 subcarrier spacing reportConfigType Config 3,6 30 reportQuantity Config 1-6 periodic CSI reporting periodicity Config 1,2,4,5 slot 5 CSI reporting offset Config 3,6 10 CSI reporting offset Config 1,2,4,5 Config 3,6 4	for CSI reporting	Config 3,6		
subcarrier spacing Config 3,6 KHZ 30 reportConfigType Config 1-6 periodic reportQuantity Config 1-6 cri-RI-PMI-CQI CSI reporting periodicity Config 1,2,4,5 slot 5 CSI reporting offset Config 1,2,4,5 slot 2 Config 3,6 4 4	PDSCH/PDCCH			
reportConfigType Config 1-6 periodic reportQuantity Config 1-6 cri-RI-PMI-CQI CSI reporting periodicity Config 1,2,4,5 slot 5 Config 3,6 10 CSI reporting offset Config 1,2,4,5 slot 2 Config 3,6 4			KHZ	
reportQuantity Config 1-6 cri-RI-PMI-CQI CSI reporting periodicity Config 1,2,4,5 slot 5 Config 3,6 10 CSI reporting offset Config 1,2,4,5 slot 2 Config 3,6 4				
CSI reporting periodicity Config 1,2,4,5 slot 5 Config 3,6 10 CSI reporting offset Config 1,2,4,5 slot 2 Config 3,6 4				
Config 3,6 10	CSI reporting	Config 1,2,4,5	slot	
CSI reporting offset Config 1,2,4,5 slot 2 Config 3,6 4	periodicity	Config 2 C	SiOt	
Config 3,6	CSI reporting offeet		olot	-
	Con reporting onset		2101	
	EPRE ratio of PSS to SS		dB	·

EPRE ra	tio of PBCH DM	RS to SSS				
EPRE ra	tio of PBCH to P	BCH DMRS				
EPRE ra	tio of PDCCH DI	MRS to SSS				
EPRE ra	tio of PDCCH to	PDCCH DMRS				
EPRE ra	tio of PDSCH DI	MRS to SSS				
	tio of PDSCH to					
	tio of OCNG DM					
EPRE ra	tio of OCNG to 0	OCNG DMRS Note 1				
N_{oc} Note2	2		dBm/15kHz	-104		
λ/ Note	,	Config 1,2,4,5	dD/000	-104		
N_{oc} Note2		Config 3,6	dBm/SCS	-101		
$\hat{E}_{\!\scriptscriptstyle s}/I_{\!\scriptscriptstyle ot}$			dB	17		
\hat{E}_s/N_s	ос		dB	17		
SS-RSR	D Note3	Config 1,2,4,5	4D/CCC	-87		
		Config 3,6	dBm/SCS	-84		
SCH_RP	Note 3		dBm/15 kHz	-87		
Io ^{Note3}		Config 1,2,4,5	dBm/9.36MHz	-58.96		
10		Config 3,6	dBm/38.16MHz	-52.87		
Propagat	tion condition		-	AWGN		
Note 1:				cated and a constant		
Note 2:	Interference fr	om other cells and n	oise sources not sp	r all OFDM symbols. ecified in the test is d shall be modelled as		
	AWGN of app	ropriate power for $\it N$	$N_{\!oc}$ to be fulfilled wit	hin BW _{occupied} .		
Note 3:	for information	purposes. They are	not settable param			
Note 4:						
Note 5:						
Note 6:	MHz, 106 RBs	from F _{C,low} , and Io	is independent of th	nnel_actual-occupied (i.e. 40 le BW _{channel} configured.		
Note 7:	N _{RB,c} . is derive	d from Table 5.3.2-	1 in TS38.101-1[2] v	vith configured BW _{channel} .		

Table A.4.5.3.1.1-4: Cell specific test parameters for NR SCell for known FR1 SCell activation case, 160ms SCell measurement cycle

Parame	ator.	Unit	Cell 3			
Parame	iter	Unit	T1	T2	T3	
SSB ARFCN			freq2			
Duplex mode	Configscell 1			FDD		
Duplex mode	Configscell 2,3		TDD			
	Configscell 1			Not Applicable		
TDD configuration	Configscell 2		TDDConf.1.1			
	Configscell 3			TDDConf.2.1		
	Configscell 1		Note 7			
BW _{channel}	Configscell 2	MHz	Note 7			
	Configscell 3		Note 7			
BW _{occupied}	Configscell 1	RB	52 Note 5			
	Configscell 2			52 Note 5		

	Carefin 2		106 Note 6
B1 1 11 1 B11 B	Configscell 3		106 Note 9
DL initial BWP configuration	Configscell 1-3		DLBWP.0.1
DL dedicated BWP			DLBWP.1.1
configuration	0 " 10		
UL initial BWP configuration	Configscell 1-3		ULBWP.0.1
UL dedicated BWP configuration	Configscell 1-3		ULBWP.1.1
DRX Cycle	_	ms	Not Applicable
PDSCH Reference	Configscell 1		SR.1.1 FDD
measurement channel	ConfigsCell 2		SR.1.1 TDD
measurement channel	Configscell 3		SR.2.1 TDD
DMOLOODEOET	Configscell 1		CR.1.1 FDD
RMSI CORESET	Configscell 2		CR.1.1 TDD
Reference Channel	Configscell 3		CR.2.1 TDD
	Configscell 1		CCR.1.1 FDD
RMC CORESET	Configscell 2		CCR.1.1 TDD
Reference Channel	Configscell 3		CCR.2.1 TDD
	Configscell 1		TRS.1.1 FDD
TRS configuration	Configscell 2		TRS.1.1 FDD
1R5 configuration			TRS.1.1 TDD
OONO Dattama	Configscell 3		OP.1 Note 5
OCNG Patterns	Configscell 1,2		
	Config _{SCell} 3		OP.1 Note 6
SMTC configuration	T -		SMTC.1
SSB configuration	Configscell 1,2		SSB.1 FR1
COD comiguration	Configscell 3		SSB.2 FR1
CSI-RS configuration for	Configscell 1		CSI-RS.1.1 FDD
CSI reporting	Configscell 2		CSI-RS.1.1 TDD
CSI reporting	Configscell 3		CSI-RS.2.1 TDD
PDSCH/PDCCH	ConfigsCell 1,2	kHz	15
subcarrier spacing	Configscell 3	KMZ	30
reportConfigType	Configscell 1-3		periodic
reportQuantity	Configscell 1-3		cri-RI-PMI-CQI
CSI reporting periodicity	Configscell 1,2	slot	5
, 31	Configscell 3		10
CSI reporting offset	ConfigsCell 1,2	slot	2
co. reperming emeet	Configscell 3	0.01	4
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMR	S to SSS		
EPRE ratio of PBCH to PB	CH DMRS		
EPRE ratio of PDCCH DM	RS to SSS		
EPRE ratio of PDCCH to P		dB	0
EPRE ratio of PDSCH DM			
EPRE ratio of PDSCH to P			
EPRE ratio of OCNG DMR			
EPRE ratio of OCNG to OC			
N_{oc} Note2		dBm/15kHz	-104
oc	1	GDIII/ IORI IZ	104
$N_{_{OC}}$ Note2	Configscell 1,2	dBm/SCS	-104
· · oc	Configscell 3	35, 000	-101
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	17
\hat{E}_s/N_{oc}		dB	17
SS-RSRP ^{Note3}	Configscell 1,2	4D.m./CCC	-87
33-K3KP*****	Configscell 3	dBm/SCS	-84

SCH_RP	Note 3		dBm/15 kHz	-87	
IoNote3 Configscell 1,2		Configscell 1,2	dBm/9.36MHz	-58.96	
10		Configscell 3	dBm/38.16MHz	-52.87	
Propagat	ion condition		-	AWGN	
Note 1:	OCNG shall be u	used such that bot	h cells are fully allo	cated and a constant total transmitted power spectral	
	density is achiev	ed for all OFDM s	ymbols.		
Note 2:	Interference fron	n other cells and n	oise sources not sp	ecified in the test is assumed to be constant over	
	subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled within				
Note 3:				from other parameters for information purposes. They	
		parameters thems			
Note 4:				the UE prior to the start of time period T2.]	
Note 5:	: All UL/DL transmission shall be confined within BW _{channel_actual-occupied} (i.e. 10 MHz, 52 RBs) from F _{C,low} , and Io is independent of the BW _{channel} configured.				
Note 6:	All UL/DL transn	nission shall be co	nfined within BW _{cha}	nnel_actual-occupied (i.e. 40 MHz, 106 RBs) from F _{C,low} , and	

A.4.5.3.1.2 Test Requirements

Note 7:

Io is independent of the BW_{channel} configured.

During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot m + $\frac{T_{HARQ} + T_{activation_time} + T_{CSI_Reporting}}{NR \ slot \ length}$, $T_{activation_time} = T_{FirstSSB} + 5 ms$, as defined in clause 8.3.

N_{RB,c}. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW_{channel}.

During T3 the UE shall stop sending CSI reports for SCell at latest in a slot $n + \frac{T_{HARQ} + 3ms}{NR \, slot \, length}$, as defined in clause 8.3.

During T2 interruption of PSCell during SCell activation shall not happen outside the slot $m+1+\frac{T_{\rm HARQ}}{\rm NR~slot~length}$ to $m+1+\frac{T_{\rm HARQ}+3\,{\rm ms}+T_{\rm X}}{\rm NR~slot~length}+N_{\rm interruption}$, and interruption of E-UTRA PCell during SCell activation shall not happen outside the subframe $m_1+1+\frac{T_{\rm HARQ}}{\rm EUTRA~slot~length}$ to subframe $m_2+1+\frac{T_{\rm HARQ}+3\,{\rm ms}+T_{\rm X}}{\rm EUTRA~slot~length}+N_{\rm interruption}$, as defined in clause 8.3.

During T3 the starting point of interruption of PSCell during SCell deactivation shall not happen outside the slot n + $1 + \frac{T_{\text{HARQ}}}{NR \, slot \, length}$ to n + $1 + \frac{T_{\text{HARQ}} + 3 \, \text{ms}}{NR \, slot \, length}$, as defined in clause 8.3 and the starting point of interruption of E-UTRA PCell during SCell deactivation shall not happen outside the subframe $n_1 + 1 + \frac{T_{\text{HARQ}}}{EUTRA \, subframe \, length}$ to subframe $n_2 + 1 + \frac{T_{\text{HARQ}} + 3 \, \text{ms}}{EUTRA \, subframe \, length}$.

The interruption of PSCell shall not be more than the values specified for EN-DC in Clause 8.2.1.2.4.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot m + $\frac{T_{HARQ} + T_{activtion_time} + T_{CSI_Reporting}}{NR \ slot \ length}$ as defined in clause 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.

A.4.5.3.2 SCell Activation and deactivation of known SCell in FR1 for 640ms SCell measurement cycle

A.4.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.4.5.3.1.1. The supported test configurations are the same as defined in clause A.4.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.4.5.3.2.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-2.

Table A.4.5.3.2.1-1: General test parameters for known FR1 SCell activation case, 640ms SCell measurement cycle

Parameter	Unit	Value	Comment
SCell measurement cycle (measCycleSCell)	ms	640	

A.4.5.3.2.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value $T_{FirstSSB_MAX} + T_{rs} + 5ms$.

A.4.5.3.3 SCell Activation and deactivation of unknown SCell in FR1

A.4.5.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is unknown by the UE at the time of activation.

The supported test configurations are defined in clause A.4.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.4.5.3.3.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-2. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell, NR has two cells. Cell 1 and Cell 2 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRAN and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2. The UE shall be able to report valid CSI for the activated SCell at latest in slot m + $\frac{\text{THARQ} + T_{\text{activtion,time}} + T_{\text{CSI_Reporting}}}{NR \text{ slot } length}$ as defined in clause 8.3 provided the SCell can be successfully detected on the first attempt. The UE shall start reporting CSI after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k) and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PSCell interruption due to activation of SCell shall occur in the slot $m+1+\frac{T_{\text{HARQ}} + 3ms + T_{\text{X}}}{NR \text{ slot length}}$ to slot $m+1+\frac{T_{\text{HARQ}} + 3ms + T_{\text{X}}}{NR \text{ slot length}} + N_{\text{interruption}}$, as defined in clause 8.3, where $N_{\text{interruption}}$ is the interruption length given in section 8.2. Any E-UTRA PCell interruption due to activation of SCell shall occur in the subframe $m_1+1+\frac{T_{\text{HARQ}}}{EUTRA \text{ slot length}}$ to subframe $m_2+1+\frac{T_{\text{HARQ}} + 3ms + T_{\text{X}}}{EUTRA \text{ slot length}} + N_{\text{interruption}}$, where m_1 and m_2 are the index of the first and last subframe of E-UTRA PCell which overlaps with slot m, and $N_{\text{interruption}}$ is the interruption length given in TS 36.133 [14] section 7.32.

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell at latest in slot n + $\frac{T_{HARQ} + 3ms}{NR \ slot \ length}$ as defined in clause 8.3. The starting point of any PSCell interruption due to the deactivation shall occur in the slot n + 1 + $\frac{T_{HARQ}}{NR \ slot \ length}$ to n + 1 + $\frac{T_{HARQ} + 3ms}{NR \ slot \ length}$, as defined in clause 8.3. The starting point of any E-UTRA PCell interruption due to the deactivation shall occur in the subframe $n_1 + 1 + \frac{T_{HARQ}}{EUTRA \ subframe \ length}$ to subframe $n_2 + 1 + \frac{T_{HARQ} + 3ms}{EUTRA \ subframe \ length}$, where n_1 and n_2 are the index of the first and last subframe of E-UTRA PCell which overlaps with slot n.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PSCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell1 deactivation command is sent until CSI reporting for SCell1 is discontinued.

Table A.4.5.3.3.1-1: General test parameters for unknown FR1 SCell activation case, 160ms SCell measurement cycle

Parameter Unit Value		Value	Comment		
T1	ms	100	During this time the PSCell shall be known and the SCell configured, but not detected.		

A.4.5.3.3.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value $T_{FirstSSB\ MAX} + T_{SMTC\ MAX} + 2*T_{rs} + 5$ ms as defined in clause 8.3.

A.4.5.4 UE UL carrier RRC reconfiguration Delay

A.4.5.4.1 UE UL carrier RRC reconfiguration Delay

Table A.4.5.4.1-1 - Table A.4.5.4.1-4 : Void

A.4.5.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that when the UE receives a RRC message implying NR UL or Supplementary UL carrier configuration, the UE shall be ready to start transmission on the newly configured carrier within the time limits specified in clause 8.4.2 and 8.4.3 for configuring and deconfiguring, respectively.

There are three cells: E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and FR1 SCell (Cell 3). For SCell, both NR uplink and supplementary uplink are broadcast by *ServingCellConfigCommonSIB*. The test parameters for PSCell and SCell are given in Table A. 4.5.4.1.1-1, Table A. 4.5.4.1.1-2, Table A. 4.5.4.1.1-3 and Table A. 4.5.4.1.1-4 below. The test parameters and applicability for E-UTRAN PCell are defined in A.3.7.2. The test consists two tests. In test 1, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, NR uplink of cell 3 is configured to UE. At the start of T2, a supplementary uplink of cell3 is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the supplementary uplink is released through *RRCReconfiguration*.

In test 2, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, supplementray uplink on cell 3 is configured to UE. At the start of T2, a NR uplink is configured to UE through

RRCReconfiguration, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the NR uplink is released through *RRCReconfiguration*.

Table A.4.5.4.1.1-1: Supported test configurations

Configuration	PSCell (Cell2)	SCell (Cell3)
1	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
2	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
3	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode
4	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
5	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
6	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode
7	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode; SUL: 15kHz SCS, 10 MHz bandwidth, SUL duplex mode
8	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 15kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
9	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode
Note 2 The UI	E is only required to be tested in one of the supported te E is only required to be tested in one with smallest aggre nations which is composed of CCs ≥ the bandwidth (BW	egated channel bandwidth from supported band

Table A.4.5.4.1.1-2: General test parameters for EN-DC UE UL carrier RRC reconfiguration Delay

Parameter	Unit	Test configuration	Value	Comment
RF Channel Number		Config 1,2,3, 4, 5, 6, 7, 8, 9	1, 2, 3	Three radio channels are used for these two tests.
Active cell		Config 1,2,3, 4, 5, 6, 7, 8, 9	Cell 1: E-UTRAN PCell Cell 2: FR1 PSCell Cell 3: FR1 SCell	E-UTRAN PCell on RF channel number 1 FR1 PSCell on RF channel number 2 FR1 SCell on RF channel number 3
CP length		Config 1,2,3, 4, 5, 6, 7, 8, 9	Normal	

DRX		Config 1,2,3, 4, 5, 6, 7, 8, 9	OFF	
Measurement gap pattern Id		Config 1,2,3, 4, 5, 6, 7, 8, 9	OFF	
Filter coefficient		Config 1,2,3, 4, 5, 6, 7, 8, 9	0	L3 filtering is not used
T1	S	Config 1,2,3, 4, 5, 6, 7, 8, 9	5	
T2	S	Config 1,2,3, 4, 5, 6, 7, 8, 9	5	
T3	S	Config 1,2,3, 4, 5, 6, 7, 8, 9	5	

Table A.4.5.4.1.1-3: NR Cell specific test parameters for EN-DC UE UL carrier RRC reconfiguration Delay on PSCell (Cell 2)

Parameter	Unit	Test		Test 1			Test 2		
		Configuration	T1	T2	T3	T1	T2	Т3	
Channel number		Conf 1, 2, 3, 4,		2			2		
Charmer number		5, 6, 7, 8, 9							
		Conf 1, 2, 3	N/A		N/A TDD Conf 1 1				
TDD configuration		Conf 4, 5, 6		TDD Conf.1.			TDD Conf.1.		
		Conf 7, 8, 9		TDD Conf.2.1		-	TDD Conf.2.		
		Conf 1, 2, 3		Note 6			Note 6		
BW _{channel}	MHz	Conf 4, 5, 6		Note 6			Note 6		
		Conf 7, 8, 9		Note 6			Note 6		
BW _{occupied}	RB	Conf 1, 2, 3		52 Note 4			52 Note 4		
		Conf 4, 5, 6		52 Note 4 106 Note 5			52 Note 4		
		Conf 7, 8, 9					106 Note 5		
PDSCH reference		Conf 1, 2, 3		SR.1.1 FDE			SR.1.1 FDD		
measurement		Conf 4, 5, 6		SR.1.1 TDE)		SR.1.1 TDD		
channel as defined in A.3.1.1		Conf 7, 8, 9		SR 2.1 TDE)		SR 2.1 TDD		
RMSI CORESET		Conf 1, 2, 3		CR.1.1 FDE)		CR.1.1 FDD		
reference		Conf 4, 5, 6		CR.1.1 TDE)		CR.1.1 TDD		
measurement		Conf 7, 8, 9							
channel as defined in A.3.1.2				CR.2.1 TDE)	CR.2.1 TDD			
RMC CORESET		Conf 1, 2, 3	(CCR.1.1 FD	D	CCR.1.1 FDD)	
reference		Conf 4, 5, 6	(CCR.1.1 TD	D	CCR.1.1 TDD)	
measurement channel as defined in A.3.1.3		Conf 7, 8, 9		CCR.2.1 TD	D		CCR.2.1 TDE)	
OCNG Pattern Note 1		Conf 1, 2, 3, 4, 5, 6	OP.1 Note 4			OP.1 Note 4			
		Config 7, 8, 9		OP.1 Note 5			OP.1 Note 5		
SSB configuration		Conf 1, 2, 3, 4, 5, 6		SSB.1 FR1			SSB.1 FR1		
J		Conf 7, 8, 9		SSB.2 FR1			SSB.2 FR1		
SMTC configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		SMTC.1		SMTC.1			
		Conf 1		TRS.1.1 FD	D		TRS.1.1 FDE)	
		Conf 2		TRS.1.1 FD			TRS.1.1 FDE		
		Conf 3		TRS.1.1 FD			TRS.1.1 FDE		
001.00 (Conf 4		TRS.1.1 TD			TRS.1.1 TDD		
CSI-RS for tracking		Conf 5		TRS.1.1 TD	D		TRS.1.1 TDD)	
		Conf 6		TRS.1.1 TD			TRS.1.1 TDD		
		Conf 7		TRS.1.2 TD			TRS.1.2 TDD		
		Conf 8		TRS.1.2 TD			TRS.1.2 TDD		

]	Conf 9	7	ΓRS.1.2 TD	D	-	TRS.1.2 TDI)
DL initial BWP		Conf 1, 2, 3, 4,						
configuration		5, 6, 7, 8, 9		DLBWP.0.	1	DLBWP.0.1		
DL dedicated BWP		Conf 1, 2, 3, 4,		DLBWP.1.	1	DLBWP.1.1		
configuration		5, 6, 7, 8, 9		DLBWP.1.	l		DLDWP.I.I	
UL dedicated BWP		Conf 1, 2, 3, 4,		ULBWP.1.	1		ULBWP.1.1	
configuration		5, 6, 7, 8, 9		OLBVVF.1.	I		OLBWF.I.I	
EPRE ratio of PSS								
to SSS								
EPRE ratio of								
PBCH_DMRS to								
SSS								
EPRE ratio of PBCH								
to PBCH_DMRS								
EPRE ratio of								
PDCCH_DMRS to								
SSS EDDE rotio of								
EPRE ratio of								
PDCCH DMBS	dB	Conf 1, 2, 3, 4,		0			0	
PDCCH_DMRS EPRE ratio of	uБ	5, 6, 7, 8, 9		U			U	
PDSCH_DMRS to								
SSS								
EPRE ratio of								
PDSCH to								
PDSCH_DMRS								
EPRE ratio of								
OCNG DMRS to								
SSS								
EPRE ratio of								
OCNG to OCNG								
DMRS								
	dBm/	Conf 1, 2, 3, 4,		-102			-102	
	15kHz	5, 6, 7, 8, 9						
N_{oc} Note 2	dBm/	Conf		-102			-102	
oc .	SCS	1,2,3,4,5,6						
		Conf 7,8,9		-99			-99	T
\hat{E}_s/N_{oc}	dB	Conf 1, 2, 3, 4,	16	16	16	16	16	16
		5, 6, 7, 8, 9	4.0	40	40	4.0	4.0	4.0
\hat{E}_s/I_{ot} Note 3	dB	Conf 1, 2, 3, 4,	16	16	16	16	16	16
s / =ot		5, 6, 7, 8, 9	00		60	00	00	00
OO DODD Note 2	dBm/	Conf	-86	-86	-86	-86	-86	-86
SS-RSRP Note 3	SCS	1,2,3,4,5,6	60	00	00	00	00	00
		Conf 7,8,9	-83	-83 57.0	-83 57.0	-83 57.0	-83 57.0	-83
	dBm/	Conf	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
	9.36	1,2,3,4,5,6						
	MHz dBm/	Conf 7,8,9	-51.8	-51.8	-51.8	-51.8	-51.8	-51.8
lo Note 3	38.16	COIII 7,8,9	-51.8	-01.8	-01.0	-01.8	-51.8	-51.8
	MHz							
Propagation	IVI∏∠	Conf 1, 2, 3, 4,		AWGN			AWGN	
Condition		5, 6, 7, 8, 9		AWGIN			AWGIN	
Antenna		Conf 1, 2, 3, 4,		1 x 2			1 x 2	
configuration		5, 6, 7, 8, 9		1 1 2			1 1 2	
Comigaration	l	0, 0, 7, 0, 0						

- NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled within BW-accupied.
- NOTE 3: $\hat{E}_{_{s}}/I_{_{ot}}$, Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- NOTE 4: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 10 MHz, 52 RBs) from F_{C,low}, and lo is independent of the BW_{channel} configured.
- NOTE 5: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 40 MHz, 106 RBs) from F_{C,low}, and lo is independent of the BW_{channel} configured.
- NOTE 6: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW_{channel}.

Table A.4.5.4.1.1-4: NR Cell specific test parameters for EN-DC UE UL carrier RRC reconfiguration Delay on SCell (Cell 3)

Parameter	Unit	Test		Test 1			Test 2	
		Configuration	T1	T2	Т3	T1	T2	T3
Channel number		Conf 1, 2, 3, 4,		3			3	
		5, 6, 7, 8, 9						
		Conf 1, 4, 7		N/A			N/A	
TDD configuration		Conf 2, 5, 8		TDDConf.1.	.1		TDDConf.1.1	
		Conf 3, 6, 9		TDDConf.2.	.1		TDDConf.2.1	
		Conf 1, 4, 7		Note 6			Note 6	
BW _{channel}	MHz	Conf 2, 5, 8		Note 6			Note 6	
		Conf 3, 6, 9		Note 6			Note 6	
BWoccupied	RB	Conf 1, 4, 7		52 Note 4			52 Note 4	
		Conf 2, 5, 8		52 Note 4			52 Note 4	
		Conf 3, 6, 9		106 Note 5			106 Note 5	
		Conf 1, 4, 7	G- FR1- A3-10 in [13]	G-FR1- A3-10 in [13]	G-FR1- A3-10 in [13]	N/A	G-FR1- A3-10 in [13]	N/A
PUSCH parameters for NR UL carrier		Conf 2, 5, 8	G- FR1- A3-10 in [13]	G-FR1- A3-10 in [13]	G-FR1- A3-10 in [13]	N/A	G-FR1- A3-10 in [13]	N/A
		Conf 3, 6, 9	G- FR1- A3-14 in [13]	G-FR1- A3-14 in [13]	G-FR1- A3-14 in [13]	N/A	G-FR1- A3-14 in [13]	N/A
		Conf 1, 4, 7	Table 8.3.3.1 .2-1 in [13]	Table 8.3.3.1. 2-1 in [13]	Table 8.3.3.1.2 -1 in [13]	N/A	N/A	N/A
PUCCH parameters For NR UL carrier		Conf 2, 5, 8	Table 8.3.3.1 .2-1 in [13]	Table 8.3.3.1. 2-1 in [13]	Table 8.3.3.1.2 -1 in [13]	N/A	N/A	N/A
		Conf 3, 6, 9	Table 8.3.3.1 .2-2 in [13]	Table 8.3.3.1. 2-2 in [13]	Table 8.3.3.1.2 -2 in [13]	N/A	N/A	N/A
PUSCH parameters for supplementary UL		Conf 1, 4, 7	N/A	G-FR1- A3-10 in [13]	N/A	G-FR1- A3-10 in [13]	G-FR1- A3-10 in [13]	G-FR1- A3-10 in [13]

		Conf 2, 5, 8		G-FR1-		G-FR1-	G-FR1-	G-FR1-
			N/A	A3-10	N/A	A3-10 in	A3-10 in	A3-10 in
				in [13]		[13]	[13]	[13]
		Conf 3, 6, 9		G-FR1-		G-FR1-	G-FR1-	G-FR1-
		, ,	N/A	A3-14	N/A	A3-14 in	A3-14 in	A3-14 in
				in [13]		[13]	[13]	[13]
		Conf 1, 4, 7				Table	Table	Table
		., ., .	N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
						-1 in [13]	-1 in [13]	-1 in [13]
		Conf 2, 5, 8					Table	
PUCCH parameters		00111 2, 0, 0				Table	8.3.3.1.2	Table
for supplementary			N/A	N/A	N/A	8.3.3.1.2	-1 in	8.3.3.1.2
UL						-1 in [13]	[13]	-1 in [13]
		Conf 3, 6, 9				Table	Table	Table
		COIII 3, 0, 9	N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
			IN/A	IN/A	IN/A			
DD0011 (0 (4 4 7		00 4 4 50		-2 in [13]		-2 in [13]
PDSCH reference		Conf 1, 4, 7		SR.1.1 FD			SR.1.1 FDD	
measurement		Conf 2, 5, 8		SR.1.1 TD	D		SR.1.1 TDD	
channel as defined		Conf 3, 6, 9		SR 2.1 TD	D		SR 2.1 TDD)
in A.3.1.1								
RMSI CORESET		Conf 1, 4, 7		CR.1.1 FD			CR.1.1 FDD	
reference		Conf 2, 5, 8		CR.1.1 TD	D		CR.1.1 TDD)
measurement		Conf 3, 6, 9						
channel as defined				CR.2.1 TD	D		CR.2.1 TDD)
in A.3.1.2								
RMC CORESET		Conf 1, 4, 7	(CCR.1.1 FE	DD	CCR.1.1 FDD		
reference		Conf 2, 5, 8	(CCR.1.1 TE	DD	CCR.1.1 TDD)
measurement		Conf 3, 6, 9						
channel as defined		, ,	(CCR.2.1 TE	DD		CR.2.1 TDI)
in A.3.1.3								
OCNG Pattern Note 1		Conf 1, 2, 4, 5,		OP.1 Note 4		OP.1 Note 4		
OCNG Pattern New 1		7, 8		-		-		
		Conf 3, 6, 9		OP.1 Note 5		OP.1 Note 5		
		Conf 1, 2, 4, 5,		000 4 50	_	CCD 4 ED4		
SSB configuration		7,8		SSB.1 FR	1	SSB.1 FR1		
		Conf 3, 6, 9		SSB.2 FR	1	SSB.2 FR1		
		Conf 1, 2, 3, 4,			<u>-</u>			
SMTC configuration		5, 6, 7, 8, 9		SMTC.1		SMTC.1		
		Conf 1		TRS.1.1 FC	חר	-	TRS.1.1 FDI	,
		Conf 2		TRS.1.1 TE			RS.1.1 TDI	
		Conf 3		TRS.1.2 TE			RS.1.2 TDI	
CCL DC for two alide at		Conf 4		TRS.1.1 FC			RS.1.1 FDI	
CSI-RS for tracking		Conf 5		TRS.1.1 TE		TRS.1.1 TDD		
		Conf 6		TRS.1.2 TD			RS.1.2 TDI	
		Conf 7		TRS.1.1 FD			RS.1.1 FDI	
		Conf 8		TRS.1.1 TD			TRS.1.1 TDI	
		Conf 9		TRS.1.2 TD	DD	7	TRS.1.2 TDI)
DL initial BWP		Conf 1, 2, 3, 4,		DLBWP.0.	1		DLBWP.0.1	
configuration		5, 6, 7, 8, 9		DLDVVF.U.	<u> </u>			
DL dedicated BWP		Conf 1, 2, 3, 4,	DI DIAID 4.4			DI DW/D 4 4	·	
configuration		5, 6, 7, 8, 9	DLBWP.1.1		<u> </u>	DLBWP.1.1		
UL dedicated BWP		Conf 1, 2, 3, 4,	LII DVID 1 1			III DWD 4 4		
configuration		5, 6, 7, 8, 9		ULBWP.1.	1		ULBWP.1.1	
EPRE ratio of PSS		, , , -, -						
I ELLE ISSO OL LOO		1						
to SSS								
to SSS EPRE ratio of	dB	Conf 1, 2, 3, 4,		Ω			0	
to SSS EPRE ratio of PBCH_DMRS to	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		0			0	
to SSS EPRE ratio of PBCH_DMRS to SSS	dB			0			0	
to SSS EPRE ratio of PBCH_DMRS to	dB			0			0	

EPRE ratio of	Ī							
PDCCH_DMRS to								
SSS								
EPRE ratio of								
PDCCH to								
PDCCH_DMRS								
EPRE ratio of								
PDSCH_DMRS to								
SSS								
EPRE ratio of								
PDSCH to								
PDSCH_DMRS								
EPRE ratio of								
OCNG DMRS to								
SSS EPRE ratio of								
OCNG to OCNG								
DMRS								
DIVINO	dBm /	Conf 1, 2, 3, 4,						
	15kHz	5, 6, 7, 8, 9		-102			-102	
N_{oc} Note 2	dBm/ Conf 1, 2, 4, 5,			-102		-102		
	SCS	7,8						
		Conf 3, 6, 9		-99		-99		
\hat{E}_s/N_{oc}	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
$\hat{E}_{_{s}}/I_{_{ot}}$ Note 3	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
SS-RSRP Note 3	dBm/	Conf 1, 2, 4, 5, 7,8	-86	-86	-86	-86	-86	-86
	SCS	Conf 3, 6, 9	-83	-83	-83	-83	-83	-83
	dBm/	Conf 1, 2, 4, 5,						
	9.36	7,8	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
Io Note 3	MHz							
10	dBm/	Conf 3, 6, 9						
	38.16		-51.8	-51.8	-51.8	-51.8	-51.8	-51.8
	MHz							
Propagation		Conf 1, 2, 3, 4,	AWGN			AWGN		
Condition		5, 6, 7, 8, 9	AVVGIN			AWGIN		
Antenna		Conf 1, 2, 3, 4,	1 x 2 1 x 2					
configuration		5, 6, 7, 8, 9				L		

- NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled within ${\sf BW}_{\sf occupied}$.
- NOTE 3: $\hat{E}_{_{s}}/I_{_{ot}}$, Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- NOTE 4: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 10 MHz, 52 RBs) from F_{C,low}, and lo is independent of the BW_{channel} configured.
- NOTE 5: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 40 MHz, 106 RBs) from F_{C,low}, and lo is independent of the BW_{channel} configured.
- NOTE 6: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW_{channel}.

A.4.5.4.1.2 Test Requirements

In test 1 the UE shall be ready to start transmission on the supplementary uplink carrier on SCell within 20ms from the start of T2.

In test 1 the UE shall stop the transmission on the supplementary uplink carrier on SCell within 20ms from the start of T3.

In test 2 the UE shall be ready to start transmission on the NR uplink carrier on SCell within 20ms from the start of T2.

In test 2 the UE shall stop the transmission on the NR uplink carrier on SCell within 20ms from the start of T3.

All of the above test requirements shall be fulfilled in order for the observed UE UL carrier configuration delay and UE UL carrier release delay to be counted as correct. The rate of correct observed UE UL carrier configuration delay and UE UL carrier release delay during repeated tests shall be at least 90%.

A.4.5.5 Beam Failure Detection and Link recovery procedures

A.4.5.5.1 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in non-DRX mode

A.4.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.1.1-1, A.4.5.5.1.1-2, A.4.5.5.1.1-3 and A.4.5.5.1.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.1.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q_0 in the active PSCell to emulate SSB based beam failure. Figure A.4.5.5.1.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 1.

Table A.4.5.5.1.1-1: Supported test configurations for FR1 PCell

Configuration

Description

Configuration	Description				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: The UE is only required to pass in one of the supported test configurations in FR1					

Table A.4.5.5.1.1-2: General test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Unit	Value	Comment
		Test 1	
Active E-UTRA PCell		Cell 1	

E 1. E . E		1		T
E-UTRA RF Chan	nel Number		1	
Active PSCell			Cell 2	
RF Channel Numb			2	
Duplex mode	Config 1, 4		FDD	
	Config 2, 3,		TDD	
	5, 6			
BWchannel	Config 1, 4	MHz	10: NRB,c = 52	
	Config 2, 5		10: NRB,c = 52	
	Config 3, 6		40: NRB,c =	
			106	
DL initial BWP	Config 1, 2,		DLBWP.0.1	
configuration	3, 4, 5, 6			
DL dedicated	Config 1, 2,		DLBWP.1.1	
BWP	3, 4, 5, 6			
configuration				
UL initial BWP	Config 1, 2,		ULBWP.0.1	
configuration	3, 4, 5, 6			
UL dedicated	Config 1, 2,		ULBWP.1.1	
BWP	3, 4, 5, 6			
configuration				
TDD	Config 1, 4		Not Applicable	
Configuration				
	Config 2, 5		TDDConf.1.1	
	Config 3, 6		TDDConf.2.1	
RMSI CORESET	Config 1, 4		CR.1.1 FDD	
Reference				
Channel				
	Config 2, 5		CR.1.1 TDD	
	Config 3, 6		CR.2.1 TDD	
Dedicated	Config 1, 4		CCR.1.1 FDD	
CORESET				
Reference				
Channel				
	Config 2, 5		CCR.1.1 TDD	
	Config 3, 6		CCR.2.1 TDD	
SSB	Config 1, 4		SSB.3 FR1	
Configuration				
	Config 2, 5		SSB.3 FR1	
	Config 3, 6		SSB.4 FR1	
SMTC	Config 1, 2,		SMTC.1	
Configuration	4, 5			
	Config 3, 6		SMTC.1	
PDSCH/PDCCH	Config 1, 2,		15 KHz	
subcarrier	4, 5			
spacing				
	Config 3, 6		30 KHz	
PRACH	Config 1, 2,		Table A.3.8.2.2-	
Configuration	4, 5		1	
20mgaradon	Config 3, 6	1	Table A.3.8.2.2-	
	Jonning 0, 0		1	
SSB Index assigne	ed as BED RS		0	
(q ₀)	as Di D 110			
SSB Index assigne	ed as CRD RS		1	
	tu as CDD INS		'	
OCNG parameters	<u> </u>		OP.1	
CP length	•		Normal	
Correlation Matrix	and Antenna	 	2x2 Low	
Configuration	ana Antollia		ZAZ LUW	
Beam failure	DCI format	 	1-0	
Dealli iallule	DOLIDINAL		1-0	

detection	Number of		2	
transmission	Control			
parameters	OFDM			
'	symbols			
	Aggregation	CCE	8	
	level	002	J	
	Ratio of	dB	0	
		ub	U	
	hypothetical			
	PDCCH RE			
	energy to			
	average			
	SSS RE			
	energy			
	Ratio of	dB	0	
	hypothetical			
	PDCCH			
	DMRS			
	energy to			
	average			
	SSS ŘE			
	energy			
	DMRS		REG bundle	
	precoder		size	
	granularity		3126	
	REG bundle		6	
	size		O	
DRX	SIZE		OFF	
Gap pattern ID			gp0	
gapOffset	There also also		0	Miles of the Calabia
rlmInSyncOutOfSy	nc i hreshold		absent	When the field is
				absent, the UE
				applies the value 0.
				(Table 8.1.1-1).
rsrp-	Config 1, 2,	dBm/	-98	Threshold used for
ThresholdSSB	4, 5	SCS		$Q_{in_LR_SSB}$
		kHz		
	Config 3, 6		-95	
powerControlOffse	tSS		db0	Used for deriving
				rsrp-ThresholdCSI-
				RS
beamFailureInstan	ceMaxCount		n1	see TS 38.321 [7],
				clause 5.17
beamFailureDetect	tionTimer		pbfd4	see TS 38.321 [7],
boarm androbotoo			polar	clause 5.17
CSI-RS	Config 1, 4	<u> </u>	CSI-RS.1.1	0.0000011
configuration for	Joining 1, 4	1	FDD	
CSI reporting			יטט ו	
Correporting	Config 2, 5	 	CSI-RS.1.1	
	Corning 2, 5			
	Config 3, 6		TDD CSI-RS.2.1	
	Coning 3, 6			
001 00 /	0 "		TDD	
CSI-RS for	Config 1, 4		TRS.1.1 FDD	
tracking		ļ		
	Config 2, 5		TRS.1.1 TDD	
	Config 3, 6		TRS.1.2 TDD	
SSB Index assigne	ed as RLM RS		0,1	
T310 timer		ms	1000	
N310			2	
14310				
T1		S	0.2	During this time the
		S	0.2	During this time the the UE shall be fully

			synchronized to cell 1
T2	S	0.37	
T3	S	0.24	
T4	S	0	
T5	S	0.17	
D1	S	0.13	

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.4.5.5.1.1-3: Cell specific test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit		Test 1			
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH D	OMRS to SSS	dB			0		
EPRE ratio of PDCCH to	o PDCCH DMRS	dB					
EPRE ratio of PBCH DN	MRS to SSS	dB					
EPRE ratio of PBCH to	PBCH DMRS	dB					
EPRE ratio of PSS to S	SS	dB					
EPRE ratio of PDSCH D	MRS to SSS	dB					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DI	MRS to SSS	dB					
EPRE ratio of OCNG to	OCNG DMRS	dB					
SNR_SSB of set q ₀	Config 1, 4	dB	5	-3	-12	-12	-12
	Config 2, 5		5	-3	-12	-12	-12
	Config 3, 6		5	-3	-12	-12	-12
SNR_SSB of set q ₁	Config 1, 4	dB	-10	-10	10	10	10
	Config 2, 5		-10	-10	10	10	10
	Config 3, 6		-10	-10	10	10	10
SSB_RP of set q ₁	Config 1, 4	dBm/	-108	-108	-88	-88	-88
	Config 2, 5	SCS kHz	-108	-108	-88	-88	-88
	Config 3, 6		-105	-105	-85	-85	-85
N_{oc}	0				-98		
1 Voc	Config 2, 5	KHz			-98		
	Config 3, 6				-98		
Propagation condition			TDL-C 300ns 100Hz				

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.4.5.5.1.1-4: Void

Figure A.4.5.5.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

T3

D

T4

T5

A.4.5.5.1.2 Test Requirements

T1

T2

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 120 + 10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.5.2 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with SSB-based BFD and LR in DRX mode

A.4.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.2.1-1, A.4.5.5.2.1-2, A.4.5.5.2.1-3, A.4.5.5.2.1-4 and A.4.5.5.2.1-5 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.2.1-1 shows

the variation of the downlink SNR of the PCell and the SNR of the SSB in set q_0 in the active PSCell to emulate SSB based beam failure. Figure A.4.5.5.2.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.4.5.5.2.1-1: Supported test configurations for FR1 PCell

Configuration	Description				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: The UE is only required to pass in one of the supported test configurations in FR1					

Table A.4.5.5.2.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Paramete	Parameter		Value	Comment
			Test 1	
Active E-UTRA PCel	I		Cell 1	
E-UTRA RF Channe	l Number		1	
Active PSCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1, 4		FDD	
	Config 2, 3, 5, 6		TDD	
BWchannel	Config 1,	MHz	10: NRB,c = 52	
	Config 2, 5		10: NRB,c = 52	
	Config 3, 6		40: NRB,c = 106	
DL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		DLBWP.1.1	
UL initial BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.0.1	
UL dedicated BWP configuration	Config 1, 2, 3, 4, 5, 6		ULBWP.1.1	
TDD Configuration	Config 1, 4		Not Applicable	
	Config 2, 5		TDDConf.1.1	
	Config 3,		TDDConf.2.1	

RMSI CORESET Reference Channe	Config 1,		CR.1.1 FDD	
	Config 2, 5		CR.1.1 TDD	
	Config 3,		CR.2.1 TDD	
Dedicated CORESET Reference Channe	Config 1,		CCR.1.1 FDD	
	Config 2,		CCR.1.1 TDD	
	Config 3,		CCR.2.1 TDD	
SSB Configuration	Config 1,		SSB.3 FR1	
	Config 2, 5		SSB.3 FR1	
	Config 3,		SSB.4 FR1	
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1	
	Config 3,		SMTC.1	
PDSCH/PDCCH subcarrier spacing			15 KHz	
	Config 3, 6		30 KHz	
PRACH	Config 1,		Table	
Configuration	2, 4, 5		A.3.8.2.2-1	
	Config 3,		Table A.3.8.2.2-1	
SSB Index assigne			0	
SSB Index assigne	ed as CBD		1	
OCNG parameters	,		OP.1	
CP length			Normal	
Correlation Matrix a Configuration	and Antenna		2x2 Low	
Beam failure	DCI format		1-0	
detection	Number of		2	
transmission	Control			
parameters	OFDM			
	symbols Aggregation	CCE	8	
	level	CCL	0	
	Ratio of	dB	0	
	hypothetical PDCCH RE			
	energy to			
	average			
	SSS RE energy			
	Ratio of	dB	0	
	hypothetical			
	PDCCH			
	DMRS			
	energy to			
	average SSS RE			
	energy			

1		1		
	DMRS		REG bundle	
	precoder		size	
	granularity			
	REG bundle		6	
	size		Ŭ	
DRX	3126		DRX.7	A.3.3.7
				A.S.S.1
Gap pattern ID			N.A.	
rlmInSyncOutOfSy	/ncThreshold		absent	When the field is
				absent, the UE
				applies the value
				0. (Table 8.1.1-1).
rsrp-	Config 1, 2,	dBm/SCS	-98	Threshold used
ThresholdSSB	4, 5	kHz	00	for Q _{in_LR_SSB}
THICSHOIGOOD	Config 3, 6	NI IZ	-95	TOT QIN_LR_SSB
0 1 1011	Corning 3, 6			
powerControlOffse	etSS		db0	Used for deriving
				rsrp-
				ThresholdCSI-RS
beamFailureInstar	nceMaxCount		n1	see TS 38.321 [7],
				clause 5.17
beamFailureDetec	tionTimer		pbfd4	see TS 38.321 [7],
bearin andrebeted	Monnine		pbia	clause 5.17
001.00	06-4-4		001 00 4 4	Clause 5.17
CSI-RS	Config 1, 4		CSI-RS.1.1	
configuration for			FDD	
CSI reporting				
	Config 2, 5		CSI-RS.1.1	
			TDD	
	Config 3, 6		CSI-RS.2.1	
	Johnnig O, O		TDD	
CSI-RS for	Config 1, 4		TRS.1.1 FDD	
	Corning 1, 4		ואס.ו.ו רטט	
tracking	0 " 0 -		TD0 / / TDD	
	Config 2, 5		TRS.1.1 TDD	
	Config 3, 6		TRS.1.2 TDD	
SSB Index assign	ed as RLM		0,1	
RS				
T310 Timer		ms	1000	
N310			2	
T1		c	1	During this time
' '		S	ı	
				the the UE shall
				be fully
				synchronized to
				cell 1
T2		S	5.17	
T3		S	3.24	
T4		S	0	
T5			1.97	
		S		
D1		S	1.93	

Note 1: All configurations are assigned to the UE prior to the start of time period

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Note 3: E-UTRAN is in non-DRX mode under test.

Table A.4.5.5.2.1-3: Cell specific test parameters for FR1 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter	Unit	Test 1				
		T1	T2	T3	T4	T5
EPRE ratio of PDCCH DMRS to SSS				0		
EPRE ratio of PDCCH to PDCCH DMRS	dB					

EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DM	RS to SSS	dB					
EPRE ratio of PDSCH to F	DSCH DMRS	dB					
EPRE ratio of OCNG DMR	RS to SSS	dB					
EPRE ratio of OCNG to O	CNG DMRS	dB					
SNR_SSB of set q ₀	Config 1, 4	dB	5	-3	-12	-12	-12
	Config 2, 5		5	-3	-12	-12	-12
	Config 3, 6		5	-3	-12	-12	-12
SNR_SSB of set q ₁	Config 1, 4	dB	-10	-10	10	10	10
	Config 2, 5		-10	-10	10	10	10
	Config 3, 6		-10	-10	10	10	10
SSB_RP of set q ₁	Config 1, 4	dBm/	-108	-108	-88	-88	-88
	Config 2, 5	SCS kHz	-108	-108	-88	-88	-88
	Config 3, 6		-105	-105	-85	-85	-85
N_{oc}	Config 1, 4	dBm/15			-98		
1 voc		KHz					
Config 2, 5			-98				
	Config 3, 6				-98		
Propagation condition		-		TDL-	C 300ns 10	00Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.4.5.5.2.1-4: Void

Table A.4.5.5.2.1-5: Void

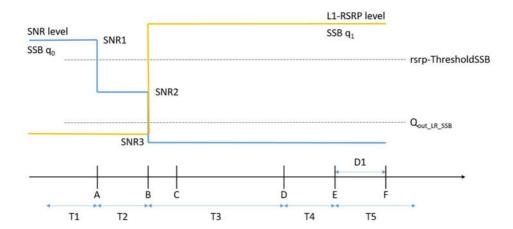


Figure A.4.5.5.2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.4.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 1920+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.5.3 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.4.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.3.1-1, A.4.5.5.3.1-2, and A.4.5.5.3.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.3.1-1 shows the variation of the downlink SNR of the PSCell and the SNR of the CSI-RS in set q_0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.4.5.5.3.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled.

Table A.4.5.5.3.1-1: Supported test configurations for FR1 PSCell

Configuration	Description				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: The UE is only required to pass in one of the supported test configurations in FR1					

Table A.4.5.5.3.1-2: General test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parame	eter	Unit	Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Active PSCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1, 4		FDD	
·	Config 2, 3, 5,		TDD	
	6			
BWchannel	Config 1, 4	MHz	10: NRB,c = 52	
	Config 2, 5		10: NRB,c = 52	
	Config 3, 6		40: NRB,c = 106	
DL initial BWP	Config 1, 2, 3,		DLBWP.0.1	
configuration	4, 5, 6			
DL dedicated BWP	Config 1, 2, 3,		DLBWP.1.1	
configuration	4, 5, 6			
UL initial BWP	Config 1, 2, 3,		ULBWP.0.1	
configuration	4, 5, 6			
UL dedicated BWP	Config 1, 2, 3,		ULBWP.1.1	
configuration	4, 5, 6			
TDD Configuration	Config 1, 4		Not Applicable	
	Config 2, 5		TDDConf.1.1	
	Config 3, 6		TDDConf.2.1	
RMSI CORESET	Config 1, 4		CR.1.1 FDD	A.3.1.2
Reference Channel				
	Config 2, 5		CR.1.1 TDD	
	Config 3, 6		CR.2.1 TDD	
Dedicated	Config 1, 4		CCR.1.1 FDD	A.3.1.3
CORESET				
Reference Channel				
	Config 2, 5		CCR.1.1 TDD	
	Config 3, 6		CCR.2.1 TDD	

		1		
SSB Configuration	Config 1, 4		SSB.3 FR1	A.3.10
	Config 2, 5		SSB.3 FR1	
	Config 3, 6		SSB.4 FR1	
SMTC Configuration	Config 1, 2, 4,		SMTC.1	A.3.11
3	5			
	Config 3, 6	 	SMTC.1	_
PDSCH/PDCCH	Config 1, 2, 4,		15 KHz	
	_		13 KHZ	
subcarrier spacing	5		00.1(1.1	
	Config 3, 6		30 KHz	
PRACH	Config 1, 2, 4,		FR1 PRACH	A.3.8.2
Configuration	5		configuration 4	
comgaration	Config 3, 6	+	FR1 PRACH	A.3.8.2
	Coming 5, 6		configuration 4	A.3.6.2
: DO II				
csi-RS-Index assigned			0	
failure detection RS in	ı set q ₀			
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	
Correlation Matrix and	d Antenna		2x2 Low	
Configuration				
Beam failure	DCI format		1-0	
detection	Number of		2	
			۷	
transmission	Control			
parameters	OFDM			
	symbols			
	Aggregation	CCE	8	
	level			
	Ratio of	dB	0	
	hypothetical			
	PDCCH RE			
	energy to			
	average CSI-			
	RS RE energy			
	Ratio of	dB	0	
	hypothetical			
	PDCCH			
	DMRS energy			
	to average			
	CSI-RS ŘE			
	energy			
	DMRS		REG bundle size	
	_		REG buildle size	
	precoder			
	granularity			
	REG bundle		6	
	size			
DRX			OFF	
Gap pattern ID			N.A.	
csi-RS-Index assigned	d as candidate		1	
beam detection RS in				
rlmInSyncOutOfSync			absent	When the field is
- , = ,			~~~ ~ · · · · ·	absent, the UE
				applies the value 0.
				(Table 8.1.1-1).
rorn ThrochaldCCD	Config 1 2 1	dDm/CCC	00	Threshold used for
rsrp-ThresholdSSB	Config 1, 2, 4,	dBm/SCS	-98	
	5	kHz		Qin_LR_SSB
	Config 3, 6		-95	
powerControlOffsetSS	3		db0	Used for deriving
				rsrp-ThresholdCSI-
				RS
beamFailureInstanceI	MaxCount		n1	see TS 38.321 [7],
	= - · · ·		• •	clause 5.17
		ll		0.0000 0.17

beamFailureDetection	nTimer		pbfd4	see TS 38.321 [7],
				clause 5.17
CSI-RS	Config 1, 4		CSI-RS.1.2 FDD	A.3.14
configuration for q ₀	Config 2, 5		CSI-RS.1.2 TDD	
and q ₁	Config 3, 6		CSI-RS.2.2 TDD	
CSI-RS	Config 1, 4		CSI-RS.1.1 FDD	A.3.14
configuration for	Config 2, 5		CSI-RS.1.1 TDD	
CSI reporting	Config 3, 6		CSI-RS.2.1 TDD	
TRS configuration	Config 1, 4		TRS.1.1 FDD	
	Config 2, 5		TRS.1.1 TDD	
	Config 3, 6		TRS.1.2 TDD	
csi-RS-Index	Config 1, 4		CSI-RS.1.2 FDD	A.3.14
assigned as RLM	Config 2, 5		CSI-RS.1.2 TDD	
RS	Config 3, 6		CSI-RS.2.2 TDD	
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time the the UE shall be fully synchronized to cell
T2		S	0.18	
T3		S	0.14	
T4	<u> </u>	S	0	
T5		S	0.08	
D1		S	0.04	
Note 1: UE-specific	c PDCCH is not tr	ansmitted aft	er T1 starts.	

Table A.4.5.5.3.1-3: Cell specific test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DN	IRS to SSS	dB		•	0		
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMF	RS to SSS	dB					
EPRE ratio of PBCH to PI	BCH DMRS	dB					
EPRE ratio of PSS to SSS	3	dB					
EPRE ratio of PDSCH DM	IRS to SSS	dB					
EPRE ratio of PDSCH to I	PDSCH DMRS	dB					
EPRE ratio of OCNG DMI	RS to SSS	dB					
EPRE ratio of OCNG to O	CNG DMRS	dB					
SNR_CSI-RS of set q ₀	Config 1, 4	dB	5	-3	-12	-12	-12
	Config 2, 5		5	-3	-12	-12	-12
	Config 3, 6		5	-3	-12	-12	-12
SNR_CSI-RS of set q ₁	Config 1, 4	dB	-10	-10	10	10	10
	Config 2, 5		-10	-10	10	10	10
	Config 3, 6		-10	-10	10	10	10
CSI-RS_RP of set q ₁	Config 1, 4	dBm/	-108	-108	-88	-88	-88
	Config 2, 5	SCS kHz	-108	-108	-88	-88	-88
	Config 3, 6		-105	-105	-85	-85	-85
Λ/ Config 1, 4		dBm/15	-98				
N_{oc}		KHz					
Config 2, 5					-98		
Config 3, 6					-98		
Propagation condition				TDL-	C 300ns 1	00Hz	

Note 1:	OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3:	NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4:	Void
Note 5:	The timers and layer 3 filtering related parameters are configured prior to the start of time period
	T1.
Note 6:	The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7:	SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.Note 8: The SNR
	in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure
	A.4.5.5.1.1-1.
Note 9:	The SNR values are specified for testing a UE which supports 2RX on at least one band. For
	testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

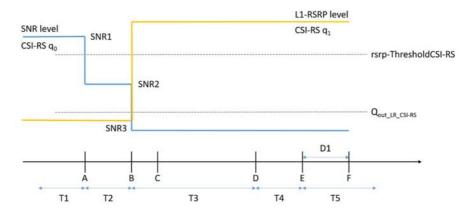


Figure A.4.5.5.3.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

A.4.5.5.3.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 30+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

Note:

A.4.5.5.4 EN-DC Beam Failure Detection and Link Recovery Test for FR1 PSCell configured with CSI-RS-based BFD and LR in DRX mode

A.4.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.4.5.5.4.1-1, A.4.5.5.4.1-2, A.4.5.5.4.1-3, and A.4.5.5.4.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.4.5.5.4.1-1 shows the variation of the downlink SNR of the PSCell and the SNR of the CSI-RS in set q_0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.4.5.5.4.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

ConfigurationDescription1LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode2LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode3LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode4LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode5LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode6LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.4.5.5.4.1-1: Supported test configurations for FR1 PSCell

Table A.4.5.5.4.1-2: General test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

The UE is only required to pass in one of the supported test configurations in FR1

Parameter		Unit	Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Active PSCell			Cell 2	
RF Channel Number			2	
Duplex mode	Config 1, 4		FDD	
	Config 2, 3, 5, 6		TDD	
BWchannel	Config 1, 4	MHz	10: NRB,c = 52	
	Config 2, 5		10: NRB,c = 52	
	Config 3, 6		40: NRB,c = 106	
DL initial BWP	Config 1, 2, 3,		DLBWP.0.1	
configuration	4, 5, 6			
DL dedicated BWP	Config 1, 2, 3,		DLBWP.1.1	
configuration	4, 5, 6			
UL initial BWP	Config 1, 2, 3,		ULBWP.0.1	
configuration	4, 5, 6			

UL dedicated BWP	Config 1, 2, 3,	1	ULBWP.1.1	
configuration	4, 5, 6		ULDVVP.1.1	
TDD Configuration	Config 1, 4		Not Applicable	
TDD Configuration			TDDConf.1.1	
	Config 2, 5 Config 3, 6		TDDConf.1.1	
DMCLCODECET				A 2 4 2
RMSI CORESET	Config 1, 4		CR.1.1 FDD	A.3.1.2
Reference	Cartin O. F		CD 4 4 TDD	
Channel	Config 2, 5		CR.1.1 TDD	
D !: 1 100DE0ET	Config 3, 6		CR.2.1 TDD	1010
Dedicated CORESET Reference	Config 1, 4		CCR.1.1 FDD	A.3.1.3
Channel	Config 2, 5		CCR.1.1 TDD	
	Config 3, 6		CCR.2.1 TDD	
SSB Configuration	Config 1, 4		SSB.3 FR1	A.3.10
OOD Configuration	Config 2, 5		SSB.3 FR1	A.J. 10
	Config 3, 6		SSB.4 FR1	
CMTC Configuration				A.3.11
SMTC Configuration	Config 1, 2, 4, 5		SMTC.1	A.3.11
	Config 3, 6		SMTC.1	
PDSCH/PDCCH	Config 1, 2, 4, 5		15 KHz	
subcarrier spacing	Config 3, 6		30 KHz	
PRACH Configuration	Config 1, 2, 4, 5		FR1 PRACH	A.3.8.2
3	3 , , , ,		configuration 4	
	Config 3, 6		FR1 PRACH	A.3.8.2
	• • • • • • • • • • • • • • • • • • •		configuration 4	7
csi-RS-Index assigned as b	neam failure		0	
detection RS in set q ₀			· ·	
OCNG parameters			OP.1	A.3.2.1
CP length			Normal	71.0.2.1
Correlation Matrix and Ante	anna Configuration		2x2 Low	
Correlation Matrix and Arte	erina Coringulation		ZXZ LUW	
Beam failure detection	DCI format		1-0	
transmission parameters	Number of		2	
'	Control OFDM			
	symbols			
	Aggregation	CCE	8	
	level	ID.	•	
	Ratio of	dB	0	
	hypothetical PDCCH RE			
	energy to			
	average CSI-RS			
	RE energy			
	Ratio of	dB	0	
	hypothetical	ا ا	· ·	
	PDCCH DMRS			
	energy to			
	average CSI-RS			
	RE energy DMRS precoder		REG bundle size	
	granularity		NEG DUHUIE SIZE	
	REG bundle		6	
	size		3	
DRX	1 0.20		DRX.7	A.3.3.7
Gap pattern ID			N.A.	
csi-RS-Index assigned as of	andidate heam		1	
detection RS in set q ₁			<u>'</u>	
rlmInSyncOutOfSyncThres	hold		absent	When the field is
_				absent, the UE
				applies the value
				0. (Table 8.1.1-1).
				/-

rsrp-ThresholdSSB		dBm	-98	Threshold used for
				Q _{in LR SSB}
powerControlOffsetSS			db0	Used for deriving
•				rsrp-ThresholdCSI-
				RS
beamFailureInstanceMa	beamFailureInstanceMaxCount		n1	see TS 38.321 [7],
				clause 5.17
beamFailureDetectionT	ïmer		pbfd4	see TS 38.321 [7],
				clause 5.17
CSI-RS configuration	Config 1, 4		CSI-RS.1.2 FDD	A.3.14
for q ₀ and q ₁	Config 2, 5		CSI-RS.1.2 TDD	
	Config 3, 6		CSI-RS.2.2 TDD	
CSI-RS configuration	Config 1, 4		CSI-RS.1.1 FDD	A.3.14
for CSI reporting	Config 2, 5		CSI-RS.1.1 TDD	
	Config 3, 6		CSI-RS.2.1 TDD	
TRS configuration	Config 1, 4		TRS.1.1 FDD	
	Config 2, 5		TRS.1.1 TDD	
	Config 3, 6		TRS.1.2 TDD	
csi-RS-Index	Config 1, 4		CSI-RS.1.2 FDD	A.3.14
assigned as RLM RS	Config 2, 5		CSI-RS.1.2 TDD	
	Config 3, 6		CSI-RS.2.2 TDD	
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time
				the the UE shall be
				fully synchronized
				to cell 1
T2		S	8.37	
T3		S	6.44	
T4		S	0	
T5		S	1.97	
D1		S	1.93	
Note 1: UE-specific F	PDCCH is not transm	itted after	T1 starts.	

Table A.4.5.5.4.1-3: Cell specific test parameters for FR1 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Test 1					
			T1	T2	Т3	T4	T5	
EPRE ratio of PDCCH DMRS to SSS		dB						
EPRE ratio of PDCCH to PDCCH DMRS		dB						
EPRE ratio of PBCH DMRS to SSS		dB						
EPRE ratio of PBCH to PBCH DMRS		dB						
EPRE ratio of PSS to SSS		dB			0			
EPRE ratio of PDSCH DMRS to SSS		dB						
EPRE ratio of PDSCH to PDSCH DMRS		dB						
EPRE ratio of OCNG DMRS to SSS		dB						
EPRE ratio of OCNG to OCNG DMRS		dB						
SNR_CSI-RS of set q ₀	Config 1, 4	dB	5	-3	-12	-12	-12	
	Config 2, 5		5	-3	-12	-12	-12	
	Config 3, 6		5	-3	-12	-12	-12	
SNR_CSI-RS of set q ₁	Config 1, 4	dB	-10	-10	10	10	10	
	Config 2, 5		-10	-10	10	10	10	
	Config 3, 6		-10	-10	10	10	10	
CSI-RS_RP of set q ₁	Config 1, 4	dBm/	-108	-108	-88	-88	-88	
	Config 2, 5	SCS kHz	-108	-108	-88	-88	-88	

		Config 3, 6		-105	-105	-85	-85	-85	
N_{oc}	N Config 1, 4		dBm/15	-98					
1 ^{0}c			KHz						
Config 2,		Config 2, 5		-98					
	Config 3, 6			-98					
Propagation condition				TDL-C 300ns 100Hz					
Note 1:	OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total								
	transmitted power spectral density is achieved for all OFDM symbols.								
Note 2:	The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.								
Note 3:	NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start								
	of time period T	1.							
Note 4:	Void								
Note 5:	The timers and layer 3 filtering related parameters are configured prior to the start of time period								
	T1.								
Note 6:	The signal contains PDCCH for UEs other than the device under test as part of OCNG.								
Note 7:	SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.								
Note 8:	The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3								
İ	respectively in fi								
Note 9:	The SNR values								
	testing of a UE v	which supports 4	4RX on all ba	nds, the SI	NR during T	3 is modifi	ed as spec	fied in	
	clause A.3.6.								

Table A.4.5.5.4.1-4: Void

Table A.4.5.5.4.1-5: Void

Table A.4.5.5.4.1-6: Void

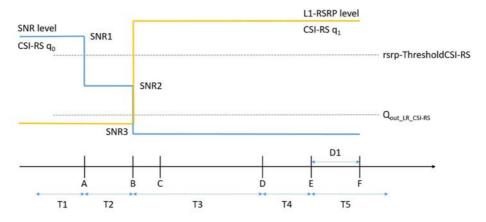


Figure A.4.5.5.4.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

A.4.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q₁.

No later than time point F occurring no later than D1 = 1920+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.6 Active BWP switch

A.4.5.6.1 DCI-based and Timer-based Active BWP Switch

A.4.5.6.1.1 E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC

A.4.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in TS38.133 clause 8.6, and interruption requirement for E-UTRA victim cell defined in TS36.133 clause 7.32.2.7. Supported test configurations are shown in Table A.4.5.6.1.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one PSCell (Cell 2) as given in Table A.4.5.6.1.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of PSCell is specified in Table A.4.5.6.1.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

Before the test starts,

- UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for PSCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PSCell.
- UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PSCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PSCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of PSCell's DL slot ($i+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell no later

than the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-2 starting from the first DL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay})$.

The starting time of E-UTRA PCell (Cell 1) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PSCell(Cell 2).

During T3,

The time period T3 starts from the slot #j, where j is the first slot of the subframe immediately after the *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of PSCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell at latest on the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from the first DL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay})$.

The starting time of E-UTRA PCell (Cell 1) interruption due to BWP switch of PSCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PSCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to E-UTRA PCell is carried out in the correct time span by monitoring ACK/NACK sent in E-UTRA PCell during BWP switch of PSCell, respectively.

Table A.4.5.6.1.1.1-1: DL BWP switch supported test configurations

Config		Description		
1		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3		LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6		LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations.		
Note 2:	A UF which fulfil	s the requirements in test case A.4.5.6.1.2 can skip the test cases in A.4.5.6.1.1.		

Table A.4.5.6.1.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		ı	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.

Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.4.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parame	ter	Unit	Cell 2
Frequency Range		1	FR1
Duplex mode	Config 1,4		FDD
Bupiex mode	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
122 configuration	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BW _{channel}	Config 1,4		10 MHz: N _{RB,c} = 52
DV V channel	Config 2,5		10 MHz: N _{RB,c} = 52
	Config 3,6	_	40 MHz: N _{RB,c} = 106
Active BWP ID	Coming 5,6		1, 2
Initial DL BWP			DLBWP.0.2 Note 4
Configuration	Config 1,4		DLBWP.U.Z
	Config 2,5		
	Config 3,6		
Active DL BWP-1 Configuration	Config 1,4		DLBWP.1.1 Note 4
	Config 2,5		
	Config 3,6		
Active DL BWP-2 Configuration	Config 1,4		DLBWP.1.3 Note 4
garation	Config 2,5		
	Config 3,6		
Initial UL BWP			ULBWP.0.2 Note 4
Configuration	Config 1,4		5-2 15.2
	Config 2,5		
	Config 3,6		
Active UL BWP-1 Configuration	Config 1,4		ULBWP.1.1 Note 4
	Config 2,5		
	Config 3,6		
Active UL BWP-2	Config 1,4		N/A
Configuration	Config 2,5		ULBWP.1.3 Note 4
3	Config 3,6		ULBWP.1.3 Note 4
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
	Config 3,6	1	SR.2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5	1	CR.1.1 TDD
	Config 3,6	1	CR.2.1 TDD
Dedicated CORESET	Config 1,4		CCR.1.2 FDD
parameters	Config 2,5	+	CCR.1.2 TDD
F 3	Config 3,6	+	CCR.2.4 TDD
OCNG Patterns	Joining 0,0	+	OP.1
SSB Configuration	Config 1,2,4,5	+	SSB.1 FR1
COD Comiguration	Config 1,2,4,5	+	SSB.2 FR1
SMTC Configuration	Corning 3,0		SMTC.1
Sivi 10 Configuration			SIVITO. I

Correlation Matrix and Antenna				1x2 Low
Configuration				
		Config 1,4		TRS.1.1 FDD
		Config 2,5		TRS.1.1 TDD
		Config 3,6		TRS.1.2 TDD
EPRE rat	tio of PSS to SS	S	dB	0
EPRE rat	tio of PBCH DM	RS to SSS		
EPRE rat	tio of PBCH to P	BCH DMRS		
EPRE rat	tio of PDCCH DI	MRS to SSS	1	
EPRE rat	tio of PDCCH to	PDCCH DMRS		
EPRE rat	tio of PDSCH DI	MRS to SSS		
EPRE rat	tio of PDSCH to	PDSCH		
	tio of OCNG DM	IRS to SSS(Note		
1)				
	tio of OCNG to 0	DCNG DMRS		
(Note 1)		T -		
N _{oc} Note 2		Config 1,2,4,5	dBm/SCS	-104
		Config 3,6		-101
N _{oc} Note 2	Noc ^{Note 2}		dBm/15kH	-104
00 000	Note 2	0 " 1015	Z	
SS-RSRF	Note 3	Config 1,2,4,5	dBm/SCS	-87
A //		Config 3,6	JD.	-84
Ê _s /I _{ot}			dB	17
Ê _s /N _{oc}			dB	17
10110100		Config 1,2,4,5	dBm/ 9.36MHz	-58.96
		-	dBm/	-52.86
		Config 3,6	38.16MHz	-32.80
Propagat	ion Condition	<u> </u>	JO. TOIVITIZ	AWGN
Note 1:		e used such that bo	th cells are full	y allocated and a constant
				ved for all OFDM symbols.
Note 2: Interference from other cells and n				
assumed to be constant over sub-				
AWGN of appropriate power for No				
Note 3: SS-RSRP and lo levels have been				
				ameters themselves.
Note 4:				an UL BWP. DLBWP.0.2 is
				h ULBWP.1.1; DLBWP.1.3 is
	linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].			

A.4.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PSCell from the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK/NACK for PSCell from the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+kI)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1, the start time of E-UTRA PCell interruption during PSCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start time of E-UTRA PCell interruption of during PSCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of E-UTRA PCell shall not be longer than the interruption duration specified for active BWP switch in TS36.133 Clause 7.32.2.7.

All of the above test requirements shall be fulfilled in order for the observed E-UTRA PCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+k1)$, $(j+T_{BWPswitchDelay}+k1)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.4.5.6.1.2 E-UTRAN – NR PSCell FR1 DL active BWP switch with FR1 SCell in non-DRX in synchronous EN-DC

A.4.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirements for NR victim cell defined in clause 8.2.1.2.7 and interruption requirement for E-UTRA victim cell defined in clause 7.32.2.7 of TS 36.133 [15]. Supported test configurations for LTE PCell and NR PSCell are shown in Table A.4.5.6.1.2.1-1. Supported test configurations for NR SCell are shown in table A.4.5.6.1.2.1-1A. Test configuration for LTE PCell and NR PSCell and test configuration for NR SCell are chosen independently.

The test scenario comprises of one E-UTRA PCell (Cell 1), one PSCell (Cell 2) and one SCell (Cell 3) as given in Table A.4.5.6.1.2.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of PSCell and SCell are specified in Table A.4.5.6.1.2.1-3 and Table A.4.5.6.1.2.1-4 below.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA PCell (Cell 1) and PSCell (Cell 2) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 3) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 3 and the time duration of T2.

Before the test starts,

- UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC), Cell 2 (PSCell) on radio channel 2 (PSCC) and Cell 3 (SCell) on radio channel 3 (SCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, BWP-1 and BWP-2, in Cell 3 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PSCell, BWP-0 in Cell 2 before starting the test.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in SCell.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-0 in PSCell.
- UE is configured with a *bwp-InactivityTimer* timer value for SCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of SCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PSCell no later than on the first UL slot that occurs after the beginning of slot $(i+T_{BWPswitchDelay}+k_1)$. The UE shall be continuously scheduled on SCell's BWP-2 starting from the first DL slot that occurs after the beginning of slot $(i+T_{BWPswitchDelay})$.

E-UTRA PCell(Cell 1) interruption due to BWP switch on PSCell shall occur within the BWP switch delay.

PSCell(Cell 2) interruption due to BWP switch on SCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on SCell(Cell 3).

During T3,

The time period T3 starts from the slot #j, where j is the first slot of the subframe immediately after bwp-InactivityTimer timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of SCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PSCell no later than on the first UL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay}+k_1)$. The UE shall be continuously scheduled on SCell's BWP-1 starting from the first DL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay})$.

E-UTRA PCell(Cell 1) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

PSCell(Cell 2) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to E-UTRA PCell and NR PSCell is carried out in the correct time span by monitoring ACK/NACK sent in E-UTRA PCell and PSCell during BWP switch of SCell, respectively.

Table A.4.5.6.1.2.1-1: DL BWP switch supported test configurations for LTE PCell and NR PSCell

Config		Description			
1		LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode			
2		LTE FDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode			
3		LTE FDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode			
4		LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode			
5		LTE TDD, NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode			
6		LTE TDD, NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode			
Note 1:	The UE is only	required to be tested in one of the supported test configurations			
Note 2:	A UE which ful	fils the requirements in test case A.4.5.6.1.2 can skip the test cases in A.4.5.6.1.1.			
Note 3:	Void				

Note 4: The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BW_{channel}) defined in each test configuration

Table A.4.5.6.1.2.1-1A: DL BWP switch supported test configurations for NR SCell

Configscell		Description			
1		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode			
2		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode			
3		NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode			
Note 1:	The UE is only required to be tested in one of the supported test configurations				
Note 2:	A UE which fulfils the requirements in test case A.4.5.6.1.2 can skip the test cases in A.4.5.6.1.1.				
Note 3:	The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band combinations which is composed of CCs ≥ the bandwidth (BW _{channel}) defined in each test configuration				

Table A.4.5.6.1.2.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		ľ	test
NR RF Channel Number		2, 3	Two NR radio channels are used for this
		2, 3	test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
Active SCell		Cell 3	SCell on RF channel number 3.
CP length		Normal	
DRX		OFF	
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	uБ	U	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	ub	O	
Cell-individual offset for cells	dB	0	Individual offset for cells on SCC.
on RF channel number 3	ub	0	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
Cell3 timing offset to cell2	μs	3	Synchronous cells
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.4.5.6.1.2.1-3: NR Cell specific test parameters for NR PSCell for DL BWP switch in synchronous EN-DC

Para	meter	Unit	Cell 2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable
	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BW _{channel}	Config 1,2,3,4,5,6		Note 7
BW _{occupied}	Config 1,2,4,5	RB	52 Note 5
	Config 3,6		106 Note 6
Active BWP ID			0
Initial DL BWP	Config 1,2,3,4,5,6		DLBWP.0.2
Configuration	Corning 1,2,3,4,5,6		
Active DL BWP-0 Configuration	Config 1,2,3,4,5,6		DLBWP.0.2

Active DL BWP-1	Config 1,2,3,4,5,6		N.A.
Configuration	Oomig 1,2,0,4,0,0		
Active DL BWP-2 Config 1,2,3,4,5,6			N.A.
Configuration			
Initial UL BWP	Config 1,2,3,4,5,6		ULBWP.0.2
Configuration			
Active UL BWP-0	Config 1,2,3,4,5,6		ULBWP.0.2
Configuration	0 " 100150		
Active UL BWP-1	Config 1,2,3,4,5,6		N.A.
Configuration Active UL BWP-2	Config 4 0 0 4 F C		N.A.
Configuration	Config 1,2,3,4,5,6		N.A.
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 1,4	-	SR.1.1 TDD
measurement channel	Config 2,5		SR.2.1 TDD
DMCLCODECET	Config 1,4		CR.1.1 FDD
RMSI CORESET		-	CR.1.1 TDD
parameters	Config 2,5		
D. II. / LOODESET	Config 3,6		CR.2.1 TDD
Dedicated CORESET	Config 1,4		CCR.1.2 FDD
parameters	Config 2,5		CCR.1.2 TDD
0010 5 #	Config 3,6		CCR.2.4 TDD
OCNG Patterns	Config 1,2,4,5	1	OP.1 Note 5
	Config 3,6		OP.1 Note 6
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
	Config 3,6		SSB.2 FR1
SMTC Configuration			SMTC.1
TRS Configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
Antenna Configuration			1x2
Propagation Condition			AWGN
EPRE ratio of PSS to SS	S	dB	0
EPRE ratio of PBCH DM	RS to SSS		
EPRE ratio of PBCH to P	BCH DMRS		
EPRE ratio of PDCCH DI	MRS to SSS		
EPRE ratio of PDCCH to	PDCCH DMRS		
EPRE ratio of PDSCH DI	MRS to SSS		
EPRE ratio of PDSCH to		1	
EPRE ratio of OCNG DM	IRS to SSS Note 1	1	
EPRE ratio of OCNG to 0	OCNG DMRS Note 1	1	
N _{oc} Note 2		dBm/15 kHz	-104
SS-RSRP Note 3		dBm/15 kHz	-87
Ês/Iot		dB	17
Ê _s /N _{oc}		dB	17
Io ^{Note3}	Config 1,2,4,5	dBm/9.36MHz	-58.96
	Config 3,6	dBm/38.16MHz	-52.86

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is
	assumed to be constant over subcarriers and time and shall be modelled as
	AWGN of appropriate power for N _{oc} to be fulfilled within BW _{occupied} .
Note 3:	SS-RSRP and lo levels have been derived from other parameters for
	information purposes. They are not settable parameters themselves.
Note 4:	For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is
	linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is
	linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].
Note 5:	All UL/DL transmission shall be confined within BW _{occupied} (i.e. 10 MHz, 52
	RBs) from F _{C,low} , and Io is independent of the BW _{channel} configured.
Note 6:	All UL/DL transmission shall be confined within BW _{occupied} (i.e. 40 MHz, 106
	RBs) from F _{C,low} , and Io is independent of the BW _{channel} configured.
Note 7:	NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured
	BWchannel.

Table A.4.5.6.1.2.1-4: NR Cell specific test parameters for NR SCell for DL BWP switch in synchronous EN-DC

Parame	ter	Unit	Cell 3
Frequency Range			FR1
Duplex mode	Configscell 1		FDD
	Configscell 2,3		TDD
TDD configuration	Configscell 1		Not Applicable
-	Configscell 2		TDDConf.1.1
	Configscell 3		TDDConf.2.1
BW _{channel}	Configscell 1,2,3		Note 7
BW _{occupied}	Configscell 1,2	RB	52 Note 5
·	Configscell 3		106 Note 6
Active BWP ID			1,2
Initial DL BWP	0		DLBWP.0.2
Configuration	Configscell 1,2,3		
Active DL BWP-0	0		N.A.
Configuration	Configscell 1,2,3		
Active DL BWP-1	Confin 400		DLBWP.1.3
Configuration	Config _{SCell} 1,2,3		
Active DL BWP-2	Confin 400		DLBWP.1.1
Configuration	Configscell 1,2,3		
Initial UL BWP	Configscell 1,2,3		N.A.
Configuration			
Active UL BWP-0	Config _{SCell} 1,2,3		N.A.
Configuration			
Active UL BWP-1	Configscell 1,2,3		N.A.
Configuration			
Active UL BWP-2	Config _{SCell} 1,2,3		N.A.
Configuration	0 " 1		00.44500
PDSCH Reference	Configscell 1	1	SR.1.1 FDD
measurement channel	ConfigsCell 2	1	SR.1.1 TDD
	Configscell 3		SR.2.1 TDD
RMSI CORESET	Config _{SCell} 1	_	CR.1.1 FDD
parameters	Configscell 2	_	CR.1.1 TDD
	Configscell 3		CR.2.1 TDD
Dedicated CORESET	Configscell 1		CCR.1.2 FDD
parameters	Configscell 2		CCR.1.2 TDD
	Configscell 3		CCR.2.4 TDD
OCNG Patterns	Config _{SCell} 1,2]	OP.1 Note 5

Ì		Configscell 3		OP.1 Note 6	
		ConfigsCell 1,2		SSB.1 FR1	
		ConfigsCell 3		SSB.2 FR1	
SMTC C	onfiguration	Connigscell 5		SMTC.1	
	figuration	Configee # 1		TRS.1.1 FDD	
TKS COII	iliguration	Configscell 1		TRS.1.1 TDD	
		Configscell 2			
At	O	Configscell 3		TRS.1.2 TDD	
	Configuration			1x2	
	ion Condition		ID.	AWGN	
	tio of PSS to SS		dB	0	
	tio of PBCH DM				
	tio of PBCH to F				
	tio of PDCCH D				
		PDCCH DMRS			
EPRE rat	tio of PDSCH DI	MRS to SSS			
	tio of PDSCH to				
		IRS to SSS Note 1			
EPRE rat	tio of OCNG to 0	OCNG DMRS Note 1			
N _{oc} Note 2			dBm/15 kHz	-104	
SS-RSRI	Note 3		dBm/15 kHz	-87	
Ês/Iot			dB	17	
Ês/Noc			dB	17	
Io ^{Note3}		Configscell 1,2	dBm/9.36MHz	-58.96	
		Configscell 3	dBm/38.16MHz	-52.86	
Note 1:	OCNG shall be	e used such that bot	h cells are fully allo	cated and a constant	
	total transmitte	ed power spectral de	ensity is achieved fo	r all OFDM symbols.	
Note 2:	Interference fr	om other cells and n	ioise sources not sp	ecified in the test is	
	assumed to be	e constant over subc	arriers and time and	d shall be modelled as	
	AWGN of app	ropriate power for N	oc to be fulfilled with	in BW _{occupied} .	
Note 3:	SS-RSRP and	I lo levels have beer	derived from other	parameters for	
	information pu	rposes. They are no	t settable paramete	rs themselves.	
Note 4:	For unpaired s	spectrum, a DL BWF	is linked with an U	L BWP. DLBWP.0.2 is	
linked with ULBWP.0.2; DLBWP.1.					
		BWP.1.3 defined in			
Note 5:	5: All UL/DL transmission shall be confined within BW _{occupied} (i.e. 10 N				
		ow, and lo is indepen			
Note 6:				upied (i.e. 40 MHz, 106	
NI-1 7		ow, and lo is indepen			
Note 7:		ved from Table 5.3.2	2-1 in 1538.101-1[2]	with configured	
<u> </u>	BWchannel.				

A.4.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for SCell on PSCell from the first UL slot that occurs after the beginning of DL slot ($i+T_{BWPswitchDelay}+k_1$).

During T3, the UE shall start to send the ACK/NACK for SCell on PSCell from the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+k_1)$.

Where, k_1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability bwp-SwitchingDelay [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed SCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1, the start of the interruption of E-UTRA PCell during SCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of E-UTRA PCell during SCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of E-UTRA PCell shall not be longer than the interruption duration specified for active BWP switch in clause 7.32.2.7 of TS 36.133 [15].

During T1, the start of the interruption of PSCell during SCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of PSCell during SCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PSCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.6.2.

All of the above test requirements shall be fulfilled in order for the observed E-UTRA PCell and PSCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+k_1)$, $(j+T_{BWPswitchDelay}+k_1)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.4.5.6.2 RRC-based Active BWP Switch

A.4.5.6.2.1 E-UTRAN – NR PSCell FR1 DL active BWP switch in non-DRX in synchronous EN-DC

A.4.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.3. Supported test configurations are shown in Table A.4.5.6.2.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1) and one PSCell (Cell 2) as given in Table A.4.5.6.2.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of PSCell are specified in Table A.4.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) and to Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PSCell).
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 of initial condition in PSCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side in PSCell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to receive PDSCH on PSCell from on the first DL slot that occurs after PSCell's DL slot i + $\frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length}$ as defined in clause 8.6.3 and starts to report valid ACK/NACK

for the PSCell from the first UL slot that occurs after the beginning of DL slot i \pm

 $\frac{T_{\text{RRCprocessingDelay}} + T_{\text{BWPswitchDelayRRC}}}{\text{NR Slot length}} + \text{k1. The UE shall be continuously scheduled on PSCell's BWP-1}$

starting from the first DL slot occurs after the beginnig of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR Slot length}$.

 $T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PSCell by counting the time from the time when the RRCReconfiguration message including updated BWP configuration is sent till the time when a vaild ACK/NACK is received.

Table A.4.5.6.2.1.1-1: DL BWP switch supported test configurations

Config	Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note 1: The UE is only required to be tested in one of the supported test configurations				

Table A.4.5.6.2.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		4	One E-UTRA radio channel is used for this
Number		'	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	s	0.2	

Table A.4.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Paran	neter	Unit	Cell 2
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
-	Config 2,3,5,6		TDD
TDD configuration	Config 1.4		Not Applicable

I		Config 2,5	٦	TDDConf.1.1
		Config 3,6	+	TDDConf.2.1
BWchannel		Config 1,4		10 MHz: N _{RB,c} = 52
DVVcnannei		Config 2,5	=	10 MHz: N _{RB,c} = 52
		Config 3,6	†	40 MHz: N _{RB,c} = 32
Active DL B	BWP ID	Coming 0,0		1
Initial DL B\		Config 1,4		DLBWP.0.2
Configuration		Config 2,5	1	323111.0.2
garan		Config 3,6	1	
Initial UL B\	ΝP	Config 1,4		ULBWP.0.2
Configuration	on	Config 2,5	1	
		Config 3,6	1	
Initial Condition	Active DL BWP-1 Configurat ion	Config 1,4		DLBWP.1.3
		Config 2,5	1	
		Config 3,6	1	
	Active UL	G ,		ULBWP.1.3
	BWP-1 Configurat ion	Config 1,4		
		Config 2,5	_	
		Config 3,6		
Final Condition	Active DL BWP-1 Configurat ion	Config 1,4		DLBWP.1.1
		Config 2,5		
		Config 3,6		
	Active UL BWP-1 Configurat ion	Config 1,4		ULBWP.1.1
		Config 2,5	1	
		Config 3,6	1	
PDSCH Re measureme		Config 1,4		SR.1.1 FDD
		Config 2,5		SR.1.1 TDD
		Config 3,6		SR.2.1 TDD
RMSI COR parameters		Config 1,4		CR.1.1 FDD
		Config 2,5	4	CR.1.1 TDD
5	2005057	Config 3,6		CR.2.1 TDD
Dedicated (parameters		Config 1,4		CCR.1.2 FDD
		Config 2,5		CCR.1.2 TDD
		Config 3,6		CCR.2.4 TDD
OCNG Patt		T = -:		OP.1
SSB Config	juration	Config 1,2,4,5	_	SSB.1 FR1
CMTC Confirmedia		Config 3,6		SSB.2 FR1
SMTC Configuration		0 "		SMTC.1
TRS Configuration		Config 1,4		TRS.1.1 FDD
		Config 2,5		TRS.1.1 TDD
Anton	oficureties	Config 3,6		TRS.1.2 TDD
Antenna Co				1x2
Propagation Condition EPRE ratio of PSS to SSS			40	AWGN
		to \$\$\$	dB	0
EPRE ratio of PBCH DMRS to SSS			_	I

EPRE ration	o of PBCH to PBC	H DMRS]				
EPRE ration	o of PDCCH DMR	S to SSS					
EPRE ration	o of PDCCH to PD	CCH DMRS	1				
EPRE ration	o of PDSCH DMR	S to SSS					
EPRE ration	o of PDSCH to PD	SCH]				
EPRE ration	o of OCNG DMRS	to SSS(Note 1)					
	o of OCNG to OCN	NG DMRS (Note 1)					
N _{oc} Note 2			dBm/15	-104			
			kHz				
SS-RSRI	Note 3		dBm/15	-87			
			kHz				
Ês/Iot			dB	17			
Ês/Noc			dB	17			
Io ^{Note3}		Config 1,2,4,5	dBm/	-58.96			
			9.36MHz				
		Confin 0.0	dBm/	-52.86			
		Config 3,6	38.16MHz				
Note 1:	OCNG shall be	e used such that bot	th cells are full	y allocated and a constant			
	total transmitte	ed power spectral de	ensity is achiev	ed for all OFDM symbols.			
Note 2:	Interference from	om other cells and r	noise sources r	not specified in the test is			
	assumed to be	constant over subc	carriers and tim	ne and shall be modelled			
	as AWGN of appropriate power for N₀c to be fulfilled.						
Note 3:	SS-RSRP and	lo levels have beer	derived from	other parameters for			
	information purposes. They are not settable parameters themselves.						
Note 4:	For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2						
		JLBWP.0.2; DLBWF					
	DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of						
	TS 38.213 [3].						
	[-].						

A.4.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant on PSCell from the first DL slot occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \ Slot \ length}$, and starts to report valid ACK/NACK for the PSCell from the first UL slot that occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \ Slot \ length} + k1$

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

A.4.5.7 PSCell addition and release delay

A.4.5.7.1 Addition and Release Delay of known NR PSCell

A.4.5.7.1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell addition and release delays under EN-DC are within the requirements stated in clause 7.31.2 [15] for the case when the PSCell is known by the UE at the time of addition.

Supported test configurations are shown in A.4.5.7.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.1-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.4.5.7.1.1-2 and cell-specific parameters in A.4.5.7.1.1-3 below. The test consists of five successive time periods with duration of T1, T2, T3, T4 and T5 respectively. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (NR PSCell) on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event B1 is configured for neighbour cell (Cell2). Before the start of T2 the UE is configured with the measurement gaps (gap pattern Id # 0). The Cell2 becomes known to the UE during T2. Therefore, during T2 the UE shall report Event B1. The point in time at which the RRC message to release measurement gap is transmitted from the test system defines the start of period T3. During T3, after measurement gap is released, the test system transmits the RRC message to the UE to add PSCell on radio channel 2.

The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of period T4.

The test system shall observe the periodic reporting of CSI for PSCell during T5. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of period T5.

The test system shall send a RRC message to the UE to release PSCell (Cell 2) on radio channel 2. The RRC message to release PSCell (Cell2) shall be sent to the UE during period T5, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to release PSCell (Cell2) is received at the UE antenna connector defines the start of period T6.

Configuration Description LTE FDD, NR SCS 15 kHz, BW 10 MHz, FDD LTE FDD, NR SCS 15 kHz, BW 10 MHz, TDD 2 3 LTE FDD, NR SCS 30 kHz, BW 40 MHz, TDD 4 LTE TDD, NR SCS 15 kHz, BW 10 MHz, FDD 5 LTE TDD, NR SCS 15 kHz, BW 10 MHz, TDD 6 LTE TDD, NR SCS 30 kHz, BW 40 MHz, TDD Note: The UE is only required to pass in one of the supported test configurations in FR1

Table A.4.5.7.1.1-1: Supported test configurations for FR1 PSCell

Table A.4.5.7.1.1-2: General Test Parameters for PSCell Addition and Release

Parameter	Parameter		Value	Comment	
RF Channel N	RF Channel Number		1, 2	Two radio channels are used for this test. One	
			1, 2	for E-UTRA cell and second for NR Cell	
Initial	Active PCell		Cell1	PCell on RF channel number 1.	
Condition	Neighbour cell		Cell2	Neighbour cell on RF channel number 2.	
Final	Active PCell		Cell1	PCell on RF channel number 1.	
Condition	Neighbour Cell		Cell2	PSCell released on RF channel number 2.	
B1	Hysteresis	dB	0	Hysteresis for evaluation of event B1.	
	Threshold	dBm	-96	Actual RSRP threshold for event B1. Needs to	
	RSRP			take absolute accuracy tolerance in clause	
	(Config 1,2,4,5)			9.11.1 of TS 36.133 [15] into account plus	
				margin.	
	Threshold	dBm	-93	Actual RSRP threshold for event B1. Needs to	
	RSRP			take absolute accuracy tolerance in clause	
	(Config 3,6)			9.11.1 of TS 36.133 [15] into account plus	
				margin.	

Time to Trigger	S	0	
DRX		OFF	Continuous monitoring of primary cell
Measurement gap pattern Id		0	Gaps are configured before T2 and released before T3.
PRACH configuration on cell2		FR1 PRACH configuration	Captured in A.3.8.2.1
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on primary component carrier.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on carrier frequency of cell2.
T1	s	1	During this time the PCell shall be known and cell2 shall be unknown.
T2	s	1.5	During this time the UE shall identify neighbour cell (cell2) and report event B1.
Т3	s	3	During this time the test system transmits the RRC messages to release measurement gap and add PSCell.
T4	S	0.5	During this time the UE adds the PSCell.
T5	s	0.5	During this time the UE sends CSI reports for PSCell.
T6	S	0.5	During this time the UE releases the PSCell.

Table A.4.5.7.1.1-3: Cell Specific Parameters for PSCell Addition and Release

Parameter	Unit	Config	Test				
Parameter		Config	T1	T2	Т3	T4	T5
E-UTRA RF Channel Number		1,2,3,4,5,6			1		
NR RF Channel Number		1,2,3,4,5,6			2		
TDD		1,4		No	ot Applicat	ole	
configuration		2,5		T	DDConf.1	.1	
		3,6		Т	DDConf.2	.1	
		1,4		10): N _{RB,c} = 5	52	
BW _{channel}	MHz	2,5		10): N _{RB,c} = 5	52	
		3,6	40: N _{RB,c} = 106				
Initial BWP		1,2,3	DLBWP.0.1				
Configuration		1,2,3	ULBWP.0.1				
Dedicated BWP		1,2,3	DLBWP.1.1				
Configuration		1,2,0	ULBWP.1.1				
PDSCH		1,4		5	R.1.1 FDI	D	
Reference		2,5		5	R.1.1 TDI	D	
measurement channel		3,6		5	R.2.1 TDI	D	
RMSI CORESET		1,4		C	R.1.1 FD	D	
Reference		2,5			R.1.1 TD	D	
Channel		3,6		(R.2.1 TD	D	
Dedicated		1,4		С	CR.1.1 FD	D	
CORESET		2,5		С	CR.1.1 TD	D	
Reference Channel		3,6		С	CR.2.1 TD	D	
OCNG Patterns		1,2,3,4,5,6			OP.1		
		1,2,4,5		,	SSB.1 FR	1	

000	I		1		
SSB		3,6		SSB.2 FR1	
configuration				OMTO 4	
SMTC		1,2,4,5		SMTC.1	
configuration		3,6		SMTC.1	
TRS		1,4		TRS.1.1 FDD	
Configuration		2,5		TRS.1.1 TDD	
_		3,6		TRS.1.2 TDD	
CSI-RS		1,4		CSI-RS.1.1 FDD	
configuration for		2,5		CSI-RS.1.1 TDD	
CSI reporting		3,6		CSI-RS.2.1 TDD	
reportConfigType		1,2,3,4,5,6		periodic	
reportQuantity		1,2,3,4,5,6		cri-RI-PMI-CQI	
CSI reporting		1,2,4,5		5	
periodicity	slot	3,6		10	
CSI reporting		1,2,4,5		2	
offset	slot	3,6		4	
EPRE ratio of		0,0			
PSS to SSS					
EPRE ratio of					
PBCH DMRS to					
SSS					
EPRE ratio of					
PBCH to PBCH					
DMRS					
EPRE ratio of					
PDCCH DMRS					
to SSS					
EPRE ratio of					
PDCCH to	dB	1,2,3,4,5,6		0	
PDCCH DMRS		1,2,0,1,0,0		ŭ	
EPRE ratio of					
PDSCH DMRS					
to SSS					
EPRE ratio of					
PDSCH to					
PDSCH					
EPRE ratio of					
OCNG DMRS to					
SSS(Note 1)					
EPRE ratio of					
OCNG to OCNG					
DMRS (Note 1)					
N Note2	dBm/15 kHz	1,2,3,4,5,6	N/A	-88	
$N_{oc}^{}$ Note2	UBIII/13 KHZ	1,2,3,4,5,0		-00	
$N_{oc}^{}$ Note2	dBm/SCS	1,2,4,5	N/A	-88	
1 voc	ubili/SCS	3,6	N/A	-85	
î /r		400450	indials.	0	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		1,2,3,4,5,6	-infinity	0	
\hat{E}_s/N_{oc}		1,2,3,4,5,6	-infinity	0	
SS-RSRP ^{Note3}		1,2,4,5	-infinity	-88	
	dBm/SCS	3,6	-infinity	-85	
Io ^{Note3}	dPm/0.26ML!-				
10	dBm/9.36MHz	1,2,4,5	N/A	-57	
	dBm/38.1MHz	3,6	N/A	-51	
Propagation		1,2,3,4,5,6		AWGN	
condition		,_,,,,,,,,,		,	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total
	transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate
	power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information
	purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference
	and noise at each receiver antenna nort

A.4.5.7.1.2 Test Requirements

The UE shall transmit the PRACH to PSCell no later than 82 ms^{Note1} from the start of T3.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T4.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T4

The UE shall stop sending CSI reports for PSCell no later than 20ms from the start of T5.

All the above test requirements shall be fulfilled in order for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

Note1: The PSCell addition delay can be expressed as follows as specified in clause 7.31.2 [15]:

$$T_{config_PSCell} = T_{RRC_delay} + T_{processing} + T_{search} + T_{\Delta} + T_{PSCell_DU} + 2msWhere:$$

 $T_{RRC_delay} = 20 \text{ms}$

 $T_{processing} = 20 ms$

 $T_{search} = 0$

 $T_{\Delta}\!=20ms$

 $T_{PSCell_DU} = 1*10+10 = 20ms$

A.4.6 Measurement procedure

A.4.6.1 Intra-frequency Measurements

A.4.6.1.1 EN-DC event triggered reporting tests without gap under non-DRX

A.4.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

A.4.6.1.1.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.1.2-1,

A.4.6.1.1.2-2, A.4.6.1.1.2-3 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.4.6.1.1.2-1: Supported test configurations

Config Description				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note 1: The UE is only required to be tested in one of the supported test configurations				
Note 2: Target NR Cell 3 has the same SCS. BW and duplex mode as NR serving Cell 2				

Table A.4.6.1.1.2-2: General test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1, 2, 3, 4, 5, 6	E-UTRAN Cell 1 and NR Cell 2	
Neighbour cell		1, 2, 3, 4, 5, 6	NR Cell 3	Cell to be identified.
RF Channel Number		1, 2, 3, 4, 5, 6	1: Cell 1 2: Cell 2 and Cell 3	
SSB configuration		1, 4 2, 5 3, 6	SSB.1 FR1 SSB.1 FR1 SSB.2 FR1	
SMTC configuration		1, 4 2, 5 3, 6	SMTC.2 SMTC.1 SMTC.1	
A3-Offset	dB	1, 2, 3, 4, 5, 6	-4.5	
CP length		1, 2, 3, 4, 5, 6	Normal	
Hysteresis	dB	1, 2, 3, 4, 5, 6	0	
Time To Trigger	S	1, 2, 3, 4, 5, 6	0	
Filter coefficient		1, 2, 3, 4, 5, 6	0	L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	N/A	OFF
Time offset between PCell and PSCell		1, 2, 3, 4, 5, 6	3 μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1, 4	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2, 5	3 μs	Synchronous cells
I		3, 6	3 μs	Synchronous cells

T1	s	1, 2, 3, 4, 5, 6	5	
T2	S	1, 2, 3, 4, 5, 6	5	

Table A.4.6.1.1.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1

Parameter	Unit	Test configuration	Се	II 2	Cell 3	
		3	T1	T2	T1	T2
TDD		1, 4	N	/A	N/A	
configuration		2, 5	TDDC	onf.1.1	TDDC	onf.1.1
· ·		3, 6	TDDC	onf.2.1	TDDConf.2.1	
PDSCH RMC		1, 4	SR.1.	1 FDD	N,	/A
configuration		2, 5	SR.1.	1 TDD		
· ·		3, 6	SR.2.	1 TDD	1	
RMSI CORESET		1, 4		1 FDD	N/A	
RMC		2, 5	CR.1.	1 TDD	N.	/A
configuration		3, 6		1 TDD	N.	/A
Dedicated		1, 4		.1 FDD		/A
CORESET RMC		2, 5		.1 TDD		/A
configuration		3, 6		.1 TDD		/A
OCNG Patterns		1, 2, 3, 4, 5, 6		2.1	OF	
TRS		1, 2, 3, 4, 5, 6		.1 FDD		/A
-			_			/A /A
configuration	-	2, 5		.1 TDD		/A /A
1 '6' 1 DW/D		3, 6		.2 TDD		
Initial BWP		1, 2, 3, 4, 5, 6	DLBWP.0.1		DLBWP.0.1	
configuration Active DL BWP		1, 2, 3, 4, 5, 6	ULBWP.0.1 DLBWP.1.1		ULBWP.0.1 DLBWP.1.1	
configuration		1, 2, 3, 4, 5, 6	DLBWP.1.1		DLDW	VP.1.1
Active UL BWP		1, 2, 3, 4, 5, 6	ULBWP.1.1		III RW	/P.1.1
configuration		1, 2, 0, 4, 0, 0	OLDV	v	OLDWI IIII	
RLM-RS		1, 2, 3, 4, 5, 6	SSB		SSB	
N_{oc} Note 2	dBm/SCS	1, 4			.98	-
		2, 5			·98	
		3, 6		-	·95	
$N_{oc}^{}$ Note 2	dBm/15 kHz	1, 4			·98	
		2, 5	1			
		3, 6	1			
$\hat{E}_{_{\!s}}/I_{_{\!ot}}$	dB	1, 4	4	-1.46	-Infinity	-1.46
		2, 5				
		3, 6 1, 4	<u> </u>			
\hat{E}_s/N_{oc}	dB	1, 4	4	4	-Infinity	4
		2, 5				
		3, 6				
SS-RSRP Note 3	dBm/SCS kHz	1, 4	-94	-94	94 -Infinity -	
		2, 5	-94	-94	-Infinity	-94
		3, 6	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1, 4	-64.60	-62.25	-64.60	-62.25
	dBm/9.36 MHz	2, 5	-64.60	-62.25	-64.60	-62.25
	dBm/38.16 MHz	3, 6	-58.50	-56.16	-58.50	-56.16

Propagat	tion		1, 2, 3, 4, 5, 6	AWGN			
Condition	า						
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period							
	T2.						
Note 2:	Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for						
	N_{oc} to I	oe fulfilled.					
Note 3:		P levels have been de ble parameters thems	•	meters for information purposes. They are			

A.4.6.1.1.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.1.2 EN-DC event triggered reporting tests without gap under DRX

A.4.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

A.4.6.1.2.2 Test parameters

Note 1:

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.2.1-1, A.4.6.1.2.1-2, A.4.6.1.2.1-3 and A.4.6.1.2.1-4 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode

Table A.4.6.1.2.2-1: Supported test configurations

The UE is only required to be tested in one of the supported test configurations

Note 2: Target NR Cell 3 has the same SCS, BW and duplex mode as NR serving Cell 2

Table A.4.6.1.2.2-2: General test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1 with DRX

Parameter	Unit	Test configur ation	Value		Comment
			Test 1	Test 2	
Active cell		1, 2, 3, 4, 5, 6	E-UTRAN Cell 1 and NR Cell 2		
Neighbour cell		1, 2, 3, 4, 5, 6		Cell 3	Cell to be identified.
RF Channel Number		1, 2, 3, 4, 5, 6	1: C 2: Cell 2 a	ell 1 and Cell 3	
SSB configuration		1, 4 2, 5 3, 6	SSB.	1 FR1 1 FR1 2 FR1	
SMTC configuration		1, 4 2, 5	SM	ΓC.2 ΓC.1	
A3-Offset	-ID	3, 6	SM	ΓC.1	
	dB	1, 2, 3, 4, 5, 6		.5	
CP length		1, 2, 3, 4, 5, 6		mal	
Hysteresis	dB	1, 2, 3, 4, 5, 6)	
Time To Trigger	S	1, 2, 3, 4, 5, 6		0	
Filter coefficient		1, 2, 3, 4, 5, 6)	L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	DRX.1	DRX.7	
Time offset between PCell and PSCell		1, 2, 3, 4, 5, 6		μs	Synchronous EN-DC
Time offset between serving and neighbour cells		1, 4	3 ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		2, 5	3 μs		Synchronous cells
	S	3, 6 1, 2, 3, 4,	3 μs 5		Synchronous cells
	3	5, 6			
T2	S	1, 2, 3, 4, 5, 6	5	10	

Table A.4.6.1.2.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for PSCell in FR1 with DRX

Parameter	Unit	Test configuration	Cell 2		Ce	ell 3
			T1	T2	T1	T2
TDD configuration		1, 4	, 4 N/A , 5 TDDConf.1.1		N/A TDDConf.1.1	
		2, 5				
		3, 6	TDDC	TDDConf.2.1		onf.2.1
PDSCH RMC		1, 4	SR.1.1 FDD		N	I/A
configuration		2, 5	SR.1	.1 TDD		

		3, 6	SR.2.	1 TDD	1			
RMSI CORESET		1, 4	CR.1.	1 FDD	N,	/A		
RMC		2, 5	CR.1.	1 TDD	N,	/A		
configuration		3, 6	CR.2.	1 TDD	N.	/A		
Dedicated		1, 4		.1 FDD	N.	/A		
CORESET RMC		2, 5		.1 TDD		/A		
configuration		3, 6		R.2.1 TDD N/A				
OCNG Patterns		1, 2, 3, 4, 5, 6		P.1	OP.1			
TRS		1, 4		.1 FDD		/A		
configuration		2, 5		.1 TDD		/A		
comigaration		3, 6		.2 TDD		/A		
Initial BWP		1, 2, 3, 4, 5, 6						
configuration		1, 2, 3, 4, 3, 0	DLBWP.0.1 DLBWP.0.1 ULBWP.0.1					
Active DL BWP		1, 2, 3, 4, 5, 6		VP.1.1	DLBW			
configuration		., _, 0, ., 0, 0	DESWITTEN					
Active UL BWP		1, 2, 3, 4, 5, 6	ULBWP.1.1 ULBWP.1.1			/P.1.1		
configuration								
RLM-RS		1, 2, 3, 4, 5, 6	SSB		SSB			
$N_{_{OC}}$ Note 2	dBm/SCS	1, 4	-98					
		2, 5		-98		98		
		3, 6			-95			
$N_{_{oc}}$ Note 2	dBm/15 kHz	1, 4		-	-98			
		2, 5						
		3, 6 1, 4		_				
$\mathbf{\hat{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$	dB	1, 4	4	-1.46	-Infinity	-1.46		
		2, 5						
		3, 6						
\hat{E}_s/N_{oc}	dB	1, 4	4	4	-Infinity	4		
		2, 5						
		3, 6						
SS-RSRP Note 3	dBm/SCS kHz	1, 4	-94	-94	-Infinity	-94		
		2, 5	-94	-94	-Infinity	-94		
		3, 6	-91	-91	-Infinity	-91		
lo	dBm/9.36 MHz	1, 4	-64.60	-62.25	-64.60	-62.25		
	dBm/9.36 MHz	2, 5	-64.60	-62.25	-64.60	-62.25		
	dBm/38.16 MHz	3, 6	-58.50	-56.16	-58.50	-56.16		
Propagation Condition		1, 2, 3, 4, 5, 6		A۷	VGN			

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.2.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.1.3 EN-DC event triggered reporting tests with per-UE gaps under non-DRX

A.4.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.4.6.1.3.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.3.1-1 and A.4.6.1.3.1-2 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note 1: The UE is	s only required to be tested in one of the supported test configurations		
Note 2: Target NR Cell 3 has the same SCS, BW and duplex mode as NR serving Cell 2			

Table A.4.6.1.3.2-1: Supported test configurations

Table A.4.6.1.3.2-2: General test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1, 2, 3, 4, 5, 6	E-UTRAN Cell 1 and NR Cell 2	
Neighbour cell		1, 2, 3, 4, 5, 6	NR Cell 3	Cell to be identified.
RF Channel Number		1, 2, 3, 4, 5, 6	1: Cell 1 2: Cell 2 and Cell 3	

Measurement gap type		1, 2, 3, 4,	Per-UE gaps	
Modediement gap type		5, 6	To or or gaps	
Measurement gap repitition	ms	1, 2, 3, 4,	40	
periodicity		5, 6		
Measurement gap length	ms	1, 2, 3, 4,	6	
		5, 6		
Measurement gap offset	ms	1, 2, 3, 4,	39	
000		5, 6	000 4 504	
SSB configuration		1, 4	SSB.1 FR1	
		2, 5	SSB.1 FR1	
CMTC coefiningtion		3, 6	SSB.2 FR1	
SMTC configuration		1, 4	SMTC.2	
		2, 5	SMTC.1	
001.00		3, 6	SMTC.1	
CSI-RS parameters		1, 4	CSI-RS.1.2 FDD resource #0	
		2, 5	CSI-RS.1.2 TDD resource #0	
10.0%	ID.	3, 6	CSI-RS.2.2 TDD resource #0	
A3-Offset	dB	1, 2, 3, 4,	-4.5	
CP length		5, 6 1, 2, 3, 4,	Normal	
CP length			Normai	
Hysteresis	dB	5, 6 1, 2, 3, 4,	0	
riysteresis	uБ	5, 6	0	
Time To Trigger	S	1, 2, 3, 4,	0	
Time to trigger	3	5, 6	· ·	
Filter coefficient		1, 2, 3, 4,	0	L3 filtering is not used
		5, 6	-	
DRX		1, 2, 3, 4,	N/A	OFF
		5, 6		
Time offset between PCell		1, 2, 3, 4,	3 μs	Synchronous EN-DC
and PSCell		5, 6		,
Time offset between serving		1, 4	3 ms	Asynchronous cells.
and neighbour cells				The timing of Cell 3 is 3ms
				later than the timing of Cell 2.
		2, 5	3 μs	Synchronous cells
		3, 6	3 μs	Synchronous cells
T1	s	1, 2, 3, 4,	5	
		5, 6		
T2	S	1, 2, 3, 4,	5	
		5, 6		

Table A.4.6.1.3.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1

Parameter	Unit	Test	Test Cell 2 Cell		II 3	
		configuration	T1	T2	T1	T2
TDD		1, 4	N	/A	N	/A
configuration		2, 5	TDDC	onf.1.1	TDDC	onf.1.1
		3, 6	TDDConf.2.1		TDDC	onf.2.1
PDSCH RMC		1, 4	SR.1.1 FDD N/A		/A	
configuration		2, 5	SR.1.1 TDD			
		3, 6	SR.2.	1 TDD		
RMSI CORESET		1, 4	CR.1.	1 FDD	N	/A
RMC		2, 5	CR.1.	1 TDD	N/A	
configuration		3, 6	CR.2.1 TDD		N	/A
Dedicated		1, 4	CCR.1.2 FDD N/A		/A	
CORESET RMC		2, 5	CCR.1	.2 TDD	N	/A

configuration		3, 6	CCR.2	.1 TDD	N,	/A
OCNG Patterns		1, 2, 3, 4, 5, 6	OI	P.1	OF	P.1
TRS		1, 4	TRS.1	.1 FDD	N,	/A
configuration		2, 5	TRS.1	.1 TDD	N/A	
		3, 6	TRS.1	.2 TDD	N.	/A
Initial BWP		1, 2, 3, 4, 5, 6	DLBV	VP.0.1	DLBW	/P.0.1
configuration			ULBV	√P.0.1	ULBW	/P.0.1
Active DL BWP		1, 2, 3, 4, 5, 6	DLBV	VP.1.2	DLBW	/P.1.1
configuration						
Active UL BWP configuration		1, 2, 3, 4, 5, 6	ULBV	VP.1.2	ULBW	/P.1.1
RLM-RS		1, 2, 3, 4, 5, 6 1, 4	CSI	-RS	SS	SB
N_{oc} Note 2	dBm/SCS	1, 4		-	98	
		2, 5	-98			
		3, 6	-95			
N_{oc} Note 2	dBm/15 kHz	3, 6 1, 4	-98			
		2, 5				
		3, 6 1, 4				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 4	4	-1.46	-Infinity	-1.46
		2, 5				
		3, 6				
\hat{E}_s/N_{oc}	dB	1, 4	4	4	-Infinity	4
		2, 5				
		3, 6	1			
SS-RSRP Note 3	dBm/SCS kHz	1, 4	-94	-94	-Infinity	-94
		2, 5	-94	-94	-Infinity	-94
		3, 6	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1, 4	-64.60	-62.25	-64.60	-62.25
	dBm/9.36 MHz	2, 5	-64.60	-62.25	-64.60	-62.25
	dBm/38.16 MHz	3, 6	-58.50	-56.16	-58.50	-56.16
Propagation Condition		1, 2, 3, 4, 5, 6		AV	VGN	

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.3.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.1.4 EN-DC event triggered reporting tests with per-UE gaps under DRX

A.4.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.4.6.1.4.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.4.2-1, A.4.6.1.4.2-2, A.4.6.1.4.2-3 A.4.6.1.4.2-4 and A.4.6.1.4.2-5 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.4.6.1.4.2-1: Supported test configurations

Config	Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mod				
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note 1: The UE is only required to be tested in one of the supported test configurations				
Note 2: Target NR Cell 3 has the same SCS, BW and duplex mode as NR serving Cell 2				

Table A.4.6.1.4.2-2: General test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1 with DRX

Parameter	Unit	Test configur ation	Value		Comment
			Test 1	Test 2	
Active cell		1, 2, 3, 4, 5, 6	E-UTRAN Cell 1 and NR Cell 2		
Neighbour cell		1, 2, 3, 4, 5, 6	NR Cell 3		Cell to be identified.
RF Channel Number		1, 2, 3, 4, 5, 6	1: Cell 1 2: Cell 2 and Cell 3		
Measurement gap type		1, 2, 3, 4, 5, 6	Per-UE gaps		
Measurement gap repitition periodicity	ms	1, 2, 3, 4, 5, 6		40	

Measurement gap length	ms	1, 2, 3, 4,		6	
Wododiement gap length	1110	5, 6		J	
Measurement gap offset	ms	1, 2, 3, 4,	;	39	
0.		5, 6			
SSB configuration		1, 4		.1 FR1	
		2, 5		.1 FR1	
		3, 6		.2 FR1	
SMTC configuration		1, 4		TC.2	
		2, 5		TC.1	
		3, 6		TC.1	
CSI-RS parameters		1, 4		DD resource #0	
		2, 5		DD resource #0	
		3, 6		DD resource #0	
A3-Offset	dB	1, 2, 3, 4,		4.5	
		5, 6			
CP length		1, 2, 3, 4,	No	rmal	
		5, 6			
Hysteresis	dB	1, 2, 3, 4,		0	
		5, 6			
Time To Trigger	S	1, 2, 3, 4,		0	
E'll an an afficient		5, 6		^	LO Citaria mia natura d
Filter coefficient		1, 2, 3, 4,		0	L3 filtering is not used
DRX		5, 6	DRX.1	DRX.7	
DRA		1, 2, 3, 4, 5, 6	DRA.1	DRX.7	
Time offset between PCell		1, 2, 3, 4,	2		Synchronous EN-DC
and PSCell		5, 6	3	μs	Synchionous EN-DC
Time offset between serving		1, 4	3	ms	Asynchronous cells.
and neighbour cells		1, 4		1113	The timing of Cell 3 is 3ms later
and neighboar conc					than the timing of Cell 2.
		2, 5	3	IIS	Synchronous cells
		3, 6	3 μs 3 μs		Synchronous cells
T1	S	1, 2, 3, 4,		μ3 5	Cynonicus cono
• •		5, 6			
T2	S	1, 2, 3, 4,	5	10	
		5, 6			

Table A.4.6.1.4.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting with per-UE gaps for PSCell in FR1 with DRX

Parameter	Unit	Test configuration	Cell 2		Cell 3	
			T1	T2	T1	T2
TDD		1, 4	N/	/A	N/A	
configuration		2, 5	TDDC	onf.1.1	TDDC	onf.1.1
		3, 6	TDDC	onf.2.1	TDDC	onf.2.1
PDSCH RMC		1, 4	SR.1.	1 FDD	N.	/A
configuration		2, 5	SR.1.1 TDD			
		3, 6	SR.2.1 TDD			
RMSI CORESET		1, 4	CR.1.	1 FDD	N,	/Α
RMC		2, 5	CR.1.	1 TDD	N,	/Α
configuration		3, 6	CR.2.	1 TDD	N,	/A
Dedicated		1, 4	CCR.1	.2 FDD	N,	/Α
CORESET RMC		2, 5	CCR.1.2 TDD N/A		/Α	
configuration		3, 6	CCR.2.1 TDD		N,	/A
OCNG Patterns		1, 2, 3, 4, 5, 6	OP.1 OP.1		P.1	
TRS		1, 4	TRS.1.	.1 FDD	N,	/A

configuration		2, 5	TRS.1.1 TDD N/A		/A	
g		3, 6	TRS.1	.2 TDD	N,	/A
Initial BWP		1, 2, 3, 4, 5, 6	DLBV	VP.0.1	DLBW	/P.0.1
configuration		., _, 0, ., 0, 0	ULBWP.0.1 ULBWP.0.1			
Active DL BWP		1, 2, 3, 4, 5, 6	DLBV	VP.1.2	DLBW	
configuration		, , , , ,				
Active UL BWP		1, 2, 3, 4, 5, 6	ULBV	VP.1.2	ULBW	/P.1.1
configuration						
RLM-RS		1, 2, 3, 4, 5, 6	CSI	-RS	SS	SB
$N_{oc}^{}$ Note 2	dBm/SCS	1, 4		-	-98	
		2, 5		-	-98	
		3, 6			-95	
N_{oc} Note 2	dBm/15 KHz	1, 4	-98			
		2, 5				
		3, 6				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 4	4	-1.46	-Infinity	-1.46
		2, 5				
		3, 6 1, 4				
\hat{E}_s/N_{oc}	dB	1, 4	4	4	-Infinity	4
		2, 5	1			
		3, 6	1			
SS-RSRP Note 3	dBm/SCS KHz	1, 4	-94	-94	-Infinity	-94
		2, 5	-94	-94	-Infinity	-94
		3, 6	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1, 4	-64.60	-62.25	-64.60	-62.25
	dBm/9.36 MHz	2, 5	-64.60	-62.25	-64.60	-62.25
	dBm/38.16 MHz	3, 6	-58.50	-56.16	-58.50	-56.16
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN			
NI / A TI						

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.4.3 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.1.5 EN-DC event triggered reporting tests without gap under non-DRX with SSB index reading

A.4.6.1.5.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

A.4.6.1.5.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for FDD PSCell are given in Table A.4.6.1.5.1-1 and A.4.6.1.5.1-2 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.4.6.1.5.2-1: Supported test configurations

	Config	Description				
1 L		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
Note 1:	The UE is only required to be tested in one of the supported test configurations					
Note 2:	Target NR Cell 3 has the same SCS, BW and duplex mode as NR serving Cell 2					

Table A.4.6.1.5.2-2: General test parameters for EN-DC intra-frequency event triggered reporting without gap for FDD PSCell in FR1 with SSB index reading

Parameter	Unit	Test	Value	Comment
		configur		
		ation		
Active cell		1, 2	E-UTRAN Cell 1 and NR	
			Cell 2	
Neighbour cell		1, 2	NR Cell 3	Cell to be identified.
RF Channel Number		1, 2	1: Cell 1	
			2: Cell 2 and Cell 3	
SSB configuration		1, 2	SSB.1 FR1	
SMTC configuration		1, 2	SMTC.2	
A3-Offset	dB	1, 2	-4.5	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	S	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	N/A	OFF
Time offset between PCell		1, 2	3 μs	Synchronous EN-DC
and PSCell			•	
Time offset between serving		1, 2	3 ms	Asynchronous cells.
and neighbour cells				The timing of Cell 3 is 3ms later
				than the timing of Cell 2.
T1	S	1, 2	5	
T2	s	1. 2	5	

Table A.4.6.1.5.1-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting without gap for FDD PSCell in FR1 with SSB index reading

Parameter	Unit	Test configuration	Cell 2		Cell 3	
		_	T1	T2	T1	T2
TDD configuration		1, 2	N	/A	N/A	
PDSCH RMC configuration		1, 2		1 FDD		/A
RMSI CORESET RMC configuration		1, 2	CR.1.	1 FDD	N.	/A
Dedicated CORESET RMC configuration		1, 2	CCR.1	.1 FDD	N.	/A
OCNG Patterns		1, 2		P.1	OF	P.1
TRS configuration		1, 2	TRS.1.1 FDD		N/A	
Initial BWP configuration		1, 2	DLBWP.0.1 ULBWP.0.1		DLBWP.0.1 ULBWP.0.1	
Active DL BWP configuration		1, 2	DLBWP.1.1		DLBWP.1.1	
Active UL BWP configuration		1, 2	ULBV	VP.1.1	ULBWP.1.1	
RLM-RS		1, 2	SS	SB	SSB	
$N_{oc}^{}$ Note 2	dBm/SCS	1, 2 1, 2	-98			
N_{oc} Note 2	dBm/15 kHz	1, 2	-98			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 2	4	-1.46	-Infinity	-1.46
\hat{E}_s/N_{oc}	dB	1, 2	4	4	-Infinity	4
SS-RSRP Note 3	dBm/SCS kHz	1, 2	-94	-94	-Infinity	-94
lo	dBm/9.36 MHz	1, 2	-64.60	-62.25	-64.60	-62.25
Propagation Condition		1, 2 1, 2	AWGN			

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.5.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.1.6 EN-DC event triggered reporting tests with SSB index reading with per-UE gaps

A.4.6.1.6.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.4.6.1.6.2 Test parameters

Three cells are deployed in the test, which are E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters for PSCell are given in Table A.4.6.1.6.2-1 A.4.6.1.6.2-2 and A.4.6.1.6.2-3 below and the test parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Table A.4.6.1.6.2-1: Supported test configurations

	Config	Description				
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
Note 1:	The UE is only required to be tested in one of the supported test configurations					
Note 2:	Target NR Cell 3 has the same SCS, BW and duplex mode as NR serving Cell 2					

Table A.4.6.1.6.2-2: General test parameters for EN-DC intra-frequency event triggered reporting with gap for PSCell in FR1 with SSB index reading

Parameter	Unit	Test	Value	Comment
		configur ation		
Active cell		1, 2	E-UTRAN Cell 1 and NR Cell	
Active cell		1, 2	2	
Neighbour cell		1, 2	NR Cell 3	Cell to be identified.
RF Channel Number		1, 2	1: Cell 1	
			2: Cell 2 and Cell 3	
Measurement gap type		1, 2	Per-UE gaps	
Measurement gap repitition periodicity	ms	1, 2	40	
Measurement gap length	ms	1, 2	6	
Measurement gap offset	ms	1, 2	39	
SSB configuration		1, 2	SSB.1 FR1	
SMTC configuration		1, 2	SMTC.2	
CSI-RS parameters		1, 2	CSI-RS.1.2 FDD resource #0	
A3-Offset	dB	1, 2	-4.5	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	S	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	N/A	OFF
Time offset between PCell and PSCell		1, 2	3 μs	Synchronous EN-DC

Time offset between serving and neighbour cells		1, 2	3 ms	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
T1	S	1, 2	5	
T2	S	1, 2	5	

Table A.4.6.1.6.2-3: NR Cell specific test parameters for EN-DC intra-frequency event triggered reporting with gap for PSCell in FR1 with SSB index reading

Parameter	Unit	Test	Cell 2 T1 T2		Cell 3		
		configuration			T1 T2		
TDD configuration		1, 2	N	N/A N/A			
PDSCH RMC		1, 2 1, 2	SR.1.	1 FDD	N.	/A	
configuration							
RMSI CORESET		1, 2	CR.1.	1 FDD	N/A		
RMC							
configuration							
Dedicated		1, 2	CCR.1	.2 FDD	N.	/A	
CORESET RMC							
configuration							
OCNG Patterns		1, 2	_	P.1	OF		
TRS configuration		1, 2	TRS.1.1 FDD		N/A		
Initial BWP		1, 2		√P.0.1	DLBWP.0.1		
configuration				ULBWP.0.1		ULBWP.0.1	
Active DL BWP		1, 2	DLBWP.1.2		DLBWP.1.1		
configuration							
Active UL BWP		1, 2	ULBV	ULBWP.1.2		ULBWP.1.1	
configuration							
RLM-RS		1, 2 1, 2	CSI	CSI-RS S			
$N_{_{OC}}$ Note 2	dBm/SCS	1, 2	-98				
$N_{_{oc}}$ Note 2	dBm/15 kHz	1, 2	-98				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1, 2	4	-1.46	-Infinity	-1.46	
\hat{E}_s/N_{oc}	dB	1, 2	4	4	-Infinity	4	
SS-RSRP Note 3	dBm/SCS kHz	1, 2	-94	-94 -94		-94	
lo	dBm/9.36 MHz	1, 2 1, 2	-64.60	-62.25	-Infinity -64.60	-62.25	
Propagation		1, 2	AWGN				
Condition							

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.1.6.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.2 Inter-frequency Measurements

A.4.6.2.1 EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX is not used

A.4.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.1.1-1, A.4.6.2.1.1-2, and A.4.6.2.1.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.1.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.4.6.2.1.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.1.1-1.

Table A.4.6.2.1.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

Conf	fig	Description				
1		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duple		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
6	6 LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mod					
Note 1: The	The UE is only required to be tested in one of the supported test configurations					
Note 2: targ	target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2					

Table A.4.6.2.1.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Value		Comment		
		configurati	Test 1 Test 2				
		on					
E-UTRA RF Channel		Config	1		One E-UTRAN carrier frequencies		
Number		1,2,3,4,5,6			is used.		
NR RF Channel		Config	1,	2	Two FR1 NR carrier frequencies is		
Number		1,2,3,4,5,6			used.		

Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (PCell) and NR cell 2 (PScell)		LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.		
Neighbour cell		Config 1,2,3,4,5,6	NR (cell 3	NR cell 3 is on NR RF channel number 2.		
Gap Pattern Id		Config 1,2,3,4,5,6	0	4	As specified in clause 9.1.2-1.		
Measurement gap offset		Config 1,2,3,4,5,6	9	9			
A3-Offset	dB	Config 1,2,3,4,5,6	-	6			
Hysteresis	dB	Config 1,2,3,4,5,6	()			
CP length		Config 1,2,3,4,5,6	Normal				
TimeToTrigger	s	Config 1,2,3,4,5,6	0				
Filter coefficient		Config 1,2,3,4,5,6	0		L3 filtering is not used		
DRX		Config 1,2,3,4,5,6	OFF		DRX is not used		
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs		Synchronous EN-DC		
Time offset between serving and neighbour cells		Config 1,4	3 ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.		
		Config 2,3,5,6	3 μs		Synchronous cells.		
T1	S	Config 1,2,3,4,5,6	5				
T2	S	Config 1,2,3,4,5,6	1	1			

Table A.4.6.2.1.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Cell 2		Cell 3		
		configuratio	T1	T2	T1	T2	
		n					
NR RF Channel Number		Config	1		2		
		1,2,3,4,5,6					
Duplex mode		Config 1,4		FDD			
		Config		T	DD		
		2,3,5,6					
BW _{channel}	MHz	Config 1,4		10: N _{RB,c} = 52			
		Config 2,5	10: N _{RB,c} = 52				
		Config 3,6	40: $N_{RB,c} = 106$				
BWP BW	MHz	Config 1,4	10: N _{RB,c} = 52				
		Config 2,5		10: N _R	B,c = 52		
		Config 3,6		40: N _{RB,c} = 106			
TDD configuration		Config 2,5	TDDC	onf.1.1	TDD	Conf.1.1	
		Config 3,6	TDDC	onf.2.1	TDD	Conf.2.1	
Initial DL BWP		Config	DLBV	VP.0.1		NA	
		1,2,3,4,5,6					
Initial UL BWP		Config	ULBWP.0.1 NA		NA		
		1,2,3,4,5,6					

Dedicated DL BWP		Config	DLB\	WP.1.1		NA	
Dedicated UL BWP		1,2,3,4,5,6 Config	ULB\	WP.1.1		NA	
		1,2,3,4,5,6					
TRS configuration		Config 1,4	TRS.1.1 FDD		NA		
		Config 2,5		S.1.1 TDD		NA	
00100		Config 3,6		.2 TDD	NA OD 4		
OCNG Patterns defined in		Config 1,2,3,4,5,6	O	P.1		OP.1	
A.3.2.1.1 (OP.1) PDSCH Reference			CD 4	4 EDD			
measurement channel		Config 1,4		1 FDD			
		Config 2,5		.1 TDD			
D140100DE0EED /		Config 3,6		1 TDD			
RMSI CORESET Reference Channel		Config 1,4		.1 FDD		-	
Charmer		Config 2,5		CR.1.1 TDD			
D. II. / LOODESET		Config 3,6	CR2.	1 TDD			
Dedicated CORESET Reference Channel		Config 1,4		I.1 FDD			
		Config 2,5		I.1 TDD			
CCD managed to the		Config 3,6		2.1 TDD	007	0 F FD4	
SSB parameters		Config 1,4 Config 2,5		1 FR1 1 FR1		B.5 FR1 B.5 FR1	
		Config 2,5					
SMTC configuration defined in A.3.11		Config 1,4	SSB.2 FR1 SMTC.2		SSB.6 FR1 SMTC.5		
		Config 2,3,5,6	SMTC.1		SMTC.4		
PDSCH/PDCCH subcarrier	kHz	Config		45			
spacing		1,2,4,5		· · · · · ·	15		
		Config 3,6	30				
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS							
to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS							
to SSS							
EPRE ratio of PDCCH to		Config		_			
PDCCH DMRS		1,2,3,4,5,6		0	0		
EPRE ratio of PDSCH DMRS							
to SSS EPRE ratio of PDSCH to							
PDSCH							
EPRE ratio of OCNG DMRS							
to SSS(Note 1) EPRE ratio of OCNG to							
OCNG DMRS (Note 1)							
Note2	dBm/15 kHz		-98		-98		
Note2 N _{oc}	dBm/S	Config	-	98	-98		
1. voc	CS	1,2,4,5					
		Config 3,6	-95			-95	
SS-RSRP Note 3	dBm/S	Config	-94	-94	-Infinity	-91	
	CS	1,2,4,5	04	04	In Electric	00	
Ê s /I ot	dB	Config 3,6 Config	-91 4	-91 4	-Infinity -Infinity	-88 7	
		1,2,3,4,5,6	-	·	_	•	
\hat{E}_{s}/N_{oc}	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7	

Io ^{Note3}		dBm/9.	Config	-64.59	-64.59	-70.05	-62.26
		36MHz	1,2,4,5				
		dBm/38	Config 3,6	-58.49	-58.49	-63.94	-56.15
		.16MHz					
Propagat	ion Condition		Config		AW	/GN	
			1,2,3,4,5,6				
Note 1:	OCNG shall be used	such that b	oth cells are full	ly allocated a	and a constan	t total trans	mitted power
	spectral density is ac	hieved for a	all OFDM symbo	ols.			
Note 2:	Interference from oth	er cells and	noise sources	not specified	I in the test is	assumed to	be constant
	over subcarriers and	time and s	hall be modelled	l as AWGN o	of appropriate	power for ,	√ to be
	fulfilled.						· oc
Note 3:	SS-RSRP and lo lev	els have be	en derived from	other param	neters for infor	mation pure	ooses. They
	are not settable para			zanza paran			
Note 4:	SS-RSRP minimum			assuming ind	dependent int	erference a	nd noise at

A.4.6.2.1.2 **Test Requirements**

each receiver antenna port.

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 760 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.2.2 EN-DC event triggered reporting tests for FR1 cell without SSB time index detection when DRX is used

A.4.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.2.1-1, A.4.6.2.2.1-2, and A.4.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.2.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.4.6.2.2.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.2.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.4.6.2.2.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

	Config	Description					
1		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
	6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note 1: The UE is only required to be tested in one of the supported test configurations							
Note 2: target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2							

Table A.4.6.2.2.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Value			Comment						
		configurati	Test	Test	Test Test Test							
		on	1 2 3 4		4							
E-UTRA RF Channel		Config			1		One E-UTRAN carrier frequencies					
Number		1,2,3,4,5,6					is used.					
NR RF Channel		Config		1,	, 2		Two FR1 NR carrier frequencies is					
Number		1,2,3,4,5,6					used.					
A - (' II		0 6'	1.75	0-114 /5	20 - 11)	LND	LTE Out 4 is an ELITPA DE					
Active cell		Config	LIE	Cell 1 (F		ia ink	LTE Cell 1 is on E-UTRA RF					
		1,2,3,4,5,6		cell 2 (PScell)		channel number 1.					
							NR Cell 2 is on NR RF channel					
NI-2-delice con a di		0 ("		ND	11 0		number 1.					
Neighbour cell		Config		NK (cell 3		NR cell 3 is on NR RF channel					
Gap Pattern Id		1,2,3,4,5,6	.	0	1	4	number 2. As specified in clause 9.1.2-1.					
Gap Pattern Id		Config	(J	1	4	As specified in clause 9.1.2-1.					
Management		1,2,3,4,5,6			.							
Measurement gap		Config	3	9	,	9						
offset	-ID	1,2,3,4,5,6										
A3-Offset	dB	Config		-	6							
	ID.	1,2,3,4,5,6										
Hysteresis	dB	Config		(0							
OD to south		1,2,3,4,5,6		NI								
CP length		Config		ION	mal							
		1,2,3,4,5,6										
TimeToTrigger	s	Config		(0							
E:14 (6: 1		1,2,3,4,5,6					10.5%					
Filter coefficient		Config		(0		L3 filtering is not used					
227		1,2,3,4,5,6										
DRX	ms	Config	DRX				As specified in clause A.3.3					
T' (())		1,2,3,4,5,6	.1 .7 .1 .7		./							
Time offset between		Config	3 µs			Synchronous EN-DC						
PCell and PSCell		1,2,3,4,5,6										
Time offset between		Config 1,4	3ms		3ms Asynchronous cells.		Asynchronous cells.					
serving and neighbour			1			The timing of Cell 3 is 3ms later						
cells							than the timing of Cell 2.					

		Config 2,3,5,6	3µs			Synchronous cells.	
T1	s	Config 1,2,3,4,5,6	5				
T2	S	Config 1,2,3,4,5,6	1.1 11 1.1 11		11		

Table A.4.6.2.2.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Cell 2			Cell 3
		configuratio	T1	T2	T1	T2
		n				
NR RF Channel Number		Config	1		2	
Durales, reade		1,2,3,4,5,6				
Duplex mode		Config 1,4 Config			FDD TDD	
		2,3,5,6			טטו	
BWchannel	MHz	Config 1,4		10· N	N _{RB,c} = 52	
D V V Chammer	1411.12	Config 2,5			$N_{RB,c} = 52$	
		Config 3,6			RB,c = 106	
BWP BW	MHz	Config 1,4			$N_{RB,c} = 52$	
		Config 2,5			$N_{RB,c} = 52$	
		Config 3,6		40: N	RB,c = 106	
TDD configuration		Config 2,5	TDDC	onf.1.1	TD	DConf.1.1
		Config 3,6	TDDC	onf.2.1	TD	DConf.2.1
Initial DL BWP		Config	DLBW	/P.0.1		NA
		1,2,3,4,5,6				
Initial UL BWP		Config	ULBWP.0.1		NA	
		1,2,3,4,5,6				
Dedicated DL BWP		Config	DLBWP.1.1		NA	
		1,2,3,4,5,6				
Dedicated UL BWP		Config	ULBW	/P.1.1		NA
		1,2,3,4,5,6				
TRS configuration		Config 1,4	TRS.1.			NA
		Config 2,5	TRS.1.			NA
		Config 3,6	TRS.1.	2 TDD		NA
OCNG Patterns defined in		Config	OF	P.1		OP.1
A.3.2.1.1 (OP.1)		1,2,3,4,5,6				
PDSCH Reference		Config 1,4	SR.1.	1 FDD		
measurement channel		Config 2,5	SR.1.	1 TDD		
		Config 3,6	SR2.1	TDD		
RMSI CORESET Reference		Config 1,4	CR.1.	1 FDD		-
Channel		Config 2,5	CR.1.		-	
		Config 3,6	CR2.1		1	
		Config 1,4	CCR.1		†	
Dedicated CORESET Reference Channel		Config 2,5	CCR.1			
. to. or		Config 3,6	CCR.2.1 TDD			
SSB parameters		Config 1,4	SSB.		SS	SB.5 FR1
,		Config 2,5	SSB.1 FR1		SSB.5 FR1	
		Config 3,6	SSB.2	2 FR1	SS	SB.6 FR1

SMTC configuration defined in A.3.11		Config 1,4	SM	ΓC.2	SM	TC.5	
		Config 2,3,5,6	SM	ΓC.1	SMTC.4		
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2,4,5			15		
		Config 3,6			30		
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2,3,4,5,6	(0		0	
EPRE ratio of PDSCH DMRS to SSS		, , , , ,					
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
Note2 N_{oc}	dBm/15 kHz			98	-98		
Note2	dBm/S CS	Config 1,2,4,5		98	-98		
		Config 3,6		95		95	
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	-94	-94	-Infinity	-91	
		Config 3,6	-91	-91	-Infinity	-88	
Ê , /I ot	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7	
\hat{E}_{s}/N_{oc}	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7	
Io ^{Note3}	dBm/9. 36MHz	Config 1,2,4,5	-64.59	-64.59	-70.05	-62.26	
	dBm/38 .16MHz	Config 3,6	-58.49	-58.49	-63.94	-56.15	
Propagation Condition		Config 1,2,3,4,5,6		A	WGN		

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.4.6.2.2.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered

measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

- A.4.6.2.3 Void
- A.4.6.2.4 Void
- A.4.6.2.5 EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is not used

A.4.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.5.1-1, A.4.6.2.5.1-2, and A.4.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.4.6.2.5.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.5.1-1.

Table A.4.6.2.5.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

Config	Description						
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode						
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode						

Γ		3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Γ		4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
Γ	5		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
Γ	6		LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Γ	Note 1: The UE is only required to be tested in one of the supported test configurations						
	Note 2: target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2						

Table A.4.6.2.5.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel		Config		1	One E-UTRAN carrier frequencies
Number		1,2,3,4,5,6			is used.
NR RF Channel Number		Config 1,2,3,4,5,6	1,	2	Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (PCell) and NR cell 2 (PScell)		LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3,4,5,6	NR (cell 3	NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3,4,5,6	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3,4,5,6	9	9	
A3-Offset	dB	Config 1,2,3,4,5,6		6	
Hysteresis	dB	Config 1,2,3,4,5,6	(0	
CP length		Config 1,2,3,4,5,6	Noi	mal	
TimeToTrigger	8	Config 1,2,3,4,5,6)	
Filter coefficient		Config 1,2,3,4,5,6	(0	L3 filtering is not used
DRX		Config 1,2,3,4,5,6	0	FF	DRX is not used
Time offset between PCell and PSCell		Config 1,2,3,4,5,6		μs	Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4		ns	Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	3µs		Synchronous cells.
T1	S	Config 1,2,3,4,5,6	5		
T2	S	Config 1,2,3,4,5,6	1.1	1	

Table A.4.6.2.5.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Cell 2	Cell 3

		Test	T1	T2	T1	T2		
		configuratio n						
NR RF Channel Number		Config		1 1		2		
		1,2,3,4,5,6						
Duplex mode		Config 1,4		F	-DD			
		Config		٦	ΓDD			
DIM	NAL I—	2,3,5,6		40. N				
BW _{channel}	MHz	Config 1,4 Config 2,5			RB,c = 52			
		Config 3,6			N _{RB,c} = 52 I _{RB,c} = 106			
BWP BW	MHz	Config 1,4 10: N _{RB,c} = 52						
		Config 2,5			RB,c = 52			
		Config 3,6		40: N	RB,c = 106			
TDD configuration		Config 2,5	TDDC	onf.1.1	TDD	Conf.1.1		
		Config 3,6	TDDC	onf.2.1	TDD	Conf.2.1		
Initial DL BWP		Config 1,2,3,4,5,6	DLBV	VP.0.1		NA		
Initial UL BWP		Config 1,2,3,4,5,6	ULBV	VP.0.1		NA		
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBV	VP.1.1		NA		
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBV	VP.1.1		NA		
TRS configuration		Config 1,4		.1 FDD		NA		
		Config 2,5				NA		
		Config 3,6	TRS.1.2 TDD OP.1			NA		
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2,3,4,5,6			(OP.1		
PDSCH Reference		Config 1,4	SR.1.	1 FDD				
measurement channel		Config 2,5	SR.1.	1 TDD				
		Config 3,6	SR2.	1 TDD				
RMSI CORESET Reference		Config 1,4	CR.1.	1 FDD		-		
Channel		Config 2,5	CR.1.	1 TDD				
		Config 3,6	CR2.	1 TDD				
		Config 1,4	CCR.1	.1 FDD				
Dedicated CORESET Reference Channel		Config 2,5		.1 TDD				
		Config 3,6		.1 TDD				
SSB parameters		Config 1,4		1 FR1		3.5 FR1		
		Config 2,5 Config 3,6		<u>1 FR1</u> 2 FR1		3.5 FR1 3.6 FR1		
SMTC configuration defined in A.3.11		Config 1,4		TC.2		MTC.5		
		Config 2,3,5,6	SM	TC.1	SI	MTC.4		
PDSCH/PDCCH subcarrier	kHz	Config			15			
spacing		1,2,4,5						
EDDE votic of DOC to COC		Config 3,6			30			
EPRE ratio of PSS to SSS		_						
EPRE ratio of PBCH DMRS to SSS	SSS		(0		0		
EPRE ratio of PBCH to PBCH DMRS								

EPRE ratio of PDCCH DMRS							
to SSS							
EPRE ratio of PDCCH to							
PDCCH DMRS							
EPRE ratio of PDSCH DMRS							
to SSS							
EPRE ratio of PDSCH to							
PDSCH							
EPRE ratio of OCNG DMRS							
to SSS(Note 1)							
EPRE ratio of OCNG to							
OCNG DMRS (Note 1)							
Note2 N _{oc}	dBm/15		-6	98	-	98	
oc	kHz						
Note2 N _{ac}	dBm/S	Config	-6	98	-98		
· oc	CS	1,2,4,5					
		Config 3,6	-(95	-	·95	
SS-RSRP Note 3	dBm/S	Config	-94	-94	-Infinity	-91	
	CS	1,2,4,5					
		Config 3,6	-91	-91	-Infinity	-88	
Ê s /I ot	dB	Config	4	4	-Infinity	7	
		1,2,3,4,5,6					
\hat{E}_{s}/N_{oc}	dB	Config	4	4	-Infinity	7	
		1,2,3,4,5,6					
Io ^{Note3}	dBm/9.	Config	-64.59	-64.59	-70.05	-62.26	
	36MHz	1,2,4,5					
	dBm/38	Config 3,6	-58.49	-58.49	-63.94	-56.15	
	.16MHz						
Propagation Condition		Config		Α'	WGN		
<u> </u>		1,2,3,4,5,6					
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power							

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.4.6.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1040 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 880 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.2.6 EN-DC event triggered reporting tests for FR1 cell with SSB time index detection when DRX is used

A.4.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR1 on NR RF channel 2. The test parameters and configurations are given in Tables A.4.6.2.6.1-1, A.4.6.2.6.1-2, and A.4.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.4.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.4.6.2.6.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.4.6.2.6.1-1.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.4.6.2.6.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR1

	Config	Description	
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
6		LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note 1: The UE is only required to be tested in one of the supported test configurations			
Note 2: target NR cell3 has the same SCS, BW and duplex mode as NR serving cell2			

Table A.4.6.2.6.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test		Value			Comment	
		configurati	Test	Test	Test	Test		
		on	1	2	3	4		
E-UTRA RF Channel		Config			1		One E-UTRAN carrier frequencies	
Number		1,2,3,4,5,6					is used.	
NR RF Channel		Config	1, 2			Two FR1 NR carrier frequencies is		
Number		1,2,3,4,5,6					used.	
Active cell		Config	LTE (LTE Cell 1 (PCell) and NR		id NR	LTE Cell 1 is on E-UTRA RF	
		1,2,3,4,5,6	cell 2 (PScell)		cell 2 (PScell)			channel number 1.
					1			NR Cell 2 is on NR RF channel
							number 1.	

Neighbour cell		Config 1,2,3,4,5,6		NR (cell 3		NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3,4,5,6	()	4		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3,4,5,6	(9	,	9	
A3-Offset	dB	Config 1,2,3,4,5,6		-	6		
Hysteresis	dB	Config 1,2,3,4,5,6		(0		
CP length		Config 1,2,3,4,5,6		Nor	mal		
TimeToTrigger	S	Config 1,2,3,4,5,6		(0		
Filter coefficient		Config 1,2,3,4,5,6		()		L3 filtering is not used
DRX	ms	Config 1,2,3,4,5,6	DRX .1	DRX .7	DRX .1	DRX .7	As specified in clause A.3.3
Time offset between PCell and PSCell		Config 1,2,3,4,5,6		3	μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4		3ms			Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	3µs				Synchronous cells.
T1	S	Config 1,2,3,4,5,6	5				
T2	S	Config 1,2,3,4,5,6	1.3	13.5	1.3	13.5	

Table A.4.6.2.6.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Ce	Cell 2		Cell 3		
		configuratio n	T1	T2	T1	T2		
NR RF Channel Number		Config 1,2,3,4,5,6	,	1		2		
Duplex mode		Config 1,4			-DD			
		Config 2,3,5,6		-	ΓDD			
BW _{channel}	MHz	Config 1,4		10: N	I _{RB,c} = 52			
		Config 2,5		10: N _{RB,c} = 52				
		Config 3,6		40: N _{RB,c} = 106				
BWP BW	MHz	Config 1,4		10: $N_{RB,c} = 52$				
		Config 2,5	5 10: N _{RB,c} =		$I_{RB,c} = 52$	B,c = 52		
		Config 3,6		40: N	RB,c = 106			
OCNG Patterns defined in		Config	OP.1		OP.1			
A.3.2.1.1 (OP.1)		1,2,3,4,5,6						
PDSCH Reference		Config 1,4	SR.1.	SR.1.1 FDD -		-		
measurement channel		Config 2,5	SR.1.	1 TDD				
		Config 3,6	SR.2.	1 TDD				
RMSI CORESET Reference		Config 1,4	CR.1.	1 FDD		-		
Channel		Config 2,5	CR.1.	1 TDD				
		Config 3,6	CR.2.	1 TDD				
		Config 1,4	CCR.1	.1 FDD				
Dedicated CORESET Reference Channel		Config 2,5	CCR.1	.1 TDD				

		Config 3,6	CCR.2	.1 TDD]		
TDD configuration		Config 2,5	TDDConf.1.1		Conf.1.1		
		Config 3,6		TDD	Conf.2.1		
Initial DL BWP		Config 1,2,3,4,5,6		DLE	3WP.0.1		
TRS configuration		Config 1,4	TRS.	1.1 FDD		N/A	
3		Config 2,5		1.1 TDD		N/A	
		Config 3,6	TRS.	1.2 TDD		N/A	
Initial UL BWP		Config 1,2,3,4,5,6			3WP.0.1		
Dedicated DL BWP		Config 1,2,3,4,5,6		DLE	3WP.1.1		
Dedicated UL BWP		Config 1,2,3,4,5,6		ULE	3WP.1.1		
SSB parameters		Config 1,4	SSB.	1 FR1	SSE	3.5 FR1	
		Config 2,5	SSB.	1 FR1	SSE	3.5 FR1	
		Config 3,6	SSB.	2 FR1	SSB.6 FR1		
SMTC configuration defined in A.3.11		Config 1,4	SM	TC.2	SMTC.5		
		Config 2,3,5,6	SMTC.1		SN	SMTC.4	
PDSCH/PDCCH subcarrier kH spacing		Config 1,2,4,5			15		
EDDE vertice of DOC to COC		Config 3,6	30				
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS							
to SSS							
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2,3,4,5,6		0		0	
EPRE ratio of PDSCH DMRS to SSS		, , , , ,					
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to							
OCNG DMRS (Note 1) N_{oc}^{Note2}	dBm/15 kHz		-98(-98		
N_{oc} Note2	dBm/S CS	Config 1,2,4,5	-98 -98		-98		
		Config 3,6	-95			-95	
SS-RSRP Note 3	dBm/S CS	Config 1,2,4,5	-94	-94	-Infinity	-91	
		Config 3,6	-91	-91	-Infinity	-88	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7	
\hat{E}_s/N_{oc}	dB	Config 1,2,3,4,5,6	4	4	-Infinity	7	

Io ^{Note3}		dBm/9.	Config	-64.59	-64.59	-70.05	-62.26
		36MHz	1,2,4,5				
		dBm/38	Config 3,6	-58.49	-58.49	-63.94	-56.15
		.16MHz					
Propagat	tion Condition		Config		A'	WGN	
			1,2,3,4,5,6				
Note 1:	OCNG shall be used	such that b	ooth cells are full	y allocated a	and a consta	nt total trans	mitted power
	spectral density is ac						
Note 2:	Interference from oth	er cells and	d noise sources	not specified	in the test is	s assumed to	be constant
	over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\!oc}$ to be						
	fulfilled.						
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They						
	are not settable parameters themselves.						
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at						
	each receiver antenn	a port.	-	· ·	-		

A.4.6.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 13440 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 13440 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.2.7 Void

A.4.6.2.8 Void

A.4.6.3 Void

A.4.6.4 L1-RSRP measurement for beam reporting

A.4.6.4.1 SSB based L1-RSRP measurement when DRX is not used

A.4.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.4.6.4.1.1-1.

Table A.4.6.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations				

A.4.6.4.1.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.4.1.2-1 and Table A.4.6.4.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.4.6.4.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~6		freq1
	1,4		FDD
Duplex mode	2,5		TDD
	3,6		TDD
	1,4		N/A
TDD Configuration	2,5		TDDConf.1.1
	3,6		TDDConf.2.1
BW _{channel}	1,4	MHz	10: N _{RB,c} = 52

		,	
	2,5		10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106
DD00HD (1,4		SR.1.1 FDD
PDSCH Reference measurement	2,5		SR.1.1 TDD
channel	3,6		SR.2.1 TDD
	1,4		CR.1.1 FDD
RMSI CORESET Reference	2,5		CR.1.1 TDD
Channel	3,6		CR.2.1 TDD
	1,4		CCR.1.1 FDD
Dedicated CORESET Reference	2,5		CCR.1.1 TDD
Channel	3,6		CCR.2.1 TDD
	1,4		SSB.3 FR1
SSB configuration	2,5		SSB.3 FR1
SOB configuration	3,6		SSB.4 FR1
OCNG Patterns	1~6		OP.1
OCING Falleriis	1~0		DLBWP.0.1
Initial BWP Configuration	1~6		ULBWP.0.1
			DLBWP.1.1
Dedicated BWP configuration	1~6		ULBWP.1.1
SMTC configuration	1~6		SMTC.1
	1,4		TRS.1.1 FDD
TRS Configuration	2,5		TRS.1.1 TDD
The Goldinguistics	3,6		TRS.1.2 TDD
DRX configuration	1~6		Off
reportConfigType	1~6		periodic
reportQuantity	1~6		ssb-Index-RSRP
Number of reported RS	1~6		2
L1-RSRP reporting period	1~6	slot	80
T1	1~6	S	5
T2	1~6	S	1
EPRE ratio of PSS to SSS	. 0	- C	•
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH			
DMRS			
EPRE ratio of PDCCH DMRS to			
SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS			
EPRE ratio of PDSCH DMRS to	1~6	dB	0
SSS			
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG			
DMRS Note 1			
Propagation condition	1~6		AWGN
Note 1: OCNG shall be used such t			ted and a constant

Table A.4.6.4.1.2-2: SSB specific test parameters

Parameter	Config	Unit	SS	B#0	SSB#1	
i arameter	Coming	Offic	T1	T2	T1	T2

$N_{oc}^{ m Note2}$	1~6	dBm/15kHz -94.65							
Note2	1,2,4,5	dBm/SSB SCS		-94.65					
TV _{oc}	3,6	0BIII/33B 3C3	-91.65						
\hat{E}_{s}/I_{ot}	1~6	dB	0	0	-Infinity	3			
SSB RSRP Note3	1,2,4,5	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65			
OOD NON	3,6	GBIII/00B 000	-91.65	-91.65	-Infinity	-88.65			
Io Note3	1,2,4,5	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93			
10	3,6	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84			
\hat{E}_s/N_{oc}	1~6	dB	0	0	-Infinity	3			

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.4.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.4.2 SSB based L1-RSRP measurement when DRX is used

A.4.6.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.4.6.4.2.1-1.

Table A.4.6.4.2.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

	Config	Description		
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
	6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to be tested in one of the supported test configurations				

A.4.6.4.2.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.4.2.2-1 and Table A.4.6.4.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.4.6.4.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~6		freq1
	1,4		FDD
Duplex mode	2,5		TDD
	3,6		TDD
	1,4		N/A
TDD Configuration	2,5		TDDConf.1.1
	3,6		TDDConf.2.1
	1,4		10: N _{RB,c} = 52
BW _{channel}	2,5	MHz	10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106
PDSCH Reference measurement	1,4		SR.1.1 FDD
channel	2,5		SR.1.1 TDD
Chamer	3,6		SR.2.1 TDD
RMSI CORESET Reference	1,4		CR.1.1 FDD
Channel	2,5		CR.1.1 TDD
Gridinier	3,6		CR.2.1 TDD
Dedicated CORESET Reference	1,4		CCR.1.1 FDD
Channel	2,5		CCR.1.1 TDD
Chamber	3,6		CCR.2.1 TDD
	1,4		SSB.3 FR1
SSB configuration	2,5		SSB.3 FR1
	3,6		SSB.4 FR1
OCNG Patterns	1~6		OP.1
Initial BWP Configuration	1~6		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~6		DLBWP.1.1
			ULBWP.1.1
SMTC configuration	1~6		SMTC.1
	1,4		TRS.1.1 FDD
TRS Configuration	2,5		TRS.1.1 TDD
	3,6		TRS.1.2 TDD
DRX configuration	1~6		DRX.3
reportConfigType	1~6		periodic
reportQuantity	1~6		ssb-Index-RSRP
Number of reported RS	1~6		2
L1-RSRP reporting period	1~6	slot	80
T1	1~6	S	5
T2	1~6	s	1
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS	1~6	dB	0

EPRE ratio of PBCH to PBCH			
DMRS			
EPRE ratio of PDCCH DMRS to			
SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS			
EPRE ratio of PDSCH DMRS to			
SSS			
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG			
DMRS Note 1			
Propagation condition	1~6		AWGN
Note 1: OCNG shall be used such t	hat both cells	s are fully alloca	ted and a constant

total transmitted power spectral density is achieved for all OFDM symbols.

Table A.4.6.4.2.2-2: SSB specific test parameters

Doromotor	Config	Unit	SS	B#0	SSI	3#1
Parameter	Config	Unit	T1	T2	T1	T2
$N_{_{\!oc}}$ Note2	1~6	dBm/15kHz		-94	.65	
√ Note2	1,2,4,5	dBm/SSB SCS		-94	.65	
$N_{oc}^{ m Note2}$	3,6	UBIII/55B 5C5		-91	.65	
$\hat{ extsf{E}}_{ extsf{s}}/ extsf{I}_{ ext{ot}}$	1~6	dB	0	0	-Infinity	3
SSB RSRP Note3	1,2,4,5	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65
OOD NON	3,6	ubili/00b 000	-91.65	-91.65	-Infinity	-88.65
Io Note3	1,2,4,5	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93
10	3,6	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
\hat{E}_s/N_{cc}	1~6	dB	0	0	-Infinity	3

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.4.2.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.4.3 CSI-RS based L1-RSRP measurement when DRX is not used

A.4.6.4.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.4.6.4.3.1-1.

Table A.4.6.4.3.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to be tested in one of the supported test configurations			

A.4.6.4.3.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.4.3.2-1 and Table A.4.6.4.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (0 for Config 1,2,4,5 and 8 for Config 3,6) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.4.6.4.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.4.6.4.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~6		freq1
	1,4		FDD
Duplex mode	2,5		TDD
	3,6		TDD
	1,4		N/A
TDD Configuration	2,5		TDDConf.1.1
	3,6		TDDConf.2.1
	1,4		10: N _{RB,c} = 52
BWchannel	2,5	MHz	10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106
PDSCH Reference measurement	1,4		SR.1.1 FDD
channel	2,5		SR.1.1 TDD
GHAIHIGH	3,6		SR.2.1 TDD
RMSI CORESET Reference Channel	1,4		CR.1.1 FDD

	2,5	j !	CR.1.1 TDD
	3,6		CR.2.1 TDD
Dedicated CORESET Reference	1,4		CCR.1.1 FDD
Channel	2,5		CCR.1.1 TDD
Channe	3,6	!	CCR.2.1 TDD
	1,4		SSB.3 FR1
SSB configuration	2,5		SSB.3 FR1
	3,6	'	SSB.4 FR1
	1,4		CSI-RS 1.3 FDD
CSI-RS configuration	2,5	'	CSI-RS 1.3 TDD
	3,6		CSI-RS 2.3 TDD
OCNG Patterns	1~6		OP.1
	1,4		TRS.1.1 FDD
TRS Configuration	2,5		TRS.1.1 TDD
110 009	3,6		TRS.1.2 TDD
			DLBWP.0.1
Initial BWP Configuration	1~6	!	ULBWP.0.1
	 		DLBWP.1.1
Dedicated BWP configuration	1~6		ULBWP.1.1
SMTC configuration	1~6		SMTC.1
DRX configuration	1~6		Off
reportConfigType	1~6		aperiodic
reportQuantity	1~6		cri-RSRP
Number of reported RS	1~6		2
			SSB#0 for resource#0
qcl-Info	1~6	!	SSB#1 for resource#1
reportSlotOffsetList	1~6	slots	8
T1	1~6	S	5
EPRE ratio of PSS to SSS	<u> </u>		Ţ Ţ
EPRE ratio of PBCH DMRS to SSS	1	!	l
EPRE ratio of PBCH to PBCH DMRS	·		
EPRE ratio of PDCCH DMRS to SSS	·		
EPRE ratio of PDCCH to PDCCH	·	'	
DMRS		'	
EPRE ratio of PDSCH DMRS to SSS	1~6	dB	0
EPRE ratio of PDSCH to PDSCH	1 11-0	u u	
DMRS			
EPRE ratio of OCNG DMRS to	·	'	
SSSNote 1			
EPRE ratio of OCNG to OCNG DMRS	·		
Note 1			
Propagation condition	1~6	 	AWGN
r Topagation condition	1~0		AVVOIV

Table A.4.6.4.3.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1
$N_{oc}^{ m Note1}$	1~6	dBm/15kHz	-94.65	
Note1	1,2,4,5	dBm/SSB SCS	-94.65	
TV _{oc}	3,6	- dBm/SSB SCS -	-91.65	

$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~6	dB	0	3
CSI-RS RSRP	1,2,4,5 dBm/SSB SCS		-94.65	-91.65
Note2	3,6	UBII//33B 3C3	-91.65	-88.65
lo Note2	1,2,4,5	dBm/9.36 MHz	-63.69	-61.93
3,6 dBm/38.16 MHz		-57.59	-55.84	
\hat{E}_s/N_{oc}	1~6	dB	0	3

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: CSI-RS RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.4.3.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the absolute accuracy requirement in clause 10.1.20.1.1 and relative accuracy requirement in clause 10.1.20.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.6.4.4 CSI-RS based L1-RSRP measurement when DRX is used

A.4.6.4.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.4.6.4.4.1-1.

Table A.4.6.4.4.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Config	Description		
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note: The UE is only required to be tested in one of the supported test configurations			

A.4.6.4.4.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.6.4.4.2-1 and Table A.4.6.4.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (0 for Config 1,2,4,5 and 8 for Config 3,6) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.4.6.4.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.4.6.4.4.2-1: General test parameters

SSB GSCN	Parameter	Config	Unit	Value
Duplex mode	SSB GSCN	1~6		
Duplex mode		1,4		FDD
TDD Configuration	Duplex mode			TDD
TDD Configuration	·			TDD
TDD Configuration 2,5 3,6 TDDConf.1.1				N/A
BWchannel	TDD Configuration			TDDConf.1.1
BWchannel 2,5	3			
3,6 A0: N _{RB,c} = 106		1,4		10: N _{RB,c} = 52
PDSCH Reference measurement channel	BW _{channel}	2,5	MHz	10: N _{RB,c} = 52
PUBCH Reference measurement channel		3,6		40: N _{RB,c} = 106
channel 2,5 SR.1.1 TDD 3,6 SR.2.1 TDD 1,4 CR.1.1 FDD 2,5 CR.1.1 TDD 3,6 CR.2.1 TDD Dedicated CORESET Reference Channel 1,4 CCR.1.1 FDD Channel CCR.2.1 TDD CCR.2.1 TDD SSB configuration 2,5 SSB.3 FR1 SSB configuration 2,5 SSB.3 FR1 SSB configuration 2,5 CSI-RS 1.3 FDD CSI-RS configuration 2,5 CSI-RS 1.3 TDD OCNG Patterns 1-6 OP.1 TRS Configuration 1-6 OP.1 TRS Configuration 1-6 DLBWP.0.1 Initial BWP Configuration 1-6 DLBWP.0.1 ILLBWP.1.1 ULBWP.1.1 SMTC configuration 1-6 SMTC.1 DRX configuration 1-6 DRX.3 reportConfigType 1-6 CR.3 TeportQuantity 1-6 SSB#0 for resource#0 Number of reported RS 1-6 SSB#0 for resource#1 TeportSlotOffset	DDSCH Reference manaurement			SR.1.1 FDD
RMSI CORESET Reference Channel		2,5		SR.1.1 TDD
RMSI CORESET Reference Channel 2,5 CR.1.1 TDD Dedicated CORESET Reference Channel 1,4 CCR.1.1 FDD CCR.1.1 TDD CCR.1.1 TDD CCR.1.1 TDD CCR.1.1 TDD CCR.2.1 TDD CCR.2.1 TDD SSB configuration 1,4 SSB.3 FR1 SSB.3 FR1 SSB.3 FR1 SSB.3 FR1 CSI-RS configuration 2,5 CSI-RS 1.3 FDD CSI-RS configuration 1,4 CSI-RS 1.3 TDD OCNG Patterns 1,4 TRS.1.1 FDD TRS Configuration 1,4 TRS.1.1 FDD TRS Configuration 1,4 TRS.1.1 TDD Initial BWP Configuration 1,4 TRS.1.1 TDD Initial BWP Configuration 1,6 DLBWP.0.1 ULBWP.0.1 ULBWP.0.1 ULBWP.0.1 ULBWP.0.1 ULBWP.0.1 ULBWP.0.1 ULBWP.1.1 ULBWP.0.1 ULBWP.0.1 URBYP.0.1 ULBWP.0.1 URBYP.0.1 ULBWP.0.1 ULBWP.0.1 URBYP.0.1 URBYP.0.1 URBYP.0.1 URBYP.0.1 UR	3,6		SR.2.1 TDD	
Dedicated CORESET Reference Channel		1,4		
1,4	RMSI CORESET Reference Channel	2,5		
Dedicated CORESET Reference Channel 2,5 3,6 CCR.1.1 TDD		3,6		CR.2.1 TDD
Channel 2,5 / 3,6 / 3,6 / 3,6 / 3,6 / 3,6 CCR.2.1 TDD SSB configuration 2,5 / 3,6	Dedicated CORECET Deference			CCR.1.1 FDD
3,6 CCR.2.1 TDD		2,5		CCR.1.1 TDD
SSB configuration 2,5 SSB.3 FR1 3,6 SSB.4 FR1 CSI-RS configuration 1,4 CSI-RS 1.3 FDD CSI-RS 1.3 TDD CSI-RS 2.3 TDD OCNG Patterns 1~6 OP.1 TRS Configuration 1,4 TRS.1.1 FDD TRS Configuration 1~6 TRS.1.2 TDD Initial BWP Configuration 1~6 DLBWP.0.1 ULBWP.0.1 ULBWP.0.1 ULBWP.1.1 SMTC configuration 1~6 SMTC.1 DRX configuration 1~6 DRX.3 reportConfigType 1~6 aperiodic reportQuantity 1~6 cri-RSRP Number of reported RS 1~6 SSB#0 for resource#0 SSB#0 for resource#0 SSB#1 for resource#1 reportSlotOffsetList 1~6 s T1 1~6 s 5 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS 1~6 dB 0	Chamer	3,6		
SSB.4 FR1				
CSI-RS configuration 1,4 CSI-RS 1.3 FDD CSI-RS 1.3 TDD CSI-RS 1.3 TDD CCSI-RS 2.3 TDD CSI-RS 2.3 TDD OCNG Patterns 1,4 TRS.1.1 FDD TRS Configuration 2,5 TRS.1.1 TDD Initial BWP Configuration 1~6 DLBWP.0.1 ULBWP.0.1 ULBWP.0.1 ULBWP.1.1 SMTC configuration 1~6 SMTC.1 DRX configuration 1~6 DRX.3 reportConfigType 1~6 aperiodic reportQuantity 1~6 cri-RSRP Number of reported RS 1~6 2 qcI-Info 1~6 SSB#0 for resource#0 reportSlotOffsetList 1~6 s SB#1 for resource#1 reportSlotOffsetList 1~6 s 5 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS 1~6 dB 0	SSB configuration	2,5		SSB.3 FR1
CSI-RS configuration 2,5 CSI-RS 1.3 TDD OCNG Patterns 1~6 OP.1 TRS Configuration 1,4 TRS.1.1 FDD TRS Configuration 2,5 TRS.1.1 TDD Initial BWP Configuration 1~6 DLBWP.0.1 ULBWP.0.1 ULBWP.0.1 ULBWP.0.1 Dedicated BWP configuration 1~6 SMTC.1 DRX configuration 1~6 SMTC.1 DRX configuration 1~6 DRX.3 reportConfigType 1~6 aperiodic reportQuantity 1~6 cri-RSRP Number of reported RS 1~6 2 qcl-Info 1~6 slots 8 T1 1~6 slots 8 T1 1~6 s 5 EPRE ratio of PSC to SSS EPRE ratio of PBCH DMRS to SSS 1~6 dB 0		3,6		SSB.4 FR1
3,6 CSI-RS 2.3 TDD		1,4		
OCNG Patterns 1~6 OP.1 TRS Configuration 1,4 TRS.1.1 FDD 2,5 TRS.1.1 TDD 3,6 Initial BWP Configuration 1~6 DLBWP.0.1 ULBWP.0.1 ULBWP.0.1 Dedicated BWP configuration 1~6 SMTC.1 DRX configuration 1~6 SMTC.1 DRX configuration 1~6 aperiodic reportConfigType 1~6 aperiodic reportQuantity 1~6 cri-RSRP Number of reported RS 1~6 2 qcl-Info 1~6 SB#0 for resource#0 SSB#1 for resource#1 reportSlotOffsetList 1~6 s T1 1~6 s 5 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS 1~6 dB 0	CSI-RS configuration			
TRS Configuration 1,4 TRS.1.1 FDD 2,5 TRS.1.1 TDD 3,6 TRS.1.2 TDD Initial BWP Configuration 1~6 DLBWP.0.1 Dedicated BWP configuration 1~6 DLBWP.1.1 SMTC configuration 1~6 SMTC.1 DRX configuration 1~6 DRX.3 reportConfigType 1~6 aperiodic reportQuantity 1~6 cri-RSRP Number of reported RS 1~6 2 qcl-Info 1~6 SB#0 for resource#0 SSB#1 for resource#1 reportSlotOffsetList 1~6 s T1 1~6 s 5 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS 1~6 dB 0		3,6		
TRS Configuration 2,5 TRS.1.1 TDD 3,6 TRS.1.2 TDD Initial BWP Configuration 1~6 DLBWP.0.1 Dedicated BWP configuration 1~6 DLBWP.1.1 SMTC configuration 1~6 SMTC.1 DRX configuration 1~6 DRX.3 reportConfigType 1~6 aperiodic reportQuantity 1~6 cri-RSRP Number of reported RS 1~6 2 qcl-Info 1~6 SSB#0 for resource#0 SSB#1 for resource#1 reportSlotOffsetList 1~6 s T1 1~6 s 5 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS 1~6 dB 0	OCNG Patterns	1~6		
3,6		1,4		
Initial BWP Configuration 1~6 DLBWP.0.1 ULBWP.0.1 Dedicated BWP configuration 1~6 DLBWP.1.1 ULBWP.1.1 SMTC configuration 1~6 SMTC.1 DRX configuration reportConfigType 1~6 aperiodic reportQuantity 1~6 cri-RSRP Number of reported RS 1~6 2 qcl-Info 1~6 SSB#0 for resource#0 SSB#1 for resource#1 reportSlotOffsetList 1~6 s 5 T1 1~6 s 5 5 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS 1~6 dB 0	TRS Configuration	2,5		
Dedicated BWP configuration		3,6		TRS.1.2 TDD
Dedicated BWP configuration 1~6 DLBWP.1.1	Initial BWP Configuration	1~6		DLBWP.0.1
Dedicated BWP configuration	Initial BVVI Configuration	1~0		
SMTC configuration	Dedicated BWP configuration	1~6		
DRX configuration 1~6 DRX.3 reportConfigType 1~6 aperiodic reportQuantity 1~6 cri-RSRP Number of reported RS 1~6 2 qcl-Info 1~6 SSB#0 for resource#0 SSB#1 for resource#1 reportSlotOffsetList 1~6 slots 8 T1 1~6 s 5 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS 1~6 dB 0	_			
reportConfigType 1~6 aperiodic reportQuantity 1~6 cri-RSRP Number of reported RS 1~6 2 qcl-Info 1~6 SSB#0 for resource#0 reportSlotOffsetList 1~6 slots 8 T1 1~6 s 5 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS 1~6 dB 0	SMTC configuration			
reportQuantity 1~6 cri-RSRP Number of reported RS 1~6 2 qcl-Info 1~6 SSB#0 for resource#0 reportSlotOffsetList 1~6 slots 8 T1 1~6 s 5 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS 1~6 dB 0	DRX configuration			
Number of reported RS 1~6 2 qcl-Info 1~6 SSB#0 for resource#0 reportSlotOffsetList 1~6 slots 8 T1 1~6 s 5 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS 1~6 dB 0				
qcl-Info 1~6 SSB#0 for resource#0 reportSlotOffsetList 1~6 slots 8 T1 1~6 s 5 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS 1~6 dB 0	reportQuantity			
qci-info 1~6 SSB#1 for resource#1 reportSlotOffsetList 1~6 slots 8 T1 1~6 s 5 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS 1~6 dB 0	Number of reported RS	1~6		<u> </u>
reportSlotOffsetList 1~6 slots 8 T1 1~6 s 5 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS 1~6 dB 0	qcl-Info	1~6		
T1 1~6 s 5 EPRE ratio of PSS to SSS 1~6 dB 0	reportSlotOffsetList	1~6	slots	
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS 1~6 dB 0				
EPRE ratio of PBCH DMRS to SSS 1~6 dB 0				, in the second
		1~6	dB	0
	EPRE ratio of PBCH to PBCH DMRS	∃ . Ŭ		

EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH				
DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
DMRS				
EPRE ratio of OCNG DMRS to				
SSS ^{Note 1}				
EPRE ratio of OCNG to OCNG DMRS				
Note 1				
Propagation condition 1~6 AWGN				
Note 1: OCNG shall be used such that both cells are fully allocated and a constant				
total transmitted power spectral density is achieved for all OFDM symbols				

total transmitted power spectral density is achieved for all OFDM symbols

Table A.4.6.4.4.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1
$N_{oc}^{ m Note1}$	1~6	dBm/15kHz	-94	.65
∖ / Note1	1,2,4,5	dBm/SSB SCS	-94	.65
$N_{oc}^{ m Note1}$	3,6	UBIII/33B 3C3	-91.65	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~6	dB	0	3
CSI-RS RSRP	1,2,4,5	dBm/SSB SCS	-94.65	-91.65
Note2	3,6	GBIII/00B 000	-91.65	-88.65
lo Note2	1,2,4,5	dBm/9.36 MHz	-63.69	-61.93
10	3,6	dBm/38.16 MHz	-57.59	-55.84
\hat{E}_s/N_{oc}	1~6	dB	0	3

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: CSI-RS RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.4.6.4.4.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting absolute accuracy requirement in clause 10.1.20.1.1 and relative accuracy requirement in clause 10.1.20.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.4.7 Measurement Performance requirements

Unless explicitly stated otherwise:

- Reported measurements shall be within defined range of accuracy limits defined in Clause 10 for at least 90 % of the reported cases. If multiple measurement performance requirements are verified in the same test, the reported measurements for each requirement shall be within defined range of accuracy limits of the corresponding requirement defined in Clause 10 for at least 90% of the reported cases.
- Measurements are performed in RRC_CONNECTED state.
- The reference channels assume transmission of PDSCH with a maximum number of 5 HARQ transmissions unless otherwise specified.

A.4.7.1 SS-RSRP

A.4.7.1.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.2.1.1 and 10.1.2.1.2 for intra-frequency measurements.

A.4.7.1.1.2 Test parameters

In this set of test cases all NR cells are on the same carrier frequency. Supported test configurations are shown in table A.4.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in A.4.7.1.1.2-2. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1 In all test cases, Cell 2 is the PSCell, and Cell 3 is the target cell.

Table A.4.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Config	Description			
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is only required to be tested in one of the supported test configurations for each supported band				

Table A.4.7.1.1.2-2: SS-RSRP Intra frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3	
		Onit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3
Physical cell ID			489	0	489	0	489	0
SSB ARFCN			fr	eq1	fre	q1	freq1	
Duplex mode	Config 1,4				FD	D		
Duplex mode	Config 2,3,5,6		TDD					
	Config 1,4		Not Applicable TDDConf.1.1					
TDD configuration	Config 2,5							
	Config 3,6		TDDConf.2.1					
	Config 1,4		10: N _{RB,c} = 52					
BW _{channel}	Config 2,5	MHz	10: N _{RB,c} = 52					
	Config 3,6		40: N _{RB,c} = 106					
Downlink initial BWP configuration			DLBWP.0.1					
Downlink dedicated BWP configuration			DLBWP.1.1					
Uplink initial BWP configuration			ULBWP.0.1					
Uplink dedicated BWP c	onfiguration		ULBWP.1.1					

			1			TD0 4 4	1	TD0 4	ı
		Config 1,4		TRS.1. 1 FDD	NA	TRS.1.1 FDD	NA	TRS.1. 1 FDD	NA
TRS configu	uration	Config 2,5		TRS.1. 1 TDD	NA	TRS.1.1 TDD	NA	TRS.1. 1 TDD	NA
		Config 3,6		TRS.1. 2 TDD	NA	TRS.1.2 TDD	NA	TRS.1. 2 TDD	NA
DRX Cycle			ms		I	Not App	licable		l
,		Config 1,4		SR.1.1		SR.1.1		SR.1.1	
PDSCH Ref		Config 2,5		SR.1.1	_	SR.1.1	-	SR.1.1	-
measureme	nt channel	Config 3,6		SR2.1		SR2.1		SR2.1	
		Config 1,4		TDD CR.1.1		TDD CR.1.1		TDD CR.1.1	
RMSI CORE	ESET	Config 2,5	<u> </u>	FDD CR.1.1	_	FDD CR.1.1	_	FDD CR.1.1	_
Reference C	Channel			TDD CR2.1	-	TDD CR2.1	-	TDD CR2.1	-
		Config 3,6		TDD CCR.1.		TDD CCR.1.		TDD CCR.1.	
		Config 1,4		1 FDD CCR.1.		1 FDD		1 FDD CCR.1.	
Control Cha	nnel RMC	Config 2,5		1 TDD	-	CCR.1. 1 TDD	-	1 TDD	-
		Config 3,6		CCR2.1 TDD		CCR2. 1 TDD		CCR2.1 TDD	
		Config 1,4		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1
SSB configu	uration	Config 2,5		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1
		Config 3,6		SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1
Time offset	with Cell 2	Config 1,4 Config 2,3,5,6	ms μs	-	3	-	3	-	3
SMTC confi	guration	Config 1,4	•	SMTC.2 SMTC.1					
OCNG Patte		Config 2,3,5,6				OP			
PDSCH/PD	CCH	Config 1,2,4,5	kHz	15 kHz 30kHz					
subcarrier s		Config 3,6			1	30k	HZ T	1	I
	of PSS to SS		4						
EPRE ratio	of PBCH DIV	PBCH DMRS	-						
			+						
		MRS to SSS PDCCH DMRS	dB	0	0	0	0	0	0
		MRS to SSS	- ub	0	0	0	0	0	U
EPRE ratio			-						
		MRS to SSS(Note 1)	-						
		OCNG DMRS (Note 1)	-						
		NR_FDD_FR1_A, NR_TDD_FR1_A						4	4.4
		NR FDD FR1 B	1						14 3.5
		NR TDD FR1 C							13
	Config	NR FDD FR1 D,			106	_,	38		10
	1,2,4,5	NR_TDD_FR1_D			100		50	-11	2.5
		NR FDD FR1 E,							
		NR_TDD_FR1_E						-1	12
3.7		NR_FDD_FR1_G	1					-1	
$N_{oc}^{ m Note2}$		NR_FDD_FR1_H	dBm/15KhZ						0.5
		NR FDD FR1 A,						· ' '	0.0
		NR_TDD_FR1_A						1	1.4
		NR_FDD_FR1_B							14 3.5
	Config 3,6	NR_TDD_FR1_C		Not appl	icableNote 5	-9	94		13
		NR_FDD_FR1_D, NR_TDD_FR1_D						_11	2.5
		NR_FDD_FR1_E,							
		NR_TDD_FR1_E							12

NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_B NR_F			NR_FDD_FR1_G						-1	11
No.			NR_FDD_FR1_H							
NR_FDD_FR1_B NR_FDD_FR1_C NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_C NR_		Config 1,2,4	5		-1	106	-8	38		
Not applicable Not			NR_TDD_FR1_A NOTE							
Config 3,6 NR_FDD_FR1_D, NR_FDD_FR1_E, NR_FDD_FR1 G, NR_FDD_FR1 G, NR_FDD_FR1 G, NR_FDD_FR1 G, NR_FDD_FR1 G, NR_FDD_FR1 G, NR_FDD_FR1 A, NR_FDD_FR1 A, NR_FDD_FR1 A, NR_FDD_FR1 G,	Note2			dBm/SCS						
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	1 voc	Config 3,6	NR_FDD_FR1_D,		Not appl	icable ^{Note 5}	-6	91		
NR_FDD_FR1_H dB			NR_FDD_FR1_E, NR_TDD_FR1_E							
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$										
NR_FDD_FR1_A NR_FDD_FR1_B NR_F	$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$			dB	2.46	-5.97	2.46	-5.97	-0.01	-4.76
Config Config 1,2,4,5 NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD	\hat{E}_s/N_{oc}			dB	6	1	6	1	3	0
Config NR FDD FR1 D NR FDD FR1 D NR FDD FR1 D NR FDD FR1 E NR FDD FR1 E NR FDD FR1 E NR FDD FR1 B NR FDD FR1 B NR FDD FR1 D NR FDD FR1			NR_TDD_FR1_A						-111.00	-114.00
Config 1,2,4,5 NR FDD_FR1_D NR FDD_FR1_D NR FDD_FR1_E NR FDD_FR1_E NR FDD_FR1_E NR FDD_FR1_E NR FDD_FR1_B										
NR FDD_FR1 E NR F				dBm/SCS	-100 -10	-105	-82	-87		
SS-RSRPNois3 NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_C NR_FDD_FR1_B N			NR_FDD_FR1_E,						-109.00	-112.00
RSRPNote3 RSRPNote3 RR_FDD_FR1_A, NR_FDD_FR1_B, NR_FDD_FR1_B, NR_FDD_FR1_D, NR_FDD_FR1_B, NR_FDD_F	99-									
NR_FDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_B NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_B NR_F		Config 3,6	NR_FDD_FR1_A,		applicab	applicabl -8				
NR_FDD_FR1_G NR_FDD_FR1_H			NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_E,				-85	-90	-107.00 -106.50	-110.00 -109.50
NR_FDD_FR1_A, NR_TDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_D, NR_FDD_FR1_B NR_FDD_FR1_D NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_A, NR_TDD_FR1_A NR_FDD_FR1_A, NR_TDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_F			NR_FDD_FR1_G							
NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_A NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_D NR_FDD_FR1_B NR_FDD_FR1_D NR_FDD_FR1_B NR_FDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B										
NR_TDD_FR1_C NR_FDD_FR1_D NR_FDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_B NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_B NR_TDD_FR1_D NR_FDD_FR1_B NR_FDD_FR1_D NR_FDD_FR1_B NR_FDD_FR1_D NR_FDD_FR1_B NR_FDD_FR1_B NR_FDD_FR1_B			NOTE 6						70	52
In the second se		Confin	NR_TDD_FR1_C	dDm/						
NR_FDD_FR1_E, NR_TDD_FR1_E					-70.09		-52.09		-78.53	
NR_FDD_FR1_G			NR_FDD_FR1_E,						-78.03	
NR_FDD_FR1_A, NR_TDD_FR1_B										.03
NR_TDD_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	Io ^{Note3}									
NR_TDD_FR1_C			NR_TDD_FR1_A							
Config 3,6										
NR_IDD_FR1_D		Config 3,6	NR_FDD_FR1_D,		Not appl	icable ^{Note 5}	-51	.99		
NR_FDD_FR1_G -70.94 NR_FDD_FR1_H -70.44 Propagation condition - AWGN			NR_FDD_FR1_E,						-71	.94
Propagation condition - AWGN			NR_FDD_FR1_G							
	Drongastia	oondition	NR_FDD_FR1_H				A147	- NI	-70	.44
				-						

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over
	subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	Subtest 1 is not used when testing with 30kHz SSB SCS
Note 6:	The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this

A.4.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for cell 2 and cell 3 shall fulfil absolute requirement in clause 10.1.2.1.1 and relative requirement in clause 10.1.2.1.2.

A.4.7.1.2 EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.4.1.1 and 10.1.4.1.2 for inter-frequency measurements with the testing configurations in Table A.4.7.1.2.1-1.

Table A.4.7.1.2.1-1: Applicable NR configurations for FR1 inter-frequency SS-RSRP accuracy test

	Config	Description
	1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations on each supported band

A.4.7.1.2.2 Test parameters

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR1 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.4.7.1.2.2-1 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.4.7.1.2.2-1. The inter-frequency measurements are supported by a measurement gap.

Table A.4.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Unit	Test 1		Test 2	
Parameter	Config	Onit	Cell 2	Cell 3	Cell 2	Cell 3
SSB ARFCN	1~6		freq1	freq2	freq1	freq2
	1,4		10: N _{RB,c} = 52 10: N _{RB,c} = 52		10: N _{RB,c} = 52	
BW _{channel}	2,5	MHz			10: $N_{RB,c} = 52$	
	3,6		40: N _{RB,c} = 106		40: N _{RB,c} = 106	
Gap pattern ID			0		0	•

		1,4		FDI)	FD	D	
Duplex mode		2,5		TDI		TD		
				TDI)	TDD		
				N/A		N/A		
TDD configu	uration		2,5		nf.1.1	TDDCo		
		3,6		TDDCoi	nf.2.1	TDDCo	nf.2.1	
	_	1,4		SR.1.1 FDD		SR.1.1 FDD		
PDSCH Ref		2,5		SR.1.1 TDD	-	SR.1.1 TDD	-	
		3,6		SR.2.1 FDD		SR.2.1 FDD		
		1,4		CR.1.1 FDD	-	CR.1.1 FDD	-	
RMSI CORI Channel	ESET Reference	2,5		CR.1.1 TDD	-	CR.1.1 TDD	-	
		3,6		CR.2.1 FDD	-	CR.2.1 FDD	-	
D1' 11 - (ODECET	1,4		CCR.1.1 FDD	-	CCR.1.1 FDD	-	
Dedicated (Reference (2,5		CCR.1.1 TDD	-	CCR.1.1 TDD	-	
		3,6		CCR.2.1 TDD	- FD4	CCR.2.1 TDD	- -	
CCD confirm	uration	1,4 2,5	-	SSB.1		SSB.1		
SSB configu	uration	3,6		SSB.1		SSB.1 FR1 SSB.2 FR1		
OCNG Patt	orne	1~6		OP.		OP.1		
OCIVOT att	CITIO	1,4		TRS.1.1 FDE		TRS.1.1 FDD		
TRS configu	ıration	2,5		TRS.1.1 TDD -			TRS.1.1 TDD -	
Tree comig	aradorr	3,6				TRS.1.2 TD		
Latitia LDVA/D	0 1' 1'	,		DLBWP.0.1		DLBWP.0.1		
Initial BWP	Configuration	1~6		ULBWP.0.1		ULBWP.0.1		
Dedicated F	BWP configuration	1~6		DLBWP.1.1		DLBWP.1.1		
Dedicated E	5VVI configuration	11-0		ULBWP.1.1		ULBWP.1.1		
- : " .	'd O # O	1,4	ms	-	3	-	3	
Time offset	with Cell 2	2,3,5,6	μs	-	3	-	3	
		1,4		SMT	0.2	SMTC.2		
SMTC confi	guration	2,3,5,6		CMT	<u> </u>	SMTC.1		
EDDE	(DOO (2,3,3,0		SMTC.1		SIVITO.T		
EPRE ratio o	f PSS to SSS f PBCH DMRS to							
SSS	I FBCI I DIVING 10							
	f PBCH to PBCH							
DMRS								
EPRE ratio of PDCCH DMRS to								
SSS EPRE ratio of PDCCH to PDCCH								
DMRS		1~6	dB	0	0	0	0	
EPRE ratio of PDSCH DMRS to SSS								
EPRE ratio o DMRS	f PDSCH to PDSCH							
EPRE ratio o	EPRE ratio of OCNG DMRS to SSS ^{Note 1}							
EPRE ratio of OCNG to OCNG DMRS Note 1		1						
· -	NR_FDD_FR1_A,				1		-115	
N_{oc} Note2	NR_TDD_FR1_A NOTE 5,	1.6	dBm/15	-94.65		(N_{oc} for		
	ND EDD ED4 E	1~6	kHz			Cell 3	4445	
	NR_FDD_FR1_B NR_TDD_FR1_C	-				+8dB)	-114.5 -114	

NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6, NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H	3,6	dBm/ 38.16M Hz	-50.	19	(Io for Channel 3 +19.75dB)	-79.19 -78.69 -78.19 -77.69 -77.19 -76.19 -75.69
\hat{E}_s/N_{oc}	1~6	dB	10	10	13	-3
Propagation condition	1~6	-	AWG	AWGN		3N
Antenna configuration			1x2	2	1x:	2

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for N_{oc} to be fulfilled.

Note 3: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5 The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.4.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 and Cell 3 shall fulfil the Absolute requirement in clause 10.1.4.1.1 and Relative requirement in clause 10.1.4.1.2.

A.4.7.1.3 Void

A.4.7.2 SS-RSRQ

A.4.7.2.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.7.1.1.

A.4.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.4.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.4.7.2.1.2-2. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.4.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

	Description

1	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode
Note: The UE is only r	equired to be tested in one of the supported test configurations in each supported band

Table A.4.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

SSB ARFCN	Cell 3								
Duplex mode									
Duplex mode									
Config 2,3,5,6 TDD									
TDD configuration									
Config 3,6 TDDConf.2.1									
BWchannel Config 1,4 10: N _{RB,c} = 52 Config 2,5 MHz 10: N _{RB,c} = 52 Config 3,6 40: N _{RB,c} = 106 Initial DL BWP Dedicated DL BWP Initial UL BWP Dedicated UL BWP									
BWchannel Config 2,5 MHz 10: N _{RB,c} = 52 Config 3,6 40: N _{RB,c} = 106 Initial DL BWP DLBWP.0.1 Dedicated BWP DLBWP.1.1 Initial UL BWP ULBWP.0.1 Dedicated UL BWP ULBWP.1.1									
Config 3,6 40: N _{RB,c} = 106									
BWP configuration Dedicated DL BWP DLBWP.0.1									
BWP configuration Dedicated BWP									
BWP configuration BWP									
BWP configuration BWP									
Dedicated UL BWP ULBWP.1.1									
BWP OLBWP.1.1									
DRY Cycle ms Not Applicable	ULBWP.1.1								
This Not Applicable									
Config 1,4 SR.1.1									
PDSCH Reference FDD FDD FDD									
measurement Config 2,5 SR.1.1 TDD SR.1.1 TDD SR.1.1 TDD SR.1.1 TDD	-								
channel CP24 CP24 CP24									
Config 3,6 SR2.1 SR2.1 SR2.1 TDD TDD									
Config 1,4 CR.1.1 CR.1.1 CR.1.1									
FDD FDD FDD									
RMSI CORESET Config 2,5 CR.1.1 - CR.1.1									
Reference Charmer									
Config 3,6 CR.2.1 CR.2.1 CR.2.1 CR.2.1 TDD TDD TDD									
Config 1,4 CCR.1. CCR.1. CCR.1.1									
TFDD TFDD FDD									
Control Channel Config 2,5 CCR.1. CCR.1. CCR.1.	_								
RMC									
Config 3,6 CCR.2. CCR.2. CCR.2. TDD TDD									
TDC4 TDC44 TDC44									
TRS configuration Config 1,4 TRS.1.1 - TRS.1.1 - TRS.1.1 FDD - TRS.1.1 FDD	-								
Config 2,5 TRS.1. TRS.1.1 TRS.1.1 TRS.1.1									
1 TDD									
Config 3,6 2 TDD TDD TDD TDD									
OCNG Patterns OP. 1									
SS-RSSI-Measurement Not Applicable									
Time offset with Config 1,4 ms - 3 - 3 -	3								
Cell 2 Config 2,3,5,6 μs - 3 - 3 -	3								
SMTC Config 1,4 SMTC.2									
configuration Config 2,3,5,6 SMTC.1									

Config 1,2,4,5 Config 3,6 SSB.1 FR1	0
PDSCH/PDCCH Subcarrier spacing Config 1,2,4,5 Config 3,6 Config 3,6 Subcarrier spacing Subcarrier spacing Config 3,6 Subcarrier spacing Subcarrier spacing	0
Subcarrier spacing Config 3,6	0
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1) EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH TO 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0
EPRE ratio of PBCH DMRS to SSS	0
EPRE ratio of PBCH to PBCH DMRS	0
EPRE ratio of PDCCH to PDCCH DMRS	0
EPRE ratio of PDSCH DMRS to SSS	0
EPRE ratio of PDSCH to PDSCH	
EPRE ratio of OCNG DMRS to SSS(Note 1)	
NR_FDD_FR1_A	
Config 1,2,4,5	
Config 1,2,4,5	
Config 1,2,4,5	
Name Name <td< td=""><td></td></td<>	
Name Name <td< td=""><td></td></td<>	
Noc NR_FDD_FR1_D, NR_TDD_FR1_E, NR_TDD_FR1_E, NR_FDD_FR1_E, NR_FDD_FR1_G 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
Noc NR_FDD_FR1_B Noc NR_FDD_FR1_H Note2 NR_FDD_FR1_A NR_FDD_FR1_A NR_FDD_FR1_A NR_TDD_FR1_A NR_TDD_FR1_A	
NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A, NR_TDD_FR1_A NOTE 7 NR_FDD_FR1_A Hz -114	
Noce NR_FDD_FR1_G -111 Note2 NR_FDD_FR1_H -110.5 NR_TDD_FR1_A, NR_TDD_FR1_A, NOTE 7 Hz -114	
Note2 NR_FDD_FR1_H NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 7 dBm/15k Hz -110.5	
Note2 NR_FDD_FR1_A, Hz NR_TDD_FR1_A NOTE 7 NR_TDD_FR1_A -114	
Note2 NR_FDD_FR1_A, Hz NR_TDD_FR1_A NOTE 7 NR_TDD_FR1_A -114	
NR_TDD_FR1_A NOTE 7	
NR_FDD_FR1_B -113.5	
· · · · · · · · · · · · · · · · · · ·	
Config NR_TDD_FR1_C113	
3,6 NR_FDD_FR1_D, -91 -	
NR_TDD_FR1_D	
NR_FDD_FR1_E,	
NR_IDD_FR1_E	
NR_FDD_FR1_G -111	
NR_FDD_FR1_H -110.5	
NR_FDD_FR1_A,	
NR_TDD_FR1_A -114	
NR_FDD_FR1_B -113.5	
Config NR_TDD_FR1_C113	
NR_FDD_FR1_D, -85 -101 112.5	
INK_IDD_FKI_D	
NR_FDD_FR1_E,	
NR_FDD_FR1_G -111	
N_{oc} NR_FDD_FR1_H dBm/SC -110.5	
Note2 NR_FDD_FR1_A, S NR_TDD_FR1_A -111	
NOTE 7	
NR_FDD_FR1_B -110.5	
NP TDD EP1 C	
CONTIG NID EDD EP1 D	
3,6 NR_TDD_FR1_D -109.5	
NR FDD FR1 F	
NR_TDD_FR1_E -109	
NR_FDD_FR1_G -108	

\hat{E}_{s}/I_{ot}		dB	-1	.76	-4	7	-5.46	-5.46	
\hat{E}_s/N_c	ос		dB	3	3	-2.9	-2.9	-4	-4
SS-	Config 1,2,4,5	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 7 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E		-82	-82	-103.9	-103.9	-118 -117.5 -117 -116.5 -116	-118 -117.5 -117 -116.5 -116
		NR_FDD_FR1_G NR_FDD_FR1_H	dBm/SC					-115 -114.5	-115 -114.5
RSRP Note3		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 7	S		-85			-115	-115
	Config 3,6	NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E,		-85		-	-	-114.5 -114 -113.5	-114.5 -114 -113.5
		NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H						-112 -111.5	-112 -111.5
SS-RSRQ Note3		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 7 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dB	-14.77	-14.77	-16.76	-16.76	-17.34	-17.34
	Config 1,2,4,5	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 7 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D	dBm/ 9.36MHz	-4	50	-7	70	-83 -82 -82	3 2.5
Io ^{Note3}		NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H						-81.5 -80.5 -80	
	Config 3,6	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 7 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D,	dBm/ 38.16M Hz	-50			-	-77.4 -76.9 -76.4	
		NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E						-75.9 -75.4	

	NR	R_FDD_FR1_G			-74.4			1.4	
	NR						-73	3.9	
Propaga	Propagation condition		-	AWGN	AWGN	AWGN	AWGN	AWGN	AWGN
Antenna configuration			1x2	1x2	1x2	1x2	1x2	1x2	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in Clause 3.5.2.
- Note 6: Subtest 2 is not used when testing with 30kHz SSB SCS.
- Note 7: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.4.7.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.7.1.1.

A.4.7.2.2 EN-DC Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.9.1.1 and 10.1.9.1.2 for inter frequency measurement.

A.4.7.2.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.4.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.4.7.2.2.2-2. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.4.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE	is only required to be tested in one of the supported test configurations

Table A.4.7.2.2.2: SS-RSRQ Inter frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3	
F-	Onit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN			freq1	freq2	freq1	freq2	freq1	freq2
Duplex mode	Config 1.4				FD	D		

	Config 2,3,5,6				TD	D					
	Config 1,4		Not Applicable								
TDD configuration	Config 2,5	7	TDDConf.1.1 TDDConf.2.1								
	Config 3,6										
	Config 1,4		10: N _{RB,c} = 52								
BWchannel	Config 2,5	MHz	10: N _{RB,c} = 52								
	Config 3,6		40: N _{RB,c} = 106								
	Config 1,4		10: N _{RB,c} = 52								
BWP BW	Config 2,5	MHz			10: N _{RB}	,c = 52					
	Config 3,6		40: N _{RB,c} = 106								
DRX Cycle	ms			Not App	licable						
	Config 1,4		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD				
PDSCH Reference measurement channel	Config 2,5		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1.1 TDD	-			
	Config 3,6		SR.2.1 TDD		SR.2.1 TDD		SR.2.1 TDD				
	Config 1,4		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD				
RMSI CORESET Reference Channel	Config 2,5		CR.1.1 TDD	-	CR.1.1 TDD	-	CR.1.1 TDD	-			
	Config 3,6		CR.2.1 TDD		CR.2.1 TDD		CR.2.1 TDD				
	Config 1,4		CCR.1. 1 FDD		CCR.1. 1 FDD		CCR.1 .1 FDD				
Dedicated CORESET Reference Channel	Config 2,5		CCR.1. 1 TDD	-	CCR.1. 1 TDD	_	CCR.1 .1 TDD	-			
	Config 3,6		CCR.2. 1 TDD		CCR.2. 1 TDD		CCR.2 .1 TDD				
TRS configuration	Config 1,4		TRS.1. 1 FDD	-	TRS.1.1 FDD	-	TRS.1. 1 FDD	-			
	Config 2,5		TRS.1. 1 TDD		TRS.1.1 TDD		TRS.1. 1 TDD				
	Config 3,6		TRS.1. 2 TDD		TRS.1.2 TDD		TRS.1. 2 TDD				
OCNG Patterns					OCNG p	attern 1	-				
Time offset with Cell 2	Config 1,4	ms	-	3	-	3	-	3			
	Config 2,3,5,6	μs	-	3	-	3	-	3			
SMTC configuration	Config 1,4	_			SMTC pa						
Config 2,3,5,6 Config 1,2,4,5		-	SMTC pattern 1 SSB pattern 1 in FR1								
SSB configuration	Config 3,6		SSB pattern 2 in FR1								
PDSCH/PDCCH	Config 1,2,4,5 Config 3,6	kHz			15 k	Hz					
subcarrier spacing	NIIZ			30 k	Hz	_					
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS EPRE ratio of PBCH to PBC EPRE ratio of PDCCH DMR	dB	0	0	0	0	0	0				
	EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS										

EPRE ratio	of PDSCH DMF	RS to SSS									
EPRE ratio of PDSCH to PDSCH											
	EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)										
EPRE ratio	of OCNG to OC										
	Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G	dBm/15kHz	-80.18	-80.18	-106	-106	-116 -115.5 -115 -114.5 -114	-116 -115.5 -115 -114.5 -114		
N_{oc}		NR_FDD_FR1_H						-112.5	-112.5		
	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dBm/15kHz	-86.27	-86.27	-113	-113	-116 -115.5 -115 -114.5 -114 -113 -112.5	-116 -115.5 -115 -114.5 -114 -113 -112.5		
		NR FDD FR1 A									
N_{oc}	Config 1,2,4,5	NR_TDD_FR1_A		-80.18	-80.18	-106	-106	-116 -115.5 -115 -114.5 -114.5 -114 -113 -112.5	-116 -115.5 -115 -114.5 -114 -113 -112.5		
	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G	dBm/SCS	dBm/SCS	dBm/SCS	dBm/SCS	-83.27	-83.27	-110	-110	-113 -112.5 -112 -111.5 -111 -110 -109.5
Ê ¸ /I ot			dB	-1.75	-1.75	-1.75	-1.75	3	-1.75		
\hat{E}_{s}/N_{oc}			dB	-1.75	-1.75	-1.75	-1.75	3	-1.75		
		NR_FDD_FR1_A NR_TDD_FR1_A NR_SDL_FR1_A NR_FDD_FR1_B						-113	- 117.75		
								-112.5	117.25		
	Config	NR_TDD_FR1_C NR_FDD_FR1_D		-81.93	-81.93	-107.75	-107.75	-112	116.75		
SS- RSRP ^{Note3}	1,2,4,5	NR_FDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E	dBm/SCS	-01.30	-01.30	-107.75	-107.73	-111.5 -111	116.25 - 115.75		
		NR_FDD_FR1_G							-		
		NR_FDD_FR1_H						-110 -109.5	114.75 - 114.25		
	Config 3,6	NR_FDD_FR1_A NR_TDD_FR1_A		-85.02	-85.02	-111.75	-111.75	-110	114.25		
L		INK_IDD_FKI_A	l		l	l		-110	114./5		

		ND ODL ED4 A	ı		1	1	1	1	
		NR_SDL_FR1_A							
		NR_FDD_FR1_B						-109.5	114.25
		NR_TDD_FR1_C						-109	- 113.75
		NR_FDD_FR1_D	†						-
		NR_TDD_FR1_D	ļ					-108.5	113.25
		NR_FDD_FR1_E NR_TDD_FR1_E						-108	112.75
		NR_FDD_FR1_G	†						-
		NK_FDD_FK1_G						-107	111.75
		NR_FDD_FR1_H						-106.5	111.25
		NR_FDD_FR1_A							
		NR_TDD_FR1_A NR_FDD_FR1_B	1						
		NR TDD FR1 C	ł						
N	-4-2	NR_FDD_FR1_D	dB	-14.77	-14.77	-40.59	-40.59		
SS-RSRQ N	nes	NR_TDD_FR1_D						-12.56	-14.76
		NR_FDD_FR1_E							
		NR_TDD_FR1_E							
		NR_FDD_FR1_G	ļ						
		NR_FDD_FR1_H							
		NR_FDD_FR1_A						00.00	05.00
	Config 1,2,4,5	NR_TDD_FR1_A NR_SDL_FR1_A	dBm/ 9.36MHz	-50	-50	-75.83	-75.83	-83.28	-85.83
		NR_FDD_FR1_B						-82.78	-85.33
		NR_TDD_FR1_C						-82.28	-84.83
		NR_FDD_FR1_D						-81.78	-84.33
		NR_TDD_FR1_D NR_FDD_FR1_E							
		NR_TDD_FR1_E						-81.28	-83.83
		NR FDD FR1 G						-80.28	-82.83
Io ^{Note3}		NR_FDD_FR1_H						-79.78	-82.33
10		NR_FDD_FR1_A							
		NR_TDD_FR1_A						-77.19	-79.73
		NR_SDL_FR1_A							
		NR_FDD_FR1_B						-76.69	-79.23
	0	NR_TDD_FR1_C	dBm/	50	50	70.70	70.70	-76.19	-78.73
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D	38.16MHz	-50	-50	-76.73	-76.73	-75.69	-78.23
		NR_FDD_FR1_E	†					75.40	77.70
		NR_TDD_FR1_E						-75.19	-77.73
		NR_FDD_FR1_G						-74.19	-76.73
		NR_FDD_FR1_H						-73.69	-76.53
Propagation	n condition			AWGN	AWGN	AWGN	AWGN	AWG	AWG
. Topagane	condition			,	/	/	/ 111 011	N	N

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.

Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: NR operating band groups are as defined in Section 3.5.2.

A.4.7.2.2.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in section 10.1.9.1.1 and 10.1.9.1.2.

A.4.7.3 SS-SINR

A.4.7.3.1 EN-DC Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.12.1.1.

A.4.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.4.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is tested by using the parameters in Table A.4.7.3.1.2-2. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.4.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is	s only required to be tested in one of the supported test configurations

Table A.4.7.3.1.2-2: SS-SINR Intra frequency test parameters

Parame	Unit	Tes	Test 1		Test 2		
Parame	Unit	Cell 2	Cell 3	Cell 2	Cell 3		
SSB ARFCN			fre	q1	free	q1	
Duplex mode	Config 1,4			F	DD		
Duplex mode	Config 2,3,5,6			T	DD		
	Config 1,4			Not Ap	plicable		
TDD configuration	Config 2,5			TDDC	onf.1.1		
	Config 3,6			TDDC	onf.2.1		
Downlink initial BWP cor	nfiguration			DLBV	VP.0.1		
Downlink dedicated BWI				DLBV	VP.1.1		
Uplink initial BWP config				ULBWP.0.1			
Uplink dedicated BWP c	onfiguration		ULBWP.1.1				
DRX Cycle configuration		ms		Not Applicable			
TRS Configuration	Config 1,4		TRS.1.1		TRS.1.1		
	0 " 0 5		FDD		FDD		
	Config 2,5		TRS.1.1 TDD	-	TRS.1.1 TDD	-	
	Config 3,6		TRS.1.2		TRS.1.2		
	Johning 5,5		TDD		TDD		
	Config 1,4		SR.1.1		SR.1.1		
	Coming 1,4		FDD		FDD		
PDSCH Reference	Config 2,5		SR.1.1	-	SR.1.1	-	
measurement channel		4	TDD		TDD		
	Config 3,6		SR.2.1 TDD		SR2.1 TDD		
	0 " 1 1	1	CR.1.1		CR.1.1		
	Config 1,4		FDD	-	FDD		

RMSI COF	RESET	Config 2,5		CR.1.1 TDD		CR.1.1 TDD	
Reference	Channel	Config 3,6		CR.2.1 TDD		CR.2.1 TDD	
		Config 1,4		CCR.1. 1 FDD		CCR.1.1 FDD	
Dedicated Reference	CORESET Channel	Config 2,5		CCR.1. 1 TDD	-	CCR.1.1 TDD	-
		Config 3,6		CCR.2. 1 TDD		CCR.2.1 TDD	
OCNG Pat	terns				0	P.1	
	/leasurement				Not Ap	plicable	
T. "	0 0	Config 1,4	ms	-	3	-	3
i ime offse	t with Cell 2	Config 2,3,5,6	แร	-	3	-	3
01470	e	Config 1,4	•		SM	TC.2	
SMTC con	figuration	Config 2,3,5,6				TC.1	
		Config 1,2,4,5				1 FR1	
SSB config	guration	Config 3,6				2 FR1	
PDSCH/PI	CCH	Config 1,2,4,5				15	
subcarrier		Config 3,6	kHz			30	
	of PSS to SSS				<u> </u>	<u> </u>	
	of PBCH DMRS	S to SSS	1				
	of PBCH to PB0		1				
	of PDCCH DMF				0	0	
EPRE ratio	of PDCCH to P	DCCH DMRS	dB	0			0
EPRE ratio	of PDSCH DMF	RS to SSS					
	of PDSCH to Pl						
		S to SSS(Note 1)					
EPRE ratio	of OCNG to OC	NG DMRS (Note 1)					
	NR_FDD_FR1_A, NR_TDD_FR1_A					-116	
		NR FDD FR1 B	1	-93		-115.5	
		NR_TDD_FR1_C				-115	
$N_{\it oc}^{\rm Note2}$		NR_FDD_FR1_D, NR_TDD_FR1_D	dBm/15kH z			-114.5	
		NR_FDD_FR1_E,				-114	
		NR_TDD_FR1_E NR_FDD_FR1_G				-1	13
		NR_FDD_FR1_H				-11:	_
	Config 1,2,4	5		-93 Sa		Same as	Noc for
	Corning 1,2,4]	-\	<i>3</i> .3	15k	Hz
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6				-11	13
		NR FDD FR1 B				-11:	2.5
N_{oc} Note2		NR TDD FR1 C	dBm/SCS			-11	
oc oc	Config 3,6	NR_FDD_FR1_D,	42/11/000	_0	90		
	309 0,0	NR_TDD_FR1_D		`		-11	1.5
		NR_FDD_FR1_E, NR_TDD_FR1_E				-1 ⁻	11
		NR FDD FR1 G				-1 ⁻	10
		NR FDD FR1 H				-10	_
\hat{E}_{s}/I_{ot}			dB	0	-3.19	-5.46	-5.46
\hat{E}_s/N_{oc}		dB	4.54	2.66	-4	-4	
s / OC		NR_FDD_FR1_A,	-				
SS-	Config	NR_TDD_FR1_A NOTE 6	-ID (000		06.51	-120	-120
RSRP ^{Not}	1,2,4,5		dBm/SCS	-88.46	-90.34	440.5	440.5
65		NR_FDD_FR1_B				-119.5	-119.5
		NR_TDD_FR1_C				-119	-119

			1	1	1	1	1
		NR_FDD_FR1_D, NR_TDD_FR1_D				-118.5	-118.5
		NR_FDD_FR1_E, NR_TDD_FR1_E				-118	-118
		NR_FDD_FR1_E				-117	-117
		NR_FDD_FR1_H	1			-116.5	-116.5
		NR_FDD_FR1_A,				110.0	110.0
		NR_TDD_FR1_A				-117	-117
		NR_FDD_FR1_B				-116.5	-116.5
		NR_TDD_FR1_C				-116	-116
	Config 3,6	NR_FDD_FR1_D,		-85.46	-87.34	-115.5	-115.5
		NR_TDD_FR1_D					
		NR_FDD_FR1_E,				-115	-115
		NR_TDD_FR1_E					
		NR_FDD_FR1_G				-114	-114
		NR_FDD_FR1_H				-113.5	-113.5
		NR_FDD_FR1_A, NR_TDD_FR1_A					
		NR_TDD_FRT_A NOTE 6					
		NR_FDD_FR1_B					
		NR TDD FR1 C					
SS-SINR N	lote3	NR_FDD_FR1_D,	dB	0	-3.19	-5.46	-5.46
J G G G G G G G G G G G G G G G G G G G		NR TDD FR1 D				0.10	0.10
		NR_FDD_FR1_E,					
		NR_TDD_FR1_E					
		NR_FDD_FR1_G					
		NR_FDD_FR1_H]				
		NR_FDD_FR1_A,				-85	.51
		NR_TDD_FR1_A NOTE 6					
		NR_FDD_FR1_B				-85	.01
	Config	NR_TDD_FR1_C	dBm/			-84	.51
	1,2,4,5	NR_FDD_FR1_D,	9.36MHz	-57.5		-84.01	
	1,2,1,0	NR_TDD_FR1_D	0.001/11/12				
		NR_FDD_FR1_E,				-83.51	
		NR_TDD_FR1_E				00	E 4
		NR_FDD_FR1_G	-			-82	
Io ^{Note3}		NR_FDD_FR1_H NR_FDD_FR1_A,				-82 -79	
		NR TDD FR1 A				-13	1
		NOTE 6					
		NR_FDD_FR1_B	1			-78	.91
		NR_TDD_FR1_C	<i>,</i>			-78	
	Config 3,6	NR_FDD_FR1_D,	dBm/	-51	.41	-77	
		NR_TDD_FR1_D	38.16MHz				
		NR_FDD_FR1_E,				-77	.41
		NR_TDD_FR1_E					
		NR_FDD_FR1_G				-76	
NR_FDD_FR1_H					-75.91		.91
	on condition		-			/GN	
Antenna configuration			-	1x2			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4:	SS-SINR, SS-RSRP minimum requirements are specified assuming independent
	interference and noise at each receiver antenna port.
Note 5:	NR operating band groups are as defined in Clause 3.5.2.
Note 6:	The test configuration excludes support for band n51 and it is not required to run this test
	on band n51 in this release of the specification.

A.4.7.3.1.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.12.1.1.

A.4.7.3.2 EN-DC Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.4.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.14.1.1 and 10.1.14.1.2 for interfrequency measurement.

A.4.7.3.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.4.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table A.4.7.3.2.2-2. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell of which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.4.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

Config	Description				
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations					

Table A.4.7.3.2.2-2: SS-SINR Inter frequency test parameters

Parameter		Unit	it Test 1		Test 2		Test 3		
Faia	meter	Onit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN			freq1	freq2	freq1	freq2	freq1	freq2	
Duplex mode	Config 1,4				F	DD			
Duplex mode	Config 2,3,5,6		TDD						
Config 1,4					Not Ap	plicable			
TDD configuration	Config 2,5		TDDConf.1.1						
	Config 3,6		TDDConf.2.1						
Downlink initial BWP of	configuration		DLBWP.0.1						
Downlink dedicated BWP configuration			DLBWP.1.1						
Uplink initial BWP configuration			ULBWP.0.1						
Uplink dedicated BWP configuration			ULBWP.1.1						

DRX Cycle configuration	ms	Not Applicable						
Gap pattern ID	Gap pattern ID		0	-	0	-	0	-
TRS Configuration	Config 1,4		TRS.1. 1 FDD		TRS.1.1 FDD		TRS.1.1 FDD	
	Config 2,5		TRS.1. 1 TDD	-	TRS.1.1 TDD	-	TRS.1.1 TDD	-
	Config 3,6		TRS.1. 2 TDD		TRS.1.2 TDD		TRS.1.2 TDD	
	Config 1,4		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD	
PDSCH Reference measurement channel	Config 2,5		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1.1 TDD	-
	Config 3,6		SR.2.1 TDD		SR.2.1 TDD		SR.2.1 TDD	
	Config 1,4		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD	
RMSI CORESET Reference Channel	Config 2,5		CR.1.1 TDD	-	CR.1.1 TDD	-	CR.1.1 TDD	-
	Config 3,6		CR.2.1 TDD		CR.2.1 TDD		CR.2.1 TDD	
	Config 1,4		CCR.1. 1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD	
Dedicated CORESET Reference Channel	Config 2,5		CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	CCR.1. 1 TDD	-
	Config 3,6		CCR.2. 1 TDD		CCR.2. 1 TDD		CCR.2. 1 TDD	
OCNG Patterns			OP.1					
SS-RSSI-Measuremer	t		Not Applicable					
SMTC configruation			SMTC.1					
Time offset with Cell 2	Config 1,4	ms	-	3	-	3	-	3
	Config 2,3,5,6	μs	-	3	-	3	-	3
SMTC configruation	Config 1,4				SM	TC.2		
Sivi o comigration	Config 2,3,5,6				SM	TC.1		
SSB configuration	Config 1,2,4,5				SSB.	.1 FR1		
33B configuration	Config 3,6				SSB.	.2 FR1		
PDSCH/PDCCH	Config 1,2,4,5	kHz	15					
subcarrier spacing	Config 3,6	KI IZ			;	30		
EPRE ratio of PSS to SSS								
	EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DN	/IRS to SSS	dB						
	EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS		0	0	0	0	0	0
EPRE ratio of PDSCH to		1						
EPRE ratio of OCNG DM	RS to SSS(Note 1)							
EPRE ratio of OCNG to C								
N _{oc} Note2 Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15k Hz	-8	38	-108.5		-119.5	
	NR_FDD_FR1_B						-1	19

	1	ND TDD FD4 O	1		1	440.5
		NR_TDD_FR1_C NR_FDD_FR1_D	=			-118.5
		NR_TDD_FR1_D				-118
		NR_FDD_FR1_E NR_TDD_FR1_E				-117.5
		NR_FDD_FR1_G				-116.5
		NR_FDD_FR1_H				-116
	Config 1,2,4			-88	-108.5	Same as Noc for 15kHz
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6				-116.5
N_{oc} Note2		NR_FDD_FR1_B	dBm/SC			-116
IV oc	Config 3,6	NR_TDD_FR1_C	S	-85	-105.5	-115.5
	Coming 0,0	NR_FDD_FR1_D NR_TDD_FR1_D		00	100.0	-115
		NR_FDD_FR1_E NR_TDD_FR1_E				-114.5
		NR_FDD_FR1_G	-			-114.5
Ê/I		NR_FDD_FR1_H	٩D	-1.75	20	-113 -4.0
\hat{E}_s/I_{ot}			dB			_
\hat{E}_{s}/N_{oc}	1	T	dB	-1.75	20	-4.0
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6				-123.5
	Config 1,2,4,5	NR_FDD_FR1_B	dBm/SC	-89.75	-88.5	-123
		NR_TDD_FR1_C				-122.5
		NR_FDD_FR1_D NR_TDD_FR1_D				-122
		NR_FDD_FR1_E NR_TDD_FR1_E				-121.5
		NR_FDD_FR1_G				-120.5
SS- RSRP ^{Not}		NR_FDD_FR1_H				-120
e3		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	S			-120.5
		NR FDD FR1 B				-120
	0	NR_TDD_FR1_C		00.75	05.5	-119.5
	Config 3,6	NR_FDD_FR1_D		-86.75	-85.5	-119
		NR_TDD_FR1_D	-			110
		NR_FDD_FR1_E NR_TDD_FR1_E				-118.5
		NR_FDD_FR1_G]			-117.5
		NR_FDD_FR1_H				-117
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6				
		NR_FDD_FR1_B	-			
CC CIVIDA	lote3	NR_TDD_FR1_C	٦D	4 7 E	20	4.0
SS-SINR Note3		NR_FDD_FR1_D	dB	-1.75	20	-4.0
		NR_TDD_FR1_D	-			
		NR_FDD_FR1_E NR_TDD_FR1_E				
		NR_FDD_FR1_G	1			
		NR_FDD_FR1_H				

		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6				-90.09	
		NR_FDD_FR1_B				-89.59	
	Config	NR_TDD_FR1_C	dBm/	E7 02	-60.5	-89.09	
	1,2,4,5	NR_FDD_FR1_D NR_TDD_FR1_D	9.36MHz	-57.83	-60.5	-88.59	
		NR_FDD_FR1_E NR_TDD_FR1_E				-88.09	
		NR_FDD_FR1_G				-87.09	
Io ^{Note3}		NR_FDD_FR1_H				-86.59	
.0		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6		54.70		-84	
		NR_FDD_FR1_B				-83.5	
	Config 2.6	NR_TDD_FR1_C	dBm/ 38.16MH		-54.41	-83	
	Config 3,6	NR_FDD_FR1_D NR_TDD_FR1_D	Z Z	-51.73	-54.41	-82.5	
		NR_FDD_FR1_E				-82	
		NR_TDD_FR1_E NR_FDD_FR1_G				-81	
		NR FDD FR1 H				-80.5	
Propagation	Propagation condition		-		AWGN		
	Antenna configuration		-	1x2			

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in Clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.4.7.3.2.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.14.1.1 and 10.1.14.1.2.

A.4.7.4 L1-RSRP measurement for beam reporting

A.4.7.4.1 SSB based L1-RSRP measurement

A.4.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 9.5.2 and clause 10.1.19.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.4.7.4.1.1-1.

Table A.4.7.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	LTE FDD. NR 15 kHz SSB SCS. 10 MHz bandwidth. FDD duplex mode

	2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

A.4.7.4.1.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.7.4.1.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.4.7.4.1.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.4.7.4.1.2-1: FR1 SSB based L1-RSRP test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~6		freq1	freq1
	1,4		FDD	FDD
Duplex mode	2,5		TDD	TDD
	3,6		TDD	TDD
	1,4		N/A	N/A
TDD Configuration	2,5		TDDConf.1.1	TDDConf.1.1
	3,6		TDDConf.2.1	TDDConf.2.1
	1,4		10: N _{RB,c} = 52	10: N _{RB,c} = 52
BW _{channel}	2,5	MHz	10: N _{RB,c} = 52	10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106	40: N _{RB,c} = 106
PDSCH Reference	1,4		SR.1.1 FDD	SR.1.1 FDD
measurement channel	2,5		SR.1.1 TDD	SR.1.1 TDD
ineasurement channel	3,6		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET Reference	1,4		CR.1.1 FDD	CR.1.1 FDD
Channel	2,5		CR.1.1 TDD	CR.1.1 TDD
Chamer	3,6		CR.2.1 TDD	CR.2.1 TDD
Dedicated CORESET	1,4		CCR.1.1 FDD	CCR.1.1 FDD
Reference Channel	2,5		CCR.1.1 TDD	CCR.1.1 TDD
Neierence Charmer	3,6		CCR.2.1 TDD	CCR.2.1 TDD
	1,4		SSB.3 FR1	SSB.3 FR1
SSB configuration	2,5		SSB.3 FR1	SSB.3 FR1
	3,6		SSB.4 FR1	SSB.4 FR1
OCNG Patterns	1~6		OP.1	OP.1
	1,4		TRS.1.1 FDD	TRS.1.1 FDD
TRS configuration	2,5		TRS.1.1 TDD	TRS.1.1 TDD
	3,6		TRS.1.2 TDD	TRS.1.2 TDD
Initial BWP Configuration	1~6		DLBWP.0.1	DLBWP.0.1
Initial BVVF Configuration	1~0		ULBWP.0.1	ULBWP.0.1
Dedicated BWP configuration	1~6		DLBWP.1.1	DLBWP.1.1
Dedicated DVVP Configuration	1~0		ULBWP.1.1	ULBWP.1.1
SMTC configuration	1~6		SMTC.1	SMTC.1
reportConfigType	1~6		periodic	periodic

reportQu	antity	1~6		ssb-Index-RSRP	ssb-Index-RSRP
	of reported RS	1~6		2	2
	reporting period	1~6		slot80	slot80
	o of PSS to SSS				
	of PBCH DMRS to SSS				
	of PBCH to PBCH DMRS				
	of PDCCH DMRS to SSS				
	of PDCCH to PDCCH				
DMRS EPRE ratio	o of PDSCH DMRS to SSS	1~6	dB	0	0
	o of PDSCH to PDSCH	11-0	ub.	· ·	· ·
DMRS					
	of OCNG DMRS to				
SSSNote 1	o of OCNG to OCNG				
DMRS Note					
5	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-117
	NOTE 5				
	NR_FDD_FR1_B				-116.5
N_{oc}	NR_TDD_FR1_C				-116
Note2	NR_FDD_FR1_D,	1~6	dBm/15kHz	-94.65	
Notez	NR_TDD_FR1_D	. 0	abili, fold iz	0 1.00	-115.5
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				-115
	NR_FDD_FR1_G	- -			-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				110.0
	NR_TDD_FR1_A				-117
	NOTE 5				
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,	1,2,4,5		-94.65	
	NR_TDD_FR1_D	,2, .,0		000	-115.5
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				-115
	NR_FDD_FR1_G				-114
N_{oc}	NR_FDD_FR1_H		dBm/SSB		-113.5
Note2	NR_FDD_FR1_A,		SCS		
Notez	NR_TDD_FR1_A				-114
	NOTE 5				'''
	NR FDD FR1 B				-113.5
	NR_TDD_FR1_C				-114
	NR_FDD_FR1_D,	3,6		-91.65	
	NR_TDD_FR1_D	0,0		0.100	-112.5
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				-112
	NR_FDD_FR1_G				-111
	NR FDD FR1 H				-110.5
\hat{E}_{s}/I_{ot}	<u> </u>	1.6	40	10	
$\mathbf{L}_{\mathrm{s}}/1_{\mathrm{ot}}$	T	1~6	dB	10	-3
	NR_FDD_FR1_A, NR_TDD_FR1_A				
					-120
SSB	NOTE 5		dBm/SSB		
RSRP	NR_FDD_FR1_B	1,2,4,5	SCS	-84.65	-119.5
Note3	NR_TDD_FR1_C				-119
	NR_FDD_FR1_D,				-118.5
	NR_TDD_FR1_D				

	ND 500 504 5			T	1
	NR_FDD_FR1_E,				-118
	NR_TDD_FR1_E NR_FDD_FR1_G				-117
	NR_FDD_FR1_H	+			-116.5
	NR_FDD_FR1_A,		-		-110.5
	NR_TDD_FR1_A				-117
	NOTE 5				-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,	3,6		-81.65	445.5
	NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				-113
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A	1,2,4,5	dBm/9.36 MHz		-87.28
	NOTE 5				
	NR_FDD_FR1_B				-86.78
	NR_TDD_FR1_C				-86.28
	NR_FDD_FR1_D,			-56.28	-85.78
	NR_TDD_FR1_D	1			
	NR_FDD_FR1_E,				-85.28
	NR_TDD_FR1_E	-			04.00
	NR_FDD_FR1_G	-			-84.28
lo Note3	NR_FDD_FR1_H NR_FDD_FR1_A,				-83.78
	NR_TDD_FR1_A,				-81.19
	NOTE 5				-01.19
	NR_FDD_FR1_B				-80.69
	NR_TDD_FR1_C	1			-80.19
	NR_FDD_FR1_D,	3,6	dBm/38.16	-50.19	
	NR_TDD_FR1_D	,	MHz		-79.69
	NR_FDD_FR1_E,	1			70.40
	NR_TDD_FR1_E				-79.19
	NR_FDD_FR1_G	1			-78.19
	NR_FDD_FR1_H				-77.69
\hat{E}_s/N_o	c	1~6	dB	10	-3
	tion condition	1~6		AWGN	AWGN
-	configuration	1~6		1x2	1x2
		L	Ļ		1

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.4.7.4.1.3 Test Requirements

The L1-RSRP measurement accuracy for SSB resource reported by UE in L1-RSRP report (SSB#0 or SSB#1) of Cell 2 shall fulfil the requirements in clauses 10.1.19.1.

A.4.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

A.4.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 9.5.3 and clause 10.1.19.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.4.7.4.2.1-1.

Table A.4.7.4.2.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Config	Description
1	LTE FDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only	required to be tested in one of the supported test configurations in each supported band

A.4.7.4.2.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.4.7.4.2.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.4.7.4.2.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.4.7.4.2.2-1: FR1 CSI-RS based L1-RSRP test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~6		freq1	freq1
	1,4		FDD	FDD
Duplex mode	2,5		TDD	TDD
	3,6		TDD	TDD
	1,4		N/A	N/A
TDD Configuration	2,5		TDDConf.1.1	TDDConf.1.1
	3,6		TDDConf.2.1	TDDConf.2.1
	1,4		10: N _{RB,c} = 52	10: N _{RB,c} = 52
BWchannel	2,5	MHz	10: N _{RB,c} = 52	10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106	40: N _{RB,c} = 106
PDSCH Reference	1,4		SR.1.1 FDD	SR.1.1 FDD
measurement channel	2,5		SR.1.1 TDD	SR.1.1 TDD
measurement channel	3,6		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET Reference	1,4		CR.1.1 FDD	CR.1.1 FDD
Channel	2,5		CR.1.1 TDD	CR.1.1 TDD

		3,6	<u> </u>	CR.2.1 TDD	CR.2.1 TDD
		1,4		CCR.1.1 FDD	CCR.1.1 FDD
Dedicate	d CORESET	2,5		CCR.1.1 FDD	CCR.1.1 TDD
Reference	Reference Channel			CCR.1.1 TDD	CCR.1.1 TDD
		3,6 1,4		SSB.3 FR1	SSB.3 FR1
CCD con	figuration	,		SSB.3 FR1	SSB.3 FR1
335 0011	nguration	2,5			
OCNC D	ott o mo o	3,6		SSB.4 FR1	SSB.4 FR1
OCNG P	allerns	1~6		OP.1	OP.1
TDC	£: ±:	1,4		TRS.1.1 FDD	TRS.1.1 FDD
TRS con	figuration	2,5		TRS.1.1 TDD	TRS.1.1 TDD
		3,6		TRS.1.2 TDD	TRS.1.2 TDD
Initial BW	/P Configuration	1~6		DLBWP.0.1	DLBWP.0.1
				ULBWP.0.1	ULBWP.0.1
Dedicate	d BWP configuration	1~6		DLBWP.1.1	DLBWP.1.1
CMTC		4.0		ULBWP.1.1	ULBWP.1.1
SIVITOR	onfiguration	1~6		SMTC.1	SMTC.1
001.00		1,4		CSI-RS 1.2 FDD	CSI-RS 1.2 FDD
CSI-RS		2,5		CSI-RS 1.2 TDD	CSI-RS 1.2 TDD
		3,6		CSI-RS 2.2 TDD	CSI-RS 2.2 FDD
reportCo	· · ·	1~6		periodic	periodic
reportQu	·	1~6		cri-RSRP	cri-RSRP
	of reported RS	1~6		2	2
	reporting period	1~6		slot80	slot80
	o of PSS to SSS o of PBCH DMRS to SSS				
	o of PBCH to PBCH DMRS				
	o of PDCCH DMRS to SSS				
	of PDCCH to PDCCH				
DMRS					
	EPRE ratio of PDSCH DMRS to SSS		dB	0	0
EPRE ratio of PDSCH to PDSCH					
DMRS EDDE ratio	o of OCNG DMRS to				
SSS ^{Note 1}	O O OCING DIVING TO				
EPRE ratio	o of OCNG to OCNG	,			
DMRS Note					
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-117
	NOTE 5				
	NR_FDD_FR1_B				-116.5
N_{oc}	NR_TDD_FR1_C				-116
Note2	NR_FDD_FR1_D,	1~6	dBm/15kHz	-94.65	-115.5
	NR_TDD_FR1_D				
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				
	NR_FDD_FR1_G	,			-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				
NR_TDD_FR1_A					-117
	NOTE 5				
	NR_FDD_FR1_B	,			-116.5
N_{oc}	NR_TDD_FR1_C	1,2,4,5	dBm/CSI-RS		-116
Note2	Note?		SCS	-94.65	-115.5
NOIGZ	NR_TDD_FR1_D				110.0
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				-114
l	NR_FDD_FR1_H				-113.5

	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-114
	NR_FDD_FR1_B				-113.5
	NR_TDD_FR1_C				-114
	NR_FDD_FR1_D, NR_TDD_FR1_D	3,6		-91.65	-112.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-112
	NR_FDD_FR1_G				-111
	NR_FDD_FR1_H				-110.5
\hat{E}_{s}/I_{ot}		1~6	dB	10	10
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-120
	NR_FDD_FR1_B				-119.5
	NR TDD FR1 C				-119
	NR_FDD_FR1_D,	1,2,4,5		-84.65	
	NR_TDD_FR1_D	IR_TDD_FR1_D IR_FDD_FR1_E, IR_TDD_FR1_E IR_FDD_FR1_G			-118.5
	NR_FDD_FR1_E,			-118	
				-117	
CSI-RS	NR_FDD_FR1_H			-116.5	
RSRP Note3	NR_FDD_FR1_A,		SCS		
Notes	NR_TDD_FR1_A				-117
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C	3,6			-116
	NR_FDD_FR1_D, NR_TDD_FR1_D			-81.65	-115.5
	NR_FDD_FR1_E, NR_TDD_FR1_E				-115
	NR FDD FR1 G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-87.28
	NR_FDD_FR1_B				-86.78
	NR TDD FR1 C				-86.28
	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2,4,5	dBm/9.36 MHz	-56.28	-85.78
	NR_FDD_FR1_E,				-85.28
	NR_TDD_FR1_E NR_FDD_FR1_G				-84.28
	NR_FDD_FR1_H				-83.78
lo Note3	NR_FDD_FR1_A,				-00.70
	NR_TDD_FR1_A NOTE 5				-81.19
	NR_FDD_FR1_B				-80.69
	NR_TDD_FR1_C		dBm/38.16		-80.19
	NR_FDD_FR1_D, NR_TDD_FR1_D	3,6	MHz	-50.19	-79.69
	NR_FDD_FR1_E, NR_TDD_FR1_E				-79.19
	NR_FDD_FR1_G				-78.19
	NR_FDD_FR1_H				-77.69

\hat{E}_s/N_{oc}	1~6	dB	10	-3
Propagation condition	1~6		AWGN	AWGN
Antenna configuration	1~6		1x2	1x2

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.4.7.4.2.3 Test Requirements

The L1-RSRP measurement accuracy for CSI-RS resource reported by UE in L1-RSRP report (CSI-RS#0 or CSI-RS#1) of Cell 2 shall fulfil the requirements in clauses 10.1.19.2.

A.4.7.5 SFTD accuracy

A.4.7.5.1 SFTD accuracy

A.4.7.5.1.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the SFTD measurement accuracy is within the specified limits. This test will verify the requirements as specified in clause 9.1.27 in TS 36.133 [15] for EN-DC SFTD measurements.

A.4.7.5.1.2 Test Parameters

Supported test configurations are shown in Table A.4.7.5.1.2-1. In this set of test cases there are two cells on different carriers. Cell 1 is E-UTRAN PCell and Cell 2 is NR FR1 PSCell. The test parameters of cell 1 are given in clause A.3.7.2.1. The test parameters of cell 2 are given in Table A.4.7.5.1.2-2. The SFTD between PCell and PSCell shall be set by the test equipment to one of the time differences in Table A.4.7.5.1.2-3.

Table A.4.7.5.1.2-1: Supported test configurations for SFTD accuracy

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is of	only required to be tested in one of the supported test configurations

Table A.4.7.5.1.2-2: Test parameters for SFTD accuracy

Parameter	Config	Unit	Test 1
SSB GSCN	1~6		freq1
Duplex mode	1,4		FDD

		2,5		TDD
		3,6		TDD
		1,4		N/A
TDD Configu	ıration	2,5		TDDConf.1.1
. 2 2 3 3		3,6		TDDConf.2.1
		1,4		10: N _{RB,c} = 52
BW _{channel}		2,5	MHz	10: N _{RB,c} = 52
- · · channel		3,6	_	40: N _{RB,c} = 106
		1,4		SR.1.1 FDD
PDSCH Ref	erence measurement channel	2,5		SR.1.1 TDD
PDSCH Reference measurement channel		3,6		SR.2.1 TDD
		1,4		CR.1.1 FDD
RMSI CORE	SET Reference Channel	2,5		CR.1.1 TDD
RMSI CORESET Reference Channel		3,6		CR.2.1 TDD
		1,4		CCR.1.1 FDD
RMC CORE	SET Reference Channel	2,5		CCR.1.1 TDD
		3,6		CCR.2.1 TDD
		1,4		SSB.1 FR1
SSB configu	ration	2,5		SSB.1 FR1
3-		3,6	7	SSB.2 FR1
SMTC config	guration	1~6		SMTC.1
DL BWP cor		1~6		DLBWP.1.1
UL BWP cor		1~6		ULBWP.1.1
		1,4		TRS.1.1 FDD
CSI-RS for	tracking	2,5		TRS.1.1 TDD
	3	3,6		TRS.1.2 TDD
OCNG Patte	erns	1~6		OP.1
EPRE ratio	of PSS to SSS			
EPRE ratio	of PBCH DMRS to SSS			
EPRE ratio	of PBCH to PBCH DMRS	1		
EPRE ratio	of PDCCH DMRS to SSS			
EPRE ratio	of PDCCH to PDCCH DMRS	1~6	dB	0
EPRE ratio	of PDSCH DMRS to SSS			
EPRE ratio	of PDSCH to PDSCH DMRS			
EPRE ratio	of OCNG DMRS to SSS ^{Note 1}			
EPRE ratio	of OCNG to OCNG DMRS Note 1			
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A ^{NOTE 5}			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
N_{oc} Note2	NR_FDD_FR1_D,	1~6	dBm/15kHz	-104
oc	NR_TDD_FR1_D NR_FDD_FR1_E,	4		
	NR_TDD_FR1_E,			
	NR FDD FR1 G	1		
	NR FDD FR1 H	1		
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,	1,2,4,5		-104
	NR_TDD_FR1_D	1,2,4,0		-104
	NR_FDD_FR1_E,			
$N_{oc}^{ m Note2}$	NR_TDD_FR1_E	4	dBm/SSB SCS	
oc	NR_FDD_FR1_G	4		
	NR_FDD_FR1_H		4	
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B	1		
	NR_TDD_FR1_C	3,6		-101
	NR_FDD_FR1_D,	+		
	NR_TDD_FR1_D			

	TAID EDD ED4 E			T
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E	\dashv		
	NR_FDD_FR1_G	4		
- A /+	NR_FDD_FR1_H	+		
$E_{\rm s}/I_{\rm ot}$		1~6	dB	-3
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$ $\hat{E}_{\mathrm{s}}/N_{\mathrm{oc}}$		1~6	dB	-3
	NR_FDD_FR1_A,			
	NR_TDD_FR1_A NOTE 5	_		
	NR_FDD_FR1_B			
	NR_TDD_FR1_C	_		
	NR_FDD_FR1_D,	1,2,4,5		-107
	NR_TDD_FR1_D	=		
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E NR_FDD_FR1_G	=		
CC DCDD	NR_FDD_FR1_H	-		
SS-RSRP Note3	NR_FDD_FR1_A,	-	dBm/SCS	
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B	1		
	NR TDD FR1 C	┥		
	NR FDD FR1 D,	┥		
	NR_TDD_FR1_D	3,6		-104
	NR_FDD_FR1_E,	7		
	NR_TDD_FR1_E			
	NR_FDD_FR1_G	7		
	NR_FDD_FR1_H	T		
	NR_FDD_FR1_A,	<u> </u>	dBm/9.36 MHz	-74.28
	NR_TDD_FR1_A NOTE 5	_		
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,	1,2,4,5		
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E	4		
	NR_FDD_FR1_G	4		
lo Note3	NR_FDD_FR1_H	+	 	
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B	\dashv		
	NR_TDD_FR1_C	\dashv		
	NR_FDD_FR1_D,	\dashv		
	NR_TDD_FR1_D,	3,6	dBm/38.16 MHz	-68.18
	NR_FDD_FR1_E,	\dashv		
	NR_TDD_FR1_E			
	NR_FDD_FR1_G	7		
	NR_FDD_FR1_H	=		
Propagation		1~6		AWGN
Antenna con		1~6		1x2
7	ingura.c			··

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

SFN offset between PCell Condition Frame boundary offset between PCell and and PSCell PSCell (Ts) -122000 1 100 2 300 -60540 3 500 1000 700 4 62540 5 900 124000

Table A.4.7.5.1.2-3: Timing offsets for SFTD accuracy test

A.4.7.5.1.3 Test Requirements

The SFTD reported by the UE consists of 2 elements, SFN offset and frame boundary offset between PCell and PSCell. The reported SFTD accuracy shall fulfil the requirement in clause 9.1.27 in TS 36.133 [15].

A.4.7.5.2 Void

A.4.7.5.3 Void

A.4.8 Void

A.4A NE-DC test with all NR cells in FR1

A.4A.1 Signaling characteristics

A.4A.1.1 E-UTRAN PSCell addition

A.4A.1.1.1 Test purpose and environment

The purpose of this test is to verify that the LTE PSCell addition/release delay and interruption under NE-DC are within the requirements stated in clause 8.8 and clause 8.2.3.2.3 for the case when the PSCell is known by the UE at the time of addition.

Supported test configurations are shown in A.4A.1.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.1-1.

The test parameters for NR cell are given in Tables A.4A.1.1.1-2 and cell-specific parameters in A.4A.1.1.1-3 below. The test consists of five successive time periods with duration of T1, T2, T3, T4 and T5 respectively. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (NR PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (E-UTRAN PSCell) on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

Before the start of T2, the UE in the measurement control information that event-triggered reporting with Event B1 is configured for neighbour cell (Cell2). Before the start of T2 the UE is configured with the measurement gaps (gap pattern Id # 0). The Cell2 becomes known to the UE during T2. Therefore, during T2 the UE shall report Event B1. The point in time at which the RRC message to release measurement gap is transmitted from the test system defines the start of period T3. During T3, after measurement gap is released, the test system transmits the RRC message to the UE to add PSCell on radio channel 2.

The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of period T4.

The test system shall observe the periodic reporting of CSI for PSCell during T5. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of period T5.

The test system shall send a RRC message to the UE to release PSCell (Cell 2) on radio channel 2. The RRC message to release PSCell (Cell2) shall be sent to the UE during period T5, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to release PSCell (Cell2) is received at the UE antenna connector defines the start of period T6.

Table A.4A.1.1.1-1: Applicable E-UTRA and NR configurations for NE-DC PSCell addition and Release test

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only required to be tested in one of the supported test configurations

Table A.4A.1.1.1-2: General Test Parameters for PSCell Addition and Release

Par	rameter	Unit	Value	Comment
RF Channel N	lumber		1, 2	Two radio channels are used for this test. One
				for NR cell and second for E-UTRAN Cell
Initial	Active PCell		Cell1	PCell on RF channel number 1.
	Neighbour cell		Cell2	Neighbour cell on RF channel number 2.
Final	Active PCell		Cell1	PCell on RF channel number 1.
Condition	Neighbour Cell		Cell2	PSCell released on RF channel number 2.
B1	Hysteresis	dB	0	Hysteresis for evaluation of event B1.
	Threshold	dBm	-96	Actual RSRP threshold for event B1.
	RSRP			
	(Config 1,2,4,5)			
	Threshold	dBm	-93	Actual RSRP threshold for event B1.
	RSRP			
	(Config 3,6)			
	Time to Trigger	S	0	
DRX			OFF	Continuous monitoring of primary cell
Measurement gap pattern Id			0	Gaps are configured before T2 and released
				before T3.
	offset for cells on	dB	0	Individual offset for cells on primary component
RF channel nu				carrier.
	offset for cells on	dB	0	Individual offset for cells on carrier frequency of
RF channel nu	umber 2			cell2.
T1		S	1	During this time the PCell shall be known and
				cell2 shall be unknown.
T2		S	1	During this time the UE shall identify neighbour
				cell (cell2) and report event B1.
Т3		S	3.5	During this time the test system transmits the
				RRC messages to release measurement gap
				and add PSCell.
T4		S	0.5	During this time the UE adds the PSCell.
T5		S	0.5	During this time the UE sends CSI reports for
				PSCell.

T6	S	0.5	During this time the UE releases the PSCell.
		0.0	Burning and and GE released and recent

Table A.4A.1.1.1-3: NR Cell Specific Parameters for PSCell Addition and Release

Parameter	Unit	Config	Test
NR RF Channel Number		1,2,3,4,5,6	1
E-UTRA RF Channel Number		1,2,3,4,5,6	2
TDD		1,4	Not Applicable
configuration		2,5	TDDConf.1.1
_		3,6	TDDConf.2.1
BW _{channel}	MHz	1,4	10: N _{RB,c} = 52
		2,5	10: N _{RB,c} = 52
		3,6	40: N _{RB,c} = 106
Initial BWP Configuration		1,2,3	DLBWP.0.1
		,_,-	ULBWP.0.1
Dedicated BWP Configuration		1,2,3	DLBWP.1.1
			ULBWP.1.1
PDSCH Reference		1,4	SR.1.1 FDD
measurement		2,5	SR.1.1 TDD
channel		3,6	SR.2.1 TDD
RMSI CORESET Reference		1,4	CR.1.1 FDD
Channel		2,5	CR.1.1 TDD
		3,6	CR.2.1 TDD
Dedicated CORESET Reference		1,4	CCR.1.1 FDD
Channel		2,5	CCR.1.1 TDD
		3,6	CCR.2.1 TDD
OCNG Patterns		1,2,3,4,5,6	OP.1
SSB configuration		1,2,4,5	SSB.1 FR1
		3,6	SSB.2 FR1
SMTC configuration		1,2,4,5	SMTC.1
_		3,6	SMTC.1
TRS Configuration		1,4	TRS.1.1 FDD
		2,5	TRS.1.1 TDD
		3,6	TRS.1.2 TDD
CSI-RS configuration for CSI reporting		1,4	CSI-RS.1.1 FDD
		2,5	CSI-RS.1.1 TDD
		3,6	CSI-RS.2.1 TDD
reportConfigType		1,2,3,4,5,6	periodic
reportQuantity		1,2,3,4,5,6	cri-RI-PMI-CQI
CSI reporting periodicity	slot	1,2,4,5	5
		3,6	10
CSI reporting offset	slot	1,2,4,5	2
<u> </u>		3,6	4
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to			
SSS EPRE ratio of PBCH to PBCH			
DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS	dB	1,2,3,4,5,6	0
EPRE ratio of PDSCH DMRS to			
SSS			
EPRE ratio of PDSCH to PDSCH			

EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE ratio of OCNG to OCNG DMRS (Note 1)			
N_{oc} Note2	dBm/15 kHz	1,2,3,4,5,6	-88
$N_{oc}^{ m Note2}$	dBm/SCS	1,2,4,5	-88
		3,6	-85
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		1,2,3,4,5,6	0
\hat{E}_s/N_{oc}		1,2,3,4,5,6	0
SS-RSRP ^{Note3}	dBm/SCS	1,2,4,5	-88
		3,6	-85
Io ^{Note3}	dBm/9.36MHz	1,2,4,5	-57
	dBm/38.1MHz	3,6	-51
Propagation condition		1,2,3,4,5,6	AWGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled
- Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.4A.1.1.1-4: E-UTRAN cell specific test parameters for PSCell Addition and Release tests

Parameter	Unit	E-UTRAN Cell				
		T1	T1 T2 T3 T4 T5			
Duplex mode			FDD or TDD			
TDD special subframe configuration ^{Note1}				6		
TDD uplink-downlink configuration ^{Note1}				1		
BW _{channel}			5 M	Hz: N _{RB,c} :	= 25	
			10 M	1Hz: N _{RB,c}	= 50	
			20 M	Hz: N _{RB,c} :	= 100	
PDSCH parameters:			5 M	1Hz: R.7 F	DD	
DL Reference Measurement Channel ^{Note2}			10 N	ИHz: R.3 I	-DD	
				ИHz: R.6 I		
			0	1Hz: R.4 T		
				иHz: R.0 ⁻		
				ИHz: R.3 ⁻		
PCFICH/PDCCH/PHICH parameters:				Hz: R.11 I		
DL Reference Measurement Channel ^{Note2}				ИHz: R.6 I		
				1Hz: R.10		
				Hz: R.11		
				ИHz: R.6		
N. a				1Hz: R.10		
OCNG Patterns ^{Note2}				tz: OP.20		
				Hz: OP.10		
				Hz: OP.17		
			_	Hz: OP.9		
				IHz: OP.1		
			20 N	IHz: OP.7	TDD	
PBCH_RA	dB					
PBCH_RB	dB					

PSS_RA	dB		
SSS_RA	dB		
PCFICH_RB	dB		
PHICH_RA	dB		
PHICH_RB	dB		0
PDCCH_RA	dB		
PDCCH_RB	dB		
PDSCH_RA	dB		
PDSCH_RB	dB		
OCNG_RA ^{Note3}	dB		
OCNG_RB ^{Note3}	dB		
N _{oc} Note4	dBm/15 kHz	N/A	-104
Ê _s /N _{oc}	dB	-infinite	17
Ê _s /I _{ot}	dB	-infinite	17
RSRP Note5	dBm/15 kHz	-infinite	-87
SCH_RP Note5	dBm/15 kHz	-infinite	-87
lo Note5	dBm/Ch BW	N/A	-59.13+10log(N _{RB,c} /50)
Propagation Condition			AWGN
Antenna Configuration			1x2
Note 1: Special subframe and uplink-dowr	nlink configuration	s are speci	fied in table 4.2-1 in TS 36.211.
Note 2: DL RMCs and OCNG patterns are	specified in claus	ses A 3.1 a	nd A 3.2 of TS 36.133 respectively.
Note 3: OCNG shall be used such that all	cells are fully alloc	cated and a	a constant total transmitted power
spectral density is achieved for all			
			the test is assumed to be constant
over subcarriers and time and sha	all be modelled as	AWGN of a	appropriate power for N _{oc} to be

E_s/I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information

A.4A.1.1.2 Test Requirements

Note 5:

The UE shall transmit the PRACH to PSCell at latest 120 ms^{Note1} into T3.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T4.

purposes. They are not settable parameters themselves.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T4

The UE shall stop sending CSI reports for PSCell in at latest 20ms into T5.

Interruption on PCell during PSCell addition and release shall not exceed the values specified for NE-DC in Clause 8.2.3.2.3.

All the above test requirements shall be fulfilled in order for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

Note1: The PSCell addition delay can be expressed as follows as specified in clause 8.8 [15]:

 $T_{config_EUTRAN-PSCell} = 20ms + T_{activation_time} + 50ms + T_{PCell_DU} + T_{E-UTRAN-PSCell_DU}$

Where:

 $T_{activation_time} = 20ms$

 $T_{PSCell_DU} = 0ms$

 $T_{\text{E-UTRAN-PSCell_DU}} = 30 \text{ms}$

A.4A.1.2 Active BWP switch

A.4A.1.2.1 E-UTRAN PSCell – NR PCell FR1 DCI-based and Timer-based DL active BWP switch in non-DRX in synchronous NE-DC

A.4A.1.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in TS38.133 clause 8.6, and interruption requirement for E-UTRA victim cell defined in TS36.133 clause 7.36.2.6. Supported test configurations are shown in Table A.4A.1.2.1.1-1.

The test scenario comprises of one NR PCell (Cell 1), and one E-UTRA PSCell (Cell 2) as given in Table A.4A.1.2.1.1-2. Cell-specific parameters of NR PCell is specified in Table A.4A.1.2.1.1-3. below, and cell-specific parameters of E-UTRA PSCell are specified in Table A.3.7.2.1-1.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 1 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for PCell, BWP-1 and BWP-2, in Cell 1 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PCell.
- UE is configured with a *bwp-InactivityTimer* timer value for PCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PCell no later than at the beginning of the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PCell's BWP-2 starting from the beginning of the DL slot right after DL slot $(i+T_{BWPswitchDelay})$.

The starting time of PSCell(Cell 2) interruption due to BWP switch on PCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on PCell(Cell 1).

During T3,

The time period T3 starts from the slot #j, where j is the beginning slot of the DL subframe immediately after the *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH at the beginning of the DL slot right after PCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PCell at latest at the beginning of the DL slot right after DL slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PCell's BWP-1 starting from the beginning of the DL slot right after DL slot $(j+T_{BWPswitchDelay})$.

The starting time of PSCell(Cell 2) interruption due to BWP switch of PCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in PCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

The test equipment verifies that potential interruption to E-UTRA PSCell is carried out in the correct time span by monitoring ACK/NACK sent in PSCell during BWP switch of PCell, respectively.

Config Description LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 1 2 LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode 3 LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode 4 LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode 5 LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode 6 Note 1: The UE is only required to be tested in one of the supported test configurations.

Table A.4A.1.2.1.1-1: DL BWP switch supported test configurations

Table A.4A.1.2.1.1-2: General test parameters for DL BWP switch in synchronous NE-DC

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
E-UTRA RF Channel		2	One E-UTRA radio channel is used for this
Number		2	test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	[200]	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	uБ	U	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	uБ	0	
Cell2 timing offset to cell1	μs	3	Synchronous NE-DC
T1	S	[0.2]	
T2	S	[0.2]	
T3	S	[0.2]	

Table A.4A.1.2.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous NE-DC

Parame	ter	Unit	Cell 1
Frequency Range			FR1
Duplex mode	Config 1,4		FDD
	Config 2,3,5,6		TDD
TDD configuration	Config 1,4		Not Applicable

Ī	0 " 0 5	1	[TDD0_(11.1
	Config 2,5		TDDConf.1.1
	Config 3,6		TDDConf.2.1
BW _{channel}	Config 1,4		10 MHz: N _{RB,c} = 52
	Config 2,5		10 MHz: N _{RB,c} = 52
	Config 3,6		40 MHz: N _{RB,c} = 106
Active BWP ID	T -		1, 2
Initial DL BWP	Config 1,4		DLBWP.0.2 Note 4
Configuration	Config 2,5		
	Config 3,6		
Active DL BWP-1	Config 1,4		DLBWP.1.1 Note 4
Configuration	Config 2,5		
	Config 3,6		
Active DL BWP-2	Config 1,4		DLBWP.1.3 Note 4
Configuration	Config 2,5		
	Config 3,6		
Initial UL BWP	Config 1,4		ULBWP.0.2 Note 4
Configuration	Config 2,5		
	Config 3,6		
Active UL BWP-1	Config 1,4		ULBWP.1.1 Note 4
Configuration	Config 2,5		
J	Config 3,6		
Active UL BWP-2	Config 1,4		ULBWP.1.3 Note 4
Configuration	Config 2,5		
garano	Config 3,6		
PDSCH Reference	Config 1,4		SR.1.1 FDD
measurement channel	Config 2,5		SR.1.1 TDD
modedicinent charmer	Config 3,6		SR.2.1 TDD
RMSI CORESET	Config 1,4		CR.1.1 FDD
parameters	Config 2,5		CR.1.1 TDD
parameters	Config 3,6		CR.2.1 TDD
Dedicated CORESET	Config 1,4		CCR.1.1 FDD
parameters	Config 1,4		CCR.1.1 TDD
parameters	Config 3,6		CCR.2.3 TDD
OCNG Patterns	Corning 3,0		OP.1
SSB Configuration	Config 1,2,4,5		SSB.1 FR1
33B Configuration	Config 3,6		SSB.2 FR1
SMTC Configuration	Corning 3,0		SMTC.1
Correlation Matrix and A	ntonno		1x2 Low
	ntenna		IXZ LOW
Configuration TRS Configuration	Config 1 4		TRS.1.1 FDD
TRS Configuration	Config 1,4		
	Config 2,5		TRS.1.1 TDD
EDDE rotio of DCC to CC	Config 3,6		TRS.1.2 TDD
EPRE ratio of PSS to SS			
EPRE ratio of PBCH DM			
EPRE ratio of PBCH to F			
EPRE ratio of PDCCH D		dB	
	EPRE ratio of PDCCH to PDCCH DMRS		0
EPRE ratio of PDSCH D		}	
EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note			
	1K2 to 222 (Note		
1)	OCNO DIADO		
EPRE ratio of OCNG to OCNG DMRS			
(Note 1) Noc ^{Note 2}	Onnfin 4 0 4 5	dDm/000	[404]
INoc Total	Config 1,2,4,5	dBm/SCS	[-104]
N. Note 2	Config 3,6	IB (1=:::	[-101]
Noc Note 2	1 0	dBm/15kHz	-104
SS-RSRP Note 3	Config 1,2,4,5	dBm/SCS	[-87]
A "	Config 3,6		[-90]
Ê _s /I _{ot}		dB	17

Ê _s /N _{oc}			dB	17	
Io ^{Note3}		Config 1,2,4,5	dBm/9.36MHz	[-59]	
		Config 3,6	dBm/38.16MHz	[-61.9]	
Propagation Condition				AWGN	
Note 1:				located and a constant	
	total transmitted	l power spectral	density is achieved	for all OFDM symbols.	
Note 2:	Interference from other cells and noise sources not specified in the test is				
	assumed to be constant over subcarriers and time and shall be modelled as				
	AWGN of appropriate power for Noc to be fulfilled.				
Note 3:	3: SS-RSRP and lo levels have been derived from other parameters for				
	information purposes. They are not settable parameters themselves.				
Note 4:	For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is				
	linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is				
	linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].				

A.4A.1.2.1.2 Test Requirements

During T1, the UE shall start to send the ACK for PCell in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK for PCell in the DL slot right after DL slot $(j+T_{BWPswitchDelay}+kI)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability bwp-SwitchingDelay [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1, the start time of PSCell interruption during PCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start time of PSCell interruption of during PCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PSCell shall not be longer than the interruption duration specified for active BWP switch in TS36.133 Clause 7.36.2.6.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the DL slot right after DL slot $(i+T_{BWPswitchDelay}+kI)$, $(j+T_{BWPswitchDelay}+kI)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK.

A.4A.2 Measurement performance

A.4A.2.1 SFTD accuracy

A.4A.2.1.1 SFTD accuracy

A.4A.2.1.1.1 Test Purpose

The purpose of this set of tests is to verify that the SFTD measurement accuracy is within the specified limits. This test will verify the requirements as specified in clause 10.21.1.1 for NE-DC SFTD measurements.

A.4A.2.1.1.2 Test Environment

Supported test configurations are shown in Table A.4A.2.1.1.2-1. In this set of test cases there are two cells on different carriers. Cell 1 is NR FR1 PCell and Cell 2 is E-UTRAN target cell. The test parameters of cell 1 are given in clause A.4A.2.1.1.2-2. The test parameters of cell 2 are given in Table A.3.7.2.1. The SFTD between PCell and target cell shall be set by the test equipment to one of the time differences in Table A.4A.2.1.1.2-3.

Table A.4A.2.1.1.2-1: Supported test configurations for SFTD accuracy

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note 1: The UE is only required to be tested in one of the supported test configurations	
Note 2: A UE whi	ch fulfils the requirements in test case A.4A.1.1 can skip the test cases in A.4.7.5.1

Table A.4A.2.1.1.2-2: Test parameters for SFTD accuracy (Cell 1)

Parameter	Config	Unit	Test 1
SSB GSCN	1~6		freq1
Duplex mode	1,4		FDD
	2,5		TDD
	3,6		TDD
TDD Configuration	1,4		N/A
	2,5		TDDConf.1.1
	3,6		TDDConf.2.1
BWchannel	1,4	MHz	10: N _{RB,c} = 52
	2,5		10: N _{RB,c} = 52
	3,6		40: N _{RB,c} = 106
PDSCH Reference measurement channel	1,4		SR.1.1 FDD
	2,5		SR.1.1 TDD
	3,6		SR.2.1 TDD
RMSI CORESET Reference Channel	1,4		CR.1.1 FDD
	2,5		CR.1.1 TDD
	3,6		CR.2.1 TDD
RMC CORESET Reference Channel	1,4		CCR.1.1 FDD
	2,5		CCR.1.1 TDD
	3,6		CCR.2.1 TDD

SSB config	uration	1,4		SSB.1 FR1
SSB Corning	uration	•	-	
		2,5	-	SSB.1 FR1
01.170		3,6		SSB.2 FR1
SMTC conf		1~6		SMTC.1
	onfiguration	1~6		DLBWP.1.1
UL BWP co	<u> </u>	1~6		ULBWP.1.1
OCNG Pat		1~6		OP.1
EPRE ratio	of PSS to SSS	1~6	dB	0
EPRE ratio	of PBCH DMRS to SSS			
EPRE ratio	of PBCH to PBCH DMRS			
EPRE ratio	of PDCCH DMRS to SSS			
EPRE ratio	of PDCCH to PDCCH			
DMRS				
EPRE ratio	of PDSCH DMRS to SSS			
	of PDSCH to PDSCH			
DMRS				
EPRE ratio	of OCNG DMRS to SSS ^{Note}			
1				
EPRE ratio	of OCNG to OCNG DMRS			
Note 1				
N _{oc} Note2	NR_FDD_FR1_A,	1~6	dBm/15kHz	-104
IV _{oc}	NR_TDD_FR1_A NOTE 5	. 0	abili, folding	101
	NR FDD FR1 B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E,			
	NR_FDD_FR1_F			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H	4045	-ID (00D 000	404
$N_{oc}^{ m Note2}$	NR_FDD_FR1_A,	1,2,4,5	dBm/SSB SCS	-104
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_F			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H		1	
	NR_FDD_FR1_A,	3,6		-101
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_F			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
\hat{E}_s/I_{ot}		1~6	dB	-3
		1~6	dB	-3
\hat{E}_s/N_{oc}		1~0	UD	-3

SS-RSRP	NR_FDD_FR1_A,	1,2,4,5	dBm/SCS	-107
Note3	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_F			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A,	3,6	-	-104
	NR_TDD_FR1_A NOTE 5	3,0		-104
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D,			
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_F			
	NR_FDD_FR1_G			
lo Note3	NR_FDD_FR1_H	4045	-ID /0.00 MI I	74.00
10 140165	NR_FDD_FR1_A,	1,2,4,5	dBm/9.36 MHz	-74.28
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_F			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
	NR_FDD_FR1_A,	3,6	dBm/38.16	-68.18
	NR_TDD_FR1_A NOTE 5		MHz	
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E,			
	NR_TDD_FR1_E			
	NR_FDD_FR1_F			
	NR_FDD_FR1_G			
	NR_FDD_FR1_H			
Propagation	n condition	1~6		AWGN
Antenna co	nfiguration	1~6		1x2
1				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

Table A.4A.2.1.1.2-3: Timing offsets for SFTD accuracy test

Configuration	SFN offset between PCell and PSCell	Frame boundary offset between PCell and PSCell (Ts)
1	100	-122000
2	300	-60540
3	500	1000
4	700	62540
5	900	124000

A.4A.2.1.1.3 Test Requirements

The SFTD reported by the UE consists of 2 elements, SFN offset and frame boundary offset between PCell and E-UTRAN target cell. The reported SFTD accuracy shall fulfil the requirement in clause 10.1.21.1.

A.5 EN-DC tests with one or more NR cells in FR2

A.5.1 Void

A.5.2 Void

A.5.3 RRC_CONNECTED state mobility

A.5.3.1 Void

A.5.3.2 RRC Connection Mobility Control

A.5.3.2.1 Void

A.5.3.2.2 Random Access

A.5.3.2.2.1 Contention based random access test in FR2 for PSCell/SCell in EN-DC

A.5.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in clause 6.2.2.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell or SCell in FR2. Supported test parameters are shown in Table A.5.3.2.2.1.1-1. UE capable of EN-DC with PSCell or SCell in FR2 needs to be tested by using the parameters in Table A.5.3.2.2.1.1-2 and Table A.5.3.2.2.1.1-3.

Table A.5.3.2.2.1.1-1: Supported test configurations for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

	Config	Description		
	1	LTE FDD, NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex		
	ı	mode		
	2	LTE TDD, NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex		
	2	mode		
Note:	Note: The UE is only required to be tested in one of the supported test configurations depending on UE			
	capability			

Table A.5.3.2.2.1.1-2: General test parameters for contention based random access test in FR2 for PSCell/SCell in EN-DC

Paramet	Parameter		Test-1	Comments
SSB Configuration	Config 1,2		SSB.1 FR2	As defined in A.3.10
CSI-RS for tracking	Config 1,2		TRS.2.1 TDD	
Duplex Mode for Cell 2	Config 1,2		TDD	
TDD Configuration	Config 1,2		TDDConf.3.1	
BW _{channel}	Config 1	MHz	100: N _{RB,c} = 24	
OCNG Pattern Note 1			OP.3	As defined in A.3.2.1.
PDSCH Reference	Config 1,2		SR.3.1 TDD	As defined in A.3.1.1.
Channel Note 2				
RMSI CORESET	Config 1,2		CR.3.1 TDD	As defined in A.3.1.2
Reference Channel				
Dedicated CORESET	Config 1,2		CCR.3.1 TDD	
Reference Channel				
NR RF Channel Number			1	
EPRE ratio of PSS to SS		dB		
EPRE ratio of PBCH_DN		dB		
EPRE ratio of PBCH to F		dB		
EPRE ratio of PDCCH_D		dB	0	
EPRE ratio of PDCCH to		dB dB		
	EPRE ratio of PDSCH_DMRS to SSS			
EPRE ratio of PDSCH to	PDSCH_DMRS	dB dBm/ SCS		
ss-PBCH-BlockPower	ss-PBCH-BlockPower		+20 +Δ _{UL}	As defined in TS 38.331
				[2].
				ΔυL is derived from the
				uplink calibration process Note 3
Configured UE transmitte	ed power (dBm	maximum value configurable	As defined in clause
$P_{\mathrm{CMAX, f,c}}$)			for certain power class	6.2.4 in TS 38.101-2 [19]
PRACH Configuration			FR2 PRACH configuration 1	As defined in A.3.8.3,
- Tu to T comigaration			Trice in to the coming and all of the	with exceptions as
				defined below.
rsrp-ThresholdSSB		dBm	RSRP_69 +ΔDL	RSRP_69 corresponds to
•			_	-88dBm. Δ _{DL} is derived
				from the downlink
				calibration process Note 4
preambleReceivedTarge	tPower	dBm	-100	As defined in TS 38.331
				[2].

Note 1:	OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
Note 2:	The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.
Note 3:	The Δ _{UL} value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, <i>preambleReceivedTargetPower</i> = -100dBm and ss- <i>PBCH-BlockPower</i> = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.
Note 4:	The Δ _{DL} value is calculated as (RSRP_REP – RSRP_76), where RSRP_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported

Table A.5.3.2.2.1.1-3: OTA-related test parameters for contention based random access test in FR2 for PSCell/SCell in EN-DC

value RSRP_x, x is treated as a positive integer value.

Parameter		Unit	Test-1	Comments
AoA setup			Setup 1	As defined in A.3.15.1
Assumption	for UE beams ^{Note 3}		Rough	
	Es Note1	dBm/SCS	-80.6	Power of SSB with index
	SSB_RP	dBm/SCS	-80.6	0 is set to be above
SSB with				configured rsrp- ThresholdSSB
index 0	Es/lot _{BB}	dB	21.09	
	lo	dBm/95.04 MHz	-56.01	lo in symbols containing SSB index 0
	Es Note1	dBm/SCS	-95.0	Power of SSB with index
SSB with index 1	SSB_RP	dBm/SCS	-95.0	1 is set to be below configured rsrp- ThresholdSSB
	Es/lot _{BB}	dB	6.69	
	lo	dBm/95.04 MHz	-70.41	Io in symbols containing SSB index 1
Propagation	Condition	n - AWGN		

Note 1: No articial noise is applied in this test.

Note 2: Void.

Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.5.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.5.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

A.5.3.2.2.1.2.5 Void

A.5.3.2.2.1.2.6 Void

A.5.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.5.3.2.2.2 Non-contention based random access test in FR2 for PSCell/SCell in EN-DC

A.5.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in clause 6.2.2.2 and clause 7.1.2 in an AWGN model.

For this test two cells are used, with the configuration of Cell 1 (E-UTRA PCell) specified in clause A.3.7.2.1 and Cell 2 configured as PSCell or SCell in FR2. Supported test parameters are shown in Table A.5.3.2.2.2.1-1. UE capable of EN-DC withPSCell or SCell in FR2 needs to be tested by using the parameters in Table A.5.3.2.2.2.1-2 and Table A.5.3.2.2.2.1-3 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2). Test 2 is only applicable to UE which supports csi-RSRP-AndRSRQ-MeasWithSSB or csi-RSRP-AndRSRQ-MeasWithoutSSB.

Table A.5.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

	Config	Description		
1		LTE FDD, NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex		
	1	mode		
	2	LTE TDD, NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex		
	2	mode		
Note:	Note: The UE is only required to be tested in one of the supported test configurations depending on UE			
	capability			

Table A.5.3.2.2.1-2: General test parameters for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

Parame	ter	Unit	Test-1	Test-2	Comments
SSB Configuration	Config 1,2		SSB.1 FR2	SSB.1 FR2	As defined in A.3.10
CSI-RS	Config 1,2		N/A	CSI-RS.3.1	As defined in A.3.1.4
Configuration				TDD	
CSI-RS for tracking	Config 1,2		TRS.2.1 TDD	TRS.2.1 TDD	
Duplex Mode for	Config 1,2		TDD	TDD	
Cell 2					
TDD Configuration	Config 1,2		TDDConf.3.1	TDDConf.3.1	
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 24	100: N _{RB,c} = 24	
OCNG Pattern Note 1			OP.3	OP.3	As defined in A.3.2.1.
PDSCH Reference	Config 1,2		SR3.1 TDD	SR3.1 TDD	As defined in A.3.1.1.
Channel Note 2					
RMSI CORESET	Config 1,2		CR.3.1 TDD	CR.3.1 TDD	As defined in A.3.1.2
Reference Channel					
Dedicated	Config 1,2		CCR.3.1 TDD	CCR.3.1 TDD	
CORESET					
Reference Channel					
NR RF Channel Num	ber		1	1	
EPRE ratio of PSS to	SSS	dB	0	0	

dB dB			
иь			
dB			
dB			
GB			
dB			
dB			
dBm/ SCS	+20 +∆∪L	+20 +Δul	As defined in TS 38.331 [2]. Δ _{UL} is derived from the uplink calibration process ^{Note 3}
dBm	maximum value configurable for certain power class	maximum value configurable for certain power class	As defined in clause 6.2.4 in TS 38.101-2 [19]
	FR2 PRACH configuration 2	FR2 PRACH configuration 3	As defined in A.3.8.3, with exceptions as defined below
dBm	RSRP_69 +∆bl	RSRP_69 + ADL	RSRP_69 corresponds to -88dBm. Δ _{DL} is derived from the downlink calibration process Note 4
dBm	-100	-100	As defined in TS 38.331 [2]
	dB dB dB dBm/SCS dBm	dB dB dB dB dB dBm/ SCS +20 +ΔυL dBm maximum value configurable for certain power class FR2 PRACH configuration 2 dBm RSRP_69 +ΔDL	dB dB dB dB dB dBm/ SCS +20 +ΔυL +20 +ΔυL dBm maximum value configurable for certain power class FR2 PRACH configuration 2 dBm RSRP_69 +ΔDL RSRP_69 +ΔDL

- Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
- Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.
- Note 3: The ΔυL value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, preambleReceivedTargetPower = -100dBm and ss-PBCH-BlockPower = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.
- Note 4: The Δ_{DL} value is calculated as (RSRP_REP RSRP_76), where RSRP_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP_x, x is treated as a positive integer value.

Table A.5.3.2.2.1-3: OTA-related test parameters for non-contention based random access test in FR2 for PSCell/SCell in EN-DC

Parameter		Unit	Test-1	Test-2	Comments
AoA setup	AoA setup		Setup 1	Setup 1	As defined in A.3.15.1
Assumption	for UE beams ^{Note 3}		Rough	Rough	
	Es Note1	dBm/SC S	-80.6	-80.6	Power of SSB with index 0 is set to be above
SSB with	SSB_RP	dBm/SC S	-80.6	-80.6	configured rsrp- ThresholdSSB
index 0	Es/Iot _{BB}	dB	21.09	21.09	
	lo	dBm/95.0 4 MHz	-56.01	-56.01	lo in symbols containing SSB index 0

SSB with index 1	Es Note1	dBm/SC S	-95.0	-95.0	Power of SSB with index 1 is set to be below configured rsrp- ThresholdSSB
	SSB_RP	dBm/SC S	-95.0	-95.0	
	Es/lot _{BB}	dB	6.69	6.69	
	lo	dBm/95.0 4 MHz	-70.41	-70.41	Io in symbols containing SSB index 1
Propagation Condition		-	AWGN	AWGN	

Note 1: No articial noise is applied in this test.

Note 2: void.

Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system

implementation

A.5.3.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.5.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for SSB-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-2, to test the UE behavior specified in Clause 6.2.2.2.2.1 for CSI-RS-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -60 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.5.3.2.3 Void

A.5.4 Timing

A.5.4.1 UE transmit timing

A.5.4.1.1 NR UE Transmit Timing Test for FR2

A.5.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table 5.4.1.1.1-1.

Table A.5.4.1.1.1-1: Supported test configurations for FR2 PSCell

Configuration Description			
	1	LTE FDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz	
	2	LTE TDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz	

The test consists of E-UTRA PCell and NR PSCell. The configuration for E-UTRA is given in A.3.7.2.1. Tables A.5.4.1.1.1-2 and A.5.4.1.1.1-2A define the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.5.4.1.1.1-3.

Table A.5.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2	Band Group
SSB ARFCN		1,2	Freq1	Freq1	
Duplex Mode		1,2	T	DD	
TDD configuration		1,2	TDDC	onf.3.1	
BW _{channel}	MHz	1,2	100: N _F	RB,c = 66	
Data RBs allocated		1,2	6	6	
Initial BWP Configuration		1,2	DLBW ULBW		
Dedicated BWP Configuration		1,2	DLBV ULBV		
TRS Configuration		1,2	TRS.2	.1 TDD	
PDSCH/PDCCH TCI state		1,2	TCI.S	tate.2	
DRx Cycle	ms	1,2	N/A	DRX.8 ^{Note5}	
PDSCH Reference measurement channel		1,2	SR.3.	3 TDD	
RMSI CORESET Reference Channel		1,2	CR.3.	2 TDD	
Dedicated CORESET Reference Channel		1,2	CCR.3	.7 TDD	
OCNG Patterns		1,2	OF	P 1	
SSB Configuration		1,2		4 FR2	
SMTC Configuration		1,2		ΓC.1	
PDSCH/PDCCH		1,2			
subcarrier spacing	kHz	.,_	12	20	
EPRE ratio of PSS to					
SSS EDDE('('DDOLL					
EPRE ratio of PBCH					
DMRS to SSS EPRE ratio of PBCH to					
PBCH DMRS					
EPRE ratio of PDCCH					
DMRS to SSS					
EPRE ratio of PDCCH to					
PDCCH DMRS	dB	1,2	0	0	
EPRE ratio of PDSCH					
DMRS to SSS					
EPRE ratio of PDSCH to					
PDSCH					
EPRE ratio of OCNG					
DMRS to SSS(Note 1)					
EPRE ratio of OCNG to					
OCNG DMRS (Note 1)					
Propagation condition		1,2		'GN	
SRS Config		1,2	SRSConf.1 ^{Note6}	SRSConf.2 ^{Note6}	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Note 3: Void Note 4: Void

Note 5: DRx related parameters are given in Table A.3.3.8-1

Note 6: SRS configs are given in Table A.5.4.1.1.1-3

Table A.5.4.1.1.1-2A: OTA related test parameters

Parameter	Unit	Test 1	Test 2
Angle of arrival configuration		Setup 1 according to clause A.3.15	
Assumption for UE beams ^{Note}		Fine	
$N_{oc}^{ m Note1}$	dBm/15kHz ^{Note4}	-112	
$N_{oc}^{ m Note1}$	dBm/SCS ^{Note3}	-1	00
\hat{E}_s/N_{oc}	dB	4	
SSB_RPNote2	dBm/SCS Note4	-!	96
\hat{E}_s/I_{ot}	dB		4
Io ^{Note2}	dBm/95.04 MHz Note4	-6	8.5

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 2: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: Void

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone

Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation

Table A.5.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

	Field	SRSConf.1	SRSConf.2	Comments
SRS-ResourceSet	srs-ResourceSetId	0	0	
	srs-ResourceldList	0	0	
	resourceType	Periodic	Periodic	
	Usage	Codebook	Codebook	
SRS-Resource	SRS-Resourceld	0	0	
	nrofSRS-Ports	Port1	Port1	
	transmissionComb	n2	n2	
	combOffset-n2	0	0	
	cyclicShift-n2	0	0	
	resourceMapping startPosition	0	0	
	resourceMapping nrofSymbols	n1	n1	
	resourceMapping repetitionFactor	n1	n1	
	freqDomainPosition	0	0	

freqDomainShift	0	0	
freqHopping c-SRS	17	17	Matches N _{RB,c}
freqHopping b-SRS	0	0	
freqHopping b-hop	0	0	
groupOrSequenceHopping	Neither	Neither	
resourceType	Periodic	Periodic	
periodicityAndOffset-p	sl1,0	sl2560,4	Offset to align with DRx periodicity
sequenceld	0	0	Any 10 bit number

Table A.5.4.1.1.1-4: Void

A.5.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test

- 1) Set up E-UTRA PCell according to parameters given in Table A.3.7.2.2-1 and setup NR PSCell according to parameters given in Table A.5.4.1.1.1-1.
- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 13792
 - b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1
- 3) The test system shall adjust the timing of the DL path by values given in Table A.5.4.1.1.2-1

Table A.5.4.1.1.2-1 Adjustment Value for DL Timing

SCS of SSB signals (kHz)	Adjustment Value	
	Test1	Test2
240	+8*64T _c	+4*64T _c

- 4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in Clause 7.1.2 Table 7.1.2.1-1 until the UE transmit timing offset is within ($N_{TA} + N_{TA_offset}$) $\times T_c \pm T_e$ respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.
- 5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment

A.5.4.2 UE timer accuracy

A.5.4.3 Timing advance

A.5.4.3.1 EN-DC FR2 timing advance adjustment accuracy

A.5.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.5.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.5.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.5.4.3.1.2-2, A.5.4.3.1.2-3, A.5.4.3.1.2-3A and A.5.4.3.1.2-4. The configuration of Cell 1 (LTE PCell) is specified in clause A.3.7.2.1.

In all test cases, two cells are used. Cell 1 is the PCell in the primary Timing Advance Group (pTAG) and cell 2 is the PSCell is in the secondary Timing Advance Group (sTAG). Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands for sTAG are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.5.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured for PSCell in sTAG.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element for sTAG, as specified in clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance for sTAG used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements for sTAG, with Timing Advance Command value specified in table A.5.4.3.1.2-2. This value shall result in changes of the timing advance for sTAG used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in clause 5.2 in TS 38.321, shall be configured so that it does not expire in the duration of the test.

Table A.5.4.3.1.2-1: Timing advance supported test configurations

Config	Description			
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note: The UE is only re	te: The UE is only required to be tested in one of the supported test configurations			

Table A.5.4.3.1.2-2: General test parameters for timing advance

Parameter	Unit	Value	Comment
RF channel number		Cell 1: 1	1 for E-UTRAN PCell
		Cell 2: 2	2 for NR PSCell
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1

Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T _A) value during T1		31	N _{TA_new =} N _{TA_old} for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T _A) value during T2		39	For 120 kHz SCS $N_{TA_new} = N_{TA_old} + 1024*T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	s	5	
T2	S	5	

Table A.5.4.3.1.2-3: Cell specific test parameters for timing advance

Davameter	l lmit	Tes	st1
Parameter	Unit	T1	T2
Duplex mode		TD	DD
TDD configuration		TDDCc	onf.3.1
BW _{channel}	MHz	100: N _R	$_{\rm B,c} = 66$
BWP BW	MHz	100: N _R :	$_{\rm B,c} = 66$
DRx Cycle	ms	Not App	olicable
PDSCH Reference measurement channel		SR.3.1	TDD
RMSI CORESET Reference Channel		CR.3.1	TDD
Dedicated CORESET Reference Channel		CCR.3.	1 TDD
TRS configuration		TRS.2.	1 TDD
PDSCH/PDCCH TCI state		TCI.St	tate.2
OCNG Patterns		OCNG p	attern 1
SMTC configuration		SMTC.	1 FR2
SSB configuration		SSB.3	FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	kHz
PUCCH/PUSCH subcarrier spacing	kHz	120	kHz
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS	dB	0	1
EPRE ratio of PDSCH DMRS to SSS	uБ	٥	
EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note 1)			
EPRE ratio of OCNG to OCNG DMRS (Note			
1)			
Propagation condition	-	AW	GN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.5.4.3.1.2-3A: OTA related test parameters

Parameter	Unit	Test 1	
		T1	T2
Angle of arrival configuration		Setup 1 according to clause A.3.15.1	
Assumption for UE beams ^{Note}		Fi	ne
$N_{oc}^{ m Note1}$	dBm/15kHz ^{Note4}	-1	12

$N_{oc}^{}$ Note1		dBm/SCS ^{Note3}	-103	
\hat{E}_s/N_{oc}		dB	4	
SS-RSRF	Note2	dBm/SCS Note4	-99	
$\hat{E}_{_{\!s}}/I_{_{\!ot}}$		dB	4	
Io ^{Note2}		dBm/95.04 MHz Note4	-68.5	
Note 1:		rriers and time and shall be m	ot specified in the test is assumed to be nodelled as AWGN of appropriate power	
Note 2:		els have been derived from on on the settable parameters them	ther parameters for information selves.	
Note 3: SS-RSRP minimum noise at each receive			ssuming independent interference and	
Note 4:	Equivalent power red	ceived by an antenna with 0dBi gain at the centre of the quiet zone		
Note 5:				
Note 6:		oes of UE beam is given in B. st system implementation	2.1.3, and does not limit UE	

Table A.5.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

Field	Value	Comment
c-SRS	16	Eraguanay hanning in disabled
b-SRS	0	Frequency hopping is disabled
b-hop	0	
freqDomainPosition	0	Frequency domain position of SRS
freqDomainShift	0	
groupOrSequenceHopping	neither	No group or sequence hopping
SRS-PeriodicityAndOffset	sl5=4	Once every 5 slots
pathlossReferenceRS	ssb-Index=0	SSB #0 is used for SRS path loss estimation
usage	Codebook	Codebook based UL transmission
startPosition	0	resourceMapping setting. SRS on last
nrofSymbols	n1	symbol of slot, and 1symbols for SRS
repetitionFactor	n1	without repetition.
combOffset-n2	0	transmissionComb actting
cyclicShift-n2	0	transmissionComb setting
nrofSRS-Ports	port1	Number of antenna ports used for SRS transmission
Note: For further information see cla	use 6.3.2 in TS 38	3.331 [2].

A.5.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value for PSCell in sTAG to the transmission timing at the designated activation time i.e. k+1 slots after the reception of the timing advance command, where k = 11.

The Timing Advance adjustment accuracy for PSCell in sTAG shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.5.5 Signaling characteristics

A.5.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

Editor note: The metric for the detection of the UE UL transmitted signal by the TE is FFS.

A.5.5.1.1 Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with SSB-based RLM RS in non-DRX mode

A.5.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.5.5.1.1.1-1. The test parameters are given in Tables A.5.5.1.1.1-2, A.5.5.1.1.1-3, and A. 5.5.1.1.1-4 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.5.5.1.1.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In addition to RLM-RS radio link monitoring using SSB index 0 and SSB index 1, the UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.5.5.1.1.1-1: Supported test configurations for FR2 PSCell

Configuration	Description								
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode								
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode								
Note: The UE is only required to pass in one of the supported test configurations in FR2									

Table A.5.5.1.1.1-2: General test parameters for FR2 out-of-sync testing in non-DRX mode

Paramete	r	Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 2		TDD
BW _{channel}	Config 1, 2		100: $N_{RB,c} = 66$
Data RBs allocated	Config 1, 2		24
DL initial BWP configuration	Config 1, 2		DLBWP.0.1
DL dedicated BWP	Config 1, 2		DLBWP.1.1
configuration			
UL initial BWP configuration	Config 1, 2		ULBWP.0.1

			1	
UL dedicated B	BWP	Config 1, 2		ULBWP.1.1
configuration		0 " 1 0		TDD0 (0)
TDD Configura		Config 1, 2		TDDConf.3.1
RMSI CORESE	ET Reference	Config 1, 2		CR.3.1 TDD
Channel				
Dedicated COF		Config 1, 2		CCR.3.4 TDD
Reference Cha				
SSB Configura		Config 1, 2		SSB.1 FR2
SMTC Configur		Config 1, 2		SMTC.1
PDSCH/PDCC	H subcarrier	Config 1, 2		120 KHz
spacing	.,	0 " 1 0		T.I. 40004
PRACH Config		Config 1, 2		Table A.3.8.3.1
SSB index assi RS	gned as RLM	Config 1, 2		0,1
OCNG parame	ters			OP.5
CP length				Normal
Out of sync	DCI format			1-0
transmission	Number of Co	ntrol OFDM		2
parameters	symbols			
	Aggregation le	evel	CCE	8
	Ratio of hypot	hetical PDCCH RE	dB	4
	energy to aver			
	energy			
		hetical PDCCH	dB	4
	DMRS energy	to average SSS RE		
	energy			
	DMRS precod			REG bundle size
	REG bundle s	ize		6
DRX				OFF
Gap pattern ID				gp0
Layer 3 filtering	1			Enabled
T310 timer			ms	0
T311 timer			ms	1000
N310				1
N311		T-		1
CSI-RS for CSI		Config 1, 2		CSI-RS.3.1 TDD
reportConfigTy	pe			periodic
reportQuantity				cri-RI-PMI-CQI
CSI reporting p			slot	40
CSI reporting o			slot	4
	PDCCH/PDSCH			TCI.State.2
CSI-RS for trac	king	Config 1, 2		TRS.2.1 TDD
T1	·		S	0.2
T2	·		S	9.68
T3			S	9.68
D1			S	9.64
		e assigned to the UE		rt of time period T1.
		is not transmitted after		
Note 3: E-U	TRAN is in non-l	DRX mode under test		

Table A.5.5.1.1.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for out-of-sync radio link monitoring tests in non-DRX mode

Parameter	Unit	Test 1						
		T1	T2	T3	T1	T2	Т3	
AoA setup		Setup 3 defined in A.3.15						
-		AoA1 AoA2						
Assumption for UE beams ^{Note 5}		Rough Rough						

EPRE ratio of PDCCI	H DMRS to SSS	dB		4				
EPRE ratio of PDCCI	to PDCCH DMRS	dB						
EPRE ratio of PBCH	DMRS to SSS	dB						
EPRE ratio of PBCH	to PBCH DMRS	dB						
EPRE ratio of PSS to	SSS	dB		0				
EPRE ratio of PDSCH	I DMRS to SSS	dB		U			Not sent	
EPRE ratio of PDSCH	to PDSCH DMRS	dB						
EPRE ratio of OCNG	DMRS to SSS	dB						
EPRE ratio of OCNG	to OCNG DMRS	dB						
ssb-Index 0 SNR	Config 1, 2	dB	2 ^{Note 6} -	·6 ^{Note 6}	-15			
ssb-Index 1 SNR	Config 1, 2		No	ot sent		2 ^{Note 6}	-15	
λ7	Config 1, 2	dBm/		-92.1		00.4		
N_{oc}		15kHz	-	-92.1			-92.1	
Time multiplexing of t	he downlink			Dofino	d in Figur	:0 A E E 1	112	
transmissions from ea	ach AoA			Deline	d in Figui	e A.S.S. I	.1.1-2	
Propagation condition			TDL-A	30ns 7	5Hz	TDL	-A 30ns 7	'5Hz
Note 1: OCNG sha	II be used such that a c	onstant to	otal transmit	tted pov	ver spectr	al density	/ is achie	ved for
all OFDM s	symbols.							
	contains PDCCH for U					part of C	CNG.	
	correspond to the sign							
	alues are specified for						e band. F	or
	UE which supports 4R							
	about types of UE bea	ım is give	n in B.2.1.3,	, and do	es not lin	nit UE imp	olementat	tion or
	implementation					_		
Note 6: This value	allows up to 1dB degra	dation fro	m applied S	SNR to U	JE baseb	and		

Table A.5.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

Field	Test 1
Field	Value
gapOffset	0
	ame boundary aligned. SS is partially overlapped with

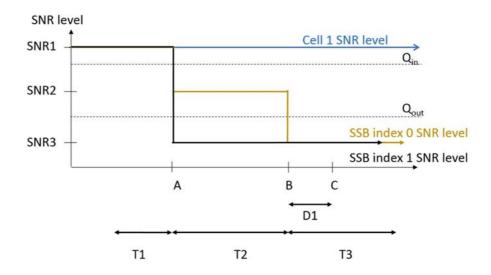


Figure A.5.5.1.1.1-1: SNR variation for out-of-sync testing

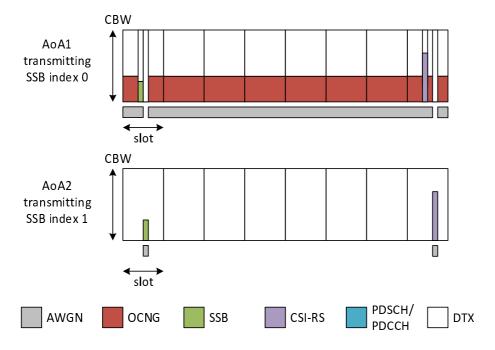


Figure A.5.5.1.1.1-2: Time multiplexed downlink transmissions

A.5.5.1.1.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.2 Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in non-DRX mode

A.5.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.5.5.1.2.1-1. The test parameters are given in Tables A.5.5.1.2.1-2, and A.5.5.1.2.1-3 below. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.5.5.1.2.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms.

Table A.5.5.1.2.1-1: Supported test configurations for FR2 PSCell

Configuration	guration Description							
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode							
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode							
Note: The UE is only required to pass in one of the supported test configurations in FR2								

Table A.5.5.1.2.1-2: General test parameters for FR2 in-sync testing in non-DRX mode

Paramete	r	Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 2		TDD
BW _{channel}	Config 1, 2		100: $N_{RB,c} = 66$
Data RBs allocated	Config 1, 2		24
DL initial BWP configuration	Config 1, 2		DLBWP.0.1
DL dedicated BWP	Config 1, 2		DLBWP.1.1
configuration			
UL initial BWP configuration	Config 1, 2		ULBWP.0.1
UL dedicated BWP	Config 1, 2		ULBWP.1.1
configuration			
TDD Configuration	Config 1, 2		TDDConf.3.1
RMSI CORESET Reference	Config 1, 2		CR.3.1 TDD
Channel			
Dedicated CORESET	Config 1, 2		CCR.3.1 TDD
Reference Channel			
SSB Configuration	Config 1, 2		SSB.1 FR2
SMTC Configuration	Config 1, 2		SMTC.3

PDSCH/PDCC	H subcarrier	Config 1, 2		120 KHz
spacing				
PRACH Config		Config 1, 2		Table A.3.8.3.1
SSB index ass	gned as RLM	Config 1, 2		0,1
RS OCNG parame	toro			OP.5
	leis			
CP length	DCI format			Normal 1-0
n sync ransmission		stral OFDM asymptotic		2
parameters		ntrol OFDM symbols	005	
Jarameters	Aggregation le		CCE	4
		etical PDCCH RE age SSS RE energy	dB	0
	Ratio of hypoth	age 333 KE ellergy	dB	0
			ив	0
		to average SSS RE		
	energy DMRS precode	ar granularity		REG bundle size
	REG bundle size			
Out of our	DCI format	∠ U		6
Out of sync ransmission		stral OFDM as reals als		1-0
		ntrol OFDM symbols	005	2
oarameters	Aggregation le		CCE	8
		etical PDCCH RE	dB	4
		age SSS RE energy	JD	
	Ratio of hypoth		dB	4
		to average SSS RE		
	energy	an anna an danite e		DEC hundle sine
	DMRS precode			REG bundle size
DDV	REG bundle size	ze		6
DRX				OFF N. A
Gap pattern ID				N.A.
Layer 3 filtering)			Enabled
T310 timer			ms	4000
T311 timer			ms	1000
N310				1
N311				1
CSI-RS for CS		Config 1, 2		CSI-RS.3.1 TDD
reportConfigTy	pe			periodic
reportQuantity				cri-RI-PMI-CQI
CSI reporting p	eriodicity		slot	40
CSI reporting of			slot	4
	PDCCH/PDSCH			TCI.State.2
CSI-RS for trac	king	Config 1, 2		TRS.2.1 TDD
Γ1			S	0.2
Τ2			S	0.2
Т3			S	1.88
Γ4			S	0.2
Т5			S	3.84
			S	3.8
D1				<u> </u>
	onfigurations are	assigned to the UE pr		

Table A.5.5.1.2.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for in-sync radio link monitoring tests in non-DRX mode

Parameter	Unit		Test 1								
		T1	T2	Т3	T4	T5	T1	T2	T3	T4	T5
AoA setup			Setup 3 defined in A.3.15								
				AoA1					AoA2		

Assumption for UE b	peams ^{Note 5}				Rough			Rough					
EPRE ratio of PDCC to SSS	CH DMRS	dB			0					_			
EPRE ratio of PDCC PDCCH DMRS	CH to	dB											
EPRE ratio of PBCH SSS	I DMRS to	dB											
EPRE ratio of PBCH DMRS	I to PBCH	dB											
EPRE ratio of PSS to	o SSS	dB											
EPRE ratio of PDSC to SSS	CH DMRS	dB	0 Not sent				ot sent						
EPRE ratio of PDSC PDSCH DMRS	H to	dB											
EPRE ratio of OCNO	G DMRS to	dB											
EPRE ratio of OCNO	G to OCNG	dB											
ssb-Index 0 C	Config 1, 2	dB	2 ^{Note} 6	6 6	-15	-4.5	2 ^{Note} 6						
ssb-Index 1 C	Config 1, 2				Not sen	t		2 ^{Note} 6	-15	-15	-15	-15	
N_{oc}	Config 1, 2	dBm/ 15kHz	-92.1				-92.1						
Time multiplexing of downlink transmissic each AoA							in Figu	re A.5.5	5.1.2.1-	2			
Propagation condition					A 30ns	_				A 30ns	_		

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.1.2.1-4: Void

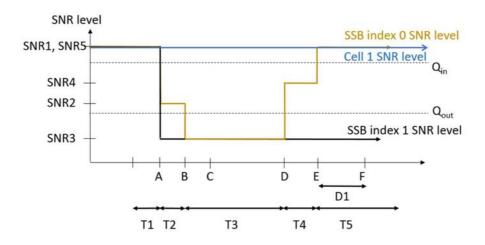


Figure A.5.5.1.2.1-1: SNR variation for in-sync testing

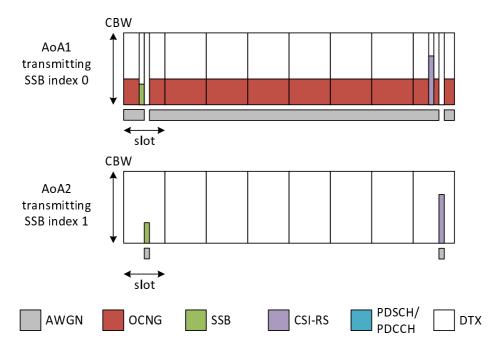


Figure A.5.5.1.2.1-2: Time multiplexed downlink transmissions

A.5.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.3 Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with SSB-based RLM RS in DRX mode

A.5.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.5.5.1.3.1-1. The test parameters are given in Tables A.5.5.1.3.1-2, and A.5.5.1.3.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.5.5.1.3.1-1: Supported test configurations for FR2 PSCell

Configuration	Description				
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note: The l	JE is only required to pass in one of the supported test configurations in FR2				

Table A.5.5.1.3.1-2: General test parameters for FR2 out-of-sync testing in DRX mode

Paramete	r	Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 2		TDD
BW _{channel}	Config 1, 2		100: N _{RB,c} = 66
Data RBs allocated	Config 1, 2		66
DL initial BWP configuration	Config 1, 2		DLBWP.0.1
DL dedicated BWP	Config 1, 2		DLBWP.1.1
configuration			
UL initial BWP configuration	Config 1, 2		ULBWP.0.1
UL dedicated BWP	Config 1, 2		ULBWP.1.1
configuration			
TDD Configuration	Config 1, 2		TDDConf.3.1
RMSI CORESET Reference	Config 1, 2		CR.3.1 TDD
Channel			
Dedicated CORESET	Config 1, 2		CCR.3.4 TDD
Reference Channel			
SSB Configuration	Config 1, 2		SSB.1 FR2
SMTC Configuration	Config 1, 2		SMTC.1

PDSCH/PDCC	H subcarrier	Config 1, 2		120 KHz
spacing				
PRACH Config	RACH Configuration Config 1, 2			Table A.3.8.3.1
SSB index ass	igned as RLM	Config 1, 2		0,1
OCNG parame	ters			OP.1
CP length				Normal
Out of sync	DCI format			1-0
transmission	Number of Co	ntrol OFDM symbols		2
parameters	Aggregation le		CCE	8
		netical PDCCH RE age SSS RE energy	dB	4
		netical PDCCH to average SSS RE	dB	4
	DMRS precod	er granularity		REG bundle size
	REG bundle s	ze		6
DRX Configura	ition			DRX.3
Gap pattern ID				N.A.
Layer 3 filtering]			Enabled
T310 timer			ms	0
T311 timer			ms	1000
N310				1
N311				1
CSI-RS for CS	I reporting	Config 1, 2		CSI-RS.3.1 TDD
reportConfigTy	ре			periodic
reportQuantity				cri-RI-PMI-CQI
CSI reporting p			slot	40
CSI reporting of			slot	4
	PDCCH/PDSCH			TCI.State.2
CSI-RS for trac	king	Config 1, 2		TRS.2.1 TDD
T1			S	0.2
T2			S	14.48
T3			S	14.48
D1			S	14.44
Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts. Note 3: E-UTRAN is in non-DRX mode under test.				t of time period T1.

Table A.5.5.1.3.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for out-of-sync radio link monitoring tests in DRX mode

Parameter		Unit		Test 1	
			T1	T2	T3
AoA setup			Set	up 1 defined in A.	3.15
Assumption for UE bear	ms ^{Note 5}			Rough	
EPRE ratio of PDCCH [DMRS to SSS	dB		4	
EPRE ratio of PDCCH t	o PDCCH DMRS	dB		0	
EPRE ratio of PBCH DN	MRS to SSS	dB			
EPRE ratio of PBCH to	PBCH DMRS	dB			
EPRE ratio of PSS to S	SS	dB			
EPRE ratio of PDSCH [DMRS to SSS	dB		0	
EPRE ratio of PDSCH t	PRE ratio of PDSCH to PDSCH DMRS				
EPRE ratio of OCNG D	dB				
EPRE ratio of OCNG to	OCNG DMRS	dB	3		
ssb-Index 0 SNR	Config 1, 2	dB	2 ^{Note 6}	-6 ^{Note 6}	-15
ssb-Index 1 SNR	Config 1, 2		2 ^{Note 6}	-15	-15

N_{oc}		Config 1, 2	dBm/15K Hz	-104.7dBm
Propagat	tion condition			TDL-A 30ns 75Hz
Note 1:				Cell 2 are fully allocated and a constant total
	transmitted power	er spectral density is	s achieved fo	or all OFDM symbols.
Note 2:	The signal contain	ins PDCCH for UEs	other than t	he device under test as part of OCNG.
Note 3:				o over the SSS REs.
Note 4:				hich supports 2RX on at least one band. For
testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.			, the SNR during T3 is A.3.6.	
			ı is given in E	3.2.1.3, and does not limit UE implementation
or test system implementation				
Note 6:	This value allows	up to 1dB degrada	ation from ap	plied SNR to UE baseband

Table A.5.5.1.3.1-4: Void

Table A.5.5.1.3.1-5: Void

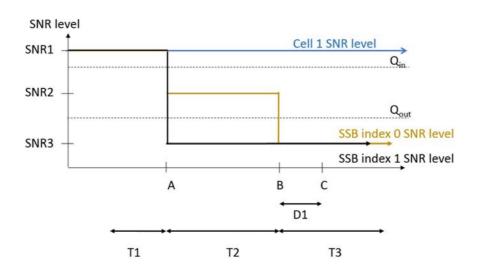


Figure A.5.5.1.3.1-1: SNR variation for out-of-sync testing

A.5.5.1.3.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal in Cell 2 no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.4 Radio Link Monitoring In-sync Test for FR2 PSCell configured with SSB-based RLM RS in DRX mode

A.5.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PSCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.5.5.1.4.1-1. The test parameters are given in Tables A.5.5.1.4.1-2, and A.5.5.1.4.1-3. There are two cells, Cell 1 is the E-UTRAN PCell, and Cell 2 is the PSCell, in the test. The E-UTRAN PCell setting refers to Table A.3.7.2.1-2. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1 and Cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.5.5.1.4.1-1: Supported test configurations for FR2 PSCell

Configuration	Description				
1	FDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2	TDD LTE PCell, NR 120 KHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note: The l	JE is only required to pass in one of the supported test configurations in FR2				

Table A.5.5.1.4.1-2: General test parameters for FR2 in-sync testing in DRX mode

Paramete	r	Unit	Value
			Test 1
Asting E LITPA POSIT			0-11.4
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel Number			1
Active PSCell			Cell 2
RF Channel Number			2
Duplex mode	Config 1, 2		TDD
BW _{channel}	Config 1, 2		100: $N_{RB,c} = 66$
Data RBs allocated	Config 1, 2		66
DL initial BWP configuration	Config 1, 2		DLBWP.0.1
DL dedicated BWP	Config 1, 2		DLBWP.1.1
configuration			
UL initial BWP configuration	Config 1, 2		ULBWP.0.1
UL dedicated BWP	Config 1, 2		ULBWP.1.1
configuration			
TDD Configuration	Config 1, 2		TDDConf.3.1
RMSI CORESET Reference	Config 1, 2		CR.3.1 TDD
Channel			
Dedicated CORESET	Config 1, 2		CCR.3.1 TDD
Reference Channel			
SSB Configuration	Config 1, 2		SSB.1 FR2
SMTC Configuration Config 1, 2			SMTC.3
PDSCH/PDCCH subcarrier	Config 1, 2		120 KHz
spacing			

PRACH Config		Config 1, 2		Table A.3.8.3.1
SSB index assigned as RLM Config 1, 2 RS				0,1
OCNG parame	eters	ı		OP.1
CP length				Normal
In sync	DCI format			1-0
transmission	Number of Co	ntrol OFDM symbols		2
parameters	Aggregation le	•	CCE	4
•		netical PDCCH RE	dB	0
		age SSS RE energy		· ·
		netical PDCCH	dB	0
		to average SSS RE		-
	energy	J		
	DMRS precode	er granularity		REG bundle size
	REG bundle si			6
Out of sync	DCI format			1-0
transmission		ntrol OFDM symbols		2
parameters	Aggregation le		CCE	
•		netical PDCCH RE	dB	4
		age SSS RE energy		•
	Ratio of hypoth	netical PDCCH	dB	4
		to average SSS RE		·
	energy	g		
	DMRS precod	er granularity		REG bundle size
	REG bundle si			6
DRX Configura				DRX.11
Gap pattern ID				N.A.
Layer 3 filtering				Enabled
T310 timer			ms	4000
T311 timer			ms	1000
N310				1
N311				1
CSI-RS for CS	I reporting	Config 1, 2		CSI-RS.3.1 TDD
reportConfigTy		, , ,		periodic
reportQuantity				cri-RI-PMI-CQI
CSI reporting p	periodicity		slot	40
CSI reporting of			slot	4
	PDCCH/PDSCH		3.07	TCI.State.2
CSI-RS for trac		Config 1, 2		TRS.2.1 TDD
T1	<u> </u>	<u>, </u>	S	0.2
T2			S	0.2
T3			S	2.8
T4			S	0.2
T5			S	3.88
D1			S	3.84
Note 2: UE-	specific PDCCH	e assigned to the UE p is not transmitted afte DRX mode under test.		of time period T1.

Table A.5.5.1.4.1-3: OTA related cell specific test parameters for FR2 (Cell 2) for in-sync radio link monitoring test in DRX mode

Parameter	Unit	Test 1					
		T1	T2	T3	T4	T5	
AoA setup		Setup 1 defined in A.3.15			15		
Assumption for UE beams ^{Note 5}		Rough					
EPRE ratio of PDCCH DMRS to SSS	dB	3 0					

EPRE ratio of PDCCH to	dB			0			
EPRE ratio of PBCH DN	dB						
EPRE ratio of PBCH to	PBCH DMRS	dB					
EPRE ratio of PSS to S	SS	dB					
EPRE ratio of PDSCH D	MRS to SSS	dB			0		
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DI	MRS to SSS	dB					
EPRE ratio of OCNG to	OCNG DMRS	dB					
ssb-Index 0 SNR	Config 1, 2	dB	2 ^{Note}	- 6 ^{Note}	-15	-4.5	2 ^{Note 6}
				6			
ssb-Index 1 SNR	Config 1, 2		2 ^{Note} -15 -15 -15 -15		-15		
N_{oc}	Config 1, 2	dBm/1 5KHz	-104.7dBm				
Propagation condition				TDL	-A 30ns	75Hz	

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.3
- Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is
- Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.1.4.1-4: Void

Table A.5.5.1.4.1-5: Void

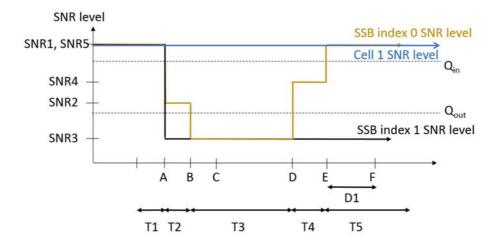


Figure A.5.5.1.4.1-1: SNR variation for in-sync testing.

A.5.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.5 EN-DC Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with CSI-RS-based RLM in non-DRX mode

A.5.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.5.1-1, A.5.5.1.5.1-2, A.5.5.1.5.1-3 and A.5.5.1.5.1-3A below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.5.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms). In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.5.5.1.5.1-1: Supported test configurations for FR2 PSCell

Configuration Description			
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2 LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mod			
Note: The UE is only required to pass in one of the supported test configurations in FR2			

Table A.5.5.1.5.1-2: General test parameters for FR2 PSCell for CSI-RS out-of-sync testing in non-DRX mode

ı	Parameter	Unit	Value
			Test 1
Active E-UTRA PCell			Cell 1
E-UTRA RF Channel I	Number		1
Active PSCell			Cell 2
RF Channel Number			2
Duplex Mode			TDD
BW _{channel}	Config 1, 2		100: N _{RB,c} = 66
Data RBs allocated	Config 1, 2		24
BWoccupied	Config 1, 2		24
TDD Configuration	Config 1		TDDConf.3.1
	Config 2		TDDConf.3.1
DL initial BWP configuration	Config 1, 2		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2		DLBWP.1.4

	T -		
UL initial BWP	Config 1, 2		ULBWP.0.1
configuration			
UL dedicated BWP	Config 1, 2		ULBWP.1.4
configuration			
RMSI CORESET	Config 1		CR.3.1 TDD
Reference Channel			
	Config 2		CR.3.1 TDD
Dedicated CORESET	Config 1		CCR.3.4 TDD
Reference Channel			CCR.3.6 TDD
	Config 2		CCR.3.4 TDD
			CCR.3.6 TDD
SSB Configuration	Config 1		SSB.1 FR2
	Config 2		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
	Config 2		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing			
	Config 2		120 KHz
CSI-RS for RLM	Config 1, 2		Resource #4 in TRS.2.1
			TDD
			Resource #4 in TRS.2.2
			TDD
TRS configuration			TRS.2.1 TDD
			TRS.2.2 TDD
TCI configuration for PI			TCI.State.2
TCI configuration for PI	DCCH#2		TCI.State.3
OCNG parameters			OP.5
CP length			Normal
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH	dB	4
	RE energy to average CSI-		
	RS RE energy		
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average	42	·
	CSI-RS RE energy		
	comments		
	_		REG bundle size
	DMRS precoder granularity		NEO Bullale 3126
	REG bundle size		6
DRX			OFF
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting	Config 2		CSI-RS.3.1 TDD
reportConfigType			periodic
reportQuantity			cri-RI-PMI-CQI
CSI reporting periodicit	у	slot	40
CSI reporting offset		slot	4
T1		s	0.2
T2		S	0.35
T3		s	0.35

D1	S	0.31
Note 1: UE-specific PDCCH is not transmitted after T	1 starts.	
Note 2: E-UTRAN is in non-DRX mode under test.		

Table A.5.5.1.5.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

	Parameter			Test 1					
				T1	T2	T3	T1	T2	T3
AoA setup)			Setup 3 defii			ned in A.3.15		
				AoA1			AoA2		
	on for UE bea				Rough			Rough	
		DMRS to SSS	dB		4				
		to PDCCH DMRS	dB						
		MRS to SSS	dB						
EPRE rati	o of PBCH to	PBCH DMRS	dB						
EPRE rati	o of PSS to S	SSS	dB						
EPRE rati	o of PDSCH	DMRS to SSS	dB		0			Not sent	
		to PDSCH DMRS	dB						
		MRS to SSS	dB						
EPRE rati	o of OCNG to	OCNG DMRS	dB						
SNR on R	RLM-RS1	Config 1, 2	dB	2 ^{Note 11} -6 ^{Note} -15					
SNR on R	LM-RS2	Config 1, 2			Not sent		2 ^{Note 11}	-14	-15
N_{oc}		Config 1, 2	dBm/ 15kHz		-92.1		-92.1		
Propagation	on condition			TDL-A 30ns 75Hz TDL-A 30			-A 30ns 7	5Hz	
Note 1:		be used such that the	resource	s in Cell 2	2 are fully	allocated	and a co	nstant to	tal
		power spectral density							
Note 2:		esources for CSI repor							
Note 3:		S resource set configu	ration for	CSI repor	ting are a	ssigned t	o the UE	prior to th	e start
	of time perio								
Note 4:		nt gap configuration is							
Note 5:	The timers a	and layer 3 filtering rela	ated para	meters ar	e configui	red prior t	o the star	t of time p	period
Note 6:	The signal of	ontains PDCCH for U	Es other t	han the d	evice und	ler test as	part of C	CNG.	
Note 7:									
Note 8:	Note 8: The SNR in time periods T1, T2 and			lenoted as	s SNR1, S	SNR2 and	d SNR3 re	espectivel	y in
	figure A.5.5.1.5.1-1.								
Note 9:	Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For					or			
N	testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6. Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or								
Note 10:			m is give	n in B.2.1	.ദ, and do	es not lir	nit UE imi	piementat	ion or
Note 11:		implementation	dation fra	m annlisa	I CNID to I	IE booch	and		
Note 11:	rnis value a	llows up to 1dB degra	uation fro	m applied	I DINK IO L	J⊏ Daseb	and		

Table A.5.5.1.5.1-3A: Measurement gap configuration for FR2 CSI-RS out-of-sync radio link monitoring in non-DRX mode

	Field		
	gapOffset	0	
Note 1:	E-UTRAN PCell and PSCe synchronous and frame bo aligned. (Ensure that RLM partially overlapped with m gap)	oundary RS is	

Table A.5.5.1.5.1-4: Void

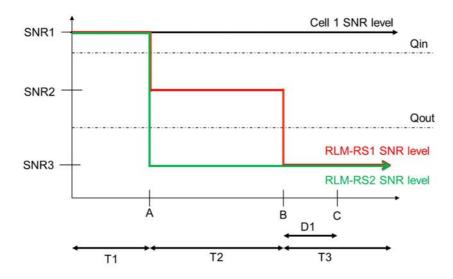


Figure A.5.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.5.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D_1 after the start of the time duration T3) on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.6 EN-DC Radio Link Monitoring In-sync Test for FR2 PSCell configured with CSI-RS-based RLM in non-DRX mode

A.5.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when no DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.6.1-1, A.5.5.1.6.1-2, and A.5.5.1.6.1-3 below. There are two cells, cell 1which is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.6.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.5.5.1.6.1-1: Supported test configurations for FR2 PSCell

Config	Configuration Description					
	1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
	2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note: The UE is only required to pass in one of the supported test configurations in FR2						

Table A.5.5.1.6.1-2: General test parameters for FR2 PSCell for CSI-RS in-sync testing in non-DRX mode

Active E-UTRA PCell Cell 1	P	arameter	Unit	Value
E-UTRA RF Channel Number				Test 1
Active PSCell Cell 2 RF Channel Number 2 Duplex Mode TDD BWohannel Config 1, 2 Data RBs Config 1, 2 allocated 24 BWoccupied Config 1, 2 TDD Config 1 Config 2 TDDConf.3.1 DL initial BWP configuration Config 2, 2 DL dedicated BWP configuration Config 1, 2 UL initial BWP configuration Config 1, 2 UL dedicated BWP configuration Config 1, 2 UL dedicated BWP configuration Config 1 UL dedicated Config 1, 2 ULBWP.1.4 BWP configuration Config 1 CORESET Reference Channel Config 1 Config 2 CR.3.1 TDD Dedicated Config 1 CCR.3.3 TDD CORESET Reference Channel Config 2 Config 2 CCR.3.1 TDD CORESET Reference Config 2 CCR.3.3 TDD Config 2 CCR.3.1 TDD CORESET Reference Config 2 CCR.3.3 TDD Config 2 SSB.1 FR2 <	Active E-UTRA PO	Cell		Cell 1
RF Channel Number	E-UTRA RF Chan	nel Number		1
Duplex Mode BWchannel Config 1, 2 100: N _{RB,c} = 66				Cell 2
DW Description Descript	RF Channel Numb	per		2
Data RBs Config 1, 2 24	Duplex Mode			
Allocated BWocupied Config 1, 2 24 TDD	BW _{channel}	Config 1, 2		100: $N_{RB,c} = 66$
BWoccupied Config 1, 2		Config 1, 2		24
TDD		Config 1 2		24
Configuration Config 2 TDDConf.3.1 DL initial BWP configuration Config 1, 2 DLBWP.0.1 DL decicated BWP configuration DUL initial BWP configuration UL initial BWP configuration UL dedicated BWP configuration Config 1, 2 ULBWP.0.1 UL dedicated BWP configuration Config 1 CR.3.1 TDD RMSI CORESET Reference Channel Config 2 CR.3.1 TDD CORESET Reference Channel Config 1 CCR.3.1 TDD CORESET Reference Channel Config 2 CCR.3.1 TDD CORESET SBB Config 1 CCR.3.3 TDD SSB Config 2 CCR.3.3 TDD SSB SBB Config 1 SSB.1 FR2 Configuration Config 2 SSB.1 FR2 SMTC Config 1 SMTC.1 Configuration Config 2 SMTC.1 PDSCH/PDCH config 1 Config 2 SMTC.1 PDSCH/PDCH config 1 Config 2 Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD OCNG parameters OP.5 TRS.2.1 TDD TRS.2.2 TDD TCI configuration for PDCCH#1/PDSCH TCI. State.2				- -
DL initial BWP configuration				
configuration DL dedicated BWP Config 1, 2 DLBWP.1.4 BWP configuration UL initial BWP configuration UL dedicated BWP configuration UL dedicated BWP configuration UL dedicated BWP configuration UL BWP.1.4 RMSI CORESET Reference Channel Config 1 CR.3.1 TDD CORESET Reference Channel Config 1 CCR.3.1 TDD CORESET Reference Channel Config 2 CCR.3.1 TDD CORESET Channel Config 2 CCR.3.1 TDD CORESET Channel Config 2 CCR.3.1 TDD COBSBB Config 1 SSB.1 FR2 CCR.3.3 TDD SSB Config 2 SSB.1 FR2 SSB.1 FR2 Configuration Config 2 SSB.1 FR2 Configuration Config 2 SMTC.1 PDSCH/PDCH Config 1 SMTC.1 SMTC.1 PDSCH/PDCCH Spacing Config 2 T20 KHz CSI-RS for RLM Config 1, 2 Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD OCNG parameters OP.5 TRS.2.1 TDD TRS.2.2 TDD TCI configuration for PDCCH#1/PDSCH TCI. State.2				
BWP configuration Config 1, 2 ULBWP.0.1 UL dedicated BWP configuration Config 1, 2 ULBWP.1.4 BWP configuration Config 1 CR.3.1 TDD CORESET Reference Channel Config 2 CR.3.1 TDD Dedicated Config 1 CORESET CORE.3.3 TDD CCR.3.3 TDD Reference Channel Config 2 CCR.3.1 TDD CORESET CORE.3.3 TDD CCR.3.3 TDD Reference Config 2 CCR.3.3 TDD Channel SSB.1 FR2 SSB Config 1 SSB.1 FR2 COnfiguration Config 2 SMTC.1 Configuration Config 2 SMTC.1 PDSCH/PDCCH Subcarrier Spacing Config 1 120 KHz CSI-RS for RLM Config 1, 2 Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD OCNG parameters OP.5 TRS configuration TRS.2.2 TDD TCI configuration for PDCCH#1/PDSCH TCI.state.2				DLBWP.0.1
UL initial BWP configuration Config 1, 2 ULBWP.0.1 UL dedicated BWP configuration Config 1, 2 ULBWP.1.4 RMSI CORESET Reference Channel Config 2 CR.3.1 TDD Dedicated Channel Config 2 CR.3.1 TDD Dedicated CORESET Reference Channel Config 2 CCR.3.1 TDD CORESET Reference Channel Config 2 CCR.3.1 TDD CORESET Reference Channel Config 2 CCR.3.1 TDD Cohannel Config 2 CCR.3.1 TDD SSB Config 1 SSB.1 FR2 Configuration Config 2 SSB.1 FR2 SMTC Config 1 SMTC.1 Configuration Config 2 SMTC.1 PDSCH/PDCCH subcarrier spacing Config 1 120 KHz CSI-RS for RLM Config 1, 2 Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD OCNG parameters OP.5 TRS configuration TRS.2.2 TDD TCI configuration for PDCCH#1/PDSCH TCI. State.2	BWP	Config 1, 2		DLBWP.1.4
configuration Config 1, 2 ULBWP.1.4 BWP configuration Config 1, 2 ULBWP.1.4 RMSI CORESET Reference Channel Config 2 CR.3.1 TDD Dedicated COnfig 1 CCR.3.1 TDD CORESET Reference Config 2 CCR.3.1 TDD Reference Config 2 CCR.3.1 TDD Channel CCR.3.3 TDD SSB Config 1 SSB.1 FR2 Configuration Config 2 SSB.1 FR2 SMTC Config 2 SMTC.1 Configuration Config 2 SMTC.1 PDSCH/PDCCH subcarrier spacing Config 2 SMTC.1 SPACHIPDCCH config 1 120 KHz SUBCHIPD CONFIGURATION Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD COLNG parameters OP.5 TRS configuration TRS.2.1 TDD TRS.2.2 TDD TCI configuration for PDCCH#1/PDSCH TCI.State.2				
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Config 2 CR.3.1 TDD	RMSI CORESET Reference	Config 1		CR.3.1 TDD
Dedicated CORESET Config 1 CCR.3.1 TDD CCR.3.3 TDD Reference Channel Config 2 CCR.3.1 TDD CCR.3.3 TDD SSB Config 1 SSB.1 FR2 Configuration Config 2 SSB.1 FR2 SMTC Config 1 SMTC.1 Configuration Config 2 SMTC.1 PDSCH/PDCCH subcarrier spacing Config 1 120 KHz CSI-RS for RLM Config 1, 2 Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD OCNG parameters OP.5 TRS configuration TRS.2.1 TDD TRS.2.2 TDD TCI configuration for PDCCH#1/PDSCH TCI.State.2	Channel	Confin 0		OD 24 TDD
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Configuration Config 2 SSB.1 FR2 SMTC Config 1 SMTC.1 Configuration Config 2 SMTC.1 PDSCH/PDCCH Config 1 120 KHz subcarrier spacing Config 2 120 KHz CSI-RS for RLM Config 1, 2 Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD OCNG parameters OP.5 TRS configuration TRS.2.1 TDD TRS.2.2 TDD TCI configuration for PDCCH#1/PDSCH TCI.State.2		Config 1		
SMTC Config 1 SMTC.1 Configuration Config 2 SMTC.1 PDSCH/PDCCH subcarrier spacing Config 1 120 KHz CSI-RS for RLM Config 2 Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD OCNG parameters OP.5 TRS configuration TRS.2.1 TDD TRS.2.2 TDD TCI configuration for PDCCH#1/PDSCH TCI.State.2				
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TRS configuration TRS.2.1 TDD TRS.2.2 TDD TCI configuration for PDCCH#1/PDSCH TCI.State.2		Config 1, 2		
TRS configuration TRS.2.1 TDD TRS.2.2 TDD TCI configuration for PDCCH#1/PDSCH TCI.State.2	OCNG parameters	S		
TCI configuration for PDCCH#1/PDSCH TCI.State.2				
	TCI configuration	TCI configuration for PDCCH#1/PDSCH		
				TCI.State.3

CD longth			Normal
CP length	DCI formet		
Out of sync transmission	DCI format		1-0 2
	Number of Control		2
parameters	OFDM symbols	CCE	0
	Aggregation level	CCE	<u>8</u> 4
	Ratio of hypothetical PDCCH RE energy to	dB	4
	average CSI-RS RE		
	•		
	energy	in.	
	Ratio of hypothetical	dB	4
	PDCCH DMRS energy		
	to average CSI-RS RE		
	energy		DE0.1
	DMRS precoder		REG bundle size
	granularity		
In avena	REG bundle size		<u>6</u> 1-0
In sync transmission	DCI format		
parameters	Number of Control		2
parameters	OFDM symbols	CCE	1
	Aggregation level Ratio of hypothetical	CCE dB	<u>4</u> 0
	PDCCH RE energy to	uБ	U
	average CSI-RS RE		
	energy		
	Ratio of hypothetical	dB	0
	PDCCH DMRS energy	uБ	U
	to average CSI-RS RE		
	energy		
	DMRS precoder		REG bundle size
	granularity		NEO Barraio 3120
	REG bundle size		6
DRX			OFF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		me	1000
T311 timer		ms ms	1000
N310		1110	1
N311			<u>'</u> 1
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting	Config 2		CSI-RS.3.1 TDD
reportConfigType			periodic
reportQuantity			cri-RI-PMI-CQI
CSI reporting periodicity		slot	40
CSI reporting offset		slot	4
T1		S	0.2
T2		S	0.2
T3		S	0.24
T4		S	0.2
T5		S	0.88
D1		S	0.84
	ecific PDCCH is not transmit		S.
Note 2: E-UTRA	N is in non-DRX mode unde	r test.	

Table A.5.5.1.6.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

Paran	Unit	Test 1										
			T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
AoA setup			Setup 3 defined in A.3.15									
					AoA1	-				AoA2		
Assumption for U	JE beams ^{Note 10}				Rough					Rough		
EPRE ratio of PI	DCCH DMRS	dB			0							
to SSS					0							
EPRE ratio of PI	DCCH to	dB										
PDCCH DMRS												
EPRE ratio of PI	BCH DMRS to	dB										
SSS	DOLLA BROW	ID.	-									
EPRE ratio of PI DMRS	BCH to PBCH	dB										
EPRE ratio of PS	SS to SSS	dB	1									
EPRE ratio of PI	DSCH DMRS	dB				Not sent						
to SSS					0					NOL SELL	ı	
EPRE ratio of PI	DSCH to	dB										
PDSCH DMRS												
EPRE ratio of O	CNG DMRS to	dB										
EPRE ratio of O	CNG to OCNG	dB										
DMRS	CING TO OCING	uБ										
SNR on RLM-	Config 1, 2	dB	2 ^{Note}	-	-15	-4.5	2 ^{Note}					
RS1	J ,		11	6 ^{Note}			11					
				11								
SNR on RLM-	Config 1, 2				Not sen	t		2 ^{Note}	-14	-15	-15	-14
RS2								11				
N_{oc}	Config 1, 2	dBm/ 15KHz	-92.1		-92.1 -92.1							
Propagation con	dition		TDL-A 30ns 75Hz TDL-A 30ns 75Hz									
	Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total											

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.5.5.1.6.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.1.6.1-3A: Void

Table A.5.5.1.6.1-4: Void

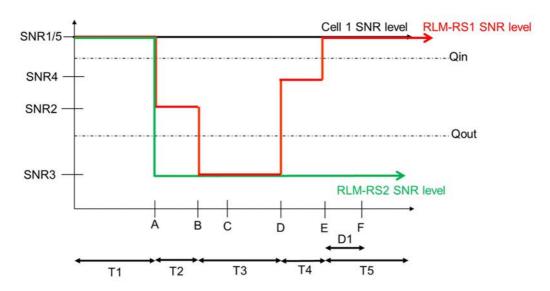


Figure A.5.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.5.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.7 EN-DC Radio Link Monitoring Out-of-sync Test for FR2 PSCell configured with CSI-RS-based RLM in DRX mode

A.5.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.7.1-1, A.5.5.1.7.1-2, and A.5.5.1.7.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.5.5.1.7.1-1 shows the variation of the downlink SNR in the E-UTRAN PCell and the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is enabled in PSCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when Onduration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. In the test, SSB0 and SSB1 are configured as BFD-RS and are not same as RLM-RS to avoid triggering the beam failure during the RLM test.

Table A.5.5.1.7.1-1: Supported test configurations for FR2 PSCell

Configuration Description					
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2 LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex					
Note: The UE is only required to pass in one of the supported test configurations in FR2					

Table A.5.5.1.7.1-2: General test parameters for FR2 PSCell for CSI-RS out-of-sync testing in DRX mode

Pa	arameter	Unit	Value			
			Test 1			
Active E-UTRA	PCell		Cell 1			
E-UTRA RF Cha	annel Number		1			
Active PSCell			Cell 2			
RF Channel Nur	RF Channel Number		2			
Duplex Mode			TDD			
TDD	Config 1		TDDConf.3.1			
Configuration	Config 2		TDDConf.3.1			
DL initial BWP configuration	Config 1, 2		DLBWP.0.1			
DL dedicated BWP configuration	Config 1, 2		DLBWP.1.1			
UL initial BWP configuration	Config 1, 2		ULBWP.0.1			
UL dedicated BWP configuration	Config 1, 2		ULBWP.1.1			
RMSI CORESET Reference Channel	Config 1		CR. 3.1 TDD			
	Config 2		CR. 3.1 TDD			
Dedicated CORESET	Config 1		CCR. 3.4 TDD CCR.3.6 TDD			
Reference Channel	Config 2		CCR. 3.4 TDD CCR.3.6 TDD			
SSB	Config 1		SSB.1 FR2			
Configuration	Config 2		SSB.1 FR2			
SMTC	Config 1		SMTC.1			
Configuration	Config 2		SMTC.1			
PDSCH/PDCC	Config 1		120 KHz			
H subcarrier spacing	Config 2		120 KHz			
CSI-RS for RLM	SI-RS for Config 1, 2		Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD			
SSB index for BFD-RS	Config 1, 2		0, 1			
TRS configuration			TRS.2.1 TDD TRS.2.2 TDD			
TCI configuration for PDCCH#1/PDSCH			TCI.State.2			
TCI configuration			TCI.State.3			
OCNG paramete			OP.1			
CP length			Normal			

Out of sync	DCI format		1-0			
transmission	Number of Control		2			
parameters	OFDM symbols		2			
parameters	Aggregation level	CCE	8			
	Ratio of hypothetical	dB	4			
	PDCCH RE energy to	ub	T			
	average CSI-RS RE					
	energy					
	Ratio of hypothetical	dB	4			
	PDCCH DMRS	42	·			
	energy to average					
	CSI-RS RE energy					
	DMRS precoder		REG bundle size			
	granularity					
	REG bundle size		6			
DRX			DRX.3			
Gap pattern ID			N.A.			
Layer 3 filtering			Enabled			
T310 timer		ms	0			
T311 timer		ms	1000			
N310			1			
N311			1			
CSI-RS for	Config 1		CSI-RS.3.1 TDD			
CSI reporting	Config 2		CSI-RS.3.1 TDD			
reportConfigTyp	е		periodic			
reportQuantity		slot	cri-RI-PMI-CQI			
	CSI reporting periodicity		40			
CSI reporting offset		slot	4			
T1		S	0.2			
T2		S	1.28			
T3		S	1.28			
D1 s 1.24						
	pecific PDCCH is not tran		starts.			
Note 2: E-UTRAN is in non-DRX mode under test.						

Table A.5.5.1.7.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter	Unit	Test 1			
		T1	T2	T3	
AoA setup		Setup 1 defined in A.3.15			
Assumption for UE beams ^{Note 10}			Rough		
EPRE ratio of PDCCH DMRS to SSS	dB		4		
EPRE ratio of PDCCH to PDCCH DMRS	dB				
EPRE ratio of PBCH DMRS to SSS	dB				
EPRE ratio of PBCH to PBCH DMRS	dB				
EPRE ratio of PSS to SSS	dB				
EPRE ratio of PDSCH DMRS to SSS	dB		0		
EPRE ratio of PDSCH to PDSCH DMRS	dB				
EPRE ratio of OCNG DMRS to SSS	dB				

EPRE ratio of O	CNG to OCNG	dB			
SNR on RLM- RS1	Config 1, 2	dB	2 ^{Note 11}	-6 ^{Note 11}	-15
SNR on RLM- RS2	Config 1, 2		2 ^{Note 11}	-14	-15
M	Config 1	dBm/15KHz		-104.7	
N_{oc}	Config 2			-104.7	
Propagation condition			TDL-A 30ns 75Hz		

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.1.7.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.1.7.1-3A: Void

Table A.5.5.1.7.1-4: Void

Table A.5.5.1.7.1-5: Void

Table A.5.5.1.7.1-6: Void

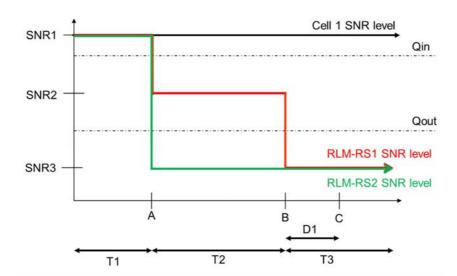


Figure A.5.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.5.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 2 (PSCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 2.

The UE shall stop transmitting uplink signal in Cell 2 (PSCell) no later than time point C (D_1 after the start of the time duration T3) on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.8 EN-DC Radio Link Monitoring In-sync Test for FR2 PSCell configured with CSI-RS-based RLM in DRX mode

A.5.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PSCell when DRX is used. This test will partly verify the FR2 TDD PSCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.5.5.1.8.1-1, A.5.5.1.8.1-2, A.5.5.1.8.1-3 and A.5.5.1.8.1-3A below. There are two cells, cell 1which is the E-UTRAN PCell, and cell 2 is the NR PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.1.8.1-1 shows the variation of the downlink SNR in the PSCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms). In the test, SSB0 and SSB1 are configured as BFD-RS and are not same with RLM-RS to avoid triggering the beam failure during the RLM test.

Table A.5.5.1.8.1-1: Supported test configurations for FR2 PSCell

Configuration	ntion Description	
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note: The UE is only required to pass in one of the supported test configurations in FR2		

Table A.5.5.1.8.1-2: General test parameters for FR2 PSCell for CSI-RS in-sync testing in non-DRX mode

Parameter		Unit	Value		
			Test 1		
Active E-UTRA PCell			Cell 1		
	E-UTRA RF Channel Number		1		
Active PSCell			Cell 2		
RF Channel N	umber		2		
Duplex Mode	T = " .		TDD		
TDD	Config 1		TDDConf.3.1		
Configuratio	Config 2		TDDConf.3.1		
DL initial	Config 1, 2		DLBWP.0.1		
BWP configuration	_				
DI	Config 1, 2		DLBWP.1.1		
dedicated BWP	Corning 1, 2		DEBWF.1.1		
configuration					
UL initial BWP	Config 1, 2		ULBWP.0.1		
configuration					
UL	Config 1, 2		ULBWP.1.1		
dedicated BWP					
configuration					
RMSI CORESET Reference	Config 1		CR.3.1 TDD		
Channel					
	Config 2		CR.3.1 TDD		
Dedicated	Config 1		CCR.3.1 TDD		
CORESET			CCR.3.3 TDD		
Reference	Config 2		CCR.3.1 TDD		
Channel			CCR.3.3 TDD		
SSB	Config 1		SSB.1 FR2		
Configuratio n	Config 2		SSB.1 FR2		
SMTC	Config 1		SMTC.1		
Configuratio n	Config 2		SMTC.1		
PDSCH/PD	Config 1		120 KHz		
CCH subcarrier spacing	Config 2		120 KHz		
CSI-RS for RLM	Config 1, 2		Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD		
SSB index for BFD-RS	Config 1, 2		0, 1		

TRS configura	tion		TRS.2.1 TDD
			TRS.2.2 TDD
	ion for PDCCH#1/PDSCH		TCI.State.2
	ion for PDCCH#2		TCI.State.3
OCNG parame	eters		OP.1
CP length	DCI format		Normal
Out of sync transmission	DCI format Number of Control OFDM		1-0 2
parameters	symbols		2
P	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy to		
	average CSI-RS RE		
	energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS energy to		
	average CSI-RS RE energy		
			REG bundle size
	DMRS precoder granularity		REG buildle Size
	REG bundle size		6
In sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols	005	
	Aggregation level Ratio of hypothetical	CCE dB	<u>4</u> 0
	PDCCH RE energy to	uБ	O
	average CSI-RS RE		
	energy		
	Ratio of hypothetical	dB	0
	PDCCH DMRS energy to		
	average CSI-RS RE		
	energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			gp0
Layer 3 filterin	g		Enabled
T310 timer		ms	2000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for	Config 1		CSI-RS.3.1 TDD
CSI	Config 2		CSI-RS.3.1 TDD
reporting			
reportConfigType reportQuantity			periodic cri-RI-PMI-CQI
CSI reporting periodicity		slot	40
CSI reporting periodicity CSI reporting offset		slot	40
T1		S	0.2
T2		S	0.2
T3		S	1.64
T4		S	0.2
T5		s	1.88
D1		S	1.84
Note 1: UE-	specific PDCCH is not transmi	tted after T1 starts.	
Note 2: E-UT	RAN is in non-DRX mode unde	er test.	

Table A.5.5.1.8.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
AoA setup			Setup 1 defined in A.3.15				
Assumption f	or UE beams ^{Note 10}			•	Rough		
EPRE ratio o	f PDCCH DMRS to	dB			0		
EPRE ratio o	f PDCCH to PDCCH	dB					
EPRE ratio of PBCH DMRS to SSS		dB					
EPRE ratio of PBCH to PBCH DMRS		dB					
EPRE ratio o	f PSS to SSS	dB	7				
EPRE ratio of PDSCH DMRS to SSS		dB			0		
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR on RLM-RS1	Config 1, 2	dB	2 ^{Note 11}	-6 ^{Note 11}	-15	-4.5	2 ^{Note 11}
SNR on RLM-RS2	Config 1, 2	dB	2 ^{Note 11}	-14	-15	-15	-14
N_{oc}	Config 1, 2	dBm/15KHz	-104.7				
Propagation condition			TDL-A 30ns 75Hz				

- Note 1: OCNG shall be used such that the resources in Cell 2 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.5.5.1.8.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.1.8.1-3A: Measurement gap configuration for FR2 CSI-RS in-sync radio link monitoring in DRX mode

Field		Test 1	
	rieid		
	gapOffset	0	
Note 1:	E-UTRAN PCell and PSCell are SFN- synchronous and frame boundary aligned. (Ensure that RLM RS is partially overlapped with measurement		

Table A.5.5.1.8.1-4: Void

Table A.5.5.1.8.1-5: Void

Table A.5.5.1.8.1-6: Void

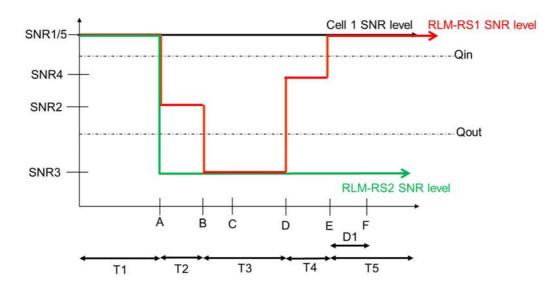


Figure A.5.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

A.5.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PSCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.1.9 EN-DC Radio Link Monitoring UE Scheduling Restrictions on FR2

A.5.5.1.9.1 Test Purpose and Environment

The purpose is to verify that the NR UE correctly follows the RLM scheduling restrictions requirements defined in clause 8.1.7. This test verifies that the UE correctly receive the PDCCH scheduled on the symbols right before the RLM SSB symbols without overlap so that it sends ACK/NACK correctly. The test case is only applicable to UE which supports pdcch-MonitoringAnyOccasions or pdcch-MonitoringAnyOccasionsWithSpanGap.

Two cells are deployed in the test, which are E-UTRAN PCell (Cell 1) and NR FR2 PSCell (Cell 2). The test parameters for NR PSCell are given in table A.5.5.1.9.1-1, table A.5.5.1.9.1-2 and table A.5.5.1.9.1-3 below and the parameters and applicability for the E-UTRAN cell are defined in A.3.7.2. The UE is required during time period T1 to transmit ACK/NACK correctly upon scheduling of PDSCH.

Table A.5.5.1.9.1-1: Supported test configurations

Con	nfiguration	Description	
1		FDD LTE, 120 kHz SSB SCS, 120 kHz RMC SCS, 100 MHz bandwidth, TDD duplex	
		mode	
2		TDD LTE, 120 kHz SSB SCS, 120 kHz RMC SCS, 100 MHz bandwidth, TDD duplex	
		mode	
Note:	The UE is only required to be tested in one of the supported test configurations.		

Table A.5.5.1.9.1-2: General test parameters for RLM scheduling restriction test case in FR2

Parameter	Unit	Test configuration	Value	Comment
RF Channel Number		1, 2	1 and 2	1 for NR PSCell and 2 for LTE PCell
SSB configuration		1, 2	SSB.1 FR2	
SMTC configuration		1, 2	SMTC	
			pattern 1	
DRX cycle length	S	1, 2	OFF	
T1	S	1, 2	5	During T1 the UE is required to correctly transmit ACK/NACK

Table A.5.5.1.9.1-3: Cell specific test parameters for RLM scheduling restriction test case in FR2

Parameter	Unit	Test configuration	Се	II 2
AoA setup		1, 2	1, 2 Setup 3 defined i	
			AoA1	AoA2
Assumption for UE			Rough	Rough
beams ^{Note 1}				
TDD configuration		1, 2	TDDC	onf.3.1
BW _{channel}	MHz	1, 2	100: N _F	RB,c = 66
Data RBs allocated		1, 2	2	4
PDSCH Reference		1, 2	SR.3.2 TDD	Not sent
measurement				
channel				
RMSI CORESET		1, 2	CR.3.1 TDD	Not sent
RMC configuration				
Dedicated CORESET		1, 2	CCR.3.2 TDD	Not sent
RMC configuration				
TRS configuration		1, 2 1, 2	TRS.2.1 TDD	TRS.2.2 TDD
PDCCH/PDSCH TCI		1, 2	TCI.State.2	Not sent
state				
OCNG Pattern		1, 2	OP.5 defined in	Not sent
			A.3.2.1	
Initial DL BWP		1, 2	DLBW	/P.0.1
configuration				
Initial UL BWP		1, 2	ULBW	/P.0.1
configuration				
RLM-RS		1, 2	SSB with index	SSB with index
			0	1
N_{oc}	dBm/15kHz	1, 2	-92.1	-92.1
N_{oc} Note2	dBm/SCS	1, 2	-83.1	-83.1

\hat{E}_s/N_{oc}	dB	1, 2	2	2
$\hat{E}_{s}/I_{ot\ BB\ Note\ 4}$	dB	1, 2	1	1
SSB_RP Note3	SB_RP Note3 dBm/SCS		-81.1	-81.1
lo	dBm/95.04 MHz	1, 2	-54.35	-54.35
Time multiplexing of the downlink transmissions from each AoA		1, 2	Defined in Figu	re A.5.5.1.9.1-1
Propagation		1, 2	AWGN	AWGN
Condition				

Note 1: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate

power for $N_{oc} \,$ to be fulfilled.

Note 3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

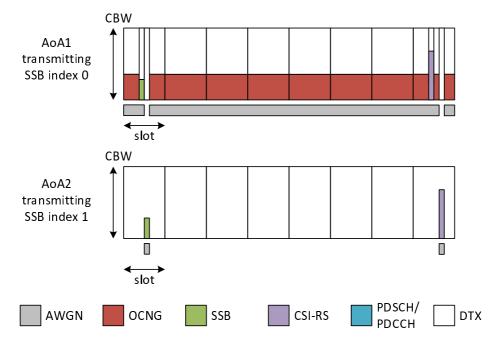


Figure A.5.5.1.9.1-1: Time multiplexed downlink transmissions

A.5.5.1.9.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.1.7.3.

A.5.5.2 Interruption

A.5.5.2.1 E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

A.5.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that when E-UTRA PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.1.1-1.

The general test parameters are given in Table A.5.5.2.1.1-2, and NR cell specific test parameters are given in Table A.5.5.2.1.1-3 and A.5.5.2.1.1-4. The E-UTRAN PCell DRX configuration parameters are given in Table A.5.5.2.1.1-5 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.2-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell on and Cell2 is NR FR2 PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. PDCCH indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.5.5.2.1.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

Config		Description		
	1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note:	The UE is only re	UE is only required to be tested in one of the supported test configurations		

Table A.5.5.2.1.1-2: General test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		1, 2	other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to cell1 and cell 2
DRX		DRX.4	DRX related parameters are defined in
		DNA.4	Table A.3.3.4-1
Measurement gap pattern		OFF	
ld		011	
T1	S	6.25	

Table A.5.5.2.1.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Parameter		Unit	Cell 2
Frequency Range			FR2
Duplex mode	Config 1,2		TDD
TDD configuration Config 1,2			TDDConf.3.1
BWchannel	Config 1.2	MHz	100: Npp c = 66

Data RBs allocated	Config 1,2		66
Downlink initial BWP Configuration	Config 1,2		DLBWP.0.1
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.1.1
Uplink initial BWP configuration	Config 1,2		ULBWP.0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1
TRS configuration	Config 1,2		TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD
RMC CORESET Reference Channel	Config 1,2		CCR.3.1 TDD
OCNG Patterns			OP.1
SSB Configuration			SSB.3 FR2
SMTC Configuration	Config 1,2		SMTC.1
EPRE ratio of PSS to SSS		dB	
EPRE ratio of PBCH DMRS			
EPRE ratio of PBCH to PBC			
EPRE ratio of PDCCH DMR			_
EPRE ratio of PDCCH to PE			0
EPRE ratio of PDSCH DMR EPRE ratio of PDSCH to PE			
EPRE ratio of OCNG DMRS			
EPRE ratio of OCNG to OC			
Ē _s /N _{oc}		dB	17
Propagation Condition			AWGN
Time offset to cell1 Note 2		μs	3
N. 4	1 1 1 1 1		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Table A.5.5.2.1.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in synchronous EN-DC

Parameter	Unit	Cell2
Angle of arrival configuration		Setup 1 according to clause A.3.15.1
Assumption for UE beams ^{Note}		Fine
N_{oc} Note1	dBm/15kHz ^{Note4}	-112
N_{oc} Note1	dBm/SCS ^{Note3}	-102.97
\hat{E}_s/N_{oc}	dB	17
SSB_RP ^{Note2}	dBm/SCS Note4	-85.97
\hat{E}_{s}/I_{ot}	dB	17
Io ^{Note2}	dBm/95.04 MHz Note4	-56.90

Note 1:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power
	for N_{oc} to be fulfilled.
Note 2:	SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 4:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
Note 5:	As observed with 0dBi gain antenna at the centre of the quiet zone
Note 6:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Table A.5.5.2.1.1-5: Void

A.5.5.2.1.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed 0.625ms (5 slots) as defined in clause 8. 2.1.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.2.2 E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

A.5.5.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that when LTE PCell is in DRX and NR PSCell is in non-DRX, NR PSCell interruptions due to transitions from active to non-active and from non-active to active during LTE PCell DRX the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.2.1-1.

The general test parameters are given in Table A.5.5.2.2.1-2, and NR cell specific test parameters are given in Table A.5.5.2.2.1-3 and A.5.5.2.2.1-4. The E-UTRAN PCell DRX configuration parameters are given in Table A.5.5.2.2.1-5 below. And the E-UTRAN cell specific test parameters can refer to Table A.3.7.2.2-1. In the test there are two cells: Cell1 and Cell2. Cell1 is LTE PCell and Cell2 is NR PSCell. The test consists of one time period, with duration of T1. During T1, NR PSCell is continuously scheduled in DL while LTE PCell is not scheduled and has DRX configured. Prior to the start of the time duration T1, Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. Prior to start of T1 the DRX inactivity timer for the LTE PCell has already expired. During T1 the UE shall be continuously scheduled on NR PSCell while not scheduled on LTE PCell. PDCCH indicating a new transmission on PSCell shall be sent continuously during the entire time duration to ensure UE would not enter DRX state on PSCell.

Table A.5.5.2.2.1-1: Interruption at transitions between active and non-active during DRX supported test configurations

Config		Description
	1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	: The UE is only required to be tested in one of the supported test configurations	

Table A.5.5.2.2.1-2: General test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the other is NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
CP length		Normal	Applicable to cell1 and cell 2
DRX		DRX.6	DRX related parameters are defined in Table A.3.3.6-1
Measurement gap pattern Id		OFF	
T1	S	6.25	

Table A.5.5.2.2.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

Parameter		Unit	Cell 2
Frequency Range			FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66
Data RBs allocated	Config 1,2		66
Downlink initial BWP Configuration	Config 1,2		DLBWP.0.1
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.1.1
Uplink initial BWP configuration	Config 1,2		ULBWP.0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1
TRS configuration	Config 1,2		TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD
RMC CORESET Reference Channel	Config 1,2		CCR.3.1 TDD
OCNG Patterns	1		OP.1
SSB Configuration			SSB.3 FR2
SMTC Configuration	Config 1,2		SMTC.1
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS EPRE ratio of PBCH to PBC EPRE ratio of PDCCH DMR EPRE ratio of PDCCH DMR EPRE ratio of PDSCH DMR EPRE ratio of PDSCH DMR EPRE ratio of PDSCH to PE EPRE ratio of OCNG DMRS EPRE ratio of OCNG to OC Ês/Noc	CH DMRS S to SSS DCCH DMRS S to SSS S to SSS DSCH S to SSS(Note 1)	dB dB	0
		UD.	
Propagation Condition			AWGN
Time offset to cell1 Note 2		μs	62.5

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Table A.5.5.2.2.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions at transitions between active and non-active during DRX in asynchronous EN-DC

	Parameter	Unit	Cell2		
	arrival configuration		Setup 1 according to clause A.3.15.1		
Assumpti	on for UE beams ^{Note}		Fine		
N_{oc} Note1		dBm/15kHz ^{Note4}	-112		
N_{oc} Note1		dBm/SCS ^{Note3}	-102.97		
\hat{E}_s/N_{oc}		dB	17		
SSB_RP	Note2	dBm/SCS Note4	-85.97		
\hat{E}_{s}/I_{ot}		dB	17		
Io ^{Note2}		dBm/95.04 MHz Note4	-56.90		
Note 1:	Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power				
	for N_{oc} to be fulfille	d.			
Note 2:	Note 2: SSB_RP and lo levels have been derived from other parameters for information purposes They are not settable parameters themselves.				
Note 3:					
Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone					
Note 5:	Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone				
Note 6:	· ·				

Table A.5.5.2.2.1-5: Void

A.5.5.2.2.2 Test Requirements

The UE shall be continuously scheduled in NR PSCell during the entire length of T1. UE shall not be scheduled in LTE PCell during T1. During the time duration T1 the UE shall transmit at least 99% of ACK/NACK on NR PSCell.

Interruption on NR PSCell shall not exceed 0.625ms (5 slots) as defined in clause 8. 2.1.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.2.3 E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

A.5.5.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that for NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.3.1-1.

The general test parameters are given in Table A.5.5.2.3.1-2, and NR cell specific test parameters are given in Table A.5.5.2.3.1-3 and A.5.5.2.3.1-4 below. The E-UTRAN cell specific test parameters can be found in Table A.3.7.2.1-2. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell 3 are NR FR2 PSCell and NR FR2 deactivated SCell, respectively. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* for the deactivated NR SCells is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.3.1-1: Interruption during measurements on deactivated NR SCC supported test configurations

	Config	Description		
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note:	The UE is only re	The UE is only required to be tested in one of the supported test configurations		

Table A.5.5.2.3.1-2: General test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2, 3	One is E-UTRAN RF channel and the
		1, 2, 3	other two are NR RF channels
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 3.
CP length		Normal	Applicable to cell1, cell 2 and cell3
AoA number		1	Applicable to cell2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
ld		OFF	
SCell measurement cycle	mc	640	
(measCycleSCell)	ms	040	

Table A.5.5.2.3.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parameter		Unit	Cell 2	Cell 3
Frequency Range	Frequency Range		FR2	FR2
Duplex mode	Config 1,2		TDD	TDD
TDD configuration	Config 1,2		TDDConf.3.1	TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Data RBs allocated	Config 1,2		66	66
Downlink initial BWP Configuration	Config 1,2		DLBWP.0.1	DLBWP.0.1

Downlink dedicated BWP Configuration	Config 1,2		DLBWP.1.1	DLBWP.1.1
Uplink initial BWP configuration	Config 1,2		ULBWP.0.1	ULBWP.0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1	ULBWP.1.1
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD	-
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD	CR.3.1 TDD
PDCCH CORESET parameters	Config 1,2		CCR 3.1 TDD	CCR 3.1 TDD
OCNG Patterns	•		OP.1	OP.1
SSB Configuration	Config 1,2		SSB.1 FR2	SSB.1 FR2
SMTC Configuration	Config 1,2		SMTC.1	SMTC.1
TRS configuration	Config 1,2		TRS.2.1 TDD	TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0	TCI.State.0
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS				
EPRE ratio of PBCH to PBC				
EPRE ratio of PDCCH DMR		dB	_	_
	RE ratio of PDCCH to PDCCH DMRS		0	0
	EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH		-		
EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)		+		
Propagation Condition			AWGN	AWGN
Time offset to cell1 Note 2		μs	3	3+ Time offset to cell2
Time offset to cell2 Note 3		แร	-	3
		μο		1 -

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Note 3: Receive time difference of signals received between slot timing boundary from two NR Cells including time alignment error between the two cells

Table A.5.5.2.3.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in synchronous EN-DC

Parai	meter	Unit	Cell 2	Cell 3	
Angle of arrival configuration			Setup 1 defined i	n clause A.3.15.1	
Assumption for UE be	eams ^{Note 6}		Fine	Rough	
	NR_TDD_FR2_A				
	NR_TDD_FR2_B				
Note1	NR_TDD_FR2_F	dBm/15kHz	-111.7	-104.7	
OC .	NR_TDD_FR2_G	UDIII/ IOKIIZ	-111.7	-104.7	
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
	NR_TDD_FR2_A				
Note1	NR_TDD_FR2_B		-102.7	-95.7	
	NR_TDD_FR2_F	dBm/SCS ^{Note}			
OC .	NR_TDD_FR2_G	3			
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
	NR_TDD_FR2_A	dBm/SCS			
SSB_RP ^{Note2}	NR_TDD_FR2_B	Note4	-90.7	-90.7	
	NR_TDD_FR2_F				

	NR_TDD_FR2_G				
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
	NR_TDD_FR2_A				
	NR_TDD_FR2_B				
\hat{E}_{s}/I_{ot}	NR_TDD_FR2_F	dB	12	5	
$\mathbf{E}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	NR_TDD_FR2_G	uБ	12	5	
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
	NR_TDD_FR2_A				
	NR_TDD_FR2_B				
Ê/N	NR_TDD_FR2_F	dB	12	5	
\hat{E}_s/N_{oc}	NR_TDD_FR2_G	ав			
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
	NR_TDD_FR2_A		-61.45	-60.52	
	NR_TDD_FR2_B				
lo ^{Note2}	NR_TDD_FR2_F	dBm/95.04			
10	NR_TDD_FR2_G	MHz Note4			
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
Note 1:	Interference from other cells and				
	constant over subcarriers and time	e and shall be n	nodelled as AWGN of	f appropriate power	
	for N_{oc} to be fulfilled.				
Note 2:	SSB_RP and lo levels have been	derived from ot	her parameters for in	formation	
	purposes. They are not settable parameters themselves.				
Note 3:					
noise at each receiver antenna port.					
Note 4:	Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone				
Note 5:	As observed with 0dBi gain antenna at the centre of the quiet zone				
Note 6:	Information about types of UE beam is given in B.2.1.3, and does not limit UE				
	implementation or test system implementation				

A.5.5.2.3.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell.

If the NR PSCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PSCell immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.3.2-1.

If the NR PSCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PSCell no earlier than 4 slot before an SMTC and no later than 4 slot after the SMTC. the interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.3.2-2.

Table A.5.5.2.3.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4

Table A.5.5.2.3.2-2: Interruption duration if the NR PSCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	8 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.2.4 E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

A.5.5.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that for NR PSCell interruptions during the measurement on the deactivated NR SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.4.1-1.

The general test parameters are given in Table A.5.5.2.4.1-2, and NR cell specific test parameters are given in Table A.5.5.2.4.1-3 and A.5.5.2.4.1-4 below. The E-UTRAN cell specific test parameters can be found in Table A.3.7.2.1-2. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 is LTE PCell, Cell2 and Cell 3 are NR FR2 PSCell and NR FR2 deactivated SCell, respectively. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* for the deactivated NR SCells is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.4.1-1: Interruption during measurements on deactivated NR SCC supported test configurations

Config Description		Description	
1 LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD du			
2 LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex n			
Note:	Note: The UE is only required to be tested in one of the supported test configurations		

Table A.5.5.2.4.1-2: General test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	One is E-UTRAN RF channel and the
		Ι, Ζ	other two are NR RF channel
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on NR RF channel
SCell			number 2.
CP length		Normal	Applicable to cell1, cell 2 and cell3
AoA number		1	Applicable to cell2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
ld		011	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	S	10	

Table A.5.5.2.4.1-3: NR cell specific test parameters for E-UTRAN – NR interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

Parameter		Unit	Cell 2	Cell 3
Frequency Range			FR2	FR2
Duplex mode	Config 1,2		TDD	TDD
TDD configuration	Config 1,2		TDDConf.3.1	TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Data RBs allocated	Config 1,2		66	66
Downlink initial BWP Configuration	Config 1,2		DLBWP.	.0.1
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.	1.1
Uplink initial BWP configuration	Config 1,2		ULBWP.	0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.	.1.1
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD	-
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD	CR.3.1 TDD
PDCCH CORESET parameters	Config 1,2		CCR.3.1 TDD	CCR.3.1 TDD
OCNG Patterns			OP.1	OP.1
SSB Configuration			SSB.1 FR2	SSB.1 FR2
SMTC Configuration	Config 1,2		SMTC.1 FR2	SMTC.1 FR2
TRS configuration	Config 1,2		TRS.2.1 TDD	TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0	TCI.State.0
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)		dB	0	0
Propagation Condition			AWGN	AWGN
Time offset to cell1 Note 2		μs	62.5	62.5+ Time offset to cell2
Time offset to cell2 Note 3		μs	-	3

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.5.5.2.4.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated NR SCC in asynchronous EN-DC

	Parameter	Unit	Cell 2	Cell 3
Angle of arrival configuration			Setup 1 defined i	n clause A.3.15.1
Assumption for UE beams ^{Note 6}			Fine	Rough
	NR_TDD_FR2_A			
	NR_TDD_FR2_B			
N_{oc} Note1	NR_TDD_FR2_F	4D/4-51-11-	444.7	4047
oc .	NR_TDD_FR2_G	dBm/15kHz	-111.7	-104.7
	NR_TDD_FR2_T			
	NR TDD FR2 Y			

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Note 3: Receive time difference of signals received between slot timing boundary from two NR Cells including time alignment error between the two cells

		NR_TDD_FR2_A				
3.7 . No. 4		NR_TDD_FR2_B		-102.7	-95.7	
N_{oc} Note1		NR_TDD_FR2_F	dBm/SCSNote			
		NR_TDD_FR2_G	3		00	
		NR_TDD_FR2_T				
		NR_TDD_FR2_Y				
		NR_TDD_FR2_A				
		NR_TDD_FR2_B				
SSB_RP	Note2	NR_TDD_FR2_F	dBm/SCS	-90.7	-90.7	
SSD_IXE		NR_TDD_FR2_G	Note4	-30.7	-30.7	
		NR_TDD_FR2_T				
		NR_TDD_FR2_Y				
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$			dB	12	5	
Ê _s /N _{oc}			dB	12	5	
		NR_TDD_FR2_A				
		NR_TDD_FR2_B		-61.45	-60.52	
Io ^{Note2}		NR_TDD_FR2_F	dBm/95.04			
10.10.02		NR_TDD_FR2_G	MHz Note4			
		NR_TDD_FR2_T				
		NR_TDD_FR2_Y				
Note 1:		ce from other cells and ver subcarriers and tim				
			2			
	for IV_{oc} to	o be fulfilled.				
Note 2:	SSB_RP a	and lo levels have been	derived from ot	her parameters for in	formation	
purposes. They are not settable parameters themselves.						
Note 3: SS-RSRP minimum requirements are specified assuming independent interference and					t interference and	
	noise at each receiver antenna port.					
Note 4:						
Note 5:	As observe	ed with 0dBi gain anten	na at the centre	of the quiet zone	•	
Note 6:	Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE					
	implementation or test system implementation					

A.5.5.2.4.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell.

If the NR PSCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PSCell immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.4.2-1.

If the NR PSCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PSCell no earlier than 4 slot before an SMTC and no later than 4 slot after the SMTC. the interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.4.2-2.

Table A.5.5.2.4.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4

Table A.5.5.2.4.2-2: Interruption duration if the NR PSCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	8 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.2.5 E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

A.5.5.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that for NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8.2.1.2. Supported test configurations are shown in table A.5.5.2.5.1-1.

The general test parameters are given in Table A.5.5.2.5.1-2, and NR cell specific test parameters are given in Table A.5.5.2.5.1-3 and A.5.5.2.5.1-4 below. The E-UTRAN cell specific test parameters can be found in Table A.3.7.2.1-2. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 are LTE PCell and LTE deactivated SCell, respectively, and Cell2 is NR FR2 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated E-UTRA SCell is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.5.1-1: Interruption during measurements on deactivated E-UTRAN SCC supported test configurations

	Config	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

Table A.5.5.2.5.1-2: General test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in synchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		1, 2, 3	One is NR RF channel and two are E- UTRAN RF channels
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated SCell		Cell3	Deactivated SCell on E-UTRAN RF channel number 3.
CP length		Normal	Applicable to cell1, cell 2 and cell3
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

Table A.5.5.2.5.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in synchronous EN-DC

Parameter		Unit	Cell 2
Frequency Range			FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66
Data RBs allocated	Config 1,2		66
Downlink initial BWP	-		DLBWP.0.1
Configuration	Config 1,2		DLBWP.U.1
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.1.1
Uplink initial BWP	Config 1.0		ULBWP.0.1
configuration	Config 1,2		ULBVVP.U.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1
PDSCH Reference	Config 1,2		SR.3.1 TDD
measurement channel	Corning 1,2		317.3.1 100
RMSI CORESET	Config 1,2		CR.3.1 TDD
Reference Channel	Coming 1,2		O14.6.1 122
PDCCH CORESET	Config 1,2		CCR.3.1 TDD
parameters			***************************************
OCNG Patterns			OP.1
SMTC Configuration	Config 1,2		SMTC.1 FR2
SSB Configuration	Config 1,2		SSB.1 FR2
TRS configuration	Config 1,2		TRS.2.1 TDD
TCI state	Config 1,2		TCI.State.0
EPRE ratio of PSS to SSS		dB	
EPRE ratio of PBCH DMRS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			0
EPRE ratio of PDSCH to PDSCH		4	
EPRE ratio of PDSCH to PDSCH		-	
EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)		-	
Propagation Condition			AWGN
Time offset to cell1 Note 2		II.C	3
Time onset to cell 1 has 2		μs	J

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.5.5.2.5.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in synchronous EN-DC

Parameter	Unit	Cell2
Angle of arrival configuration		Setup 1 according to clause A.3.15.1
Assumption for UE beams ^{Note}		Fine
N_{oc} Note1	dBm/15kHz ^{Note4}	-112
$N_{oc}^{}$ Note1	dBm/SCS ^{Note3}	-102.97

Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

\hat{E}_s/N_{od}	c	dB	17		
SSB_RP	Note2	dBm/SCS Note4	-85.97		
\hat{E}_{s}/I_{ot}		dB	17		
Io ^{Note2}		dBm/95.04 MHz Note4	-56.90		
Note 1:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.				
Note 2:	SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				
Note 3:	,				
Note 4: Note 5: Note 6:	 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone 5: As observed with 0dBi gain antenna at the centre of the quiet zone 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE 				
NOTE 6:		oes of UE beam is given in B. ist system implementation	.2.1.3, and does not limit UE		

A.5.5.2.5.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.5.2-1.

Table A.5.5.2.5.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	5

Table A.5.5.2.5.2-2: Void

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.2.6 E-UTRAN – NR FR2 interruptions during measurements on deactivated E-UTRAN SCC in asynchronous EN-DC

A.5.5.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that for NR PSCell interruptions during the measurement on the deactivated E-UTRAN SCC, the UE missed ACK/NACK does not exceed the limits. This test will verify the missed ACK/NACK rate for NR PSCell in EN-DC specified in clause 8. 2.1.2. Supported test configurations are shown in table A.5.5.2.6.1-1.

The general test parameters are given in Table A.5.5.2.6.1-2, and NR cell specific test parameters are given in Table A.5.5.2.6.1-3 and A.5.5.2.6.1-4 below. The E-UTRAN cell specific test parameters can be found in Table A.3.7.2.1-2. In the test there are three cells: Cell1, Cell2 and Cell3. Cell1 and Cell3 are LTE PCell and LTE deactivated SCell, respectively, and Cell2 is NR FR2 PSCell. Cell1 shall be configured as LTE PCell and Cell2 shall be configured as

NR PSCell. The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated E-UTRA SCell is received by the UE, defines the start of time period T1. During T1, LTE PCell and NR PSCell are continuously scheduled in DL.

Table A.5.5.2.6.1-1: Interruption during measurements on deactivated E-UTRAN SCC supported test configurations

	Config	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

Table A.5.5.2.6.1-2: General test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in asynchronous EN-DC

Parameter	Unit	Value	Comment
RF Channel Number		4 0 0	One is NR RF channel and two are E-
		1, 2, 3	UTRAN RF channels
Active PCell		Cell1	PCell on E-UTRAN RF channel number 1.
Configured PSCell		Cell2	PSCell on NR RF channel number 2.
Configured deactivated		Cell3	Deactivated SCell on E-UTRAN RF
SCell			channel number 3.
CP length		Normal	Applicable to cell1, cell 2 and cell3
DRX		OFF	
Measurement gap pattern		OFF	
Id		OH	
SCell measurement cycle	ms	640	
(measCycleSCell)	1115	040	
T1	S	10	

Table A.5.5.2.6.1-3: NR cell specific test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in asynchronous EN-DC

Parameter		Unit	Cell 2
Frequency Range			FR2
Duplex mode	Config 1,2		TDD
TDD configuration	Config 1,2		TDDConf.3.1
BW _{channel}	Config 1,2	MHz	100: N _{RB,c} = 66
Data RBs allocated	Config 1,2		66
Downlink initial BWP Configuration	Config 1,2		DLBWP.0.1
Downlink dedicated BWP Configuration	Config 1,2		DLBWP.1.1
Uplink initial BWP configuration	Config 1,2		ULBWP.0.1
Uplink dedicated BWP configuration	Config 1,2		ULBWP.1.1
PDSCH Reference measurement channel	Config 1,2		SR.3.1 TDD
RMSI CORESET Reference Channel	Config 1,2		CR.3.1 TDD
PDCCH CORESET	Config 1,2		CCR.3.1 TDD
parameters OCNG Patterns	-		OP.1
	Config 1.2		SMTC.1 FR2
SMTC Configuration	Config 1,2		
SSB Configuration	Config 1,2		SSB.1 FR2

TRS configuration	Config 1,2		TRS.2.1 TDD		
TCI state	Config 1,2	TCI.State.0			
EPRE ratio of PSS to SSS		dB			
EPRE ratio of PBCH DMI	RS to SSS				
EPRE ratio of PBCH to P	BCH DMRS				
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS			0		
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to C	OCNG DMRS (Note 1)				
Propagation Condition			AWGN		
Time offset to cell1 Note 2		μs	62.5		

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Receive time difference of signals received between subframe timing boundary of E-UTRA PCell and slot timing boundary of PSCell including time alignment error between the two cells

Table A.5.5.2.6.1-4: NR cell specific OTA related test parameters for E-UTRAN – NR FR2 interruptions during measurements on deactivated E_UTRAN SCC in asynchronous EN-DC

Parameter		Unit	Cell2		
	arrival configuration		Setup 1 according to clause A.3.15.1		
Assumption for UE beams ^{Note}			Fine		
N_{oc}^{Note1}		dBm/15kHz ^{Note4}	440		
		UDIII/ IOKIIZ*****	-112		
		(2.2.2N).(2.2.2N).(3.			
N_{oc} Note:	1	dBm/SCS ^{Note3}	-102.97		
\hat{E}_s/N_{od}	c	dB	17		
SSB_RP ^{Note2}		dBm/SCS Note4	-85.97		
$\hat{\mathrm{E}}_{_{\! \mathrm{s}}}/\mathrm{I}_{_{\! \mathrm{ot}}}$		dB	17		
Io ^{Note2}		dBm/95.04 MHz Note4	-56.90		
Note 1:			ot specified in the test is assumed to be nodelled as AWGN of appropriate power		
	for N_{oc} to be fulfilled.				
Note 2:		ls have been derived from ot e parameters themselves.	her parameters for information purposes.		
Note 3:					
Note 4:	· ·				
Note 5:					
Note 6:	Information about typ	oes of UE beam is given in B	.2.1.3, and does not limit UE		
	•	•	I.3, and does not limit UE implementation		
	or test system implementation				

A.5.5.2.6.2 Test Requirements

The UE shall be continuously scheduled in LTE PCell and NR PSCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on NR PSCell. The UE is only allowed to

cause interruptions immediately before and immediately after an SMTC. Each interruption on NR PSCell shall not exceed the value defined in Table A.5.5.2.6.2-1.

Table A.5.5.2.6.2-1: Interruption duration if the NR PSCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	5

Table A.5.5.2.6.2-2: Void

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.3 SCell Activation and Deactivation Delay

A.5.5.3.1 SCell Activation and deactivation of SCell in FR2 intra-band

A.5.5.3.1.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.4.5.3.1.1 except the SCell is in FR2 intraband.

The supported test configurations are shown in table A.5.5.3.1.1-1 below. The general and cell specific test parameters are the same except those described in the following clause. The listed parameter values in Tables A.5.5.3.1.1-2 and A.5.5.3.1.1-3 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-2 and A.4.5.3.1.1-3. In this case, OTA related test parameters are shown in table A.5.5.3.1.1-4 below.

In this test it is assumed that the UE is receiving RRC messages pertaining to the SCell in SCG via signaling on SRB3.

Table A.5.5.3.1.1-1: Supported test configurations for FR2 SCell activation case with FR2 PSCell

Configuration	Description
1	FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The UE i	s only required to pass in one of the supported test configurations

Table A.5.5.3.1.1-2: General test parameters for FR2 SCell activation case with FR2 PSCell

Parameter	Unit	Value	Comment
Active PCell		Cell 1	Primary cell on E-UTRAN RF channel number 1. As specified in clause A.3.7.2.2

Table A.5.5.3.1.1-3: Cell specific test parameters for FR2 SCell activation case with FR2 PSCell

ParameterNote 5	Unit	Cell 2			Cell 3		
		T1	T2	T3	T1	T2	T3

SSB ARFCN		freq1	freq2		
Duplex mode		TDD	TDD		
TDD configuration		TDDConf.3.1	TDDConf.3.1		
BW _{channel}	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66		
Data RBs allocated		66	66		
PDSCH Reference measurement channel		SR.3.1 TDD	SR.3.1 TDD		
RMSI CORESET Reference Channel		CR.3.1 TDD	CR.3.1 TDD		
RMC CORESET Reference Channel		CCR.3.1 TDD	CCR.3.1 TDD		
DL initial BWP configuration		DLBV	/P.0.1		
DL dedicated BWP configuration		DLBV	/P.1.1		
UL initial BWP configuration		ULBV	/P.0.1		
UL dedicated BWP configuration		ULBV	/P.1.1		
OCNG Patterns		OF	P.1		
SMTC configuration		SMTC.1			
SSB configuration		SSB.1 FR2			
TCI state		TCI.State.0			
TRS configuration			.1 TDD		
CSI-RS configuration for CSI reporting		CSI-RS.	3.1 TDD		
reportConfigType		periodic	N/A		
reportQuantity		cri-RI-PMI-CQI	N/A		
CSI reporting periodicity	slot	40	N/A		
CSI reporting offset	slot	4	N/A		
PDSCH/PDCCH subcarrier spacing	kHz	12	20		
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS	dB)		
EPRE ratio of PDSCH_DMRS to SSS	uБ	,	J		
EPRE ratio of PDSCH to PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSSNote 1					
EPRE ratio of OCNG to OCNG DMRS Note					
1					
Propagation conditions		AW	'GN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Note 5: All parameters apply for configuration 1 and 2

Table A.5.5.3.1.1-4: OTA related test parameters for FR2 SCell activation case with FR2 PSCell

Parameter ^{Note 6}	Unit		Cell 2		Cell 3		
rai ailletei	Onit	T1	T2	T3	T1	T2	Т3
Angle of arrival configuration			Setu	ip 1 accord	ding to A.3.	15.1	
Assumption for UE beams ^{Note 7}			Rough			Rough	
$N_{_{OC}}$ Note1	dBm/15kHz ^N ote4	-104.7		-104.7			
$N_{oc}^{}$ Note1	dBm/SCS ^{Note}	-95.7		-95.7			
\hat{E}_s/N_{oc}	dB		7			7	
SSB_RPNote2	dBm/SCS Note4		-88.7			-88.7	

$\hat{E}_{_{\!s}}/I_{_{\!ot}}$		dB	7	7	
lo ^{Note2}		dBm/95.04 MHz ^{Note4}	-58.92	-58.92	
Note 1:	Interference from other cells and	noise sources n	ot specified in the test is assume	ed to be constant over	
	subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.				
Note 2:	Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.				
Note 3:	Void				
Note 4:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone				
Note 5:	Void				
Note 6:	All parameters apply for configuration 1 and 2				
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation				

A.5.5.3.1.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case.

A.5.5.3.2 SCell Activation and deactivation of known SCell in FR1 for 160ms SCell measurement cycle

A.5.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.4.5.3.1.1, except PSCell is in FR2.

The supported test configurations are shown in table A.5.5.3.2.1-1 below. The general test parameters are the same in Tables A.4.5.3.1.1-2. The cell specific test parameters are given in Tables A.5.5.3.2.1-2. In this case, OTA related test parameters are the same as in table A.5.5.3.2.1-3.

Table A.5.5.3.2.1-1: Supported test configurations for FR1 SCell activation case with PSCell is FR2

Configuration	Description
1	FDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	FDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	FDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	TDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	TDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	TDD LTE PCell, Cell 2 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Cell 3 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE i	s only required to pass in one of the supported test configurations

Table A.5.5.3.2.1-2: Cell specific test parameters for FR1 SCell activation case with FR2 PSCell

Parameter		Unit	Cell 2			Cell 3		
		Ollit	T1	T2	T3	T1	T2	T3
SSB ARFCN			freq2		freq1			
Duplex mode	Config 1,4		TDD		TDD FDD			

	Config 2,3,5,6		TDD	TDD	
	Config 1,4		100	Not Applicable	
TDD and Course Course			TDD0 (0 4		
TDD configuration	Config 2,5		TDDConf.3.1	TDDConf.1.1	
	Config 3,6			TDDConf.2.1	
	Config 1,4			10: N _{RB,c} = 52	
BW _{channel}	Config 2,5	MHz	100: N _{RB,c} = 66	10: N _{RB,c} = 52	
	Config 3,6			40: N _{RB,c} = 106	
	Config 1,4			52	
Data RBs allocated	Config 2,5	_	66	52	
	Config 3,6	1		106	
DL initial BWP	Config				
configuration	1,2,3,4,5,6		DLBV	VP.0.1	
DL dedicated BWP	Config		DI BW	VP.1.1	
configuration	1,2,3,4,5,6		DLBV	VP.1.1	
UL initial BWP	Config		UI BV	VP.0.1	
configuration UL dedicated BWP	1,2,3,4,5,6		3251	= ***	
configuration	Config 1,2,3,4,5,6		ULBV	VP.1.1	
DRX Cycle	1,2,0,1,0,0	ms	Not Ap	plicable	
Divi Gyolo	Config 1,4	1110		SR.1.1 FDD	
PDSCH Reference	Config 2,5	1	SR.3.1 TDD	SR.1.1 TDD	
measurement channel	Config 3,6	1	GIA.G.T TEE	SR.2.1 TDD	
	Config 1,4			CR.1.1 FDD	
RMSI CORESET	Config 2,5	1	CR.3.1 TDD	CR.1.1 TDD	
Reference Channel	Config 3,6	1		CR.2.1 TDD	
RMC CORESET	Config 1,4			CCR.1.1 FDD	
Reference Channel	Config 2,5		CCR.3.1 TDD	CCR.1.1 TDD	
	Config 3,6			CCR.2.1 TDD	
OCNG Patterns				P.1	
SMTC configuration TCI state			TCI.State.0	TC.1 NA	
TOTState	Config 1,4		TCI.State.0	TRS.1.1 FDD	
TRS configuration	Config 2,5	-	TRS.2.1 TDD	TRS.1.1 TDD	
Tree configuration	Config 3,6	_	11(6.2.1 155	TRS.1.2 TDD	
000 ('	Config 1,2,4,5		00D 4 FD0	SSB.1 FR1	
SSB configuration	Config 3,6	1	SSB.1 FR2	SSB.2 FR1	
	Config 1,4			CSI-RS.1.1 FDD	
CSI-RS configuration for CSI reporting	Config 2,5		CSI-RS.3.1 TDD	CSI-RS.1.1 TDD	
Tor Correporting	Config 3,6	_		CSI-RS.2.1 TDD	
PDSCH/PDCCH	Config 1,2,4,5		400111	15kHz	
subcarrier spacing	Config 3,6	kHz	120kHz	30kHz	
reportConfigType	Config 1-6		periodic	N/A	
reportQuantity	Config 1-6		cri-RI-PMI-CQI	N/A	
CSI reporting periodicity	Config 1,2,3,4,5,6	slot	40	N/A	
CSI reporting offset	Config 1,2,3,4,5,6	slot	4	N/A	
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)		dB	0		

			AWGN	NA	
Propagation condition		-		Link only, see clause	
				A.3.7A	
Note 1:	OCNG shall be used such that bo	th cells are fully	allocated and a constant total	transmitted power spectral	
	density is achieved for all OFDM s	symbols.			
Note 2:	Void				
Note 3:	Void				
Note 4: The unlink resources for CSI reporting are assigned to the LIE prior to the start of time period T2.1					

Table A.5.5.3.2.1-3: OTA related test parameters for FR1 SCell activation case with FR2 PSCell

Parameter		Unit		Cell 2		Cell 3			
Fair	ameter	Offic	T1	T2	T3	T1	T2	Т3	
Angle of arrival confi	<u> </u>		Setup 1 according to clause A.3.15.1						
Assumption for UE b	peams ^{Note 7}			Rough					
N_{oc} Note1		dBm/15kHz		-104.7					
N_{oc} Note1	Config 1,2,4,5 Config 3,6	dBm/SCS		-95.7					
SSB_RPNote2	Config 1,2,4,5 Config 3,6	dBm/SCS Note3		-88.7		NA Link only, see clau A.3.7A		clause	
\hat{E}_s/N_{oc}	Config 1,2,3,4,5,6	dB		7				71.5.771	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB		7					
Io ^{Note2}	Config 1,2,4,5	dBm/ChBw ^N	-58.92						
10	Config 3,6	ote4,Note6							

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: Void
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: Void
- Note 6: ChBW is 95.04 MHz for Cell2, 9.36 MHz for Cell 3 in configurations 1,2,4,5, 38.1 MHz in configurations 3,6
- Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.5.5.3.2.2 Test Requirements

The test requirements defined in clause A.4.5.3.1.2 shall apply to this test case, with the following exceptions:

- Placement of interruptions is only verified in NR PSCell.

A.5.5.3.3 Void

A.5.5.3.4 Void

A.5.5.3.5 SCell Activation and deactivation of SCell in FR2

A.5.5.3.5.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell is in FR2.

The supported test configurations are shown in table A.5.5.3.5.1-1 below. The test parameters are the same as in clause A.4.5.3.3.1 except those described in the following clause. The listed parameter values in Tables A.5.5.3.5.1-2 will replace the values of corresponding parameters in Tables A.4.5.3.3.1-2. The listed parameter values in Tables A.5.5.3.5.1-3 will replace the values of corresponding parameters in Tables A.4.5.3.3.1-3. In this case, OTA related test parameters are shown in table A.5.5.3.5.1-4 below.

The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are three carriers, E-UTRA has one cell (Cell 1), NR has two cells, PSCell (Cell 2) in FR1 and SCell (Cell 3) in FR2. Cell 1 and Cell 2 have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1 (PCell) on E-UTRAN and Cell 2 (PSCell) on NR, but is not aware of Cell 3 (SCell) on NR. The UE is monitoring the PCell and PSCell. The UE shall be continuously scheduled in the PCell and PSCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 3) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2.

During T2, the test equipment monitors the L1-RSRP measurement reporting for the SCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot $m+T_{L1-RSRP}$. In the next DL slot after slot $m+T_{L1-RSRP}$, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell.

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PSCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell1 deactivation command is sent until CSI reporting for SCell1 is discontinued.

Table A.5.5.3.5.1-1: FR2 SCell activation in non-DRX test configurations with FR1 PSCell

Configuration	Description
1	LTE FDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE FDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3	LTE FDD PCell, Cell 2 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4	LTE TDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
5	LTE TDD PCell, Cell 2 NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
6	LTE TDD PCell, Cell 2 NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
	Cell 3 NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only required to be tested in one of the supported test configurations

Table A.5.5.3.5.1-2: General test parameters for FR2 SCell activation case with FR1 PSCell

Parameter	Unit	Value	Comment
Active PCell		Cell 1	Primary cell on E-UTRAN RF channel number 1. As specified in clause A.3.7.2.2
T2	S	2	During this time the UE shall activate the SCell.

Table A.5.5.3.5.1-3: Cell specific test parameters for FR2 SCell activation case with FR1 PSCell

Parameter		Unit		Cell 2		Cell 3			
	ter	Onit	T1			T1	T2	T3	
SSB ARFCN				freq1			freq2		
Duplex mode	Config 1,4			FDD		TDD			
2 apiex mede	Config 2,3,5,6			TDD			TDD		
	Config 1,4		No	ot Applicat	ble				
TDD configuration	Config 2,5		Т	DDConf.1	.1	-	TDDConf.	3.1	
	Config 3,6		Т	DDConf.2	.1				
	Config 1,4		10	0: N _{RB,c} = \$	52				
BW _{channel}	Config 2,5	MHz	10	0: N _{RB,c} = \$	52	1	00: N _{RB,c} =	- 66	
	Config 3,6		40): N _{RB,c} = 1	06				
Data RBs allocated	Config 1,4			52			66		
	Config 2,5			52					
	Config 3,6			106					
	Config 1,4		10: N _{RB,c} = 52						
BWP BW	Config 2,5		10	10: N _{RB,c} = 52		100: N _{RB,c} = 66		- 66	
	Config 3,6		40: N _{RB,c} = 106						
DRx Cycle		ms	Not Ap			oplicable			
PDSCH Reference	Config 1,4		,	SR.1.1 FDE)				
measurement channel	Config 2,5		,	SR.1.1 TDE)	SR.3.1 TDD			
measurement channel	Config 3,6			SR.2.1 TDE)	7			
RMSI CORESET	Config 1,4		(CR.1.1 FDE)				
Reference Channel	Config 2,5		(CR.1.1 TDE)		CR.3.1 TD	D	
Reference Charmer	Config 3,6			CR.2.1 TDE					
RMC CORESET	Config 1,4			CR.1.1 FD					
Reference Channel	Config 2,5			CR.1.1 TD			CCR.3.1 TI	DD	
Config 3,6			CCR.2.1 TDD						
OCNG Patterns					P.1				
SMTC configuration			SMT		ГС.1				
TCI state	1						TCI.State	e.0	
	Config 1,4		TRS.2.1 TDD		TRS.2.1 TDD				
TRS configuration	Config 2,5		TRS.1.1 TDD				DD		
	Config 3,6			TRS.1.2 TDD					
SSB configuration	Config 1,2,4,5			SSB.1 FR1 SSB.1 FR2		22			
J = J =	Config 3,6			SSB.2 FR	.1				

PDSCH/PDCCH	Config 1,2,4,5	kHz	15 kHz		120 kHz		
subcarrier spacing	Config 3,6		30 kHz	<u> </u>			
CSI-RS configuration	Config 1~6		NA	NA	CSI-RS.3.1 TDD Note 5		
reportConfigType	Config 1~6		periodic		NA		
reportQuantity	Config 1~6		cri-RI-PMI-CQI		NA		
CSI reporting periodicity Note 6	Config 1~6	slot	40		NA		
CSI reporting offset	Config 1~6	slot	4 NA		NA		
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS	S to SSS						
EPRE ratio of PBCH to PBC	CH DMRS						
EPRE ratio of PDCCH DMF	RS to SSS						
EPRE ratio of PDCCH to P	DCCH DMRS	dB	0				
EPRE ratio of PDSCH DMF	RS to SSS						
EPRE ratio of PDSCH to PI	DSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OC	NG DMRS (Note 1)						
Propagation condition		-	N/A Link only, see clause A.3.7A		AWGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void

Note 4: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T2. Note 5: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+T_{L1-RSRP} during T2.

Note 6: L1-RSRP measurement and reporting are configured to the the UE prior to the start of time period T1.

Table A.5.5.3.5.1-4: OTA related test parameters for FR2 SCell activation case with FR1 PSCell

Parameter		I I m i 4	Cell 2			Cell 3			
		Unit	T1	T2	T3	T1	T2	T3	
Angle of arrival con	•		NA		Setup 1 according to clause A.3.15.1				
Assumption for U	E beams ^{Note 7}		NA				Rough		
N_{oc} Note1		dBm/15kHz			-104.7				
N_{oc} Note1	Config 1,2,4,5 Config 3,6	dBm/SCS				-95.7			
SSB_RPNote2	Config 1,2,4,5 Config 3,6	dBm/SCS Note3	linka	Link only, see clause A.3.7A		-∞	-88.7	-88.7	
\hat{E}_s/N_{oc}	Config 1,2,3,4,5,6	dB	LIIK			-∞	7	7	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB			-∞	7	7		
IoNote2, Note 4	Config 1,2,4,5	dBm/95.04				-66.68	-58.92	-58.92	
10	Config 3,6	MHz				-00.00	-50.92	-56.92	

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 2: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: Void

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: Void Note 6: Void Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

A.5.5.3.5.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after slot (m+k). UE is allowed to postpone CSI report to next available UL resource if an available uplink resource is subject to interruption. Whether CSI report in a slot was interrupted is checked by monitoring ACK/NACK sent in PSCell in the slot.

During T2 the UE shall start sending valid L1-RSRP report for the SCell in the configured slots for CSI reporting after slot $(m+T_{L1-RSRP})$, where $T_{L1-RSRP}$ is no larger than

$$3ms + T_{FirstSSB_MAX} + 15*T_{SMTC_MAX} + 8*T_{rs} + T_{L1\text{-RSRP, measure}} + T_{L1\text{-RSRP, report}}$$

as defined in clause 8.3.2. For this test case, $T_{FirstSSB_MAX} = T_{SMTC_MAX} = T_{rs} = 20ms$; $T_{L1-RSRP, measure} = 480ms$ and $T_{L1-RSRP, measure} = 5ms$, which allows $T_{L1-RSRP}$ 1000ms.

During T2 the UE shall start sending CSI reports for the SCell with non-zero CQI index in the configured slots for CSI reporting no later than slot $m + \frac{T_{HARQ} + T_{activtion_time} + T_{CSI_Reporting}}{NR \, slot \, length}$, where

- T_{HARO} is defined in Table A.5.5.3.1.1-2
- $-T_{activation_time} = 3ms + T_{FirstSSB_MAX} + 15*T_{SMTC_MAX} + 8*T_{rs} + T_{L1-RSRP, measure} + T_{L1-RSRP, report} + max \; \{(T_{HARQ} + T_{uncertainty_MAC} + 5ms + T_{FineTiming}), \; \{T_{uncertainty_RRC} + T_{RRC_delay}\}, \; which \; allows \; 1030ms \; T_{uncertainty_RRC} + T_{unce$
- $T_{CSI_Reporting} = 10ms$
- NR slot length is 0.125ms for this test case.

During T3 the UE shall stop sending CSI reports for both SCells no later than slot $n + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$, as defined in clause 8.3.

During T2 interruption of PSCell during SCell activation shall not happen outside the slot $m+1+\frac{T_{\rm HARQ}}{\rm NR~slot~length}$ to $m+1+\frac{T_{\rm HARQ}+3\,{\rm ms}+T_{\rm X}}{\rm NR~slot~length}$, and interruption of E-UTRA PCell during SCell activation shall not happen outside the subframe $m_1+1+\frac{T_{\rm HARQ}}{\rm EUTRA~slot~length}$ to subframe $m_2+1+\frac{T_{\rm HARQ}+3\,{\rm ms}+T_{\rm X}}{\rm EUTRA~slot~length}$, as defined in clause 8.3, where $T_{\rm X}=20\,{\rm ms}$, and m_1 and m_2 are the index of the first and last subframe of E-UTRA PCell which overlaps with slot m.

During T3 the starting point of interruption of PSCell during SCell deactivation shall not happen outside the slot n + $1 + \frac{T_{\text{HARQ}}}{NR \, slot \, length}$ to n + $1 + \frac{T_{\text{HARQ}} + 3\, \text{ms}}{NR \, slot \, length}$, as defined in clause 8.3 and the starting point of interruption of E-UTRA PCell during SCell deactivation shall not happen outside the subframe $n_1 + 1 + \frac{T_{\text{HARQ}}}{EUTRA \, subframe \, length}$ to subframe $n_2 + 1 + \frac{T_{\text{HARQ}} + 3\, \text{ms}}{EUTRA \, subframe \, length}$, where n_1 and n_2 are the index of the first and last subframe of E-UTRA PCell which overlaps with slot n.

The interruption of PSCell due to activation of SCell1 and SCell2 shall not be more than the values specified for EN-DC in Clause 8.2.1.2.10.

The interruption of PCell due to activation of SCell1 and SCell2 shall not be more than the values specified for ENDC in Clause 7.32.2.5 of TS 36.133 [50].

A.5.5.4 Void

A.5.5.5 Beam Failure Detection and Link recovery procedures

A.5.5.5.1 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with SSB-based BFD and LR in non-DRX mode

A.5.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.1.1-1, A.5.5.5.1.1-2, A.5.5.5.1.1-3 and A.5.5.5.1.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.1.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q_0 in the active PSCell to emulate SSB based beam failure. Figure A.5.5.5.1.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 1.

Table A.5.5.5.1.1-1: Supported test configurations for FR2 PSCell

Configuration	Description				
1	LTE FDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth				
2	LTE TDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth				
3	LTE FDD, TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth				
4	LTE TDD, TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth				
Note: The UE is only required to pass in one of the supported test configurations in FR2					

Table A.5.5.5.1.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Test Config.	Unit	Value	Comment
			Test 1	
Active E-UTRA PCell	1-4		Cell 1	
E-UTRA RF Channel Number	1-4		1	
Active PCell	1-4		Cell 2	
RF Channel Number	1-4		2	
Duplex mode	1-4		TDD	
TDD Configuration	1-4		TDDConf.3.1	
BW _{channel}	1-4	MHz	100: $N_{RB,c} = 66$	
Data RBs allocated	1-4		66	
PDSCH/PDCCH subcarrier spacing	1-4	kHz	120	
DL initial BWP configuration	1-4		DLBWP.0.1	
DL dedicated BWP configuration	1-4		DLBWP.1.1	
UL initial BWP configuration	1-4		ULBWP.0.1	

UL dedicated BWP co	nfiguration	1-4	1	ULBWP.1.1		
PDSCH Reference Ch		1-4				
PDSCH Reference Ch	nannei			SR.3.2 TDD		
DMCI CODECET Data	Channal	3-4		SR.3.3 TDD		
RMSI CORESET Refe	erence Channel	1-2		CR.3.1 TDD		
Dadia dad OODEOET	Defended Observed	3-4		CR.3.2 TDD		
Dedicated CORESET	Reference Channel	1-2	-	CCR.3.1 TDD		
00110		3-4		CCR.3.7 TDD		
OCNG parameters		1-4		OP.1		
CP length		1-4		Normal		
PDSCH/PDCCH TCI s	state	1-4		TCI.State.0		
CSI-RS for tracking		1-4		TRS.2.1 TDD		
SSB Configuration		1-2		SSB.1 FR2		
		3-4		SSB.2 FR2		
SMTC Configuration		1-4		SMTC.3		
PRACH Configuration		1-4		FR2 PRACH	A.3.8.3.2	
		1-4		configuration 2	A.3.6.3.2	
DRX configuration		1-4		OFF		
SSB index assigned a		1-4		0		
SSB index assigned a	s CBD RS (q ₁)	1-4		1		
SSB index assigned a		1-4		0,1		
Beam failure	DCI format	1-4		1-0		
detection	Number of Control					
transmission	OFDM symbols	1-4		2		
parameters	Aggregation level	1-4	CCE	8		
	Ratio of hypothetical					
	PDCCH RE energy to	1-4	dB	0		
	average SSS RE energy			· ·		
	Ratio of hypothetical					
	PDCCH DMRS energy			_		
	to average SSS RE	1-4	dB	0		
	energy					
	DMRS precoder			REG bundle		
	granularity	1-4		size		
	REG bundle size	1-4		6		
Gap pattern ID		1-4		gp0		
gapOffset		1-4	ms	0		
rlmlnSyncOutOfSyncT	hreshold		1110	•	Value 0 is applied.	
	Tilositola	1-4		absent	(Table 8.1.1-1).	
rsrp-ThresholdSSB					(14515 5.1.1 1).	
Torp Timeoriolage		1-2	dBm/SCS	-95	Threshold used for	
		3-4	ubili/SCS	-92	Qin_LR_SSB	
0 1 10" 100						
powerControlOffsetSS	,			" 0	Used for deriving	
		1-4		db0	rsrp-ThresholdCSI-	
hanna Fallenna I	An Count				RS TO 20 204 [7]	
beamFailureInstanceN	/laxCount	1-4		n1	see TS 38.321 [7],	
					clause 5.17	
beamFailureDetectionTimer		1-4		pbfd4	see TS 38.321 [7],	
001.00		-		-	clause 5.17	
CSI-RS configuration	for CSI reporting	1-4		CSI-RS.3.1		
				TDD		
reportConfigType		1-4		periodic		
reportQuantity		1-4		cri-RI-PMI-CQI		
CSI reporting periodicity		1-4	slot	40		
CSI reporting offset		1-4	slot	4		
T310		1-4	ms	1000		
N310		1-4		2		
T1					The UE shall be fully	
		1-4	S	1	synchronized to cell 1	
					during T1	
T2		1-4	S	2.61		
· -						

T3	1-4	S	1.64			
T4	1-4	S	0			
T5	1-4	S	1.01			
D1	1-4	S	0.97			
Note 1: All configurations are assigned to the UE prior to the start of time period T1.						

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.5.5.5.1.1-3: Cell specific test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

er	Unit	Test 1						
		T1	T2	Т3	T4	T5		
		Setup 1 defined in A.3.15						
ams ^{Note 10}								
I DMRS to	dB			0				
I to PDCCH	dB							
DMRS EPRE ratio of PBCH DMRS to SSS								
EPRE ratio of PBCH to PBCH DMRS								
EPRE ratio of PSS to SSS								
EPRE ratio of PDSCH DMRS to SSS								
I to PDSCH	dB							
DMRS to	dB							
to OCNG	dB							
Config 1-4	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12		
Config 1-4	dB	0.2	0.2	20.2	20.2	20.2		
Config 1-2	dBm/SCS	-104.5	-104.5	-84.5	-84.5	-84.5		
Config 3-4		-101.5	-101.5	-81.5	-81.5	-81.5		
Config 1-4	dBm/120 KHz	-104.7						
		TDL-A 30ns 75Hz						
	amsNote 10 I DMRS to I to PDCCH DMRS to O PBCH SSS I DMRS to I to PDSCH DMRS to Config 1-4 Config 1-4 Config 1-2 Config 3-4 Config 1-4	amsNote 10 I DMRS to dB I to PDCCH dB DMRS to dB O PBCH dB SSS dB I DMRS to dB I to PDSCH dB DMRS to dB I to PDSCH dB Config 1-4 dB Config 1-4 dB Config 1-2 Config 3-4 Config 1-4 dBm/120 KHz	T1 amsNote 10 H DMRS to	T1 T2 ams^Note 10	T1 T2 T3 Setup 1 defined in A. Rough DMRS to dB DMRS to dB O PBCH dB SSS dB I DMRS to dB Tto PDSCH dB DMRS to dB Config 1-4 dB Config 1-4 dB Config 1-2 dBm/SCS Config 3-4 Config 1-4 dBm/120 KHz TDL-A 30ns 75H	T1 T2 T3 T4 Setup 1 defined in A.3.15 Rough H DMRS to		

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.5.1.1-4: Void

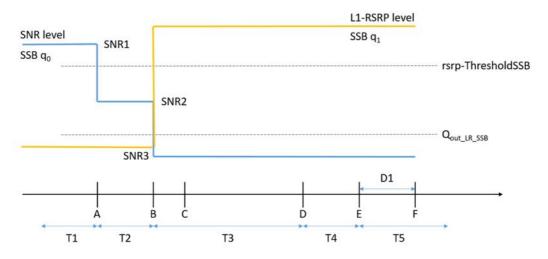


Figure A.5.5.5.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.5.5.5.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q₁.

No later than time point F occurring no later than D1 = 960+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.5.2 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with SSB-based BFD and LR in DRX mode

A.5.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell,

during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.2.1-1, A.5.5.5.2.1-2, A.5.5.5.2.1-3, A.5.5.5.2.1-4 and A.5.5.5.2.1-5 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.2.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q₀ in the active PSCell to emulate SSB based beam failure. Figure A.5.5.5.2.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q₁ of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCSell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.5.5.5.2.1-1: Supported test configurations for FR2 PSCell

Configuration	Description			
1	LTE FDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth			
2	LTE TDD, TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth			
3	LTE FDD, TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth			
4	LTE TDD, TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth			
Note: The UE is only required to pass in one of the supported test configurations in FR2				

Table A.5.5.5.2.1-2: General test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter	Test Config.	Unit	Value	Comment
			Test 1	
Active E-UTRA PCell	1-4		Cell 1	
E-UTRA RF Channel Number	1-4		1	
Active PCell	1-4		Cell 2	
RF Channel Number	1-4		2	
Duplex mode	1-4		TDD	
TDD Configuration	1-4		TDDConf.3.1	
BW _{channel}	1-4	MHz	100: N _{RB,c} = 66	
Data RBs allocated	1-4		66	
PDSCH/PDCCH subcarrier spacing	1-4	kHz	120	
DL initial BWP configuration	1-4		DLBWP.0.1	
DL dedicated BWP configuration	1-4		DLBWP.1.1	
UL initial BWP configuration	1-4		ULBWP.0.1	
UL dedicated BWP configuration	1-4		ULBWP.1.1	
PDSCH Reference Channel	1-2		SR.3.2 TDD	
	3-4		SR.3.3 TDD	
RMSI CORESET Reference Channel	1-2		CR.3.1 TDD	
	3-4		CR.3.2 TDD	
Dedicated CORESET Reference Channel	1-2		CCR.3.1 TDD	
	3-4		CCR.3.7 TDD	
OCNG parameters	1-4		OP.1	
CP length	1-4		Normal	
PDSCH/PDCCH TCI state	1-4		TCI.State.0	
CSI-RS for tracking	1-4		TRS.2.1 TDD	
SSB Configuration	1-2		SSB.1 FR2	
	3-4		SSB.2 FR2	
SMTC Configuration	1-4		SMTC.3	

PRACH Configuration	1	1-4		FR2 PRACH	A.3.8.3.2
==:/				configuration 2	
DRX configuration		1-4		DRX.3	A.3.3.3
SSB index assigned a		1-4 1-4		0	
	SSB index assigned as CBD RS (q ₁)			1	
SSB index assigned a		1-4		0,1	
Beam failure	DCI format	1-4		1-0	
detection transmission	Number of Control OFDM symbols	1-4		2	
parameters	Aggregation level	1-4	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	1-4	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	1-4	dB	0	
	DMRS precoder granularity	1-4		REG bundle size	
	REG bundle size	1-4		6	
Gap pattern ID		1-4		N/A	
rlmInSyncOutOfSync	Threshold	1-4		absent	Value 0 is applied. (Table 8.1.1-1).
rsrp-ThresholdSSB		1-2	JD (200	-95	Threshold used for
		3-4	dBm/SCS	-92	Qin_LR_SSB
powerControlOffsetSS	6	1-4		db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceI	MaxCount	1-4		n1	see TS 38.321 [7], clause 5.17
beamFailureDetection	Timer	1-4		pbfd4	see TS 38.321 [7], clause 5.17
CSI-RS configuration	for CSI reporting	1-4		CSI-RS.3.1 TDD	
reportConfigType		1-4		periodic	
reportQuantity		1-4		cri-RI-PMI-CQI	
CSI reporting periodic	ity	1-4	slot	40	
CSI reporting offset		1-4	slot	4	
T310		1-4	ms	1000	
N310		1-4		2	
T1		1-4	S	1	The UE shall be fully synchronized to cell 1 during T1
T2		1-4	S	3.37	
T3		1-4	S	2.8	
T4		1-4	S	0	
T5		1-4	S	0.61	
D1		1-4	S	0.57	
Note 1: UE-specific	PDCCH is not transmitted a	after T1 st	arts.		

Table A.5.5.5.2.1-3: Cell specific test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter	Unit	Test 1				
		T1	T2	T3	T4	T5
AoA setup		Setup 1 defined in A.3.15				

Assumption for UE beams				Rough			
EPRE ratio of PDCCH DM	dB	0					
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMR	S to SSS	dB					
EPRE ratio of PBCH to PE	3CH DMRS	dB					
EPRE ratio of PSS to SSS	dB						
EPRE ratio of PDSCH DM	dB						
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMF	RS to SSS	dB					
EPRE ratio of OCNG to O	CNG DMRS	dB					
SNR_SSB of set q ₀	Config 1-4	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
SNR_SSB of set q ₁	Config 1-4	dB	0.2	0.2	20.2	20.2	20.2
SSB_RP of set q ₁ Config 1-2		dBm/	-104.5	-104.5	-84.5	-84.5	-84.5
Config 3-4		SCS	-101.5	-101.5	-81.5	-81.5	-81.5
N	Config 1-4	dBm/120			-104.7		
N_{oc}		KHz					
Propagation condition			TDL-A 30ns 75Hz			•	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.2.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.5.2.1-4: Void

Table A.5.5.5.2.1-5: Void

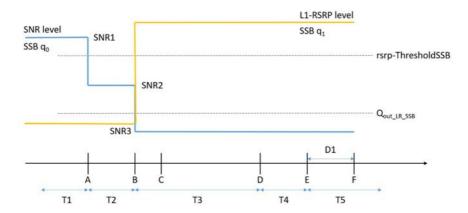


Figure A.5.5.5.2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.5.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 560+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.5.3 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.3.1-1, A.5.5.5.3.1-2, and A.5.5.5.3.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.3.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the CSI-RS in set q_0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.5.5.5.3.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized

to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled.

Table A.5.5.5.3.1-1: Supported test configurations for FR2 PSCell

Configuration	Description					
1	LTE FDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth					
2	LTE TDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth					

Table A.5.5.3.1-2: General test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Test Config.	Unit	Value	Comment
				Test 1	
Active E-UTRA PCell		1-2		Cell 1	
E-UTRA RF Channel Number		1-2		1	
Active PCell		1-2		Cell 2	
RF Channel Number		1-2		2	
Duplex mode		1-2		TDD	
TDD Configuration		1-2		TDDConf.3.1	
BW _{channel}		1-2		100: N _{RB,c} = 66	
Data RBs allocated		1-2		66	
PDSCH/PDCCH subc	arrier spacing	1-2	kHz	120	
DL initial BWP configu		1-2		DLBWP.0.1	
DL dedicated BWP co		1-2		DLBWP.1.1	
UL initial BWP configu		1-2		ULBWP.0.1	
UL dedicated BWP co		1-2		ULBWP.1.1	
PDSCH Reference Ch		1-2		SR.3.2 TDD	
RMSI CORESET Refe		1-2		CR.3.1 TDD	
Dedicated CORESET		1-2		CCR.3.1 TDD	
OCNG parameters		1-2		OP.1	
CP length		1-2		Normal	
PDSCH/PDCCH TCI	state	1-2		TCI.State.0	
CSI-RS for tracking		1-2		TRS.2.1 TDD	
SSB Configuration		1-2		SSB.1 FR2	
SMTC Configuration		1-2		SMTC.3	
PRACH Configuration	1			FR2 PRACH	10001
· · · · · · · · · · · · · · · · · · ·		1-2		configuration 4	A.3.8.3.4
DRX configuration		1-2		OFF	
CSI-RS configuration	for BFD/CBD/RLM			CSI-RS.3.2	10110
J		1-2		TDD	A.3.14.2
CSI-RS index assigne	ed as BFD RS (g ₀)	1-2		0	
CSI-RS index assigne		1-2		1	
CSI-RS index assigne		1-2		0,1	
Beam failure	DCI format	1-2		1-0	
detection Number of Control					
transmission OFDM symbols		1-2		2	
parameters Aggregation level		1-2	CCE	8	
	Ratio of hypothetical		-		
	PDCCH RE energy to	1-2	dB	0	
	average SSS RE energy				
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	1-2	dB	0	

	DMRS precoder			REG bundle	
	granularity	1-2		size	
	REG bundle size	1-2		6	
Gap pattern ID		1-2		N/A	
rlmlnSyncOutOfSyncT	hreshold	1-2		absent	Value 0 is applied. (Table 8.1.1-1).
rsrp-ThresholdSSB		1-2	dBm/SCS	-95	Threshold used for Qin_LR_SSB
powerControlOffsetSS		1-2		db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceN	faxCount factoring the state of	1-2		n1	see TS 38.321 [7], clause 5.17
beamFailureDetection	Timer	1-2		pbfd4	see TS 38.321 [7], clause 5.17
CSI-RS configuration for CSI reporting		1-2		CSI-RS.3.1 TDD	A.3.14.2
reportConfigType		1-2		periodic	
reportQuantity		1-2		cri-RI-PMI-CQI	
CSI reporting periodici	ty	1-2	slot	40	
CSI reporting offset		1-2	slot	4	
T310		1-2	ms	1000	
N310		1-2		2	
T1		1-2	S	1	The UE shall be fully synchronized to cell 1 during T1
T2		1-2	S	1.17	
T3	<u> </u>	1-2	S	0.9	
T4		1-2	S	0	
T5		1-2	S	0.31	
D1		1-2	S	0.27	
Note 1: UE-specific	PDCCH is not transmitted	ed after T1 st	arts.		

Table A.5.5.3.1-3: Cell specific test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Test 1				
			T1	T2	T3	T4	T5
AoA setup				Setup '	defined in	A.3.15	
Assumption for UE beams	Note 10				Rough		
EPRE ratio of PDCCH DM	IRS to SSS	dB			0		
EPRE ratio of PDCCH to I	PDCCH DMRS	dB					
EPRE ratio of PBCH DMR	S to SSS	dB					
EPRE ratio of PBCH to PE	3CH DMRS	dB					
EPRE ratio of PSS to SSS	5	dB					
EPRE ratio of PDSCH DM	RS to SSS	dB					
EPRE ratio of PDSCH to F	PDSCH DMRS	dB					
EPRE ratio of OCNG DMF	RS to SSS	dB					
EPRE ratio of OCNG to O	CNG DMRS	dB					
SNR_CSI-RS of set q ₀	Config 1-2	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
SNR_CSI-RS of set q ₁	Config 1-2	dB	0.2	0.2	20.2	20.2	20.2
CSI-RS_RP of set q ₁	Config 1-2	dBm/S	-104.5	-104.5	-84.5	-84.5	-84.5
		CS					
M Config 1-2		dBm/12			-104.7		
N_{oc}		0 KHz					
Propagation condition	<u>-</u>			TDI	A 30ns 7	5Hz	

test system implementation

Note 11:

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1. NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start Note 3: of time period T1. Note 4: Void Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 6: Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.3.1-1. Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6. Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or Note 10:

Table A.5.5.5.3.1-4: Void

This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.5.3.1-5: Void

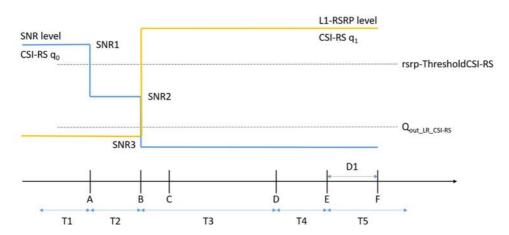


Figure A.5.5.5.3.1-1: SNR and L1-RSRP variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

A.5.5.5.3.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.5.4 EN-DC Beam Failure Detection and Link Recovery Test for FR2 PSCell configured with CSI-RS-based BFD and LR in DRX mode

A.5.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving PSCell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP of the PSCell, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.5.5.5.4.1-1, A.5.5.5.4.1-2, A.5.5.5.4.1-3, and A.5.5.5.4.1-4 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.4.1-1 shows the variation of the downlink SNR of the PCell and the SNR of the CSI-RS in set q_0 in the active PSCell to emulate CSI-RS based beam failure. Figure A.5.5.5.4.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.5.5.5.4.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	LTE FDD, TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth
2	LTE TDD, FDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.5.5.5.4.1-2: General test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter	Test Config.	Unit	Value	Comment
			Test 1	
Active E-UTRA PCell	1-2		Cell 1	
E-UTRA RF Channel Number	1-2		1	
Active PCell	1-2		Cell 2	
RF Channel Number	1-2		2	
Duplex mode	1-2		TDD	
TDD Configuration	1-2		TDDConf.3.1	
BW _{channel}	1-2		100: N _{RB,c} = 66	
Data RBs allocated	1-2		66	
PDSCH/PDCCH subcarrier spacing	1-2	kHz	120	
DL initial BWP configuration	1-2		DLBWP.0.1	
DL dedicated BWP configuration	1-2		DLBWP.1.1	
UL initial BWP configuration	1-2		ULBWP.0.1	
UL dedicated BWP configuration	1-2		ULBWP.1.1	

DD00115 (5:		1-2	1	00 0 0 700	T
PDSCH Reference Channel				SR.3.2 TDD	
RMSI CORESET Refe		1-2		CR.3.1 TDD	
Dedicated CORESET	Reference Channel	1-2		CCR.3.1 TDD	
OCNG parameters		1-2		OP.1	
CP length		1-2		Normal	
PDSCH/PDCCH TCI s	state	1-2		TCI.State.0	
CSI-RS for tracking		1-2		TRS.2.1 TDD	
SSB Configuration		1-2		SSB.1 FR2	
SMTC Configuration		1-2		SMTC.3	
PRACH Configuration		1-2		FR2 PRACH	A.3.8.3.4
				configuration 4	A.3.6.3.4
DRX configuration		1-2		DRX.3	A.3.3.3
CSI-RS configuration	for BFD/CBD/RLM	1-2		CSI-RS.3.2	A.3.14.2
		1-2		TDD	A.3.14.2
CSI-RS index assigne	d as BFD RS (q ₀)	1-2		0	
CSI-RS index assigne		1-2		1	
CSI-RS index assigne		1-2		0,1	
Beam failure	DCI format	1-2		1-0	
detection	Number of Control				
transmission	OFDM symbols	1-2		2	
parameters	Aggregation level	1-2	CCE	8	
1	Ratio of hypothetical		002		
	PDCCH RE energy to	1-2	dB	0	
	average SSS RE energy	' -	ub l	O	
	Ratio of hypothetical				
	PDCCH DMRS energy to average SSS RE		dB		
		1-2		0	
	energy DMRS precoder			REG bundle	
	granularity	1-2		size	
	REG bundle size	1-2		6	
Gap pattern ID	REG buildle size	1-2		N/A	
rlmInSyncOutOfSyncT	hrashald	1-2		IN/A	Value 0 is applied.
Ilminayncoulolaynci	nresnoia	1-2		absent	
warma Thura ah aldCCD					(Table 8.1.1-1).
rsrp-ThresholdSSB		1-2	dBm/SCS	-95	Threshold used for
					Qin_LR_SSB
powerControlOffsetSS	•	4.0		مالہ ٥	Used for deriving
		1-2		db0	rsrp-ThresholdCSI-
to a configuration of the second	1		-		RS TO 00 004 [7]
beamFailureInstanceN	viaxCount	1-2		n1	see TS 38.321 [7],
			1	1	clause 5.17
beamFailureDetectionTimer			1		TC
beamFailureDetection	Timer	1-2		pbfd4	see TS 38.321 [7],
		1-2		pbfd4	see TS 38.321 [7], clause 5.17
beamFailureDetection CSI-RS configuration				CSI-RS.3.1	clause 5.17
CSI-RS configuration		1-2		CSI-RS.3.1 TDD	
CSI-RS configuration reportConfigType		1-2 1-2		CSI-RS.3.1 TDD periodic	clause 5.17
CSI-RS configuration reportConfigType reportQuantity	for CSI reporting	1-2 1-2 1-2		CSI-RS.3.1 TDD	clause 5.17
CSI-RS configuration reportConfigType	for CSI reporting	1-2 1-2	slot	CSI-RS.3.1 TDD periodic	clause 5.17
CSI-RS configuration reportConfigType reportQuantity	for CSI reporting	1-2 1-2 1-2	slot slot	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI	clause 5.17
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic	for CSI reporting	1-2 1-2 1-2 1-2		CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40	clause 5.17
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset	for CSI reporting	1-2 1-2 1-2 1-2 1-2	slot	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4	clause 5.17
reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310	for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2	slot	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000	clause 5.17
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310	for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2	slot	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000	clause 5.17 A.3.14.2 The UE shall be fully
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310	for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2	Clause 5.17 A.3.14.2 The UE shall be fully synchronized to cell 1
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310 T1	for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2	clause 5.17 A.3.14.2 The UE shall be fully
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310 T1	for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2	Clause 5.17 A.3.14.2 The UE shall be fully synchronized to cell 1
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310 T1 T2 T3	for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms s	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2 1	Clause 5.17 A.3.14.2 The UE shall be fully synchronized to cell 1
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310 T1 T2 T3 T4	for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms s s	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2 1 5.43 5.16 0	Clause 5.17 A.3.14.2 The UE shall be fully synchronized to cell 1
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310 T1 T2 T3 T4 T5	for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms s s s	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2 1 5.43 5.16 0 0.31	Clause 5.17 A.3.14.2 The UE shall be fully synchronized to cell 1
CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310 T1 T2 T3 T4 T5 D1	for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms s s s	CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2 1 5.43 5.16 0	Clause 5.17 A.3.14.2 The UE shall be fully synchronized to cell 1

Table A.5.5.5.4.1-3: Cell specific test parameters for FR2 PSCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Paramete	Unit	Test 1					
			T1	T2	Т3	T4	T5
AoA setup				Setup '	defined in	A.3.15	•
Assumption for UE beams	Note 10				Rough		
EPRE ratio of PDCCH DN	IRS to SSS	dB			0		
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DMF	RS to SSS	dB					
EPRE ratio of PBCH to PI	BCH DMRS	dB					
EPRE ratio of PSS to SSS	3	dB					
EPRE ratio of PDSCH DM	IRS to SSS	dB					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DMI	RS to SSS	dB					
EPRE ratio of OCNG to C	CNG DMRS	dB					
SNR_CSI-RS of set q ₀	Config 1-2	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
SNR_CSI-RS of set q ₁	Config 1-2	dB	0.2	0.2	20.2	20.2	20.2
CSI-RS_RP of set q ₁	Config 1-2	dBm/S	-104.5	-104.5	-84.5	- 84.5	-84.5
		CS					
λ/ Config 1-2		dBm/12			-104.7		
N_{oc}		0 KHz					
Propagation condition		TDL-A 30ns 75Hz					
Note 1: OCNG shall be	used such that th	e resources	in Cell 1 a	re fully allo	cated and a	constant t	otal

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.4.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.5.5.5.4.1-4: Void

Table A.5.5.5.4.1-5: Void

Table A.5.5.5.4.1-6: Void

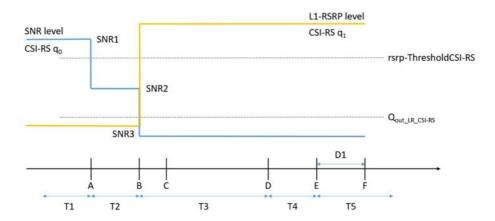


Figure A.5.5.5.4.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

A.5.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.5.5 EN-DC scheduling availability restriction during Beam Failure Detection and Link Recovery for FR2 PSCell configured with SSB-based BFD and LR in non-DRX mode

A.5.5.5.5.1 Test Purpose and Environment

The purpose is to test scheduling availability restrictions when the UE is performing beam failure detection or when the UE is performing L1-RSRP measurement for candidate beam detection, when no DRX is used. This test will verify the scheduling availability restriction requirements for SSB based beam failure detection and link recovery for an FR2 serving cell in clause 8.5.7 and 8.5.8.

The test parameters are given in Tables A.5.5.5.5.1-1, A.5.5.5.5.1-2 and A.5.5.5.5.1-3 below. There are two cells, cell 1 is the E-UTRAN PCell, and cell 2 is the PSCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.5.5.5.5.1-3 shows the variation of the downlink SNR of the PCell and the SNR of the SSB in set q_0 in the active PSCell to emulate SSB based beam failure. Figure A.5.5.5.5.1-3 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1 and cell 2. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. This test will focus on the scheduling availability during beam failure detection and candidate beam detection. In the test, DRX configuration is not enabled. Test is to test the scheduling availability restriction of UE performing beam failure detection and candidate beam detection and candidate beam detection and candidate beam detection and candidate beam detection. During the test the UE is scheduled to transmit continuously in UL.

Table A.5.5.5.5.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note: The UE	is only required to be tested in one of the supported test configurations

Table A.5.5.5.1-2: General test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Parameter Test Config. Unit Value		Value	Comment
			Test 1	
Active E-UTRA PCell	1-4		Cell 1	
E-UTRA RF Channel Number	1-4		1	
Active PCell	1-4		Cell 2	
RF Channel Number	1-4		2	
Duplex mode	1-4		TDD	
TDD Configuration	1-4		TDDConf.3.1	
BW _{channel}	1-4		100: N _{RB,c} = 66	
Data RBs allocated	1-4		66	
PDSCH/PDCCH subcarrier spacing	1-4	kHz	120	
DL initial BWP configuration	1-4		DLBWP.0.1	
DL dedicated BWP configuration	1-4		DLBWP.1.1	
UL initial BWP configuration	1-4		ULBWP.0.1	
UL dedicated BWP configuration	1-4		ULBWP.1.1	
PDSCH Reference Channel	1-2		SR.3.2 TDD	
	3-4		SR.3.3 TDD	
RMSI CORESET Reference Channel	1-2		CR.3.1 TDD	
	3-4		CR.3.2 TDD	
Dedicated CORESET Reference Channel	1-2		CCR.3.1 TDD	
	3-4		CCR.3.7 TDD	
OCNG parameters	1-4		OP.1	
CP length	1-4		Normal	
PDSCH/PDCCH TCI state	1-4		TCI.State.0	
CSI-RS for tracking	1-4		TRS.2.1 TDD	
SSB Configuration	1-2		SSB.1 FR2	
	3-4		SSB.2 FR2	
SMTC Configuration	1-4		SMTC.1	
PRACH Configuration	1-4		FR2 PRACH	A.3.8.3.2
	1-4		configuration 2	A.J.U.J.Z
DRX configuration	1-4		OFF	
SSB index assigned as BFD RS (q ₀)	1-4		0	

SSB index assigned	as CBD RS (q ₁)	1-4		1	
Beam failure	DCI format	1-4		1-0	
detection	Number of Control	1-4		2	
transmission	OFDM symbols	1-4		2	
parameters	Aggregation level	1-4	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	1-4	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	1-4	dB	0	
	DMRS precoder granularity	1-4		REG bundle size	
	REG bundle size	1-4		6	
Gap pattern ID		1-4		N/A	No measurement gap is configured
rlmlnSyncOutOfSync	Threshold	1-4		absent	Value 0 is applied. (Table 8.1.1-1).
rsrp-ThresholdSSB		1-2	dBm/SCS	-95	Threshold used for
		3-4	abili, ccc	-92	Q _{in_LR_SSB}
powerControlOffsetSS		1-4		db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstance	eMaxCount	1-4		n1	see TS 38.321 [7], clause 5.17
beamFailureDetectio	nTimer	1-4		pbfd4	see TS 38.321 [7], clause 5.17
CSI-RS configuration	for CSI reporting	1-4		CSI-RS.3.1 TDD	
reportConfigType		1-4		periodic	
reportQuantity		1-4		cri-RI-PMI-CQI	
CSI reporting periodi	city	1-4	slot	40	
CSI reporting offset		1-4	slot	4	
T310		1-4	ms	1000	
N310		1-4		2	
T1		1-4	s	1	The UE shall be fully synchronized to cell 1 during T1
T2		1-4	S	2.6	
T3		1-4	S	1.64	
T4		1-4	S	0	
T5		1-4	S	1.01	
D1		1-4	S	0.97	
Note 1: All configu Note 2: UE-specifi	rrations are assigned to the Uic PDCCH is not transmitted a	IE prior to	the start of tir	me period T1.	

Table A.5.5.5.5.1-3: Cell specific test parameters for FR2 PSCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Test 1					
		T1	T2	Т3	T4	T5
AoA setup		Setup 1 defined in A.3.15				
Assumption for UE beamsNote 10			•	Rough		
EPRE ratio of PDCCH DMRS to SSS	dB			0		
EPRE ratio of PDCCH to PDCCH DMRS	dB					

EPRE ratio of PBCH DMRS	dB						
EPRE ratio of PBCH to PB	dB						
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMI	RS to SSS	dB					
EPRE ratio of PDSCH to P	DSCH DMRS	dB					
EPRE ratio of OCNG DMR	S to SSS	dB					
EPRE ratio of OCNG to OC	CNG DMRS	dB					
SNR_SSB of set q ₀	Config 1-4	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
SNR_SSB of set q ₁	Config 1-4	dB	0.2	0.2	20.2	20.2	20.2
SSB_RP of set q ₁	Config 1-2	dBm/	-104.5	-104.5	-84.5	-84.5	-84.5
	Config 3-4	SCS	-101.5	-101.5	-81.5	-81.5	-81.5
N_{oc} Config 1-4		dBm/120	-104.7				
1 voc		kHz					
Propagation condition				TDI	A 30ns 7	5Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.5.5.5.5.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

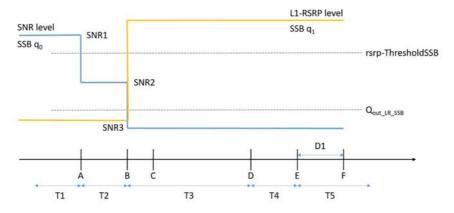


Figure A.5.5.5.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.5.5.5.5.2 Test Requirements

The UE behaviour during time duration T3 follows the requirements defined in clause 8.5.7.3:

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on BFD-RS symbols to be measured for beam failure detection.

The UE behaviour during time durations T4 and T5 follows the requirements defined in clause 8.5.8.3:

- The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on reference symbols to be measured for candidate beam detection.

A.5.5.6 Active BWP switch

A.5.5.6.1 DCI-based and Timer-based Active BWP Switch

A.5.5.6.1.1 E-UTRAN – NR PSCell FR2 DL active BWP switch with non-DRX in synchronous EN-DC

A.5.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6. Supported test configurations are shown in Table A.5.5.6.1.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one PSCell (Cell 2) as given in Table A.5.5.6.1.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of PSCell is specified in Table A.5.5.6.1.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.5.5.6.1.1.1-4

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

Before the test starts,

- UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for PSCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in PSCell.
- UE is configured with a *bwp-InactivityTimer* timer value for PSCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for PSCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in PSCell's slot # denoted *i*. The UE should switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of PSCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell no later than the first UL slot that occurs after the beginning of slot $(i+T_{BWPswitchDelay}+kI)$. The UE shall be

continuously scheduled on PSCell's BWP-2 starting from the first DL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}$).

During T2, the test equipment won't transmit DCI format for PDSCH reception on PSCell(Cell 2).

During T3,

The time period T3 starts from the slot #j, where j is the first slot of the half subframe immediately after the slot wherein *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of PSCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the PSCell at latest on the first UL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on PSCell's BWP-1 starting from the first DL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay})$.

The test equipment verifies the DL BWP switch time in PSCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

Table A.5.5.6.1.1.1-1: DL BWP switch supported test configurations

	Config	Description		
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note 1:	The UE is only required to be tested in one of the supported test configurations			
Note 2:	A UE which fulfils the requirements in test case A.5.5.2.2 can skip the test cases in A.5.5.2.1.			

Table A.5.5.6.1.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		'	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	uБ	U	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	uБ	0	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.5.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Cell 2
Frequency Range		FR2
Duplex mode		TDD

TDD configuration		TDDConf.3.1
BW _{channel}		100 MHz: N _{RB,c} = 66
Active BWP ID		1, 2
Initial DL BWP Configuration		DLBWP.0.2 Note 2
Active DL BWP-1 Configuration		DLBWP.1.1 Note 2
Active DL BWP-2 Configuration		DLBWP.1.3 Note 2
Initial UL BWP Configuration		ULBWP.0.2 Note 2
Active UL BWP-1 Configuration		ULBWP.1.1 Note 2
Active UL BWP-2 Configuration		ULBWP.1.3 Note 2
PDSCH Reference measurement channel		SR.3.1 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP.1
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State		TCI.State.0
TRS Configuration		TRS.2.1 TDD
Correlation Matrix and Antenna		1x2 Low
Configuration		
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH DMRS to SSS	ļ	
EPRE ratio of PBCH to PBCH DMRS	ļ	
EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PDCCH to PDCCH DMRS]	
EPRE ratio of PDSCH DMRS to SSS		
EPRE ratio of PDSCH to PDSCH]	
EPRE ratio of OCNG DMRS to SSS(Note 1)]	
EPRE ratio of OCNG to OCNG DMRS (Note		
1)		
Propagation Condition		AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

Table A.5.5.6.1.1.1-4: OTA related test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Cell 2
Angle of arrival configuration		Setup 1 according to clause
		A.3.15.1
Assumption for UE beams ^{Note 6}		Fine
N _{oc} Note 1	dBm/15	-112
	kHz	
N _{oc} Note 1	dBm/SCS	-103
SS-RSRP Note 2	dBm/120	-85
	kHz Note3	
Ê _s /I _{ot}	dB	18
lo ^{Note2}	dBm/95.04	-55.94
	MHz Note4	

Note 1:	Interference from other cells and noise sources not specified in the test is
	assumed to be constant over subcarriers and time and shall be modelled as
	AWGN of appropriate power for N _{oc} to be fulfilled.
Note 2:	SS-RSRP and lo levels have been derived from other parameters for
	information purposes. They are not settable parameters themselves.
Note 3:	SS-RSRP minimum requirements are specified assuming independent
	interference and noise at each receiver antenna port.
Note 4:	Equivalent power received by an antenna with 0 dBi gain at the centre of the
	quiet zone
Note 5:	As observed with 0dBi gain antenna at the centre of the quiet zone.
Note 6:	Information about types of UE beam is given in B.2.1.3, and does not limit UE
	implementation or test system implementation

A.5.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PSCell from the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+k1)$.

During T3, the UE shall start to send the ACK/NACK for PSCell from the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+k1)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after the beginning of DL slot ($i+T_{BWPswitchDelay}+kI$), ($j+T_{BWPswitchDelay}+kI$), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.5.5.6.1.2 E-UTRAN – NR PSCell FR2 with FR2 SCell DL active BWP switch in non-DRX in synchronous EN-DC

A.5.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6.2, and interruption requirements for NR victim cell defined in clause 8.2.1.2. 7. Supported test configurations are shown in Table A.5.5.6.1.2.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), one PSCell (Cell 2) and one SCell (Cell 3) as given in Table A.5.5.6.1.2.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of PSCell and SCell are specified in Table A.5.5.6.1.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) and SCell (Cell 3) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 3 and the time duration of T2.

Before the test starts.

- UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC), Cell 2 (PSCell) on radio channel 2 (PSCC) and Cell 3 (SCell) on radio channel 3 (SCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, BWP-1 and BWP-2, in Cell 3 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PSCell, BWP-0 in Cell 2 before starting the test.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in SCell.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-0 in PSCell.
- UE is configured with a *bwp-InactivityTimer* timer value for SCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of SCell's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PSCell no later than the first UL slot that occurs after the beginning of slot $(i+T_{BWPswitchDelay}+k_1)$. The UE shall be continuously scheduled on SCell's BWP-2 starting from the first DL slot that occurs after the beginning of slot $(i+T_{BWPswitchDelay})$.

PSCell(Cell 2) interruption due to BWP switch on SCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on SCell(Cell 3).

During T3,

The time period T3 starts from the slot #j, where j is the first slot of the half subframe immediately after *bwp-InactivityTimer* timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of SCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PSCell at latest on the first UL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay}+k_1)$. The UE shall be continuously scheduled on SCell's BWP-1 starting from the first DL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay})$.

PSCell(Cell 2) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to NR PSCell is carried out in the correct time span by monitoring ACK/NACK sent in PSCell during BWP switch of SCell.

Table A.5.5.6.1.2.1-1: DL BWP switch supported test configurations

Config	Description
--------	-------------

1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note 1:	The UE is only required to be tested in one of the supported test configurations	
Note 2:	A UE which fulfils the requirements in test case A.5.5.6.1.2 can skip the test cases in A.5.5.6.1.1.	
Note 3:	NR configuration is the same for PSCell and SCells.	

Table A.5.5.6.1.2.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		1	test
NR RF Channel Number		2, 3	Two NR radio channels are used for this
		2, 3	test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
Active SCell		Cell 3	SCell on RF channel number 3.
CP length		Normal	
DRX		OFF	
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	ub	O	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	UD	O	
Cell-individual offset for cells	dB	0	Individual offset for cells on SCC.
on RF channel number 3	UD	O	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
Cell3 timing offset to cell2	μs	3	Synchronous cells
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.5.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Cell 2	Cell 3
Frequency Range		FR2	
Duplex mode		TI	DD
TDD configuration		TDDC	onf.3.1
BW _{channel}		100 MHz:	$N_{RB,c} = 66$
Active BWP ID		0	1,2
Initial DL BWP Configuration		DLBWP.0.2	DLBWP.0.2
Active DL BWP-0 Configuration		DLBWP.0.2	N.A.
Active DL BWP-1 Configuration		N.A.	DLBWP.1.3
Active DL BWP-2 Configuration		N.A.	DLBWP.1.1
Initial UL BWP Configuration		ULBWP.0.2	N.A.
Active UL BWP-0 Configuration		ULBWP.0.2	N.A.
Active UL BWP-1 Configuration		N.A.	N.A.
Active UL BWP-2 Configuration		N.A.	N.A.
PDSCH Reference measurement channel		SR.3.	1 TDD
RMSI CORESET parameters		CR.3.	1 TDD
Dedicated CORESET parameters		CCR.3	.1 TDD
OCNG Patterns		OF	P.1
SSB Configuration		SSB.	1 FR2
SMTC Configuration		SMT	ΓC.1
TCI State		TRS.2	.1 TDD

TRS Configuration		TCI.S	tate.0
Antenna Configuration		1:	x2
Propagation Condition		AW	'GN
EPRE ratio of PSS to SSS	dB	0	0
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH			
EPRE ratio of OCNG DMRS to SSS(Note			
1)			
EPRE ratio of OCNG to OCNG DMRS			
(Note 1)			
Note 1: OCNG shall be used such that bo		•	ital transmitted power
	spectral density is achieved for all OFDM symbols.		
Note 2: Interference from other cells and		•	
subcarriers and time and shall be			
Note 3: SS-RSRP and lo levels have bee		other parameters for informa	tion purposes. They are
not settable parameters themselv			
Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULB		linked with ULBWP.0.2;	

Table A.5.5.6.1.2.1-4: OTA related test parameters for DL BWP switch in synchronous EN-DC

DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3.

Parameter	Unit	Cell 2	Cell 3
Angle of arrival configuration		Setup 1 accordi	ng to clause A.3.15
Assumption for UE beams ^{Note 6}		F	ine
Noc ^{Note 1}	dBm/15 kHz	-112	-112
SS-RSRP Note 2	dBm/120 kHz ^{Note3}	-85	-85
Ê _s /I _{ot}	dB	18	18
lo ^{Note2}	dBm/95.04 MHz ^{Note4}	-55.94	-55.94
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over			

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.
- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone.
- Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.5.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for SCell from the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+k_1)$.

During T3, the UE shall start to send the ACK/NACK for SCell from the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+k_1)$.

Where, k₁ is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration T_{BWPswitchDelay} defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed SCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1, the start of the interruption of PSCell during SCell active BWP switch shall not happen outside the BWP switch delay.

During T3, the start of the interruption of PSCell during SCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PSCell shall not be longer than the interruption duration specified for active BWP switch in Clause 8.6.2.

All of the above test requirements shall be fulfilled in order for the observed active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+k_1)$, $(j+T_{BWPswitchDelay}+k_1)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.5.5.6.2 RRC-based Active BWP Switch

A.5.5.6.2.1 E-UTRAN – NR PSCell FR2 DL active BWP switch with non-DRX in synchronous EN-DC

A.5.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.3. Supported test configurations are shown in Table A.5.5.6.2.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1) and one PSCell (Cell 2) as given in Table A.5.5.6.2.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of PSCell are specified in Table A.5.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on E-UTRA PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) and to Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 2 (PSCell).
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 of initial condition in PSCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

If the *RRCReconfiguration* is embedded in E-UTRA RRC message, time period T1 starts when a E-UTRA RRC message *RRCConnectionReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side from PCell in PSCell's slot # denoted *i*. Otherwise, i.e., if the *RRCReconfiguration* is not embedded in E-UTRA RRC message, time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side in from PSCell in PSCell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to completely receive PDSCH on PSCell from the first DL slot occurs right after the beginning of PSCell's DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \ Slot \ length}$ as defined in clause 8.6.3 and starts to report valid ACK/NACK for the PSCell from the first UL slot that occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \ Slot \ length} + k1.$ The UE shall be continuously scheduled on PSCell's BWP-1 starting from the first DL slot that occurs right after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \ Slot \ length}$.

 $T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PSCell by counting the time from the time when the RRCReconfiguration message including updated BWP configuration is sent till the time when a vaild ACK/NACK is received.

Table A.5.5.6.2.1.1-1: DL BWP switch supported test configurations

Config	Description	
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note 1: The UE is only required to be tested in one of the supported test configurations		

Table A.5.5.6.2.1.1-2: General test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		'	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells	dB	0	Individual offset for cells on PCC.
on RF channel number 1	uБ	0	
Cell-individual offset for cells	dB	0	Individual offset for cells on PSCC.
on RF channel number 2	uБ	0	
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	0.2	

Table A.5.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in synchronous EN-DC

Parameter	Unit	Cell 2
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
BW _{channel}		100 MHz: N _{RB,c} = 66
Active BWP ID		1, 2

	BWP Confi			DLBWP.0.2	
Initial UL I	3WP Confi	guration		ULBWP.0.2	
Initial Con	dition	Active DL BWP-1		DLBWP.1.3	
		Configuration Active UL BWP-1		ULBWP.1.3	
		Configuration		GEBWI II.	
Final		Active DL BWP-1		DLBWP.1.1	
Condition		Configuration			
		Active UL BWP-1		ULBWP.1.1	
		Configuration			
PDSCH R	eference n	neasurement channel		SR.3.1 TDD	
RMSI CO	RESET pai	rameters		CR.3.1 TDD	
Dedicated	CORESE	Γ parameters		CCR.3.1 TDD	
OCNG Pa	itterns			OP.1	
SSB Conf	iguration			SSB.1 FR2	
SMTC Co	nfiguration			SMTC.1	
TCI State				TCI.State.0	
TRS Conf	iguration			TRS.2.1 TDD	
Antenna Configuration				1x2	
Propagation Condition				AWGN	
EPRE ratio of PSS to SSS			dB	0	
		MRS to SSS			
		PBCH DMRS			
		DMRS to SSS			
		o PDCCH DMRS	-		
		OMRS to SSS	=		
	of PDSCH t	MRS to SSS(Note 1)	-		
		OCNG DMRS (Note 1)	-		
Note 1:			th cells are full	y allocated and a constant	
11010 11				red for all OFDM symbols.	
Note 2:			•	not specified in the test is	
	assumed to be constant over subcarriers and time and shall be modelled				
	as AWGN of appropriate power for N _{oc} to be fulfilled.				
Note 3:	SS-RSRP and lo levels have been derived from other parameters for				
		n purposes. They are no			
Note 4:	For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2				
	is linked with LIL DWD 0.3: DLDWD 1.1 is linked with LIL DWD 1.1:				

Table A.5.5.6.2.1.1-4: OTA related test parameters for BWP switching test case

TS 38.213 [3].

is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of

Para	meter	Unit	Cell 2
Angle of arrival confid	nuration		Setup 1 according to
Angle of arrival config	guration		A.3.15
Assumption for UE be	eams ^{Note 5}		Fine
	NR_TDD_FR2_A		
	NR_TDD_FR2_B		
$N_{oc}^{\rm Note1}$	NR_TDD_FR2_F	dBm/15kHz	-112
	NR_TDD_FR2_G	UDIII/ IOKIIZ	
	NR_TDD_FR2_T		
	NR_TDD_FR2_Y		
	NR_TDD_FR2_A		
N_{oc}^{Note1}	NR_TDD_FR2_B	dBm/SCS	-103
	NR_TDD_FR2_F		-103
	NR_TDD_FR2_G		

		NR_TDD_FR2_T				
		NR_TDD_FR2_Y				
		NR_TDD_FR2_A				
		NR_TDD_FR2_B				
SS-RSRI	⊃Note2	NR_TDD_FR2_F	dBm/SCS	-85		
33-K3KI		NR_TDD_FR2_G	Note3	-85		
		NR_TDD_FR2_T				
		NR_TDD_FR2_Y				
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$			dB	18		
		NR_TDD_FR2_A				
		NR_TDD_FR2_B		-55.94		
Io ^{Note2}		NR_TDD_FR2_F	dBm/95.04			
10		NR_TDD_FR2_G	MHz Note4			
		NR_TDD_FR2_T				
		NR_TDD_FR2_Y				
Note 1:				ot specified in the test is		
	assumed t	o be constant over sub	carriers and time	e and shall be modelled as		
	AWGN of	appropriate power for	$N_{_{oc}}$ to be fulfille	d.		
Note 2:	SS-RSRP	and lo levels have bee	n derived from a	ther parameters for		
	information purposes. They are not settable parameters themselves.					
Note 3:						
	interference and noise at each receiver antenna port.					
Note 4:	4: Equivalent power received by an antenna with 0dBi gain at the centre of the					
	quiet zone					
Note 5:	ote 5: Information about types of UE beam is given in B.2.1.3, and does not limit U					
	implementation or test system implementation					

A.5.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PSCell from the first DL slot that occurs right after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length}$ and starts to report valid ACK/NACK for the

PSCell from the first UL slot that occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length} + k1$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed PSCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.5.7 PSCell addition and release delay

A.5.5.7.1 Addition and Release Delay of NR PSCell

A.5.5.7.1.1 Test purpose and environment

The purpose of this test is to verify that the NR PSCell addition and release delays under EN-DC are within the requirements stated in clause 7.31.2 of TS 36.133 [15] for the case when the PSCell is unknown by the UE at the time of addition.

Supported test configurations are shown in A.5.5.7.1.1-1. The test parameters for the E-UTRA cell are given in Table A.3.7.2.2-1. The E-UTRA cell once set up is not changed across time.

The test parameters for NR cell are given in Tables A.5.5.7.1.1-2, cell-specific parameters in A.5.5.7.1.1-3 and OTA parameters in A.5.5.7.1.1-4 below. The test consists of four successive time periods with duration of T1, T2, T3 and T4. There are two carriers each with one cell. Before the test starts the UE is connected to Cell 1 (E-UTRA PCell) on radio channel 1 (PCC) but is not aware of Cell 2 (NR PSCell) on radio channel 2. The UE is only monitoring the PCC. During T1 only Cell1 is known to the UE.

The test system shall send a RRC message to the UE to add PSCell (Cell 2) on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added. The RRC message to add PSCell shall be sent to the UE during period T1. The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of period T2.

The test system shall observe the periodic reporting of CSI for PSCell during T3. The point in time at which the UE has sent PRACH to the PSCell (Cell 2) defines the start of period T3.

The test system shall send a RRC message to the UE to release PSCell (Cell 2) on radio channel 2. The RRC message to release PSCell (Cell2) shall be sent to the UE during period T3, after the UE has sent at least one CQI report with non-zero CQI index for PSCell (Cell 2). The point in time at which the RRC message to release PSCell (Cell2) is received at the UE antenna connector defines the start of period T4.

Table A.5.5.7.1.1-1: Supported test configurations for FR2 PSCell

Configuration Description		Description
•	1	LTE FDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz
2	2	LTE TDD, NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz
Note: T	The UE is only	required to be tested in one of the supported test configurations

Table A.5.5.7.1.1-2: General Test Parameters for PSCell Addition and Release

Pa	arameter	Unit	Value	Comment
RF Channel Number			1, 2	Two radio channels are used for this test. One for E-UTRA cell and second for NR Cell
Initial	Active PCell		Cell1	PCell on RF channel number 1.
Condition	Neighbour cell		Cell2	Neighbour cell on RF channel number 2.
Final	Active PCell		Cell1	PCell on RF channel number 1.
Condition	Neighbour Cell		Cell2	PSCell released on RF channel number 2.
B1	Hysteresis	dB	0	Hysteresis for evaluation of event B1.
	Threshold	dBm	-118	Actual RSRP threshold for event B1. Needs to
	RSRP			take absolute accuracy tolerance in clause
				9.1.11.1 into account plus margin.
	Time to Trigger	S	0	
DRX			OFF	Continuous monitoring of primary cell
PRACH conf	iguration on cell2		FR2	Captured in A.3.8.3.2
	3		configuration 2	
Cell-individua RF channel r	al offset for cells on number 1	dB	0	Individual offset for cells on primary component carrier.
Cell-individual offset for cells on RF channel number 2		dB	0	Individual offset for cells on carrier frequency of cell2.
T1		s	1	During this time the PCell shall be known and cell2 shall be unknown.
T2		S	1	During this time the UE adds the PSCell.
T3		s	1	During this time the UE sends CSI reports for PSCell.
T4		S	1	During this time the UE releases the PSCell.

Table A.5.5.7.1.1-3: Cell Specific Parameters for PSCell Addition and Release

Parameter	Unit	Config	Test T1 T2 T3 T4		
E-UTRA Channel					
Number		1,2	1		
NR Channel Number		1,2	2		
Duplex Mode		1,2	TDD		
TDD configuration		1,2	TDDConf.3.1		
BWchannel	MHz	1,2	100: NRB,c = 66		
Data RBs allocated		1,2	48		
Initial BWP			DLBWP.0.1		
Configuration		1,2	ULBWP.0.1		
Dedicated BWP		1,2	DLBWP.1.1		
Configuration		1,2	ULBWP.1.1		
TRS Configuration		1	TRS.2.1 TDD		
PDSCH/PDCCH TCI		1	TOLOUS C		
state		1	TCI.State.2		
PDSCH Reference		1.0	SR.3.3 TDD		
measurement channel		1,2	3R.3.3 TDD		
RMSI CORESET		1,2	CR.3.2 TDD		
Reference Channel		1,2	CIN.S.Z TDD		
Dedicated CORESET		1,2	CCR.3.7 TDD		
Reference Channel					
OCNG Patterns		1,2	OP.3		
SSB configuration		1,2	SSB.2 FR2		
SMTC configuration		1,2	SMTC.2		
PDSCH/PDCCH	kHz	1,2	120		
subcarrier spacing			TDC 0.4 TDD		
TRS Configuration		1,2	TRS.2.1 TDD		
CSI-RS configuration for CSI reporting		1,2	CSI-RS.3.1 TDD		
reportConfigType		1,2	periodic		
reportQuantity		1,2	cri-RI-PMI-CQI		
CSI reporting					
periodicity	slot	1,2	40		
CSI reporting offset	slot	1,2	4		
EPRE ratio of PSS to					
SSS					
EPRE ratio of PBCH					
DMRS to SSS					
EPRE ratio of PBCH to					
PBCH DMRS					
EPRE ratio of PDCCH					
DMRS to SSS					
EPRE ratio of PDCCH	JD.	4.0			
to PDCCH DMRS	dB	1,2	0		
EPRE ratio of PDSCH					
DMRS to SSS EPRE ratio of PDSCH	-				
to PDSCH					
EPRE ratio of OCNG					
DMRS to SSS(Note 1)					
EPRE ratio of OCNG					
to OCNG DMRS (Note					
1)					
Propagation condition		1,2	AWGN		

Table A.5.5.7.1.1-4: OTA related test parameters

Parameter	Unit		Cell 2			
		T1	T2	Т3	T4	
Angle of arrival configuration		Setup 2a according to clause A.3.15.2.1			iuse	
Assumption for UE beams ^{Note}		Rough				
Ês Note2	dBm/SCS	-∞ -81				
SSB_RPNote 2, Note 4	dBm/SCS	-∞ -81				
$\hat{E}_{_{\mathrm{S}}}/I_{_{\mathrm{ot}}}$ BB Note 2, Note 7	dB	-∞ 4.88				
Io ^{Note 2, Note 4}	dBm/95.04 MHz	N/A		-56.41		

Note 1: Void

Note 2: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: Void

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: Void

Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation.

Note 7: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

A.5.5.7.1.2 Test Requirements

The UE shall transmit the PRACH to PSCell at latest 582 ms^{Notel} into T2.

The UE shall send at least one CSI report for PSCell with non-zero CQI index during T3.

The UE shall periodically send CSI reports for PSCell after the UE has sent first CQI report with non-zero CQI index during T3.

The UE shall stop sending CSI reports for PSCell in at latest 20 ms into T4.

All the above test requirements shall be fulfilled for the observed PSCell addition delay and PSCell release delay to be counted as correct. The rate of correct observed PSCell addition delay and PSCell release delay during repeated tests shall be at least 90%.

Note1: The PSCell addition delay can be expressed as follows as specified in clause 7.31.2 of TS 36.133 [15]:

$$T_{config_PSCell} = T_{RRC_delay} + T_{processing} + T_{search} + T_{\Delta} + T_{PSCell_DU} + 2ms$$

Where:

 $T_{RRC_delay} = 20ms$

 $T_{processing} = 40 ms$

 $T_{search} = 8*3*20 = 480 \text{ ms}$

 $T_{\Delta} = 20 ms$

 $T_{PSCell_DU} = 1*10+10 = 20 \text{ ms}$

A.5.5.8 Active TCI state switch delay

A.5.5.8.1 MAC-CE based active TCI state switch

A.5.5.8.1.1 E-UTRAN – NR PSCell FR2 active TCI state switch for a known TCI state

A.5.5.8.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3Supported test configurations are shown in Table A.5.5.8.1.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in Table A.5.5.8.1.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.5.5.8.1.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.5.5.8.1.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 2 different TCI states for PSCell, PDCCH TCI state 0 (QCL'd to SSB0) and TCIstate 1 (QCL'd to SSB1), in Cell 2 before starting the test.
- UE is indicated in TCI state 0 as the active PDCCH TCI state

The test consists of two time periods, T1 and T2. Figure A.5.5.8.1.1.1-1 and Figure A.5.5.8.1.1.1-2 show the Time multiplexed (allocation in Frequency is symbolic) downlink transmissions from each Angle of Arrival. During T1 only SSB to which PDCCH-TCI-state0 is QCL'd is transmitted. At the beginning of T2, the SSB corresponding to TCI state 1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a MAC-CE command indicating a switch to TCI state 1. *tci-PresentInDCI* is not configured in the PDSCH configuration, i.e. TCI state for the PDSCH is identical to the PDCCH TCI state.

The test equipment verifies that UE can be scheduled on PSCell on TCI state 0 till n+ T_{HARQ} +3 ms. The test equipment also verifies the TCI state switch time in PSCell by scheduling the UE on TCI state 1 after n+ T_{HARQ} +3 ms + ($T_{first-SSB}$ + $T_{SSB-proc}$).

Table A.5.5.8.1.1.1-1: Supported test configurations

	Config	Description			
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note 1:	The UE is only re	JE is only required to be tested in one of the supported test configurations			

Table A.5.5.8.1.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment
E-UTRA RF Channel		4	One E-UTRA radio channel is used for this
Number		1	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	

DRX		OFF	For both PCell and PSCell
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	0.2	
T2	S	0.2	

Table A.5.5.8.1.1.1-3: NR Cell specific test parameters for TCI state switch

Parameter	Unit	Cell 2
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
BW _{channel}		100 MHz: N _{RB,c} = 66
Initial DL BWP Configuration		DLBWP.0.2
Dedicated DL BWP Configuration		DLBWP.1.1
Initial UL BWP Configuration		ULBWP.0.2
Dedicated UL BWP Configuration		ULBWP.1.1
PDSCH Reference measurement channel		SR.3.2 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP.5
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State 0		TCI.State.2
TCI State 1		TCI.State.3
TRS Configuration		TRS.2.1 TDD
		TRS.2.2 TDD
Correlation Matrix and Antenna		1x2 Low
Configuration		
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH DMRS to SSS		
EPRE ratio of PBCH to PBCH DMRS		
EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PDSCH DMRS to SSS		
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS(Note 1)		
EPRE ratio of OCNG to OCNG DMRS (Note		
1)		
Propagation Condition		AWGN
Note 1: OCNG shall be used such that a cor	nstant total t	ransmitted power spectral

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.5.5.8.1.1.1-4: OTA related test parameters for TCI state switch

Parameter	Unit	Cell 2				
		SSB0		S	SB1	
		T1 T2		T1	T2	
Angle of arrival		Setup 3 according to clause A.3.15.3				
configuration		AoA1 AoA2			oA2	
Assumption for UE beams Note 6		Rou	ıgh	Ro	ough	
Ês	dBm/SCS	-80.6	-80.6	-Infinity	-80.6	
SSB-RP Note 2	dBm/SCS	-80.6	-80.6	-Infinity	-80.6	

$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$ BB $^{\mathrm{No}}$	ote 7	7 dB 8.3 8.3		8.3 8.3 -Infinity						
lo Note2		dBm/95.04 MHz Note4	-56.0	-56.0	- Infinity	-56.0				
Note 1:	Void									
Note 2:	SSB-RP	and lo levels have been	derived from	n other par	ameters for	information				
	purpose	s. They are not settable p	oarameters t	hemselves	i.					
Note 3:	Void									
Note 4:	Equivalent power received by an antenna with 0 dBi gain at the centre of the									
Note 5	quiet zo			ntor of the	aulat ====					
Note 5:		rved with 0dBi gain anter								
Note 6:	Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.									
Note 7:	Calculat	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-								
		assumed for the associated Reiseris requirement in clause 7.3.2 of 13 so. 101- 2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB _P from								
				band relax	ation factor	ΔIVIB _P from				
	TS 38.1	01-2 [19] Table 6.2.1.3-4.								

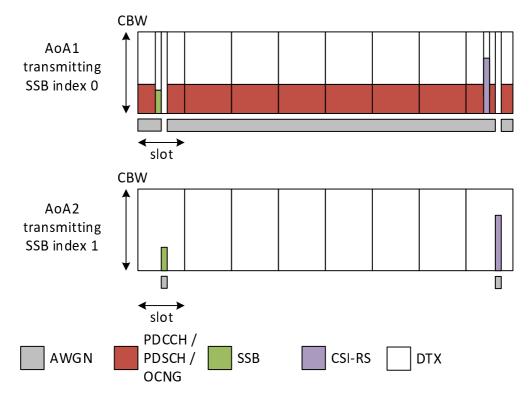


Figure A.5.5.8.1.1.1-1: Time multiplexed downlink transmissions during T1

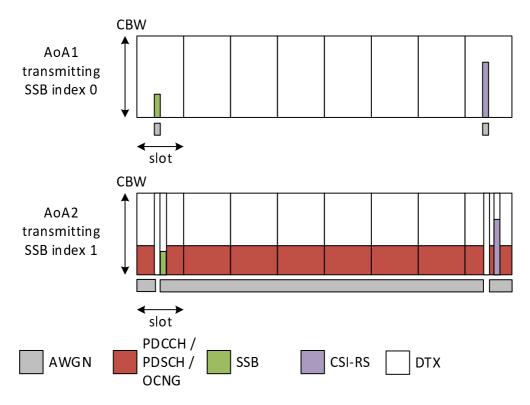


Figure A.5.5.8.1.1.1-2: Time multiplexed downlink transmissions during T2

A.5.5.8.1.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with results for both SSB0 and SSB1.

After receiving MAC-CE command in slot n, UE shall:

- be able to continue to receive on TCI state 0 till $n+T_{HARQ}+3 ms$
- be able to start receiving on TCI state 1 after n+ T_{HARQ} +5 ms + $T_{first\text{-}SSB}$

A.5.5.8.2 RRC based active TCI state switch

A.5.5.8.2.1 E-UTRAN – NR PSCell FR2 active TCI state switch for a known TCI state

A.5.5.8.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3Supported test configurations are shown in Table A.5.5.8.2.1.1-1.

The test scenario comprises of one E-UTRA PCell (Cell 1), and one NR PSCell (Cell 2) as given in Table A.5.5.8.2.1.1-2. Cell-specific parameters of E-UTRA PCell are specified in Table A.3.7.2.1-1 and Cell-specific parameters of NR PSCell is specified in Table A.5.5.8.2.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.5.5.8.2.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PSCell (Cell 2) to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (PSCell) on radio channel 2 (PSCC).
- UE is configured with 1 TCI state for PSCell, PDCCH-TCI-state0 (QCL'd to SSB0)
- UE is indicated in TCI state0 as the active TCI state

The test consists of two time periods, T1 and T2. Figure A.5.5.8.2.1.1-1 and Figure A.5.5.8.2.1.1-2 show the Time multiplexed (allocation in Frequency is symbolic) downlink transmissions from each Angle of Arrival. During T1 only SSB to which TCI-state0 is QCL'd is transmitted. At the beginning of T2, the SSB corresponding to TCI-state1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280 ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a RRC command indicating a switch to TCI-state1.

The test equipment verifies the TCI state switch time in PSCell by scheduling the UE on TCI state 1 after n+ $T_{RRC_processing} + T_{first-SSB} + 2ms$.

Table A.5.5.8.2.1.1-1: Supported test configurations

Config		Description
1	L.	TE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	Ľ	TE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: The UE is	s only requ	uired to be tested in one of the supported test configurations

Table A.5.5.8.2.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment
E-UTRA RF Channel		1	One E-UTRA radio channel is used for this
Number		ı	test
NR RF Channel Number		2	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active PSCell		Cell 2	PSCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Synchronous EN-DC
T1	S	0.2	
T2	S	2	

Table A.5.5.8.2.1.1-3: NR Cell specific test parameters for TCI state switch

Parameter	Unit	Cell 2
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
BW _{channel}		100 MHz: N _{RB,c} = 66
Initial DL BWP Configuration		DLBWP.0.2
Dedicated DL BWP Configuration		DLBWP.1.1
Initial UL BWP Configuration		ULBWP.0.2
Dedicated UL BWP Configuration		ULBWP.1.1
PDSCH Reference measurement channel		SR.3.2 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD

OCNG Patterns		OP.5				
SSB Configuration		SSB.1 FR2				
SMTC Configuration		SMTC.1				
TCI State 0		TC. State.2				
TCI State 1		TCI.State.3				
TRS Configuration		TRS.2.1 TDD				
		TRS.2.2 TDD				
reportConfigType		ssb-Index-RSRP				
reportConfigType		periodic				
Number of reported RS		2				
L1-RSRP reporting period	slot	640				
timeRestrictionForChannelMeasurements		configured				
Correlation Matrix and Antenna		1x2 Low				
Configuration						
EPRE ratio of PSS to SSS	dB	0				
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH]					
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note						
1)						
Propagation Condition	Propagation Condition AWGN					
Note 1: OCNG shall be used such that a cor	nstant total tr	ansmitted power spectral				

Table A.5.5.8.2.1.1-4: OTA related test parameters for TCI state switch

density is achieved for all OFDM symbols.

Parameter	Unit	Cell 2					
		SSB0		SS	SB1		
		T1	T2	T1	T2		
Angle of arrival		Setup 3 according to clause A.3.15.3					
configuration		AoA1 AoA2					
Assumption for		Rou	ıgh	Ro	Rough		
UE beams ^{Note 6}							
Ês	dBm/SCS	-80.6	-80.6	-Infinity	-80.6		
SSB-RP Note 2	dBm/SCS	-80.6	-80.6	-Infinity	-80.6		
Ê _s /I _{ot} BB Note 7	dB	8.3	8.3	-Infinity	8.3		
lo Note2	dBm/95.04 MHz Note4	-56.0	-56.0	- Infinity	-56.0		
Note 1: Void				•			

Note 2: SSB-RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: Void

Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 5: As observed with 0dBi gain antenna at the center of the quiet zone.

Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 7: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

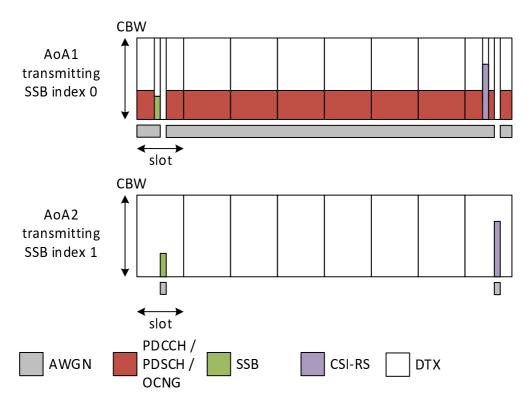


Figure A.5.5.8.2.1.1-1: Time multiplexed downlink transmissions during T1

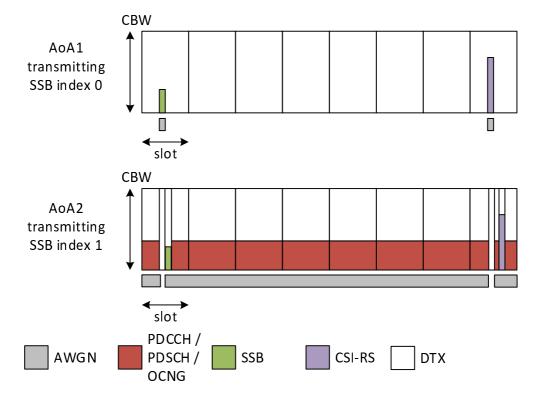


Figure A.5.5.8.2.1.1-2: Time multiplexed downlink transmissions during T2

A.5.5.8.2.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with both SSB0 and SSB1.

After receiving RRC command in slot n, UE shall be able to start receiving on TCI state 1 after n+ $T_{RRC_processing}$ + $T_{first-SSB}$ + 2ms.

A.5.6 Measurement procedure

A.5.6.1 Intra-frequency Measurements

A.5.6.1.1 EN-DC event triggered reporting test without gap under non-DRX

A.5.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.1.1-1.

Table A.5.6.1.1.1-1: supported test configurations

Cor	nfiguration	Description
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3		LTE FDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4		LTE TDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations.

There are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.6.1.1.1-2, A.5.6.1.1.1-3 and A.5.6.1.1.1-4 below.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.5.6.1.1.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap without DRX

Parameter	Unit	Config	Value	Comment
Active cell		1~4	E-UTRAN PCell (Cell 1) PSCell (Cell 2)	
Neighbour cell		1~4	Cell 3	Cell to be identified.

RF Channel Number		1~4	1: Cell 1 2: Cell 2 and Cell 3	One TDD carrier frequency is used for the NR cells and one TDD or FDD carrier frequency is used for E-UTRAN cell.
SMTC configuration		1~4	SMTC.1	
A3-Offset	dB	1~4	-11	
CP length		1~4	Normal	
Hysteresis	dB	1~4	0	
Time To Trigger	S	1~4	0	
Filter coefficient		1~4	0	L3 filtering is not used
DRX		1~4	OFF	
Time offset between Cell 1 and Cell 2		1~4	3 μs	Synchronous EN-DC
Time offset between Cell 2 and Cell 3		1~4	3 μs	Synchronous cells
T1	S	1~4	5	
T2	S	1~4	5	

Table A.5.6.1.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap without DRX

Parameter	Unit	Config	Cel	I 2	Cel	Cell 3	
			T1	T2	T1	T2	
TDD configuration		1~4	TDDC	onf.3.1	TDDCc	onf.3.1	
BW _{channel}	MHz	1~4	100: N _R	$_{\rm B,c} = 66$	100: N _R	$_{\rm B,c} = 66$	
Data RBs allocated		1,2	2-	4	24	4	
		3,4	48 48		8		
Intial BWP configuration		1~4	DLBW	P.0.1	DLBW	P.0.1	
			ULBW	P.0.1	ULBW	P.0.1	
Active DL BWP configuration		1~4	DLBW	P.1.1	DLBW	P.1.1	
Active UL BWP configuration		1~4	ULBW	P.1.1	ULBW	P.1.1	
RLM-RS		1~4	SS	B	SS	SB	
PDSCH RMC configuration		1,2	SR.3.2	SR.3.2 TDD		Ά	
		3,4	SR.3.3	3 TDD	1		
RMSI CORESET RMC		1,2	CR.3.	CR.3.1 TDD		Ά	
configuration		3,4	CR.3.2	2 TDD	N/	Ά	
Dedicated CORESET RMC		1,2	CCR.3.	1 TDD	N/	Ά	
configuration		3,4	CCR.3.	7 TDD	N/A		
PDSCH/PDCCH subcarrier spacing	kHz	1~4	12	20	12	20	
OCNG Patterns		1~4	OF	2.5	N/	Ά	
TRS configuration		1~4	TRS.2.1 TDD N/A		Ά		
PDSCH/PDCCH TCI state		1~4	TCI.S	TCI.State.2 N/A		Ά	
cellIndividualOffset	dB	1~4	N/	Ά	10	6	
SSB configuration		1, 2	SSB.3	FR2	SSB.7	FR2	
-		3, 4	SSB.4	FR2	SSB.8	FR2	
Propagation Condition		1~4	AW	GN	AW	GN	

Table A.5.6.1.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap without DRX

Parameter	Unit	Config	Ce	II 2	Cell 3		
			T1	T2	T1	T2	
AoA setup		1~4	Se	Setup 3 defined in A.3.15.3			
			Ao	AoA1		AoA2	
Assumption for UE beams ^{Note 4}		1~4	Rough		Rough		
Es	dBm/SCS	1, 2	-89	-89	-Infinity	-89	
		3, 4	-86	-86	-Infinity	-86	
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 5	dB	1~4	-0.12	-0.12	-Infinity	-0.12	
SSB_RP	dBm/SCS	1, 2	-89	-89	-Infinity	-89	
		3, 4	-86	-86	-Infinity	-86	
Io	dBm/95.04MHz	1,2	-64.41	-64.41	-Infinity	-64.41	
		3,4	-61.41	-61.41	-Infinity	-61.41	
Time multiplexing of the downlink transmissions from each AoA		1~4	Defin	Defined in Figure A.5.6.1.1.1-1			

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Void

Note 3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

Note 5: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

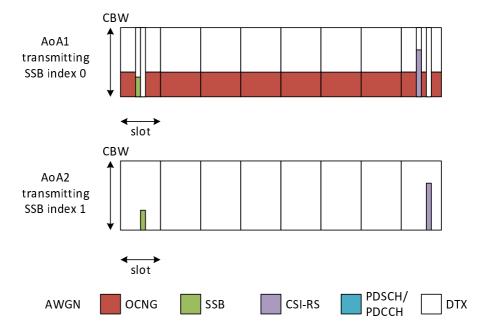


Figure A.5.6.1.1.1-1: Time multiplexed downlink transmissions (Config 1,2 example)

A.5.6.1.1.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 2.4s for a UE supporting power class 1,
- 1.44s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTIDCCH higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.1.2 EN-DC event triggered reporting test without gap under DRX

A.5.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.2.1-1.

Table A.5.6.1.2.1-1: supported test configurations

Configura	ation Description				
1	LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2	LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
3	LTE FDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
4	LTE TDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations.					

There are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.6.1.2.1-2 ~ Table A.5.6.1.2.1-6 below.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.5.6.1.2.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap with DRX

Parameter	Unit	Config	Value		Comment
			Test 1	Test 2	

Active cell			F-IITRAN F	PCell (Cell 1)	
Active cen		1~4	PSCell (Cell 2)		
Neighbour cell		1~4	Cell 3		Cell to be identified.
RF Channel Number			1: Cell 1		One TDD carrier frequency is used for the NR
		1~4	2: Cell 2 and Cell 3		cells and one TDD or FDD carrier frequency is used for E-UTRAN cell.
SMTC configuration		1~4	SMTC.1		
A3-Offset	dB	1~4	-6		
CP length		1~4	Normal		
Hysteresis	dB	1~4	0		
Time To Trigger	S	1~4	0		
Filter coefficient		1~4	0		L3 filtering is not used
DRX		1~4	DRX.1	DRX.7	DRX related parameters are defined in Table
		1~4			A.5.6.1.2.1-4
Time offset between		1~4	3 μs		Synchronous EN-DC
Cell 1 and Cell 2					
Time offset between		1~4	3 μs		Synchronous cells
Cell 2 and Cell 3		1~4			
T1	S	1~4	5		
T2	S	1~4	10	52	

Table A.5.6.1.2.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap with DRX

Parameter	Unit	Config	Cell 2		Cell 3		
			T1	T2	T1	T2	
TDD configuration		1~4	TDDConf.3.1		TDDConf.3.1		
BW _{channel}	MHz	1~4	100: N	RB,c = 66	100: N _{RB,c} = 66		
Data RBs		1~4	(66	6	66	
allocated							
Intial BWP		1~4		VP.0.1	DLBWP.0.1		
configuration				VP.0.1		VP.0.1	
Active DL BWP		1~4	DLB\	WP.1.1	DLBV	VP.1.1	
configuration							
Active UL BWP		1~4	ULB\	WP.1.1	ULBV	VP.1.1	
configuration							
RLM-RS		1~4	_	SB	_	SB	
PDSCH RMC		1,2	SR.3	.2 TDD	N	I/A	
configuration		3,4	SR.3	SR.3.3 TDD			
RMSI CORESET		1,2	CR.3	CR.3.1 TDD		l/A	
RMC		2.4	OD 0	0D 0 0 TDD		N/A	
configuration		3,4	CR.3	CR.3.2 TDD		IN/A	
Dedicated		1,2	CCR.3	CCR.3.1 TDD		I/A	
CORESET RMC							
configuration		3,4	CCR.3	CCR.3.7 TDD		I/A	
PDSCH/PDCCH	kHz	1~4	1	20	1	20	
subcarrier							
spacing							
OCNG Patterns		1~4	0	OP.1		P.1	
PDSCH/PDCCH		1~4	TCI.S	TCI.State.2		l/A	
TCI state							
CSI-RS for			TRS.2	TRS.2.1 TDD		I/A	
tracking			TRS.2	2.1 TDD	N	l/A	
SSB configuration		1, 2	SSB.3 FR2 SSB.3 F		3 FR2		
		3, 4	SSB.4 FR2		SSB.4 FR2		

Propagation	1~4	AWGN	AWGN
Condition			

Table A.5.6.1.2.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 without gap with DRX

Parameter	Unit	Config	Ce	II 2	Cell 3		
		_	T1 T2		T1	T2	
AoA setup		1~4	Setup 1 defined in A.3.15.1				
Assumption for							
UE beams ^{Note 4}						1	
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 5	te 5 dB 1~4 3.77 -1.52				-Infinity	-1.52	
$N_{oc}^{}$ Note 2	dBm/15 KHz	1~4	-98				
$N_{oc}^{$	dBm/SCS	1, 2	-89				
		3, 4			-86		
SSB_RP	dBm/SCS	1, 2	-85	-85	-Infinity	-85	
		3, 4	-82	-82	-Infinity	-82	
\hat{E}_s/N_{oc}	dB	1~4	4 4 -Infinity			4	
Io	dBm/95.04MHz	dBm/95.04MHz 1~4 -54.53 -52.18 See Cell 2					
Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.							
Note 3: Es/lot, purpos: Informa or test	SSB_RP and lo levels es. They are not settabation about types of UE system implementation	le parameters themse beam is given in B.2.	elves. 1.3, and do	oes not lim	it UE implen	nentation	
	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB						

A.5.6.1.2.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

- 7.2s for a UE supporting power class 1,
- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.1.3 EN-DC event triggered reporting test with per-UE gaps under non-DRX

A.5.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.3.1-1.

Table A.5.6.1.3.1-1: supported test configurations

С	Configuration	Description				
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
3		LTE FDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
4		LTE TDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note:	Note: The UE is only required to be tested in one of the supported test configurations.					

There are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.6.1.3.1-2 ~ 4 below.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.5.6.1.3.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Value	Comment
Active cell			E-UTRAN PCell	
		1~4	(Cell 1)	
			PSCell (Cell 2)	
Neighbour cell		1~4	Cell 3	Cell to be identified.
RF Channel Number			1: Cell 1	One TDD carrier frequency is used for the NR cells
		1~4	2: Cell 2 and	and one TDD or FDD carrier frequency is used for
			Cell 3	E-UTRAN cell.
Gap type		1~4	Per-UE gaps	
Measurement gap repitition periodicity	ms	1~4	40	
Measurement gap length	ms	1~4	6	
Measurement gap	ms	4 4	39	
offset		1~4		
SMTC configuration		1~4	SMTC.1	
CSI-RS parameters			CSI-RS.3.2	Resource #1 is not used
		1~4	TDD resource	
			#0	
A3-Offset	dB	1~4	-11	

CP length		1~4	Normal	
Hysteresis	dB	1~4	0	
Time To Trigger	S	1~4	0	
Filter coefficient		1~4	0	L3 filtering is not used
DRX		1~4	OFF	
Time offset between		1~4	3 μs	Synchronous EN-DC
Cell 1 and Cell 2		1~4		
Time offset between		1~4	3 μs	Synchronous cells
Cell 2 and Cell 3		1~4		
T1	s	1~4	5	
T2	S	1~4	5	

Table A.5.6.1.3.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Cell 2	Cell 3
			T1 T2	T1 T2
TDD configuration		1~4	TDDConf.3.1	TDDConf.3.1
BW _{channel}	MHz	1~4	100: N _{RB,c} = 60	6 100: N _{RB,c} = 66
Data RBs allocated		1,2	24	24
		3,4	48	48
Intial BWP configuration		1~4	DLBWP.0.1	DLBWP.0.1
			ULBWP.0.1	ULBWP.0.1
Active DL BWP configuration		1~4	DLBWP.1.2	DLBWP.1.1
Active UL BWP configuration		1~4	ULBWP.1.2	ULBWP.1.1
RLM-RS		1~4	CSI-RS	SSB
PDSCH RMC configuration		1,2	SR.3.2 TDD	N/A
		3,4	SR.3.3 TDD	
RMSI CORESET RMC		1,2	CR.3.1 TDD	N/A
configuration		3,4	CR.3.2 TDD	N/A
Dedicated CORESET RMC		1,2	CCR.3.1 TDD	N/A
configuration		3,4	CCR.3.7 TDD	N/A
TRS configuration		1~4	TRS.2.1 TDD	N/A
PDSCH/PDCCH TCI state		1~4	TCI.State.2	N/A
PDSCH/PDCCH subcarrier spacing	kHz	1~4	120	120
OCNG Patterns		1~4	OP.5	N/A
cellIndividualOffset	dB	1~4	N/A	16
SSB	ub	1, 2	SSB.3 FR2	SSB.7 FR2
335		3, 4	SSB.4 FR2	SSB.8 FR2
Propagation Condition		1~4	AWGN	AWGN

Table A.5.6.1.3.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Cell 2		Cell 3	
			T1	T2	T1	T2
AoA setup		1~4	Setup 3 defined in A.3.15.3			

			Ao	AoA1 Rough		A2
Assumption for UE beams ^{Note 4}		1~4	Ro			Rough
Es	dBm/SCS	1, 2	-89	-89	-Infinity	-89
		3, 4	-86	-86	-Infinity	-86
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 5	dB	1~4	-0.12	-0.12	-Infinity	-0.12
SSB_RP	dBm/SCS	1, 2	-89	-89	-Infinity	-89
		3, 4	-86	-86	-Infinity	-86
Io	dBm/95.04MHz	1,2	-64.41	-64.41	-Infinity	-64.41
		3,4	-61.41	-61.41	-Infinity	-61.41
Time multiplexing of the downlink transmissions from each AoA		1~4	Def	Defined in Figure A.5.6.1.3.1-1		

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period

Note 2: Void

Note 3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information

purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation

or test system implementation.

Note 5: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the

associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB

for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

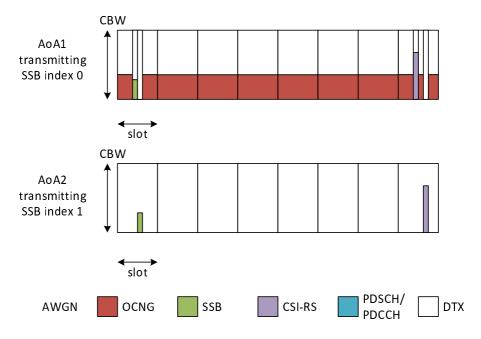


Figure A.5.6.1.3.1-1: Time multiplexed downlink transmissions (Config 1,2 example)

A.5.6.1.3.2 **Test Requirements**

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 3.2s for a UE supporting power class 1,
- 1.92s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.1.4 EN-DC event triggered reporting test with per-UE gaps under DRX

A.5.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.5.6.1.4.1-1.

Table A.5.6.1.4.1-1: supported test configurations

Co	onfiguration	Description				
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
3		LTE FDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
4		LTE TDD, 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note:	Note: The UE is only required to be tested in one of the supported test configurations.					

There are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on the same frequency as the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.6.1.4.1-2 \sim 6.

During the test, Cell 2 and Cell 3 are transmitted from the direction determined according to A3.8.

There are two BWPs configured in Cell 2, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 2. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PSCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of cell 3.

Table A.5.6.1.4.1-2: General test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps with DRX

Pa	arameter	Unit	Config	Value		Comment
				Test 1	Test 2	

Active cell		1~4	E-UTRAN PC	, ,	
			PSCell (Cell 2)	
Neighbour cell		1~4	Cell 3		Cell to be identified.
RF Channel			1: Cell 1		One TDD carrier frequency is used for the
Number		1~4	2: Cell 2 and 0	Cell 3	NR cells and one TDD or FDD carrier
					frequency is used for E-UTRAN cell.
Gap type		1~4	Per-UE gaps		
Measurement gap	ms	1~4	40		
repitition periodicity		1~4			
Measurement gap	ms	1~4	6		
length		1~4			
Measurement gap	ms	1~4	39		
offset		1~4			
SMTC configuration		1~4	SMTC.1		
CSI-RS parameters		1~4	CSI-RS.3.2 TI	OD resource #0	Resource #1 is not used
A3-Offset	dB	1~4	-6		
CP length		1~4	Normal		
Hysteresis	dB	1~4	0		
Time To Trigger	S	1~4	0		
Filter coefficient		1~4	0		L3 filtering is not used
DRX		1~4	DRX.1	DRX.7	DRX related parameters are defined in
		1~4			Table A.5.6.1.4.1-5
Time offset between		1~4	3 μs		Synchronous EN-DC
Cell 1 and Cell 2		1~4	'		
Time offset between		4 4	3 μs		Synchronous cells
Cell 2 and Cell 3		1~4			
T1	s	1~4	5		
T2	S	1~4	10	52	

Table A.5.6.1.4.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Cell 2	Cell 3
			T1 T2	T1 T2
TDD configuration		1~4	TDDConf.3.1	TDDConf.3.1
BW _{channel}	MHz	1~4	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Data RBs		1~4	66	66
allocated				
Intial BWP		1~4	DLBWP.0.1	DLBWP.0.1
configuration			ULBWP.0.1	ULBWP.0.1
Active DL BWP		1~4	DLBWP.1.2	DLBWP.1.1
configuration				
Active UL BWP		1~4	ULBWP.1.2	ULBWP.1.1
configuration				
RLM-RS		1~4	CSI-RS	SSB
PDSCH RMC		1,2	SR.3.2 TDD	N/A
configuration		3,4	SR.3.3 TDD	
RMSI CORESET RMC		1,2	CR.3.1 TDD	N/A
configuration		3,4	CR.3.2 TDD	N/A
Dedicated CORESET RMC		1,2	CCR.3.1 TDD	N/A
configuration		3,4	CCR.3.7 TDD	N/A
TRS configuration		1~4	TRS.2.1 TDD	N/A

PDSCH/PDCCH		1~4	TCI.State.2	N/A
TCI state				
PDSCH/PDCCH subcarrier spacing	kHz	1~4	120	120
OCNG Patterns		1~4	OP.1	OP.1
SSB		1, 2	SSB.3 FR2	SSB.3 FR2
		3, 4	SSB.4 FR2	SSB.4 FR2
Propagation Condition		1~4	AWGN	AWGN

Table A.5.6.1.4.1-4: NR Cell specific test parameters for intra-frequency event triggered reporting for EN-DC with TDD PSCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config		II 2	Cell 3		
		_	T1	T2	T1	T2	
AoA setup		1~4	S	etup 1 defii	ned in A.3.1	5.1	
Assumption for UE beams ^{Note 4}		1~4	Ro	Rough Rough			
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 5	dB	1~4	3.77	-1.52	-Infinity	-1.52	
N_{oc} Note 2	dBm/15 KHz	1~4		-98			
N_{oc} Note 2	dBm/SCS	1, 2		-89			
		3, 4		-	·86		
SSB_RP	dBm/SCS	1, 2	-85	-85	-Infinity	-85	
		3, 4	-82	-82	-Infinity	-82	
\hat{E}_s/N_{oc}	dB	1~4	4	4	-Infinity	4	
Io	dBm/95.04MHz	1~4	-54.53	-52.18	See Cell 2	2 columns	

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

Note 5: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

Table A.5.6.1.4.1-5: Void

Table A.5.6.1.4.1-6: Void

A.5.6.1.4.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,

- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.20s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2 Inter-frequency Measurements

A.5.6.2.1 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is not used

A.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.1.1-1, A.5.6.2.1.1-2, and A.5.6.2.1.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.1.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.1.1-1.

Table A.5.6.2.1.1-1 EN-DC event triggered reporting tests without SSB index reading for FR2-FR2

	Config	Description			
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note 1: Note 2:	The UE is only required to be tested in one of the supported test configurations target NR cell has the same SCS, BW and duplex mode as NR serving cell				

Table A.5.6.2.1.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Value	Comment

		Test configurati on	Test 1	Test 2	
E-UTRA RF Channel Number		Config 1,2	1		One E-UTRAN TDD carrier frequency is used.
NR RF Channel Number		Config 1,2	1, 2		Two FR2 NR carrier frequencies are used.
Active cell		Config 1,2	LTE Cell 1 (PCell) and NR cell 2 (PScell)		LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2	NR cell 3		NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2	0 13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2	39 39		
SMTC-SSB parameters		Config 1,2	SSB.3 FR2		As specified in clause A.3.10.2
offsetMO	dB	Config 1,2	16		Applied to NR Cell 3 measurement object
A3-Offset	dB	Config 1,2	-11		
Hysteresis	dB	Config 1,2	0		
CP length		Config 1,2	Normal		
TimeToTrigger	S	Config 1,2	0		
Filter coefficient		Config 1,2	0		L3 filtering is not used
DRX		Config 1,2	OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,2 3μs		Synchronous cells.	
T1	S	Config 1,2	5		
T2	S	Config 1,2	5.2 for PC1; 5.2 for PC1; 3.5 for other PC PC		

Table A.5.6.2.1.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit Test		Ce	II 2	Cell 3			
		configuratio n	T1	T2	T1	T2		
AoA setup		Config 1,2	Setu	p 3 as speci	fied in claus	ed in clause A.3.15		
			Ac	A1		AoA2		
Assumption for UE beams ^{Note}		Config 1,2	Rough		Rough			
NR RF Channel Number		Config 1,2	1		2			
Duplex mode		Config 1,2	TI	DD	TDD			
BW _{channel}	MHz	Config 1,2	100: N	RB,c = 66	100: N _{RB,c} = 66			
Data RBs allocated		Config 1,2	6	6		66		
BWP BW	MHz	Config 1,2	100: N	RB,c = 66	100: N _{RB,c} = 66			
TDD configuration		Config 1,2	TDDConf.3.1		TDDConf.3.1			
Initial DL BWP		Config 1,2	DLBV	VP.0.1 NA		NA		

Initial UL BWP		Config 1,2	ULBV	VP.0.1	NA		
Dedicated DL BWP		Config 1,2	DLBV	VP.1.1		NA	
Dedicated UL BWP	Dedicated UL BWP		ULBWP.1.1		NA		
OCNG Patterns defined in A.3.2.1.1		Config 1,2	Ol	P.1	OP.1		
TRS configuration		Config 1,2	TRS.2	.1 TDD		NA	
PDSCH/PDCCH TCI state		Config 1,2	TCI.S	State.2		NA	
PDSCH Reference measurement channel		Config 1,2	SR.3.	1 TDD		-	
RMSI CORESET Reference Channel		Config 1,2	CR.3.	1 TDD		-	
Dedicated CORESET Reference Channel		Config 1,2	CCR.3	.1 TDD	-		
SMTC configuration defined in A.3.11		Config 1,2	SMTC.1		SMTC.1		
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	1	20	120		
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS					0		
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2		0			
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to							
OCNG DMRS (Note 1) Ês	dBm/S CS	Config 1,2	-87	-87	-Infinity	-87	
SSB_RP Note 3	dBm/S CS Note5	Config 1,2	-87	-87	-Infinity	-87	
\hat{E}_{s}/I_{ot} BB Note 8	dB	Config 1,2	1.89	1.89	-Infinity	1.89	
Io Note3	dBm/95 .04 MHz Note5	Config 1,2	-58.01	-58.01	-Infinity	-58.01	
Propagation Condition		Config 1,2	AW	/GN	A	AWGN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Void
Note 3:	SSB-RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Void
Note 5:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
Note 6:	As observed with 0dBi gain antenna at the centre of the quiet zone
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 8:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the
	associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for
	UE multi-band relaxation factor ΔMB _S from TS 38.101-2 [19] Table 6.2.1.3-4.

A.5.6.2.1.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.2 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is used

A.5.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.2.1-1, A.5.6.2.2.1-2, and A.5.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.2.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.2.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.2.1-1.

Table A.5.6.2.2.1-1 EN-DC event triggered reporting tests without SSB index reading for FR2-FR2

	Config	Description					
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations					
Note 2:	target NR cell ha	arget NR cell has the same SCS, BW and duplex mode as NR serving cell					

Table A.5.6.2.2.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Value			Comment	
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel	E-UTRA RF Channel Config 1,2 1			One E-UTRAN TDD carrier			
Number							frequenciy is used.
NR RF Channel		Config 1,2		1,	2		Two FR2 NR carrier frequencies
Number							are used.
Active cell		Config 1,2	I TF C	ell 1 (PC	Cell) and	l NR	LTE Cell 1 is on E-UTRA RF
7.0				(PScell)	<i>-</i> , a		channel number 1.
				(NR Cell 2 is on NR RF channel
							number 1.
Neighbour cell		Config 1,2	NR ce	II 3			NR cell 3 is on NR RF channel
_							number 2.
Gap Pattern Id		Config 1,2	0		13		As specified in clause 9.1.2-1.
Measurement gap		Config 1,2	39		39		
offset		Corning 1,2			00		
SMTC-SSB parameters		Config 1,2	SSB.3	FR2			As specified in clause A.3.10.2
A3-Offset	dB	Config 1,2	-6				
Hysteresis	dB	Config 1,2	0				
CP length		Config 1,2	Norma	al			
TimeToTrigger	S	Config 1,2	0				
Filter coefficient		Config 1,2	0	1	1		L3 filtering is not used
DRX		Config 1,2	DRX .1	DRX .7	DRX .1	DRX .7	As specified in clause A.3.3
Time offset between		Config 1,2	3 μs				Synchronous EN-DC
PCell and PSCell							
Time offset between		Config 1,2	3µs				Synchronous cells.
serving and neighbour							
cells							
T1	s	Config 1,2	5	T		T	
T2	S	Config 1,2	8 for	82	8 for	82	
			PC1;	for	PC1;	for	
			5 for	PC1;	5 for	PC1;	
			othe	52	othe	52	
			r PC	for	r PC	for	
				othe		other	
				r PC		PC	

Table A.5.6.2.2.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Cell 2	Cell 3

		Test	T1	T2	T1	T2
		configuratio n				
AoA setup		Config 1,2	Setup 1 as specifi		ied in clause A.3.15	
Assumption for UE beams ^{Note}		Config 1,2	Rough		Rough	
NR RF Channel Number		Config 1,2	,	1		2
Duplex mode		Config 1,2	TE	DD	-	TDD
BW _{channel}	MHz	Config 1,2	100: N _F	RB,c = 66	100: 1	N _{RB,c} = 66
Data RBs allocated		Config 1,2		6		66
BWP BW	MHz	Config 1,2		$_{RB,c} = 66$		$N_{RB,c} = 66$
TDD configuration		Config 1,2	TDDC	onf.3.1	TDD	Conf.3.1
Initial DL BWP		Config 1,2	DLBW	VP.0.1		NA
Initial UL BWP		Config 1,2	ULBW	VP.0.1		
Dedicated DL BWP		Config 1,2	DLBV	VP.1.1		NA
Dedicated UL BWP		Config 1,2	ULBW	VP.1.1		NA
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2		P.1	(OP.1
TRS configuration		Config 1,2	TRS.2.1 TDD		NA	
PDSCH/PDCCH TCI state		Config 1,2	TCI.State.2			NA
PDSCH Reference measurement channel		Config 1,2	SR.3.1 TDD			-
RMSI CORESET Reference Channel		Config 1,2	CR.3.	1 TDD	-	
Dedicated CORESET Reference Channel		Config 1,2	CCR.3	.1 TDD	-	
SMTC configuration defined in A.3.11		Config 1,2	SM	ΓC.1	SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	12	20		120
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS		•				
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2	0			0
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
$N_{oc}^{ m Note2}$	dBm/15 kHz Note5		-10)4.7	^	104.7

N_{oc} Note2	dBm/S CS	Config 1,2	-95.7		-95.7	
	Note4					
SSB_RP Note 3	dBm/S	Config 1,2	-89.7	-89.7	-Infinity	-86.7
	CS					
	Note5					
\hat{E}_{s}/I_{ot}	dB	Config 1,2	6	6	-Infinity	9
\hat{E}_s/N_{oc}	dB	Config 1,2	6	6	-Infinity	9
Io ^{Note3}	dBm/95 .04	Config 1,2	-59.7	-59.7	-66.7	-57.2
	MHz					
	Note5					
Propagation Condition		Config 1,2	AWGN AWG		WGN	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Void
- Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

A.5.6.2.2.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.3 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is not used

A.5.6.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.3.1-1, A.5.6.2.3.1-2, and A.5.6.2.3.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.3.1-1 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.3.1-1 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.3.1-1.

Table A.5.6.2.3.1-1 EN-DC event triggered reporting tests with SSB index reading for FR2-FR2

	Config	Description
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations
Note 2:	target NR cell ha	is the same SCS, BW and duplex mode as NR serving cell

Table A.5.6.2.3.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Va	lue	Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel		Config 1,2	,	1	One E-UTRAN TDD carrier
Number		_			frequency is used.
NR RF Channel Number		Config 1,2	1,	, 2	Two FR2 NR carrier frequencies are used.
Active cell		Config 1,2	LTE Cell 1 (PC	Cell) and NR	LTE Cell 1 is on E-UTRA RF
			cell 2 (PScell)		channel number 1.
					NR Cell 2 is on NR RF channel
					number 1.
Neighbour cell		Config 1,2	NR cell 3		NR cell 3 is on NR RF channel
		0 " 10		T 40	number 2.
Gap Pattern Id		Config 1,2	0	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2	39	39	
SMTC-SSB parameters		Config 1,2	SSB.3 FR2		As specified in clause A.3.10.2
offsetMO	dB	Config 1,2	16		Applied to NR Cell 3 measurement object
A3-Offset	dB	Config 1,2	-11		
Hysteresis	dB	Config 1,2	0		
CP length		Config 1,2	Normal		
TimeToTrigger	S	Config 1,2	0		
Filter coefficient		Config 1,2	0		L3 filtering is not used
DRX		Config 1,2	OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2	3 μs		Synchronous EN-DC

Time offset between serving and neighbour cells		Config 1,2	3µs		Synchronous cells.
T1	S	Config 1,2	5		
T2	s	Config 1,2	7 for PC1; 4.5 for other PC	7 for PC1; 4.5 for other PC	

Table A.5.6.2.3.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Cell 2		(Cell 3
		configuratio n	T1	T1 T2		T2
AoA setup		Config 1,2	Setu	p 3 as specifi	ed in clause A.3.15	
			Ac	A1	AoA2	
Assumption for UE beams ^{Note}		Config 1,2	Ro	ugh	F	Rough
NR RF Channel Number		Config 1,2		1		2
Duplex mode		Config 1,2		OD		TDD
BW _{channel}	MHz	Config 1,2	100: N	RB,c = 66	100:	$N_{RB,c} = 66$
Data RBs allocated		Config 1,2	6	66		66
BWP BW	MHz	Config 1,2	100: N	RB,c = 66	100:	$N_{RB,c} = 66$
TDD configuration		Config 1,2	TDDC	onf.3.1	TDD	Conf.3.1
Initial DL BWP		Config 1,2	DLBV	VP.0.1		NA
Initial UL BWP		Config 1,2	DLBV	VP.0.1		N/A
Dedicated DL BWP		Config 1,2	DLBWP.1.1			NA
Dedicated UL BWP		Config 1,2	ULBWP.1.1			NA
OCNG Patterns defined in A.3.2.1.1		Config 1,2	Ol	P.1	(OP.1
PDSCH Reference measurement channel		Config 1,2		1 TDD		-
RMSI CORESET Reference Channel		Config 1,2	CR.3.	1 TDD		-
Dedicated CORESET Reference Channel		Config 1,2	CCR.3	.1 TDD		-
TRS configuration		Config 1,2	TRS.2	.1 TDD		NA
PDSCH/PDCCH TCI state		Config 1,2	TCI.State.2		NA	
SMTC configuration defined in A.3.11		Config 1,2	SMTC.1		SI	MTC.1
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2	120			120
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS		Config 1,2		0		0

EPRE ratio of PBCH to PBCH DMRS								
EPRE ratio of PDCCH DMRS to SSS								
EPRE ratio of PDCCH to PDCCH DMRS								
EPRE ratio of PDSCH DMRS to SSS								
EPRE ratio of PDSCH to PDSCH								
EPRE ratio of OCNG DMRS to SSS(Note 1)								
EPRE ratio of OCNG to OCNG DMRS (Note 1)								
Ês	dBm/S CS	Config 1	-87	-87	-Infinity	-87		
SSB_RP Note 3	dBm/S CS Note5	Config 1,2	-87	-87	-Infinity	-87		
$\hat{E}_{s}/I_{ot\ BB\ Note\ 8}$	dB	Config 1,2	1.89	1.89	-Infinity	1.89		
lo Note3	dBm/95 .04 MHz _{Note5}	Config 1,2	-58.01	-58.01	-Infinity	-58.01		
Propagation Condition		Config 1,2	AV	/GN	Α\	WGN		
spectral density is ac								
Note 2: Void Note 3: SSB-RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.								
Note 4: Void Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone								
Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or								

A.5.6.2.3.2 Test Requirements

Note 8:

test system implementation

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the

associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.4 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is used

A.5.6.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR2 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.4.1-1, A.5.6.2.4.1-2, and A.5.6.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.4.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.4.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.2-1. Supported test configurations are shown in table A.5.6.2.4.1-1.

Table A.5.6.2.4.1-1: EN-DC event triggered reporting tests with SSB index reading for FR2-FR2

	Config	Description					
1		LTE FDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2		LTE TDD, 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
Note 1:	1: The UE is only required to be tested in one of the supported test configurations						
Note 2:	target NR cell has the same SCS, BW and duplex mode as NR serving cell						

Table A.5.6.2.4.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test		Value			Comment
		configurati on	Test 1	Test 2	Test 3	Test 4	
E-UTRA RF Channel Number		Config 1,2		1			One E-UTRAN TDD carrier frequency is used.
NR RF Channel Number		Config 1,2		1, 2			Two FR2 NR carrier frequencies are used.
Active cell		Config 1,2		LTE Cell 1 (PCell) and NR cell 2 (PScell)			LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2	NR cell 3				NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2	0	0 13			As specified in clause 9.1.2-1.

Measurement gap offset		Config 1,2	39		39		
SMTC-SSB parameters		Config 1,2	SSB.3	FR2			As specified in clause A.3.10.2
A3-Offset	dB	Config 1,2	-6				
Hysteresis	dB	Config 1,2	0				
CP length		Config 1,2	Norma	ıl			
TimeToTrigger	s	Config 1,2	0				
Filter coefficient		Config 1,2	0				L3 filtering is not used
DRX		Config 1,2	DRX .1	DRX .7	DRX .1	DRX .7	As specified in clause A.3.3
Time offset between PCell and PSCell		Config 1,2	3 μs				Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,2	3µs				Synchronous cells.
T1	S	Config 1,2	5				
T2	S	Config 1,2	11 for PC1; 6.5 for othe r PC	108 for PC1; 67 for othe r PC	for PC1; 6.5 for othe r PC	108 for PC1; 67 for other PC	

Table A.5.6.2.4.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit Test		Ce	II 2	Cell 3		
		configuratio n	T1	T2	T1	T2	
AoA setup		Config 1,2	Setu	p 1 as specif	ied in claus	e A.3.15	
Assumption for UE beams ^{Note}		Config 1,2	Ro	ugh	F	Rough	
NR RF Channel Number		Config 1,2		1		2	
Duplex mode		Config 1,2	TI	DD		TDD	
BWchannel	MHz	Config 1,2	100: N	RB,c = 66	100:	N _{RB,c} = 66	
Data RBs allocated		Config 1,2	6	66		66	
BWP BW	MHz	Config 1,2	100: N	RB,c = 66	100:	$N_{RB,c} = 66$	
TDD configuration		Config 1,2	TDDC	onf.3.1	TDDConf.3.1		
Initial DL BWP		Config 1,2	DLBV	VP.0.1	NA		
Initial UL BWP		Config 1,2	ULBV	VP.0.1			
Dedicated DL BWP		Config 1,2	DLBV	VP.1.1	NA		
Dedicated UL BWP		Config 1,2	ULBWP.1.1		NA		
OCNG Patterns defined in A.3.2.1.1		Config 1,2	OP.1		OP.1 OP.1		
PDSCH Reference measurement channel		Config 1,2	SR.3.1 TDD		-		
RMSI CORESET Reference Channel		Config 1,2	CR.3.	1 TDD		-	

TCI.S SMT	.1 TDD		A IA
SMT		N	IA
	ΓC 1		
	10.1	SM	ΓC.1
12	20	12	20
-104.7		-104.7	
-95.7		-95.7	
-89.7	-89.7	-Infinity	-86.7
6	6	-Infinity	9
6	6	-Infinity	9
-59.7	-59.7	-66.7	-57.2
	-10 -99 -89.7 6 6 -59.7	-104.7 -95.7 -89.7 -89.7 -89.7 -89.7 -89.7 -89.7 -89.7 -89.7 -89.7 -89.7 -89.7 -89.7 -89.7 -89.7	-104.7 -10 -95.7 -99 -89.7 -89.7 -Infinity 6 6 6 -Infinity 6 6 -Infinity -59.7 -59.7 -66.7

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Void

Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone

Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

A.5.6.2.4.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.5 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is not used

A.5.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.5.1-1, A.5.6.2.5.1-2, and A.5.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.5.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.5.1-1.

Table A.5.6.2.5.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD	120 kHz SSB SCS,
	duplex mode	100 MHz bandwidth, TDD
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD	duplex mode
	duplex mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD	
	duplex mode	

4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD				
	duplex mode				
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD				
	duplex mode				
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD				
	duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations					

Table A.5.6.2.5.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel		Config		1	One E-UTRAN TDD carrier
Number		1,2,3,4,5,6			frequency is used.
NR RF Channel		Config	1	, 2	One FR1 and one FR2 NR carrier
Number		1,2,3,4,5,6			frequency is used.
Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (Pocell)	Cell) and NR	LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3,4,5,6	NR cell 3		NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3,4,5,6	0	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3,4,5,6	39	39	
SMTC-SSB parameters on NR RF Channel 1		Config 1,4	SSB.1 FR1		As specified in clause A.3.10.1
		Config 2,5	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3,6	SSB.2 FR1		As specified in clause A.3.10.1
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3,4,5,6	SSB.3 FR2		As specified in clause A.3.10.2
CSI-RS for tracking		Config 1,4	TRS.1.1 FDD		
		Config 2,5	TRS.1.1 TDD		
		Config 3,6	TRS.1.2 TDD		
offsetMO	dB	Config 1,2,3,4,5,6	6		
Hysteresis	dB	Config 1,2,3,4,5,6	0		
a4-Threshold	dBm	Config 1,2,3,4,5,6	-105		
CP length		Config 1,2,3,4,5,6	Normal		
TimeToTrigger	s	Config 1,2,3,4,5,6	0		
Filter coefficient		Config 1,2,3,4,5,6	0		L3 filtering is not used
DRX		Config 1,2,3,4,5,6	OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4	3ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.

		Config 2,3,5,6	3μs		Synchronous cells.
T1	S	Config 1,2,3,4,5,6	5		
T2	S	Config 1,2,3,4,5,6		5.2 for PC1; 3.5 for other PC	

Table A.5.6.2.5.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Cell 2		Cell 3		
		configuratio n	T1	T2	T1	T2	
AoA setup		Config	N/A		Setup 1 a	Setup 1 as specified in	
•		1,2,3,4,5,6				se A.3.15	
Assumption for UE beams ^{Note}		Config	ı	N/A	F	Rough	
7		1,2,3,4,5,6					
NR RF Channel Number		Config		1		2	
		1,2,3,4,5,6					
Duplex mode		Config 1,4		DD	_	TDD	
		Config	Т	DD		TDD	
		2,3,5,6					
BW _{channel}	MHz	Config 1,4		RB,c = 52		$N_{RB,c} = 66$	
		Config 2,5		_{RB,c} = 52	100:	$N_{RB,c} = 66$	
DIAGO DIAG		Config 3,6	40: N _F	_{B,c} = 106	100:	$N_{RB,c} = 66$	
BWP BW	MHz	Config 1,4	10: N	_{RB,c} = 52	100:	$N_{RB,c} = 66$	
		Config 2,5	10: N	RB,c = 52	100:	$N_{RB,c} = 66$	
		Config 3,6		B,c = 106	100:	$N_{RB,c} = 66$	
Data RBs allocated		Config 1,4		52		66	
		Config 2,5		52		66	
		Config 3,6	106			66	
TDD configuration		Config 2,5	TDDConf.1.1		TDD	Conf.3.1	
		Config 3,6	TDDConf.2.1		TDD	Conf.3.1	
Initial DL BWP		Config	DLBWP.0.1			NA	
Initial UL BWP		1,2,3,4,5,6		WP.0.1		NI A	
		Config 1,2,3,4,5,6				NA	
Dedicated DL BWP		Config 1,2,3,4,5,6	DLB	WP.1.1		NA	
Dedicated UL BWP		Config 1,2,3,4,5,6	ULB	WP.1.1		NA	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2,3,4,5,6	C	P.1		OP.1	
PDSCH Reference		Config 1,4	SR 1	.1 FDD		-	
measurement channel		Config 2,5		.1 TDD	- 		
		Config 2,5			_		
DMCI CODECET Deference			SR2.1 TDD				
RMSI CORESET Reference Channel		Config 1,4	CR.1.1 FDD		-		
Channel		Config 2,5	CR.1.1 TDD		_		
D. II. / LOODEGET		Config 3,6		.1 TDD			
Dedicated CORESET Reference Channel		Config 1,4		1.1 FDD		-	
		Config 2,5	CCR.	1.1 TDD			

		Config 3,6	CCR.2.1 TDD			
SMTC configuration defined in A.3.11		Config 1,4	SMTC.2	SM	ITC.2	
		Config 2,3,5,6	SMTC.1	SM	ITC.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2,4,5	15		20	
		Config 3,6	30	1	20	
EPRE ratio of PSS to SSS		Config 1,2,3,4,5,6	0		0	
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
Ës	dBm/S CS	Config 1,2,3,4,5,6		-Infinity	-87	
SSB_RP Note 3	dBm/S CS Note5	Config 1,2,3,4,5,6		-Infinity	-87	
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 8	dB	Config 1,2,3,4,5,6	Link only, see clause A.3.7A	-Infinity	14.69	
Io ^{Note3}	dBm/95 .04 MHz Note5	Config 1,2,3,4,5,6		-Infinity	-58.01	
Propagation Condition		Config 1,2,3,4,5,6		AV	AWGN	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Void
- Note 3: SSB_RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Void.
- Note 5: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 6: As observed with 0dBi gain antenna at the centre of the quiet zone
- Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 8: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

A.5.6.2.5.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.6 EN-DC event triggered reporting tests for FR2 cell without SSB time index detection when DRX is used

A.5.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.6.1-1, A.5.6.2.6.1-2, and A.5.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.6.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.6.1-1.

Table A.5.6.2.6.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD	120 kHz SSB SCS,
	duplex mode	100 MHz bandwidth, TDD
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD	duplex mode
	duplex mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD	
	duplex mode	
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD	
	duplex mode	
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD	
	duplex mode	
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD	
	duplex mode	
Note: The U	E is only required to be tested in one of the supported test configurate	tions

Table A.5.6.2.6.1-2: General test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test		Value			Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel		Config			1		One E-UTRAN TDD carrier
Number		1,2,3,4,5,6					frequency is used.
NR RF Channel		Config		1,	, 2		One FR1 and one FR2 NR carrier
Number		1,2,3,4,5,6					frequency is used.
Active cell		Config			Cell) and	NR	LTE Cell 1 is on E-UTRA RF
		1,2,3,4,5,6	cell 2 ((PScell)			channel number 1.
							NR Cell 2 is on NR RF channel
Niciolah aya call		Cantin	NR ce	11.0			number 1. NR cell 3 is on NR RF channel
Neighbour cell		Config	NR ce	11 3			
Con Dottorn Id		1,2,3,4,5,6	0		13		number 2.
Gap Pattern Id		Config	U		13		As specified in clause 9.1.2-1.
Measurement gap		1,2,3,4,5,6 Config	39		39		
offset		1,2,3,4,5,6	39		39		
SMTC-SSB parameters		Config 1,4	SSB.1	ED1			As specified in clause A.3.10.1
on NR RF Channel 1		Corning 1,4	33B.1	LKI			As specified in clause A.S. 10.1
on with channer		Config 2,5	SSB.1	FR1			As specified in clause A.3.10.1
		Corning 2,0	OOD.1	1 1 1 1			7.6 Specified in clause 75.16.1
		Config 3,6	SSB.2	FR1			As specified in clause A.3.10.1
		Corning 0,0	005.2				7.6 opeomed in oladee 7e. re. r
SMTC-SSB parameters		Config	SSB.3	FR2			As specified in clause A.3.10.2
on NR RF Channel 2		1,2,3,4,5,6	002.0				/ to opening in clause / i.e. re
CSI-RS for tracking		Config 1,4	TRS.1	.1 FDD			
		Config 2,5		.1 TDD			
		Config 3,6		.2 TDD			
offsetMO	dB	Config	6				
		1,2,3,4,5,6					
Hysteresis	dB	Config	0				
		1,2,3,4,5,6					
a4-Threshold	dBm	Config	-105				
		1,2,3,4,5,6					
CP length		Config	Norma	d			
		1,2,3,4,5,6					
TimeToTrigger	s	Config	0				
		1,2,3,4,5,6					1000
Filter coefficient		Config	0				L3 filtering is not used
DDV		1,2,3,4,5,6	DDV	DDV	DDV	DDV	As appoiling in plants A 2.2
DRX		Config	DRX	DRX	DRX	DRX	As specified in clause A.3.3
Time offset between		1,2,3,4,5,6 Config	.1	.7	.1	.7	Synchronous EN-DC
PCell and PSCell		1,2,3,4,5,6	3 μs				Synchionous Liv-DC
Time offset between		Config 1,4	3ms				Asynchronous cells.
serving and neighbour		Joining 1,4	Jillo				The timing of Cell 3 is 3ms later
cells							than the timing of Cell 2.
		Config	3µs				Synchronous cells.
		2,3,5,6	σμο				
		' ' ' '					
T1	s	Config	5				
		1,2,3,4,5,6					

T2	S	Config	8 for	82	8 for	82
		1,2,3,4,5,6	PC1;	for	PC1;	for
			5 for	PC1;	5 for	PC1;
			othe	52	othe	52
			r PC	for	r PC	for
				othe		other
				r PC		PC

Table A.5.6.2.6.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting without SSB time index detection

Parameter	Unit	Test	Cell 2		Cell 3	
		configuratio n	T1	T2	T1	T2
AoA setup		Config	N/A			as specified in
		1,2,3,4,5,6			clause A.3.15	
Assumption for UE beams ^{Note}		Config	1	I/A	F	Rough
7		1,2,3,4,5,6				
NR RF Channel Number		Config		1		2
		1,2,3,4,5,6				
Duplex mode		Config 1,4		DD		TDD
		Config 2,3,5,6	_	DD		TDD
BW _{channel}	MHz	Config 1,4		RB,c = 52		$N_{RB,c} = 66$
		Config 2,5		RB,c = 52		$N_{RB,c} = 66$
		Config 3,6		B,c = 106		$N_{RB,c} = 66$
BWP BW	MHz	Config 1,4		RB,c = 52		$N_{RB,c} = 66$
		Config 2,5		RB,c = 52		$N_{RB,c} = 66$
		Config 3,6		$_{B,c} = 106$	100:	$N_{RB,c} = 66$
Data RBs allocated		Config 1,4		52		66
		Config 2,5		52		66
		Config 3,6		06		66
TDD configuration		Config 2,5 TDDConf.1.1		Conf.1.1	TDD	Conf.3.1
		Config 3,6	TDDConf.2.1		TDD	Conf.3.1
Initial DL BWP		Config	DLBWP.0.1			NA
Initial UL BWP		1,2,3,4,5,6	LILDI	WP.0.1		NA
Initial OL BVVP		Config 1,2,3,4,5,6	ULB	WP.0.1		NA
Dedicated DL BWP		Config	DLB\	WP.1.1		NA
D. II. (LLIII DIA/D		1,2,3,4,5,6	LILEN	ND 4 4		N 1 A
Dedicated UL BWP		Config 1,2,3,4,5,6		WP.1.1		NA
OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2,3,4,5,6	0	P.1		OP.1
PDSCH Reference		Config 1,4	SR.1	.1 FDD		-
measurement channel		Config 2,5		.1 TDD	+	
		Config 3,6		.1 TDD	+	
RMSI CORESET Reference		Config 1,4			+	
Channel		Config 1,4	CR.1.1 FDD CR.1.1 TDD		-	
Charliner		Config 2,5	CR2.1 TDD		- 	
Dedicated CORESET		Config 1,4	CR2.1 IDD CCR.1.1 FDD			-
Reference Channel						
		Config 2,5	CCR.	1.1 TDD		

		Config 3,6	CCR.2.1 TDD			
SMTC configuration defined in A.3.11		Config 1,4	SMTC.2	SM	TC.2	
		Config 2,3,5,6	SMTC.1	SM	TC.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2,4,5	15	1	20	
		Config 3,6	30	1	20	
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2,3,4,5,6	0	0		
EPRE ratio of PDSCH DMRS to SSS		.,_,0, .,0,0				
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
N oc Note2	dBm/15 kHz Note5			-10)4.7	
N_{oc} Note2	dBm/S CS	Config 1,2,4,5		-95.7 -95.7		
	Note4	Config 3,6				
SSB_RP Note 3	dBm/S CS	Config 1,2,4,5		-Infinity	-86.7	
	Note5	Config 3,6		-Infinity	-86.7	
\hat{E}_{s}/I_{ot}	dB	Config 1,2,3,4,5,6	N/A	-Infinity	9	
\hat{E}_s/N_{oc}	dB	Config 1,2,3,4,5,6	Link only, see clause A.3.7A	-Infinity	9	
IO ^{Note3}	dBm/9. 36MHz	Config 1,2,4,5		-	-	
	dBm/38 .16MHz	Config 3,6		-	-	
	dBm/95 .04 MHz Note5	Config 1,2,3,4,5,6		-66.7	-57.2	
Propagation Condition	140100	Config 1,2,3,4,5,6		AW	/GN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be
	fulfilled.
Note 3:	SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SSB_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 6:	As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.5.6.2.6.2 Test Requirements

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.7 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is not used

A.5.6.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.7.1-1, A.5.6.2.7.1-2, and A.5.6.2.7.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.7.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #13 as defined in Table A.5.6.2.7.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.7.1-1.

Table A.5.6.2.7.1-1: EN-DC event triggered reporting tests with SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell					
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD	120 kHz SSB SCS,					
	duplex mode	100 MHz bandwidth, TDD					
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD	duplex mode					
	duplex mode						
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD						
	duplex mode						
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD						
	duplex mode						
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD						
	duplex mode						
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD						
	duplex mode						
Note: The U	Note: The UE is only required to be tested in one of the supported test configurations						

Table A.5.6.2.7.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Value		Comment		
		configurati on	Test 1	Test 2			
E-UTRA RF Channel		Config		1	One E-UTRAN TDD carrier		
Number		1,2,3,4,5,6			frequency is used.		
NR RF Channel Number		Config 1,2,3,4,5,6	1,	, 2	One FR1 and one FR2 NR carrier frequency is used.		
Active cell		Config 1,2,3,4,5,6	LTE Cell 1 (PCell) and NR cell 2 (PScell)				LTE Cell 1 is on E-UTRA RF channel number 1. NR Cell 2 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3,4,5,6	NR cell 3		NR cell 3		NR cell 3 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3,4,5,6	0	13	As specified in clause 9.1.2-1.		
Measurement gap offset		Config 1,2,3,4,5,6	39	39			
SMTC-SSB parameters on NR RF Channel 1		Config 1,4	SSB.1 FR1		As specified in clause A.3.10.1		
		Config 2,5	SSB.1 FR1		As specified in clause A.3.10.1		
		Config 3,6	SSB.2 FR1		As specified in clause A.3.10.1		
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3,4,5,6	SSB.3 FR2		As specified in clause A.3.10.2		
CSI-RS for tracking		Config 1,4	TRS.1.1 FDD				
		Config 2,5	TRS.1.1 TDD				
		Config 3,6	TRS.1.2 TDD				
offsetMO	dB	Config 1,2,3,4,5,6	6				

Hysteresis	dB	Config 1,2,3,4,5,6	0		
a4-Threshold	dBm	Config 1,2,3,4,5,6	-105		
CP length		Config 1,2,3,4,5,6	Normal		
TimeToTrigger	s	Config 1,2,3,4,5,6	0		
Filter coefficient		Config 1,2,3,4,5,6	0		L3 filtering is not used
DRX		Config 1,2,3,4,5,6	OFF		DRX is not used
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs		Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4	3ms		Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	3μs		Synchronous cells.
T1	S	Config 1,2,3,4,5,6	5		
T2	S	Config 1,2,3,4,5,6	7 for PC1; 4.5 for other PC	7 for PC1; 4.5 for other PC	

Table A.5.6.2.7.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	Cell 2			Cell 3
		configuratio	T1	T2	T1	T2
		n				L
AoA setup		Config	N	I/A		s specified in
No.		1,2,3,4,5,6				se A.3.15
Assumption for UE beams ^{Note}		Config	N	l/A	F	lough
		1,2,3,4,5,6				
NR RF Channel Number		Config		1		2
		1,2,3,4,5,6				
Duplex mode		Config 1,4		DD		TDD
		Config	TI	DD		TDD
		2,3,5,6				
BWchannel	MHz	Config 1,4		$_{\rm B,c} = 52$	100: N _{RB,c} = 66	
		Config 2,5	10: $N_{RB,c} = 52$		100: $N_{RB,c} = 66$	
		Config 3,6	40: Nre	s,c = 106	100:	$N_{RB,c} = 66$
BWP BW	MHz	Config 1,4	10: N _R	$_{\rm B,c} = 52$	100: N _{RB,c} = 66	
		Config 2,5	10: N _R	$_{\rm B,c} = 52$	100: N _{RB,c} = 66	
		Config 3,6	40: Nre	э,c = 106	100:	$N_{RB,c} = 66$
Data RBs allocated		Config 1,4	5	52		66
		Config 2,5	5	52		66
		Config 3,6	1	06		66
OCNG Patterns defined in		Config	Ol	P.1	OP.1	
A.3.2.1.1 (OP.1)		1,2,3,4,5,6				
PDSCH Reference		Config 1,4	SR.1.	1 FDD		-
measurement channel		Config 2,5	SR.1.	1 TDD		
		Config 3,6	SR2.1 TDD			
RMSI CORESET Reference		Config 1,4	CR.1.	CR.1.1 FDD		-
Channel		Config 2,5	CR.1.	1 TDD		
		Config 3,6	CR2.	1 TDD		

D !' / LOODEOFT	1	0 " 1 1	000 44 500		
Dedicated CORESET Reference Channel		Config 1,4	CCR.1.1 FDD		-
		Config 2,5	CCR.1.1 TDD		
		Config 3,6	CCR.2.1 TDD		
TDD configuration		Config 2,5	TDDConf.1.1	TDD	Conf.3.1
		Config 3,6	TDDConf.2.1	TDD	Conf.3.1
Initial DL BWP		Config 1,2,3,4,5,6	DLBWP.0.1		NA
Initial UL BWP		Config 1,2,3,4,5,6	ULBWP.0.1		NA
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBWP.1.1		NA
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBWP.1.1		NA
SMTC configuration defined in A.3.11		Config 1,4	SMTC.2	SM	/ITC.2
		Config 2,3,5,6	SMTC.1	SM	/ITC.1
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2,4,5	15		120
		Config 3,6	30		120
EPRE ratio of PSS to SSS		Config 1,2,3,4,5,6	0		0
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to					
OCNG DMRS (Note 1) Ês	dBm/S CS	Config 1,2,3,4,5,6		-Infinity	-87
SSB_RP Note 3	dBm/S CS Note5	Config 1,2,3,4,5,6		-Infinity	-87
\hat{E}_{s}/I_{ot} BB Note 8	dB	Config 1,2,3,4,5,6	Link only, see clause A.3.7A	-Infinity	14.69
Io ^{Note3}	dBm/95 .04 MHz Note5	Config 1,2,3,4,5,6	7.3.76	-Infinity	-58.01
Propagation Condition	140160	Config 1,2,3,4,5,6		A	WGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Void
Note 3:	SS-RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Void
Note 5:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
Note 6:	As observed with 0dBi gain antenna at the centre of the quiet zone
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 8:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the
	associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for
	UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

A.5.6.2.7.2 Test Requirements

In test 1 with per-UE gap and in test 2 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.2.8 EN-DC event triggered reporting tests for FR2 cell with SSB time index detection when DRX is used

A.5.6.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the EN-DC inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are three cells: LTE cell 1 as PCell on E-UTRA RF channel 1, NR cell 2 as PSCell in FR1 on NR RF channel 1 and NR cell 3 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.5.6.2.8.1-1, A.5.6.2.8.1-2, and A.5.6.2.8.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.5.6.2.8.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #13 as defined in Table A.5.6.2.8.1-2 is provided for UE that support per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 3.

The configuration of LTE cell 1 is defined in table A.3.7.2.1-1. Supported test configurations are shown in table A.5.6.2.8.1-1.

Table A.5.6.2.8.1-1: EN-DC event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD	120 kHz SSB SCS,
	duplex mode	100 MHz bandwidth, TDD
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD	duplex mode
	duplex mode	
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD	
	duplex mode	
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD	
	duplex mode	
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD	
	duplex mode	
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD	
	duplex mode	
Note: The UI	E is only required to be tested in one of the supported test configura-	tions

Table A.5.6.2.8.1-2: General test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test		Value			Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
E-UTRA RF Channel		Config		•	1		One E-UTRAN TDD carrier
Number		1,2,3,4,5,6					frequency is used.
NR RF Channel		Config		1,	2		One FR1 and one FR2 NR carrier
Number		1,2,3,4,5,6					frequency is used.
Active cell		Config	LTE C	ell 1 (PC	Cell) and	l NR	LTE Cell 1 is on E-UTRA RF
		1,2,3,4,5,6	cell 2 ((PScell)			channel number 1.
							NR Cell 2 is on NR RF channel
							number 1.
Neighbour cell		Config	NR ce	II 3			NR cell 3 is on NR RF channel
		1,2,3,4,5,6					number 2.
Gap Pattern Id		Config	0		13		As specified in clause 9.1.2-1.
		1,2,3,4,5,6					
Measurement gap		Config	39		39		
offset		1,2,3,4,5,6					
SMTC-SSB parameters		Config 1,4	SSB.1	FR1			As specified in clause A.3.10.1
on NR RF Channel 1							
		Config 2,5	SSB.1	FR1			As specified in clause A.3.10.1
		Config 3,6	SSB.2	FR1			As specified in clause A.3.10.1
SMTC-SSB parameters		Config	SSB.3	FR2			As specified in clause A.3.10.2
on NR RF Channel 2		1,2,3,4,5,6					·
CSI-RS for tracking		Config 1,4	TRS.1	.1 FDD			
		Config 2,5	TRS.1	.1 TDD			
		Config 3,6	TRS.1	.2 TDD			
offsetMO	dB	Config	6				
		1,2,3,4,5,6					
Hysteresis	dB	Config	0				
		1,2,3,4,5,6	<u> </u>				
a4-Threshold	dBm	Config	-105				
		1,2,3,4,5,6	<u> </u>				
CP length		Config	Norma	al			
		1,2,3,4,5,6					

TimeToTrigger	S	Config 1,2,3,4,5,6	0				
Filter coefficient		Config 1,2,3,4,5,6	0				L3 filtering is not used
DRX		Config 1,2,3,4,5,6	DRX .1	DRX .7	DRX .1	DRX .7	As specified in clause A.3.3
Time offset between PCell and PSCell		Config 1,2,3,4,5,6	3 μs				Synchronous EN-DC
Time offset between serving and neighbour cells		Config 1,4	3ms				Asynchronous cells. The timing of Cell 3 is 3ms later than the timing of Cell 2.
		Config 2,3,5,6	Зµѕ				Synchronous cells.
T1	s	Config 1,2,3,4,5,6	5				
T2	S	Config 1,2,3,4,5,6	for PC1; 6.5 for othe r PC	for PC1; 67 for othe r PC	for PC1; 6.5 for othe r PC	for PC1; 67 for other PC	

Table A.5.6.2.8.1-3: Cell specific test parameters for EN-DC inter-frequency event triggered reporting with SSB time index detection

Parameter	Unit	Test	C	ell 2	C	Cell 3		
		configuratio	T1	T1 T2		T2		
		n		1				
AoA setup		Config	ı	N/A		s specified in		
Note:		1,2,3,4,5,6		.,,		se A.3.15		
Assumption for UE beams ^{Note}		Config	ı	N/A	R	ough		
l NB BE OL		1,2,3,4,5,6						
NR RF Channel Number		Config		1		2		
<u> </u>		1,2,3,4,5,6						
Duplex mode		Config 1,4		DD		TDD		
		Config	Т	DD		TDD		
		2,3,5,6						
BW _{channel}	MHz	Config 1,4		RB,c = 52	-	V _{RB,c} = 66		
		Config 2,5		RB,c = 52	-	V _{RB,c} = 66		
		Config 3,6		B,c = 106		$N_{RB,c} = 66$		
BWP BW	MHz	Config 1,4	10: $N_{RB,c} = 52$			$N_{RB,c} = 66$		
		Config 2,5		RB,c = 52		$N_{RB,c} = 66$		
		Config 3,6		$_{\rm B,c} = 106$	100: I	$N_{RB,c} = 66$		
Data RBs allocated		Config 1,4		52		66		
		Config 2,5		52		66		
		Config 3,6	1	06		66		
OCNG Patterns defined in		Config	0	P.1	(OP.1		
A.3.2.1.1 (OP.1)		1,2,3,4,5,6						
PDSCH Reference		Config 1,4	SR.1	.1 FDD		-		
measurement channel		Config 2,5	SR.1	.1 TDD				
		Config 3,6	SR2.	SR2.1 TDD				
RMSI CORESET Reference		Config 1,4	CR.1	.1 FDD		-		
Channel		Config 2,5	CR.1.1 TDD CR2.1 TDD					
		Config 3,6						
Dedicated CORESET Reference Channel		Config 1,4	CCR.	CCR.1.1 FDD		-		

		Config 2,5	CCR.1.1 TDD		
		Config 3,6	CCR.2.1 TDD		
TDD configuration		Config 2,5	TDDConf.1.1	TDD	Conf.3.1
		Config 3,6	TDDConf.2.1	TDD	Conf.3.1
Initial DL BWP		Config 1,2,3,4,5,6	DLBWP.0.1		NA
Initial UL BWP		Config 1,2,3,4,5,6	ULBWP.0.1		NA
Dedicated DL BWP		Config 1,2,3,4,5,6	DLBWP.1.1		NA
Dedicated UL BWP		Config 1,2,3,4,5,6	ULBWP.1.1		NA
SMTC configuration defined in A.3.11		Config 1,4	SMTC.2	SI	MTC.2
		Config 2,3,5,6	SMTC.1	SI	MTC.1
PDSCH/PDCCH subcarrier spacing	kHz	Config 1,2,4,5	15		120
		Config 3,6	30		120
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2,3,4,5,6	0		0
EPRE ratio of PDSCH DMRS to SSS		1,=,=,1,1,=,=			
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
N oc Note2	dBm/15 kHz			_^	104.7
N_{oc}^{Note2}	Note5 dBm/S	Config		_	95.7
1 oc	CS	1,2,4,5			
OOD DD Note 2	Note4	Config 3,6			95.7
SSB_RP Note 3	dBm/S CS	Config 1,2,4,5	N/A	-Infinity	-86.7
	Note5	Config 3,6	Link only, see clause	-Infinity	-86.7
Ê _s /I _{ot}	dB	Config 1,2,3,4,5,6	A.3.7A	-Infinity	9
\hat{E}_s/N_{oc}	dB	Config 1,2,3,4,5,6		-Infinity	9
Io ^{Note3}	dBm/9. 36MHz	Config 1,2,4,5		-	-
	dBm/38 .16MHz	Config 3,6		-	-

		dBm/95	Config		-66.7	-57.2
			5		-00.7	-51.2
		.04	1,2,3,4,5,6			
		MHz				
		Note5				
Propagati	ion Condition		Config		A'	WGN
			1,2,3,4,5,6			
Note 1:	OCNG shall be used	such that b	oth cells are full	y allocated and a constan	t total trans	mitted power
	spectral density is ac	hieved for a	all OFDM symbo	ols.		
Note 2:	Interference from oth	er cells and	noise sources	not specified in the test is	assumed to	be constant
				as AWGN of appropriate		
				. ac / C c. app. opa.c	pooo. ,	oc 10 DO
	fulfilled.					
Note 3:	SSB_RP and lo level	s have bee	n derived from o	other parameters for inforr	nation purp	oses. They
	are not settable para	meters thei	nselves.	•		•
Note 4:	•			ssuming independent inte	rference an	d noise at
14010 4.	-	•	s are specified a	ssumming independent inte	incremee an	a noise at
	each receiver antenn	•		151 1		
Note 5:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone					
Note 6:	As observed with 0dl	Bi gain ante	enna at the centr	e of the quiet zone		

A.5.6.2.8.2 Test Requirements

Note 7:

In test 1 with per-UE gap and in test 3 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or

10080 for UE supporting power class 1, or

test system implementation

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 with per-FR gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.5.6.3 L1-RSRP measurement for beam reporting

A.5.6.3.1 SSB based L1-RSRP measurement when DRX is not used

A.5.6.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.5.6.3.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.5.6.3.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

Config	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note: The l	JE is only required to be tested in one of the supported test configurations

A.5.6.3.1.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR2 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.1.2-1 and Table A.5.6.3.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.5.6.3.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~4		freq1
Duplex mode	1~4		TDD
TDD Configuration	1~4		TDDConf.3.1
BW _{channel}	1~4	MHz	100: N _{RB,c} = 66
Data RBs allocated	1~4		66
PDSCH Reference	1,2		SR.3.2 TDD
measurement channel	3,4		SR.3.3 TDD
RMSI CORESET Reference	1,2		CR.3.1 TDD
Channel	3,4		CR.3.2 TDD
Dedicated CORESET	1~4		CCR.3.1 TDD
Reference Channel	3,4		CCR.3.7 TDD
CCD configuration	1,2		SSB.1 FR2
SSB configuration	3,4		SSB.2 FR2
OCNG Patterns	1~4		OP.1
Initial BWP Configuration	1~4		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~4		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1~4		SMTC.1
TRS Configuration	1~4		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~4		TCI.State.2
DRX configuration	1~4		Off
reportConfigType	1~4		periodic
reportQuantity	1~4		ssb-Index-RSRP
Number of reported RS	1~4		2
L1-RSRP reporting period	1~4	slot	320
T1	1~4	S	5
T2	1~4	S	2
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS	1~4	dB	0

EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG			
DMRS Note 1			
Propagation condition	1~4		AWGN
Note 1: OCNG shall be used such that both cells are fully allocated and a			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.5.6.3.1.2-2: SSB specific test parameters

Parameter	Config	Unit	SS	B#0	SSI	3#1
Parameter	Config Unit	Unit	T1	T2	T1	T2
Angle of arrival configuration			Set	up 1 accord	ling to A.3.	15.1
Assumption for UE beams ^{Note 4}	1~4			Ro	ugh	
$N_{oc}^{ m Note2}$	1~4	dBm/15kHz		-1	05	
A7 Note2	1,2	dDm/CCD CCC		-9	96	
$N_{oc}^{ m Note2}$	3,4	3,4 dBm/SSB SCS -93				
\hat{E}_{s}/I_{ot}	1~4	dB	0	0	-Infinity	9
SSB_RP Note3	1,2	dBm/SSB SCS	-96	-96	-Infinity	-87
	3,4		-93	-93	-Infinity	-84
Io Note3	1,2	- dBm/95.04MHz	-63.97	-63.97	-66.98	-57.47
	3,4	GDIII/93.04IVIIIZ	-63.97	-63.97	-66.98	-57.47
\hat{E}_s/N_{oc}	1~4	dB	0	0	-Infinity	9

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for

 N_{oc} to be fulfilled.

Note 3: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.5.6.3.1.3 Test Requirements

A.5.6.3.1.3 Test Requirements

The UE shall send L1-RSRP report every 320 slots. No later than X ms plus 320 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 1680 for UE supporting power class 1
- 1200 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.6.3.2 SSB based L1-RSRP measurement when DRX is used

A.5.6.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.5.6.3.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.5.6.3.2.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

Config Description		
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
3	LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
4	LTE TDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note: The UE is only required to be tested in one of the supported test configurations		

A.5.6.3.2.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR2 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.2.2-1 and Table A.5.6.3.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.5.6.3.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~4		freq1
Duplex mode	1~4		TDD
TDD Configuration	1~4		TDDConf.3.1
BW _{channel}	1~4	MHz	100: N _{RB,c} = 66
Data RBs allocated	1~4		66
PDSCH Reference	1,2		SR.3.2 TDD
measurement channel	3,4		SR.3.3 TDD
RMSI CORESET Reference	1,2		CR.3.1 TDD
Channel	3,4		CR.3.2 TDD
Dedicated CORESET	1,2		CCR.3.1 TDD
Reference Channel	3,4		CCR.3.7 TDD

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.5.6.3.2.2-2: SSB specific test parameters

Parameter	Config	Unit	SS	B#0	SSI	3#1
Parameter	Config	Unit	T1	T2	T1	T2
Angle of arrival configuration			Set	up 1 accord	ding to A.3.	15.1
Assumption for UE beams ^{Note 4}	1~4			Ro	ugh	
N_{oc} Note2	1~4	dBm/15kHz	-105			
Ŋ Note2	1,2	dBm/SSB SCS		-(96	
$N_{oc}^{ m Note2}$	3,4	UBIII/33B 3C3	-93			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~4	dB	0	0	-Infinity	9
SSB_RP Note3	1,2	dBm/SSB SCS	-96	-96	-Infinity	-87
OOD_IXI	3,4		-93	-93	-Infinity	-84
Io Note3	1,2	ID (0-044)	-63.97	-63.97	-66.98	-57.4
10 1000	3,4	dBm/95.04MHz	-63.97	-63.97	-66.98	-57.4
\hat{E}_s/N_{oc}	1~4	dB	0	0	-Infinity	9

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for
	N_{oc} to be fulfilled.
Note 3:	SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.5.6.3.2.3 Test Requirements

The UE shall send L1-RSRP report every 320 slots. No later than X ms plus 320 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 2880 for UE supporting power class 1
- 1920 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.6.3.3 CSI-RS based L1-RSRP measurement when DRX is not used

A.5.6.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.5.6.3.3.1-1.

Table A.5.6.3.3.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

	Config	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

A.5.6.3.3.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.3.2-1 and Table A.5.6.3.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 480ms from the beginning of the test, the DCI trigger comes in slot 1 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.5.6.3.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.5.6.3.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
BW _{channel}	1~2	MHz	100: N _{RB,c} = 66
Data RBs allocated	1~2		66
PDSCH Reference measurement channel	1~2		SR.3.3 TDD
RMSI CORESET Reference Channel	1~2		CR.3.2 TDD
Dedicated CORESET Reference Channel	1~2		CCR.3.7 TDD
SSB configuration	1~2		SSB.1 FR2
CSI-RS configuration	1~2		CSI-RS.3.3 TDD
OCNG Patterns	1~2		OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~2		SMTC.1
TRS Configuration	1~2		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2
DRX configuration	1~2		Off
reportConfigType	1~2		aperiodic
reportQuantity	1~2		cri-RSRP
Number of reported RS	1~2		2
qcl-Info	1~2		SSB#0 for resource#0 SSB#1 for resource#1
reportSlotOffsetList	1~2		8
Propagation condition	1~2		AWGN
T1	1~2	s	5
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH			
DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1	1~2	dB	0

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.5.6.3.3.2-1: CSI-RS specific test parameters

Parameter Confi	y Unit	CSI-RS#0	CSI-RS#1	
-----------------	--------	----------	----------	--

Angle of arrival configuration	1~2		Setup 1 according to A.3.15.1		
Assumption for UE beams ^{Note 4}	1~2		Rough		
$N_{oc}^{ m Note1}$	1~2	dBm/15kHz	-105		
$N_{oc}^{ m Note1}$	1~2	dBm/SSB SCS	-95.97		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~2	dB	0	9	
CSI-RS RSRP Note2	1~2	dBm/SSB SCS	-95.97	-86.97	
lo Note2	1~2	dBm/95.04MHz	-63.97	-57.47	
\hat{E}_s/N_{oc}	1~2	dB	0	9	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for

 N_{oc} to be fulfilled.

Note 3: CSI-RS RSRP and lo levels have been derived from other parameters for information

purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation

A.5.6.3.3.3 Test Requirements

After 480ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1. The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

For absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1, the UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.6.3.3.3-1.

For relative accuracy of CSI-RS0 compared with CSI-RS1, the UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.5.6.3.3.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes 1,2,3		
CSI-RS0		CSI-RS _RP0 - δ + G _{min} \leq Reported RSRP(dBm) \leq CSI-RS _RP0 + δ + G _{max}		
	CSI-RS1	CSI-RS _RP1 - δ + G _{min} \leq Reported RSRP(dBm) \leq CSI-RS _RP1 + δ + G _{max}		
Note 1:	te 1: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration			
Note 2:	δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the lo used in the test			
Note 3:				

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.6.3.4 CSI-RS based L1-RSRP measurement when DRX is used

A.5.6.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.5.6.3.4.1-1.

Table A.5.6.3.4.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

	Config	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

A.5.6.3.4.2 Test parameters

There are two cells in the test, E-UTRAN PCell (Cell 1) and FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.6.3.4.2-1 and Table A.5.6.3.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 1440ms from the beginning of the test, the DCI trigger comes in slot 1 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.5.6.3.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.5.6.3.4.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
BWchannel	1~2	MHz	100: N _{RB,c} = 66
Data RBs allocated	1~2		66
PDSCH Reference measurement channel	1~2		SR.3.3 TDD
RMSI CORESET Reference Channel	1~2		CR.3.2 TDD
Dedicated CORESET Reference Channel	1~2		CCR.3.7 TDD
SSB configuration	1~2		SSB.1 FR2
CSI-RS configuration	1~2		CSI-RS.3.3 TDD
OCNG Patterns	1~2		OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~2		SMTC.1
TRS Configuration	1~2		TRS.2.1 TDD

PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2
DRX configuration	1~2		DRX.3
reportConfigType	1~2		aperiodic
reportQuantity	1~2		cri-RSRP
Number of reported RS	1~2		2
gcl-Info	1~2		SSB#0 for resource#0
qci-iiilo	1~2		SSB#1 for resource#1
reportSlotOffsetList	1~2		8
Propagation condition	1~2		AWGN
T1	1~2	S	5
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS			
EPRE ratio of PDSCH DMRS to SSS	1~2	dB	0
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSSNote 1			
EPRE ratio of OCNG to OCNG			
DMRS Note 1			
Note 1: OCNG shall be used such that both cells are fully allocated and a			

Table A.5.6.3.4.2-1: CSI-RS specific test parameters

OFDM symbols.

constant total transmitted power spectral density is achieved for all

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1	
Angle of arrival configuration	1~2		Setup 1 according to A.3.15.1		
Assumption for UE beams ^{Note 4}	1~2		Rough		
$N_{_{\! oc}}$ Note1	1~2	dBm/15kHz	-105		
$N_{oc}^{}$ Note1	1~2	dBm/SSB SCS	-95.97		
\hat{E}_{s}/I_{ot}	1~2	dB	0 9		
CSI-RS RSRP Note2	1~2	dBm/SSB SCS	-95.97	-86.97	
lo ^{Note2}	1~2	dBm/95.04MHz	-63.97	-57.47	
\hat{E}_s/N_{oc}	1~2	dB	0	9	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: CSI-RS RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.5.6.3.4.3 Test Requirements

After1440ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1.

For absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1, the UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.6.3.4.3-1.

For relative accuracy of CSI-RS0 compared with CSI-RS1, the UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.5.6.3.4.3-1: L1-RSRP absolute accuracy test requirement

	Test requirement Notes 1,2,3		
CSI-RS0		CSI-RS _RP0 - δ + G _{min} \leq Reported RSRP(dBm) \leq CSI-RS _RP0 + δ + G _{max}	
CSI-RS1		CSI-RS _RP1 - δ + G _{min} \leq Reported RSRP(dBm) \leq CSI-RS _RP1 + δ + G _{max}	
Note 1:	te 1: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration		
Note 2:	Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the lo used in the test		
Note 3:			

The rate of correct events observed during repeated tests shall be at least 90%.

A.5.7 Measurement Performance requirements

Unless explicitly stated otherwise:

- Reported measurements shall be within defined range of accuracy limits defined in Clause 10 for at least 90 % of the reported cases. If multiple measurement performance requirements are verified in the same test, the reported measurements for each requirement shall be within defined range of accuracy limits of the corresponding requirement defined in Clause 10 for at least 90% of the reported cases.
- Measurements are performed in RRC_CONNECTED state.
- The reference channels assume transmission of PDSCH with a maximum number of 5 HARQ transmissions unless otherwise specified.

A.5.7.1 SS-RSRP

A.5.7.1.1 EN-DC intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.5.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.3.1.1 and 10.1.3.1.2 for intra-frequency measurements.

A.5.7.1.1.2 Test parameters

In this set of test cases, all NR cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in Table A.5.7.1.1.2-2 and A.5.7.1.1.2-3. The E-UTRA PCell is configured as specified in clause A.3.7.2.2. In all test cases, Cell 1 is the PCell, cell 2 is the PSCell and Cell 3 is the target cell. The test consists of two time phases T1 and T2.

Table A.5.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Co	nfiguration	Description
1		FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to pass in one of the supported test configurations

Table A.5.7.1.1.2-2: SS-RSRP Intra frequency general test parameters

Parameter ^{Note 5}		Unit	Т	T1		T2	
		Onit	Cell 2	Cell 3	Cell 2	Cell 3	
Physical cell ID			489	489 0		0	
SSB ARFCN			fre	•	freq1		
Duplex mode				DD		DD	
TDD configuration			TDDC		TDDC		
BW _{channel}		MHz	100: N _F	$R_{B,c} = 66$	100: N _R	$_{B,c} = 66$	
Data RBs allocated			2	4	_	4	
	Initial DL BWP				VP.0.1		
BWP configuration	Dedicated DL BWP				VP.1.1		
	Initial UL BWP				VP.0.1		
	Dedicated UL BWP			ULBV	VP.1.1		
TRS configuration			TRS.2.		TRS.2.		
TKS configuration			1 TDD	-	1 TDD	-	
TCI state			TCI.Sta	_	TCI.Sta	_	
101 State			te.0	_	te.0	-	
PDSCH Reference m	easurement channel		SR.3.2	_	SR.3.2	_	
1 DOOT Reference in	leasurement channel		TDD	_	TDD	_	
			CR.3.1		CR.3.1		
RMSI CORESET Ref	erence Channel		TDD	-	TDD	-	
			CCR.3.		CCR.3.		
Dedicated CORESE	Reference Channel		1 TDD	-	1 TDD	-	
OCNG Patterns			000	00.0	00.0	000	
OCNG Patterns			OP.3 SSB.3	OP.3 SSB.3	OP.3 SSB.3	OP.3 SSB.3	
SSB configuration			FR2	FR2	FR2	FR2	
-			SMTC.	SMTC.	SMTC.	SMTC.	
SMTC configuration			1 SWITC.	3W1C.	1 SWITC.	3W1C.	
Time offset with Cell	2	μS	- '	3	_	3	
PDSCH/PDCCH sub		μο kHz	120	120	120	120	
EPRE ratio of PSS to SSS		IXI IZ	120	120	120	120	
EPRE ratio of PBCH_DMRS to SSS							
EPRE ratio of PBCH to PBCH_DMRS							
EPRE ratio of PDCCH_DMRS to SSS							
EPRE ratio of PDCCH to PDCCH_DMRS		dB	0	0	0	0	
EPRE ratio of PDSCH_DMRS to SSS							
EPRE ratio of PDSCH to PDSCH_DMRS							
EPRE ratio of OCNG							
	2				<u> </u>		

EPRE ratio of OCNG to OCNG DMRS Note		
Propagation conditions	AWGN AWGN	
Antenna configuration	1x2 1x2 1x2 1x2	2

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total

transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Note 5: All parameters apply for configuration 1 and 2

Note 6: Void

Table A.5.7.1.1.2-3: SS-RSRP Intra frequency OTA related test parameters

Dovemeter	l lmi4	Т	1	T2		
Parameter	Unit	Cell 2 Cell 3		Cell 2	Cell 3	
Angle of arrival configuration		Setup 1 according to clause A.3.15.1				
Assumption for UE beams ^{Note 8}			Ro	ugh		
$N_{oc}^{}$ Note1	dBm/15kH z ^{Note4}	- 9	1.6	N	/A	
$N_{oc}^{}$ Note1	dBm/SCS Note4	-82	2.6	N	I/A	
\hat{E}_s/N_{oc}	dB	6.0	1.0	N/A	N/A	
Es	dBm/SCS Note4	-76.6	-81.6	(Table B.2.2-2 Rx Beam Peak +2.1dB)	(Table B.2.2-2 Rx Beam Peak +2.1dB)	
SSB_RPNote2	dBm/SCS	-76.6	-81.6	(Table B.2.2-2 Rx Beam Peak +2.1dB)	(Table B.2.2-2 Rx Beam Peak +2.1dB)	
$\hat{E}_{_{\! S}}/I_{_{\! m ot}{}_{\! m BB}}$ Note6	dB	2.44	-5.98	-5.98	-5.98	
Io ^{Note2}	dBm/95.04 MHz ^{Note4}	-60.06				

Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled

Note 2: SSB_RP, Es/lot, Es in test 1 and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: Void

Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 5: Void

Note 6: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor Δ MB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

Note 7: All parameters apply for configurations 1 and 2

Note 8: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.5.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.3.1.1 and relative accuracy requirements in clause 10.1.3.1.2. The following requirements are to be verified:

During T1:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.5.7.1.1.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

During T2:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.5.7.1.1.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

During T1 and T2:

Relative accuracy of Cell 2 during T2 compared with Cell 2 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1

Relative accuracy of Cell 3 during T2 compared with Cell 3 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

Table A.5.7.1.1.3-1: SS-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3	
	Cell 2	SSB_RP2 - δ +G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP2 + δ +G _{max}	
	Cell 3	SSB_RP3 - δ +G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP3 + δ +G _{max}	
Note 1:	1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration		
Note 2:	ote 2: δ is the RSRP absolute accuracy requirement from Table 10.1.3.1.1-1, selected according to the lo used in the test		
Note 3:	Note 3: G _{min} and G _{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class		

A.5.7.1.2 EN-DC inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.5.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.5.1.1 and 10.1.5.1.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.5.7.1.2.1-1.

Table A.5.7.1.2.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Configuration	Description
---------------	-------------

1	FDD LTE PCell, cells 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex
	mode
2	TDD LTE PCell, cells 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3	FDD LTE PCell, cells 2&3 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4	TDD LTE PCell, cells 2&3 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

A.5.7.1.2.2 Test parameters

In this set of test cases, there are three cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.7.1.2.2-1 and Table A.5.7.1.2.2-2 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.5.7.1.2.2-1 and Table A.5.7.1.2.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.5.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter	Confin	Unit	Tes	Test 1		Test 2	
	Config	Unit	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN	1~4		freq1	freq2	freq1	freq2	
BW _{channel}	1~4		100: 100: N _{RB,c} = 66 N _{RB,c} = 66				
Data RBs allocated	1,2			4		4	
Data NDS allocated	3,4		4	8	4	8	
Duplex mode	1~4		TE	DD	TE	DD	
TDD configuration	1~4		TDDC	onf.3.1	TDDC	onf.3.1	
PDSCH Reference	1,2		SR.3.2 TDD		SR.3.2 TDD		
measurement channel	3,4		SR.3.3 TDD	-	SR.3.3 TDD	•	
RMSI CORESET	1,2		CR.3.1 TDD		CR.3.1 TDD		
Reference Channel	3,4		CR.3.2 TDD	-	CR.3.2 TDD	-	
Dedicated CORESET	1,2		CCR.3.1 TDD		CCR.3.1 TDD		
Reference Channel	3,4		CCR.3.7 TDD	-	CCR.3.7 TDD	-	
SSB configuration	1,2		SSB.3 FR2		SSB.3 FR2		
	3,4		SSB.4 FR2		SSB.4 FR2		
PDSCH/PDCCH subcarrier spacing	1~4	kHz	12	20	120		
OCNG Patterns	1~4		OF	P.3	OP.3		
Initial BWP Configuration	1~4		DLBW ULBW	/P.0.1 /P.0.1	DLBWP.0.1 ULBWP.0.1		
Dedicated BWP configuration	1~4			/P.1.3 /P.1.3	DLBWP.1.3 ULBWP.1.3		
TRS Configuration	1~4			.1 TDD		.1 TDD	
PDCCH/PDSCH TCI Configuration	1~4		TCI.S	tate.2	TCI.State.2		
SMTC configuration	1~4		SMTC.1		SMTC.1		
Time offset between Cell 2 and Cell 3	1~4	μs	3			3	
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS	1~4	dB	0	0	0	0	

EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS						
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH DMRS						
EPRE ratio of OCNG DMRS to SSS ^{Note 1}						
EPRE ratio of OCNG to OCNG DMRS Note 1						
Propagation condition	1~4	-	AWGN	AWGN	AWGN	AWGN
Antenna configuration	1~4	-	1x2	1x2	1x2	1x2

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Table A.5.7.1.2.2-2: SS-RSRP inter-frequency OTA related test parameters

Parameter	Confin	Unit	Tes	Test 1		st 2
Parameter	Config	Onit	Cell 2	Cell 3	Cell 2	Cell 3
				ccording to	Setup 4b according to	
Angle of arrival configuration				.3.15.4.2		.3.15.4.2
	1~4		AoA1	AoA2	AoA1	AoA2
comiguration			Spherical	Rx Beam	Spherical	Rx Beam
			coverage	Peak	coverage	Peak
Assumption for UE beams ^{Note 7}	1~4		Ro	ugh	Ro	ugh
	1, 2		-90.6	-90.6	(Table	(Table
λ/	., _	dBm/15kH	00.0	00.0	B.2.3-2 Rx Beam	B.2.3-2 Rx Beam
N_{oc} Note1		z ^{Note4}			Peak ^{Note 8}	Peak ^{Note 8}
00	3, 4		-93.7	-93.7	+1.97dB)	-3.03dB)
					(Table	(Table
	1, 2		-81.6 -81.6 -81.7 -81.7	-81.6	B.2.3-2	B.2.3-2
					Rx Beam	Rx Beam
	,			Peak ^{Note 8}	Peak ^{Note 8}	
λ7		dBm/SCS			+11.0dB)	+6.0dB)
$N_{_{\!oc}}$ Note1	3, 4	Note4		-81.7	(Table	(Table
					B.2.3-2	B.2.3-2
					Rx Beam	Rx Beam
					Peak ^{Note 8}	Peak ^{Note 8}
					+14.0dB)	+9.0dB)
\hat{E}_{s}/N_{oc}	1~4	dB	6.0	6.0	17.0	-1.0
					(Table	(Table
					B.2.3-2	B.2. 3-2
	1, 2		-75.6	-75.6	Rx Beam	Rx Beam
					Peak ^{Note 8}	Peak ^{Note 8}
SSB_RPNote2		dBm/SCS			+28.0dB)	+5.0dB)
33 <u>5_</u> 1(1					(Table	(Table
	2.4		75.7	75.7	B.2.3-2	B.2. 3-2
	3, 4		-75.7	-75.7	Rx Beam Peak ^{Note 8}	Rx Beam Peak ^{Note 8}
(SSB_RP _{Cell 2} -					+31.0dB) +8.0dB)	
SSB_RP _{Cell 3})	1~4	dB	(0	23	.00
005_iti (eii 3)		L	l .		l	

fr /t		1, 2		5.26	5.96		0.40
$\mathbf{L}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}^{\mathrm{BB}}}$	B ^{Note6}	3, 4	dB	4.61	5.91	9.53	-3.46
Io ^{Note2}		1, 2	dBm/95.04	-50.00	-50.00	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +52.68dB)	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +33.13dB)
		3, 4	MHz ^{Note4}	-50.09	-50.09	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +55.69dB)	(Table B.2.3-2 Rx Beam Peak ^{Note 8} +36.14dB)
(lOfreq 1 -	(IO _{freq 1} - IO _{freq 2}) 1~4				0		.55
Note 1:	is assu	used, interference med to be con opriate power P, Es/lot, lo, (istant over sub for N_{oc} to b	bcarriers and be fulfilled.	time and sha	ll be modelled	d as AWGN
Note 3:		erived from ot eters themselv		rs for informat	tion purposes	. They are no	t settable
Note 4:		ent power rec	eived by an a	ntenna with 0) dBi gain at tl	ne centre of th	ne quiet
Note 6:							
Note 7:	Informa implem	ation about typ entation or tes	es of UE bear st system impl	ementation			
Note 8:		The value in Table B.2.3-2 is the Minimum SSB_RP for SCS _{SSB} = 120 kHz, selected					

A.5.7.1.2.3 Test Requirements

adjustment.

The SS-RSRP measurement accuracy for Cell 2 and Cell 3 shall fulfil the absolute requirements in clause 10.1.5.1.1 and the relative requirements in clause 10.1.5.1.2.

according to the operating band of cell 3 and UE power class, without $\Delta MB_{P,n}$

Test 1:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.5.7.1.2.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.5.7.1.2.3-2.

Test 2:

Absolute accuracy of Cell 2 and absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.5.7.1.2.3-1.

Relative accuracy of Cell 3 compared with Cell 2. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.5.7.1.2.3-2.

Table A.5.7.1.2.3-1: SS-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3,4		
	Cell 2	SSB_RP2 -δ +G _{min} +X ≤ Reported RSRP(dBm) ≤ SSB_RP2 +δ +G _{max}		
	Cell 3	SSB_RP3 -δ +G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP3 +δ+G _{max}		
Note 1:	-	quivalent power received by an antenna with 0dBi gain at the centre of the quiet zone est for the cell n under consideration		
Note 2:	δ is the RSRP absolute accuracy requirement from Table 10.1.5.1.1-1, selected according to the lo used in the test			
Note 3:	G _{min} and G _{max} are t according to the UI	he minimum and maximum UE gain values from Table B.2.1.5.1-1, selected E power class		
Note 4:		coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) 19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating a negative value.		

Table A.5.7.1.2.3-2: SS-RSRP relative accuracy test requirement

		Test requirement Notes1,2,3,4, 5, 6				
С	ell 3 – Cell 2	SSB_RP3 - SSB_RP2 - δ - D - G _{inter} ≤ Reported RSRP(dB) ≤ SSB_RP3 - SSB_RP2 + δ + G _{inter} -(X)				
Note 1:		quivalent power received by an antenna with 0dBi gain at the centre of the quiet zone est for the cell n under consideration				
Note 2:	δ is the RSRP rela	tive accuracy requirement from Table 10.1.5.1.2-1				
Note 3:	Void					
Note 4:	: X is the Spherical coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value.					
Note 5:		e to mis-alignment between fine beam and rough beam. D is the Rough Beam gain am peak direction from Table B.2.1.5.3-1, selected according to the UE power class. ive value.				
Note 6:		due to different antenna gain caused by frequency separation. G _{inter} is from Table ed according to the UE power class, and is always a positive value.				

A.5.7.1.3 EN-DC inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

A.5.7.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 10.1.5.1.1 for inter-frequency measurements with the testing configurations in Table A.5.7.1.3.1-1.

Table A.5.7.1.3.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Config	Description of serving cell	Description of target cell
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz	
	bandwidth, FDD duplex mode	
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz	
	bandwidth, TDD duplex mode	120 kHz SSB SCS, 100 MHz
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz	bandwidth, TDD duplex mode
	bandwidth, TDD duplex mode	·
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz	
	bandwidth, FDD duplex mode	

5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note: The UE is only required to be tested in one of the supported test configurations						

A.5.7.1.3.2 Test parameters

In this set of test cases there are three cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2) and a FR2 neighbour cell (Cell 3) on a different frequency than the PSCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 and Cell 3 are given in Table A.5.7.1.3.2-1 and Table A.5.7.1.3.2-2 below. Absolute accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.5.7.1.3.2-1 and Table A.5.7.1.3.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.5.7.1.3.2-1: SS-RSRP inter-frequency test parameters

D	0 6	1114	Tes	st 1	Tes	st 2	
Parameter	Config	Unit	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN	1~6		freq1	freq2	freq1	freq2	
	1,4		10:		10:		
	1,4		$N_{RB,c} = 52$		$N_{RB,c} = 52$		
BW _{channel}	2,5	MHz	10:	100:	10:	100:	
			$N_{RB,c} = 52$	$N_{RB,c} = 66$	N _{RB,c} = 52 40:	$N_{RB,c} = 66$	
	3,6		N _{RB,c} = 106		N _{RB,c} = 106		
Data DDa allacated	1,2,4,5		52	0.4	52	00	
Data RBs allocated	3,6		106	24	106	66	
Gap pattern ID			(D .	()	
	1,4		FDD		FDD		
Duplex mode	2,5		TDD	TDD	TDD	TDD	
	3,6		TDD		TDD		
	1,4		N/A		N/A		
	2,5		TDDConf.	TDDConf.	TDDConf.	TDDConf. 3.1	
TDD configuration	2,5		1.1	3.1	1.1		
	3,6		TDDConf.	5.1	TDDConf.	0.1	
	· ·		2.1		2.1		
PDSCH Reference	1,4		SR.1.1 FDD		SR.1.1 FDD		
measurement channel	2,5		SR.1.1 TDD	-	SR.1.1 TDD	-	
	3,6		SR.2.1 FDD		SR.2.1 FDD		
RMSI CORESET	1,4		CR.1.1 FDD	-	CR.1.1 FDD	-	
Reference Channel	2,5		CR.1.1 TDD	-	CR.1.1 TDD	-	
	3,6		CR.2.1 FDD	-	CR.2.1 FDD	-	
Dedicated CORESET	1,4		CCR.1.1 FDD	-	CCR.1.1 FDD	-	
Reference Channel	2,5		CCR.1.1 TDD	-	CCR.1.1 TDD	-	
	3,6		CCR.2.1 TDD	-	CCR.2.1 TDD	-	
	1,4		SSB.1		SSB.1		
			FR1 SSB.1	CCD 2	FR1 SSB.1	CCD 2	
SSB configuration	2,5			SSB.3 FR2		SSB.3 FR2	
Ç			FR1 SSB.2	FR2	FR1 SSB.2	rrz.	
	3,6		FR1		FR1		
OCNG Patterns	1~6		OP.1	OP.3	OP.1	OP.1	
Initial BWP				VP.0.1	DLBW		
Configuration	1~6			VP.0.1	ULBW		
Dedicated BWP	4.0			VP.1.3	DLBW		
configuration	1~6			VP.1.3	ULBW		
TRS Configuration	1~6			.1 TDD		TRS.2.1 TDD	

PDCCH/PDSCH TCI Configuration	1~6		TCI.S	tate.2	TCI.State.2		
SMTC configuration	1~6		SMT	ΓC.1	SMTC.1		
Time offset between Cell 2 and Cell 3	1~6	μs	:	3	3	3	
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS							
EPRE ratio of PDCCH to PDCCH DMRS	1~6	dB	0	0	0	0	
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH DMRS							
EPRE ratio of OCNG DMRS to SSS ^{Note 1}							
EPRE ratio of OCNG to OCNG DMRS Note 1							
Propagation condition	1~6	-	NA	AWGN	NA	AWGN	
Antenna configuration	1~6	-	Link only, see clause A.3.7A	1x2	Link only, see clause A.3.7A	1x2	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total

transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Table A.5.7.1.3.2-2: SS-RSRP inter-frequency OTA related test parameters

Parameter	Config	Unit	Tes	st 1	Test 2	NOTE 3
Parameter	Config	Ullit	Cell 2	Cell 3	Cell 2	Cell 3
Angle of arrival configuration according to clause A.3.15			NA	Setup 2b	NA	Setup 2b
Assumption for UE beams ^{Note 4}			N/A	Rough	N/A	Rough
N_{oc}	1~6	dBm/15 kHz		-90		NA
N_{oc}	1~6	dBm/SS B SCS		-80.97		NA
\hat{E}_s/N_{oc}	1~6	dB		5	NA Link only, see clause	NA
Es	1~6	dBm/SC S	NA Link only, see clause			(Table B.2.3-2 Spheric al coverag e +1dB)
SSB_RPNote1	1~6	dBm/SC S	A.3.7A	-76.0	A.3.7A	(Table B.2.3-2 Spheric al coverag e +1dB)
$\hat{E}/I_{ m otbB}$ Note6	1~6	dB		4.35		-3.81

			dBm/				SSB_R
Io ^{Note1}		1~6	95.04M		-50.18		P+28.9
			Hz				8
Note 1:	Es/lot, SSB_RP and I	o levels ha	ive been de	rived from ot	her parame	ters for inforn	nation
	purposes. They are no	ot settable	parameters	themselves			
Note 2:	Void						
Note 3:	No additional noise is	added by	the test sys	tem in Test 2	2.		
Note 4:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.						
Note 5:	Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of						
	appropriate power for N_{oc} to be fulfilled.						
Note 6:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor Δ MB _S from TS 38.101-2 [19] Table 6.2.1.3-4.						

A.5.7.1.3.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 3 shall fulfil the Absolute requirement in clause 10.1.5.1.1.

Test 1:

Absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.5.7.1.3.3.

Test 2:

Absolute accuracy of Cell 3. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.5.7.1.3.3.

Table A.5.7.1.3.3: SS-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3,4		
	Cell 3	SSB_RP2 - δ +G _{min} +X ≤ Reported RSRP(dBm) ≤ SSB_RP2 + δ +G _{max}		
Note 1:	ote 1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zon configured in the test for the cell n under consideration			
Note 2:				
Note 3:				
Note 4:		coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) 19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating a negative value.		

A.5.7.2 SS-RSRQ

A.5.7.2.1 EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.8.1.1.

A.5.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.5.7.2.1.2-2 and Table A.5.7.2.1.2-3. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.5.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

Co	nfiguration	Description
1		FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to pass in one of the supported test configurations

Table A.5.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Parameter		l lmi4	Tes	Test 1		Test 2	
Pa	rameter	Unit	Cell 2	Cell 2 Cell 3		Cell 3	
SSB ARFCN			Free	Freq1		q1	
Duplex mode			TD	D	TDD		
TDD configuration			TDDCo	nf.3.1	TDDC	onf.3.1	
BW _{channel}		MHz	100: N _{RE}	$_{3,c} = 66$	100: N _R	$_{\rm B,c} = 66$	
Data RBs allocated	I		66		6	6	
	Initial DL BWP			DLB\	WP.0.1		
BWP	Dedicated DL BWP			DLB\	WP.1.1		
configuration	Initial UL BWP				WP.0.1		
	Dedicated UL BWP			ULB\	WP.1.1		
TRS configuration			TRS.2.1 TDD		TRS.2.1 TDD		
TCI state			TCI.State		TCI.State		
1 OI State			.0		.0		
PDSCH Reference	measurement channel		SR.3.1		SR.3.1		
1 200111101010100	measurement ename.		TDD		TDD		
RMSI CORESET R	Reference Channel		CR.3.1	-	CR.3.1	-	
			TDD		TDD		
Control channel RN	/IC		CCR.3.1 TDD	-	CCR.3.1 TDD	-	
OCNG Patterns			OP.1	OP.1	OP.1	OP.1	
SMTC configuration	n		SMTC.1				
SSB configuration			SSB.3	SSB.3	SSB.3	SSB.3	
			FR2	FR2	FR2	FR2	
PDSCH/PDCCH su		kHz	120	120	120	120	
SS-RSSI-Measurer				Not Ap	pplicable		
EPRE ratio of PSS							
EPRE ratio of PBC							
EPRE ratio of PBC							
EPRE ratio of PDC							
EPRE ratio of PDC	dB	0	0	0	0		
EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS		-					
	1						
EPRE ratio of OCNG DMRS to SSS ^{Note 1} EPRE ratio of OCNG to OCNG DMRS Note 1							
EFRE IALIO OF OCING TO OCING DIVING							
	tion condition		AWO	3N	AW	GN	
Antenna	Configuration		1x2	1x2	1x2	1x2	

Note 5:

Void

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted
	power spectral density is achieved for all OFDM symbols.
Note 2:	Void
Note 3:	Void
Note 1:	Void

Table A.5.7.2.1.2-3: SS-RSRQ Intra frequency OTA related test parameters

	Parameter		Tes	st 1	Test 2	
	Farameter	Unit	Cell 2	Cell 3	Cell 2	Cell 3
Angle of a	Angle of arrival configuration		Setup 1 according		Setup 1 according to clause A.3.15.1	
Assumpti	on for UE beams ^{Note 9}		io ciause	to clause A.3.15.1 clause A.3.1 Rough		
Note1		dBm/15kHz ^N				95
1 voc		ote4	-9	5		95
N_{oc} Note1		dBm/SCS ^{Note}	-8	6	-8	36
\hat{E}_s/N_{oc}		dB	3	3	-3	-3
SSB_RP ^t		dBm/SCS Note4	-83	-83	-89	-89
SS-RSR0	Note2	dB	-14.77	-14.77	-16.81	-16.81
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	-1.76	-1.76	-4.76	-4.76
Io ^{Note2}		dBm/95.04 MHz ^{Note4}	60 61			•
Note 1:	Interference from other cells and		•		_	
	over subcarriers and time and shafulfilled.	all be modelled a	as AWGN o	f appropria	te power for I	\mathbf{V}_{oc} to be
Note 2:	SS-RSRQ, SSB_RP, and lo level	s have been der	ived from o	ther param	eters for inform	mation
. 1010	purposes. They are not settable p			or param		
Note 3:	SS-RSRQ and SS-RSRP minimu and noise at each receiver antenr		are specifie	ed assumin	g independent	t interference
Note 4:	· ·					e
Note 5:						·
Note 6:	Void					
Note 7:	Void					
Note 8:	Void					
Note 9:						entation or
	test system implementation					

A.5.7.2.1.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ -2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ +3.5dB to Nominal SS-RSRQ -3.5dB according to the requirements in clause 10.1.8.1.1. Nominal SS-RSRQ is the value shown in table A.5.7.2.1.2-3.

A.5.7.2.2 EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.9.1.1 and 10.1.9.1.2 for inter-frequency measurement.

A.5.7.2.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.5.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test setup in Table A.5.7.2.2.2-2 and Table A.5.7.2.2.2-3. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.5.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.5.7.2.2.2: SS-RSRQ Inter frequency general test parameters

Parameter		Unit	Tes	st 1	Tes	st 2	
Fala	Onit	Cell 2	Cell 3	Cell 2	Cell 3		
SSB ARFCN		Freq1	Freq1 freq2		Freq2		
Duplex mode			TE	DD	T	TDD	
TDD configuration			TDDC	onf.3.1	TDDC		
BW _{channel}		MHz	100: Na	RB,C = 66	100: N _F	$_{B,c} = 66$	
Data RBs allocated			6	6		6	
	Initial DL BWP				VP.0.1		
BWP configuration	Dedicated DL BWP				VP.1.1		
	Initial UL BWP			ULBV	VP.0.1		
	Dedicated UL BWP			ULBV	VP.1.1		
TRS configuration			TRS.2.	_	TRS.2.	_	
Tree configuration			1 TDD		1 TDD		
TCI state			TCI.Sta	_	TCI.Sta	-	
			te.0		te.0		
DD 0011 D /			SR.3.1		SR.3.1		
PDSCH Reference m	neasurement channel		TDD	-	TDD	-	
			CR.3.1		CR.3.1		
RMSI CORESET Re	ference Channel		TDD	-	TDD	-	
			OP.1	OP.1	OP.1	OP.1	
OCNG Patterns			OF.1	OF.1	OF.1	OF.1	
SSB configuration			SSB.3	SSB.3	SSB.3	SSB.3	
33b Configuration			FR2	FR2	FR2	FR2	
SMTC configuration			SMTC.	SMTC.	SMTC.	SMTC.	
SW10 configuration			1 FR2	1 FR2	1 FR2	1 FR2	
PDSCH/PDCCH subcarrier spacing		kHz	120	120	120	120	
EPRE ratio of PSS to SSS							
	EPRE ratio of PBCH_DMRS to SSS						
EPRE ratio of PBCH	dB	0	0	0	0		
EPRE ratio of PDCC							
EPRE ratio of PDCC	H to PDCCH_DMRS						

EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1				
Propagation conditions	AWGN	AWGN	AWGN	AWGN
Antenna configuration	1x2	1x2	1x2	1x2

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total

transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Table A.5.7.2.2.2-3: SS-RSRQ Inter frequency OTA related test parameters

Parameter	Unit	Tes	st 1	Test 2		
Parameter	Offic	Cell 2	Cell 3	Cell 2	Cell 3	
AoA setup			in clause		in clause	
'		in claus	e A.3.15	in claus	e A.3.15	
Assumption for UE beams ^{Note 8}		Ro	ugh	Ro	ugh	
N_{oc} Note1	dBm/15kHz ^N ote4	-94.03	-94.03	-94.03	-94.03	
$N_{oc}^{}$ Note1	dBm/SCS ^{Note}	-85.0	-85.0	-85.0	-85.0	
\hat{E}_s / N_{oc}	dB	-1.75	-1.75	-3	-3	
SSB_RPNote2	dBm/SCS Note4	-86.75	-86.75	-88	-88	
SS-RSRQ ^{Note2}	dB	-14.75	-14.75	-15.56	-15.56	
\hat{E}_{s}/I_{ot}	dB	-1.75	-1.75	-3	-3	
Io ^{Note2}	dBm/95.04 MHz ^{Note4}	-53.8	-53.8	-54.25	-54.25	

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for N_{oc} to be fulfilled.

Note 2: SS-RSRQ, SSB_RP , and lo levels have been derived from other parameters for

information purposes. They are not settable parameters themselves.

Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone

Note 6: Void

Note 7: Void

Note 8: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation

A.5.7.2.2.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SSRQ-2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ+3.5dB to Nominal SS-RSRQ-3.5dB according to the requirements in clause 10.1.10.1.1.

The SS-RSRQ relative measurement accuracy shall fulfil the requirements in clause 10.1.10.1.2.

A.5.7.3 SS-SINR

A.5.7.3.1 EN-DC Intra-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.13.1.1.

A.5.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.5.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is test by using the parameters in Table A.5.7.3.1.2-2 and Table A.5.7.3.1.2-3. The configuration of cell 1 (E-UTRA PCell) is specified in clause A.3.7.2.1. In all test cases, Cell 2 is the PSCell and Cell 3 is the target cell.

Table A.5.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

Cor	nfiguration	Description
1		FDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		TDD LTE PCell, Cell 2&3 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to pass in one of the supported test configurations

Table A.5.7.3.1.2-2: SS-SINR Intra frequency test parameters

Parameter	Unit	Tes	Test 1		Test 2	
Parameter	Unit	Cell 2	Cell 3	Cell 2	Cell 3	
SSB ARFCN		Fre	eq2	Fre	q2	
Duplex mode		TI	DD	TE)D	
TDD configuration		TDDC	onf.3.1	TDDC	onf.3.1	
BW _{channel}	MHz	100: N	RB,c = 66	100: NR	$_{\rm B,c} = 66$	
Data RBs allocated		6	66	6	6	
Downlink initial BWP configuration			DLBV	VP.0.1		
Downlink dedicated BWP configuration				VP.1.1		
Uplink initial BWP configuration				VP.0.1		
Uplink dedicated BWP configuration				VP.1.1		
DRX cycle configuration	ms		Not ap	plicable		
TRS configuration			TRS.2.1 TDD			
TCI state			TCI.State.0			
PDSCH Reference measurement channel		SR.3.1		SR.3.1		
1 Beer 1 tererense medearement enamer		TDD		TDD		
RMSI CORESET Reference Channel		CR.3.1	_	CR.3.1	_	
		TDD		TDD		
Dedicated RMSI CORESET Reference		CCR.3	_	CCR.3.	_	
Channel		.1 TDD		1 TDD		
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	
SMTC configuration		SMTC.1				
SSB configuration		SSB.1	SSB.1	SSB.1	SSB.1	
· ·		FR2	FR2	FR2	FR2	
PDSCH/PDCCH subcarrier spacing	kHz	120 120 120 120				
SS-RSSI-Measurement			Not Applicable			

EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1	dB	0	0	0	0
Propagation conditions		AWGN AWGI		GN	
Antenna configuration		1x2	1x2	1x2	1x2

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Table A.5.7.3.1.2-3: SS-SINR Intra frequency OTA related test parameters

Parameter	Unit	Tes	st 1	Test 2			
Parameter	Onit	Cell 2	Cell 3	Cell 2	Cell 3		
Angle of arrival configuration		accord	up 1 ding to	Setup 1 according to			
Note 2			A.3.15.1		A.3.15.1		
Assumption for UE beams ^{Note 9}		Ro	ugh	Ro	ugh		
$N_{oc}^{ m Note1}$	dBm/15kHz Note4	-1	-105		-105 -10		05
$N_{oc}^{}$ Note1	dBm/SCS Note3	-96		-96 -96		96	
\hat{E}_s/N_{oc}	dB	4.54	2.66	-3	-3		
SS-RSRPNote2	dBm/SCS Note4	-91.46	-93.34	-99	-99		
SS-SINR Note2	dB	0	-3.2	-4.76	-4.76		
\hat{E}_{s}/I_{ot}	dB	0	-3.2	-4.76	-4.76		
Io ^{Note2}	dBm/95.04 MHz Note4 59.43 -6		59.43		64		

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 2: SS-SINR, SSB_RP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone

Note 6: Void Note 7: Void Note 8: Void Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.5.7.3.1.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3B to Nominal SS-SINR -3dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.10.13.1. Nominal SS-SINR is the value shown in table A.5.7.3.1.2-3.

A.5.7.3.2 EN-DC Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.5.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.15.1.1 and 10.1.15.1.2 for inter-frequency measurement.

A.5.7.3.2.2 Test Parameters

In this test case the two NR cells (i.e., Cell 2 and Cell 3) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.5.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test setup in Table A.5.7.3.2.2-2 and Table A.5.7.3.2.2-3. In all test cases, Cell 2 is the PSCell and Cell 3 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.5.7.3.2.2-2: SS-SINR Inter frequency SS-SINR supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A. 5.7.3.2.2-2: SS-SINR Inter frequency general test parameters

Parameter	Unit	Test 1		Test 2		Test 3				
Farameter	Onit	Cell 2	Cell 3	Cell 2	Cell 3	Cell 2	Cell 3			
SSB ARFCN		Freq1	freq2	freq1	Freq2	freq1	Freq2			
Duplex mode		T	TDD		TDD TDD		TDD TDD		T	DO
TDD configuration		TDDC	onf.3.1	TDDC	onf.3.1	TDDC	onf.3.1			
BW _{channel}	MHz	100: N _F	100: N _{RB,c} = 66 100: N _{RB,c} = 66		100: N _{RB,c} = 66		$_{B,c} = 66$			
Data RBs allocated		6	6	66		66 6		6		
Downlink initial BWP configuration				DLBW	/P.0.1					
Downlink dedicated BWP configuration				DLBV	/P.1.1					
Uplink initial BWP configuration				ULBV	/P.0.1					
Uplink dedicated BWP configuration		ULBWP.1.1								
DRX cycle configuration	ms	Not applicable								
TRS configuration		TRS.2.1 TDD								
TCI state				TCI.S	tate.0					

PDSCH Reference measurement channel		SR.3.1 TDD	-	SR.3.1 TDD	-	SR.3.1 TDD	-
RMSI CORESET Reference Channel		CR.3.1 TDD	-	CR.3.1 TDD	-	CR.3.1 TDD	-
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	OP.1	OP.1
SMTC configuration		SMTC. 1 FR2					
SSB configuration		SSB.3 FR2	SSB.3 FR2	SSB.3 FR2	SSB.3 FR2	SSB.3 FR2	SSB.3 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	120	120
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH_DMRS to SSS							
EPRE ratio of PBCH to PBCH_DMRS							
EPRE ratio of PDCCH_DMRS to SSS	dB	0	0	0	0	0	0
EPRE ratio of PDCCH to PDCCH_DMRS	uБ	U		0	0		U
EPRE ratio of PDSCH_DMRS to SSS							
EPRE ratio of PDSCH to PDSCH_DMRS							
EPRE ratio of OCNG DMRS to SSS ^{Note 1}							
EPRE ratio of OCNG to OCNG DMRS Note							
1 10		414/011	414/01/	414/01/	414/01/	414/01/	414/01/
Propagation conditions		AWGN	AWGN	AWGN	AWGN	AWGN	AWGN
Antenna configuration		1x2	1x2	1x2	1x2	1x2	1x2

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Table A.5.7.3.2.2-3: SS-SINR Inter frequency OTA related test parameters

Davamatar	Parameter Unit		st 1	Tes	st 2	Test 3	
Parameter			Cell 3	Cell 2	Cell 3	Cell 2	Cell 3
		Set	up 1	Setup 1		Setup 1	
Angle of arrival configuration	degrees		ding to		ding to		ding to
			15.1	A.3.		A.3.	
Assumption for UE beams ^{Note 10}		Ro	ugh	Ro	ugh	Ro	ugh
$N_{oc}^{}$ Note1	dBm/15kHz Note4	-105	-105	-105	-105	-105	-105
$N_{oc}^{}$ Note1	dBm/SCS Note3	-96	-96	-96	-96	-96	-96
\hat{E}_s/N_{oc}	dB	-0.5	-0.5	11	11.	-3.0	-3.0
SS-RSRP ^{Note2}	dBm/SCS Note4	-96.5	-96.5	-85	-85	-99	-99
SS-SINR ^{Note2}	dB	-0.5	-0.5	11	11	-3.0	-3.0
\hat{E}_{s}/I_{ot}	dB	-0.5	-0.5	11	11	-3.0	-3.0
Io ^{Note2}	dBm/95.04 MHz ^{Note4}	-69.3	-69.3	-55.4	-55.4	-65.24	-65.24

Note 1:	Interference from other cells and noise sources not specified in the test is assumed to be constant over
	subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 2:	SS-SINR, SSB_RP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3:	SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 4:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
Note 5:	As observed with 0dBi gain antenna at the centre of the quiet zone
Note 6:	Void
Note 7:	Void
Note 8:	Void

Note 9: Void

Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

A.5.7.3.2.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3dB to Nominal SS-SINR and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR+3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.15.1.1. Nominal SS-SINR is the value shown in table A.5.7.2.2.2-3

The SS-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.15.1.2.

A.5.7.4 L1-RSRP measurement for beam reporting

A.5.7.4.1 SSB based L1-RSRP measurement

A.5.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 9.5.2 and clause 10.1.20.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.5.7.4.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.5.7.4.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config	Description
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3		LTE FDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
4		LTE TDD, NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

A.5.7.4.1.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR2 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.7.4.1.2-1 and Table A.5.7.4.1.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.5.7.4.1.2-1 and Table A.5.7.4.1.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.5.7.4.1.2-1: FR2 SSB based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~4		freq1	freq1
Duplex mode	1~4		TDD	TDD
TDD Configuration	1~4		TDDConf.3.1	TDDConf.3.1
BWchannel	1~4	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Data RBs allocated	1~4		66	66
PDSCH Reference	1,2		SR.3.2 TDD	SR.3.2 TDD
measurement channel	3,4		SR.3.3 TDD	SR.3.3 TDD
RMSI CORESET Reference	1,2		CR.3.1 TDD	CR.3.1 TDD
Channel	3,4		CR.3.2 TDD	CR.3.2 TDD
Dedicated CORESET	1,2		CCR.3.1 TDD	CCR.3.1 TDD
Reference Channel	3,4		CCR.3.7 TDD	CCR.3.7 TDD
	1,2		SSB.1 FR2	SSB.1 FR2
SSB configuration	3,4		SSB.2 FR2	SSB.2 FR2
OCNG Patterns	1~4		OP.1	OP.1
			DLBWP.0.1	DLBWP.0.1
Initial BWP Configuration	1~4		ULBWP.0.1	ULBWP.0.1
			DLBWP.1.3	DLBWP.1.3
Dedicated BWP configuration	1~4		ULBWP.1.3	ULBWP.1.3
TRS Configuration	1~4		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI	1~4		TCI.State.2	TCI.State.2
Configuration	1~4		TOI.State.2	TOI.Glate.2
SMTC configuration	1~4		SMTC.1	SMTC.1
reportConfigType	1~4		periodic	periodic
reportQuantity	1~4		ssb-Index-RSRP	ssb-Index-RSRP
Number of reported RS	1~4		2	2
L1-RSRP reporting period	1~4		slot320	slot320
Propagation condition	1~4		AWGN	AWGN
Antenna configuration			1x2	1x2
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH				
DMRS				
EPRE ratio of PDSCH DMRS to SSS	1~4	dB	0	0
EPRE ratio of PDSCH to PDSCH		<u></u>		
DMRS				
EPRE ratio of OCNG DMRS to				
SSSNote 1				
EPRE ratio of OCNG to OCNG DMRS Note 1				
Note 1: OCNC shall be used a		lle eelle ene follo	L	1

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for N_{oc} to be fulfilled.

Table A.5.7.4.1.2-2: FR2 SSB based L1-RSRP OTA related test parameters

Parameter	Config	Unit	Tes	Test 1 Test 2 NOT		NOTE 3
Farameter	Config	Offic	SSB0	SSB1	SSB0	SSB1

Angle of arrival configuration			Setup 1 ac	cording to	Setup 1 according to
			A.3.	15.1	A.3.15.1
Assumption for UE beams ^{Note 4}			Rou	ıgh	Rough
N_{oc}	1~4	dBm/15 kHz	-100		n.a.
M	1,2	dBm/SS	-9)1	n.a.
N_{oc}	3,4	B SCS	-88		n.a.
\hat{E}_{s}/I_{ot}	1~4	dB	10	-2	n.a.
SSB_RP ^{Note1}	1,2	dBm/SC	-81	-93	As in Table B.2.4-2
33B_RP.100	3,4	S	-78	-90	As in Table B.2.4-2
Io ^{Note1}	1~4	dBm/ 95.04M Hz	-51.57		SSB_RP+28.98
\hat{E}_s/N_{oc}	1~4	dB	10	-2	n.a.

Note 1: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: Void

Note 3: No additional noise is added by the test system in Test 2.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation.

A.5.7.4.1.3 Test Requirements

After 320ms from the beginning of the test, the L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.20.1. The following requirements are to be verified:

For Test 1:

Absolute accuracy of SSB0. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.7.4.1.3-1.

Relative accuracy of SSB0 compared with SSB1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.1.2-1.

For Test 2:

Absolute accuracy of SSB resource reported by UE in L1-RSRP report (SSB0 or SSB1). The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.7.4.1.3-1.

Relative accuracy of SSB0 compared with SSB1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.1.2-1.

Table A.5.7.4.1.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3				
SSB0		SSB_RP0 - δ + G _{min} $≤$ Reported RSRP(dBm) $≤$ SSB_RP0 + δ + G _{max}				
	SSB1	SSB_RP1 - δ + G _{min} \leq Reported RSRP(dBm) \leq SSB_RP1 + δ + G _{max}				
Note 1:	SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the SSB n under consideration					
Note 2:	δ is the RSRP absolute accuracy requirement from Table 10.1.20.1.1-1, selected according to the lo used in the test					
Note 3:	G _{min} and G _{max} are t according to the UE	he minimum and maximum UE gain values from Table B.2.1.5.1-1, selected E power class				

A.5.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

A.5.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in Clauses 9.5.3 and clause 10.1.20.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.5.7.4.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.5.7.4.2.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

	Config	Description
1		LTE FDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
2		LTE TDD, NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

A.5.7.4.2.2 Test parameters

In this set of test cases there are two cells in the test, E-UTRAN PCell (Cell 1), FR1 PSCell (Cell 2). The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 2 are given in Table A.5.7.4.2.2-1 and Table A.5.7.4.2.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.5.7.4.2.2-1 and Table A.5.7.4.2.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.5.7.4.2.2-1: FR2 CSI-RS based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~2		freq1	freq1
Duplex mode	1~2		TDD	TDD
TDD Configuration	1~2		TDDConf.3.1	TDDConf.3.1
BW _{channel}	1~2	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1~2		SR.3.1 TDD	SR.3.1 TDD
RMSI CORESET Reference Channel	1~2		CR.3.1 TDD	CR.3.1 TDD
Dedicated CORESET Reference Channel	1~2		CCR.3.1 TDD	CCR.3.1 TDD
SSB configuration	1~2		SSB.1 FR2	SSB.1 FR2
OCNG Patterns	1~2		OP.1	OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
TRS Configuration	1~2		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2	TCI.State.2
SMTC configuration	1~2		SMTC.1	SMTC.1
CSI-RS	1~2		CSI-RS.3.2 TDD	CSI-RS.3.2 TDD
reportConfigType	1~2		periodic	periodic
reportQuantity	1~2	· · · · · · · · · · · · · · · · · · ·	cri-RSRP	cri-RSRP
Number of reported RS	1~2		2	2

L1-RSRP reporting period	1~2		slot320	slot320
Propagation condition	1~2		AWGN	AWGN
Antenna configuration	1~2		1x2	1x2
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH				
DMRS				
EPRE ratio of PDSCH DMRS to SSS	1~2	dB	0	0
EPRE ratio of PDSCH to PDSCH				
DMRS				
EPRE ratio of OCNG DMRS to				
SSSNote 1				
EPRE ratio of OCNG to OCNG				
DMRS Note 1		1		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for N_{oc} to be fulfilled.

Table A.5.7.4.2.2-2: FR2 CSI-RS based L1-RSRP OTA related test parameters

		Unit	Tes	st 1	Test 2 NOTE 3			
Parameter	Config		CSI-RS0	CSI-RS1	CSI-RS0	CSI- RS1		
Angle of arrival configuration			Setup 1 according to		Setup 1 according to Setup 1.3.15.1		Setup 1 according to A.3.15.1	
Assumption for UE beamsNote 4			Roi	_	Rou			
N_{oc}	1~2	dBm/15 kHz	-100		-100 n.a		n.a.	
N_{oc}	1~2	dBm/SS B SCS	-91		n.a. n.a.			
\hat{E}_{s}/I_{ot}	1~2	dB	10	-2	n.a.			
CSI-RS-RSRP ^{Note1}	1~2	dBm/SC S	-81	-93	As in Table B.2.4-2			
Io ^{Note1}	1~2	dBm/ 95.04M Hz			°+28.98			
\hat{E}_s/N_{oc}	1~2	dB	-51.57	-2	n.a			

Note 1: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 3: No additional noise is added by the test system in Test 2.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.5.7.4.2.3 Test Requirements

After 320ms from the beginning of the test, the L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 2 shall fulfil the requirements in clauses 10.1.20.2. The following requirements are to be verified:

For Test 1:

Absolute accuracy of CSI-RS0. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.7.4.2.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

For Test 2:

Absolute accuracy of CSI-RS resource reported by UE in L1-RSRP report (CSI-RS0 or CSI-RS1). The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.5.7.4.2.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.5.7.4.2.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3				
CSI-RS0		CSI-RS _RP0 - δ + G _{min} ≤ Reported RSRP(dBm) ≤CSI-RS _RP0 + δ + G _{max}				
	CSI-RS1	CSI-RS _RP1 - δ + G _{min} ≤ Reported RSRP(dBm) ≤CSI-RS _RP1 + δ + G _{max}				
Note 1:	CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration					
Note 2:	δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the lo used in the test					
Note 3:	G _{min} and G _{max} are t according to the UI	he minimum and maximum UE gain values from Table B.2.1.5.1-1, selected E power class				

A.5.8 Void

A.6 NR standalone tests with all NR cells in FR1

A.6.1 SA: RRC_IDLE state mobility

A.6.1.1 Cell re-selection to NR

A.6.1.1.1 Cell reselection to FR1 intra-frequency NR case

A.6.1.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements specified in clause 4.2.2.3.

A.6.1.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.6.1.1.1.2-1, A.6.1.1.1.2-2 and A.6.1.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.6.1.1.1.2-1: Supported test configurations

Co	onfiguration	Description
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations.

Table A.6.1.1.1.2-2: General test parameters for intra frequency NR cell re-selection test case

	Parameter		Test configuration	Value	Comment
Initial condition	Active cell		1, 2, 3	Cell1	
T2 end	Active cell		1, 2, 3	Cell2	
condition	Neighbour cells		1, 2, 3	Cell1	
Final	Active cell		1, 2, 3	Cell1	
condition	Neighbour cells		1, 2, 3	Cell2	
RF Channe	el Number		1, 2, 3	1	
Time offse	t between cells		1	3 ms	Asynchronous cells
			2	3 µs	Synchronous cells
			3	3 μs	Synchronous cells
Access Ba	Access Barring Information		1, 2, 3	Not Sent	No additional delays in random access
					procedure.
SSB config	guration		1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC con	figuration		1	SMTC.2	Configured in SIB2 of Cell 1
				SMTC.6	Configured in SIB2 of Cell 2
			2	SMTC.1	
			3	SMTC.1	
DRX cycle	length	S	1, 2, 3	1.28	The value shall be used for all cells in the test.
PRACH co	nfiguration index		1, 2, 3	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2

rangeToBestCell		1, 2, 3	Not configured	
T1	S	1, 2, 3	>7	During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2
T2	s	1, 2, 3	40	T2 needs to be defined so that cell re- selection reaction time is taken into account.
ТЗ	S	1, 2, 3	15	T3 needs to be defined so that cell re- selection reaction time is taken into account.

Table A.6.1.1.1.2-3: Cell specific test parameters for intra frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test		Cell 1		Cell 2			
		configuration	T1	T2	T3	T1	T2	T3	
TDD configuration		1	N/A		N/A				
		2	TDDConf.1.1		TDDConf.1.1				
		3	TDDConf.2.1		TDDConf.2.1				
PDSCH RMC		1		SR.1.1 FDD			R.1.1 FD		
configuration		3		SR.1.1 TDD		SR.1.1 TDD			
			SR.2.1 TDD			SR.2.1 TDD			
RMSI CORESET		1		CR.1.1 FDD			CR.1.1 FDD		
RMC configuration		2		CR.1.1 TDD			R.1.1 TDI		
		3		CR.2.1 TDD			R.2.1 TDI		
Dedicated		1		CCR.1.1 FDI			CR.1.1 FD		
CORESET RMC		2		CCR.1.1 TDI			CR.1.1 TD		
configuration		3		CCR.2.1 TDI			CR.2.1 TD		
OCNG Pattern		1, 2, 3		defined in A			efined in A		
Initial DL BWP		1, 2, 3		DLBWP.0.1			LBWP.0.	1	
configuration									
Initial UL BWP		1, 2, 3	ULBWP.0.1		ULBWP.0.1				
configuration									
RLM-RS		1, 2, 3	SSB		SSB				
Qrxlevmin	dBm/SCS	1, 2	-130		-130				
		3		-127		-127			
Pcompensation	dB	1, 2, 3		0		0			
Qhysts	dB	1, 2, 3		0		0			
Qoffsets, n	dB	1, 2, 3	0			0			
Cell_selection_and_		1, 2, 3		SS-RSRP			SS-RSRP		
reselection_quality_									
measurement	ID.		40	1 0 11	0.70		0.70	0.44	
Ê , /I ot	dB	1	16	-3.11	2.79	-infinity	2.79	-3.11	
		2							
	-ID/CCC	3			00				
$N_{_{\!OC}}$ Note2	dBm/SCS	1	-98			3			
N_{oc} Note2 dBm/15 kHz		2			-98	}			
		3	-95						
		1	-98						
		2	1						
		3							
\hat{E}_{s}/N_{oc}	dB	1	16	13	16	-infinity	16	13	
		2						1	

		3						
SS-RSRP Note3	dBm/SCS	1	-82	-85	-82	-infinity	-82	-85
		2	-82	-85	-82	-infinity	-82	-85
		3	-79	-82	-79	-infinity	-79	-82
lo	dBm/9.36 MHz	1	-53.94	-52.21	-52.21	Same	as param	eters
						specified	d in Cell 1	columns
	dBm/9.36 MHz	2	-53.94	-52.21	-52.21			
	dBm/38.16 MHz	3	-47.85	-46.12	-46.12	<u> </u>		
Treselection	S	1, 2, 3	0	0	0	0	0	0
Sintrasearch	dB	1, 2, 3	60 60					
Propagation Condition		1, 2, 3			AWG	N		

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over

subcarriers and time and shall be modelled as AWGN of appropriate power for $\frac{N_{oc}}{N_{oc}}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.1.1.3 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on Cell 2.

The cell re-selection delay to a newly detectable cell shall be less than 34 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on cell 1.

The cell re-selection delay to an already detected cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{\text{detect, NR_Intra}} + T_{\text{SI-NR}}$, and to an already detected cell can be expressed as: $T_{\text{evaluate, NR_intra}} + T_{\text{SI-NR}}$,

Where:

T_{detect, NR_Intra} See Table 4.2.2.3-1 in clause 4.2.2.3

T_{evaluate, NR_ intra} See Table 4.2.2.3-1 in clause 4.2.2.3

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280ms is assumed in this test case.

This gives a total of 33.28 s, allow 34 s for the cell re-selection delay to a newly detectable cell and 7.68 s for the cell re-selection delay to an already detected cell in the test case, which we allow 8 s.

A.6.1.1.2 Cell reselection to FR1 inter-frequency NR case

A.6.1.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2.2.4.

A.6.1.1.2.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.6.1.1.2.2-1, A.6.1.1.2.2-2 and A.6.1.1.2.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1.

Table A.6.1.1.2.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell				
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD	15 kHz SSB SCS, 10 MHz bandwidth, FDD				
	duplex mode	duplex mode				
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD	15 kHz SSB SCS, 10 MHz bandwidth, TDD				
	duplex mode	duplex mode				
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD	30 kHz SSB SCS, 40 MHz bandwidth, TDD				
	duplex mode	duplex mode				
Note: The UE is only required to be tested in one of the supported test configurations.						

Table A.6.1.1.2.2-2: General test parameters for FR1 inter frequency NR cell re-selection test case

	Parameter	Unit	Test configuration	Value	Comment
Initial Active cell			1, 2, 3	Cell 2	The UE camps on cell 2 in the initial
condition	Neighbour cell		1, 2, 3	Cell 1	phase and during T1 period the UE reselects to cell 1
T1 end	Active cell		1, 2, 3	Cell1	The UE shall perform reselection to cell 1
condition	Neighbour cells		1, 2, 3	Cell2	during T1
T3 end	Active cell		1, 2, 3	Cell2	The UE shall perform reselection to cell 2
condition	Neighbour cell		1, 2, 3	Cell 1	with higher priority during T3
RF Channe	el Number		1, 2, 3	1, 2	
Time offset	t between cells		1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
Access Ba	rring Information	-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB config	juration		1	SSB.1 FR1	'
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC con	figuration		1	SMTC.2	Configured in SIB4 of Cell 1
				SMTC.6	Configured in SIB4 of Cell 2
			2	SMTC.1	
			3	SMTC.1	
DRX cycle	length	S	1, 2, 3	1.28	The value shall be used for all cells in the test.
PRACH configuration index			1, 2, 3	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBestCell			1, 2, 3	Not configured	
T1		S	1, 2, 3	15	T1 needs to be defined so that cell reselection reaction time is taken into account.

T2	S	1, 2, 3	>7	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.
Т3	S	1, 2, 3	75	T3 needs to be defined so that cell re- selection reaction time is taken into account.

Table A.6.1.1.2.2-3: Cell specific test parameters for FR1 inter frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test	Cell 1			Cell 2			
		configuration	T1	T2	T3	T1	T2	T3	
TDD configuration		1		N/A		N/A			
		2	TDDConf.1.1				TDDConf.1.1		
		3	Т	DDConf.2.	1	TDDConf.2.1			
PDSCH RMC		1	5	SR.1.1 FDD)		SR.1.1 FDD		
configuration		2		SR.1.1 TDD			SR.1.1 TDD		
		3	5	SR.2.1 TDD)		SR.2.1 TDD)	
RMSI CORESET		1		CR.1.1 FDE)	(CR.1.1 FDD)	
RMC configuration		2		CR.1.1 TDD			CR.1.1 TDD		
		3		CR.2.1 TDD			CR.2.1 TDD		
Dedicated		1	С	CR.1.1 FD	D	C	CR.1.1 FDI	D	
CORESET RMC		2	С	CR.1.1 TD	D	C	CR.1.1 TDI	D	
configuration		3	С	CR.2.1 TD	D	C	CR.2.1 TDI	D	
OCNG Pattern		1, 2, 3		defined in A			defined in A		
Initial DL BWP		1, 2, 3		DLBWP.0.1		DLBWP.0.1			
configuration									
Initial UL BWP		1, 2, 3	ULBWP.0.1			ULBWP.0.1			
configuration									
RLM-RS		1, 2, 3	SSB			SSB			
Qrxlevmin	dBm/SCS	1, 2	-140			-140			
		3	-137			-137			
Pcompensation	dB	1, 2, 3		0		0			
Cell_selection_and_		1, 2, 3		SS-RSRP		SS-RSRP			
reselection_quality_									
measurement									
Ê , /I ot	dB	1	14	14	14	-4	-infinity	12	
		2							
		3							
$N_{_{OC}}$ Note2	dBm/SCS	1			-98				
		2			-98				
		3			-95				
N_{oc} Note2	dBm/15 kHz	1			-98				
		2							
		3							
\hat{E}_{s}/N_{oc}	dB	1	14	14	14	-4	-infinity	12	
/ W.	-	2	•					_	
		3							
SS-RSRP Note3	dBm/SCS	1	-84	-84	-84	-102	-infinity	-86	
		2	-84	-84	-84	-102	-infinity	-86	
		3	-81	-81	-81	-99	-infinity	-83	
		_	<u> </u>					-	

lo	dBm/9.36 MHz	1	-55.88	-55.88	-55.88	-68.60		-57.78
							-70.05	
	dBm/9.36 MHz	2	-55.88	-55.88	-55.88	-68.60		-57.78
							-70.05	
	dBm/38.16 MHz	3	-49.79	-49.79	-49.79	-62.50		-51.69
							-63.96	
Treselection	S	1, 2, 3	0	0	0	0	0	0
SnonintrasearchP	dB	1, 2, 3		50			50	
Threshx, highP	dB	1, 2, 3		48			48	
Thresh _{serving, lowP}	dB	1, 2, 3	44 44			44		
Thresh _{x, lowP}	dB	1, 2, 3	50			50		
Propagation		1, 2, 3	AWGN					
Condition								

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over

subcarriers and time and shall be modelled as AWGN of appropriate power for $\frac{N}{oc}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.1.1.2.3 Test Requirements

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps again on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on cell 2

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The cell reselection delay to a lower priority cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on cell 1.

The cell re-selection delay to a lower priority cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate, NR_inter} + T_{SI-NR}$, and to a lower priority cell can be expressed as: $T_{evaluate, NR_inter} + T_{SI-NR}$,

Where:

Thigher_priority_search See clause 4.2.2.7

T_{evaluate, NR_ inter} See Table 4.2.2.4-1 in clause 4.2.2.4

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority cell and 7.68 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 8 s.

A.6.1.2 Inter-RAT E-UTRAN cell re-selection

A.6.1.2.1 Cell reselection to higher priority E-UTRAN

A.6.1.2.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2.2.5 when the E-UTRAN cell is of higher priority.

A.6.1.2.1.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.6.1.2.1.2-1, A.6.1.2.1.2-2, A.6.1.2.1.2-3 and A.6.1.2.1.2-4. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. NR cell 1 is already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of higher priority than cell 1.

Table A.6.1.2.1.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	FDD duplex mode	
2	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	TDD duplex mode	
3	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	TDD duplex mode	
4	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	FDD duplex mode	
5	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	TDD duplex mode	
6	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	TDD duplex mode	·
Note: The L	JE is only required to be tested in one of the sup	ported test configurations.

Table A.6.1.2.1.2-2: General test parameters for NR to E-UTRAN cell re-selection test case

Parameter		Unit	Test configuration	Value	Comment		
Initial condition	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE camps on cell 1 in the initial phase and during T2 period the UE reselects to cell 2.		
T2 end	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2		
condition	Neighbour cell		1, 2, 3, 4, 5, 6	Cell1	during T2.		
T3 end	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE shall perform reselection to cell 1		
condition	Neighbour cell		1, 2, 3, 4, 5, 6	Cell2	during T3 for iteration of the tests.		
Access Ba	Access Barring Information		1, 2, 3, 4, 5, 6	Not Sent	No additional delays in random access procedure.		
DRX cycle	DRX cycle length		1, 2, 3, 4, 5, 6	1.28	The value shall be used for all cells in the test.		
NR PRACI	H configuration index		1, 2, 3, 4, 5, 6	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2		
E-UTRAN	TRAN PRACH configuration		TRAN PRACH configuration		1, 2, 3	53	As specified in table 5.7.1-2 in
index			4, 5, 6	4	TS 36.211 [23]		
T1		ø	1, 2, 3, 4, 5, 6	>7	During T1, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T2.		

T2	S	1, 2, 3, 4, 5, 6	75	T2 needs to be defined so that cell re- selection reaction time is taken into account.
ТЗ	S	1, 2, 3, 4, 5, 6	15	T3 needs to be defined so that cell re- selection reaction time is taken into account.

Table A.6.1.2.1.2-3: Cell specific test parameters for NR cell 1

Parameter	Unit	Test configuration	Cell 1			
			T1	T2	T3	
TDD configuration		1, 4		N/A		
		2, 5	TDDConf.1.1			
		3, 6	TDDConf.2.1		.1	
PDSCH parameters		1, 4	S	R.1.1 FD	D	
		2, 5	S	SR.1.1 TDD		
		3, 6		R.2.1 TD		
RMSI CORESET		1, 4	C	R.1.1 FD	D	
parameters		2, 5	C	R.1.1 TD	D	
		3, 6	C	R.2.1 TD	D	
Dedicated CORESET		1, 4	C	CR.1.1 FE	DD	
parameters		2, 5	C	CR.1.1 TE	DD	
		3, 6	C	CR.2.1 TE	DD	
SSB parameters		1, 4	5	SSB.1 FR	1	
·		2, 5	5	SSB.1 FR	1	
		3, 6		SSB.2 FR		
NR SMTC parameters		1, 4		SMTC.2		
·		2, 5		SMTC.1		
		3, 6		SMTC.1		
OCNG Pattern		1, 2, 3, 4, 5, 6	OP.1 d	lefined in	A.3.2.1	
Initial DL BWP configuration		1, 2, 3, 4, 5, 6	DLBWP.0.1			
Initial UL BWP configuration		1, 2, 3, 4, 5, 6	ULBWP.0.1		1	
RLM-RS		1, 2, 3, 4, 5, 6	SSB			
Qrxlevmin	dBm/SCS	1, 2, 4, 5	-140 -137			
		3, 6				
λ7	dBm/SCS	1, 4	-98 -98			
N_{oc}		2, 5				
		3, 6	-95			
N_{oc}	dBm/15 kHz	1, 2, 3, 4, 5, 6		-98		
SS-RSRP	dBm/SCS	1, 4	-84	-84	-84	
		2, 5	-84	-84	-84	
		3, 6	-81	-81	-81	
Ê s /I ot	dB	1, 4	14	14	14	
		2, 5				
		3, 6				
\hat{E}_{s}/N_{oc}	dB	1, 4	14	14	14	
		2, 5				
		3, 6				
lo	dBm/9.36 MHz	1, 4	-55.88	-55.88	-55.88	
	dBm/9.36 MHz	2, 5	-55.88	-55.88	-55.88	
	dBm/38.16 MHz	3, 6	-49.79	-49.79	-49.79	
Treselection	S	1, 2, 3, 4, 5, 6		0		
SnonintrasearchP	dB	1, 2, 3, 4, 5, 6		50		
Threshx, highP (Note 2)	dB	1, 2, 3, 4, 5, 6		48		
Threshserving, lowP	dB	1, 2, 3, 4, 5, 6		44		
Thresh _{x, lowP}	dB	1, 2, 3, 4, 5, 6		50		
Propagation Condition		1, 2, 3, 4, 5, 6		AWGN		

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted
	power spectral density is achieved for all OFDM symbols.

Note 2: This refers to the value of Thresh_{x, high} which is included in NR system information, and is a threshold for the E-UTRA target cell

Table A.6.1.2.1.2-4: Cell specific test parameters for E-UTRA cell 2

Parameter	Unit		Cell 2				
		T1	T2	T3			
E-UTRA RF Channel			1				
number							
BW _{channel}	MHz		10				
OCNG Patterns defined in		OP.2	2 TDD for	test			
TS 36.133 [15] clause A.3.2			uration 1				
			2 FDD for				
		config	guration 4	, 5, 6			
PBCH_RA	dB						
PBCH_RB	dB						
PSS_RA	dB						
SSS_RA	dB						
PCFICH_RB	dB						
PHICH_RA	dB		0				
PHICH_RB	dB		0				
PDCCH_RA	dB						
PDCCH_RB	dB						
PDSCH_RA	dB						
PDSCH_RB	dB						
OCNG_RA ^{Note 1}	dB						
OCNG_RB ^{Note 1}	dB						
Qrxlevmin	dBm		-140				
N_{oc}	dBm/15 kHz		-98				
RSRP	dBm/15 KHz	-infinity	-86	-102			
Ê s /I ot	dB	-infinity	12	-4			
\hat{E}_s/N_{oc}	dB	-infinity 12 -4		-4			
TreselectionEUTRAN	S		0				
SnonintrasearchP	dB	Not sent					
Thresh _{x, highP}	dB	48					
Thresh _{serving, lowP}	dB	44					
Thresh _{x, lowP} (Note 2)	dB	50					
Propagation Condition		AWGN					
Note 1: OCNG shall be used such that both cells are fully allocated							

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: This refers to the value of Thresh_{x, Low} which is included in E-UTRA system information, and is a threshold for the NR target

A.6.1.2.1.3 Test Requirements

The cell reselection delay to a higher priority E-UTRAN cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate, E-UTRAN} + T_{SI-E-UTRA}$,

Where:

 $T_{higher_priority_search}$ See clause 4.2.2.7

T_{evaluate, E-UTRAN} See Table 4.2.2.5-1 in clause 4.2.2.5

T_{SI-E-UTRA} Maximum repetition period of relevant system info blocks that needs to be received by the UE

to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority E-UTRAN cell.

A.6.1.2.2 Cell reselection to lower priority E-UTRAN

A.6.1.2.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR to E-UTRAN inter-RAT cell reselection requirements specified in clause 4.2.2.5 when the E-UTRAN cell is of lower priority.

A.6.1.2.2.2 Test Parameters

The test scenario comprises of one NR cell and one E-UTRAN cell as given in tables A.6.1.2.2.2-1, A.6.1.2.2.2-2, A.6.1.2.2.2-3 and A.6.1.2.2.2-4. The test consists of two successive time periods, with time duration of T1 and T2 respectively. Both NR cell 1 and E-UTRAN cell 2 are already identified by the UE prior to the start of the test. E-UTRAN cell 2 is of lower priority than cell 1.

Table A.6.1.2.2.2-1: Supported test configurations

Configuration	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	FDD duplex mode	
2	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	TDD duplex mode	
3	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, TDD duplex mode
	TDD duplex mode	
4	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	FDD duplex mode	
5	NR 15 kHz SSB SCS, 10 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	TDD duplex mode	
6	NR 30 kHz SSB SCS, 40 MHz bandwidth,	LTE 10 MHz bandwidth, FDD duplex mode
	TDD duplex mode	
Note: The L	JE is only required to be tested in one of the sup	ported test configurations.

Table A.6.1.2.2.2-2: General test parameters for NR to E-UTRAN cell re-selection test case

Parameter		Unit	Test	Value	Comment
			configuration		
Initial	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE camps on cell 1 in the initial
condition	Neighbour cell		1, 2, 3, 4, 5, 6	Cell2	phase.
T1 end	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2
condition	Neighbour cell		1, 2, 3, 4, 5, 6	Cell1	during T1.
T2 end	Active cell		1, 2, 3, 4, 5, 6	Cell1	The UE shall perform reselection to cell 1
condition	Neighbour cell		1, 2, 3, 4, 5, 6	Cell2	during T2 for iteration of the tests.
Access Bar	rring Information	-	1, 2, 3, 4, 5, 6	Not Sent	No additional delays in random access
					procedure.
DRX cycle	length	S	1, 2, 3, 4, 5, 6	1.28	The value shall be used for all cells in the
					test.

NR PRACH configuration index		1, 2, 3, 4, 5, 6	102	The detailed configuration is specified in
				TS 38.211 clause 6.3.3.2
E-UTRAN PRACH configuration		1, 2, 3	53	As specified in table 5.7.1-2 in
index		4, 5, 6	4	TS 36.211 [23]
T1	S	1, 2, 3, 4, 5, 6	15	T1 needs to be defined so that cell re-
				selection reaction time is taken into
				account.
T2	S	1, 2, 3, 4, 5, 6	75	T2 needs to be defined so that cell re-
				selection reaction time is taken into
				account.

Table A.6.1.2.2.2-3: Cell specific test parameters for NR cell 1

Parameter	Unit	Test configuration	Cell 1		
			T1	T2	
TDD configuration		1, 4	N/A		
		2, 5	TDDCo		
		3, 6	TDDCo		
PDSCH RMC configuration		1, 4	SR.1.1	FDD	
		2, 5	SR.1.1	TDD	
		3, 6	SR.2.1		
RMSI CORESET RMC		1, 4	CR.1.1		
configuration		2, 5	CR.1.1		
		3, 6	CR.2.1		
Dedicated CORESET RMC		1, 4	CCR.1.1		
configuration		2, 5	CCR.1.1		
		3, 6	CCR.2.1	TDD	
SSB configuration		1, 4	SSB.1	FR1	
-		2, 5	SSB.1		
		3, 6	SSB.2	FR1	
SMTC configuration		1, 4	SMT	C.2	
		2, 5	SMT	C.1	
		3, 6	SMT	C.1	
OCNG Pattern		1, 2, 3, 4, 5, 6	OP.1 defined	l in A.3.2.1	
Initial DL BWP configuration		1, 2, 3, 4, 5, 6	DLBWI	P.0.1	
Initial UL BWP configuration		1, 2, 3, 4, 5, 6	ULBWP.0.1		
RLM-RS		1, 2, 3, 4, 5, 6	SSI	3	
Qrxlevmin	dBm/SCS	1, 2, 4, 5	-14	0	
		3, 6	-13	7	
N_{oc}	dBm/SCS	1, 4	-98	3	
IV_{oc}		2, 5	-98	3	
		3, 6	-95	5	
N_{oc}	dBm/15 kHz	1, 2, 3, 4, 5, 6	-98	3	
SS-RSRP	dBm/SCS	1, 4	-102	-86	
		2, 5	-102	-86	
		3, 6	-99	-83	
Ê , /I ot	dB	1, 4	-4	12	
		2, 5			
		3, 6			
\hat{E}_{s}/N_{oc}	dB	1, 4	-4	12	
		2, 5			
		3, 6			
lo	dBm/9.36 MHz	1, 4	-68.60	-57.78	
	dBm/9.36 MHz	2, 5	-68.60	-57.78	
	dBm/38.16 MHz	3, 6	-62.50	-51.69	
Treselection	S	1, 2, 3, 4, 5, 6	0		
SnonintrasearchP	dB	1, 2, 3, 4, 5, 6	Not s	ent	

Thresh _{x, highP}	dB	1, 2, 3, 4, 5, 6	48
Thresh _{serving, lowP}	dB	1, 2, 3, 4, 5, 6	44
Thresh _{x, lowP} (Note 2)	dB	1, 2, 3, 4, 5, 6	50
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN

Note 2: This refers to the value of Thresh_{x, Low} which is included in NR system information, and is a threshold for the E-UTRA target cell

Table A.6.1.2.2.2-4: Cell specific test parameters for E-UTRA cell 2

Parameter	Unit	Ce	ell 2	
		T1	T2	
E-UTRA RF Channel			1	
number				
BWchannel	MHz		10	
OCNG Patterns defined in			D for test	
TS 36.133 [15] clause A.3.2			tion 1, 2, 3;	
			D for test	
		configura	tion 4, 5, 6	
PBCH_RA	dB			
PBCH_RB	dB			
PSS_RA	dB			
SSS_RA	dB			
PCFICH_RB	dB			
PHICH_RA	dB		0	
PHICH_RB	dB	0		
PDCCH_RA	dB			
PDCCH_RB	dB			
PDSCH_RA	dB			
PDSCH_RB	dB			
OCNG_RA ^{Note 1}	dB			
OCNG_RB ^{Note 1}	dB			
Qrxlevmin	dBm		40	
N_{oc}	dBm/15 kHz	-1	98	
RSRP	dBm/15 KHz	-84	-84	
Ê s /I ot	dB	14	14	
\hat{E}_s/N_{oc}	dB	14	14	
TreselectionEUTRAN	S	0		
SnonintrasearchP	dB	Not sent		
Thresh _{x, highP (Note 2)}	dB	48		
Thresh _{serving, lowP}	dB	44		
Thresh _{x, lowP}	dB	50		
Propagation Condition			/GN	
Note 1: OCNG shall be used such that both cells are fully allocated				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: This refers to the value of Thresh_{x, high} which is included in E-UTRA system information, and is a threshold for the NR target cell

A.6.1.2.2.3 Test Requirements

The cell reselection delay to a lower priority E-UTRAN cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 2.

The cell re-selection delay to a lower priority cell shall be less than 8 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a lower priority cell can be expressed as: T_{evaluate, E-UTRAN} + T_{SI-E-UTRAN},

Where:

T_{evaluate, E-UTRAN} See Table 4.2.2.5-1 in clause 4.2.2.5

 $T_{SI\text{-}E\text{-}UTRA}$ Maximum repetition period of relevant system info blocks that needs to be received by the UE

to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 7.68 s, allow 8 s for the cell re-selection delay to a lower priority E-UTRAN cell.

A.6.2 SA: RRC_INACTIVE state mobility

A.6.3 RRC_CONNECTED state mobility

A.6.3.1 Handover

A.6.3.1.1 Intra-frequency handover from FR1 to FR1; known target cell

A.6.3.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra frequency handover requirements specified in clause 6.1.1.2.

A.6.3.1.1.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.1.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.1.2-2, and A.6.3.1.1.2-3.

The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE may not have any timing information of cell 2.

NR shall send a RRC message implying handover to cell 2. The RRC message implying handover shall be sent to the UE during period T2, after the UE has reported Event A3. T3 is defined as the end of the last TTI containing the RRC message implying handover.

Table A.6.3.1.1.2-1: Intra-frequency handover from FR1 to FR1 test configurations

Config	Description			
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
	Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note: The UE is	Note: The UE is only required to be tested in one of the supported test configurations			

Table A.6.3.1.1.2-2: General test parameters Intra-frequency handover from FR1 to FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
A3-Offcot		dВ	0	

Hysteresis	dB	0	
Time To Trigger	S	0	
Filter coefficient		0	L3 filtering is not used
Access Barring Information	-	Not Sent	No additional delays in random access procedure.
Time offset between cells		3 μs	Synchronous cells
T1	S	5	
T2	S	≤5	
T3	S	1	

Table A.6.3.1.1.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency handover test case

Parameter		Unit		Cell 1		Cell 2			
			T1	T2	Т3	T1	T2		Т3
NR RF Channel Number				1		<u> </u>	1		
Duplex mode	Config 1		FDD TDD						
	Config 2,3								
TDD	Config 1				Not App				
TDD configuration	Config 2		TDDConf.1.1 TDDConf.2.1						
	Config 3								
DIA	Config 1	NALL-			10: N _{RI}	3,c = 52			
BW _{channel}	Config 2	MHz			10: N _{RI}				
	Config 3				40: N _{RB}				
DIA/D DIA/	Config 1				10: N _{RI}	$_{3,c} = 52$			
BWP BW	Config 2	MHz			10: N _{RI}				
DD: Cirola	Config 3				40: N _{RB}				
DRx Cycle	0	ms			Not App				
PDSCH Reference	Config 1				SR.1. ² SR.1. ²				
measurement channel	Config 2 Config 3				SR.1. SR2.1				
			-						
CORESET Reference	Config 1 Config 2				CR.1.				
Channel					CR.1. CR2.1				
	Config 3 Config 1								
TDC configuration			TRS.1.1 FDD						
TRS configuration	Config 2 Config 3		-	TRS.1.1 TDD					
OCNG Patterns	Coning 3		TRS.1.2 TDD OP.1						
SMTC Configuration				SMTC.1					
SWITC Configuration	Config 1,2				SSB.				
SSB Configuration	Config 3	_							
PDSCH/PDCCH	Config 1,2		SSB.2 FR1 15 kHz						
subcarrier spacing	Config 1,2	kHz	30 kHz						
PUCCH/PUSCH	Config 1,2					KHZ			
subcarrier spacing	Config 3	kHz			30				
PRACH configuration	Corning 5			FR1		configurati	on 1		
BWP configuration	Initial DL BWP			1 111	DLBW		OII I		
DVVI configuration	Dedicated DL				DLBW				
	BWP				DLDW	/ [.] .]			
	Initial UL BWP				ULBW	/P 0 1			
	Dedicated UL				ULBW				
	BWP				OLDV	,, ,,,,			
EPRE ratio of PSS to SSS									
EPRE ratio of PBCH DMRS to SSS									
EPRE ratio of PBCH to PBCH DMRS			0						
EPRE ratio of PDCCH DMRS to SSS		dB							
EPRE ratio of PDCCH to	EPRE ratio of PDCCH to PDCCH DMRS			Ĭ					
EPRE ratio of PDSCH D	MRS to SSS								
EPRE ratio of PDSCH to									

	o of OCNG DMRS to SSS(Note 1) o of OCNG to OCNG DMRS (Note	ARS (Note							
Note2		dBm/15kH z		-98					
Note2	Config 1,2				-6	98			
N oc	Config 3	dBm/SCS			-9	95			
Ê , /I ot		dB	8	-3.3	-3.3	- Infinity	2.36	2.36	
\hat{E}_{s}/N_{oc}	\hat{E}_{s}/N_{oc}		8	8	8	- Infinity	11	11	
SSB_RP	Config 1,2	dBm/SCS	-90	-90	-90	- Infinity	-87	-87	
SSB_KF	Config 3	dBm/SCS	-87	-87	-87	- Infinity	-84	-84	
IoNote3	Config 1,2	dBm/ 9.36MHz	-61.41	-57.06	-57.06	-61.41	-57.06	-57.06	
10.10.00	Config 3	dBm/ 38.16MHz	-55.31	-50.96	-50.96	-55.31	-50.96	-50.96	
Propagation	on condition	-		AWGN			AWGN		

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{max} to be fulfilled.

Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.1.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 72 ms from the beginning of time period T3. The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 62$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2.

This gives a total of 72 ms.

A.6.3.1.2 Intra-frequency handover from FR1 to FR1; unknown target cell

A.6.3.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 intra frequency handover requirements specified in clause 6.1.1.2.

A.6.3.1.2.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.2.2-2, and A.6.3.1.2.2-3.

The test scenario comprises of two cells on one carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.6.3.1.2.2-1: Intra-frequency handover from FR1 to FR1 test configurations

	Config	Description
1		Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
		Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
		Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
		Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is onl	y required to be tested in one of the supported test configurations

Table A.6.3.1.2.2-2: General test parameters Intra-frequency handover from FR1 to FR1

Parameter		Unit	Value	Comment
Initial conditions			Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset betwe	en cells		3 μs	Synchronous cells
T1		S	5	
T2		S	≤5	

Table A.6.3.1.2.2-3: Cell specific test parameters for NR FR1-FR1 Intra frequency handover test case

Parameter		l lm:t	Ce	II 1	Cell 2		
Parame	eter	Unit	T1	T1 T2 T1 1		T2	
NR RF Channel Number	•		1			1	
Duplex mode	Config 1		FDD		D		
Duplex mode	Config 2,3			TD	D		
	Config 1			Not App	olicable		
TDD configuration	Config 2			TDDC	onf.1.1		
	Config 3			TDDCc	onf. 2.1		
	Config 1			10: N _{RE}			
BW _{channel}	Config 2	MHz		10: N _{RE}			
	Config 3			40: N _{RB}	,c = 106		
	Config 1						
BWP BW	Config 2	MHz	10: N _{RB,c} = 52				
	Config 3						
DRx Cycle		ms					
PDSCH Reference	Config 1						
measurement channel	Config 2						
meddarement endimer	Config 3						
CORESET Reference	Config 1		_				
Channel	Config 2						
Gridinier	Config 3						
	Config 1						
TRS configuration	Config 2						
	Config 3		40: N _{RB,c} = 106 10: N _{RB,c} = 52				
OCNG Patterns							
SMTC Configuration	1						
SSB Configuration	Config 1,2						
	Config 3						
PDSCH/PDCCH	Config 1,2	- kHz					
subcarrier spacing	Config 3	IXI IZ					
PUCCH/PUSCH	Config 1,2	kHz		15 l			
subcarrier spacing	Config 3	IXI IZ		30 l	кНz		

PRACH co	onfiguration			FR1 PRACH configuration 1					
		Initial DL BWP			DLBV	VP.0.1			
		Dedicated DL			DLBV	VP.1.1			
BWP confi	guration	BWP							
DVVF COIIII	guration	Initial UL BWP			ULBV	_			
		Dedicated UL			ULBV	VP.1.1			
		BWP							
	of PSS to SS								
	of PBCH DM								
	of PBCH to F								
	EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS		dB	0					
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1)									
		, ,							
	EPRE ratio of OCNG to OCNG DMRS (Note								
1)			alDias /4 Elil I						
Note2			dBm/15kH	-98					
	Config 1,2		Z			98			
N_{oc} Note2	Config 3		dBm/SCS			95 95			
Ê , /I ot	Coming 5		dB///666	8	-0.64	-Infinity	-0.64		
\hat{E}_{s}/N_{oc}			dB	8	8	-Infinity	8		
	Config 1,2		dBm/SCS	-90	-90	-Infinity	-90		
SSB_RP	Config 3		dBm/SCS	-87	-87	-Infinity	-87		
I Noto?	Config 1,2		dBm/ 9.36MHz	-61.41	-58.71	-61.41	-58.71		
Io ^{Note3}	Config 3		dBm/ 38.16MHz	-55.31	-52.60	-55.31	-52.60		
	Propagation condition		-	AWGN AWGN			-		
Note 1:									
i e	density is ach	ieved for all OFDM sv	mhole						

- density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_{N_{\ oc}}$ to be fulfilled.
- lo levels have been derived from other parameters for information purposes. They are not settable Note 3: parameters themselves.

A.6.3.1.2.3 **Test Requirements**

The UE shall start to transmit the PRACH to Cell 2 less than 92 ms from the beginning of time period T2. The rate of correct handovers observed during repeated tests shall be at least 90%.

The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where: NOTE:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 82$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2.

This gives a total of 92 ms.

Inter-frequency handover from FR1 to FR1; unknown target cell A.6.3.1.3

A.6.3.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR1 inter frequency handover requirements specified in clause 6.1.1.2.

A.6.3.1.3.2 Test Parameters

Supported test configurations are shown in table A.6.3.1.3.2-1. Both handover delay and interruption length are tested by using the parameters in table A.6.3.1.3.2-2, and A.6.3.1.3.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.6.3.1.3.2-1: Inter-frequency handover from FR1 to FR1 test configurations

	Config	Description
1		Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
		Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
		Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
		Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only	required to be tested in one of the supported test configurations

Table A.6.3.1.3.2-2: General test parameters Inter-frequency handover from FR1 to FR1

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
T1		S	5	·
T2		S	≤5	

Table A.6.3.1.3.2-3: Cell specific test parameters for NR FR1-FR1 Inter frequency handover test case

Parameter		Unit	Ce	Cell 1		Cell 2	
Paralli	eter	Offic	T1	T2	T1	T2	
NR RF Channel Numbe	r			1	2	2	
Duplex mode	Config 1			FD	DD		
Duplex Mode	Config 2,3			TD	DD		
	Config 1			Not App	olicable		
TDD configuration	Config 2			TDDC	onf.1.1		
	Config 3			TDDC	onf.2.1		
	Config 1			10: N _{RE}	s,c = 52		
BW _{channel}	Config 2	MHz	10: N _{RB,c} = 52				
	Config 3		40: N _{RB,c} = 106				
	Config 1		10: N _{RB,c} = 52				
BWP BW	Config 2	MHz	10: N _{RB,c} = 52				
	Config 3		40: N _{RB,c} = 106				
	Config 1			TRS.1.	1 FDD		
TRS configuration	Config 2			TRS.1.	1 TDD		
	Config 3			TRS.1.	2 TDD		
DRx Cycle		ms		Not App	olicable		
PDSCH Reference	Config 1			SR.1.	1 FDD		
measurement channel	Config 2		SR.1.1 TDD				
measurement channel	Config 3			SR2.1	TDD		
	Config 1			CR.1.	1 FDD		

CORESET Re	eference	Config 2			CR.1.	1 TDD			
Channel Config 3					CR2.	1 TDD			
OCNG Pattern	าร				OF	P.1			
SMTC Configu	uration			SMTC.1					
SSB Configure	Configuration Config 1,2			SSB.1 FR1					
ū		Config 3				2 FR1			
PDSCH/PDCC	CH	Config 1,2	kHz	15 kHz					
subcarrier spa		Config 3	KITZ			kHz			
PUCCH/PUSC		Config 1,2	kHz			kHz			
subcarrier spa		Config 3	KI IZ			kHz			
PRACH config	guration				FR1 PRACH				
		Initial DL BWP				/P.0.1			
DWD		Dedicated DL BWP			DLBW	/P.1.1			
BWP		Initial UL BWP			ULBV	/P.0.1			
		Dedicated UL			ULBV	/P.1.1			
		BWP							
EPRE ratio of	PSS to SS	SS							
EPRE ratio of	PBCH DM	IRS to SSS							
EPRE ratio of	PBCH to F	PBCH DMRS							
EPRE ratio of				dB 0					
EPRE ratio of	PDCCH to	PDCCH DMRS	dB						
EPRE ratio of			ub l		Ü				
EPRE ratio of									
		MRS to SSS(Note 1)							
	OCNG to	OCNG DMRS (Note							
1)						T			
N_{oc} Note2			dBm/15kH z	-6	98	-(98		
Note2 Co	onfig 1,2			-(98	-(98		
N _{oc} Co	onfig 3		dBm/SCS	-(95	-(95		
Ê , /I ot			dB	4	4	-Infinity	5		
\hat{E}_{s}/N_{oc}			dB	4	4	-Infinity	5		
SSB RP C	onfig 1,2		dBm/SCS	-94	-94	-Infinity	-93		
SSB_RP C	onfig 3		dBm/SCS	-91	-91	-Infinity	-90		
Io ^{Note3}	onfig 1,2		dBm/ 9.36MHz	-64.59	-64.59	-70.05	-63.85		
Co	onfig 3		dBm/ 38.16MHz	-58.49	-58.49	-63.94	-57.75		
Propagation c			-		'GN		'GN		
Note 1: OC	NG shall h				cells are fully allocated and a constant total transmitted power spectral				

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.

Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.1.3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 132 ms from the beginning of time period T2. The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 122 \text{ ms}$ in the test. $T_{interrupt}$ is defined in clause 6.1.1.2.2.

This gives a total of 132 ms.

A.6.3.1.4 SA NR - E-UTRAN handover

A.6.3.1.4.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1. This test shall verify the NR to E-UTRAN handover requirements as specified in clause 6.1.2.1.

The test comprises of one NR carrier and one E-UTRA carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 9.1.2-1 is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.6.3.1.4-1. General test parameters are provided in Table A.6.3.1.4-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.6.3.1.4-3 and A.6.3.1.4-4 respectively.

Table A.6.3.1.4-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.3.1.4-2: General test parameters for SA inter-RAT E-UTRAN handover

Pai	rameter	Unit	Value	Comment
NR RF Channel Number			1	1 NR carrier frequency is used in
				the test
LTE RF Channel I	Number		2	1 E-UTRAN carrier frequency is
				used in the test
Initial conditions	Active cell		Cell 1	NR cell
	Neighbouring cell		Cell 2	E-UTRAN cell
Final condition	Active cell		Cell 2	
NR measurement	quantity		SS-RSRP	
E-UTRAN measur	E-UTRAN measurement quantity		RSRP	
b2-Threshold1		dBm	As specified in Table	Absolute NR SS-RSRP threshold
			A.6.3.1.4-3	for event B2
b2-Threshold2EU	TRAN	dBm	-98	Absolute E-UTRAN RSRP
				threshold for event B2
Hysteresis		dB	0	
TimeToTrigger		S	0	
Filter coefficient			0	L3 filtering is not used
DRX			OFF	Non-DRX test
Access Barring Information		-	Not sent	No additional delays in random
				access procedure
Time offset betwe	en cells		3 ms	Asynchronous cells

Gap pattern configuration Id		0	As specified in Table 9.1.2-1 started before T2 starts
T1	S	5	
T2	S	≤5	
T3	s	1	

Table A.6.3.1.4-3: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

Parameter	Unit	Configuration		Cell 1	
		•	T1	T2	T3
RF channel number		1, 2, 3, 4, 5, 6		1	
Duplex mode		1, 4		FDD	
		2, 3, 5, 6		TDD	
TDD Configuration		2, 5		TDDConf.1.1	
		3, 6		TDDConf.2.1	
BW _{channel}	MHz	1, 4		$N_{RB,c} = 52 (FI)$	
		2, 5		$N_{RB,c} = 52$ (TI	
		3, 6	40:	$N_{RB,c} = 106 (T$	DD)
PDSCH reference measurement		1, 4		SR.1.1 FDD	
channel		2, 5		SR.1.1 TDD	
		3, 6		SR.2.1 TDD	
CORSET reference channel		1, 4		CR.1.1 FDD	
		2, 5		CR.1.1 TDD	
		3, 6		CR.2.1 TDD	
TRS configuration		1, 4		TRS.1.1 FDD	
		2, 5		TRS.1.1 TDD	
Nation III		3, 6		TRS.1.2 TDD	
OCNG pattern ^{Note1}	1 11 1 5 1 5 1 15	1, 2, 3, 4, 5, 6		OP.1	
BWP	Initial DL BWP	1, 2, 3, 4, 5, 6		DLBWP.0.1	
	Dedicated DL BWP			DLBWP.1.1	
	Initial UL BWP			ULBWP.0.1	
	Dedicated UL BWP			ULBWP.1.1	
SMTC configuration		1, 2, 3, 4, 5, 6		SMTC.1	
SSB configuration		1, 2, 4, 5		SSB.1 FR1	
		3, 6		SSB.2 FR1	
b2-Threshold1	dBm	1, 2, 4, 5		-96	
		3, 6		-93	
EPRE ratio of PSS to SSS	dB	1, 2, 3, 4, 5, 6		0	
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to					
PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to					
PDCCH_DMRS					
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to					
PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS					
EPRE ratio of OCNG to OCNG					
DMRS				1	
N _{oc} Note2	dBm/15 KHz	1, 2, 3, 4, 5, 6	-100	-104	-100
N _{oc} Note2	dBm/SCS	1, 2, 4, 5	-100	-104	-100
		3, 6	-97	-101	-97
Ë _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	12	0	-4
Ê _s /I _{ot} Note3	dB	1, 2, 3, 4, 5, 6	12	0	-4

SS-RSRP ^{Note3}	dBm/SCS	1, 2, 4, 5	-88	-104	-104
		3, 6	-85	-101	-101
Io ^{Note3}	dBm/9.36 MHz	1, 2, 4, 5	-59.78	-73.04	-70.59
	dBm/38.16 MHz	3, 6	-53.68	-66.9448	-64.49
Propagation condition		1, 2, 3, 4, 5, 6		AWGN	
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6		1x2 Low	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: \hat{E}_s/I_{ot} , SS-RSRP, and lo levels have been derived from other parameters for information purposes.

They are not settable parameters themselves.

Table A.6.3.1.4-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

Parameter	Unit	Configuration						
			T1	T2	Т3			
RF channel number		1, 2, 3, 4, 5, 6		2				
Duplex mode		1, 2, 3	FDD					
		4, 5, 6	TDD					
TDD special subframe configuration ^{Note1}		4, 5, 6	6					
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1					
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RB,c} = 25 10 MHz: N _{RB,c} = 50 20 MHz: N _{RB,c} = 100					
PRACH		1, 2, 3		4				
ConfigurationNote2		4, 5, 6		53				
PDSCH parameters:		1, 2, 3		5 MHz: R.7 FDD				
DL Reference				10 MHz: R.3 FDD				
Measurement				20 MHz: R.6 FDD				
Channel ^{Note3}		4, 5, 6		5 MHz: R.4 TDD				
				10 MHz: R.0 TDD 20 MHz: R.3 TDD				
PCFICH/PDCCH/PHICH		1, 2, 3		5 MHz: R.11 FDD				
parameters:				10 MHz: R.6 FDD				
DL Reference				20 MHz: R.10 FDD				
Measurement		4, 5, 6		5 MHz: R.11 TDD				
Channel ^{Note3}				10 MHz: R.6 TDD				
OCNG Patterns ^{Note3}		1.0.0		20 MHz: R.10 TDD				
OCNG Patterns 1000		1, 2, 3		5 MHz: OP.20 FDD 10 MHz: OP.10 FDD				
				20 MHz: OP.17 FDD				
		4, 5, 6		5 MHz: OP.9 TDD				
		4, 5, 6		10 MHz: OP.1 TDD				
				20 MHz: OP.7 TDD				
PBCH_RA		1, 2, 3, 4, 5, 6		20 1111 121 01 11 100				
PBCH_RB		1, 2, 3, ., 3, 0						
PSS_RA								
SSS_RA								
PCFICH_RB	dB		0					
PHICH_RA								
PHICH_RB								
PDCCH_RA								

PDCCH_RB						
PDSCH_RA						
PDSCH_RB						
OCNG_RA ^{Note4}						
OCNG_RB ^{Note4}						
N _{oc} Note5	dBm/15kHz	1, 2, 3, 4, 5, 6		-98		
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	8	78	
Ês/Iot ^{Note6}	dB	1, 2, 3, 4, 5, 6	-Infinity	78	78	
RSRP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-90	-90	
SCH_RP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-90	-90	
IoNote6	dBm/9MHz	1, 2, 3, 4, 5, 6	-67.21	-58.57	-58.57	
10			+10log(N _{RB,c} /100)	+10log(N _{RB,c} /100)	+10log(N _{RB,c} /100)	
Propagation Condition		1, 2, 3, 4, 5, 6		AWGN		
Antenna Configuration		1, 2, 3, 4, 5, 6	1x2 Low			
and Correlation Matrix Note7						

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].
- Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.
- Note 6: \hat{E}_s/I_{ot} , RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.6.3.1.4.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 85 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 50 ms and is specified in clause 6.1.2.1.

 $T_{interrupt} = 35$ ms in the test; $T_{interrupt}$ is defined in clause 6.1.2.1.

This gives a total of 85 ms.

A.6.3.1.5 SA NR - E-UTRAN handover with unknown target cell

A.6.3.1.5.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE can make correct inter-RAT E-UTRAN handover when operating in standalone (SA) operation with PCell in FR1. This test shall verify the NR to E-UTRAN handover requirements for the case when the target E-UTRAN cell is unknown as specified in clause 6.1.2.1.

The test comprises of one NR carrier and one E-UTRA carrier. There are two cells and one cell on each carrier. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN neighbour cell. The test consists of two successive time periods, with time durations of T1 and T2 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable. No Gap pattern shall be configured.

A RRC message implying handover shall be sent to the UE during period T1. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.6.3.1.5-1. General test parameters are provided in Table A.6.3.1.5-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.6.3.1.5-3 and A.6.3.1.5-4 respectively.

Table A.6.3.1.5-1: Supported test configurations for SA inter-RAT E-UTRAN handover tests

Configuration	Description					
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD					
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD					
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD					
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD					
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD					
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD					
Note: The UE is	Note: The UE is only required to be tested in one of the supported test configurations					

Table A.6.3.1.5-2: General test parameters for SA inter-RAT E-UTRAN handover

Parameter		Unit	Value	Comment
NR RF Channel Number			1	1 NR carrier frequency is used in
				the test
LTE RF Channel I	Number		2	1 E-UTRAN carrier frequency is
				used in the test
Initial conditions	Active cell		Cell 1	NR cell
	Neighbouring cell		Cell 2	E-UTRAN cell
Final condition	Active cell		Cell 2	
NR measurement	quantity		SS-RSRP	
DRX			OFF	Non-DRX test
Access Barring In	formation	-	Not sent	No additional delays in random
				access procedure
Time offset between cells			3 ms	Asynchronous cells
T1		s	≤5	
T2		S	1	

Table A.6.3.1.5-3: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 1)

Parameter		Unit	Configuration	C	ell 1
				T1	T2
RF channel number			1, 2, 3, 4, 5, 6		1
Duplex mode			1, 4	I	-DD
			2, 3, 5, 6	•	ΓDD
TDD Configuration	on		2, 5	TDD	Conf.1.1
			3, 6	TDD	Conf.2.1
BW _{channel}		MHz	1, 4		= 52 (FDD)
			2, 5	10: N _{RB,0}	= 52 (TDD)
			3, 6	40: N _{RB,c}	= 106 (TDD)
PDSCH reference measurement			1, 4	SR.	1.1 FDD
channel			2, 5	SR.	1.1 TDD
			3, 6	SR.2	2.1 TDD
CORSET referen	ice channel		1, 4	CR.	1.1 FDD
			2, 5	CR.	1.1 TDD
			3, 6	CR.2	2.1 TDD
TRS configuratio	n		1, 4	TRS.	1.1 FDD
			2, 5	TRS.	1.1 TDD
			3, 6	TRS.	1.2 TDD
OCNG pattern ^{Note1}			1, 2, 3, 4, 5, 6	(OP.1
	Initial DL BWP		1, 2, 3, 4, 5, 6	DLB	WP.0.1
BWP	Dedicated DL BWP			DLE	WP.1.1

	Initial UL BWP			ULBV	VP.0.1	
	Dedicated UL BWP			ULBWP.1.1		
SMTC configurat	ion		1, 2, 3, 4, 5, 6	SM [*]	TC.1	
SSB configuration	n		1, 2, 4, 5	SSB.	1 FR1	
			3, 6	SSB.	2 FR1	
	EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6			
EPRE ratio of PB SSS	EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PB PBCH_DMRS	SCH to					
EPRE ratio of PD	CCH_DMRS to					
SSS						
EPRE ratio of PD	CCH to					
PDCCH_DMRS		dB		(0	
EPRE ratio of PD	SCH_DMRS to					
SSS						
EPRE ratio of PD	SCH to					
PDSCH_DMRS		 				
EPRE ratio of OC	ING DMRS to					
SSS	2010 0000	-				
EPRE ratio of OC	ING TO OUNG					
N _{oc} ^{Note2}		dBm/15 KHz	100156		98	
		dBm/SCS	1, 2, 3, 4, 5, 6		98	
N _{oc} Note2		ubii/3C3	1, 2, 4, 5 3, 6		96 95	
Ê _s /N _{oc}		dB	1, 2, 3, 4, 5, 6	0	0	
Ê _s /I _{ot} Note3		dB	1, 2, 3, 4, 5, 6	0	0	
SS-RSRP ^{Note3}		dBm/SCS	1, 2, 4, 5	-98	-98	
OO RORI		dBill/000	3, 6	-95	-95	
Io ^{Note3}	I Note?		1, 2, 4, 5	-67.04	-67.04	
10.1888		dBm/38.16 MHz	3, 6	-60.94	-60.94	
Propagation cond			1, 2, 3, 4, 5, 6		/GN	
Antenna Configu Correlation Matrix			1, 2, 3, 4, 5, 6	1x2 Low		

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: \hat{E}_s/I_{ot} , SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.3.1.5-4: Cell specific test parameters for SA inter-RAT E-UTRA handover (Cell 2)

Parameter	Unit	Configuration	Cell 2	
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6		2
Duplex mode		1, 2, 3	FDD	
		4, 5, 6	TI	DD
TDD special subframe configuration ^{Note1}		4, 5, 6		3
TDD uplink-downlink configuration ^{Note1}		4, 5, 6		1
BW _{channel}	MHz	1, 2, 3, 4, 5, 6		l _{RB,c} = 25 N _{RB,c} = 50

			20 MHz: N	_{RB,c} = 100			
PRACH Configuration ^{Note2}		1, 2, 3	4				
		4, 5, 6	53	3			
PDSCH parameters:		1, 2, 3	5 MHz: F	5 MHz: R.7 FDD			
DL Reference Measurement			10 MHz: I	R.3 FDD			
Channel ^{Note3}			20 MHz: I	R.6 FDD			
		4, 5, 6	5 MHz: F	R.4 TDD			
			10 MHz: I	R.0 TDD			
			20 MHz: I	R.3 TDD			
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R	.11 FDD			
parameters:			10 MHz: I	R.6 FDD			
DL Reference Measurement			20 MHz: F	R.10 FDD			
Channel ^{Note3}		4, 5, 6	5 MHz: R	.11 TDD			
		, ,	10 MHz: I	R.6 TDD			
			20 MHz: F	R.10 TDD			
OCNG Patterns ^{Note3}		1, 2, 3	5 MHz: OF	P.20 FDD			
			10 MHz: O	10 MHz: OP.10 FDD			
			20 MHz: OP.17 FDD				
		4, 5, 6	5 MHz: OP.9 TDD				
		, ,	10 MHz: OP.1 TDD				
			20 MHz: OP.7 TDD				
PBCH_RA		1, 2, 3, 4, 5, 6					
PBCH_RB							
PSS_RA							
SSS_RA							
PCFICH_RB							
PHICH_RA							
PHICH_RB	dB		0	0			
PDCCH_RA							
PDCCH_RB							
PDSCH_RA							
PDSCH_RB							
OCNG_RA ^{Note4}							
OCNG_RB ^{Note4}							
N _{oc} Note5	dBm/15kHz	1, 2, 3, 4, 5, 6	-9	8			
Ês/Noc	dB	1, 2, 3, 4, 5, 6	-Infinity	7			
Ê _s /I _{ot} Note6	dB	1, 2, 3, 4, 5, 6	-Infinity	7			
RSRP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-91			
SCH_RP ^{Note6}			-Infinity	-91			
O ^{Note6}	dBm/9MHz	1, 2, 3, 4, 5, 6	-70.22	-62.43			
Propagation Condition		1, 2, 3, 4, 5, 6	AW	GN			
Antenna Configuration and Correlation Matrix Note7		1, 2, 3, 4, 5, 6	1x2 l				

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].
- Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.
- Note 6: \hat{E}_s/I_{ot} , RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.6.3.1.5.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 165 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 50 ms and is specified in clause 6.1.2.1.

 $T_{interrupt} = 115$ ms in the test; $T_{interrupt}$ is defined in clause 6.1.2.1.

This gives a total of 165 ms.

A.6.3.2 RRC Connection Mobility Control

A.6.3.2.1 SA: RRC Re-establishment

A.6.3.2.1.1 Intra-frequency RRC Re-establishment in FR1

A.6.3.2.1.1.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR1 with known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.6.3.2.1.1.1-1, table A.6.3.2.1.1.1-2 and table A.6.3.2.1.1.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.3.2.1.1.1-1: Supported test configurations

Co	nfiguration	Description				
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note:	Note: The UE is only required to be tested in one of the supported test configurations.					

Table A.6.3.2.1.1.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1

	Parameter		Test configuration	Value	Comment
Initial Active cell			1, 2, 3	Cell1	
condition	Neighbour cells		1, 2, 3	Cell2	
Final condition	Active cell		1, 2, 3	Cell2	
RF Channe	el Number		1, 2, 3	1	
Time offse	t between cells		1	3 ms	Asynchronous cells
			2	3 µs	Synchronous cells
			3	3 μs	Synchronous cells
N310	N310		1, 2, 3	1	Maximum consecutive out-of-sync indications from lower layers
N311	N311		1, 2, 3	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1, 2, 3	0	Radio link failure timer;
T311		ms	1, 2, 3	3000	RRC re-establishment timer
Access Barring Information		-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB config	SSB configuration		1	SSB.1 FR1	
			2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC con	SMTC configuration		1	SMTC.2	

		2	SMTC.1	
		3	SMTC.1	
DRX cycle length	S	1, 2, 3	OFF	
PRACH configuration		1, 2, 3	FR1 PRACH configurati	Table A.3.8.2.1-1
T1	S	1, 2, 3	on 1 5	
T2	ms	1, 2, 3	200	Time for the UE to detect RLF
T3	S	1, 2, 3	2	

Table A.6.3.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter	Unit	Test		Cell 1		Cell 2			
		configuration	T1	T2	T3	T1	T2	T3	
TDD configuration		1		N/A			N/A		
-		2	Т	DDConf.1.	1	Т	TDDConf.1.1		
		3	Т	DDConf.2.	1	TDDConf.2.1			
PDSCH RMC		1	5	SR.1.1 FDD		SR.1.1 FDD			
configuration									
-		2		R.1.1 TDD			SR.1.1 TDI		
		3	SR.2.1 TDD			9	SR.2.1 TDI)	
RMSI CORESET		1	CR.1.1 FDD			(CR.1.1 FDI)	
RMC configuration		2		CR.1.1 TDD)	(CR.1.1 TDI)	
		3		CR.2.1 TDD)	(CR.2.1 TDI)	
Dedicated CORESET		1	С	CR.1.1 FDI)	С	CR.1.1 FD	D	
RMC configuration		2		CR.1.1 TDI			CR.1.1 TD		
-		3		CR.2.1 TDI			CR.2.1 TD		
OCNG Pattern		1, 2, 3	OP.1 c	OP.1 defined in A.3.2.1 OP.1 defined in A.3.2					
TRS configuration		1		RS.1.1 FDI		TRS.1.1 FDD			
· ·		2		RS.1.1 TDI		TRS.1.1 TDD			
		3				RS.1.2 TD			
Initial DL BWP		1, 2, 3				DLBWP.0.			
configuration		, ,							
Initial UL BWP		1, 2, 3	ULBWP.0.1		ULBWP.0.1				
configuration		, ,	0						
Active DL BWP		1, 2, 3	DLBWP.	N/A	N/A	N/A	N/A	DLBW	
confgiuration			1.1					P.1.1	
Active UL BWP		1, 2, 3	ULBWP.	N/A	N/A	N/A	N/A	ULBW	
configuration			1.1					P.1.1	
RLM-RS		1, 2, 3		SSB			SSB		
Ê s /I ot	dB	1	1.54	-infinity	-infinity	-3.79	4	4	
		2							
		3							
N_{oc} Note2	dBm/SCS	1			-98				
TV _{oc} Noise		2			-98				
		3			-95				
Note2	dBm/15 kHz	1			-98				
N_{oc} Note2		2							
		3	1						
\hat{E}_{s}/N_{oc}	dB	1	7	-infinity	-infinity	4	4	4	
		2			,				
		3							
SS-RSRP Note3	dBm/SCS	1	-91	-infinity	-infinity	-94	-94	-94	
		2	-91	-infinity	-infinity	-94	-94	-94	
		3	-88	-infinity	-infinity	-91	-91	-91	
lo	dBm/9.36 MHz	1	-60.74	-64.59	-64.59	-60.74	-64.59	-64.59	
	dBm/9.36 MHz	2	-60.74	-64.59	-64.59	-60.74	-64.59	-64.59	

		dBm/38.16 MHz	3	-54.65	-58.50	-58.50	-54.65	-58.50	-58.50
Propagati	ion		1, 2, 3	AWGN					
Condition									
Note 1:	Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density							density	
	is achieved for all OFDM symbols.								
Note 2:	Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers					carriers			
	λI								
	and time and shall be modelled as AWGN of appropriate power for $^{IV}_{oc}$ to be fulfilled.								
Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable									
parameters themselves.									

A.6.3.2.1.1.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to a known NR intra frequency cell shall be less than 1.6 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-establish delay}} = T_{UL \text{ grant}} + T_{UE \text{ re-establish delay}}$$

Where:

 $T_{UL_grant} = It$ is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \text{ ms} + T_{identify_intra_NR} + \sum_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

$$N_{freq} = 1$$

 $T_{identify_intra_NR} = 200 \ ms$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target intra-frequency NR cell.

T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 1545 ms, allow 1.6 s in the test case.

A.6.3.2.1.2 Inter-frequency RRC Re-establishment in FR1

A.6.3.2.1.2.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay in FR1 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.6.3.2.1.2.1-1, table A.6.3.2.1.2.1-2 and table A.6.3.2.1.2.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the UE has the context of the carrier frequency of cell 2 by the end of T1.

Table A.6.3.2.1.2.1-1: Supported test configurations

1	15 kHz SSB SCS, 10 MHz bandwidth, FDD	15 kHz SSB SCS, 10 MHz bandwidth, FDD				
	duplex mode	duplex mode				
2	15 kHz SSB SCS, 10 MHz bandwidth, TDD	15 kHz SSB SCS, 10 MHz bandwidth, TDD				
	duplex mode	duplex mode				
3	30 kHz SSB SCS, 40 MHz bandwidth, TDD	30 kHz SSB SCS, 40 MHz bandwidth, TDD				
duplex mode duplex mode						
Note: The UE is only required to be tested in one of the supported test configurations.						

Table A.6.3.2.1.2.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR1

	Parameter	Unit	Test configuration	Value	Comment
Initial	Active cell		1, 2, 3	Cell1	
condition	Neighbour cells		1, 2, 3	Cell2	
Final condition	Active cell		1, 2, 3	Cell2	
RF Channe	el Number		1, 2, 3	1, 2	
Time offse	t between cells		1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
N310		-	1, 2, 3	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1, 2, 3	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1, 2, 3	0	Radio link failure timer;
T311	T311			5000	RRC re-establishment timer
Access Ba	rring Information	-	1, 2, 3 1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB config	guration		1	SSB.1 FR1	
	,		2	SSB.1 FR1	
			3	SSB.2 FR1	
SMTC con	figuration		1	SMTC.2	
			2	SMTC.1	
			3	SMTC.1	
DRX cycle	length	S	1, 2, 3	OFF	
PRACH co	PRACH configuration		1, 2, 3	FR1	Table A.3.8.2.1-1
				PRACH	
				configurati	
				on 1	
T1		S	1, 2, 3	5	
T2		ms	1, 2, 3	200	Time for the UE to detect RLF
T3		S	1, 2, 3	5	

Table A.6.3.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR1

Parameter	Unit	Test		Cell 1		Cell 2				
		configuration	T1	T1 T2 T3		T1 T2		T3		
RF Channel Number		1, 2, 3		1	2					
TDD configuration		1	N/A				N/A			
		2	TDDConf.1.1			TDDConf.1.1				
		3	-	TDDConf.2.	1	TDDConf.2.1				
PDSCH RMC configuration		1	SR.1.1 FDD			SR.1.1 FDD SR.			SR.1.1 FD)
-		2	SR.1.1 TDD				SR.1.1 TDE)		
		3		SR.2.1 TDD	1	SR.2.1 TDD				

RMSI CORESET		1		CR.1.1 FDC)		CR.1.1 FD)
RMC configuration		2		CR.1.1 TDD			R.1.1 TDI	
		3		CR.2.1 TDD		CR.2.1 TDD		
Dedicated CORESET		1		CR.1.1 FDI		CCR.1.1 FDD		
RMC configuration		2		CR.1.1 TDI			CR.1.1 TD	
		3		CR.2.1 TDI		CCR.2.1 TDD		
OCNG Pattern		1, 2, 3		defined in A			defined in A	
TRS configuration		1		RS.1.1 FDI			RS.1.1 FD	
3		2		RS.1.1 TDI			RS.1.1 TD	
		3		RS.1.2 TDI			RS.1.2 TD	
Initial DL BWP		1, 2, 3		DLBWP.0.1			DLBWP.0.	
configuration		, , -						
Initial UL BWP		1, 2, 3	l	JLBWP.0.1		Į	JLBWP.0.	1
configuration		, ,						
Active DL BWP		1, 2, 3	DLBWP.	N/A	N/A	N/A	N/A	DLBW
confgiuration			1.1					P.1.1
Active UL BWP		1, 2, 3	ULBWP.	N/A	N/A	N/A	N/A	ULBW
configuration			1.1					P.1.1
RLM-RS		1, 2, 3		SSB			SSB	
Ê s /I ot	dB	1	4	-infinity	-infinity	-infinity	-infinity	7
		2						
		3						
N_{oc} Note2	dBm/SCS	1			-98			
1 Voc		2			-98			
		3			-95			
N_{oc} Note2	dBm/15 kHz	1			-98			
T voc		2						
		3						
\hat{E}_{s}/N_{oc}	dB	1	4	-infinity	-infinity	-infinity	-infinity	7
		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-94	-infinity	-infinity	-infinity	-infinity	-91
		2	-94	-infinity	-infinity	-infinity	-infinity	-91
		3	-91	-infinity	-infinity	-infinity	-infinity	-88
lo	dBm/9.36 MHz	1	-64.59	-70.05	-70.05	-70.05	-70.05	-62.26
	dBm/9.36 MHz	2	-64.59	-70.05	-70.05	-70.05	-70.05	-62.26
	dBm/38.16 MHz	3	-58.50	-63.94	-63.94	-63.94	-63.94	-56.15
Propagation Condition		1, 2, 3		AWGN				

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for $rac{N_{oc}}{}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.2.1.2.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less than 3 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-establish_delay}} = T_{UL_grant} + T_{UE_re\text{-establish_delay}}.$$

Where:

 $T_{UL_grant} = It$ is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \; ms + T_{identify_intra_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{freq}=2\,$

 $T_{identify\ intra\ NR} = 800\ ms$

 $T_{identify_inter_NR} = 800 \ ms$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target inter-frequency NR cell.

T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 2945 ms, allow 3 s in the test case.

A.6.3.2.1.3 Intra-frequency RRC Re-establishment in FR1 without serving cell timing

A.6.3.2.1.3.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR1 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.6.3.2.1.3.1-1, table A.6.3.2.1.3.1-2 and table A.6.3.2.1.3.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.6.3.2.1.3.1-1: Supported test configurations

C	onfiguration	Description
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	quired to be tested in one of the supported test configurations.

Table A.6.3.2.1.3.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter		Unit	Test configuration	Value	Comment
Initial	Active cell		1, 2, 3	Cell1	
condition	Neighbour cells		1, 2, 3	Cell2	
Final condition	Active cell		1, 2, 3	Cell2	
RF Channe	el Number		1, 2, 3	1	
Time offse	t between cells		1	3 ms	Asynchronous cells
			2	3 μs	Synchronous cells
			3	3 μs	Synchronous cells
N310		-	1, 2, 3	1	Maximum consecutive out-of-sync indications from lower layers

N311	-	1, 2, 3	1	Minimum consecutive in-sync indications from lower layers
T310	ms	1, 2, 3	6000	Radio link failure timer configured by RLF-TimersAndConstants
T311	ms	1, 2, 3	3000	RRC re-establishment timer
Access Barring Information	-	1, 2, 3	Not Sent	No additional delays in random access procedure.
SSB configuration		1	SSB.1 FR1	
_		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
DRX cycle length	S	1, 2, 3	OFF	
PRACH configuration		1, 2, 3	FR1	Table A.3.8.2.1-1
_			PRACH	
			configurati	
			on 1	
T1	S	1, 2, 3	5	
T2	S	1, 2, 3	6	Time for the UE to detect RLF
T3	S	1, 2, 3	3	

Table A.6.3.2.1.3.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR1

Parameter	Unit	Test	Cell 1			Cell 2			
		configuration	T1	T2	T3	T1	T2	Т3	
TDD configuration		1		N/A		N/A			
		2	TI	DDConf.1.	1	Т	TDDConf.1.1		
		3	TI	DDConf.2.	1	Т	DDConf.2.	1	
PDSCH RMC		1	S	R.1.1 FDD)		SR.1.1 FDE)	
configuration									
		2	S	R.1.1 TDD)		SR.1.1 TDE		
		3		R.2.1 TDD			SR.2.1 TDD		
RMSI CORESET		1	С	R.1.1 FDD)		CR.1.1 FDE		
RMC configuration		2	С	R.1.1 TDD)		CR.1.1 TDE)	
		3		R.2.1 TDD			CR.2.1 TDE		
Dedicated CORESET		1	C	CR.1.1 FDI)	С	CR.1.1 FD	D	
RMC configuration		2		CR.1.1 TDI			CR.1.1 TD		
		3	CCR.2.1 TDD			CCR.2.1 TDD			
OCNG Pattern		1, 2, 3	OP.1 defined in A.3.2.1			OP.1 defined in A.3.2.1			
TRS Configuration		1	TF	RS.1.1.FDI)	TRS.1.1.FDD			
		2		RS.1.1.TDI			RS.1.1.TDD		
		3	TF	RS.1.2.TDI)	Т	RS.1.2.TDI	D	
Initial DL BWP configuration		1, 2, 3		DLBWP.0.1			DLBWP.0.1		
Initial UL BWP		1, 2, 3	1	JLBWP.0.1		1	JLBWP.0.1		
configuration		1, 2, 0		JEDWI .0.1		`	JEDVVI .0.1		
RLM-RS		1, 2, 3		SSB			SSB		
Ê s /I ot	dB	1	4	-infinity	-infinity	-infinity	-infinity	4	
		2							
		3							
N_{ac} Note2 dBm/SCS		1			-98				
TV _{oc} Note2		2	-98						
		3	-95						
Note2	dBm/15 kHz	1	-98						
N_{oc} Note2		2							
		3							
	dB	1	4	-infinity	-infinity	-infinity	-infinity	4	

\hat{E}_{s}/N_{oc}		2						
		3						
SS-RSRP Note3	dBm/SCS	1	-94	-infinity	-infinity	-infinity	-infinity	-94
		2	-94	-infinity	-infinity	-infinity	-infinity	-94
		3	-91	-infinity	-infinity	-infinity	-infinity	-91
lo	dBm/9.36 MHz	1	-64.59	-infinity	-infinity	-infinity	-infinity	-64.59
	dBm/9.36 MHz	2	-64.59	-infinity	-infinity	-infinity	-infinity	-64.59
	dBm/38.16 MHz	3	-58.50	-infinity	-infinity	-infinity	-infinity	-58.50
Propagation		1, 2, 3			AWG	N		
Condition								

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.2.1.3.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell without serving cell timing shall be less than 2.2 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-establish_delay}} = T_{UL_grant} + T_{UE_re\text{-establish_delay}}.$$

Where:

 $T_{UL_grant} = It$ is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \; \text{ms} \; + T_{identify_intra_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{freq} = 1$

 $T_{identify_intra_NR} = 800 \text{ ms}$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 [2] for the target intra-frequency NR cell.

T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 2145 ms, allow 2.2 s in the test case.

A.6.3.2.2 Random Access

A.6.3.2.2.1 Contention based random access test in FR1 for NR standalone

A.6.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.6.3.2.2.1.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.6.3.2.2.1.1-2.

Table A.6.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR1 for NR standalone

	Config	Description
	1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	2	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations depending on UE

Table A.6.3.2.2.1.1-2: General test parameters for contention based random access test in FR1 for NR Standalone

Parameter		Unit	Test-1	Comments
SSB Configuration	Config 1		SSB pattern 1 in FR1	As defined in A.3.10,
	Config 2		SSB pattern 2 in FR1	except for number of
				SSBs per SS-burst and
				SS/PBCH block index as
				below
Number of SSBs per SS	-burst		2	Different from the
				definition in A.3.10
SS/PBCH block index			0,1	Different from the
	1			definition in A.3.10
Duplex Mode for Cell 1	Config 1		FDD	
	Config 2		TDD	
TDD Configuration	Config 2		TDDConf.2.1	
CSI-RS for tracking	Config 1		TRS.1.1 FDD	
	Config 2		TRS.1.2 TDD	
OCNG Pattern Note 1			OP.1	As defined in A.3.2.1.
PDSCH parameters	Config 1		SR.1.1 FDD	As defined in A.3.1.1.
11010 4	Config 2		SR.2.1 TDD	
RMSI CORESET	Config 1		CR.1.1 FDD	
Reference Channel				
	Config 2		CR.2.1 TDD	
Dedicated CORESET	Config 1		CCR.1.1 FDD	
Reference Channel				
	Config 2		CCR.2.1 TDD	
NR RF Channel Number			1	
EPRE ratio of PSS to SSS		dB		
EPRE ratio of PBCH_DMRS to SSS		dB		
EPRE ratio of PBCH to PBCH_DMRS		dB	0	
EPRE ratio of PDCCH_DMRS to SSS		dB] "	
EPRE ratio of PDCCH to PDCCH_DMRS		dB		
EPRE ratio of PDSCH_DMRS to SSS		dB		

EPRE ratio of PDSCH to PDSCH_DMRS		dB				
\hat{E}_{s}/I_{ot}		dB	3	Power of SSB with index		
SSB with index 0	N_{oc}	Config 1	dBm/15kHz	-98	0 is set to be above	
		Config 2		-101	configured rsrp- ThresholdSSB	
	\hat{E}_s/N_{oc}		dB	3		
	SS-RSR	P Note 3	dBm/ SCS	-95		
	\hat{E}_{s}/I_{ot}		dB	-17	Power of SSB with index	
SSB with index 1	N_{oc}	Config 1	dBm/15kHz	-98	1 is set to be below	
		Config 2		-101	configured rsrp- ThresholdSSB	
	\hat{E}_{s}/N_{oc}		dB	-17		
	SS-RSRP Note 3		dBm/ SCS	-115		
lo Note 2 Config 1 Config 2		dBm	-65.3/9.36MHz	For symbols without SSB		
		Config 2		-62.2/38.16MHz	index 1	
ss-PBCH-Blo	ss-PBCH-BlockPower		dBm/ SCS	-5	As defined in clause	
	55-F DCI I-DIOCKF OWEI				6.3.2 in TS 38.331 [2].	
Configured UE transmitted power (dBm	23	As defined in clause		
P _{CMAX, f, c})				6.2.4 in TS 38.101-1.		
PRACH Configuration			FR1 PRACH configuration 1	As defined in A.3. 8.		
Propagation Condition		-	AWGN			

- Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
- Note 2: SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not settable parameters.
- Note 3: Void
- Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

A.6.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.6.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

A.6.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

A.6.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

A.6.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.6.3.2.2.2 Non-Contention based random access test in FR1 for NR standalone

A.6.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used and configured as PCell in FR1. Supported test parameters are shown in Table A.6.3.2.2.2.1-1. UE capable of SA with PCell in FR1 needs to be tested by using the parameters in Table A.6.3.2.2.2.1-2 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2). Test 2 is only applicable to UE which supports csi-RSRP-AndRSRQ-MeasWithSSB or csi-RSRP-AndRSRQ-MeasWithoutSSB.

Table A.6.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR1 for NR standalone

	Config Description	
1 NR 15 kHz SSB SCS, 10 MHz bandwidth		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	2	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only recapability	equired to be tested in one of the supported test configurations depending on UE

Table A.6.3.2.2.1-2: General test parameters for non-contention based random access test in FR1 for NR Standalone

Parameter		Unit	Test-1	Test-2	Comments
SSB Configuration	Config 1		SSB pattern 1 in	SSB pattern 1 in	As defined in
			FR1	FR1	A.3.10, except for
	Config 2		SSB pattern 2 in	SSB pattern 2 in	number of SSBs per
			FR1	FR1	SS-burst and
					SS/PBCH block
					index as below
Number of SSBs per SS-burst			2	2	Different from the
					definition in A.3.10
SS/PBCH block index			0,1	0,1	Different from the
					definition in A.3.10
CSI-RS Configuration	Config 1		N/A	CSI-RS.1.1 FDD	As defined in
	Config 2			CSI-RS.2.1 TDD	A.3.1.4
Duplex Mode for Cell 1	Config 1		FDD	FDD	
	Config 2		TDD	TDD	
TDD Configuration	Config 2		TDDConf.2.1	TDDConf.2.1	
CSI-RS for tracking	Config 1		TRS.1.1 FDD	TRS.1.1 FDD	
	Config 2		TRS.1.2 TDD	TRS.1.2 TDD	
OCNG Pattern Note 1			OP.1	OP.1	As defined in A.3.2.1.
RMSI CORESET Reference Channel	Config 1		CR.1.1 TDD	CR.1.1 TDD	
	Config 2		CR.2.1 TDD	CR.2.1 TDD	

Dedicated C	-	Config 1		CCR.1.1 TDD	CCR.1.1 TDD		
		Config 2		CCR.2.1 TDD	CCR.2.1 TDD		
PDSCH para	ameters	Config 1		SR.1.1 FDD	SR.1.1 FDD	As defined in	
Note 4	Note 4 Config 2			SR.2.1 TDD	SR.2.1 TDD	A.3.1.1.	
NR RF Char	nel Numbe	r		1	1		
EPRE ratio	of PSS to S	SS	dB				
EPRE ratio	of PBCH_D	MRS to SSS	dB				
EPRE ratio	of PBCH to	PBCH_DMRS	dB				
EPRE ratio	of PDCCH_	DMRS to SSS	dB	0	0		
EPRE ratio	of PDCCH t	o PDCCH_DMRS	dB				
EPRE ratio	of PDSCH_	DMRS to SSS	dB				
EPRE ratio	of PDSCH to	o PDSCH_DMRS	dB				
	\hat{E}_{s}/I_{ot}		dB	3	3	Power of SSB with	
SSB with	N_{oc}	Config 1	dBm/15kHz	-98	-98	index 0 is set to be	
index 0	1 oc	Config 2	1	-101	-101	above configured rsrp-ThresholdSSB	
	\hat{E}_{s}/N_{oc}		dB	3	3	Torp Timedinalace	
	SS-RSRP Note 3		dBm/ SCS	-95	-95		
	\hat{E}_s / I_{ot}		dB	-17	-17	Power of SSB with	
SSB with	N_{oc}	Config 1	dBm/15kHz	-98	-98	index 1 is set to be	
index 1	1 voc	Config 2		-101	-101	below configured rsrp-ThresholdSSB	
	\hat{E}_s/N_{oc}		dB	-17	-17	. TSTP-TTTTeSTTOIGGGD	
	SS-RSR	P Note 3	dBm/ SCS	-115	-115		
Note 2		Config 1	dBm	-65.3/9.36MHz	-65.3/9.36MHz	For symbols without	
IO Note 2		Config 2	1	-62.2/38.16MHz	-62.2/38.16MHz	SSB index 1	
ss-PBCH-BlockPower		dBm/ SCS	-5	-5	As defined in clause 6.3.2 in TS 38.331 [2].		
Configured UE transmitted power ($P_{\text{CMAX}, \text{L.c.}}$		dBm	23	23	As defined in clause 6.2.4 in TS 38.101-1.		
PRACH Configuration			FR1 PRACH configuration 2	FR1 PRACH configuration 3	As defined in A.3.8.2.		
Propagation	Condition		-	AWGN	AWGN		

Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: SS-RSRP, Es/lot and lo levels have been derived from other parameters for information purpose. They are not settable parameters.

Note 3: Void

Note 4: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

A.6.3.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.6.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for SSB-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-2, to test the UE behavior specified in Clause 6.2.2.2.2.1 for CSI-RS-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. In response to the first 4 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 5 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 4 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be -22 dBm with an accuracy specified in clause 6.3.4.2 of TS 38.101-1 [18]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-1 [18].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.6.3.2.3 SA: RRC Connection Release with Redirection

A.6.3.2.3.1 Redirection from NR in FR1 to NR in FR1

A.6.3.2.3.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to NR requirements specified in clause 6.2.3.2.1.

A.6.3.2.3.1.2 Test Parameters

Supported test configurations are shown in table A.6.3.2.3.1.2-1. The time delay is tested by using the parameters in table A.6.3.2.3.1.2-2, and A.6.3.2.3.1.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2. Cell 1 and Cell 2 belong to different tracking areas.

Table A.6.3.2.3.1.2-1: Redirection from NR to NR test configurations

Config	Description				
1	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2	Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
	Target cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3	Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
	Target cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note: The UE is o	nly required to be tested in one of the supported test configurations				

Table A.6.3.2.3.1.2-2: General test parameters for Redirection from NR to NR test case

Parameter		Unit	Value	Comment
Initial conditions Active cell			Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Filter coefficient	Filter coefficient		0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		S	5	
T2		S	2.3	

Table A.6.3.2.3.1.2-3: Cell specific test parameters for Redirection from NR to NR test case

Parameter	Unit	Cell 1		Cell 2	
Parameter	Unit	T1	T2	T1	T2

NR RF Channel Number	r	T	1 2
	Config 1	+	FDD
Duplex mode	Config 2,3		TDD
	Config 1		SSB.1 FR1
SSB Configuration	Config 2	_	SSB.1 FR1
	Config 3 Config 1		SSB.2 FR1 TRS.1.1 FDD
CSI-RS for tracking	Config 2	+ -	TRS.1.1 TDD
OUT TO TOT TRACKING	Config 3		TRS.1.2 TDD
	Config 1		Not Applicable
TDD configuration	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
	Config 1		10: N _{RB,c} = 52
BW _{channel}	Config 2	MHz	10: N _{RB,c} = 52
	Config 3		40: N _{RB,c} = 106
	Config 1		10: N _{RB,c} = 52
BWP BW	Config 2	MHz	10: N _{RB,c} = 52
	Config 3		$40: N_{RB,c} = 106$
DRx Cycle		ms	Not Applicable
	Config 1		SR.1.1 FDD
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD
	Config 3		SR2.1 TDD
	Config 1		CR.1.1 FDD
CORESET Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR2.1 TDD
OCNG Patterns			OCNG pattern 1
	Config 1,2		SMTC.1 FR1
SMTC configuration	Config 3		SMTC.2 FR1
PDSCH/PDCCH	Config 1,2		15 kHz
subcarrier spacing	Config 3	⊢ kHz ⊢	30 kHz
	Config 1,2		15 kHz
PUCCH/PUSCH subcarrier spacing	Config 3	kHz	
PRACH configuration	Coming o	+	30 kHz FR1 PRACH configuration 1
•	Later DL DVAD		
BWP configuration	Initial DL BWP	1	DLBWP.0.1
	Dedicated DL BWP		DLBWP.1.1
	Initial UL BWP		ULBWP.0.1
	Dedicated UL BWP		ULBWP.1.1
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to PDCCH DMRS		dB	0

EPRE ratio	o of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH							
EPRE ratio	o of OCNG DMRS to SSS(Note 1)						
EPRE ratio	o of OCNG to OCNG DMRS (Note						
1)							
Note2 N oc		dBm/15kH z		-98			
. Note2	Config 1,2			-6	8		
N oc	Config 3		-95				
$\hat{\mathbf{E}}_{ ext{s}}/\mathbf{I}_{ ext{ot}}$		dB	4	4	-infinity	4	
\hat{E}_s/N_{oc}		dB	4	4	-infinity	4	
Io ^{Note3}	Config 1,2	dBm/ 9.36MHz	-64.59	-64.59	-70.05	-64.59	
10.12.00	Config 3	dBm/ 38.16MHz	-58.49	-58.49	-63.94	-58.49	
Propagation condition		-		AW	GN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.

Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.3.2.3.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 2240 ms from the beginning of time period T2. The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

$$T_{connection_release_redirect_NR} = T_{RRC_procedure_delay} + T_{identify_NR} + T_{SI_NR} + T_{RACH},$$

where:

 $T_{RRC_procedure_delay} = 110$ msin the test.

 $T_{\text{identify-NR}} = 680 \ \text{ms}$ in the test.

 T_{SI-NR} = 1280 ms, it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target NR cell.

 $T_{RACH} = 170 \text{ ms in the test.}$

This gives a total of 2240 ms.

A.6.3.2.3.2 Redirection from NR in FR1 to E-UTRAN

A.6.3.2.3.2.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to E-UTRAN requirements specified in clause 6.2.3.2.2.

A.6.3.2.3.2.2 Test Parameters

Supported test configurations are shown in table A.6.3.2.3.2.2-1. The time delay is tested by using the parameters in table A.6.3.2.3.2.2-2, A.6.3.2.3.2.2-3 and A.6.3.2.3.2.2-4.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.6.3.2.3.2.2-1: Redirection from NR to E-UTRAN test configurations

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.3.2.3.2.2-2: General test parameters for Redirection from NR to E-UTRAN test case

Parameter		Unit	Value	Comment
Initial conditions			Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		S	5	
T2		S	2.3	

Table A.6.3.2.3.2.2-3: Cell specific test parameters for Redirection from NR to E-UTRAN (cell 1)

Parameter		Unit	Cel	l1
Param	eter	Unit	T1	T2
RF Channel Number			1	
Duplex mode	Config 1,4	<u> </u>	FD	D
Bupiex mode	Config 2,3,5,6		TD	
	Config 1	⊣ ⊢	SSB.1	
SSB Configuration	Config 2	_	SSB.1	
	Config 3		SSB.2	
	Config 1	→	TRS.1.	
CSI-RS for tracking	Config 2	⊣ ⊢	TRS.1.	
	Config 3		TRS.1.	
	Config 1,4	<u> </u>	Not App	olicable
TDD configuration	Config 2,5		TDDCc	onf.1.1
	Config 3,6		TDDCc	onf.2.1
	Config 1,4		10: N _{RB}	s,c = 52
BW _{channel}	Config 2,5	MHz	10: N _{RB}	s,c = 52
	Config 3,6		40: N _{RB,c} = 106	
	Config 1,4		10: N _{RB,c} = 52	
BWP BW	Config 2,5	MHz	MHz 10: N _{RB,c} = 52	
	Config 3,6		40: N _{RB,c} = 106	
DRx Cycle		ms	Not App	olicable
PDSCH Reference measurement channel Config 1,4			SR.1.1	FDD

		Config 2,5		SR.1.1	I TDD	
		Config 3,6		SR2.1	TDD	
		Config 1,4		CR.1.	I FDD	
CORESET Channel	Reference	Config 2,5		CR.1.	I TDD	
		Config 3,6		CR2.1	TDD	
OCNG Pat	terns	1		OCNG p	pattern 1	
		Config 1,2,4,5		SMTC		
SMTC con	figuration	Config 3,6		SMTC		
		Config 1,2,4,5		15		
PDSCH/PI subcarrier		Config 3,6	kHz			
		=		30 kHz		
PUCCH/PI		Config 1,2,4,5	kHz	15 k		
	subcarrier spacing Config 3,6			30 l		
PRACH configuration			FR1 PRACH o			
BWP confi	BWP configuraiton Initial DL BWP			DLBW	/P.0.1	
	Dedicated DL BWP			DLBW		
		Initial UL BWP		ULBW	/P.0.1	
		Dedicated UL BWP		ULBW	/P.1.1	
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)		dB	C)		
Note2		dBm/15kH z	-9	8		
Note2 Config 1,2,4,5			-9			
Config 3,6		dBm/SCS	-9	5		
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		dB	4	4		
\hat{E}_s/N_{oc}		dB	4	4		
Io ^{Note3}	Config 1,2,4	1,5	dBm/ 9.36MHz	-64.59	-64.59	
	Config 3,6		dBm/ 38.16MHz	-58.49	-58.49	
Propagation condition			-	AW	GN	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{cc} to be fulfilled.

Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.3.2.3.2.2-4: Cell specific test parameters for Redirection from NR to E-UTRAN (cell 2)

Parameter	Unit	Configuration	Ce	ell 2
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6		2
Duplex mode		1, 2, 3	FI	DD
.,		4, 5, 6		OD
TDD special subframe		4, 5, 6		6
configuration ^{Note1}		, ,		
TDD uplink-downlink		4, 5, 6		1
configuration ^{Note1}				
BW _{channel}	MHz	1, 2, 3, 4, 5, 6		N _{RB,c} = 25
				$N_{RB,c} = 50$
			20 MHz: I	V _{RB,c} = 100
PRACH Configuration ^{Note2}		1, 2, 3		4
		4, 5, 6		53
PDSCH parameters:		1, 2, 3		R.7 FDD
DL Reference Measurement				R.3 FDD
Channel ^{Note3}				R.6 FDD
		4, 5, 6		R.4 TDD
				R.0 TDD
DOCIOLI/DDOOLI/DLUOLI		4.0.0		R.3 TDD
PCFICH/PDCCH/PHICH		1, 2, 3		R.11 FDD
parameters: DL Reference Measurement				R.6 FDD
Channel ^{Note3}		4, 5, 6		R.10 FDD R.11 TDD
Chamer		4, 5, 6		R.6 TDD
				R.10 TDD
OCNG Patterns ^{Note3}		1, 2, 3		P.20 FDD
out audine		., _, o		OP.10 FDD
				OP.17 FDD
		4, 5, 6		OP.9 TDD
			10 MHz:	OP.1 TDD
			20 MHz:	OP.7 TDD
PBCH_RA		1, 2, 3, 4, 5, 6		
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				_
PHICH_RB	dB			0
PDCCH_RA				
PDCCH_RB				
PDSCH_RA				
PDSCH_RB	 			
OCNG_RA ^{Note4} OCNG_RB ^{Note4}				
N _{oc} Note5	dBm/15kHz	1 2 2 4 5 6		no
Ê _s /N _{oc}	dBm/15kHz	1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6	-! -Infinity	98 4
Ê _s /I _{ot} Note6	dB	1, 2, 3, 4, 5, 6	-Infinity	4
RSRP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-94
SCH_RP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-94
IoNote6	dBm/9MHz	1, 2, 3, 4, 5, 6	-70.22	-64.76
Propagation Condition	GDITI/ STVIT IZ	1, 2, 3, 4, 5, 6		/GN
i ropagation continuin	1, 2, 3, 4, 3, 6	ı Avı	OIN	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].

Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 5:	Interference from other cells and noise sources not specified in the test is assumed to be constant over
	subcarriers and time and shall be modelled as AWGN of appropriate power for N_{cc} to be fulfilled.
Note 6:	Ê _s /I _{ot} , RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes.
	They are not settable parameters themselves.
Note 7:	Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.6.3.2.3.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 2205 ms from the beginning of time period T2. The rate of correct RRC connection release redirection to E-UTRAN observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

$$T_{connection_release_redirect_E-UTRA} = T_{RRC_procedure_delay} + T_{identify_E-UTRA} + T_{SI-E-UTRA} + T_{RACH},$$

where:

 $T_{RRC_procedure_delay} = 110 \text{ ms in the test.}$

 $T_{identify-E-UTRA} = 800 \text{ ms in the test.}$

 $T_{SI\text{-}E\text{-}UTRA} = 1280$ ms, it is the time required for receiving all the relevant system information as defined in TS 36.331 for the target E-UTRA cell.

 $T_{RACH} = 15 \text{ ms in the test.}$

This gives a total of 2205 ms.

A.6.4 Timing

A.6.4.1 UE transmit timing

A.6.4.1.1 NR UE Transmit Timing Test for FR1

A.6.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table A.6.4.1.1.1-1.

Table A.6.4.1.1.1-1: Supported test configurations for FR1 PCell

Configuration	Description			
1	NR FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz			
2	NR TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz			
3	NR TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz			
Note: The UE is only required to be tested in one of the supported test configurations				

For this test a single NR cell is used. Table A.6.4.1.1.1-2 defines the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.6.4.1.1.1-3.

Table A.6.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2
SSB ARFCN	- Onne	1,2,3	1	1
0027		1	-	plicable
TDD configuration				
TDD Configuration		2		onf.1.1
		3		onf.2.1
		1		B,c = 52
BWchannel	MHz	2		B,c = 52
		3	40: N _{RE}	_{B,c} = 106
Initial BWP Configuration		1,2,3		VP.0.1
Dedicated BWP			DI BV	<u>VP.0.1</u> VP.1.1
Configuration		1,2,3		VP.1.1
DRx Cycle	ms	1,2,3	N/A	DRX.8 ^{Note5}
DIX Cycle	1115			
PDSCH Reference		1		1 FDD
measurement channel		2		1 TDD
		3	SR.2.	1 TDD
DMOLOODECET		1	CR.1.	1 FDD
RMSI CORESET Reference Channel		2	CR 1	1 TDD
Reference Channel		3		1 TDD
		1		.1 FDD
Dedicated CORESET		2		.1 TDD
Reference Channel		3		2.1 TDD
OCNG Patterns		1,2,3		P.1
222 " "		1,2	SSB.	1 FR1
SSB configuration		3		2 FR1
		1,2	SMTC.1	
SMTC Configuration		3	SM [*]	TC.2
		1		.1 FDD
TRS configuration		2		.1 TDD
Tree comigaration		3		.2 TDD
EPRE ratio of PSS to		3	11.0.1	.2 100 T
SSS				
EPRE ratio of PBCH				
DMRS to SSS				
EPRE ratio of PBCH to				
PBCH DMRS	<u> </u>			
EPRE ratio of PDCCH				
DMRS to SSS	 			
EPRE ratio of PDCCH to PDCCH DMRS	dB	1,2,3	0	0
EPRE ratio of PDSCH	†			
DMRS to SSS				
EPRE ratio of PDSCH to	<u> </u>			
PDSCH				
EPRE ratio of OCNG				
DMRS to SSS(Note 1)				
EPRE ratio of OCNG to				
OCNG DMRS (Note 1) Note2	alDay /4 E 1 1 1	400	00	22
N_{oc}	dBm/15 kHz	1,2,3	-98	-98
Note2	dBm/SCS	1,2	-98	-98
	22, 300	3	-95	-95
Ê s /I ot		1,2,3	3	3
\hat{E}_{s}/N_{oc}		1,2,3	3	3

SS-RSRP ^{Note3}	dBm/SCS	1,2	-95	-95	
	ubili/SCS	3	-92	-92	
Io ^{Note3}	dBm/9.36MHz	1,2	-65.2	-65.2	
	dBm/38.1MHz	3	-59.2	-59.2	
Propagation condition		1,2,3	AWGN		
SRS Config		1,2	SRSConf.1 ^{Note6}	SRSConf.3 ^{Note6}	
		3	SRSConf.1 ^{Note6}	SRSConf.2Note6	
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OEDM symbols					

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: DRx related parameters are given in Table A.3.3.8-1

Note 6: SRS configs are given in Table A.6.4.1.1.1-3

Table A.6.4.1.1.1-3: SRS Configuration for Timing Accuracy Test

	Field	SRSConf.1	SRSConf.2	SRSConf.3	Comments
SRS-	srs-ResourceSetId	0	0	0	
ResourceSet	srs-ResourceldList	0	0	0	
	resourceType	Periodic	Periodic	Periodic	
	Usage	Codebook	Codebook	Codebook	
SRS-	SRS-Resourceld	0	0	0	
Resource	nrofSRS-Ports	Port1	Port1	Port1	
	transmissionComb	n2	n2	n2	
	combOffset-n2	0	0	0	
	cyclicShift-n2	0	0	0	
	resourceMapping startPosition	0	0	0	
	resourceMapping nrofSymbols	n1	n1	n1	
	resourceMapping repetitionFactor	n1	n1	n1	
	freqDomainPosition	0	0	0	
	freqDomainShift	0	0	0	
	freqHopping c-SRS	14 for test configuration 1,2 25 for test configuration 3	25	14	Matches N _{RB,c}
	freqHopping b-SRS	0	0	0	
	freqHopping b-hop	0	0	0	
	groupOrSequenceHopping	Neither	Neither	Neither	
	resourceType	Periodic	Periodic	Periodic	
	periodicityAndOffset-p	sl1, 0	sl640, 5	sl320, 3	Offset to align with DRx periodicity
	sequenceld	0	0	0	Any 10 bit number

Table A.6.4.1.1.1-4: Void

A.6.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test

- 1) Setup NR PCell according to parameters given in Table A.6.4.1.1.1-1.
- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 25600
 - b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-
- 3) The test system shall adjust the timing of the DL path by values given in Table A.6.4.1.1.2-1

Table A.6.4.1.1.2-1: Adjustment Value for DL Timing

SCS of SSB signals (KHz)	Adjustment Value	
	Test1	Test2
15	+64*64T _c	+32*64T _c
30	+32*64T _c	+16*64T _c

- 4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in clause 7.1.2 Table 7.1.2.1-1 until the UE transmit timing offset is within ($N_{TA} + N_{TA_offset}$) $\times T_c \pm T_e$ respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX configured.
- 5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment

A.6.4.2 UE timer accuracy

A.6.4.3 Timing advance

A.6.4.3.1 SA FR1 timing advance adjustment accuracy

A.6.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.6.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.6.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.6.4.3.1.2-2, A.6.4.3.1.2-3 and A.6.4.3.1.2-4.

In all test cases, single cell is used. Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.6.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in Clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to Clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.6.4.3.1.2-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k+1 for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 38.321 [7], shall be configured so that it does not expire in the duration of the test.

Table A.6.4.3.1.2-1: Timing advance supported test configurations

	Config	Description	
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note:	The UE is only required to be tested in one of the supported test configurations		

Table A.6.4.3.1.2-2: General test parameters for timing advance

Parameter	Unit	Value	Comment
RF channel number		1	
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T _A) value during T1		31	N _{TA_new} = N _{TA_old} for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T _A) value during T2		39	For 15 kHz SCS $N_{TA_new} = N_{TA_old} + 8192*T_c$ For 30 kHz SCS $N_{TA_new} = N_{TA_old} + 4096*T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	S	5	
T2	S	5	

Table A.6.4.3.1.2-3: Cell specific test parameters for timing advance

Parameter		Unit	Test1		
Fai	Parameter		T1	T2	
Dunlay mada	Config 1		FDD		
Duplex mode	Config 2,3		TDD		
	Config 1		Not Applicable		
TDD configuration	Config 2		TDDConf.1.1		
	Config 3		TDDC	onf.2.1	
	Config 1		10: N _{RE}	_{3,c} = 52	
BW _{channel}	Config 2	MHz	10: N _{RB,c} = 52		
	Config 3		40: N _{RB,c} = 106		

	Config 1		10: N _{RB,c} = 52
BWP BW	Config 2	MHz	10: N _{RB,c} = 52
DIII DII	Config 3	1711.12	40: N _{RB,c} = 106
DRx Cycle		ms	Not Applicable
PDSCH Reference Config 1		1110	SR.1.1 FDD
measurement			SR.1.1 TDD
channel	Config 3		SR.2.1 TDD
onamoi	Config 1		CR.1.1 FDD
RMSI CORESET	Config 2		CR.1.1 TDD
Reference Channel	Config 3	+	CR.2.1 TDD
Dedicated	Coming 5		ON.Z.1 1DD
CORESET Reference Channel	Config 1		CCR.1.1 FDD
	Config 2		CCR.1.1 TDD
	Config 3		CCR.2.1 TDD
	Config 1		TRS.1.1 FDD
TRS configuration	Config 2		TRS.1.1 TDD
gg	Config 3		TRS.1.2 TDD
OCNG Patterns			OCNG pattern 1
SMTC	Config 1,2		SMTC.1 FR1
configuration	Config 3		SMTC.2 FR1
<u>-</u>	Config 1,2		SSB.1 FR1
SSB configuration	Config 3		SSB.2 FR1
PDSCH/PDCCH	Config 1,2	kHz	15 kHz
subcarrier spacing	Config 3		30 kHz
PUCCH/PUSCH	Config 1,2		15 kHz
subcarrier spacing	Config 3	kHz	30 kHz
EPRE ratio of PSS to			30 M.E
EPRE ratio of PBCH			
EPRE ratio of PBCH			
EPRE ratio of PDCC		1	
EPRE ratio of PDCC			
EPRE ratio of PDSC		dB	0
EPRE ratio of PDSC		1	
	DMRS to SSS(Note 1)		
EPRE ratio of OCNG	to OCNG DMRS (Note	-	
1)		alDay/4.5U.U	
Note2		dBm/15kH z	-98
Note2 Config 1,2		dBm/SCS	-98
N oc Config 3		ubiii/303	-95
Ê s /I ot		dB	3
\hat{E}_{s}/N_{oc}		dB	3
Config 1	,2	dBm/ 9.36MHz	-67.57
Config 3		dBm/ 38.16MHz	-62.58
	n		AWGN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_{N_{\infty}}$ to be fulfilled.

Note 3: Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Field Value Comment 12 Config 1,2 c-SRS Config 3 24 Frequency hopping is disabled b-SRS 0 b-hop 0 freqDomainPosition 0 Frequency domain position of SRS freqDomainShift 0 groupOrSequenceHopping neither No group or sequence hopping sl5=2 for SCS Once every 5 slots 15kHz SRS-PeriodicityAndOffset sl5=4 for SCS 30kHz SSB #0 is used for SRS path loss pathlossReferenceRS ssb-Index=0 estimation Codebook based UL transmission Codebook usage startPosition resourceMapping setting. SRS on last nrofSymbols n1 symbol of slot, and 1symbols for SRS without repetition. repetitionFactor n1 0 combOffset-n2 transmissionComb setting cyclicShift-n2 0 nrofSRS-Ports port1 Number of antenna ports used for SRS transmission Note: For further information see clause 6.3.2 in TS 38.331 [2]

Table A.6.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

A.6.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. k+1 slots after the reception of the timing advance command, where k=5.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.6.5 Signalling characteristics

A.6.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

For intra-band contiguous carrier aggregation, transmit OFF power is measured as the mean power per component carrier.

For UE with multiple transmit antennas, transmit OFF power is measured as the mean power at each transmit connector.

- UE output power higher than Transmit OFF power -50 dBm (as defined in TS 38.101-1 [18]) means uplink signal
- UE output power equal to or less than Transmit OFF power -50 dBm (as defined in TS 38.101-1 [18]) means no uplink signal.

A.6.5.1.1 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode

A.6.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.6.5.1.1.1-1. The test parameters are given in Tables A.6.5.1.1.1-2, A.6.5.1.1.1-3, and A.6.5.1.1.1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. The UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.6.5.1.1.1-1: Supported test configurations for FR1 PCell

Configuration Description			
1	FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
2	TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
3	TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz		
Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.6.5.1.1.1-2: General test parameters for FR1 out-of-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
BW _{channel}	Config 1	MHz	10: N _{RB,c} = 52
	Config 2		10: N _{RB,c} = 52
	Config 3		40: N _{RB,c} = 106
DL initial BWP	Config 1, 2, 3		DLBWP.0.1
configuration			DEBWF.0.1
DL dedicated BWP	Config 1, 2, 3		DLBWP.1.1
configuration			DEBWI .T.T
UL initial BWP	Config 1, 2, 3		ULBWP.0.1
configuration			02BW1 :0:1
UL dedicated BWP	Config 1, 2, 3		ULBWP.1.1
configuration	Config 1		Not Applicable
TDD Configuration	Config 1	-	Not Applicable
	Config 2		TDDConf.1.1
DATE: CODECET	Config 3		TDDConf.2.1
RMSI CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated	Config 1		CCR.1.3 FDD
CORESET			
Reference Channel		_	

_					
		Config 2		CCR.1.3 TDD	
		Config 3		CCR.2.2 TDD	
SSB Config	uration	Config 1		SSB.1 FR1	
		Config 2		SSB.1 FR1	
		Config 3		SSB.2 FR1	
SMTC Conf	iguration	Config 1, 2		SMTC.1	
		Config 3		SMTC.1	
PDSCH/PD		Config 1, 2		15 kHz	
subcarrier s	pacing	Config 3		30 kHz	
PRACH		Config 1, 2		Table A.3.8.2.1-1	
Configuration	on	Config 3		Table A.3.8.2.1-1	
SSB index a	assigned a	s RLM RS		0	
OCNG para	meters			OP.1	
CP length				Normal	
Correlation	Matrix and	Antenna		2x2 Low	
Configuration					
Out of	DCI form	at		1-0	
sync		of Control OFDM		2	
transmissi	symbols				
on	Aggregat	ion level	CCE	8	
parameter	Ratio of h	nypothetical	dB	4	
S		RE energy to			
		SSS RE energy			
		nypothetical	dB	4	
	PDCCH I	OMRS energy to			
	average	SSS RE energy			
	DMRS pr	ecoder		REG bundle size	
	granulari				
	REG bun	dle size		6	
DRX				OFF	
Gap pattern	ı ID			gp0	
Layer 3 filte	ring			Enabled	
T310 timer			ms	0	
T311 timer			ms	1000	
N310				1	
N311				1	
CSI-RS		Config 1		CSI-RS.1.1 FDD	
configuratio	n for CSI	Config 2		CSI-RS.1.1 TDD	
reporting		Config 3		CSI-RS.2.1 TDD	
CSI-RS for	tracking	Config 1		TRS.1.1 FDD	
		Config 2		TRS.1.1 TDD	
		Config 3		TRS.1.2 TDD	
T1			S	0.2	
T2				0.48	
T3			S S	0.48	
D1			S	0.44	
	Note 1: All configurations are assigned to the UE prior to the start of time				

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.6.5.1.1.1-3: Cell specific test parameters for FR1 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode

Parameter	Unit	Test 1		
		T1	T2	T3
EPRE ratio of PDCCH DMRS to SSS	dB		4	

EPRE ratio of PDC	dB		0		
EPRE ratio of PBC	dB				
EPRE ratio of PBC	CH to PBCH DMRS	dB			
EPRE ratio of PSS	to SSS	dB			
EPRE ratio of PDS	SCH DMRS to SSS	dB		0	
EPRE ratio of PDS	SCH to PDSCH DMRS	dB			
EPRE ratio of OCI	NG DMRS to SSS	dB			
EPRE ratio of OCI	NG to OCNG DMRS	dB			
SNR on RLM-RS	Config 1	dB	1	-7	-15
	Config 2		1	-7	-15
	Config 3		1	-7	-15
N_{oc}	Config 1	dBm/		-98	
¹ V _{oc}	Config 2	15kH	-98		
	Config 3	Z	-98		
N_{oc}	Config 1	dBm/		-98	
¹ V _{oc}	Config 2	SCS		-98	
			-95		
Propagation condi		TDL	-C 300ns 1	00Hz	
Note 1: OCNG	Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated				
and a constant total transmitted power spectral density is achieved for all					
OFDM symbols.					
Note 2: The signal contains DDCCH for LIEs other than the device under test as					

- Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.6.5.1.1.1-1.
- Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.6.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

Field		Test 1		
		Value		
gapOffset		0		
Note:	Ensure that RLM RS is partially overlapped with measurement gap			

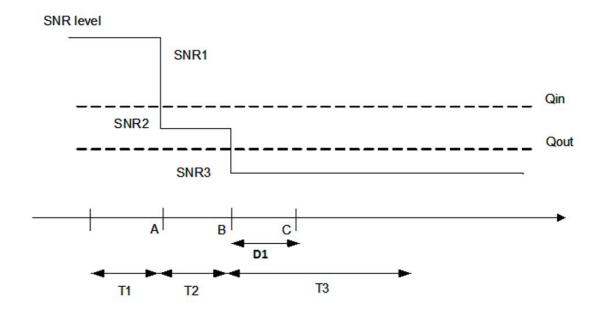


Figure A.6.5.1.1.1-1: SNR variation for out-of-sync testing

A.6.5.1.1.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.2 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in non-DRX mode

A.6.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.6.5.1.2.1-1. The test parameters are given in Tables A.6.5.1.2.1-2, and A.6.5.1.2.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the UE shall be fully synchronized for periodic CSI reporting with a reporting periodicity of 5 ms.

Table A.6.5.1.2.1-1: Supported test configurations for FR1 PCell

Configuration	Description
1	FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
2	TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz
3	TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz
	is only required to pass in one of the supported test ations in FR1

Table A.6.5.1.2.1-2: General test parameters for FR1 in-sync testing in non-DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Numbe			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
BW _{channel}	Config 1	MHz	10: N _{RB,c} = 52
	Config 2	_	10: N _{RB,c} = 52
	Config 3		40: N _{RB,c} = 106
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
RMSI CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET Reference Channel	Config 1		CCR.1.1 FDD
Reference Channel	Config 2	\dashv	CCR.1.1 TDD
	Config 2	\dashv \vdash	CCR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
336 Configuration	Config 2	+ +	SSB.1 FR1
	Config 3	+ +	SSB.2 FR1
SMTC	Config 1, 2	+ +	SMTC.1
Configuration			SMTC.1
PDSCH/PDCCH	Config 3 Config 1, 2	+ +	15 kHz
subcarrier spacing	•		
-	Config 3		30 kHz
PRACH	Config 1, 2		Table A.3.8.2.1-1
Configuration	Config 3		Table A.3.8.2.1-1
SSB index assigned as RLM RS			0
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix an Configuration	nd Antenna		2x2 Low
n sync 🛮 🗈	OCI format		1-0
transmission	Number of Control OFDM symbols		2

	Aggregation level	CCE	4
	Ratio of hypothetical	dB	0
	PDCCH RE energy to		
	average SSS RE		
	energy		
	Ratio of hypothetical	dB	0
	PDCCH DMRS		
	energy to average		
	SSS RE energy		
	DMRS precoder		REG bundle size
	granularity		
	REG bundle size		6
Out of sync	DCI format		1-0
transmission	Number of Control		2
parameters	OFDM symbols		
	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy to		
	average SSS RE		
	energy	40	4
	Ratio of hypothetical PDCCH DMRS	dB	4
	energy to average		
	SSS RE energy		
	DMRS precoder		REG bundle size
	granularity		NEO barraic size
	REG bundle size		6
DRX			0FF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
			1000
T310 timer		ms	1000
T311 timer		ms	1000
N310			1
N311 CSI-RS	Confin 4		1 CSI-RS.1.1 FDD
configuration for	Config 1		
CSI reporting	Config 2 Config 3		CSI-RS.1.1 TDD CSI-RS.2.1 TDD
CSI-RS for	Config 1, 4		TRS.1.1 FDD
tracking	Config 1, 4		TRS.1.1 TDD
liacking	Config 2, 5		TRS.1.1 TDD
T1	Cornig 3, 6	_	0.2
T2		S S	0.2
T3		S	0.24
T4		S	0.2
T5		S	0.88
D1		S	0.84
	figurations are assigned		

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.6.5.1.2.1-3: Cell specific test parameters for FR1 (Cell 1) for in-sync radio link monitoring tests in non-DRX mode

Parameter	Unit	Test 1				
		T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DMRS to SSS	dB	0				
EPRE ratio of PDCCH to PDCCH DMRS	dB	0				

EPRE ratio of PBCH DMRS to SSS			dB					
EPRE ratio of PBCH to PBCH DMRS			dB					
EPRE ratio of PSS to SSS			dB					
EPRE rat	tio of PDS0	CH DMRS to SSS	dB			0		
EPRE rat	tio of PDS0	CH to PDSCH DMRS	dB					
EPRE rat	tio of OCN	G DMRS to SSS	dB					
EPRE rat	tio of OCN	G to OCNG DMRS	dB					
SNR on F	RLM-RS	Config 1	dB	1	-7	-15	-4.5	1
		Config 2		1	-7	-15	-4.5	1
		Config 3		1	-7	-15	-4.5	1
M		Config 1	dBm/			-98		
N_{oc}		Config 2	15			-98		
	Config 3		kHz	-98				
λ/	0 0 4		dBm/	-98				
N_{oc}		Config 2	SCS			-98		
	Config 3					-95		
Propagat	ion condition	on			TDL-C	300ns	100Hz	
Note 1: OCNG shall be used such that t			ne resour	ces in	Cell 1 a	are fully	y alloca	ated
	and a co	nstant total transmitted	power sp	ectral o	density	is ach	ieved fo	or all
	OFDM sy	/mbols.						
Note 2:		al contains PDCCH for	UEs othe	r than	the dev	ice un	der tes	t as
	part of OCNG.							
Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.								
Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is						,		
SNR2, SNR3, SNR4 and SNR5 respectively in Figure A.6.5.1.2.1-1.								
Note 5: The SNR values are specified for testing a UE which supports 2RX on at								
least one band. For testing of a UE which supports 4RX on all bands, the								
SNR during T3 and T4 is modified as specified in clause A.3.6.								

Table A.6.5.1.2.1-4: Void

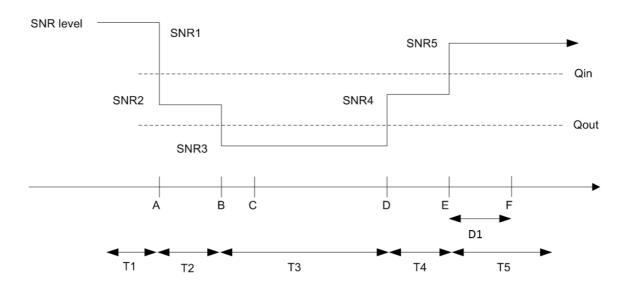


Figure A.6.5.1.2.1-1: SNR variation for in-sync testing

A.6.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.3 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode

A.6.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.6.5.1.3.1-1. The test parameters are given in Tables A.6.5.1.3.1-2, and A.6.5.1.3.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.6.5.1.3.1-1: Supported test configurations for FR1 PCell

Configuration	Description		
1	FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
2	TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
3	TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz		
Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.6.5.1.3.1-2: General test parameters for FR1 out-of-sync testing in DRX mode

Par	ameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Num	ber		1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
BW _{channel}	Config 1	MHz	10: N _{RB,c} = 52
	Config 2		10: N _{RB,c} = 52
	Config 3		40: N _{RB,c} = 106
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1

UL dedicated	Config 1, 2, 3		ļ <u>-</u>
BWP			ULBWP.1.1
configuration			
TDD	Config 1		Not Applicable
Configuration	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
RMSI CORESET	Config 1		CR.1.1 FDD
Reference	Config 2		CR.1.1 TDD
Channel	Config 3		CR.2.1 TDD
Dedicated	Config 1		CCR.1.3 FDD
CORESET	Coming 1		OOK. 1.0 1 DD
Reference			
Channel			
Charlie	Config 2		CCR.1.3 TDD
000	Config 3		CCR.2.2 TDD
SSB	Config 1		SSB.1 FR1
Configuration	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC	Config 1, 2		SMTC.1
Configuration	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier	•		_
spacing	Config 3		30 kHz
PRACH	Config 1, 2		Table A.3.8.2.1-1
Configuration	•		
Comigaration	Config 3		Table A.3.8.2.1-1
SSB index assign	ed as RLM RS		0
OCNG parameter			OP.1
CP length			Normal
Correlation Matrix	and Antonna		2x2 Low
Configuration	and Antenna		ZAZ LOW
	DCI format		1.0
Out of sync	DCI format		1-0
transmission	Number of Control		2
parameters	OFDM symbols		
	Aggregation level	CCE	8
	Ratio of	dB	4
	hypothetical		
	PDCCH RE		
	energy to average		
	SSS RE energy		
	Ratio of	dB	4
	hypothetical		
	PDCCH DMRS		
	energy to average		
	SSS RE energy		
i .			
	DMRS precoder		REG bundle size
	•		REG bundle size
	granularity		-
DRX Configuration	granularity REG bundle size		6
DRX Configuratio	granularity REG bundle size		6 DRX.3
Gap pattern ID	granularity REG bundle size		6 DRX.3 N.A.
	granularity REG bundle size		6 DRX.3
Gap pattern ID Layer 3 filtering	granularity REG bundle size	ms	6 DRX.3 N.A.
Gap pattern ID Layer 3 filtering T310 timer	granularity REG bundle size	ms ms	6 DRX.3 N.A. Enabled
Gap pattern ID Layer 3 filtering T310 timer T311 timer	granularity REG bundle size	ms ms	6 DRX.3 N.A. Enabled
Gap pattern ID Layer 3 filtering T310 timer T311 timer N310	granularity REG bundle size		6 DRX.3 N.A. Enabled 0 1000
Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311	granularity REG bundle size		6 DRX.3 N.A. Enabled 0 1000 1
Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311 CSI-RS	granularity REG bundle size n Config 1		6 DRX.3 N.A. Enabled 0 1000 1 1 CSI-RS.1.1 FDD
Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311 CSI-RS configuration for	granularity REG bundle size n Config 1 Config 2		6 DRX.3 N.A. Enabled 0 1000 1 1 CSI-RS.1.1 FDD CSI-RS.1.1 TDD
Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311 CSI-RS configuration for CSI reporting	granularity REG bundle size n Config 1 Config 2 Config 3		6 DRX.3 N.A. Enabled 0 1000 1 1 CSI-RS.1.1 FDD CSI-RS.1.1 TDD CSI-RS.2.1 TDD
Gap pattern ID Layer 3 filtering T310 timer T311 timer N310 N311 CSI-RS configuration for	granularity REG bundle size n Config 1 Config 2		6 DRX.3 N.A. Enabled 0 1000 1 1 CSI-RS.1.1 FDD CSI-RS.1.1 TDD

Config 3	3	TRS.1.2 TDD
T1	S	0.2
T2	S	0.68
T3	S	0.68
D1	S	0.64

Note 1: All configurations are assigned to the UE prior to the start of time period

T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.6.5.1.3.1-3: Cell specific test parameters for FR1 (Cell 1) for out-of-sync radio link monitoring tests in DRX mode

Parameter		Unit		Test 1	
			T1	T2	T3
EPRE ratio of PDCC	CH DMRS to SSS	dB		4	
EPRE ratio of PDC0	CH to PDCCH DMRS	dB		0	
EPRE ratio of PBCh	I DMRS to SSS	dB			
EPRE ratio of PBCH	I to PBCH DMRS	dB			
EPRE ratio of PSS t	o SSS	dB		0	
EPRE ratio of PDSC	CH DMRS to SSS	dB			
EPRE ratio of PDSC	CH to PDSCH DMRS	dB			
EPRE ratio of OCN	EPRE ratio of OCNG DMRS to SSS				
EPRE ratio of OCN	EPRE ratio of OCNG to OCNG DMRS				
SNR on RLM-RS	Config 1	dB	1	-7	-15
	Config 2		1	-7	-15
	Config 3		1	-7	-15
M	Config 1	dBm/15		-98	
18,	N Config 1			-98	
Config 3				-98	
N _{oc} Config 1 Config 2		dBm/S		-98	
		CS		-98	
	Config 3			-95	•
Propagation condition	on			TDL-C 300ns 100h	-lz

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.

Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.

Note 4: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in Figure A.6.5.1.3.1-1.

Note 5: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Table A.6.5.1.3.1-4: Void

Table A.6.5.1.3.1-5: Void

Table A.6.5.1.3.1-6: Void

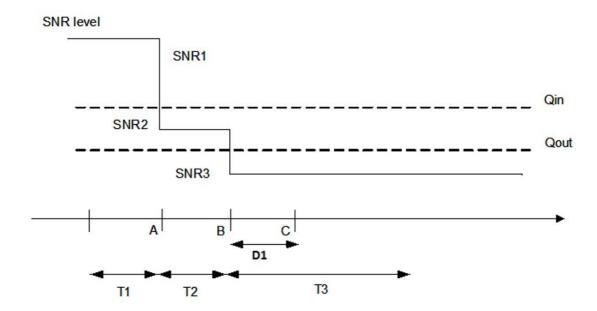


Figure A.6.5.1.3.1-1: SNR variation for out-of-sync testing

A.6.5.1.3.2 Test Requirements

The UE behaviour in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.4 Radio Link Monitoring In-sync Test for FR1 PCell configured with SSB-based RLM RS in DRX mode

A.6.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR1 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.6.5.1.4.1-1. The test parameters are given in Tables A.6.5.1.4.1-2, and A.6.5.1.4.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.6.5.1.4.1-1: Supported test configurations for FR1 PCell

Configuration	Description		
1	FDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
2	TDD, SSB SCS 15 kHz, data SCS 15 kHz, BW 10 MHz		
3	TDD, SSB SCS 30 kHz, data SCS 30 kHz, BW 40 MHz		
Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.6.5.1.4.1-2: General test parameters for FR1 in-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number	10 " 1		1
Duplex mode	Config 1		FDD
514	Config 2, 3		TDD
BW _{channel}	Config 1	MHz	10: N _{RB,c} = 52
	Config 2	_	10: N _{RB,c} = 52
	Config 3		40: N _{RB,c} = 106
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
TDD Configuration	Config 1		Not Applicable
9	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
RMSI CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET Reference Channel	Config 1		CCR.1.1 FDD
Troforonoo Onamior	Config 2		CCR.1.1 TDD
	Config 3		CCR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
garanen	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
PRACH Configuration	Config 1, 2		Table A.3.8.2.1-1
	Config 3		Table A.3.8.2.1-1
SSB index assigned as RLM RS			0
OCNG parameters			OP.1
CP length	CP length		Normal
Correlation Matrix and Configuration	Antenna		2x2 Low
	CI format		1-0
transmission Nu	mber of Control DM symbols		2

	Aggregation level	CCE	4
	Ratio of hypothetical	dB	0
	PDCCH RE energy to		
	average SSS RE		
	energy		
	Ratio of hypothetical	dB	0
	PDCCH DMRS		_
	energy to average		
	SSS RE energy		
	DMRS precoder		REG bundle size
	granularity		TAZO Barialo 6120
 	REG bundle size		6
Out of sync	DCI format		1-0
transmission	Number of Control		2
	OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical	dB	4
	PDCCH RE energy to	uБ	4
	average SSS RE		
	energy		
	Ratio of hypothetical	dB	4
	PDCCH DMRS	uБ	4
	energy to average		
	SSS RE energy		
	DMRS precoder		REG bundle size
	granularity		NEO bariale size
	REG bundle size		6
DRX Configuration	TCO Barraio 6126		DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
Layer 5 intering			Lhabled
T310 timer		ms	2000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS	Config 1		CSI-RS.1.1 FDD
configuration for	Config 2		CSI-RS.1.1 TDD
CSI reporting			CSI-RS.2.1 TDD
CSI-RS for tracking	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
T1		S	0.2
T2		S	0.2
T3			0.64
T4			0.2
T5		S S	0.88
D1		S	0.84
L	urations are assigned to		prior to the start of time period
I word it. All confligi	aradono are assigned it		phonio the start of time period

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.6.5.1.4.1-3: Cell specific test parameters for FR1 (Cell 1) for in-sync radio link monitoring tests in DRX mode

Parameter	Unit	Test 1				
		T1	T2	T3	T4	T5
EPRE ratio of PDCCH DMRS to SSS	dB	0				
EPRE ratio of PDCCH to PDCCH DMRS	dB	0				
EPRE ratio of PBCH DMRS to SSS	dB					

EPRE ratio of PBC	dB						
EPRE ratio of PSS	to SSS	dB	0				
EPRE ratio of PDS	CH DMRS to SSS	dB					
EPRE ratio of PDS	CH to PDSCH DMRS	dB					
EPRE ratio of OCN	IG DMRS to SSS	dB					
EPRE ratio of OCN	IG to OCNG DMRS	dB					
SNR on RLM-RS	Config 1	dB	1	-7	-15	-4.5	1
	Config 2		1	-7	-15	-4.5	1
	Config 3		1	-7	-15	-4.5	1
N_{oc}	Config 1	dBm/15	-98				
1 voc	Config 2	kHz	-98				
	Config 3] [-98				
N	N Config 1		-98				
N_{oc}	Config 2	CS	-98				
	Config 3		-95				
Propagation condit	ion			TDL-	·C 300ns 10	00Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- The signal contains PDCCH for UEs other than the device under test as part of OCNG. Note 2:
- Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 4: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and
 - SNR5 respectively in Figure A.6.5.1.4.1-1.
- The SNR values are specified for testing a UE which supports 2RX on at least one band. For Note 5: testing of a UE which supports 4RX on all bands, the SNR during T3 and T4 is modified as specified in clause A.3.6.

Table A.6.5.1.4.1-4: Void Table A.6.5.1.4.1-5: Void

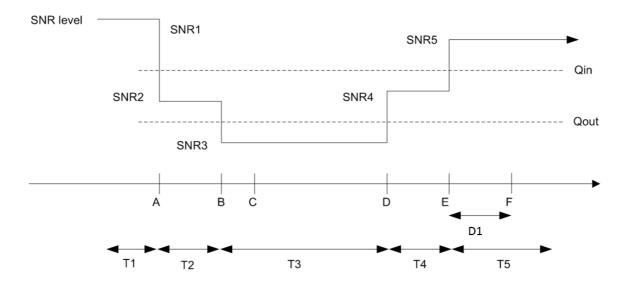


Figure A.6.5.1.4.1-1: SNR variation for in-sync testing.

A.6.5.1.4.2 **Test Requirements**

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.5 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode

A.6.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR1 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.5.1-1, A.6.5.1.5.1-2, A.6.5.1.5.1-3, and A.6.5.1.5.1-3A below. There is one cell, cell 1 which is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.5.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting of 5ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.5.1-1: Supported test configurations for FR1 PCell

Co	nfiguration	Description		
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
3		TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth		
Note:	Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.6.5.1.5.1-2: General test parameters for FR1 PCell for CSI-RS out-of-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
RMSI CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET Reference Channel	Config 1		CCR.1.3 FDD

	Config 2	1	CCR.1.3 TDD
	Config 3		CCR.2.2 TDD
SSB Configuration	Config 1		SSB.1 FR1
002 001111gu. a	Config 2		SSB.1 FR1
	Config 3	1	SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
· ·	Config 3	1	SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
TCI configuration for P	DCCH/PDSCH		TCI.State.2
OCNG parameters			OP.1
CP length			Normal
Correlation Matrix and	Antenna Configuration		2x2 Low
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration	Config 1		CSI-RS.1.1 FDD
CSI-RS configuration for CSI reporting	Config 2		CSI-RS.1.1 TDD
for CSI reporting	Config 1 Config 2 Config 3		CSI-RS.1.1 TDD CSI-RS.2.1 TDD
for CSI reporting T1	Config 2	s	CSI-RS.1.1 TDD CSI-RS.2.1 TDD 0.2
for CSI reporting T1 T2	Config 2	S	CSI-RS.1.1 TDD CSI-RS.2.1 TDD 0.2 0.88
for CSI reporting T1	Config 2		CSI-RS.1.1 TDD CSI-RS.2.1 TDD 0.2

Table A.6.5.1.5.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

Parameter	Unit	Test 1		
		T1	T2	T3
EPRE ratio of PDCCH DMRS to SSS	dB	4		

EPRE ratio (of PDCCH to PDCCH	dB			
EPRE ratio (of PBCH DMRS to	dB			
EPRE ratio of DMRS	of PBCH to PBCH	dB		0	
EPRE ratio	of PSS to SSS	dB			
EPRE ratio (of PDSCH DMRS to	dB			
EPRE ratio of DMRS	of PDSCH to PDSCH	dB			
EPRE ratio (of OCNG DMRS to	dB			
EPRE ratio of DMRS	of OCNG to OCNG	dB			
SNR on	Config 1	dB	1	-7	-15
RLM-RS	Config 2		1	-7	-15
	Config 3		1	-7	-15
N/ Config 1		dBm/15kHz	-98		
N _{oc} Config 1 Config 2			-98		
Config 3				-98	
Propagation	condition			TDL-C 300ns 100Hz	
Note 1: C	CNG shall be used such	n that the resources in	Cell 1 are fully all	ocated and a constant t	otal transmitted

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.6.5.1.5.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is [A.3.6].

Table A.6.5.1.5.1-3A: Measurement gap configuration for FR1 CSI-RS out-of-sync radio link monitoring in non-DRX mode

Field	Test 1
Field	Value
gapOffset	0
Note 1: Void	

SNR 1 SNR 2 Qout SNR 3 Cell 1 SNR level A B C D₁ ms

T3

Table A.6.5.1.5.1-4: Void

Figure A.6.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.6.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

T2

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 no later than time point C (D_1 ms after the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.6 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in non-DRX mode

A.6.5.1.6.1 Test Purpose and Environment

1

2

3 Note:

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR1 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.6.1-1, A.6.5.1.6.1-2, and A.6.5.1.6.1-3 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.6.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is not enabled. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.6.1-1: Supported test configurations for FR1 PCell

Configuration

Description

FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth

TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth

TDD duplex mode, 30kHz SSB SCS, 40 MHz bandwidth

The UE is only required to pass in one of the supported test configurations in FR1

Table A.6.5.1.6.1-2: General test parameters for FR1 PCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
DI : :: I DIAID	Config 3		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
RMSI CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET Reference Channel	Config 1		CCR.1.1 FDD
Reference Channel	Config 2		CCR.1.1 TDD
	Config 3		CCR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
OOD Coningulation	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
om o o o o mg mamon	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
Ü	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
TCI configuration for F	PDCCH/PDSCH		TCI.State.0
OCNG parameters			OP.1
CP length			Normal
	Antenna Configuration		2x2 Low
Out of sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4

	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4		
	DMRS precoder granularity		REG bundle size		
	REG bundle size		6		
In sync transmission	DCI format		1-0		
parameters	Number of Control OFDM symbols		2		
	Aggregation level	CCE	4		
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0		
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0		
	DMRS precoder granularity		REG bundle size		
	REG bundle size		6		
DRX			OFF		
Gap pattern ID	Gap pattern ID		N.A.		
Layer 3 filtering			Enabled		
T310 timer		ms	1000		
T311 timer		ms	1000		
N310			1		
N311			1		
CSI-RS configuration	Config 1		CSI-RS.1.1 FDD		
for CSI reporting	Config 2		CSI-RS.1.1 TDD		
	Config 3		CSI-RS.2.1 TDD		
T1		S	0.2		
T2		S	0.2		
T3		S	0.44		
T4		S	0.2		
T5		S	0.88		
T6		S	0.84		
Note 1: UE-specific	PDCCH is not transmitted after T1 sta	arts.			

Table A.6.5.1.6.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter	Unit	Test 1					
		T1	T2	T3	T4	T5	
EPRE ratio of PDCCH DMRS to SSS	dB			0			
EPRE ratio of PDCCH to PDCCH DMRS	dB						
EPRE ratio of PBCH DMRS to SSS	dB						
EPRE ratio of PBCH to PBCH DMRS	dB			0			
EPRE ratio of PSS to SSS	dB						
EPRE ratio of PDSCH DMRS to SSS	dB						
EPRE ratio of PDSCH to PDSCH DMRS	dB						
EPRE ratio of OCNG DMRS to SSS	dB						
EPRE ratio of OCNG to OCNG DMRS	dB						
SNR on Config 1	dB	1	-7	-15	-4.5	1	
RLM-RS Config 2		1	-7	-15	-4.5	1	

	Config 3		1	-7	-15	-4.5	1
N_{oc}	Config 1	dBm/15kHz	-98				
	Config 2		-98				
	Config 3				-98		
Propagat	tion condition		TDL-C 300ns 100Hz				

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.6.5.1.6.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in section A.3.6.1.1.

Table A.6.5.1.6.1-4: Void

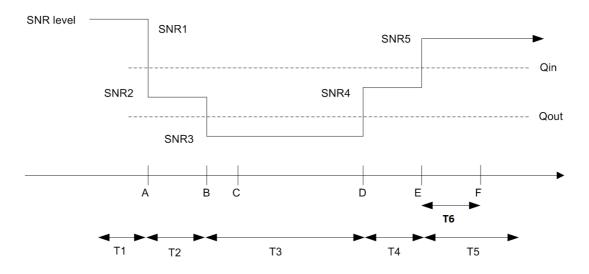


Figure A.6.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.6.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.7 Radio Link Monitoring Out-of-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode

A.6.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR1 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.7.1-1, A.6.5.1.7.1-2, and A.6.5.1.7.1-3 below. There is one cell, cell 1 is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.6.5.1.7.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.7.1-1: Supported test configurations for FR1 PCell

Configuration Description			
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth	
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth	
3		TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth	
Note: The UE is only required to pass in one of the supported test configurations in FR1			

Table A.6.5.1.7.1-2: General test parameters for FR1 PCell for CSI-RS out-of-sync testing in DRX mode

Parameter		Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
	Config 2, 3		TDD
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1
RMSI CORESET	Config 1		CR.1.1 FDD
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET Reference Channel	Config 1		CCR.1.3 FDD
	Config 2		CCR.1.3 TDD
	Config 3		CCR.2.2 TDD
SSB Configuration	Config 1		SSB.1 FR1
_	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1

SMTC Configuration	Config 1, 2		SMTC.1
- Cim C Comiguration	Config 3	1	SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
TCI configuration for F	PDCCH/PDSCH		TCI.State.0
OCNG parameters			OP.1
CP length			Normal
	d Antenna Configuration		2x2 Low
Out of sync	DCI format		1-0
transmission parameters	Number of Control OFDM symbols		2
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS configuration		4	CSI-RS.1.1 FDD
for CSI reporting	Config 2	4	CSI-RS.1.1 TDD
T4	Config 3	_	CSI-RS.2.1 TDD
T1		S	0.2
T2		S	1.28
T3		S	1.28
D1	DDCCI is not transmitted of a T4 or	S	1.24
Note 1: UE-specific	PDCCH is not transmitted after T1 st	апѕ.	

Table A.6.5.1.7.1-3: Cell specific test parameters for FR1 for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter	Unit	Test 1			
		T1	T2	T3	
EPRE ratio of PDCCH DMRS to SSS	dB	4			
EPRE ratio of PDCCH to PDCCH DMRS	dB				
EPRE ratio of PBCH DMRS to SSS	dB				
EPRE ratio of PBCH to PBCH DMRS	dB	0			

EPRE ratio o	f PSS to SSS	dB			
EPRE ratio o	of PDSCH DMRS to	dB			
EPRE ratio of PDSCH to PDSCH DMRS		dB			
EPRE ratio of OCNG DMRS to SSS		dB			
EPRE ratio of OCNG to OCNG DMRS		dB			
SNR on	Config 1	dB	1	-7	-15
RLM-RS	Config 2		1	-7	-15
	Config 3		1	-7	-15
N _{oc} Config 1		dBm/15kHz	-98		
Config 2			-98		
Config 3			-98		
Propagation	condition		TDL-C 300ns 100Hz		

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.6.5.1.7.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in section A.3.6.1.1.

Table A.6.5.1.7.1-4: Void Table A.6.5.1.7.1-5: Void

Table A.6.5.1.7.1-6: Void

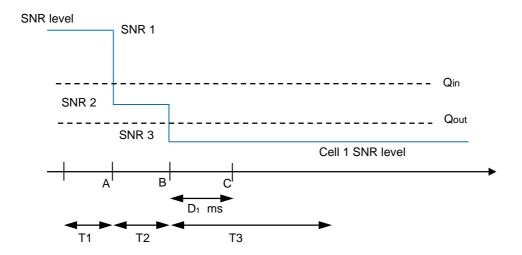


Figure A.6.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.6.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 (PCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 (PCell) no later than time point C (D_1 ms after the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.1.8 Radio Link Monitoring In-sync Test for FR1 PCell configured with CSI-RS-based RLM in DRX mode

A.6.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR1 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.6.5.1.8.1-1, A.6.5.1.81-2, A.6.5.1.8.1-3 and A.6.5.1.8.1-3A below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.1.8.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 is configured as the BFD-RS.

Table A.6.5.1.8.1-1: Supported test configurations for FR1 PSCell

Configuration		Description	
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth	
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth	
3		TDD duplex mode, 30kHz SSB SCS, 40 MHz bandwidth	
Note:	Note: The UE is only required to pass in one of the supported test configurations in FR1		

Table A.6.5.1.8.1-2: General test parameters for FR1 PCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		FDD
·	Config 2, 3		TDD
TDD Configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
DL initial BWP configuration	Config 1, 2, 3		DLBWP.0.1
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1
UL initial BWP configuration	Config 1, 2, 3		ULBWP.0.1
UL dedicated BWP configuration	Config 1, 2, 3		ULBWP.1.1

RMSI CORESET	Config 1		CR.1.1 FDD
	Config 1		
Reference Channel	Config 2		CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET	Config 1		CCR.1.1 FDD
Reference Channel			
	Config 2		CCR.1.1 TDD
	Config 3		CCR.2.1 TDD
SSB Configuration	Config 1		SSB.1 FR1
	Config 2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration	Config 1, 2		SMTC.1
	Config 3		SMTC.1
PDSCH/PDCCH	Config 1, 2		15 kHz
subcarrier spacing	Config 3		30 kHz
TRS configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
CSI-RS for RLM	Config 1		Resource #4 in TRS.1.1 FDD
	Config 2		Resource #4 in TRS.1.1 TDD
	Config 3		Resource #4 in TRS.1.2 TDD
TCI configuration for F			TCI.State.0
OCNG parameters	-DCCH/FD3CH		OP.1
CP length			Normal
	Antonno Configuration		2x2 Low
Correlation Matrix and	Antenna Configuration		2X2 LOW
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols	005	
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE	dB	4
	energy		
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average CSI-RS		
	RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync transmission	DCI format		1-0
parameters	Number of Control OFDM		2
	symbols		
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE	dB	0
	energy to average CSI-RS RE		
	energy		
	Ratio of hypothetical PDCCH	dB	0
	DMRS energy to average CSI-RS		
	RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			gp0
Layer 3 filtering			Enabled
T310 timer		ms	4000
T311 timer		ms	1000
N310			1
N311			1
		•	

CSI-RS configuration	Config 1		CSI-RS.1.1 FDD	
for CSI reporting	Config 2		CSI-RS.1.1 TDD	
	Config 3		CSI-RS.2.1 TDD	
T1		S	0.2	
T2		S	0.2	
T3		S	1.24	
T4		S	0.2	
T5		S	4	
T6		S	3.88	
Note 1: UE-specific PDCCH is not transmitted after T1 starts.				

Table A.6.5.1.8.1-3: Cell specific test parameters for FR1 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter		Unit			Test 1		
			T1	T2	T3	T4	T5
EPRE ratio o SSS	f PDCCH DMRS to	dB			0		
EPRE ratio o DMRS	f PDCCH to PDCCH	dB					
EPRE ratio o SSS	f PBCH DMRS to	dB					
EPRE ratio o DMRS	f PBCH to PBCH	dB			0		
EPRE ratio o	f PSS to SSS	dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio o DMRS	f PDSCH to PDSCH	dB					
EPRE ratio o SSS	f OCNG DMRS to	dB					
EPRE ratio o DMRS	f OCNG to OCNG	dB					
SNR on	Config 1	dB	1	-7	-15	-4.5	1
RLM-RS	Config 2		1	-7	-15	-4.5	1
	Config 3		1	-7	-15	-4.5	1
O = = (= 1 A		-98					
N_{oc}	Config 2				-98		
	Config 3			·	-98	<u> </u>	
Propagation	condition			TD	L-C 300ns 10	0Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.6.5.1.8.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is specified in section A.3.6.1.1[A.3.6].

Table A.6.5.1.8.1-3A: Measurement gap configuration for FR1 CSI-RS in-sync radio link monitoring in non-DRX mode

l —·	
Field	Toct 1
	I LEST I

		Value
	gapOffset	0
Note 1:	Void	

Table A.6.5.1.8.1-4: Void

Table A.6.5.1.8.1-5: Void

Table A.6.5.1.8.1-6: Void

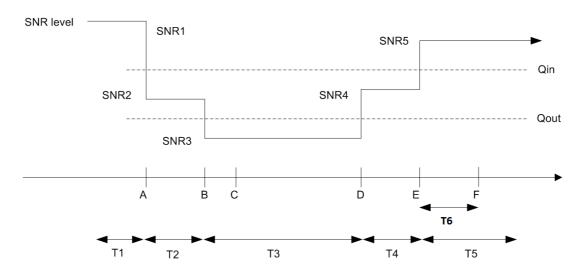


Figure A.6.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

A.6.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (T6 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.2 Interruption

A.6.5.2.1 Interruptions during measurements on deactivated NR SCC in FR1

A.6.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE missed ACK/NACK rate does not exceed the limits at NR PSCell interruptions during the measurement on the deactivated NR SCC. This test will verify the missed ACK/NACK rate for PCell in standalone NR specified in clause 8.2.2.2. Supported test configurations for NR PCell are shown in table A.6.5.2.1.1-1. Supported test configurations for NR SCell are shown in table A.6.5.2.1.1-1A. Test configuration for NR PCell and test configuration for NR SCell are chosen independently.

The general test parameters and NR cell specific test parameters are given in Table A.6.5.2.1.1-2, A.6.5.2.1.1-3 and A.6.5.2.1.1-4 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell, Cell2 is an NR deactivated SCell. Cell1 shall be configured as PCell and Cell2 shall be configured as SCell.

The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2 and the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector. During T1, PCell is continuously scheduled in DL.

Table A.6.5.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations for NR PCell

Config	Description	
1	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	
2	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	
3	NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	
Note 1: The	UE is only required to be tested in one of the supported test configurations	
ban		

Table A.6.5.2.1.1-1A: Interruptions during measurements on deactivated NR SCC supported test configurations for NR SCell

Configscell	Description
1	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
Note 1: The	UE is only required to be tested in one of the supported test configurations
Note 2: The	UE is only required to be tested in one with smallest aggregated channel bandwidth from supported
ban	d combinations which is composed of CCs ≥ the bandwidth (BW _{channel}) defined in each test
con	figuration,

Table A.6.5.2.1.1-2: General test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	Two NR RF channels
Active PCell		Cell1	PCell on NR RF channel number 1.
Configured deactivated SCell		Cell2	Deactivated SCell on NR RF channel number 2.
CP length		Normal	Applicable to Cell1 and Cell2
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

Table A.6.5.2.1.1-3: NR cell specific test parameters for NR PCell for interruptions during measurements on deactivated NR SCC in standalone NR

Parame	eter	Unit	Cell1
Frequency Range			FR1
Duplex mode Config 1			FDD
	Config 2,3		TDD
TDD configuration	Config 1		Not Applicable
_	Config 2		TDDConf.1.1

I	Config 2	1	TDDConf 2.4
DW	Config 3		TDDConf.2.1
BW _{channel}	Config 1,2	_	Note 9
DW	Config 3	DD	Note 9 52 Note 7
BW _{occupied}	Config 1,2	RB	_
	Config 3		106 Note 8
Initial DL BWP	Config 1,2,3		DLBWP.0.1
Configuration			
Dedicated DL BWP	Config 1,2,3		DLBWP.1.1
Configuration	3 , ,-		LIL DIA/D 0.4
Initial UL BWP	Config 1,2,3		ULBWP.0.1
Configuration	J , ,		LILDWD 4.4
Dedicated UL BWP	Config 1,2,3		ULBWP.1.1
Configuration PDSCH Reference	_		CD 4.4 EDD
measurement channel	Config 1 Config 2	-	SR.1.1 FDD SR.1.2 TDD
measurement channel		_	
CCI DC for troolsing	Config 3		SR.2.1 TDD
CSI-RS for tracking	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
DMCLCODECET	Config 3		TRS.1.2 TDD
RMSI CORESET parameters	Config 1		CR.1.1 FDD
parameters	Config 2	_	CR.1.1 TDD
Dadianted CODECET	Config 3		CR.2.1 TDD
Dedicated CORESET	Config 1	-	CCR.1.1 FDD
parameters	Config 2	-	CCR.1.1 TDD
00110 B #	Config 3		CCR.2.1 TDD
OCNG Patterns	Config 1,2		OP.1 Note 8
01470 0 11	Config 3		
SMTC Configuration	0 " 10		SMTC.1
SSB Configuration	Config 1,2	-	SSB.1 FR1
O a malatian Matrix and Antan	Config 3		SSB.2 FR1
Correlation Matrix and Anter	nna		1x2 Low
Configuration			
EPRE ratio of PSS to SSS	4- 000	_	
EPRE ratio of PBCH DMRS		_	
EPRE ratio of PBCH to PBC		dB 0	
EPRE ratio of PDCCH DMR EPRE ratio of PDCCH to PD			0
EPRE ratio of PDSCH DMR		иь	0
EPRE ratio of PDSCH to PD		-	
EPRE ratio of OCNG DMRS		-	
EPRE ratio of OCNG to OCI	IC DMPS Note 1	-	
Noc Note 2	NG DIVING	dBm/15 kHz	104
SS-RSRP Note 3		dBm/15 kHz	-104 97
			-87 -17
Ê _s /I _{ot}		dB	17
Ê _s /N _{oc} N _{oc} ^{Note 2}	Config 1.2	dB	17
IN _{OC}	Config 1,2	dBm/SCS	-104
Io ^{Note3}	Config 3	dDm/0.26MH=	-101 59.06
10.3355	Config 1,2	dBm/9.36MHz	-58.96
Time offset to Cell1 Note 5	Config 3	dBm/38.16MHz	-52.86
		μs	-
Propagation Condition			AWGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total
	transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed
	to be constant over subcarriers and time and shall be modeled as AWGN of
	appropriate power for N_{oc} to be fulfilled within BW $_{occupied}$.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information
	purposes. They are not settable parameters themselvess.
Note 4:	Void
Note 5:	Receive time difference between slot boundaries of signals received from the two
	cells at the UE antenna connector including time alignment error between the two
	cells.
Note 6:	For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked
	with ULBWP.0.2 defined in clause 12 of TS 38.213 [3].
Note 7:	All UL/DL transmission shall be confined within BW _{occupied} (i.e. 10 MHz, 52 RBs)
	from Fc,low, and lo is independent of the BW _{channel} configured.
Note 8:	All UL/DL transmission shall be confined within BW _{occupied} (i.e. 40 MHz, 106 RBs)
1.0.00	from F _{C,low} , and lo is independent of the BW _{channel} configured.
Note 9:	N _{RB,c.} is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW _{channel} .
NOLE 3.	TARB, c. 13 defived from Table 3.3.2-1 in 1.030. To 1-1[2] with configured by channel.

Table A.6.5.2.1.1-4: NR cell specific test parameters for NR SCell for interruptions during measurements on deactivated NR SCC in standalone NR

Parame	ter	Unit	Cell2
Frequency Range			FR1
Duplex mode	Configscell 1		FDD
	Configscell 2,3		TDD
TDD configuration	Config _{SCell} 1		Not Applicable
_	Config _{SCell} 2		TDDConf.1.1
	Configscell 3		TDDConf.2.1
BW _{channel}	Configscell 1,2		Note 9
	Configscell 3		Note 9
BWoccupied	Configscell 1,2	RB	52 Note 7
·	Configscell 3		106 Note 8
Initial DL BWP Configuration	Configscell 1,2,3		DLBWP.0.1
Dedicated DL BWP Configuration	Configscell 1,2,3		DLBWP.1.1
Initial UL BWP Configuration	Configscell 1,2,3		N/A
Dedicated UL BWP Configuration	Config 1,2,3		N/A
PDSCH Reference	Configscell 1		SR.1.1 FDD
measurement channel	Configscell 2		SR.1.2 TDD
	Configscell 3		SR.2.1 TDD
CSI-RS for tracking	Configscell 1		TRS.1.1 FDD
	Configscell 2		TRS.1.1 TDD
	Configscell 3		TRS.1.2 TDD
RMSI CORESET	Config _{SCell} 1		CR.1.1 FDD
parameters	Configscell 2		CR.1.1 TDD
	Configscell 3		CR.2.1 TDD
Dedicated CORESET	Configscell 1		CCR.1.1 FDD
parameters	Configscell 2		CCR.1.1 TDD
	Config _{SCell} 3		CCR.2.1 TDD
OCNG Patterns	Configscell 1,2		OP.1 Note 7
	Configscell 3		OP.1 Note 8
SMTC Configuration			SMTC.4
SSB Configuration Configscell 1,2			SSB.5 FR1
	Config _{SCell} 3		SSB.6 FR1
Correlation Matrix and An Configuration			1x2 Low
EPRE ratio of PSS to SS	S	dB	0

EDDE rot	to of DDCI DMD	C to CCC		
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS			<u> </u>	
			-	
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS				
	tio of PDSCH DMI		1	
	tio of PDSCH Divil			
	tio of OCNG DMR		1	
	tio of OCNG to OC		-	
N _{oc} Note 2	IIO OI OCING IO OC	DIVING DIVING	dBm/15 kHz	104
SS-RSRF	Note 3		dBm/15 kHz	-104 -87
Ê _s /I _{ot}				-
			dB	17
Ê _s /N _{oc}		0	dB	17
N _{oc} Note 2		Configscell 1,2	dBm/SCS	-104
ı Noto2		ConfigsCell 3	ID (0.00M)	-101
Io ^{Note3}		Configscell 1,2	dBm/9.36MHz	-58.96
<i></i>	O II A Noto E	Config _{SCell} 3	dBm/38.16MHz	-52.86
	et to Cell1 Note 5		μs	3
	ion Condition			AWGN
Note 1:				ated and a constant total
Nata O			s achieved for all Of	
Note 2:				cified in the test is assumed to
		be fulfilled within B		leled as AWGN of appropriate
Note 3:				arameters for information
Note 3.			ameters themselves	
Note 4:	Void	are not settable par	ameters themselves	55.
Note 5:		ference hetween sk	nt houndaries of sign	nals received from the two
11010 0.				ent error between the two
	cells.		loldding tilllo diigilli	ioni onor bottioon are the
Note 6: For unpaired spectrum, a DL BWP is			s linked with an UL	BWP. DLBWP.0.2 is linked
with ULBWP.0.2 defined in clause 1				
Note 7: All UL/DL transmission shall be conf				ed (i.e. 10 MHz, 52 RBs) from
F _{C,low} , and lo is independent of the E				
Note 8: All UL/DL transmission shall be confir				
F _{C,low} , and Io is independent of the B				
Note 9:	N _{RB,c} . is derived	from Table 5.3.2-1	in TS38.101-1[2] wit	th configured BW _{channel} .

A.6.5.2.1.2 Test Requirements

If the NR PCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PCell immediately before and immediately after an SMTC. Each interruption on NR PCell shall not exceed the value defined in Table A.6.5.2.1.2-1.

If the NR PCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PCell no earlier than 1 slot before an SMTC and no later than 1 slot after the SMTC. the interruption on NR PCell shall not exceed the value defined in Table A.6.5.2.1.2-2.

Table A.6.5.2.1.2-1: Interruption duration if the PCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	1
1	0.5	1

Table A.6.5.2.1.2-2: Interruption duration if the PCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length
0	1	2 + SMTC duration
1	0.5	2 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.3 SCell Activation and Deactivation Delay

A.6.5.3.1 SCell Activation and deactivation of known SCell in FR1 in non-DRX for 160ms SCell measurement cycle

A.6.5.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is known by the UE at the time of activation.

The supported test configurations for NR PCell are shown in table A.6.5.3.1.1-1 below. Supported test configurations for NR SCell are shown in table A.6.5.3.1.1-1A. Test configuration for NR PCell and test configuration for NR SCell are chosen independently. The test parameters are given in Tables A.6.5.3.1.1-2 and cell-specific parameters in A.6.5.3.1.1-3 and A.6.5.3.1.1-4 below. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1, but is not aware of Cell2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI in PCell for the activated SCell at latest in slot $n + \frac{T_{\text{HARQ}} + T_{\text{activation_time}} + T_{\text{CSI_Reporting}}}{NR \text{ slot length}}$, as defined in clause 8.3. The UE shall start reporting CSI in PCell after at

least one CSI-RS transmission occasion for channel measurement and reporting after slot $n + \frac{T_{\text{HARQ}} + 3\text{ms}}{\text{NR slot length}}$ and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the slot $n + 1 + \frac{T_{\text{HARQ}}}{\text{NR slot length}}$ to $n + 1 + \frac{T_{\text{HARQ}} + 3\text{ms} + T_{\text{X}}}{\text{NR slot length}} + N_{\text{interruption}}$, as defined in clause 8.3, where $N_{\text{interruption}}$ is the interruption length given in section 8.2.

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot $m + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$, as defined in clause 8.3, and The starting point of any PCell interruption due to the deactivation shall occur in the slot $m + 1 + \frac{T_{HARQ}}{NR \ slot \ length}$ to $m + 1 + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$, as defined in clause 8.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

Table A.6.5.3.1.1-1: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations for NR PCell

Col	nfig	Description
1		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
Note 1:	The UE is	s only required to be tested in one of the supported test configurations
Note 2:		s only required to be tested in one with smallest aggregated channel bandwidth from supported
	band com	nbinations which is composed of CCs ≥ the bandwidth (BW _{channel}) defined in each test
	configura	tion,

Table A.6.5.3.1.1-1A: known FR1 SCell activation in non-DRX for 160ms SCell measurement cycle supported test configurations for NR SCell

Conf	ig scell	Description
1		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
Note 1:	The UE is	s only required to be tested in one of the supported test configurations
Note 2:		s only required to be tested in one with smallest aggregated channel bandwidth from supported abinations which is composed of CCs ≥ the bandwidth (BW _{channel}) defined in each test tion,

Table A.6.5.3.1.1-2: General test parameters for known FR1 SCell activation case, 160ms SCell measurement cycle

Parameter	Unit	Value	Comment
RF Channel Number		1,2	Two NR radio channel (1, 2) are used for this test
Active PCell		Cell 1	Primary cell on NR RF channel number 1.
Configured deactivated SCell		Cell 2	Configured deactivated secondary cell on NR RF channel number 2
CP length		Normal	
DRX		OFF	Continuous monitoring of primary cell
Cell-individual offset for cells on NR channel number	dB	0	Individual offset for cells on primary component carrier.
SCell measurement cycle (measCycleSCell)	ms	160	
Cell2 timing offset to cell1	μs	0	
Time alignment error between cell2 and cell1	μs	≤ Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.	The value of time alignment error depends upon the type of carrier aggregation.
T1	s	7	During this time the PSCell shall be known and the SCell configured and detected.
T2	s	1	During this time the UE shall activate the SCell.
Т3	S	1	During this time the UE shall deactivate the SCell.
Tharq	ms	Config 1: 2 Config 2: 3 Config 3: 2.5	k ₁ ×NR slot length k ₁ is a number of slots and is indicated by the PDSCH-to-HARQ-timing-indicator field in the DCI format, if present, or provided by <i>dl-DataToUL-ACK</i> , the value of k should be the minimum value defined in TS 38.213 [3] that will meet the timing constraints of this test case.

T _{CSI_Reporting}	15	The delay (in ms) including uncertainty in acquiring the first available downlink CSI reference resource, UE processing time for CSI reporting (clause 5.2.2.5 in TS 38.214) and uncertainty in acquiring the first available CSI reporting resources as specified in TS 38.331 [2]
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Table A.6.5.3.1.1-3: Cell specific test parameters for NR PCell for known FR1 SCell activation case, 160ms SCell measurement cycle

Daramatar	Parameter			Cell 1	
Parameter		Unit	T1	T2	Т3
Duplex mode	Config 1			FDD	
Buplex mode	Config 2,3			TDD	
	Config 1		Not applicable		
TDD configuration	Config 2		TDDConf.1.1		
	Config 3			TDDConf.2.1	
BWchannel	Config 1,2	MHz		Note 7	
	Config 3			Note 7	
BWoccupied	Config 1,2	RB		52 Note 5	
	Config 3			106 Note 6	
Initial BWP configuration				DLBWP.0.1	
TCI state	10 " 1			TCI.State.0	
	Config 1			TRS.1.1 FDD	
TRS Configuration	Config 2			TRS.1.1 TDD	
	Config 3			TRS.1.2 TDD	1
PDSCH Reference	Config 1			SR.1.1 FDD	
measurement channel	Config 2			SR.1.1 TDD	
	Config 3			SR.2.1 TDD	
Dedicated CORESET	Config 1			CCR.1.1 FDC	
parameters	Config 2			CCR.1.1 TDD	
	Config 3			CCR.2.1 TDD)
RMSI CORESET	Config 1		CR.1.1 FDD CR.1.1 TDD		
parameters	Config 2				
OONO Pattarea	Config 3		1	CR.2.1 TDD OP.1 ^{Note 5}	
OCNG Patterns	Config 1,2				
	Config 3,		1	OP.1 Note 6	
SSB Configuration	Config 1,2			SSB.1 FR1	
	Config 3		<u> </u>	SSB.2 FR1	
CSI-RS configuration for	Config 1			SI-RS.1.1 FD	
CSI reporting (Note 8)	Config 2			SI-RS.1.1 TD	
	Config 3			SI-RS.2.1 TD	טי
SMTC configuration				SMTC.1	
reportConfigType				periodic	
reportQuantity			(cri-RI-PMI-CQ	Įl
CCI reporting periodicity	Config 1,2	slot	5		
CSI reporting periodicity	Config 3			10	
CSI reporting effect	Config 1,2	slot		3	
CSI reporting offset	Config 3			5	
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH DMRS	S to SSS				
EPRE ratio of PBCH to PB					
EPRE ratio of PDCCH DMF		dB		0	
EPRE ratio of PDCCH to P	DCCH DMRS				
EPRE ratio of PDSCH DMF	RS to SSS				
EPRE ratio of PDSCH to P	DSCH		1		

EPRE ratio of OCNG DMRS to SSS Note 1					
EPRE ratio of OCNG to OCNG DMRS Note 1					
Confin 1 0			dBm/SCS	-104	
N_{oc} Note2		Config 3	ubili/SCS	-101	
$\hat{E}_{_{\!s}}/I_{_{\!ot}}$			dB	17	
\hat{E}_s/N_c	ос		dB	17	
SS-RSRI	Note3	Config 1,2	dBm/SCS	-87	
		Config 3	ubili/SCS	-84	
SCH_RP	Note 3		dBm/15 kHz	-87	
Io Note3		Config 1,2	dBm/ 9.36MHz	-58.96	
10.10.00	10 Mores		dBm/ 38.16MHz	-52.87	
Propagat	ion condition		-	AWGN	
Note 1:		sed such that bo	th cells are fully	allocated and a constant total	
				all OFDM symbols.	
Note 2:				t specified in the test is assumed	
				be modelled as AWGN of	
	appropriate powe	r for $N_{_{oc}}$ to be	e fulfilled within B	BW _{occupied} .	
Note 3:	SS-RSRP and SC	H_RP levels ha	ve been derived	from other parameters for	
	information purpo	ses. They are no	ot settable param	neters themselves.	
Note 4:		ces for CSI repo	rting are assigne	ed to the UE prior to the start of	
	time period T2.				
Note 5: All UL/DL transmission shall be co					
Note O	from F _{C,low} , and lo				
Note 6: All UL/DL transmission shall be co					
Note 7:	from Fc,low, and lo is independent of the BW _{channel} configured.				
Note 7:	·				
INOLE O.	On top of the reference configurations, CSI-RS offset should be set to meet the CS reference resource timing definition in TS 38.214 cl. 5.2.2.5.				
. c.c. c.c. c.c. c.c. c.c. c.c. c.c. c					

Table A.6.5.3.1.1-4: Cell specific test parameters for NR SCell for known FR1 SCell activation case, 160ms SCell measurement cycle

Parame	Unit	Cell 2			
Parame	Onit	T1	T2	T3	
Dupley made	Config _{SCell} 1			FDD	
Duplex mode	Configscell 2,3			TDD	
	Configscell 1		N ₁	ot applicat	ole
TDD configuration	Configscell 2		Т	DDConf.1	.1
	Configscell 3		Т	DDConf.2	.1
BWchannel	Configscell 1,2	MHz		Note 7	
DVV channel	Configscell 3	IVIITIZ		Note 7	
BW _{occupied}	Config _{SCell} 1,2	RB	52 Note 5		
	Configscell 3		106 Note 6		
Initial BWP configuration			DLBWP.0.1		
TCI state			-	TCI.State.)
	Config _{SCell} 1		TRS.1.1 FDD		
TRS Configuration	Config _{SCell} 2		Т	RS.1.1 TD	D
	Configscell 3		Т	RS.1.2 TD	D
PDSCH Reference	Configscell 1			N/A	
	Configscell 2			N/A	
measurement channel	ConfigsCell 3			N/A	
Dadiastad CODECET	Configscell 1			N/A	
Dedicated CORESET	Configscell 2			N/A	
parameters	Configscell 3			N/A	
	ConfigsCell 1			N/A	

RMSI CO	RESET	Config _{SCell} 2		N/A		
paramete		Configscell 2		N/A		
				OP.1 Note 5		
OCNG Pa	llems	Configscell 1,2		OP.1 Note 6		
		Configscell 3,				
SSB Conf	iguration	Configscell 1,2		SSB.1 FR1		
		ConfigsCell 3		SSB.2 FR1		
CSI-RS co	onfiguration	Configscell 1		CSI-RS.1.1 FDD		
	porting Note 8	Configscell 2		CSI-RS.1.1 TDD		
	g	Configscell 3		CSI-RS.2.1 TDD		
SMTC cor	nfiguration			SMTC.1		
reportCon	figType			N/A		
reportQua	ntity			N/A		
CSI repor	tina	ConfigsCell 1,2		N/A		
periodicity		Configscell 3	slot	N/A		
portodioity		•				
CSI repor	ting offset	Config _{SCell} 1,2	slot	N/A		
		Configscell 3	0.01	N/A		
	o of PSS to SS]			
	o of PBCH DM					
	o of PBCH to F					
	o of PDCCH D					
EPRE rati	o of PDCCH to	PDCCH DMRS	dB	0		
EPRE rati	o of PDSCH D	MRS to SSS				
	o of PDSCH to					
EPRE rati	o of OCNG DN	IRS to SSS Note 1				
EPRE rati	o of OCNG to	OCNG DMRS Note 1	ĺ			
		Config _{SCell} 1,2	15 (0.00	-104		
$N_{\it oc}^{\rm Note2}$		ConfigsCell 3	dBm/SCS	-101		
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$			dB	17		
\hat{E}_s/N_o	c		dB	17		
		Configscell 1,2		-87		
SS-RSRP	Note3	Configscell 3	dBm/SCS	-84		
SCH_RP	Note 3	Oormgscell o	dBm/15 kHz	-87		
COTI_III		Config _{SCell} 1,2	dBm/	-58.96		
Io Note3		Configer : 2	9.36MHz dBm/			
		Config _{SCell} 3	38.16MHz	-52.87		
Propagati	on condition		-	AWGN		
Propagation condition Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N according to be fulfilled within BWoccupied.						
Note 3:						
Note 4:						
Note 5:	Note 5: All UL/DL transmission shall be confined within BW _{occupied} (i.e. 10 MHz, 52					
Note 6:	RBs) from F _{C,low} , and Io is independent of the BW _{channel} configured. Note 6: All UL/DL transmission shall be confined within BW _{occupied} (i.e. 40 MHz, 106 RBs) from F _{C,low} , and Io is independent of the BW _{channel} configured.					
Note 7: N _{RB,c} . is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW _{channel}						
Note 8:	On top of the	reference configurat	ions, CSI-RS off	set should be set to meet the		
CSI reference resource timing definition in TS 38.214 cl. 5.2.2.5.						

A.6.5.3.1.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (n + 1 + $\frac{T_{HARQ} + 3ms}{NR \, slot \, length}$). UE is allowed to postpone CSI report to next available UL resource if an available uplink resource is subject to interruption. During T2 the UE shall start sending CSI reports for SCell with non-zero CQI index at latest in a slot n + $\frac{T_{HARQ} + T_{activition_time} + T_{CSI_Reporting}}{NR \, slot \, length}$, $T_{activation_time} = T_{FirstSSB} + 5ms$, as defined in clause 8.3.

During T3 the UE shall stop sending CSI reports for SCell at latest in a slot $m + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$, as defined in clause 8.3.

During T2 interruption of PCell / PSCell during SCell activation shall not happen outside the slot $n+1+\frac{T_{\rm HARQ}+3\,{\rm ms}+T_{\rm X}}{{\rm NR}\;{\rm slot}\;{\rm length}}$ to $n+1+\frac{T_{\rm HARQ}+3\,{\rm ms}+T_{\rm X}}{{\rm NR}\;{\rm slot}\;{\rm length}}+N_{\rm interruption}$, as defined in clause 8.3.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot $m + 1 + \frac{T_{HARQ}}{NR \, slot \, length}$ to $m + 1 + \frac{T_{HARQ} + 3ms}{NR \, slot \, length}$, as defined in clause 8.3.

The interruption on any activated serving cell shall not be more than the values specified for SA in clause 8.2.2.2.2.

All of the above test requirements shall be fulfilled in order for the observed SCell activation delay and SCell deactivation delay to be counted as correct. The rate of correct observed SCell activation delay and SCell deactivation delay during repeated tests shall be at least 90%.

NOTE: During T2 if there are no uplink resources for reporting the valid CSI in a slot $\frac{T_{\text{HARQ}} + T_{\text{activtion_time}} + T_{\text{CSI_Reporting}}}{NR \, slot \, length} \text{ as defined in clause 8.3 then the UE shall use the next available uplink resource for reporting the corresponding valid CSI.}$

A.6.5.3.2 SCell Activation and deactivation of known SCell in FR1 in non-DRX for 640 ms SCell measurement cycle

A.6.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.6.5.3.1.1. The supported test configurations are the same as defined in clause A.6.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.6.5.3.2.1-1 will replace the values of corresponding parameters in Tables A.4.5.3.1.1-1.

Table A.6.5.3.2.1-1: General test parameters for known FR1 SCell activation case, 640 ms SCell measurement cycle

Parameter	Unit	Value	Comment
SCell measurement cycle (measCycleSCell)	ms	640	

A.6.5.3.2.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value $T_{FirstSSB_MAX} + T_{rs} + 5ms$.

A.6.5.3.3 SCell Activation and deactivation of unknown SCell in FR1 in non-DRX

A.6.5.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SCell activation and deactivation times are within the requirements stated in clause 8.3, when the SCell in FR1 is unknown by the UE at the time of activation.

The supported test configurations are the same as defined in clause A.6.5.3.1.1. The test parameters are the same except those described in the following clause. The listed parameter values in Tables A.6.5.3.3.1-1 will replace the values of corresponding parameters in Tables A.6.5.3.1.1-1. The test consists of three successive time periods, with duration of T1, T2 and T3, respectively. There are two NR carriers, each with one cell. Both cells have constant signal levels throughout the test. Before the test starts the UE is connected to Cell 1, but is not aware of Cell2. The UE is only monitoring the PCC. The UE shall be continuously scheduled in the PCell throughout the whole test.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on radio channel 2. The UE now starts monitoring the SCC. The test equipment sends a MAC message for activation of the SCell.

The point in time at which the MAC message is received at the UE antenna connector, in slot # denoted n, defines the start of time period T2. The UE shall be able to report valid CSI in PCell for the activated SCell at latest in slot $\frac{T_{\text{HARQ}} + T_{\text{activition_time}} + T_{\text{CSI_Reporting}}}{NR \, slot \, length}, \text{ as defined in clause 8.3. The UE shall start reporting CSI in PCell after at least}$

one CSI-RS transmission occasion for channel measurement and reporting after slot $n+1+\frac{T_{\text{HARQ}}+3ms}{NR \, \text{slot} \, \text{length}}$ and shall report CQI index 0 (out-of-range) until the SCell activation has been completed. Any PCell interruption due to activation of SCell shall occur in the slot $n+1+\frac{T_{\text{HARQ}}}{NR \, \text{slot} \, \text{length}}$ to $m+1+\frac{T_{\text{HARQ}}+3ms+T_X}{NR \, \text{slot} \, \text{length}}+N_{\text{interruption}}$, as defined in clause 8.3, where $N_{\text{interruption}}$ is the interruption length given in section 8.2.

Time period T3 starts when a MAC message for deactivation of SCell, sent from the test equipment to the UE in a slot # denoted m, is received at the UE antenna connector. The UE shall carry out deactivation of the SCell in a slot $n + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$, as defined in clause 8.3, and the starting point of any PCell interruption due to the deactivation shall occur in the slot $n + 1 + \frac{T_{HARQ}}{NR \ slot \ length}$ to $n + 1 + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$, as defined in clause 8.3.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell during activation and deactivation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell deactivation command is sent until CQI reporting for SCell is discontinued.

Table A.6.5.3.3.1-1: General test parameters for unknown FR1 SCell activation case, 160ms SCell measurement cycle

Parameter	Unit	Value	Comment
T1	ms	100	During this time the PSCell shall be known and the SCell configured, but not detected.

A.6.5.3.3.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value $T_{FirstSSB_MAX} + T_{SMTC_MAX} + 2*T_{rs} + 5ms$ as defined in clause 8.3.

A.6.5.4 UE UL carrier RRC reconfiguration Delay

A.6.5.4.1 UE UL carrier RRC reconfiguration Delay

Table A.6.5.4.1-1 - Table A.6.5.4.1-4: Void

A.6.5.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that when the UE receives a RRC message implying NR UL or Supplementary UL carrier configuration, the UE shall be ready to start transmission on the newly configured carrier within the time limits specified in clause 8.4.2 and 8.4.3 for configuring and deconfiguring, respectively.

There are two cells: FR1 PCell (cell 1) and FR1 SCell (cell 2). Both NR uplink and supplementary uplink are broadcast by *ServingCellConfigCommonSIB*. The test parameters for PCell and SCell are given in Table A. 6.5.4.1.1-1, Table A.6.5.4.1.1-2, Table A.6.5.4.1.1-3 and Table A.6.5.4.1.1-4 below. In test 1, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, NR uplink of cell 2 is configured to UE. At the start of T2, a supplementary uplink of cell 2 is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the supplementary uplink is released through *RRCReconfiguration*.

In test 2, the test consists of three time periods, with duration of T1, T2 and T3 respectively. During time duration T1, supplementray uplink on cell 2 is configured to UE. At the start of T2, a NR uplink is configured to UE through *RRCReconfiguration*, then UE shall start transmission both on the NR uplink and supplementary uplink. At the start of T3, the NR uplink is released through *RRCReconfiguration*.

Table A.6.5.4.1.1-1: Supported test configurations

Configuration	PCell (Cell 1)	SCell (Cell 2)
1	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
2	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
3	15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode
4	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
5	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
6	15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode; SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex mode
7	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode
8	30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode	DL and UL: 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode; SUL: 15 kHz SCS, ≥10 MHz bandwidth, SUL duplex mode

9		30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex	DL and UL: 30kHz SSB SCS, ≥40 MHz bandwidth,		
		mode	TDD duplex mode;		
			SUL: 30kHz SCS, ≥40 MHz bandwidth, SUL duplex		
	m		mode		
Note 1:	Note 1: The UE is only required to be tested in one of the supported test configurations				
Note 2:	The UE is only required to be tested in one with smallest aggregated channel bandwidth from supported band				
	combin	ations which is composed of CCs ≥ the bandwidth (BW	channel) defined in each test configuration,		

Table A.6.5.4.1.1-2: General test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on Pcell

Parameter	Unit	Test	Value	Comment
	Offic	configuration		
RF Channel		Config 1,2,3, 4,	1, 2	Two radio channels are used for these two
Number		5, 6, 7, 8, 9		tests.
Active cell		Config 1,2,3, 4,	Cell 1: FR1 PCell	PCell on RF channel number 1
		5, 6, 7, 8, 9	Cell 2: FR1 SCell	FR1 SCell on RF channel number 2
CP length		Config 1,2,3, 4,	Normal	
		5, 6, 7, 8, 9		
DRX		Config 1,2,3, 4,	OFF	
		5, 6, 7, 8, 9		
Measurement		Config 1,2,3, 4,	OFF	
gap pattern Id		5, 6, 7, 8, 9		
Filter coefficient		Config 1,2,3, 4,	0	L3 filtering is not used
		5, 6, 7, 8, 9		
T1		Config 1,2,3, 4,	5	
	S	5, 6, 7, 8, 9		
T2		Config 1,2,3, 4,	5	
	S	5, 6, 7, 8, 9		
T3		Config 1,2,3, 4,	5	
	S	5, 6, 7, 8, 9		

Table A.6.5.4.1.1-3: NR Cell specific test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on PCell (Cell 1)

Parameter	Unit	Test	Test 1	Test 2
		Configuration	T1 T2 T3	T1 T2 T3
Channel number		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	1	1
		Conf 1, 2, 3	N/A	N/A
TDD configuration		Conf 4, 5, 6	TDD Conf.1.1	TDD Conf.1.1
		Conf 7, 8, 9	TDD Conf.2.1	TDD Conf.2.1
		Conf 1, 2, 3	Note 6	Note 6
BW _{channel}	MHz	Conf 4, 5, 6	Note 6	Note 6
		Conf 7, 8, 9	Note 6	Note 6
BW _{occupied}	RB	Conf 1, 2, 3	52 Note 4	52 Note 4
		Conf 4, 5, 6	52 Note 4	52 Note 4
		Conf 7, 8, 9	106 Note 5	106 Note 5
PDSCH reference		Conf 1, 2, 3	SR.1.1 FDD	SR.1.1 FDD
measurement		Conf 4, 5, 6	SR.1.1 TDD	SR.1.1 TDD
channel as defined in A.3.1.1		Conf 7, 8, 9	SR 2.1 TDD	SR 2.1 TDD
RMSI CORESET		Conf 1, 2, 3	CR.1.1 FDD	CR.1.1 FDD
reference		Conf 4, 5, 6	CR.1.1 TDD	CR.1.1 TDD
measurement channel as defined in A.3.1.2		Conf 7, 8, 9	CR.2.1 TDD	CR.2.1 TDD
RMC CORESET		Conf 1, 2, 3	CCR.1.1 FDD	CCR.1.1 FDD
reference		Conf 4, 5, 6	CCR.1.1 TDD	CCR.1.1 TDD
measurement channel as defined in A.3.1.3		Conf 7, 8, 9	CCR.2.1 TDD	CCR.2.1 TDD
OCNG Pattern Note 1		Conf 1, 2, 3, 4, 5, 6	OP.1 Note 4	OP.1 Note 4
		Config 7, 8, 9	OP.1 Note 5	OP.1 Note 5
SSB configuration		Conf 1, 2, 3, 4, 5, 6	SSB.1 FR1	SSB.1 FR1
garane		Conf 7, 8, 9	SSB.2 FR1	SSB.2 FR1
SMTC configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	SMTC.1	SMTC.1
		Conf 1	TRS.1.1 FDD	TRS.1.1 FDD
		Conf 2	TRS.1.1 FDD	TRS.1.1 FDD
		Conf 3	TRS.1.1 FDD	TRS.1.1 FDD
		Conf 4	TRS.1.1 TDD	TRS.1.1 TDD
CSI-RS for tracking		Conf 5	TRS.1.1 TDD	TRS.1.1 TDD
		Conf 6 Conf 7	TRS.1.1 TDD TRS.1.2 TDD	TRS.1.1 TDD TRS.1.2 TDD
		0 10	TDO 4 0 TDD	TDO 4 0 TDD
		Conf 8 Conf 9	TRS.1.2 TDD TRS.1.2 TDD	TRS.1.2 TDD TRS.1.2 TDD
DL initial BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	DLBWP.0.1	DLBWP.0.1
DL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	DLBWP.1.1	DLBWP.1.1
UL dedicated BWP configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	ULBWP.1.1	ULBWP.1.1
EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	0	0

	1								
EPRE ratio of									
PDCCH_DMRS to									
SSS									
EPRE ratio of									
PDCCH to									
PDCCH_DMRS									
EPRE ratio of									
PDSCH_DMRS to									
SSS									
EPRE ratio of									
PDSCH to									
PDSCH_DMRS									
EPRE ratio of									
OCNG DMRS to									
SSS									
EPRE ratio of									
OCNG to OCNG									
DMRS									
	dBm /	Conf 1, 2, 3, 4,	-102			-102			
Note 2	15kHz	15kHz 5, 6, 7, 8, 9					100		
N _{oc} Note 2	dBm/	Conf	-102			-102			
	SCS	1,2,3,4,5,6							
		Conf 7,8,9		-99	1		-99		
\hat{E}_s/N_{oc}	dB	Conf 1, 2, 3, 4,	16	16	16	16	16	16	
		5, 6, 7, 8, 9							
$\hat{E}_{_{\mathrm{S}}}/I_{_{\mathrm{ot}}}$ Note 3	dB	Conf 1, 2, 3, 4,	16	16	16	16	16	16	
S/ ot		5, 6, 7, 8, 9							
	dBm/	Conf	-86	-86	-86	-86	-86	-86	
SS-RSRP Note 3	SCS	1,2,3,4,5,6							
		Conf 7,8,9	-83	-83	-83	-83	-83	-83	
	dBm/	Conf	-57.9	-57.9	-57.9	- 57.9	-57.9	- 57.9	
	9.36	1,2,3,4,5,6							
Io Note 3	MHz								
	dBm/	Conf 7,8,9	-51.8	-51.8	-51.8	-51.8	-51.8	-51.8	
	38.16								
	MHz						<u> </u>		
Propagation		Conf 1, 2, 3, 4,		AWGN			AWGN		
Condition		5, 6, 7, 8, 9							
Antenna		Conf 1, 2, 3, 4,		1 x 2			1 x 2		
configuration NOTE 1: OCNG shall	<u> </u>	5, 6, 7, 8, 9							
1 NIC 1 L 1 · (VC NIC) O hol	11 00 11000	cuch that both cal	ic are tully	Ollocatod	and a conc	tant total tra	nemitted no	MOr	

NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.

NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled within BW_{occupied}.

NOTE 4: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 10 MHz, 52 RBs) from F_{C,low}, and lo is independent of the BW_{channel} configured.

NOTE 5: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 40 MHz, 106 RBs) from F_{C,low}, and lo is independent of the BW_{channel} configured.

NOTE 6: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW_{channel}.

Table A.6.5.4.1.1-4: NR Cell specific test parameters for NR standalone UE UL carrier RRC reconfiguration Delay on SCell (Cell 2)

Parameter	Unit	Test		Test 1			Test 2	
		Configuration	T1	T2	T3	T1	T2	T3
Channel number		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		2			2	
		Conf 1, 4, 7		N/A			N/A	
TDD configuration		Conf 2, 5, 8		TDDConf.1.	.1		TDDConf.1.1	
		Conf 3, 6, 9		TDDConf.2.	.1		TDDConf.2.1	
		Conf 1, 4, 7		Note 6			Note 6	
BW _{channel}	MHz	Conf 2, 5, 8		Note 6			Note 6	
		Conf 3, 6, 9		Note 6			Note 6	
BW _{occupied}	RB	Conf 1, 4, 7		52 Note 4			52 Note 4	
		Conf 2, 5, 8		52 Note 4			52 Note 4	
		Conf 3, 6, 9		106 Note 5			106 Note 5	
		Conf 1, 4, 7	G-	G-FR1-	G-FR1-		G-FR1-	
Ì			FR1-	A3-10	A3-10 in	N/A	A3-10 in	N/A
			A3-10	in [13]	[13]	14/71	[13]	14/71
			in [13]				[.0]	
DU0011		Conf 2, 5, 8	G-	G-FR1-	G-FR1-		G-FR1-	
PUSCH parameters			FR1-	A3-10	A3-10 in	N/A	A3-10 in	N/A
for NR UL carrier			A3-10 in [13]	in [13]	[13]		[13]	
		Conf 3, 6, 9	G-	G-FR1-	G-FR1-			
		00111 0, 0, 0	FR1-	A3-14	A3-14 in		G-FR1-	
			A3-14	in [13]	[13]	N/A	A3-14 in	N/A
			in [13]		,		[13]	
		Conf 1, 4, 7	Table	Table	Table			
			8.3.3.1	8.3.3.1.	8.3.3.1.2	N/A	N/A	N/A
			.2-1 in	2-1 in	-1 in [13]	14/71	14// (14/71
		0 (0.5.0	[13]	[13]	T 11			
PUCCH parameters		Conf 2, 5, 8	Table	Table	Table 8.3.3.1.2			
For NR UL carrier			8.3.3.1 .2-1 in	8.3.3.1. 2-1 in	-1 in [13]	N/A	N/A	N/A
I OF INIX OL Camer			[13]	[13]	-1 111 [13]			
		Conf 3, 6, 9	Table	Table	Table			
			8.3.3.1	8.3.3.1.	8.3.3.1.2	N1/A	N1/A	N1/A
			.2-2 in	2-2 in	-2 in [13]	N/A	N/A	N/A
			[13]	[13]				
		Conf 1, 4, 7		G-FR1-		G-FR1-	G-FR1-	G-FR1-
			N/A	A3-10	N/A	A3-10 in	A3-10 in	A3-10 in
DUOOLL		0(0.5.0		in [13]		[13]	[13]	[13]
PUSCH parameters for supplementary		Conf 2, 5, 8	N/A	G-FR1-	N/A	G-FR1-	G-FR1-	G-FR1-
UL			IN/A	A3-10 in [13]	IN/A	A3-10 in [13]	A3-10 in [13]	A3-10 in [13]
OL		Conf 3, 6, 9		G-FR1-		G-FR1-	G-FR1-	G-FR1-
		00111 0, 0, 0	N/A	A3-14	N/A	A3-14 in	A3-14 in	A3-14 in
				in [13]	, .	[13]	[13]	[13]
		Conf 1, 4, 7				Table	Table	Table
			N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
						-1 in [13]	-1 in [13]	-1 in [13]
PUCCH parameters		Conf 2, 5, 8				Table	Table	Table
for supplementary			N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
UL						-1 in [13]	-1 in [13]	-1 in [13]
		Conf 3, 6, 9				Table	Table	Table
		00111 0, 0, 0	N/A	N/A	N/A	8.3.3.1.2	8.3.3.1.2	8.3.3.1.2
]	, , ,	-2 in [13]	-2 in [13]	-2 in [13]
		Conf 1, 4, 7		SR.1.1 FD	D		SR.1.1 FDD	

		1		
PDSCH reference		Conf 2, 5, 8	SR.1.1 TDD	SR.1.1 TDD
measurement		Conf 3, 6, 9		
channel as defined			SR 2.1 TDD	SR 2.1 TDD
in A.3.1.1				
RMSI CORESET		Conf 1, 4, 7	CR.1.1 FDD	CR.1.1 FDD
reference		Conf 2, 5, 8	CR.1.1 TDD	CR.1.1 TDD
measurement		Conf 3, 6, 9		
channel as defined			CR.2.1 TDD	CR.2.1 TDD
in A.3.1.2				
RMC CORESET		Conf 1, 4, 7	CCR.1.1 FDD	CCR.1.1 FDD
reference		Conf 2, 5, 8	CCR.1.1 TDD	CCR.1.1 TDD
measurement		Conf 3, 6, 9		
channel as defined		, , , ,	CCR.2.1 TDD	CCR.2.1 TDD
in A.3.1.3				
OCNG Pattern Note 1		Conf 1, 2, 4, 5,	OP.1 Note 4	OP.1 Note 4
OCNG Pattern New 1		7, 8		
		Conf 3, 6, 9	OP.1 Note 5	OP.1 Note 5
		Conf 1, 2, 4, 5,		
SSB configuration		7,8	SSB.1 FR1	SSB.1 FR1
J. 3		Conf 3, 6, 9	SSB.2 FR1	SSB.2 FR1
		Conf 1, 2, 3, 4,		
SMTC configuration		5, 6, 7, 8, 9	SMTC.1	SMTC.1
CSI-RS for tracking		5, 5, 7, 5, 5	Conf 1	TRS.1.1 FDD
2011 TO 101 tracking			Conf 2	TRS.1.1 TDD
			Conf 3	TRS.1.2 TDD
			Conf 4	TRS.1.1 FDD
			Conf 5	TRS.1.1 TDD
			Conf 6	TRS.1.1 TDD
			Conf 7	TRS.1.1 FDD
			Conf 8	TRS.1.1 TDD
DI : ::: I DIMB		0 (1 0 0 1	Conf 9	TRS.1.2 TDD
DL initial BWP		Conf 1, 2, 3, 4,	DLBWP.0.1	DLBWP.0.1
configuration		5, 6, 7, 8, 9		
DL dedicated BWP		Conf 1, 2, 3, 4,	DLBWP.1.1	DLBWP.1.1
configuration		5, 6, 7, 8, 9		
UL dedicated BWP		Conf 1, 2, 3, 4,	ULBWP.1.1	ULBWP.1.1
configuration		5, 6, 7, 8, 9		
EPRE ratio of PSS				
to SSS				
EPRE ratio of				
PBCH_DMRS to				
SSS				
EPRE ratio of PBCH				
to PBCH_DMRS				
EPRE ratio of				
PDCCH_DMRS to				
SSS				
EPRE ratio of	dB	Conf 1, 2, 3, 4,	0	0
PDCCH to	UD	5, 6, 7, 8, 9	l	
PDCCH_DMRS				
EPRE ratio of				
PDSCH_DMRS to				
SSS				
EPRE ratio of				
PDSCH to				
PDSCH_DMRS				
EPRE ratio of				
OCNG DMRS to				
SSS				

EPRE ratio of OCNG to OCNG DMRS								
	dBm / 15kHz	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		-102			-102	
Note 2	dBm/ SCS	Conf 1, 2, 4, 5, 7,8		-102			-102	
	303	Conf 3, 6, 9		-99			-99	
\hat{E}_s/N_{oc}	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
$\hat{E}_{_{S}}/I_{_{ m ot}}$ Note 3	dB	Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	16	16	16	16	16	16
SS-RSRP Note 3	dBm/ SCS	Conf 1, 2, 4, 5, 7,8	-86	-86	-86	-86	-86	-86
	303	Conf 3, 6, 9	-83	-83	-83	-83	-83	-83
Io Note 3	dBm/ 9.36 MHz	Conf 1, 2, 4, 5, 7,8	-57.9	-57.9	-57.9	-57.9	-57.9	-57.9
10	dBm/ 38.16 MHz	Conf 3, 6, 9	-51.8	-51.8	-51.8	-51.8	-51.8	-51.8
Propagation Condition		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9		AWGN			AWGN	
Antenna configuration		Conf 1, 2, 3, 4, 5, 6, 7, 8, 9	1 x 2 1 x 2					

- NOTE 1: OCNG shall be used such that both cells are fully allocated, and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- NOTE 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled within BW_{occupied}.
- NOTE 3: $\hat{E}_{_{s}}/I_{_{ot}}$, Io, and SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- NOTE 4: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 10 MHz, 52 RBs) from F_{C,low}, and Io is independent of the BW_{channel} configured.
- NOTE 5: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 40 MHz, 106 RBs) from F_{C,low}, and lo is independent of the BW_{channel} configured.
- NOTE 6: NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW_{channel}.

A.6.5.4.1.2 Test Requirements

In test 1 the UE shall be ready to start transmission on the supplementary uplink carrier on SCell within 20ms from the start of T2.

In test 1 the UE shall stop the transmission on the supplementary uplink carrier on SCell within 20ms from the start of T3.

In test 2 the UE shall be ready to start transmission on the NR uplink carrier on SCell within 20ms from the start of T2.

In test 2 the UE shall stop the transmission on the NR uplink carrier on SCell within 20ms from the start of T3.

All of the above test requirements shall be fulfilled in order for the observed UE UL carrier configuration delay and UE UL carrier release delay to be counted as correct. The rate of correct observed UE UL carrier configuration delay and UE UL carrier release delay during repeated tests shall be at least 90%.

Void

A.6.5.4.2

A.6.5.5 Beam Failure Detection and Link recovery procedures

A.6.5.5.1 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in non-DRX mode

A.6.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.1.1-1, A.6.5.5.1.1-2, A.6.5.5.1.1-3 and A.6.5.5.1.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.1.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.6.5.5.1.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 1.

Table A.6.5.5.1.1-1: Supported test configurations for FR1 PCell

Configuration	Description			
1	FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth			
2	TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth			
3	TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth			
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.6.5.5.1.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Paramete	Parameter		Value	Comment
			Test 1	
Active PSCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		FDD	
	Config 2, 3		TDD	
BWchannel	Config 1	MHz	10: NRB,c = 52	
	Config 2		10: NRB,c = 52	
	Config 3		40: NRB,c = 106	
DL initial BWP configuration	Config 1, 2,		DLBWP.0.1	
DL dedicated BWP configuration	Config 1, 2, 3		DLBWP.1.1	

		ı		Τ
UL initial BWP	Config 1, 2,		ULBWP.0.1	
configuration	3			
UL dedicated BWP	Config 1, 2,		ULBWP.1.1	
configuration	3			
TDD Configuration	Config 1		Not Applicable	
	Config 2		TDDConf.1.1	
	Config 3		TDDConf.2.1	
RMSI CORESET	Config 1		CR.1.1 FDD	
Reference Channel	Config 2		CR.1.1 TDD	
	Config 3		CR.2.1 TDD	
Dedicated	Config 1		CCR.1.1 FDD	
CORESET	3			
Reference Channel	Config 2		CCR.1.1 TDD	
	Config 3		CCR.2.1 TDD	
SSB Configuration	Config 1		SSB.3 FR1	
33D Configuration	Config 2		SSB.3 FR1	
CMTC Configuration	Config 3		SSB.4 FR1	
SMTC Configuration	Config 1, 2		SMTC.1	
	Config 3		SMTC.1	
PDSCH/PDCCH	Config 1, 2		15 KHz	
subcarrier spacing	Config 3		30 KHz	
PRACH	Config 1, 2		Table A.3.8.2.2-1	
Configuration	Config 3		Table A.3.8.2.2-1	
SSB Index assigned	as BFD RS		0	
(q ₀)				
SSB Index assigned	as CBD RS		1	
(q ₁)				
OCNG parameters			OP.1	
CP length			Normal	
Correlation Matrix an	d Antenna		2x2 Low	
Configuration	D.O.I. (4.0	
Beam failure	DCI format		1-0	
detection	Number of		2	
transmission	Control			
parameters	OFDM			
	symbols			
	Aggregation	CCE	8	
	level			
	Ratio of	dB	0	
	hypothetical			
	PDCCH RE			
	energy to			
	average SSS			
	RE energy			
	Ratio of	dB	0	
	hypothetical			
	PDCCH			
	DMRS			
	energy to			
	average SSS			
	RE energy			
	DMRS		REG bundle size	
	precoder			
	granularity			
	REG bundle		6	
	size			
DRX			OFF	

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Gap pattern ID			gp0	
gapOffset			0	
rlmInSyncOutOfSync	Threshold		absent	When the
			5	field is
				absent, the
				UE applies
				the value 0.
				(Table
				8.1.1-1).
rsrp-ThresholdSSB	Config 1, 2	dBm/	-98	Threshold
				used for
	Config 3	SCS kHz	-95	$Q_{in_LR_SSB}$
powerControlOffsetS	S		db0	Used for
				deriving
				rsrp-
				ThresholdC
				SI-RS
beamFailureInstance	eMaxCount		n1	see
				clause 5.17
				of
				TS 38.321 [7]
beamFailureDetection	nTimer		pbfd4	see
			p 2	clause 5.17
				of
				TS 38.321 [
				7]
CSI-RS	Config 1		CSI-RS.1.1 FDD	
configuration for	Config 2		CSI-RS.1.1 TDD	
CSI reporting	Config 3		CSI-RS.2.1 TDD	
CSI-RS for	Config 1		TRS.1.1 FDD	
tracking	Config 2		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD	
SSB Index			0, 1	
assigned as RLM				
RS T310 Timer			1000	
		ms	1000	
N310 T1		S	2 0.2	During this
1		5	0.2	During this time the
				UE shall be
				fully
				synchronize
				d to cell 1
T2		S	0.37	
T3		s	0.24	
T4		s	0	
T5		S	0.17	
D1		S	0.13	

Note 1: All configurations are assigned to the UE prior to the start of time period T1. Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.6.5.5.1.1-3: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Unit			Test 1		
		T1	T2	T3	T4	T5

EPRE ratio of PDCCH DMRS to SSS		dB			0					
EPRE ratio of PDCCH to PDCCH DMRS		dB								
EPRE ratio	EPRE ratio of PBCH DMRS to SSS		dB							
EPRE ratio	of PBCH	to PBCH DMRS	dB	1						
EPRE ratio	of PSS to	SSS	dB							
EPRE ratio	of PDSC	H DMRS to SSS	dB							
EPRE ratio	of PDSC	H to PDSCH DMRS	dB							
EPRE ratio	of OCNG	DMRS to SSS	dB							
EPRE ratio	of OCNG	to OCNG DMRS	dB							
SNR_SSB o	of set qo	Config 1	dB	5	-3	-12	-12	-12		
	-	Config 2		5	-3	-12	-12	-12		
		Config 3		5	-3	-12	-12	-12		
SNR_SSB o	of set q₁	Config 1	dB	-10	-10	10	10	10		
		Config 2		-10	-10	10	10	10		
		Config 3		-10	-10	10	10	10		
SSB_RP of	SB_RP of set q ₁ Config 1		dBm/	-108	-108	-88	-88	-88		
		Config 2	SCS kHz	-108	-108	-88	-88	-88		
		Config 3		-105	-105	-85	-85	-85		
N_{oc}		Config 1	dBm/15			-98				
1 voc			KHz							
		Config 2		-98						
		Config 3				-98				
Propagation				TDL-C 300ns 100Hz						
		all be used such that t					constant to	otal		
		d power spectral dens								
		resources for CSI re								
		RS resource set confi	guration for C	SI reporting	g are assigi	ned to the l	JE prior to	the start		
	f time pe			415		44				
		nent gap configuration						noriod		
		s and layer 3 filtering i	elated param	eters are c	oniigurea p	nor to the s	start or time	period		
_	T1. Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.									
							i OCING.			
Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs. Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3										
respectively in figure A.4.5.5.1.1-1.										
		values are specified for		E which su	pports 2RX	on at least	one band.	For		
		a UE which supports								
	ause A.3			,	3 -		-1			

Table A.6.5.5.1.1-4: Void

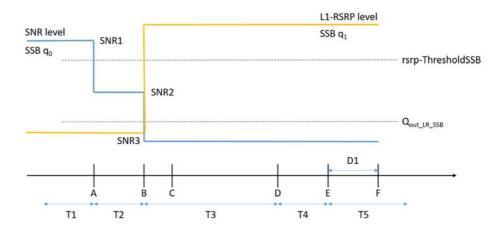


Figure A.6.5.5.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.6.5.5.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 120+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.5.2 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with SSB-based BFD and LR in DRX mode

A.6.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.2.1-1, A.6.5.5.2.1-2, A.6.5.5.2.1-3, A.6.5.5.2.1-4 and A.6.5.5.2.1-5 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.2.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.6.5.5.2.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the

period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.6.5.5.2.1-1: Supported test configurations for FR1 PCell

Con	figuration	Description				
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth				
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth				
3		TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth				
Note:	Note: The UE is only required to pass in one of the supported test configurations in FR1					

Table A.6.5.5.2.1-2: General test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value	Comment	
			Test 1		
Active PSCell			Cell 1		
RF Channel Number			1		
Duplex mode	Config 1		FDD		
	Config		TDD		
	2, 3				
BWchannel	Config 1	MHz	10: NRB,c =		
			52		
	Config 2		10: NRB,c =		
			52		
	Config 3		40: NRB,c =		
			106		
DL initial BWP	Config		DLBWP.0.1		
configuration	1, 2, 3				
DI I II (I DIMD	0 "		DI DIVID 4 4		
DL dedicated BWP	Config		DLBWP.1.1		
configuration	1, 2, 3				
UL initial BWP	Config		ULBWP.0.1		
configuration	1, 2, 3		OLDVVI .O.1		
Comiguration	1, 2, 0				
UL dedicated BWP	Config		ULBWP.1.1		
configuration	1, 2, 3				
0					
TDD Configuration	Config 1		Not		
			Applicable		
	Config 2		TDDConf.1.1		
	Config 3		TDDConf.2.1		
RMSI CORESET	Config 1		CR.1.1 FDD		
Reference Channel	Config 2		CR.1.1 TDD		
	Config 3		CR.2.1 TDD		
Dedicated	Config 1		CCR.1.1		
CORESET			FDD		
Reference Channel	Config 2		CCR.1.1		
			TDD		
	Config 3		CCR.2.1		
000 0 #			TDD		
SSB Configuration	Config 1		SSB.3 FR1		
	Config 2		SSB.3 FR1		
	Config 3		SSB.4 FR1		
SMTC Configuration	Config		SMTC.1		
	1, 2				

İ	0 " 0	1	ONTO 4	ı
DD0011/DD0011	Config 3		SMTC.1	
PDSCH/PDCCH	Config		15 KHz	
subcarrier spacin				
	Config 3		30 KHz	
PRACH	Config		Table	
Configuration	1, 2		A.3.8.2.2-1	
	Config 3	1	Table	
			A.3.8.2.2-1	
SSB Index assign	ned as BFD RS		0	
(q ₀)				
SSB Index assign	ned as CBD RS		1	
(q ₁)				
OCNG parameter	rs		OP.1	
CP length			Normal	
Correlation Matrix	and Antenna		2x2 Low	
Configuration	t and 7 intorna		ZAZ LOW	
Beam failure	DCI format		1-0	
detection	Number of		2	
transmission	Control			
parameters	OFDM			
parameters	symbols			
	Aggregation	CCE	8	
	level	CCE	0	
	Ratio of	dB	0	
		uБ	U	
	hypothetical PDCCH RE			
	energy to			
	average SSS			
	RE energy Ratio of	dB	0	
		uБ	0	
	hypothetical PDCCH			
	DMRS			
	energy to			
	average SSS			
	RE energy DMRS		REG bundle	
	precoder			
	granularity		size	
			6	
	REG bundle		6	
DDV	size		DDV 7	4007
DRX Con pottern ID		-	DRX.7	A.3.3.7
Gap pattern ID	o o o There are a lad		N.A.	\//b o = 4b =
rlmInSyncOutOfS	ync i nreshold]	Absent	When the
]		field is
]		absent, the
]		UE applies
				the value 0.
				(Table 8.1.1-
				1).
rsrp-		dBm/S	-98	Threshold
ThresholdSSB		CS kHz		used for
]	-95	Qin_LR_SSB
powerControlOffs	setSS	1	db0	Used for
PowerContiolons	.0.00]	abo	deriving
				rsrp-
]		ThresholdC
]		SI-RS
beamFailureInsta	nceMayCount		n1	see
Joann andienista	a lociviaxooutil		'''	
		1	I .	clause 5.17

				of TS 38.321 [7
beamFailureDetectionTimer			pbfd4	see clause 5.17 of
				TS 38.321 [7
CSI-RS configuration for CSI reporting	Config 1		CSI-RS.1.1 FDD	•
	Config 2		CSI-RS.1.1 TDD	
	Config 3		CSI-RS.2.1 TDD	
CSI-RS for tracking	Config 1		TRS.1.1 FDD	
	Config 2		TRS.1.1 TDD	
	Config 3		TRS.1.2 TDD	
SSB Index assigned as RLM RS			0, 1	
T310 Timer		ms	1000	
N310			2	
T1		S	1	During this time the the UE shall be fully synchronize d to cell 1
T2		S	5.17	
T3		S	3.24	
T4		S	0	
T5		S	1.97	
D1 Note 1: All confid	gurations are see	S signed to th	1.93	o start of time
I NOTE L'ALLCONTIC	228 418 2000Bann	SIGNIPO IO IO		- SIAH OLUMA

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.6.5.5.2.1-3: Cell specific test parameters for FR1 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parameter	Unit	Test 1				
		T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DMRS to SSS	dB			0		
EPRE ratio of PDCCH to PDCCH DMRS	dB	Ī				
EPRE ratio of PBCH DMRS to SSS	dB					
EPRE ratio of PBCH to PBCH DMRS	dB					
EPRE ratio of PSS to SSS	dB					
EPRE ratio of PDSCH DMRS to SSS	dB					
EPRE ratio of PDSCH to PDSCH DMRS	dB					
EPRE ratio of OCNG DMRS to SSS	dB					
EPRE ratio of OCNG to OCNG DMRS	dB					
SNR_SSB of set q ₀ Config 1	dB	5	-3	-12	-12	-12

	Config 2		5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
SNR_SSB of set q ₁	Config 1	dB	-10	-10	10	10	10
	Config 2		-10	-10	10	10	10
	Config 3		-10	-10	10	10	10
SSB_RP of set q ₁	Config 1	dBm/	-108	-108	-88	-88	-88
	Config 2	SCS kHz	-108	-108	-88	-88	-88
	Config 3		-105	-105	-85	-85	-85
M	Config 1	dBm/15			-98		
N_{oc}		KHz					
	Config 2			•	-98	•	•
	Config 3				-98		
Propagation condition			TDL-C 300ns 100Hz				

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.6.5.5.2.1-4: Void

Table A.6.5.5.2.1-5: Void

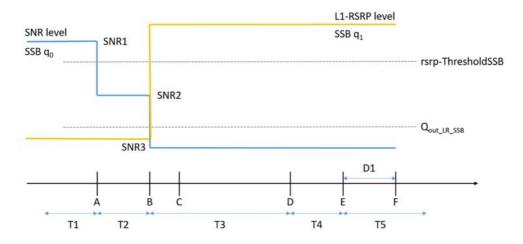


Figure A.6.5.5.2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.6.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q₁.

No later than time point F occurring no later than D1 = 1920+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.5.3 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.6.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.3.1-1, A.6.5.5.3.1-2, and below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.3.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.6.5.5.3.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled.

Table A.6.5.5.3.1-1: Supported test configurations for FR1 PCell

Co	Configuration Description			
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
3		TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth		
Note: The UE is only required to pass in one of the supported test configurations in FR1				

Table A.6.5.5.3.1-2: General test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		FDD	
	Config 2, 3		TDD	
TDD	Config 1		Not Applicable	
Configuration	Config 2		TDDConf.1.1	
	Config 3		TDDConf.2.1	

RMSI	Config 1		CR.1.1 FDD	A.3.1.2
CORESET				
Reference	Config 2		CR.1.1 TDD	
Channel	Config 3		CR.2.1 TDD	
Dedicated	Config 1		CCR.1.1 FDD	A.3.1.3
CORESET				
Reference	Config 2		CCR.1.1 TDD	
Channel	Config 3		CCR.2.1 TDD	
SSB	Config 1		SSB.3 FR1	A.3.10
Configuration	Config 2		SSB.3 FR1	
_	Config 3		SSB.4 FR1	
SMTC	Config 1, 2		SMTC.1	A.3.11
Configuration	Config 3		SMTC.1	
PDSCH/PDC	Config 1, 2		15 KHz	
	<u> </u>			
CH subcarrier	Config 3		30 KHz	
spacing	0 " 1 0 0		ED 1 BD 1 OU	1000
PRACH	Config 1, 2, 3		FR1 PRACH	A.3.8.2
Configuration			configuration 4	
	signed as beam		0	
failure detection				
OCNG paramet	ers		OP.1	A.3.2.1
CP length			Normal	
Correlation Mat	rix and Antenna		2x2 Low	
Configuration				
Beam failure	DCI format		1-0	
detection	Number of Cor		2	
transmission	OFDM symbols			
parameters	Aggregation lev	/el CCE	8	
	Ratio of hypoth	etical dB	0	
	PDCCH RE en			
	to average CSI	-RS		
	RE energy			
	Ratio of hypoth	etical dB	0	
	PDCCH DMRS			
	energy to avera	age		
	CSI-RS RE en			
	DMRS precode		REG bundle size	
	granularity			
	REG bundle siz	ze	6	
DRX			OFF	
Gap pattern ID			N.A.	
csi-RS-Index as	signed as candid	late	1	N
beam detection				,,
rlmInSyncOutOf			absent	When the field is
			4500.11	absent, the UE
				applies the value 0.
				(Table 8.1.1-1).
rsrp-	Config 1, 2	dBm/	-98	Threshold used for
ThresholdSSB	Config 3	SCS	-95	Q _{in_LR_SSB}
	3090	kHz		~==_LI_00D
powerControlOffsetSS		74.12	db0	Used for deriving
F			d.o	rsrp-ThresholdCSI-
				RS
beamFailureInstanceMaxCount			n1	see clause 5.17 of
				TS 38.321 [7]
beamFailureDet	tectionTimer		pbfd4	see clause 5.17 of
Scarin andreber	bearin andrebeteetterrinner		polut	TS 38.321 [7]
CSI-RS configu	ration for Con	fia 1	CSI-RS.1.2 FDD	A.3.14
q ₀ and q ₁	Con		CSI-RS.1.2 TDD	- /
I 40 and 41	COIT	19 4	OOI-100.1.2 1DD	_

	Config 3		CSI-RS.2.2 TDD			
CSI-RS configuration for	CSI-RS configuration for Config 1			A.3.14		
CSI reporting	Config 2		CSI-RS.1.1 TDD			
	Config 3		CSI-RS.2.1 TDD			
TRS configuration	Config 1		TRS.1.1 FDD			
	Config 2		TRS.1.1 TDD			
	Config 3		TRS.1.2 TDD			
CSI-RS-Index assigned	Config 1		CSI-RS.1.2 FDD	A.3.14		
as RLM RS	Config 2		CSI-RS.1.2 TDD			
	Config 3		CSI-RS.2.2 TDD			
T310 Timer		ms	1000			
N310			2			
T1		S	0.2	During this time the the UE shall be fully synchronized to cell 1		
T2		S	0.18			
T3	S	0.14				
T4		S	0			
T5	S	0.08				
D1	S	0.04				
Note 1: UE-specific PDCCH is not transmitted after T1 starts.						

Table A.6.5.5.3.1-3: Cell specific test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit			Test 1		
			T1	T2	Т3	T4	T5
EPRE ratio of PDC	CH DMRS to SSS	dB		•	0	•	
EPRE ratio of PDC	CH to PDCCH DMRS	dB					
EPRE ratio of PBCI	H DMRS to SSS	dB					
EPRE ratio of PBCI	H to PBCH DMRS	dB					
EPRE ratio of PSS	to SSS	dB					
EPRE ratio of PDS0	CH DMRS to SSS	dB					
EPRE ratio of PDS0	CH to PDSCH DMRS	dB					
EPRE ratio of OCN	G DMRS to SSS	dB					
EPRE ratio of OCN	G to OCNG DMRS	dB					
SNR_CSI-RS of	Config 1	dB	5	-3	-12	-12	-12
set q ₀	Config 2		5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
SNR_CSI-RS of	Config 1	dB	-10	-10	10	10	10
set q ₁	Config 2		-10	-10	10	10	10
	Config 3		-10	-10	10	10	10
CSI-RS_RP of set	Config 1	dBm/	-108	-108	-88	-88	-88
q ₁	Config 2	SCS kHz	-108	-108	-88	-88	-88
	Config 3		-105	-105	-85	-85	-85
N_{oc} Config 1		dBm/15	-98				
1 oc		KHz					
	Config 2				-98		
	Config 3				-98		
Propagation conditi		TDL-C 300ns 100Hz					

Note 1:	OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3:	NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4:	Void
Note 5:	The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
Note 6:	The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7:	SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.
Note 8:	The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.4.5.5.1.1-1.
Note 9:	The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.6.5.5.3.1-4: Void Table A.6.5.5.3.1-5: Void

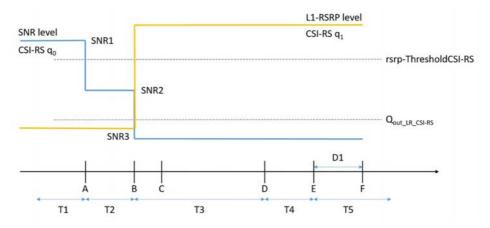


Figure A.6.5.5.3.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

A.6.5.5.3.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 30 + 10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.5.4 Beam Failure Detection and Link Recovery Test for FR1 PCell configured with CSI-RS-based BFD and LR in DRX mode

A.6.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR1 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.6.5.5.4.1-1, A.6.5.5.4.1-2, A.6.5.5.4.1-3, and A.6.5.5.4.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.6.5.5.4.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.6.5.5.4.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.6.5.5.4.1-1: Supported test configurations for FR1 PCell

Co	onfiguration	Description		
1		FDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
2		TDD duplex mode, 15 kHz SSB SCS, 10 MHz bandwidth		
3		TDD duplex mode, 30 kHz SSB SCS, 40 MHz bandwidth		
Note:	The UE is only required to pass in one of the supported test configurations in FR1			

Table A.6.5.5.4.1-2: General test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit	Value	Comment
			Test 1	
Active PCell			Cell 1	
RF Channel Number			1	
Duplex mode	Config 1		FDD	
	Config 2, 3		TDD	
TDD	Config 1		Not Applicable	
Configuration	Config 2		TDDConf.1.1	
	Config 3		TDDConf21	
RMSI CORESET	Config 1		CR.1.1 FDD	A.3.1.2
Reference	Config 2		CR.1.1 TDD	
Channel	Config 3		CR.2.1 TDD	
Dedicated	Config 1		CCR.1.1 FDD	A.3.1.3
CORESET				
Reference	Config 2		CCR.1.1 TDD	
Channel	Config 3		CCR.2.1 TDD	
SSB	Config 1		SSB.3 FR1	A.3.10
Configuration	Config 2		SSB.3 FR1	
	Config 3		SSB.4 FR1	
SMTC	Config 1, 2		SMTC.1	A.3.11
Configuration	Config 3		SMTC.1	

PDSCH/PDCC	Config 1, 2		15 KHz	
	_	-		
H subcarrier	Config 3		30 KHz	
spacing	0		ED4 DD AOU	4.0.0.0
PRACH	Config 1, 2, 3		FR1 PRACH	A.3.8.2
Configuration	d oo boom foilure		configuration 4	
csi-RS-Index assigned			0	
detection RS in set q OCNG parameters	0		OP.1	A.3.2.1
CP length			Normal	A.3.2.1
Correlation Matrix an	d Antenna		2x2 Low	
Configuration	u Antenna		ZAZ LUW	
Beam failure	DCI format		1-0	
detection	Number of		2	
transmission	Control OFDM			
tranomicolon	symbols			
parameters	Aggregation	CCE	8	
paramotoro	level	002		
	Ratio of	dB	0	
	hypothetical			
	PDCCH RE			
	energy to			
	average CSI-RS			
	RE energy			
	Ratio of	dB	0	
	hypothetical			
	PDCCH DMRS			
	energy to			
	average CSI-RS			
	RE energy			
	DMRS precoder		REG bundle size	
	granularity			
	REG bundle		6	
DDV	size		DDV 7	4 0 0 7
DRX			DRX.7	A.3.3.7
Gap pattern ID	. d. a.a. a.a. di data		N.A.	
csi-RS-Index assigne			1	
beam detection RS in rlmInSyncOutOfSync			absent	When the field is
Illiningyncoulorgync	THESHOL		absent	absent, the UE
				applies the value 0.
				(Table 8.1.1-1).
rsrp-ThresholdSSB	Config 1, 2	dBm/	-98	Threshold used for
Torp TrinconoldCob	Config 3	SCS kHz	-95	Qin_LR_SSB
	Coming o	000 Ki iz		GIII_LIN_33B
powerControlOffsetS	S		db0	Used for deriving
poworodimoromotic	•		abo	rsrp-ThresholdCSI-
				RS
beamFailureInstance	MaxCount		n1	see clause 5.17 of
				TS 38.321 [7]
beamFailureDetectio	nTimer		pbfd4	see clause 5.17 of
				TS 38.321 [7]
CSI-RS	Config 1		CSI-RS.1.2 FDD	A.3.14
configuration				.1
for q ₀ and q ₁	Config 2		CSI-RS.1.2 TDD	
	Config 3		CSI-RS.2.2 TDD	
CSI-RS	Config 1		CSI-RS.1.1 FDD	A.3.14.1
configuration	Config 2		CSI-RS.1.1 TDD	
for CSI reporting	Config 3	1	CSI-RS.2.1 TDD	
TRS	Config 1		TRS.1.1 FDD	
configuration	Config 2		TRS.1.1 TDD	
J		1		

	Config 3		TRS.1.2 TDD	
CSI-RS-Inc	lex Config 1		CSI-RS.1.2 FDD	
assigned as	s Config 2		CSI-RS.1.2 TDD	
RLM RS	Config 3		CSI-RS.2.2 TDD	
T310 Time	·	ms	1000	
N310			2	
T1		S	1	During this time the the UE shall be fully synchronized to cell 1
T2		S	8.37	
T3		S	6.44	
T4		S	0	
T5		S	1.97	
D1		S	1.93	
Note 1: UE-specific PDCCH is not transmitted after T1 starts.				

Table A.6.5.5.4.1-3: Cell specific test parameters for FR1 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter	Unit			Test 1			
			T1	T2	Т3	T4	T5
EPRE ratio of PDCCH DMF	RS to SSS	dB			0		
EPRE ratio of PDCCH to PI	DCCH DMRS	dB					
EPRE ratio of PBCH DMRS	to SSS	dB					
EPRE ratio of PBCH to PBC	CH DMRS	dB					
EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMF	RS to SSS	dB					
EPRE ratio of PDSCH to PI	DSCH DMRS	dB					
EPRE ratio of OCNG DMRS	S to SSS	dB					
EPRE ratio of OCNG to OC	NG DMRS	dB					
SNR_CSI-RS of set q ₀	Config 1	dB	5	-3	-12	-12	-12
	Config 2		5	-3	-12	-12	-12
	Config 3		5	-3	-12	-12	-12
SNR_CSI-RS of set q ₁	Config 1	dB	-10	-10	10	10	10
	Config 2		-10	-10	10	10	10
	Config 3		-10	-10	10	10	10
CSI-RS_RP of set q ₁	Config 1	dB/	-110	-110	-88	-88	-88
	Config 2	SCS kHz	-110	-110	-88	-88	-88
	Config 3		-107	-107	-85	-85	-85
N_{oc} Config 1		dBm/15	-98				
		KHz					
Config 2					-98		
		-98					
Propagation condition			TDL-C 300ns 100Hz				

Note 1:	OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 3:	NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
Note 4:	Void
Note 5:	The timers and layer 3 filtering related parameters are configured prior to the start of time period
	T1.
Note 6:	The signal contains PDCCH for UEs other than the device under test as part of OCNG.
Note 7:	SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.
Note 8:	The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3
	respectively in figure A.4.5.5.1.1-1.
Note 9:	The SNR values are specified for testing a UE which supports 2RX on at least one band. For
	testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.

Table A.6.5.5.4.1-4: Void

Table A.6.5.5.4.1-5: Void

Table A.6.5.5.4.1-6: Void

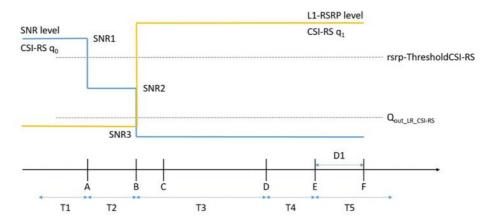


Figure A.6.5.5.4.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

A.6.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 1920 + 10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.6.5.6 Active BWP switch

A.6.5.6.1 DCI-based and Timer-based Active BWP Switch

A.6.5.6.1.1 NR FR1- NR FR1 DL active BWP switch of SCell with non-DRX in SA

A.6.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations for PCell are shown in Table A.6.5.6.1.1.1-1 below. Supported test configurations for NR SCell are shown in table A.6.5.6.1.1.1-1A below. Test configuration for NR PCell and test configuration for NR SCell are chosen independently. The test scenario comprises of one NR PCell (Cell 1) and one SCell (Cell 2) as given in Table A.6.5.6.1.1.1-2. NR Cell-specific parameters are specified in Table A.6.5.6.1.1.1-3 and Table A.6.5.6.1.1.1-4 below.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).
- UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PCell, BWP-0 in Cell 1 before starting the test.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in SCell.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-0 in PCell.
- UE is configured with a *bwp-InactivityTimer* timer value for SCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of SCell's DL slot ($i+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell no later than the first UL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}+k_1$). The UE shall be continuously scheduled on SCell's BWP-2 no later than the first DL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}$).

The starting time of PCell (Cell 1) interruption due to BWP switch on SCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on SCell (Cell 2).

During T3,

The time period T3 starts from the slot #j, where j is the first slot of the subframe immediately after bwp-InactivityTimer timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of SCell's slot (j+T_{BWPswitchDelay}) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell at latest on the first UL slot that occurs after the beginning of slot (j+T_{BWPswitchDelay}+ k_1). The UE shall be continuously scheduled on SCell's BWP-1 no later than the first DL slot that occurs after the beginning of slot (j+T_{BWPswitchDelay}).

The starting time of PCell (Cell 1) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of SCell, respectively.

Table A.6.5.6.1.1.1-1: DL BWP switch supported test configurations for NR PCell

Config Description		Description
1		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
3		NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
Note 1:	The UE is	s only required to be tested in one of the supported test configurations
Note 2:	· · · · · · · · · · · · · · · · · · ·	

Table A.6.5.6.1.1.1-1A: DL BWP switch supported test configurations for NR SCell

Configscell		Description
1		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, ≥10 MHz bandwidth, TDD duplex mode
3		NR 30 kHz SSB SCS, ≥40 MHz bandwidth, TDD duplex mode
Note 1:	The UE is	s only required to be tested in one of the supported test configurations
Note 2:		s only required to be tested in one with smallest aggregated channel bandwidth from supported
	configura	nbinations which is composed of CCs ≥ the bandwidth (BW _{channel}) defined in each test tion,

Table A.6.5.6.1.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1, 2	Two NR radio channels are used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2	SCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and SCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.

Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on SCC.
Cell2 timing offset to cell1	μs	3	Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.6.5.6.1.1.1-3: NR Cell specific test parameters for NR PCell for DL BWP switch in SA

Parameter		Unit	Cell 1
Frequency Range			FR1
Duplex mode	Config 1		FDD
	Config 2,3		TDD
TDD configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.1.2
BW _{channel}	Config 1,2		Note 7
	Config 3		Note 7
BW _{occupied}	Config 1,2	RB	52 Note 5
	Config 3		106 Note 6
Active BWP ID			0
Initial DL BWP Configura	ation		DLBWP.0.2 ^{Note4}
Initial UL BWP Configura	ation		ULBWP.0.2 ^{Note4}
Active DL BWP-0 Config			DLBWP.0.2 ^{Note4}
Active DL BWP-1 Config	uration		N.A.
Active DL BWP-2 Config	uration		N.A.
Active UL BWP-0 Config			ULBWP.0.2 ^{Note4}
Active UL BWP-1 Config			N.A.
Active UL BWP-2 Config			N.A.
PDSCH Reference	Config 1		SR.1.1 FDD
measurement channel	Config 2		SR.1.1 TDD
	Config 3		SR.2.1 TDD
RMSI CORESET	Config 1		CR.1.1 FDD
parameters	Config 2		CR.1.1 TDD
•	Config 3		CR.2.1 TDD
Dedicated CORESET	Config 1		CCR.1.2 FDD
parameters	Config 2		CCR.1.2 TDD
	Config 3		CCR.2.4 TDD
TRS Configuration	Config 1		TRS.1.1 FDD
	Config 2		TRS.1.1 TDD
	Config 3		TRS.1.2 TDD
OCNG Patterns	Config 1,2		OP.1 Note 5
	Config 3		OP.1 Note 6
SSB Configuration	Config 1,2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration			SMTC.1
Correlation Matrix and Antenna			1x2 Low
Configuration			
EPRE ratio of PSS to SS		dB	0
EPRE ratio of PBCH DM			
EPRE ratio of PBCH to F		_	
EPRE ratio of PDCCH D			
EPRE ratio of PDCCH to		4	
EPRE ratio of PDSCH DMRS to SSS			

			_	
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note				
1)				
EPRE ra	tio of OCNG to (OCNG DMRS		
(Note 1)				
N _{oc} Note 2		Config 1,2	dBm/SCS	-104
		Config 3		-101
N _{oc} Note 2			dBm/15KHz	-104
SS-RSR	P Note 3	Config 1,2	dBm/SCS	-87
		Config 3		-84
Ê _s /I _{ot}			dB	17
Ês/Noc			dB	17
Io ^{Note3}			dBm/	-58.96
		Config 1,2	9.36MHz	
		Config 3	dBm/	-52.86
		Oorling 0	38.16MHz	
Propagation Condition				AWGN
Note 1:				allocated and a constant
		• •	•	d for all OFDM symbols.
Note 2:				t specified in the test is
				and shall be modelled as
	• • •	ropriate power for N		
Note 3		I lo levels have beer		
	•	rposes. They are no	•	
Note 4: For unpaired spectrum, a DL BWF				
linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3				
N	linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].			
Note 5:	Note 5: All UL/DL transmission shall be confined within BW _{occupied} (i.e. 10 MHz, 52			
Note C	RBs) from Fc,low, and Io is independent of the BW _{channel} configured.			<u> </u>
Note 6:	All UL/DL transmission shall be confined within BW _{occupied} (i.e. 40 MHz, 106 RBs) from Fc,low, and lo is independent of the BW _{channel} configured.			
Note 7:				
Note 7:	N _{RB,c} . is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW _{channel} .			

Table A.6.5.6.1.1.1-4: NR Cell specific test parameters for NR SCell for DL BWP switch in SA

Parameter		Unit	Cell2
Frequency Range			FR1
Duplex mode	Configscell 1		FDD
	Configscell 2,3		TDD
TDD configuration	Config _{SCell} 1		Not Applicable
	Configscell 2		TDDConf.1.1
	Configscell 3		TDDConf.1.2
BW _{channel}	ConfigsCell 1,2		Note 7
	Configscell 3		Note 7
BWoccupied	Configscell 1,2	RB	52 Note 5
	Configscell 3		106 Note 6
Active BWP ID			1, 2
Initial DL BWP Configurat	ion		DLBWP.0.2 ^{Note4}
Initial UL BWP Configurat			N.A.
Active DL BWP-0 Configu	ration		N.A.
Active DL BWP-1 Configuration			DLBWP.1.1 ^{Note4}
Active DL BWP-2 Configuration			DLBWP.1.3 ^{Note4}
Active UL BWP-0 Configuration			N.A.
Active UL BWP-1 Configuration			N.A.
Active UL BWP-2 Configu	ration		N.A.

PDSCH Reference	Config _{SCell} 1		SR.1.1 FDD
measurement channel	Configscell 2		SR.1.1 TDD
	Configscell 3		SR.2.1 TDD
RMSI CORESET	Configscell 1		CR.1.1 FDD
parameters	Configscell 2	ĺ	CR.1.1 TDD
1	Configscell 3	İ	CR.2.1 TDD
Dedicated CORESET	Configscell 1		CCR.1.2 FDD
parameters	Configscell 2	İ	CCR.1.2 TDD
	Configscell 3	İ	CCR.2.4 TDD
TRS Configuration	Configscell 1		TRS.1.1 FDD
The same of the	Configscell 2		TRS.1.1 TDD
	Configscell 3		TRS.1.2 TDD
OCNG Patterns	Configscell 1,2		OP.1 Note 5
	Configscell 3		OP.1 Note 6
SSB Configuration	Configscell 1,2		SSB.1 FR1
OOD Corniguration	Configscell 3	}	SSB.2 FR1
SMTC Configu	0		SMTC.1
Correlation Matrix ar			1x2 Low
Configuration			TAZ LOW
EPRE ratio of PSS		dB	0
EPRE ratio of PBCH D		ub.	O
EPRE ratio of PBCH to			
EPRE ratio of PDCCH		}	
EPRE ratio of PDCCH to		}	
EPRE ratio of PDSCH I		-	
EPRE ratio of PDSCH			
EPRE ratio of OCNG DM			
EPRE ratio of OCNG to O	CNC DMDC Note 1		
N _{oc} Note 2		4D/CCC	404
Nochale	Configscell 1,2	dBm/SCS	-104
Note 2	Config _{SCell} 3		-101
Noc ^{Note 2}	1	dBm/15KHz	-104
SS-RSRP Note 3	Configscell 1,2	dBm/SCS	-87
	Configscell 3		-84
Ê _s /I _{ot}		dB	17
Ê _s /N _{oc}		dB	17
Io ^{Note3}		dBm/	-58.96
	Configscell 1,2	9.36MHz	
	Configscell 3	dBm/ 38.16MHz	-52.86
Propagation Condition	1	30.1012	AWGN
	used such that ho	th cells are fully:	allocated and a constant
total transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is			
			and shall be modelled as
	priate power for N		

- AWGN of appropriate power for Noc to be fulfilled within BWoccupied.
- Note 3 SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].
- Note 5: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 10 MHz, 52 RBs) from F_{C,low}, and Io is independent of the BW_{channel} configured.
- Note 6: All UL/DL transmission shall be confined within BW_{occupied} (i.e. 40 MHz, 106 RBs) from F_{C,low}, and Io is independent of the BW_{channel} configured.
- NRB,c. is derived from Table 5.3.2-1 in TS38.101-1[2] with configured BW_{channel}.

A.6.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for SCell on PCell from the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+k_1)$.

During T3, the UE shall start to send the ACK/NACK for SCell on PCell from the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+k_1)$.

Where, k₁ is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed SCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1 and T3, the start time of PCell interruption during SCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed SCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after the beginning of DL slot ($i+T_{BWPswitchDelay}+k_1$), ($j+T_{BWPswitchDelay}+k_1$), then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.6.5.6.1.2 NR FR1 DL active BWP switch with non-DRX in SA

A.6.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6.

The supported test configurations are shown in Table A.6.5.6.1.2.1-1. The test scenario comprises of one cell (Cell 1) as given in Table A.6.5.6.1.2.1-2. Cell-specific parameters of the cell are specified in Table A.6.5.6.1.2.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on Cell 1 to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.
- UE is configured with 2 different UE-specific downlink bandwidth parts, BWP-1 and BWP-2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1.
- UE is configured with a *bwp-InactivityTimer* timer value for Cell1.

The cell has constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for DL BWP switch, sent from the test equipment to the UE, is received at the UE side in Cell1's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell1's DL slot $(i+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell1 no later than the first UL slot that occurs after the beginning of slot $(i+T_{BWPswitchDelay}+k1)$. The UE shall be continuously scheduled on Cell1's BWP-2 starting from the first DL slot that occurs after the beginning of slot $(i+T_{BWPswitchDelay})$.

During T2, the test equipment won't transmit DCI format for PDSCH reception on Cell1.

During T3,

The time period T3 starts from the slot #j, where j is the first slot of the subframe immediately after bwp-InactivityTimer timer expires. The UE shall switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell1's slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell1 at latest on the first UL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay}+kI)$. The UE shall be continuously scheduled on Cell1's BWP-1 starting from the first DL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay})$.

The test equipment verifies the DL BWP switch time by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

Table A.6.5.6.1.2.1-1: DL BWP switch supported test configurations

	Config	Description		
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note 1:	The UE is only re	E is only required to be tested in one of the supported test configurations.		
Note 2:	A UE which fulfil	s the requirements in test case A.6.5.6.1.1 can skip the test cases in A.6.5.6.1.2.		

Table A.6.5.6.1.2.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell1 on RF channel number 1.
CP length		Normal	
DRX		OFF	
bwp-InactivityTimer	ms	200	
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.6.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter		Unit	Cell 1
Frequency Range	Frequency Range		FR1
Duplex mode			FDD
	Config 2,3		TDD
TDD configuration	nfiguration Config 1		Not Applicable
-	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
BW _{channel}	Config 1		10 MHz: N _{RB,c} = 52

	0 6 0	T	10 MII- N 50
	Config 2		10 MHz: N _{RB,c} = 52
A - C DIMP ID	Config 3		40 MHz: N _{RB,c} = 106
Active BWP ID			1, 2 DLBWP.0.2 Note 4
Initial DL BWP Configuration Config 1,2,3			DLBWP.0.2 Note 4
Configuration	3 , ,		DI DIAID A A Note 4
Active DL BWP-1	Config 1,2,3		DLBWP.1.1 Note 4
Configuration			The state of the state of
Active DL BWP-2	Config 1,2,3		DLBWP.1.3 Note 4
Configuration			A DESCRIPTION OF THE PROPERTY
Initial UL BWP	Config 1,2,3		ULBWP.0.2 Note 4
Configuration			Lu Burg A Nov. 4
Active UL BWP-1	Config 1,2,3		ULBWP.1.1 Note 4
Configuration	J 3 , , , -		N.//
Active UL BWP-2	Config 1		N/A
Configuration	- · · · · ·		LU DIAGO A O Note 4
	Config 2,3		ULBWP.1.3 Note 4
DD0011B (00.4.4.500
PDSCH Reference	Config 1	4	SR.1.1 FDD
measurement channel	0	4	SR.1.1 TDD
D1101 005 - 5 - 5	Config 3	-	SR.2.1 TDD
RMSI CORESET	Config 1	_	CR.1.1 FDD
parameters	Config 2	_	CR.1.1 TDD
	Config 3		CR.2.1 TDD
Dedicated CORESET	Config 1		CCR.1.2 FDD
parameters	Config 2		CCR.1.2 TDD
	Config 3		CCR.2.4 TDD
OCNG Patterns			OP.1
SSB Configuration	Config 1,2		SSB.1 FR1
	Config 3		SSB.2 FR1
SMTC Configuration			SMTC.1
Correlation Matrix and Antenna			1x2 Low
Configuration			
TRS Configuration	Config 1,4		TRS.1.1 FDD
	Config 2,5		TRS.1.1 TDD
	Config 3,6		TRS.1.2 TDD
EPRE ratio of PSS to \$	SSS	dB	0
EPRE ratio of PBCH D	MRS to SSS		
EPRE ratio of PBCH to	PBCH DMRS		
EPRE ratio of PDCCH			
EPRE ratio of PDCCH	to PDCCH DMRS		
EPRE ratio of PDSCH	DMRS to SSS		
EPRE ratio of PDSCH	to PDSCH		
EPRE ratio of OCNG [OMRS to SSS(Note		
1)			
EPRE ratio of OCNG t	o OCNG DMRS		
(Note 1)			
N _{oc} Note 2	Config 1,2	dBm/SCS	-104
	Config 3		-101
Noc ^{Note 2}		dBm/15kH	-104
		z	
SS-RSRP Note 3	Config 1,2	dBm/SCS	-87
Config 3			-84
Ê _s /I _{ot}			17
Ê _s /N _{oc}		dB	17
Io ^{Note3}	Confic 1 0	dBm/	-58.96
	Config 1,2	9.36MHz	
	Confice	dBm/	-52.86
	Config 3	38.16MHz	
Propagation Condition			AWGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant
	total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is
	assumed to be constant over subcarriers and time and shall be modelled as
	AWGN of appropriate power for Noc to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for
	information purposes. They are not settable parameters themselves.
Note 4:	For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is
	linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is
	linked with LILRWP 1.3 defined in clause 12 of TS 38 213 [3]

A.6.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+kI)$.

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+kI)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed Cell1 active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after beginning of DL slot $(i+T_{BWPswitchDelay}+kI)$, $(j+T_{BWPswitchDelay}+kI)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.6.5.6.2 RRC-based Active BWP Switch

A.6.5.6.2.1 NR FR1 DL active BWP switch of Cell with non-DRX in SA

A.6.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.

The supported test configurations are shown in Table A.6.5.6.2.1.1-1. The test scenario comprises of one Cell (Cell 1) as given in Table A.6.5.6.2.1.1-2. Cell-specific parameters of Cell are specified in Table A.6.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on Cell 1 to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1.
- UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 of initial condition in Cell

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is completely received at the UE side in Cell's slot # denoted i. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length}$ as defined in clause 8.6.3 and starts to report valid ACK/NACK

for the PCell from the first UL slot that occurs after the beginning of DL slot i +

 $\frac{r_{RRCprocessingDelay} + r_{BWPswitchDelayRRC}}{NR \ Slot \ length} + k1 \quad on \ BWP-1 \ of \ final \ condition. \ The \ UE \ shall \ be \ continuously$

scheduled on PCell's BWP-1 starting from the the first DL slot that occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}$

NR Slot length

 $T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PCell by counting the time from the time when the RRC Reconfiguration message including updated BWP configuration is sent till the time when a vaild ACK/NACK is received.

Table A.6.5.6.2.1.1-1: DL BWP switch supported test configurations in SA scenario

Config	Description	
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	
Note 1: The UE is only required to be tested in one of the supported test configurations		

Table A.6.5.6.2.1.1-2: General test parameters for DL BWP switch in SA scenario

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell on RF channel number 1.
CP length		Normal	
DRX		OFF	
T1	S	0.2	

Table A.6.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in SA scenario

Paran	neter	Unit	Cell 1
Frequency Range	Frequency Range		FR1
Duplex mode	Config 1		FDD
	Config 2,3		TDD
TDD configuration	Config 1		Not Applicable
	Config 2		TDDConf.1.1
	Config 3		TDDConf.2.1
BW _{channel}	Config 1		10 MHz: N _{RB,c} = 52
	Config 2		10 MHz: N _{RB,c} = 52
	Config 3		40 MHz: N _{RB,c} = 106
Active BWP ID			1
Initial DL BWP	Config 1,2, 3		DLBWP.0.2
Configuration			
Initial UL BWP	Config 1,2, 3		ULBWP.0.2
Configuration			

Initial Condition	Active DL BWP-1	Config 1, 2, 3		DLBWP.1.3
	Configurat ion			
	Active UL	Config 1, 2, 3		ULBWP.1.3
	BWP-1			
	Configurat ion			
Final	Active DL	Config 1, 2, 3		DLBWP.1.1
Condition	BWP-1			
	Configurat ion			
	Active UL	Config 1, 2, 3		ULBWP.1.1
	BWP-1			
	Configurat ion			
PDSCH Ref	_	Config 1		SR.1.1 FDD
measureme	nt channel	Config 2		SR.1.1 TDD
		Config 3		SR2.1 TDD
RMSI CORI	ESET	Config 1		CR.1.1 FDD
parameters		Config 2		CR.1.1 TDD
Dadianta d C	CODECET	Config 3		CR2.1 TDD
Dedicated C	ORESET	Config 1	-	CCR.1.2 FDD CCR.1.2 TDD
parameters		Config 2 Config 3	1	CCR.1.2 TDD
OCNG Patt	erns	Corning 5		OP.1
SSB Config		Config 1,2		SSB.1 FR1
002 009		Config 3	1	SSB.2 FR1
SMTC Conf	iguration			SMTC.1
TRS Config	uration	Config 1		TRS.1.1 FDD
		Config 2		TRS.1.1 TDD
		Config 3		TRS.1.2 TDD
Antenna Co				1x2 Low
Propagation		<u> </u>	٩D	AWGN
	of PSS to SS of PBCH DM		dB	0
	of PBCH to P		-	
	of PDCCH DI		1	
		PDCCH DMRS	1	
	of PDSCH DI		1	
EPRE ratio	EPRE ratio of PDSCH to PDSCH			
EPRE ratio	of OCNG DM	IRS to SSS ^(Note 1)]	
1)				
N _{oc} Note 2		Config 1,2	dBm/SCS	-104
00 5055 \	oto 2	Config 3	ID (000	-101
SS-RSRP N	ole 3	Config 1,2	dBm/SCS	-87
Config 3		dB	-84 17	
Ê _s /N _{oc}	Ê _s /l _{ot}			17
Io ^{Note3}		Config 1,2	dB dBm/	-58.96
			9.36MHz	55.00
		Config 3	dBm/	-52.86
			38.16MHz	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213 [3].

A.6.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for the PCell from the first DL slot that occurs right after the beginning of slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length}$ and starts to report valid ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length} + k1$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed Cell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6 Measurement procedure

A.6.6.1 Intra-frequency Measurements

A.6.6.1.1 SA event triggered reporting tests without gap under non-DRX

A.6.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2.5.1 and 9.2.5.2.

A.6.6.1.1.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell and neighbour cell are given in Table A.6.6.1.1.1-1 and A.6.6.1.1.1-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.6.6.1.1.1.2-1: Supported test configurations

С	onfiguration	Description			
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note:	Note: The UE is only required to be tested in one of the supported test configurations.				

Table A.6.6.1.1.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for FR1

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1, 2, 3	Cell 1	
Neighbour cell		1, 2, 3	Cell 2	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	S	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used
DRX		1, 2, 3		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	S	1, 2, 3	5	
T2	S	1, 2, 3	5	

Table A.6.6.1.1.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for FR1

Parameter			Cell 1	Cell 2
		configuration	T1 T2	T1 T2
TDD configuration		1	TN/A	TN/A
		2	TDDConf.1.1	TDDConf.1.1
		3	TDDConf.2.1	TDDConf.2.1
PDSCH RMC		1	SR.1.1 FDD	N/A
configuration		2	SR.1.1 TDD	
		3	SR.2.1 TDD	
RMSI CORESET		1	CR.1.1 FDD	N/A
RMC		2	CR.1.1 TDD	N/A
configuration		3	CR.2.1 TDD	N/A
Dedicated	edicated 1		CCR.1.1 FDD	N/A
CORESET RMC	CORESET RMC		CCR.1.1 TDD	N/A
configuration		3	CCR.2.1 TDD	N/A
OCNG Patterns		1, 2, 3	OP.1	OP.1
TRS		1	TRS.1.1 FDD	N/A
Configuration		2	TRS.1.1 TDD	N/A
		3	TRS.1.2 TDD	N/A
IInitial BWP		1, 2, 3	DLBWP.0.1	DLBWP.0.1
configuration			ULBWP.0.1	ULBWP.0.1
Active DL BWP		1, 2, 3	DLBWP.1.1 DLBWP.1	
configuration				
Active UL BWP		1, 2, 3	ULBWP.1.1 ULBWP.1.	
configuration				
RLM-RS		1, 2, 3	SSB	SSB

M. Norse	dBm/SCS	1			·98	
N_{oc} Note 2	u2, 000	2			·98	
		3			·95	
3.7	dBm/15 kHz	1			·98	
N_{oc} Note 2	UDIII/13 KI IZ	2	-	-	.90	
		2	_			
		3				
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46
L _s /L _{ot}		2				
		3				
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4
L_s/I_{oc}		2				
		3				
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
		3	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1	-64.60	-62.25	64.60	-62.25
	dBm/9.36 MHz	2	-64.60	-62.25	64.60	-62.25
	dBm/38.16 MHz	3	-58.50	-56.16	58.50	-56.16
Propagation		1, 2, 3		A۷	VGN	
Condition						

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\rm acc}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.1.1.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.2 SA event triggered reporting tests without gap under DRX

A.6.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clauses 9.2.5.1 and 9.2.5.2.

A.6.6.1.2.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.6.6.1.2.2-1, A.6.6.1.2.2-2 and A.6.6.1.2.2-3 below. In the measurement controlinformation, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.1.2.2-1: Supported test configurations

C	Configuration Description				
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note:	The UE is only re	The UE is only required to be tested in one of the supported test configurations.			

Table A.6.6.1.2.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX

Parameter	Unit	Test configur	Va	lue	Comment
		ation	Test 1	Test 2	
Active cell		1, 2, 3	Cell 1		
Neighbour cell		1, 2, 3	Cell 2		Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and	Cell 2	
SSB configuration		1	SSB.1 FR1		
_		2	SSB.1 FR1		
		3	SSB.2 FR1		
SMTC configuration		1	SMTC.2		
_		2	SMTC.1		
		3	SMTC.1		
A3-Offset	dB	1, 2, 3	-4.5		
CP length		1, 2, 3	Normal		
Hysteresis	dB	1, 2, 3	0		
Time To Trigger	S	1, 2, 3	0		
Filter coefficient		1, 2, 3	0		L3 filtering is not used
DRX		1, 2, 3	DRX.1	DRX.7	-
Time offset between serving and neighbour cells		1	3 ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3 μs		Synchronous cells
		3	3 μs		Synchronous cells
T1	S	1, 2, 3	5		
T2	S	1, 2, 3	5	10	

Table A.6.6.1.2.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for PCell in FR1 with DRX

Parameter	Unit	Test	Ce	II 1	Ce	II 2		
		configuration	T1	T2	T1	T2		
TDD configuration		1	TN	TN/A		TN/A TN/A		V/A
		2	TDDC	TDDConf.1.1 TDDConf.2.1		onf.1.1		
		3	TDDC			onf.2.1		
PDSCH RMC		1	SR.1.1 FDD N/		/A			
configuration		2	SR.1.1 TDD					
		3	SR.2.1 TDD					
		1	CR.1.1 FDD		N	/A		
		2	CR.1.	1 TDD	N	/A		

RMSI CORESET RMC configuration		3	CR.2.	1 TDD	N/	/A
Dedicated		1	CCR.1	.1 FDD	N/	/A
CORESET RMC		2		.1 TDD	N/	
configuration		3		.1 TDD	N/	
OCNG Patterns		1, 2, 3		P.1	OF	
TRS configuration		1		.1 FDD	N/	
		2		.1 TDD		/A
H 14 1 B 14 B		3		.2 TDD	N/	
Ilnitial BWP		1, 2, 3		VP.0.1	DLBW	
configuration				VP.0.1	ULBW	
Active DL BWP		1, 2, 3	DLBV	VP.1.1	DLBW	/P.1.1
configuration						
Active UL BWP		1, 2, 3	ULBV	VP.1.1	ULBW	/P.1.1
configuration				_		
RLM-RS		1, 2, 3	S	SB SSB		
N_{oc} Note 2	dBm/SCS	1			98	
oc		2		-	98	
		3		-95		
N_{oc} Note 2	dBm/15 kHz	1		-	98	
oc oc		2				
		3				
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46
$\mathbf{E}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		2			,	
		3				
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4
\mathbf{E}_{s}/N_{oc}		2			,	
		3				
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94
		2	-94	-94	-Infinity	-94
		3	-91	-91	-Infinity	-91
lo	dBm/9.36 MHz	1	-64.60	-62.25	64.60	-62.25
· · ·	dBm/9.36 MHz	2	-64.60	-62.25	64.60	-62.25
	dBm/38.16 MHz	3	-58.50	-56.16	58.50	-56.16
Propagation Condition	3211/00110111112	1, 2, 3	-58.50 -56.16 58.50 -56.16 AWGN			

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.1.2.3 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.3 SA event triggered reporting tests with per-UE gaps under non-DRX

A.6.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.6.6.1.3.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.6.6.1.3.1-1 and A.6.6.1.3.1-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Table A.6.6.1.3.2-1: Supported test configurations

	Configuration	Description			
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode			
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode			
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode			
Note:	The UE is only re	The UE is only required to be tested in one of the supported test configurations.			

Table A.6.6.1.3.2-2: General test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1, 2, 3	Cell 1	
Neighbour cell		1, 2, 3	Cell 2	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1 and Cell 2	
Measurement gap type		1, 2, 3	Per-UE gaps	
Measurement gap repitition periodicity	ms	1, 2, 3	40	
Measurement gap length	ms	1, 2, 3	6	
Measurement gap offset	ms	1, 2, 3	39	
SSB configuration		1	SSB.1 FR1	
		2	SSB.1 FR1	
		3	SSB.2 FR1	
SMTC configuration		1	SMTC.2	
		2	SMTC.1	
		3	SMTC.1	
CSI-RS parameters		1	CSI-RS.1.2 FDD resource #0	
		2	CSI-RS.1.2 TDD resource #0	
		3	CSI-RS.2.2 TDD resource #0	
A3-Offset	dB	1, 2, 3	-4.5	
CP length		1, 2, 3	Normal	
Hysteresis	dB	1, 2, 3	0	
Time To Trigger	S	1, 2, 3	0	
Filter coefficient		1, 2, 3	0	L3 filtering is not used

DRX	ms	1, 2, 3		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3 μs	Synchronous cells
		3	3 μs	Synchronous cells
T1	S	1, 2, 3	5	
T2	S	1, 2, 3	5	

Table A.6.6.1.3.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1

Parameter	Unit	Test	Cell 1		Cell 2		
		configuration	T1	T2	T1	T2	
TDD		1		I/A	TN		
configuration		2		onf.1.1	TDDC		
		3		onf.2.1	TDDConf.2.1		
PDSCH RMC		1		1 FDD	N,	/A	
configuration		2	SR.1.	1 TDD			
		3	SR.2.	1 TDD	1		
RMSI CORESET		1	CR.1.	1 FDD	N,	/A	
RMC		2	CR.1.	1 TDD	N.	/A	
configuration		3	CR.2.	1 TDD	N,	/A	
Dedicated		1		.1 FDD	N.	/A	
CORESET RMC		2		.1 TDD		/A	
configuration		3		.1 TDD		/A	
OCNG Patterns		1, 2, 3		P.1	OF		
TRS		1, 2, 3		.1 FDD	N.		
configuration		2		.1 TDD		/A	
ooga.ao		3		.2 TDD	N,		
Ilnitial BWP		1, 2, 3		VP.0.1	DLBW		
configuration			ULBV			ULBWP.0.1	
Active DL BWP		1, 2, 3	DLBV	VP.1.2	DLBW	/P.1.1	
configuration							
Active UL BWP		1, 2, 3	ULBWP.1.2 ULBWP.1.1			/P.1.1	
configuration							
RLM-RS		1, 2, 3	CSI-RS SSB			SB	
$N_{oc}^{}$ Note 2	dBm/SCS	1			98		
		2			98		
		3		-	·95		
$N_{_{\mathit{OC}}}$ Note 2	dBm/15 kHz	1		-	.98		
		2					
		3					
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46	
		2					
		3					
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4	
		2					
		3					
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94	
		2	-94	-94	-Infinity	-94	
		3	-91	-91	-Infinity	-91	
lo	dBm/9.36 MHz	1	-64.60	-62.25	64.60	-62.25	
	dBm/9.36 MHz	2	-64.60	-62.25	64.60	-62.25	

		dBm/38.16 MHz	3	-58.50	-56.16	58.50	-56.16
Propagat	ion		1, 2, 3		A۷	VGN	
Condition	١						
Note 1:	The reso	ources for uplink trans	mission are assigned	to the UE	prior to the	start of time	e period
	T2.	·	· ·		•		·
Note 2:	Interfere	nce from other cells a	nd noise sources not	specified in	n the test is	assumed t	o be
	constant	over subcarriers and	time and shall be mo	delled as A	WGN of a	opropriate p	ower for
N_{oc} to be fulfilled.							
Note 3:		P levels have been de ble parameters thems	•	meters for	information	n purposes.	They are

A.6.6.1.3.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.4 SA event triggered reporting tests with per-UE gaps under DRX

A.6.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.6.6.1.4.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for PCell are given in Table A.6.6.1.4.2-1, A.6.6.1.4.2-2 and A.6.6.1.4.2-3 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.1.4.2-1: Supported test configurations

Co	nfiguration	Description
1		15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	guired to be tested in one of the supported test configurations.

Table A.6.6.1.4.2-2: General test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1 with DRX

Parameter	Unit	Test configur ation	Va	alue	Comment
			Test 1	Test 2	
Active cell		1, 2, 3	С	ell 1	
Neighbour cell		1, 2, 3	С	ell 2	Cell to be identified.
RF Channel Number		1, 2, 3	1: Cell 1	and Cell 2	
Measurement gap type		1, 2, 3	Per-L	JE gaps	
Measurement gap repitition periodicity	ms	1, 2, 3		40	
Measurement gap length	ms	1, 2, 3		6	
Measurement gap offset	ms	1, 2, 3		39	
SSB configuration		1		.1 FR1	
		2		.1 FR1	
		3		.2 FR1	
SMTC configuration		1		ITC.2	
		2		ITC.1	
		3		ITC.1	
CSI-RS parameters		1		DD resource #0	
		3		DD resource #0	
A 2 Off t	4D			DD resource #0	
A3-Offset	dB	1, 2, 3		4.5 ormal	
CP length Hysteresis	dB	1, 2, 3 1, 2, 3	INC	0	
Time To Trigger	S	1, 2, 3		0	
Filter coefficient	3	1, 2, 3	0		L3 filtering is not used
DRX		1, 2, 3	DRX.1	DRX.7	L3 likeling is not used
DICA		1, 2, 3	DIXX.1	DIXX.1	
Time offset between serving		1	3	ms	Asynchronous cells.
and neighbour cells					The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2	3 us		Synchronous cells
		3	3	μs	Synchronous cells
T1	S	1, 2, 3		5	-
T2	S	1, 2, 3	5	10	

Table A.6.6.1.4.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with per-UE gaps for PCell in FR1 with DRX

Parameter	Unit	Test	Cell 1		Ce	II 2
		configuration	T1	T2	T1	T2
TDD		1	TN	Ī/Α	TN/A	
configuration		2	TDDC	onf.1.1	TDDC	onf.1.1
		3	TDDC	onf.2.1	TDDC	onf.2.1
PDSCH RMC		1	SR.1.	1 FDD	N	/A
configuration		2	SR.1.	SR.1.1 TDD		
		3	SR.2.	1 TDD		
RMSI CORESET		1	CR.1.	CR.1.1 FDD		/A
RMC		2	CR.1.	1 TDD	N	/A
configuration		3	CR.2.	1 TDD	N/A	
Dedicated		1	CCR.1	CCR.1.2 FDD		/A
CORESET RMC		2	CCR.1	CCR.1.2 TDD		/A
configuration		3	CCR.2	.1 TDD	N	/A
OCNG Patterns		1, 2, 3	OI	P.1	OI	P.1

TRS		1	TRS.1	.1 FDD	N.	/A		
configuration		2	TRS.1	TRS.1.1 TDD N/A				
ū		3	TRS.1	.2 TDD	N.	N/A		
IInitial BWP		1, 2, 3	DLBV	/P.0.1	DLBV	/P.0.1		
configuration			ULBV	√P.0.1	ULBV	/P.0.1		
Active DL BWP		1, 2, 3	DLBV	VP.1.2	DLBV	/P.1.1		
configuration								
Active UL BWP		1, 2, 3	ULBV	VP.1.2	ULBV	/P.1.1		
configuration								
RLM-RS		1, 2, 3	CSI	-RS	SS	SB		
N_{oc} Note 2	dBm/SCS	1		-	.98			
		2		-	·98			
		3		-95				
N_{oc} Note 2	dBm/15 kHz	1		-98				
		2						
		3						
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46		
		2						
		3						
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4		
		2						
		3						
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94		
		2	-94	-94	-Infinity	-94		
		3	-91	-91	-Infinity	-91		
lo	dBm/9.36 MHz	1	-64.60	-62.25	64.60	-62.25		
	dBm/9.36 MHz	2	-64.60	-62.25	-64.60	-62.25		
	dBm/38.16 MHz	3	-58.50	-56.16	58.50	-56.16		
Propagation Condition		1, 2, 3			VGN			

Note 1: Table A.6.6.1.4.2-1The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Table A.6.6.1.4.2-1Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: Table A.6.6.1.4.2-1SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.6.1.4.2-4: Void

Table A.6.6.1.4.2-5: Void

A.6.6.1.4.3 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 6400 ms from the beginning of time period T2. The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.5 SA event triggered reporting tests without gap under non-DRX with SSB index reading

A.6.6.1.5.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2.

A.6.6.1.5.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for FDD PCell and neighbour cell are given in Table A.6.6.1.5.2-1 and A.6.6.1.5.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.6.6.1.5.2-1: Supported test configurations

Configuration	Description
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

Table A.6.6.1.5.2-2: General test parameters for SA intra-frequency event triggered reporting without gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1	Cell 1	
Neighbour cell		1	Cell 2	Cell to be identified.
RF Channel Number		1	1: Cell 1 and Cell 2	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	S	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX	ms	1		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
T1	s	1	5	
T2	S	1	5	

Table A.6.6.1.5.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting without gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test	Ce	Cell 1		II 2
		configuration	T1	T2	T1	T2
TDD configuration		1	N/A		N/A	

PDSCH RMC		1	SR.1.	1 FDD	N/	/A	
configuration							
RMSI CORESET		1	CR.1.	1 FDD	N/	N/A	
RMC							
configuration							
Dedicated		1	CCR.1	.1 FDD	N/	/A	
CORESET RMC							
configuration							
OCNG Patterns		1	OF	P.1	OF	P.1	
TRS configuration		1	TRS.1	.1 FDD	N/	/A	
IInitial BWP		1	DLBV	√P.0,1	DLBW	/P.0.1	
configuration			ULBWP.0.1 ULBWP.0.1				
Active DL BWP		1	DLBWP.1.1 DLBWP.1.1			/P.1.1	
configuration							
Active UL BWP		1	ULBWP.1.1 ULBWP.1.1			/P.1.1	
configuration							
RLM-RS		1	SS	SB	SS	SB	
$N_{oc}^{}$ Note 2	dBm/SCS	1		-	.98		
N_{oc} Note 2	dBm/15 kHz	1		-	.98		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46	
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4	
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94 -94 -Infinity -94			
lo	dBm/9.36 MHz	1	-64.60 -62.2564.60 -62.25				
Propagation		1	AWGN				
Condition							

- Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.1.5.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.1.6 SA event triggered reporting tests with per-UE gaps under non-DRX with SSB index reading

A.6.6.1.6.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the FDD intra-frequency cell search requirements in clause 9.2.6.2 and 9.2.6.3.

A.6.6.1.6.2 Test parameters

Two cells are deployed in the test, which are FR1 PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for FDD PCell and neighbour cell are given in Table A.6.6.1.6.2-1 and A.6.6.1.6.2-2 below. In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

Table A.6.6.1.6.2-1: Supported test configurations

Configuration	Description					
1	15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					

Table A.6.6.1.6.2-2: General test parameters for SA intra-frequency event triggered reporting with gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test configur ation	Value	Comment
Active cell		1	Cell 1	
Neighbour cell		1	Cell 2	Cell to be identified.
RF Channel Number		1	1: Cell 1 and Cell 2	
Measurement gap type		1	Per-UE gaps	
Measurement gap repitition periodicity	ms	1	40	
Measurement gap length	ms	1	6	
Measurement gap offset	ms	1	39	
SSB configuration		1	SSB.1 FR1	
SMTC configuration		1	SMTC.2	
CSI-RS parameters		1	CSI-RS.1.2 FDD resource #0	
A3-Offset	dB	1	-4.5	
CP length		1	Normal	
Hysteresis	dB	1	0	
Time To Trigger	S	1	0	
Filter coefficient		1	0	L3 filtering is not used
DRX	ms	1		OFF
Time offset between serving and neighbour cells		1	3 ms	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
T1	S	1	5	
T2	S	1	5	

Table A.6.6.1.6.2-3: NR Cell specific test parameters for SA intra-frequency event triggered reporting with gap for FDD PCell in FR1 with SSB index reading

Parameter	Unit	Test	Ce	ell 1	Cell 2	
	configuration		T1 T2		T1	T2
TDD configuration		1	N/A		N/A	
PDSCH RMC configuration		1	SR.1.1 FDD		N/A	
RMSI CORESET RMC configuration		1	CR.1.1 FDD		N.	/A

Dedicated		1	CCR.1	.2 FDD	N,	/A	
CORESET RMC							
configuration							
OCNG Patterns		1	OF	P.1	OF	P.1	
TRS configuration		1	TRS.1	.1 FDD	N.	/A	
Ilnitial BWP		1	DLBV	√P.0.1	DLBW	/P.0.1	
configuration			ULBV	VP.0.1	ULBW	/P.0.1	
Active DL BWP		1	DLBV	VP.1.2	DLBW	/P.1.1	
configuration							
Active UL BWP		1	ULBV	VP.1.2	ULBW	ULBWP.1.1	
configuration							
RLM-RS		1	CSI-RS SSB		SB		
N _{oc} Note 2	dBm/SCS	1	-98				
Noc Note 2	dBm/15 kHz	1		-98			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	1	4	-1.46	-Infinity	-1.46	
\hat{E}_s/N_{oc}	dB	1	4	4	-Infinity	4	
SS-RSRP Note 3	dBm/SCS kHz	1	-94	-94	-Infinity	-94	
lo	dBm/9.36 MHz	1	-64.60				
Propagation		1	AWGN				
Condition							

- Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.
- Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.1.6.3 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE is required to read the neighbour cell SSB index and report the acquired SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2 Inter-frequency Measurements

A.6.6.2.1 SA event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

A.6.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.1.1-1, A.6.6.2.1.1-2 and A.6.6.2.1.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.6.6.2.1.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.6.6.2.1.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1

	Config	Description				
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note 1:	The UE is only required to be tested in one of the supported test configurations					
Note 2:	target NR cell has the same SCS, BW and duplex mode as NR serving cell					

Table A.6.6.2.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter	arameter Unit Test Value		lue	Comment	
		configurati on	Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1	, 2	Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pcell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	9	9	
A3-Offset	dB	Config 1,2,3	-6		
Hysteresis	dB	Config 1,2,3	0		
CP length		Config 1,2,3	Normal		
TimeToTrigger	S	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	Зµѕ		Synchronous cells.
T1	S	Config 1,2,3	5		
T2	S	Config 1,2,3	1	1	

Table A.6.6.2.1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Cell 1		Cell 2	
		configuratio	T1 T2		T1	T2
		n				

NR RF Chai	nnel Number		Config 1,2,3	1	2	
Duplex mod	е		Config 1	F	-DD	
			Config 2,3	7	rdd .	
TDD configu	ıration		Config 1	Not A	pplicable	
J	•		Config 2		Conf.1.1	
	•		Config 3	TDD	Conf.2.1	
BW _{channel}		MHz	Config 1,2		RB,c = 52	
			Config 3		RB,c = 106	
BWP BW		MHz	Config 1,2		RB,c = 52	
			Config 3		RB,c = 106	
BWP	Initial DL BWP			DLBWP.0.1	NA	
configurati	Initial UL BWP		1	ULBWP.0.1	NA	
on	Dedicated DL BWP		Config 1, 2,	DLBWP.1.1	NA	
	Dedicated UL BWP			ULBWP.1.1	NA	
TRS configu				TRS.1.1 FDD	NA	
g			Config 1			
			Config 2	TRS.1.1 TDD	NA	
			Config 3	TRS.1.2 TDD	NA	
OCNG Patte A.3.2.1.1 (O	erns defined in P.1)		Config 1,2,3	OP.1	OP.1	
PDSCH Ref			Config 1	SR.1.1 FDD	-	
measureme	nt channel		Config 2	SR.1.1 TDD		
			Config 3	SR.2.1 TDD		
RMSI CORE	RMSI CORESET Reference		Config 1	CR.1.1 FDD		
Channel	LOL I Releience		Config 2	CR.1.1 TDD		
Onamio			Config 3	CR.2.1 TDD		
Dedicated C			Config 1	CCR.1.1 FDD		
			Config 2	CCR.1.1 TDD		
			Config 3	CCR.2.1 TDD		
SSB parame	eters		Config 1	SSB.1 FR1	SSB.5 FR1	
· ·			Config 2	SSB.1 FR1	SSB.5 FR1	
			Config 3	SSB.2 FR1	SSB.6 FR1	
SMTC confi	guration defined		Config 1	SMTC.2	SMTC.5	
in A.3.11	-		Config 2, 3	SMTC.1	SMTC.4	
PDSCH/PD	CCH subcarrier	kHz	Config 1,2		15	
spacing			Config 3		30	
	of PSS to SSS	-				
EPRE ratio of	of PBCH DMRS					
	of PBCH to PBCH		-			
EPRE ratio of PDCCH DMRS to SSS			1			
EPRE ratio of PDCCH to PDCCH DMRS			Config 1,2,3	0	0	
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH						
	of OCNG DMRS		1			
EPRE ratio	of OCNG to					

Note2	dBm/15 kHz		-98		-98	
Note2	dBm/S	Config 1,2	-6	98		-98
	CS	Config 3	-9	95	-95	
SS-RSRP Note 3	dBm/S	Config 1,2	-94	-94	-Infinity	-91
	CS	Config 3	-91	-91	-Infinity	-88
\hat{E}_s/I_{ot}	dB	Config	4	4	-Infinity	7
		1,2,3,4,5,6				
\hat{E}_s/N_{oc}	dB	Config 1,2,3	4	4	-Infinity	7
Io ^{Note3}	dBm/9.	Config 1,2	-64.59	-64.59	-70.05	-62.26
	36MHz	_				
	dBm/38	Config 3	-58.49	-58.49	-63.94	-56.15
	.16MHz	_				
Propagation Condition		Config 1,2,3	AWGN AWGN		WGN	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_{N_{-\infty}}$ to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.6.6.2.1.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 760 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.2 SA event triggered reporting tests for FR1 without SSB time index detection when DRX is used

A.6.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.2.1-1, A.6.6.2.2.1-2 and A.6.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.2.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.6.6.2.2.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.2.2.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR1

	Config	Description				
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note 1:	The UE is only required to be tested in one of the supported test configurations					
Note 2:	target NR cell has the same SCS, BW and duplex mode as NR serving cell					

Table A.6.6.2.2.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Value				Comment
		configurati	Test	Test	Test	Test	
		on	1	2	3	4	
NR RF Channel		Config 1,2,3		1,	, 2		Two FR1 NR carrier frequencies is
Number							used.
Active cell		Config 1,2,3	NR ce	II 1 (Pce	ell)		NR Cell 1 is on NR RF channel
							number 1.
Neighbourgall		Config 1 2 2	NR ce	IIO			NR cell 2 is on NR RF channel
Neighbour cell		Config 1,2,3	INR CE	IIZ			number 2.
Gap Pattern Id		Config 1,2,3	0		4		As specified in clause 9.1.2-1.
Gap Fattern id		Coming 1,2,3	0		-		As specified in clause 9.1.2-1.
Measurement gap		Config 1,2,3	39		9		
offset		001111g 1,2,0					
A3-Offset	dB	Config 1,2,3	-6		I		
Hysteresis	dB	Config 1,2,3	0				
CP length		Config 1,2,3	Norma	al			
TimeToTrigger	S	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX	DRX	DRX	DRX	As specified in clause A.3.3
			.1	.7	.1	.7	
Time offset between		Config 1	3ms				Asynchronous cells.
serving and neighbour							The timing of Cell 2 is 3ms later
cells							than the timing of Cell 1.
		Config 2,3	3µs				Synchronous cells.
T1	s	Config 1,2,3	5				
T2	s	Config 1,2,3	1.1	11	1.1	11	
14	3	Corning 1,2,3	1.1	1 1 1	1.1		

Table A.6.6.2.2.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Cell 1	Cell 2
-----------	------	--------	--------

			Test	T1	T2	T1	T2	
			configuratio n					
NR RF Channel Number			Config 1,2,3		1 2		2	
Duplex mode			Config 1		FDD			
			Config 2,3		TDD			
TDD configuration BWchannel			Config 1		Not Applicable			
			Config 2		TDDConf.1.1			
		MHz	Config 3 Config 1,2		TDDConf.2.1 10: N _{RB,c} = 52			
BWP BW		IVITIZ	Config 3		40: N _{RB,c} = 32			
		MHz	Config 1,2	10: N _{RB,c} = 100				
			Config 3	40: N _{RB,c} = 106				
BWP configuratio n	Initial DL BWP		Config 1, 2,	DLBWP.0.1 NA			NA	
	Initial UL BWP		Config 1, 2,	ULBWP.0.1			NA	
	Dedicated DL BWP			DLBWP.1.1		NA		
	Dedicated UL BWP			ULBWP.1.1		NA		
TRS configuration			Config 1	TRS.1.1 FDD		NA		
			Config 2	TRS.1.1 TDD TRS.1.2 TDD		NA		
			Config 3			NA		
OCNG Patterns defined in A.3.2.1.1 (OP.1)			Config 1,2,3	OP.1		OP.1		
PDSCH Reference measurement channel			Config 1	SR.1.	SR.1.1 FDD SR.1.1 TDD		-	
			Config 2	SR.1.				
			Config 3	SR.2.1 TDD				
RMSI CORESET Reference Channel Dedicated CORESET			Config 1	CR.1.1 FDD		-		
			Config 2		CR.1.1 TDD CR.2.1 TDD			
			Config 3	CR.2.				
Reference Channel SSB parameters SMTC configuration defined			Config 1	CCR.1.1 FDD		-		
			Config 2		CCR.1.1 TDD			
			Config 3		.1 TDD	SSB.5 FR1		
			Config 1 Config 2		1 FR1 1 FR1		3.5 FR1 3.5 FR1	
			Config 3		2 FR1		3.6 FR1	
			Config 1		TC.2		MTC.5	
in A.3.11			Config 2, 3		TC.1	SMTC.4		
PDSCH/PDCCH subcarrier		kHz	Config 1,2		15			
spacing			Config 3		30			
EPRE ratio of PSS to SSS								
EPRE ratio of PBCH DMRS to SSS				Config 1,2,3 0				
EPRE ratio of PBCH to PBCH DMRS] _					
EPRE ratio of PDCCH DMRS to SSS			Config 1,2,3			0		
EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS]					
]					

EPRE ratio of PDSCH to						
PDSCH						
EPRE ratio of OCNG DMRS						
to SSS(Note 1)						
EPRE ratio of OCNG to						
OCNG DMRS (Note 1)						
Note2	dBm/15 kHz	Config 1,2,3	-9	8	-	98
Note2	dBm/S	Config 1,2	-9	8	-98	
	CS	Config 3	-95		-95	
SS-RSRP Note 3	dBm/S	Config 1,2	-94	-94	-Infinity	-91
	CS	Config 3	-91	-91	-Infinity	-88
\hat{E}_{s}/I_{ot}	dB	Config	4	4	-Infinity	7
$\mathbf{L}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		1,2,3,4,5,6				
\hat{E}_{s}/N_{oc}	dB	Config 1,2,3	4	4	-Infinity	7
Io ^{Note3}	dBm/9.	Config 1,2	-64.59	-64.59	-70.05	-62.2
	36MHz	_				
	dBm/38	Config 3	-58.49	-58.49	-63.94	-56.15
	.16MHz					
Propagation Condition Config 1,2,3 AWGN AWGI						

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_{N_{-\infty}}$ to be fulfilled
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Table A.6.6.2.2.1-4: DRX-Configuration for SA inter-frequency event triggered reporting without SSB time index detection

Field	Test1&3	Test2&4	Comment
Field	Value	Value	
drx-onDurationTimer	ms1	ms1	As specified in clause 6.3.2 in TS
drx-InactivityTimer	ms1	ms1	38.331 [2]
drx-RetransmissionTimerDL	sl1	sl1	
drx-RetransmissionTimerUL	sl1	sl1	
drx-LongCycleStartOffset	ms40	Ms640	
shortDRX	disable	disable	

Table A.6.6.2.2.1-5: *TimeAlignmentTimer* -Configuration SA inter-frequency event triggered reporting without SSB time index detection

Field	Value	Comment		
TimeAlignmentTimer	ms500	As specified in clause 6.3.2 in TS 38.331 [2]		

A.6.6.2.2.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.3 Void

A.6.6.2.4 Void

A.6.6.2.5 SA event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

A.6.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.5.1-1, A.6.6.2.5.1-2 and A.6.6.2.5.1-3.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.5.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.6.6.2.5.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.6.6.2.5.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1

	Config	Description								
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode								
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode								
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode								
Note 1:	lote 1: The UE is only required to be tested in one of the supported test configurations									
Note 2:	target NR cell has the same SCS, BW and duplex mode as NR serving cell									

Table A.6.6.2.5.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter Unit Value Comment

		Test	Test 1	Test 2	
		configurati on			
NR RF Channel Number		Config 1,2,3	1, 2		Two FR1 NR carrier frequencies is used.
Active cell		Config 1,2,3	NR cell 1 (Pce	ell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0	4	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	9	9	
A3-Offset	dB	Config 1,2,3	-6		
Hysteresis	dB	Config 1,2,3	0		
CP length		Config 1,2,3	Normal		
TimeToTrigger	S	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3µs		Synchronous cells.
T1	S	Config 1,2,3	5		
T2	S	Config 1,2,3	1.1	1	

Table A.6.6.2.5.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter		Unit	Test	Ce	ell 1	Cell 2		
			configuratio n	T1	T1 T2		T2	
NR RF Chan	nel Number		Config 1,2,3		1		2	
Duplex mode			Config 1		·	DD		
			Config 2,3			DD		
TDD configur	ation		Config 1		Not Ap	oplicable		
			Config 2		TDDC	Conf.1.1		
			Config 3		TDDC	Conf.2.1		
BW _{channel}		MHz	Config 1,2		10: N	$_{RB,c} = 52$		
			Config 3		40: N _R	B,c = 106		
BWP BW		MHz	Config 1,2		10: N _{RB,c} = 52			
			Config 3		40: N _R	B,c = 106		
BWP	Initial DL BWP			DLB\	NP.0.1	NA		
configuratio	Initial UL BWP			ULB\	NP.0.1	NA		
n	Dedicated DL BWP		Config 1, 2, 3	DLB\	WP.1.1		NA	
	Dedicated UL BWP			ULBWP.1.1			NA	
TRS configur	ation		Config 1	TRS.1	l.1 FDD		NA	
			Config 2	TRS.1	TRS.1.1 TDD		NA	
			Config 3	TRS.1	1.2 TDD		NA	
OCNG Patter	ns defined in		Config 1,2,3	OP.1		C	P.1	
A.3.2.1.1 (OF	P.1)		-					
PDSCH Refe			Config 1	SR.1	SR.1.1 FDD		-	
measuremen	t channel		Config 2	SR.1	.1 TDD			
			Config 3	SR.2	.1 TDD	1		
			Config 1	CR.1	.1 FDD	-		

RMSI CORESET Reference		Config 2	CR.1.	1 TDD		
Channel		Config 3		1 TDD		
Dedicated CORESET Reference Channel		Config 1	CCR.1	.1 FDD		-
		Config 2		.1 TDD		
		Config 3	CCR.2	.1 TDD		
SSB parameters		Config 1		1 FR1		3.5 FR1
		Config 2		1 FR1		3.5 FR1
		Config 3		2 FR1		3.6 FR1
SMTC configuration defined		Config 1		TC.2		ITC.5
in A.3.11		Config 2, 3	SM	TC.1	SN	ITC.4
PDSCH/PDCCH subcarrier	kHz	Config 1,2			15	
spacing		Config 3		;	30	
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2,3	(0	0	
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
Note2	dBm/15 kHz		-(98		-98
Note2	dBm/S	Config 1,2		98		-98
	CS	Config 3		95		-95
SS-RSRP Note 3	dBm/S	Config 1,2	-94	-94	-Infinity	-91
	CS	Config 3	-91	-91	-Infinity	-88
\hat{E}_{s}/I_{ot}	dB	Config 1,2,3	4	4	-Infinity	7
\hat{E}_{s}/N_{oc}	dB	Config 1,2,3	4	4	-Infinity	7
Io ^{Note3}	dBm/9. 36MHz	Config 1,2	-64.59	-64.59	-70.05	-62.2
	dBm/38 .16MHz	Config 3	-58.4	-58.49	-63.94	-56.15
Propagation Condition		Config 1,2,3	AW	/GN	A\	WGN
NI-1-4- CONO-II-III	1 (1 (1					to t

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_{N_{_{oc}}}$ to be fulfilled.
- Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.6.6.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1040 ms from the beginning of time period T2. The UE shall not send event triggered

measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 880 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and 2 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.6 SA event triggered reporting tests for FR1 with SSB time index detection when DRX is used

A.6.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 2. The test parameters are given in Tables A.6.6.2.6.1-1, A.6.6.2.6.1-2 and A.6.6.2.6.1-3.

In test 1&2 measurement gap pattern configuration # 0 as defined in Table A.6.6.2.6.1-2 is provided for UE that does not support per-FR gap and in test 3&4 measurement gap pattern configuration #4 as defined in Table A.6.6.2.6.1-2 is provided for UE that supports per-FR gap. If a UE supports per-FR gap and gap pattern configuration #4, it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

UE needs to be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore, UE is allocated with PUSCH resource at every DRX cycle.

Table A.6.6.2.6.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR1

	Config	Description					
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note 1:	te 1: The UE is only required to be tested in one of the supported test configurations						
Note 2:	target NR cell has the same SCS, BW and duplex mode as NR serving cell						

Table A.6.6.2.6.1-2: General test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter	Unit	Test	Value				Comment
		configurati	Test Test		Test Test		
		on	1	2	3	4	
NR RF Channel Number		Config 1,2,3	1, 2				Two FR1 NR carrier frequencies is used.

Active cell		Config 1,2,3	NR cell 1 (Pcell))	NR Cell 1 is on NR RF channel number 1.	
Neighbour cell		Config 1,2,3	NR cell2				NR cell 2 is on NR RF channel number 2.	
Gap Pattern Id		Config 1,2,3	()		4	As specified in clause 9.1.2-1.	
Measurement gap offset		Config 1,2,3	39 9			9		
A3-Offset	dB	Config 1,2,3		-	6			
Hysteresis	dB	Config 1,2,3		()			
CP length		Config 1,2,3		Nor	mal			
TimeToTrigger	S	Config 1,2,3		()			
Filter coefficient		Config 1,2,3		()		L3 filtering is not used	
DRX		Config 1,2,3	DRX .1	DRX .7	DRX .1	DRX .7	As specified in clause A.3.3	
Time offset between serving and neighbour cells		Config 1	3 ms		•	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.		
		Config 2,3		3	3 μs		Synchronous cells.	
T1	S	Config 1,2,3	5					
T2	S	Config 1,2,3	1.3	13.5	1.3	13.5		

Table A.6.6.2.6.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR1 with SSB time index detection

Parameter		Unit	Test	Ce	ell 1	Cell 2	
			configuratio	T1	T2	T1	T2
			n				
NR RF Char	nnel Number		Config 1,2,3		1		2
Duplex mode	Э		Config 1			FDD	
			Config 2,3			TDD	
TDD configu	ration		Config 1			Applicable	
			Config 2		TDD	Conf.1.1	
			Config 3		TDD	Conf.2.1	
BW _{channel}		MHz	Config 1,2			$I_{RB,c} = 52$	
			Config 3		40: N	RB,c = 106	
BWP BW		MHz	Config 1,2			$I_{RB,c} = 52$	
			Config 3			$_{RB,c} = 106$	
BWP	Initial DL BWP] [DLBV	VP.0.1		NA
configurati	Initial UL BWP] [ULBWP.0.1		NA	
on	Dedicated DL BWP		Config 1, 2, 3	DLBWP.1.1		NA	
	Dedicated UL BWP			ULBWP.1.1			NA
TRS configu	ration		Config 1	TRS.1	.1 FDD	NA	
			Config 2	TRS.1	.1 TDD	NA	
			Config 3	TRS.1	.2 TDD		NA
OCNG Patte A.3.2.1.1 (O	erns defined in P.1)		Config 1,2,3	OI	OP.1)P.1
PDSCH Refe	0.000		Config 1	SR.1.	1 FDD		-
measuremer	nt channel		Config 2	SR.1.	1 TDD		
			Config 3	SR2.	1 TDD		
RMSI CORE	SET Reference		Config 1	CR.1.	CR.1.1 FDD		-
Channel			Config 2	CR.1.	CR.1.1 TDD		
			Config 3	CR2.1 TDD			
Dedicated C Reference C	-		Config 1	CCR.1	.1 FDD		-

SSB parameters SMTC configuration defined in A.3.11 PDSCH/PDCCH subcarrier spacing EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS	kHz	Config 2 Config 3 Config 1 Config 2 Config 3 Config 1 Config 2, 3 Config 1,2 Config 3	CCR.1. CCR.2. SSB.7 SSB.7 SSB.7 SMT	.1 TDD 1 FR1 1 FR1 2 FR1 CC.2	SSB SSB SM	8.5 FR1 8.5 FR1 8.6 FR1 MTC.5 MTC.4	
SMTC configuration defined in A.3.11 PDSCH/PDCCH subcarrier spacing EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS	kHz	Config 1 Config 2 Config 3 Config 1 Config 2, 3 Config 1,2	SSB.2 SSB.2 SSB.2	1 FR1 1 FR1 2 FR1 FC.2	SSB SSB SM SM 15	3.5 FR1 3.6 FR1 MTC.5	
SMTC configuration defined in A.3.11 PDSCH/PDCCH subcarrier spacing EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS	kHz	Config 2 Config 3 Config 1 Config 2, 3 Config 1,2	SSB.2 SSB.2 SMT	1 FR1 2 FR1 TC.2	SSB SSB SM SM 15	3.5 FR1 3.6 FR1 MTC.5	
in A.3.11 PDSCH/PDCCH subcarrier spacing EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS	kHz	Config 3 Config 1 Config 2, 3 Config 1,2	SSB.2 SMT	2 FR1 CC.2	SSB SM SM 15	3.6 FR1 /ITC.5	
in A.3.11 PDSCH/PDCCH subcarrier spacing EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS	kHz	Config 1 Config 2, 3 Config 1,2	SMT	ΓC.2	SM SM 15	ITC.5	
in A.3.11 PDSCH/PDCCH subcarrier spacing EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS	kHz	Config 2, 3 Config 1,2			15 SM		
PDSCH/PDCCH subcarrier spacing EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS	kHz	Config 1,2			15		
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS		ooming o					
to SSS EPRE ratio of PBCH to PBCH DMRS							
DMRS							
EPRE ratio of PDCCH DMRS							
to SSS							
EPRE ratio of PDCCH to PDCCH DMRS		Config 1,2,3	()	0		
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
N oc	Bm/15 kHz		-9	98	-98		
10	Bm/S	Config 1,2	-9	98	-98		
	CS	Config 3	-9)5		-95	
SS-RSRP Note 3 dl	Bm/S	Config 1,2	-94	-94	-Infinity	-91	
	CS	Config 3	-91	-91	-Infinity	-88	
\hat{E}_{s}/I_{ot}	dB	Config 1,2,3	4	4	-Infinity	7	
\hat{E}_s/N_{oc}	dB	Config 1,2,3	4	4	-Infinity	7	
36	Bm/9. 6MHz	Config 1,2	-64.59	-64.59	-70.05	-62.26	
.10	Bm/38 6MHz	Config 3	-58.49	-58.49	-63.94	-56.15	
Propagation Condition		Config 1,2,3	AW	GN	A۱	WGN	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_{N_{-\infty}}$ to be
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.6.6.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 12160ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than 12160 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1, 2, 3 and 4 UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.2.7 Void

A.6.6.2.8 Void

A.6.6.3 Inter-RAT Measurements

A.6.6.3.1 SA NR - E-UTRAN event-triggered reporting in non-DRX in FR1

A.6.6.3.1.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE makes correct event-triggered reporting of inter-RAT E-UTRAN measurements when operating in standalone (SA) operation with PCell in FR1. This test shall partly verify the cell search and measurement requirements in Clauses 9.4.2 and 9.4.3.

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN inter-RAT neighbour cell. In the measurement control information from the PCell it is indictated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1. During T1, the UE shall not have any information on Cell 2.

Supported test configurations are shown in table A.6.6.3.1.1-1. General test parameters are provided in Table A.6.6.3.1.1-2 below. Test parameters for Cell 1 and Cell 2, valid for both time duration T1 and T2, are provided in Tables A.6.6.3.1.1-3 and A.6.6.3.1.1-4, respectively.

Table A.6.6.3.1.1-1: Supported test configurations in SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.6.3.1.1-2: General test parameters for SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

Parameter	Unit	Value	Comment
NR RF Channel Number		1	1 NR carrier frequency is used in the test
LTE RF Channel Number		1	1 LTE carrier frequency is used in the test
Channel Bandwidth	MHz	As specified in Tables A.6.6.3.1.1-2 and	
		A.6.6.3.1.1-3.	
Active cell		Cell 1	Cell 1 is on RF channel number 1
Neighbour cell		Cell 2	Cell 2 is on RF channel number 2
Gap Pattern Id		0	As specified in Clause Table 9.1.2-1. Per-
			UE gap pattern.
NR measurement quantity		SS-RSRP	Measurement quantity for Cell 1
Inter-RAT E-UTRAN		RSRP	Measurement quantity for Cell 2
measurement quantity			
b2-Threshold1	dBm	Note 1	SS-RSRP threshold for SS-RSRP
			measurement on cell1 for event B2
b2-Threshold2EUTRA	dBm	-97	E-UTRAN RSRP threshold for SS-RSRP
			measurement on cell1 for event B2
Hysteresis	dB	0	
TimeToTrigger	S	0	
Filter coefficient		0	L3 filtering is not used
DRX		OFF	OFF
T1	S	5	
T2	S	5	
Note 1: Values are defined	l in Table A.	6.6.3.1.1-3	

Table A.6.6.3.1.1-3: PCell specific test parameters for SA inter-RAT E-UTRA event triggered reporting in non-DRX with PCell in FR1

Parameter		Unit	Configuration	Cell 1	
			_	T1	T2
RF channel number			1, 2, 3, 4, 5, 6		1
Duplex mode	Duplex mode		1, 2, 3		FDD
·			4, 5, 6		TDD
TDD Configuration	SCS=15 KHz		2, 5	TDD	Conf.1.1
_	SCS=30 KHz		3, 6	TDD	Conf.2.1
BW _{channel}		MHz	1, 4	10: N _{RB} ,	c = 52 (FDD)
			2, 5	10: N _{RB} ,	c = 52 (TDD)
			3, 6	40: N _{RB,c}	= 106 (TDD)
PDSCH reference n	neasurement		1, 4	SR.	1.1 FDD
channel	channel		2, 5	SR.	1.1 TDD
			3, 6	SR.2.1 TDD	
RMSI CORSET refe	rence channel		1, 4	CR.	1.1 FDD
			2, 5	CR.	1.1 TDD
			3, 6	CR.	2.1 TDD
Dedicated CORSET	reference channel		1, 4	CCR	.1.1 FDD
			2, 5	CCR	.1.1 TDD
			3, 6	CCR	.2.1 TDD
BWP configurations	Initial DL BWP		1, 2, 3, 4, 5, 6	DLE	3WP.0.1
	Dedicated DL BWP		1, 2, 3, 4, 5, 6	DLE	3WP.1.1
	Initial UL BWP		1, 2, 3, 4, 5, 6	ULE	3WP.0.1
	Dedicated UL BWP		1, 2, 3, 4, 5, 6	ULE	3WP.1.1
OCNG pattern ^{Note1}			1, 2, 3, 4, 5, 6	(OP.1
SMTC configuration			1, 2, 3, 4, 5, 6	SI	MTC.1
SSB configuration			1, 2, 4, 5	SSI	3.1 FR1
			3, 6	SSI	3.2 FR1

001 00 () 11	1		TD 0	
CSI-RS for tracking		1, 4		1.1 FDD
		2, 5	TRS.	1.1 TDD
		3, 6	TRS.	1.2 TDD
b2-Threshold1	dBm	1, 2, 4, 5		-96
	UDIII	3, 6		-93
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6		
EPRE ratio of PBCH_DMRS to SSS	1			
EPRE ratio of PBCH to PBCH_DMRS	1			
EPRE ratio of PDCCH_DMRS to SSS	1			
EPRE ratio of PDCCH to				
PDCCH_DMRS	dB			0
EPRE ratio of PDSCH_DMRS to SSS				
EPRE ratio of PDSCH to				
PDSCH_DMRS				
EPRE ratio of OCNG DMRS to SSS				
EPRE ratio of OCNG to OCNG DMRS				
N _{oc} Note2	dBm/15 KHz	1, 2, 3, 4, 5, 6	-104	
Noc Note2	dBm/SCS	1, 2, 4, 5	-	104
- 100		3, 6	-	101
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	16	0
Ê _s /I _{ot} Note3	dB	1, 2, 3, 4, 5, 6	16	0
SS-RSRP ^{Note3}	dBm/SCS	1, 2, 4, 5	-88	-104
		3, 6	-85	-101
SSB_RP ^{Note3}	dBm/SCS	1, 2, 4, 5	-88	-104
		3, 6	-85	-101
	dBm/9.36	1, 2, 4, 5	-59.94	-73.04
IoNote3	MHz			
10.1000	dBm/38.16	3, 6	-53.84	-66.93
	MHz			
Propagation condition		1, 2, 3, 4, 5, 6	A	WGN
Antenna Configuration and Correlation		1, 2, 3, 4, 5, 6		1x2
Matrix				
Note 1: OCNG shall be used such that	t both cells are fu	lly allocated and a c	onstant total tra	ansmitted nower

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be

Note 3: Ê_s/I_{ot}, SS-RSRP, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.6.3.1.1-4: E-UTRAN neighbour cell specific test parameters for SA inter-RAT E-UTRAN event triggered reporting in non-DRX with PCell in FR1

Parameter	Unit	Configuration	Cell 2	
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 2, 3	FDD	
		4, 5, 6	TDD	
TDD special subframe configuration ^{Note1}		4, 5, 6	6	
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1	
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RB,c}	= 25
			10 MHz: N _{RB} ,	c = 50
			20 MHz: N _{RB,c}	= 100
PDSCH parameters:		1, 2, 3	5 MHz: R.7	FDD
DL Reference Measurement			10 MHz: R.3	FDD
Channel ^{Note2}			20 MHz: R.6	FDD

		4.5.0	EMIL. D.	TDD	
		4, 5, 6	5 MHz: R.4		
			10 MHz: R.	-	
			20 MHz: R.:		
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.1		
parameters:			10 MHz: R.		
DL Reference Measurement			20 MHz: R.1		
Channel ^{Note2}		4, 5, 6	5 MHz: R.11 TDD		
			10 MHz: R.	-	
			20 MHz: R.1	0 TDD	
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP.20 FDD		
			10 MHz: OP.	10 FDD	
			20 MHz: OP.		
		4, 5, 6	5 MHz: OP.	9 TDD	
			10 MHz: OP	.1 TDD	
			20 MHz: OP.7 TDD		
PBCH_RA		1, 2, 3, 4, 5, 6			
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB	dB		0		
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA ^{Note3}					
OCNG RB ^{Note3}					
Noc ^{Note4}	dBm/15kHz	1, 2, 3, 4, 5, 6	-106		
Ês/Noc	dB	1, 2, 3, 4, 5, 6	-Infinity	19	
Ês/Iot ^{Note5}	dB	1, 2, 3, 4, 5, 6	-Infinity	19	
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
SCH RP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
Io ^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-73.21+10log (N _{RB,c} /50)	-56.12+10log (N _{RB,c} /50)	
Propagation Condition		1, 2, 3, 4, 5, 6	AWGI	, N	
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2		
Correlation Matrix					
N 4 4 0 11 16 1		f: (:	''' 1' 4 11 40 4' TO	00.044.5001	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 5: \hat{E}_s/I_{ot} , RSRP, SCH_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.3.1.2 Test Requirements

The UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 3.84s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event-triggered measurement reports as long as the reporting criteria is not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6.3.2 SA NR - E-UTRAN event-triggered reporting in DRX in FR1

A.6.6.3.2.1 Test Purpose and Environment

The purpose of this set of tests is to verify that the UE makes correct event-triggered reporting of inter-RAT E-UTRAN measurements when operating in standalone (SA) operation with PCell in FR1 when DRX is used. This test shall partly verify the cell search and measurement requirements in Clauses 9.4.2 and 9.4.3. There are two test cases. In test 1 the UE shall be configured with DRX cycle of 40 ms. In test 2 the UE shall be configured with DRX cycle of 640 ms.

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an inter-RAT E-UTRAN inter-RAT neighbour cell. In the measurement control information from the PCell it is indictated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) is to be used. Each test consists of two consecutive time periods, with durations T1 and T2, respectively. Prior to the start of time duration T1, the UE shall be fully synchronized to Cell 1. During T1, the UE shall not have any information on Cell 2.

In each test the UE shall be provided with new Timing Advance Command MAC control element at least once during each time alignment timer period to maintain uplink time alignment. Furthermore the UE shall be allocated with PUSCH resource at every DRX cycle

Supported test configurations are shown in table A.6.6.3.2.1-1. General test parameters are provided in Table A.6.6.3.2.1-2 below. Test parameters for Cell 1 and Cell 2, valid for both time duration T1 and T2, are provided in Tables A.6.6.3.2.1-3 and A.6.6.3.2.1-4, respectively.

Table A.6.6.3.2.1-1: Supported test configurations in SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.6.3.2.1-2: General test parameters for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Parameter	Unit	Test 1 Test 2		Comment		
		Value				
NR RF Channel Number		1		1		1 NR carrier frequency is used in the test
LTE RF Channel Number		2		1 LTE carrier frequency is used in the test		
Channel Bandwidth	MHz	As specified A.6.6.3.2.1-2 A.6.6.3.2.1-3	and			
Active cell		Cell 1		Cell 1 is on RF channel number 1		
Neighbour cell		Cell 2		Cell 2 is on RF channel number 2		
Gap Pattern Id		0		As specified in Clause Table 9.1.2-1. Per-UE gap pattern.		
NR measurement quantity		SS-RSRP		Measurement quantity for Cell 1		
Inter-RAT E-UTRAN measurement quantity		RSRP		Measurement quantity for Cell 2		
b2-Threshold1	dBm	Note 1		SS-RSRP threshold for SS-RSRP measurement on cell1 for event B2		
b2-Threshold2EUTRA	dBm	-97		E-UTRAN RSRP threshold for SS-RSRP measurement on cell1 for event B2		

Hysteresis	dB	0		
TimeToTrigger	S	0		
Filter coefficient		0		L3 filtering is not used
DRX		DRX.1	DRX.7	DRX cycle configurations DRX.1 and DRX.7 are defined in Table A.3.3.1-1 and Table A.3.3.7-1 respectively.
T1	S	5		
T2	S	5	15	
Note 1: Values are define	ed in Table	A.6.6.3.2.1-3		

Table A.6.6.3.2.1-3: PCell specific test parameters for SA inter-RAT E-UTRA event triggered reporting in DRX with PCell in FR1

Para	meter	Unit	Configuration	Cell 1	
				T1 T2	
RF channel numbe	r		1, 2, 3, 4, 5, 6	1	
Duplex mode			1, 2, 3	FDD	
			4, 5, 6	TDD	
TDD Configuration	SCS=15 KHz		2, 5	TDDConf.1.1	
	SCS=30 KHz		3, 6	TDDConf.2.1	
BW _{channel}		MHz	1, 4	10: N _{RB,c} = 52 (FDD)	
			2, 5	10: $N_{RB,c} = 52 \text{ (TDD)}$	
			3, 6	40: $N_{RB,c} = 106 \text{ (TDD)}$	
PDSCH reference	measurement		1, 4	SR.1.1 FDD	
channel			2, 5	SR.1.1 TDD	
			3, 6	SR.2.1 TDD	
RMSI CORSET ref	erence channel		1, 4	CR.1.1 FDD	
			2, 5	CR.1.1 TDD	
			3, 6	CR.2.1 TDD	
Dedicated CORSE	T reference channel		1, 4	CCR.1.1 FDD	
			2, 5	CCR.1.1 TDD	
			3, 6	CCR.2.1 TDD	
BWP	Initial DL BWP		1, 2, 3, 4, 5, 6	DLBWP.0.1	
configurations	Dedicated DL BWP		1, 2, 3, 4, 5, 6	DLBWP.1.1	
	Initial UL BWP		1, 2, 3, 4, 5, 6	ULBWP.0.1	
	Dedicated UL BWP		1, 2, 3, 4, 5, 6	ULBWP.1.1	
OCNG pattern ^{Note1}			1, 2, 3, 4, 5, 6	OP.1	
SMTC configuration	n		1, 2, 3, 4, 5, 6	SMTC.1	
SSB configuration			1, 2, 4, 5	SSB.1 FR1	
			3, 6	SSB.2 FR1	
CSI-RS for tracking	1		1, 4	TRS.1.1 FDD	
			2, 5	TRS.1.1 TDD	
			3, 6	TRS.1.2 TDD	
b2-Threshold1		dBm	1, 2, 4, 5	-96	
		abiii	3, 6	-93	
EPRE ratio of PSS					
EPRE ratio of PBC					
EPRE ratio of PBC					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to					
PDCCH_DMRS		dB	1, 2, 3, 4, 5, 6	0	
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to					
PDSCH_DMRS					
EPRE ratio of OCN					
EPRE ratio of OCN	G to OCNG DMRS				
N _{oc} Note2		dBm/15 KHz	1, 2, 3, 4, 5, 6	-104	
N _{oc} Note2		dBm/SCS	1, 2, 4, 5	-104	

		3, 6		-101
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	16	0
Ê _s /I _{ot} Note3	dB	1, 2, 3, 4, 5, 6	16	0
SS-RSRP ^{Note3}	dBm/SCS	1, 2, 4, 5	-88	-104
		3, 6	-85	-101
SSB_RP ^{Note3}	dBm/SCS	1, 2, 4, 5	-88	-104
		3, 6	-85	-101
IoNote3	dBm/9.36 MHz	1, 2, 4, 5	-59.94	-73.04
10.1616	dBm/38.16 MHz	3, 6	-53.84	-66.93
Propagation condition		1, 2, 3, 4, 5, 6	А	WGN
Antenna Configuration and Correlation Matrix		1, 2, 3, 4, 5, 6		1x2

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be
- Note 3: Ê_s/I_{ot}, SS-RSRP, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.6.3.2.1-4: E-UTRAN neighbour cell specific test parameters for SA inter-RAT E-UTRAN event triggered reporting in DRX with PCell in FR1

Parameter	Unit	Configuration	Cell 2
			T1 T2
RF channel number		1, 2, 3, 4, 5, 6	2
Duplex mode		1, 2, 3	FDD
		4, 5, 6	TDD
TDD special subframe configuration ^{Note1}		4, 5, 6	6
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1
BWchannel	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RB,c} = 25 10 MHz: N _{RB,c} = 50 20 MHz: N _{RB,c} = 100
PDSCH parameters: DL Reference Measurement Channel ^{Note2}	ce Measurement		5 MHz: R.7 FDD 10 MHz: R.3 FDD 20 MHz: R.6 FDD
		4, 5, 6	5 MHz: R.4 TDD 10 MHz: R.0 TDD 20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH parameters: DL Reference Measurement		1, 2, 3	5 MHz: R.11 FDD 10 MHz: R.6 FDD 20 MHz: R.10 FDD
Channel ^{Note2}		4, 5, 6	5 MHz: R.11 TDD 10 MHz: R.6 TDD 20 MHz: R.10 TDD
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP.20 FDD 10 MHz: OP.10 FDD 20 MHz: OP.17 FDD
		4, 5, 6	5 MHz: OP.9 TDD 10 MHz: OP.1 TDD 20 MHz: OP.7 TDD
PBCH_RA PBCH_RB PSS_RA	dB	1, 2, 3, 4, 5, 6	0

SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB					
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA ^{Note3}					
OCNG RB ^{Note3}					
N _{oc} Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-104		
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	17	
Ê _s /I _{ot} Note5	dB	1, 2, 3, 4, 5, 6	-Infinity	17	
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
SCH_RP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-Infinity	-87	
Io ^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-73.21+10log (N _{RB,c} /50)	-56.12+10log (N _{RB,c}	
				/50)	
Propagation Condition Note6		1, 2, 3, 4, 5, 6	AWGN		
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2		
Correlation Matrix Note6					
	P 1 1 P 1	e: .:	''' 1: 4 11 404: TO	00 044 5003	

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.
- Note 5: \hat{E}_s/I_{ot} , RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

A.6.6.3.2.2 Test Requirements

In test 1, the UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 3.84s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

In test 2, the UE shall send one Event B2 triggered measurement report for Cell 2 to the PCell, with a measurement reporting delay less than 12.8s from the start of period T2. The measurement reporting delay is defined as the time from the beginning of time period T2 to the moment when the UE sends the measurement report on PUSCH.

The UE shall not send event-triggered measurement reports as long as the reporting criteria is not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

A.6.6.4 L1-RSRP measurement for beam reporting

A.6.6.4.1 SSB based L1-RSRP measurement when DRX is not used

A.6.6.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.6.6.4.1.1-1.

Table A.6.6.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

Ī	2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
ſ	3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is only required to be tested in one of the supported test configurations		

A.6.6.4.1.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.1.2-1 and Table A.6.6.4.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.6.6.4.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
	1		FDD
Duplex mode	2		TDD
	3		TDD
	1		N/A
TDD Configuration	2		TDDConf.1.1
	3		TDDConf.2.1
	1		10: N _{RB,c} = 52
BWchannel	2	MHz	10: N _{RB,c} = 52
	3		40: N _{RB,c} = 106
PDSCH Reference measurement	1		SR.1.1 FDD
channel	2		SR.1.1 TDD
Chamie	3		SR.2.1 TDD
RMSI CORESET Reference	1		CR.1.1 FDD
Channel	2		CR.1.1 TDD
Charine	3		CR.2.1 TDD
Dedicated CORESET Reference	1		CCR.1.1 FDD
Channel	2		CCR.1.1 TDD
Gharmer	3		CCR.2.1 TDD
	1		SSB.3 FR1
SSB configuration	2		SSB.3 FR1
	3		SSB.4 FR1
OCNG Patterns	1~3		OP.1
Initial BWP Configuration	1~3		DLBWP.0.1
Titida BVVI Coringaration	11-0		ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1
-			ULBWP.1.1
SMTC configuration	1~3		SMTC.1
	1		TRS.1.1 FDD
TRS Configuration	2		TRS.1.1 TDD
	3		TRS.1.2 TDD
DRX configuration	1~3		Off
reportConfigType	1~3		periodic
reportQuantity	1~3		ssb-Index-RSRP
Number of reported RS	1~3		2

L1-RSRP reporting period	1~3	slot	80
T1	1~3	S	5
T2	1~3	S	1
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH			
DMRS			
EPRE ratio of PDCCH DMRS to			
SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS	1~3	dB	0
EPRE ratio of PDSCH DMRS to	1~3	uВ	
SSS			
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG			
DMRS Note 1			
Propagation condition	1~3		AWGN

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.6.6.4.1.2-2: SSB specific test parameters

Parameter	Config	Unit	SS	B#0	SSI	3#1
Parameter	Config	Onit	T1	T2	T1	T2
$N_{_{\!OC}}$ Note2	1~3	dBm/15kHz		-94	.65	
$N_{oc}^{ m Note2}$	1,2	dBm/SSB SCS		-94	.65	
TV _{oc}	3			-91	.65	
$\hat{ extbf{E}}_{ ext{s}}/ extbf{I}_{ ext{ot}}$	1~3	dB	0	0	-Infinity	3
SSB RSRP Note3	RSRP Note3 1,2 dBm/SSB SCS		-94.65	-94.65	-Infinity	-91.65
OOD NON	3	dbiii/oob ooo	-91.65	-91.65	-Infinity	-88.65
lo ^{Note3}	1,2	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93
IO Notes	3	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
\hat{E}_s/N_{oc}	1~3	dB	0	0	-Infinity	3

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.4.1.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.4.2 SSB based L1-RSRP measurement when DRX is used

A.6.6.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.6.6.4.2.1-1.

Table A.6.6.4.2.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

	Config	Description
	1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
	2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
	3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only required to be tested in one of the supported test configurations	

A.6.6.4.2.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.2.2-1 and Table A.6.6.4.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.6.6.4.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
	1		FDD
Duplex mode	2		TDD
	3		TDD
	1		N/A
TDD Configuration	2		TDDConf.1.1
	3		TDDConf.2.1
	1		10: N _{RB,c} = 52
BWchannel	2	MHz	10: N _{RB,c} = 52
	3		40: N _{RB,c} = 106
PDSCH Reference measurement	1		SR.1.1 FDD
channel	2		SR.1.1 TDD
Chame	3		SR.2.1 TDD
RMSI CORESET Reference	1		CR.1.1 FDD
Channel	2		CR.1.1 TDD

	3		CR.2.1 TDD
Dedicated CORESET Reference	1		CCR.1.1 FDD
Channel	2		CCR.1.1 TDD
Channel	3		CCR.2.1 TDD
	1		SSB.3 FR1
SSB configuration	2		SSB.3 FR1
	3		SSB.4 FR1
OCNG Patterns	1~3		OP.1
Initial PWD Configuration	1~3		DLBWP.0.1
Initial BWP Configuration	1~3		ULBWP.0.1
Dedicated DMD configuration	4.2		DLBWP.1.1
Dedicated BWP configuration	1~3		ULBWP.1.1
SMTC configuration	1~3		SMTC.1
	1		TRS.1.1 FDD
TRS Configuration	2		TRS.1.1 TDD
	3		TRS.1.2 TDD
DRX configuration	1~3		DRX.3
reportConfigType	1~3		periodic
reportQuantity	1~3		ssb-Index-RSRP
Number of reported RS	1~3		2
L1-RSRP reporting period	1~3	slot	80
T1	1~3	S	5
T2	1~3	S	1
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH			
DMRS			
EPRE ratio of PDCCH DMRS to			
SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS	1~3	dB	0
EPRE ratio of PDSCH DMRS to	1~3	ub ub	O
SSS			
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG			
DMRS Note 1			
Propagation condition	1~3		AWGN

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.6.6.4.2.2-2: SSB specific test parameters

Parameter Config		Unit	SS	SSB#0		3#1
Parameter	Config	Onit	T1	T2	T1	T2
$N_{oc}^{ m Note2}$	1~3	dBm/15kHz	-94.65			
∖ / Note2	1,2	- dBm/SSB SCS		-94	.65	
$N_{oc}^{}$ Note2	3	ubii/33b 3C3	-91.65			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~3	dB	0 0 -Infinity 3		3	
SSB RSRP Note3	1,2	dBm/SSB SCS	-94.65	-94.65	-Infinity	-91.65

	3		-91.65	-91.65	-Infinity	-88.65
lo Note3	1,2	dBm/9.36 MHz	-63.69	-63.69	-66.70	-61.93
10	3	dBm/38.16 MHz	-57.59	-57.59	-60.61	-55.84
\hat{E}_s/N_{oc}	1~3	dB	0	0	-Infinity	3

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for

 N_{ac} to be fulfilled.

Note 3: SS-RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.4.2.3 Test Requirements

The UE shall send L1-RSRP report every 80 slots. No later than 640ms plus 80 slots from the beginning of time period T2, UE shall send L1-RSRP report including results of both SSB0 and SSB1 while meeting the absolute accuracy requirement in clause 10.1.19.1.1 and relative accuracy requirement in clause 10.1.19.1.2. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.4.3 CSI-RS based L1-RSRP measurement when DRX is not used

A.6.6.4.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.6.6.4.3.1-1.

Table A.6.6.4.3.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

	Config	Description		
	1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode		
	2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode		
	3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode		
Note:	e: The UE is only required to be tested in one of the supported test configurations			

A.6.6.4.3.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.3.2-1 and Table A.6.6.4.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (0 for Config 1,2 and 8 for Config 3) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.6.6.4.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.6.6.4.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
	1		FDD
Duplex mode	2		TDD
'			TDD
			N/A
TDD Configuration	2	1	TDDConf.1.1
, and the second	3	1	TDDConf.2.1
	1		10: N _{RB,c} = 52
BW _{channel}	2	MHz	10: N _{RB,c} = 52
	3		40: N _{RB,c} = 106
DDCCII Deference maccurement	1		SR.1.1 FDD
PDSCH Reference measurement channel	2	1	SR.1.1 TDD
Chamilei	3	1	SR.2.1 TDD
	1		CR.1.1 FDD
RMSI CORESET Reference Channel	2		CR.1.1 TDD
	1 3 1 2 3 1 1 2 3 3 1 1 2 3 3 1 1 2 3 3 1 1 2 3 3 3 1 1 3 3 3 1 3 3		CR.2.1 TDD
Dadicated CODECET Deference	1		CCR.1.1 FDD
Dedicated CORESET Reference Channel	2		CCR.1.1 TDD
Channel	3	1	CCR.2.1 TDD
	1		SSB.3 FR1
SSB configuration	2		SSB.3 FR1
	3		SSB.4 FR1
	1		CSI-RS 1.3 FDD
CSI-RS configuration	2		CSI-RS 1.3 TDD
	3		CSI-RS 2.3 TDD
OCNG Patterns	1~3		OP.1
	1		TRS.1.1 FDD
TRS Configuration			TRS.1.1 TDD
	3		TRS.1.2 TDD
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~3		SMTC.1
DRX configuration			Off
reportConfigType			aperiodic
reportQuantity			cri-RSRP
Number of reported RS			2
qcl-Info			SSB#0 for resource#0
reportSlotOffsetList	1 2	cloto	SSB#1 for resource#1 8
T1			
EPRE ratio of PSS to SSS	1~3	5	5
	1		
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS	1		
EPRE ratio of PDCCH DMRS to SSS	1		
EPRE ratio of PDCCH DMRS to SSS	1.3	ďΒ	0
DMRS	1~3	ų b	J
EPRE ratio of PDSCH DMRS to SSS	-		
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH	1		
DMRS			

EPRE ra	tio of OCNG DMRS to		
EPRE ra	tio of OCNG to OCNG DMRS		
Propagat	Propagation condition		AWGN
Note 1:	OCNG shall be used such that a constant total transmitted p symbols.		

Table A.6.6.4.3.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1		
$N_{oc}^{ m Note1}$	1~3	dBm/15kHz	-94	.65		
$N_{oc}^{ m Note1}$	1,2	dBm/SSB SCS	-94	.65		
TV _{oc}	3	ubiii/33b 3C3	-91.65			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~3	dB	0	3		
CSI-RS RSRP	1,2	dBm/SSB SCS	-94.65	-91.65		
Note2	3	dbiii/33b 303	-91.65	-88.65		
lo Note2	1,2	dBm/9.36 MHz	-63.69	-61.93		
10	3	dBm/38.16 MHz	-57.59	-55.84		
\hat{E}_s/N_{oc}	1~3	dB	0	3		

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: CSI-RS RSRP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.4.3.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the absolute accuracy requirement in clause 10.1.20.1.1 and relative accuracy requirement in clause 10.1.20.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.6.4.4 CSI-RS based L1-RSRP measurement when DRX is used

A.6.6.4.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.6.6.4.4.1-1.

Table A.6.6.4.4.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

	Config	Description				
	1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode				
	2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode				
	3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode				
Note:	The UE is only	The UE is only required to be tested in one of the supported test configurations				

A.6.6.4.4.2 Test parameters

There is one cells in the test, the FR1 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.6.4.4.2-1 and Table A.6.6.4.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 80ms from the beginning of the test, the DCI trigger comes in slot n (0 for Config 1,2 and 8 for Config 3) of a frame and UE provides the report back based on the reporting configuration as defined in Table A.6.6.4.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.6.6.4.4.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~3		freq1
	1		FDD
Duplex mode	2	1	TDD
	3		TDD
	1		N/A
TDD Configuration	2		TDDConf.1.1
	3		TDDConf.2.1
	1		10: N _{RB,c} = 52
BW _{channel}	2	MHz	10: N _{RB,c} = 52
	3		40: N _{RB,c} = 106
PDSCH Reference measurement	1		SR.1.1 FDD
channel	2		SR.1.1 TDD
Charline	3		SR.2.1 TDD
	1		CR.1.1 FDD
RMSI CORESET Reference Channel	2		CR.1.1 TDD
	3		CR.2.1 TDD
Dedicated CORESET Reference	1		CCR.1.1 FDD
Channel	2		CCR.1.1 TDD
Oname	3		CCR.2.1 TDD
	1		SSB.3 FR1
SSB configuration	2		SSB.3 FR1
	3		SSB.4 FR1

	1		CSI-RS 1.3 FDD
CSI-RS configuration	2	1	CSI-RS 1.3 TDD
	3	1	CSI-RS 2.3 TDD
OCNG Patterns	1~3		OP.1
	1		TRS.1.1 FDD
TRS Configuration	2		TRS.1.1 TDD
	3		TRS.1.2 TDD
Initial DMD Configuration	1~3		DLBWP.0.1
Initial BWP Configuration	1~3		ULBWP.0.1
Dedicated DMD configuration	1.0		DLBWP.1.1
Dedicated BWP configuration	1~3		ULBWP.1.1
SMTC configuration	1~3		SMTC.1
DRX configuration	1~3		DRX.3
reportConfigType	1~3		aperiodic
reportQuantity	1~3		cri-RSRP
Number of reported RS	1~3		2
and late	1~3		SSB#0 for resource#0
qcl-Info	1~3		SSB#1 for resource#1
reportSlotOffsetList	1~3	slots	8
T1	1~3	S	5
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS			
EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH to PDCCH			
DMRS			
EPRE ratio of PDSCH DMRS to SSS	1~3	dB	0
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to]		
SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1~3		AWGN
11 / 1 0010 1 111 1 1 1			

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.6.6.4.4.2-2: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1	
$N_{oc}^{ m Note1}$	1~3	dBm/15kHz	-94.65		
Note1	1,2	dBm/SSB SCS	-94	.65	
TV _{oc}	3	UBIII/33B 3C3	-91.65		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~3	dB	0 3		
CSI-RS RSRP	1,2	dBm/SSB SCS	-94.65	-91.65	
Note2	3	GDII/33B 3C3	-91.65	-88.65	
lo ^{Note2}	1,2	dBm/9.36 MHz	-63.69	-61.93	

	3	dBm/38.16 MHz	-57.59	-55.84	
\hat{E}_s/N_{oc}	1~3	dB	0	3	

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for

 N_{ac} to be fulfilled.

Note 2: CSI-RS RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.6.6.4.4.3 Test Requirements

After 80ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the absolute accuracy requirement in clause 10.1.20.1.1 and relative accuracy requirement in clause 10.1.20.1.2.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.6.7 Measurement Performance requirements

Unless explicitly stated otherwise:

- Reported measurements shall be within defined range of accuracy limits defined in Clause 10 for at least 90 % of the reported cases. If multiple measurement performance requirements are verified in the same test, the reported measurements for each requirement shall be within defined range of accuracy limits of the corresponding requirement defined in Clause 10 for at least 90% of the reported cases.
- Measurements are performed in RRC_CONNECTED state.
- The reference channels assume transmission of PDSCH with a maximum number of 5 HARQ transmissions unless otherwise specified.

A.6.7.1 SS-RSRP

A.6.7.1.1 SA: intra-frequency case measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.2.1.1 and 10.1.2.1.2 for intra-frequency measurements.

A.6.7.1.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in table A.6.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in A.6.7.1.1.2-2. In all test cases, Cell 1 is the PCell, and Cell 2 is the target cell.

Table A.6.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Config	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode

3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

Table A.6.7.1.1.2-2: SS-RSRP Intra frequency test parameters

Parameter		Unit	Tes			Test 2		Test 3	
	etei	Olin	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2	
Cell ID			489 0 489 0			489	0		
SSB ARFCN Config 1			Tre	q1	FC		fre	q1	
Duplex mode	Config 2,3				TC				
	Config 1				Not App	olicable			
TDD configuration	Config 2			TDDConf.1.1					
	Config 3				TDDC	onf.2.1			
	Config 1				10: N _{RE}	$_{3,c} = 52$			
BWchannel	Config 2	MHz			10: N _{RE}	s,c = 52			
	Config 3				40: N _{RB}	,c = 106			
	Config 1				10: N _{RE}	s,c = 52			
BWP BW	Config 2				10: N _{RE}	s,c = 52			
	Config 3				40: N _{RB}	,c = 106			
Downlink initial BWP cor	nfiguration				DLBW	/P.0.1			
Downlink dedicated BW	P configuration				DLBW	/P.1.1			
Uplink initial BWP config	uration		ULBWP.0.1						
-	Uplink dedicated BWP configuration				ULBW				
TRS configuration	Config 1		TRS.1. 1 FDD	NA	TRS.1 .1 FDD	NA	TRS.1. 1 FDD	NA	
	Config 2		TRS.1. 1 TDD	NA	TRS.1 .1 TDD	NA	TRS.1. 1 TDD	NA	
	Config 3		TRS.1. 2 TDD	NA	TRS.1 .2 TDD	NA	TRS.1. 2 TDD	NA	
DRX Cycle		ms			Not App	olicable			
	Config 1		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD		
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1.1 TDD	-	
	Config 3		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD		
	Config 1		CR.1.1 FDD		CR.1.1 FDD		CR.1.1 FDD		
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD	-	CR.1.1 TDD	-	CR.1.1 TDD	-	
	Config 3		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD		
Control channel RMC	Config 1		CCR.1. 1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD		
Control Graffilet KIVIC	Config 2		CCR.1. 1 TDD	_	CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	

		Config 3		CCR2.1 TDD		CCR2. 1 TDD		CCR2.1 TDD	
		Config 1		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1
SSB config	uration	Config 2		SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1	SSB.1 FR1
		Config 3		SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1	SSB.2 FR1
Time offset	t with Cell 1	Config 1	ms	-	3	-	3	-	3
Time onsei	with Cell 1	Config 2,3	μs	-	3	-	3	-	3
SMTC conf	figuration	Config 1		SMTC.2					
		Config 2,3		SMTC.1					
OCNG Patterns						OCNG p	attern 1		
	PDSCH/PDCCH Config 1,2 subcarrier spacing Config 3								
		kHz		Γ	(Hz	1			
EPRE ratio	EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS		dB	0		0			
EPRE ratio	of PDSCH D of PDSCH to of OCNG DN	MRS to SSS	dB	0	0	0	0	0	0
Note2	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dBm/15Kh Z	-10	06	-8	38	-11 -1 -11 -1 -1	14 3.5 13 2.5 12 11 0.5
·· ac	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D, NR_TDD_FR1_D NR_FDD_FR1_E, NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_G NR_FDD_FR1_H		Not applicable ^{Note 5}		-94		-114 -113.5 -113 -112.5 -112 -111 -110.5	
Note2	Config 1,2		dBm/SCS	-10	06		38	Sam	e as 5kHz

		NR_FDD_FR1_A, NR_TDD_FR1_A						-111	
		NR_FDD_FR1_B NR_TDD_FR1_C						-11 -1	0.5
	Config 3	NR_FDD_FR1_D, NR_TDD_FR1_D		No applical	ot ble ^{Note 5}	-6	91		9.5
		NR_FDD_FR1_E, NR_TDD_FR1_E						-109	
		NR_FDD_FR1_G NR_FDD_FR1_H						-1 -10	
Ê/I _{ot}	I	1	dB	2.46	-5.97	2.46	-5.97	-0.01	-4.76
\hat{E}_{s}/N_{oc}			dB	6	1	6	1	3	0
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6						- 111.00	114.00
		NR_FDD_FR1_B						- 110.50	- 113.50
Config 1,2 SS- RSRPNot	NR_TDD_FR1_C	dBm/SCS			00		- 110.00	- 113.00	
	NR_FDD_FR1_D, NR_TDD_FR1_D		-100	-105	-82	-87	- 109.50	- 112.50	
	NR_FDD_FR1_E, NR_TDD_FR1_E						109.00	112.00	
	NR_FDD_FR1_G						108.00	111.00	
	NR_FDD_FR1_H						- 107.50	- 110.50	
e3		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBiii//eee	Not	Not applic			108.00	- 111.00
		NR_FDD_FR1_B						- 107.50	- 110.50
		NR_TDD_FR1_C						- 107.00	- 110.00
	Config 3	NR_FDD_FR1_D, NR_TDD_FR1_D		applica ble ^{Note 5}	able ^{Not}	-85	-90	- 106.50	- 109.50
		NR_FDD_FR1_E, NR_TDD_FR1_E						- 106.00	109.00
		NR_FDD_FR1_G						105.00	108.00
		NR_FDD_FR1_H						- 104.50	- 107.50
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6						-80	.03
		NR_FDD_FR1_B							.53
	Config 1,2	NR_TDD_FR1_C NR_FDD_FR1_D,	dBm/	-70	09	-52	2.09		.03
Io ^{Note3}	Joining 1,2	NR_TDD_FR1_D NR_FDD_FR1_E,	9.36MHz		.00	32			.03
		NR_TDD_FR1_E NR_FDD_FR1_G						-77	.03
		NR_FDD_FR1_H						-77.03 -76.53	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/ 38.16MHz	No applicat	ot ole ^{Note 5} -	-51.99			.94
L		t				L			

NR_FDD_FR1_B			-73.44
NR_TDD_FR1_C			-72.94
NR_FDD_FR1_D,			-72.44
NR_TDD_FR1_D			
NR_FDD_FR1_E,			-71.94
NR_TDD_FR1_E			
NR_FDD_FR1_G			-70.94
NR_FDD_FR1_H			-70.44
Propagation condition	-	AWGN	
Antenna configuration		1x2	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Subtest 1 is not used when testing with 30kHz SSB SCS.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.6.7.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for cell 1 and cell 2 shall fulfil absolute requirement in clause 10.1.2.1.1 and relative requirement in clause 10.1.2.1.2.

A.6.7.1.2 SA inter-frequency case measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.4.1.1 and 10.1.4.1.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.6.7.1.2.1-1.

Table A.6.7.1.2.1-1: Applicable NR configurations for FR1 inter-frequency SS-RSRP accuracy test

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only red	quired to be tested in one of the supported test configurations in each supported band

A.6.7.1.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a FR1 neighbour cell (Cell 2) on a different frequency than the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.6.7.1.2.2-1 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.6.7.1.2.2-1. The inter-frequency measurements are supported by a measurement gap.

Table A.6.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Unit	Test	1	Test 2		
Parameter	Coning	Unit	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN	1~3		freq1	freq2	freq1	freq2	
BWchannel	1	MHz	10: N _{RB c} = 52		10: N _{RB c} = 52		

				40: N		40:N	
		2		10: N _{RB,c}		10: N _{RB,0}	
		3		40: N _{RB,c} :		40: N _{RB,c}	
		1	<u> </u>	FDD		FDI	
Duplex mod	de	2		TDD		TDI)
		3		TDD		TDI	
		1		N/A		N/A	1
TDD config	uration	2		TDDCon	f.1.1	TDDCor	nf.1.1
		3		TDDCon	f.2.1	TDDCor	nf.2.1
	_	1		SR.1.1 FDD		SR.1.1 FDD	
PDSCH Re		2	_	SR.1.1 TDD	_	SR.1.1 TDD	_
measureme	ent channel	3	_	SR.2.1 FDD		SR.2.1 FDD	
		1		CR.1.1 FDD	_	CR.1.1 FDD	-
RMSI COR	ESET Reference	2	-	CR.1.1 TDD	-	CR.1.1 TDD	-
Channel		3		CR.2.1 FDD	<u> </u>	CR.2.1 FDD	_
		1		CCR.1.1 FDD	-	CCR.1.1 FDD	-
Dedicated 0	CORESET				-		-
Reference (Channel	2		CCR.1.1 TDD	-	CCR.1.1 TDD	-
		3		CCR.2.1 TDD	-	CCR.2.1 TDD	-
		1	_	SSB.1 F		SSB.1	
SSB configu	uration	2		SSB.1 F		SSB.1	
		3		SSB.2 F		SSB.2	
OCNG Patt	erns	1~3		OP.1		OP.	1
	TRS configuration			TRS.1.1 FDD		TRS.1.1 FDD	
TRS config				TRS.1.1 TDD	-	TRS.1.1 TDD	
				TRS.1.2 TDD		TRS.1.2 TDD	
Initial BWP	Initial BWP Configuration			DLBWP ULBWP		DLBWF ULBWF	
Dedicated BWP configuration		1~3		DLBWP	.1.1	DLBWF	P.1.1
			ms	ULBWP -	3	ULBWF	3
Time offset	with Cell 1	2,3	μs	-	3	-	3
CMTC	:	1		SMTC	.2	SMTC.2	
SMTC confi	iguration	2,3		SMTC	.1	SMTC.1	
EPRE ratio o	of PSS to SSS						
EPRE ratio o	of PBCH DMRS to						
EPRE ratio o	f PBCH to PBCH						
DMRS							
EPRE ratio o	of PDCCH DMRS to						
SSS							
	of PDCCH to PDCCH	1 2	٩D	0		_	_
DMRS	of PDSCH DMRS to	1~3	dB	0	0	0	0
SSS	I PUSCH DIVIKS 10						
	of PDSCH to PDSCH						
DMRS	11 DOOLL TO FDOOL						
	of OCNG DMRS to	1					
SSS ^{Note 1}							
EPRE ratio of OCNG to OCNG							
DMRS Note 1							
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5						-115
						λ7	4445
N_{oc} Note2	NR_FDD_FR1_B	1 2	dBm/15	-94.6	5	$(N_{oc \text{ for}})$	-114.5
OL.	NR_TDD_FR1_C	1~3	kHz			Channel 2	-114
	NR_FDD_FR1_D,					+8dB)	-113.5
	NR_TDD_FR1_D NR_FDD_FR1_E,	1					-113
	NR_TDD_FR1_E						113
				•		•	

	ND EDD ED4 O		I				110
	NR_FDD_FR1_G NR_FDD_FR1_H						-112 -111.5
	NR_FDD_FR1_A,						-111.5
	NR_TDD_FR1_A						110
	NOTE 5,						-114.5
	NR_FDD_FR1_B NR_TDD_FR1_C					N c	-114.5
	NR_FDD_FR1_D,	1,2		-94.65		$(N_{oc} \text{ for})$	-113.5
	NR_TDD_FR1_D	,				Channel 2 +8dB)	
	NR_FDD_FR1_E, NR_TDD_FR1_E					+oub)	-113
	NR_FDD_FR1_G						-112
N_{oc} Note2	NR_FDD_FR1_H		dBm/SS				-111.5
	NR_FDD_FR1_A,		B SCS				-112.00
	NR_TDD_FR1_A						
	NR_FDD_FR1_B						-111.50
	NR_TDD_FR1_C					(N_{oc}) for	-111.00
	NR_FDD_FR1_D,	3		-91.65		Channel 2	-110.50
	NR_TDD_FR1_D NR_FDD_FR1_E,					+8dB)	-110.00
	NR_TDD_FR1_E						110.00
	NR_FDD_FR1_G						-109.00
	NR_FDD_FR1_H						-108.50
	$\mathbf{\hat{E}}_{_{\mathrm{s}}}/\mathbf{I}_{_{\mathrm{ot}}}$	1~3	dB	10	10	13	-3
	NR_FDD_FR1_A,			·			
	NR_TDD_FR1_A						-118.00
	NR_FDD_FR1_B						-117.50
-	NR_TDD_FR1_C					(RSRP for	-117.00
	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2,4,5		-84.65		Cell 2 +25dB)	-116.50
	NR_FDD_FR1_E,					+23 uB)	
	NR_TDD_FR1_E		dBm/SC S				-116.00
00	NR_FDD_FR1_G						-115.00
SS- RSRP ^{Note3}	NR_FDD_FR1_H NR_FDD_FR1_A,						-114.50 -115.00
KOKF	NR_TDD_FR1_A		3				-113.00
	NOTE 5,						44450
	NR_FDD_FR1_B NR_TDD_FR1_C					(RSRP for	-114.50
	NR_FDD_FR1_D,	3		-81.65		Cell 2	-114.00 -113.50
	NR_TDD_FR1_D					+25dB)	
	NR_FDD_FR1_E, NR_TDD_FR1_E						-113.00
	NR_FDD_FR1_G						-112.00
	NR_FDD_FR1_H						-111.50
	NR_FDD_FR1_A,						-85.28
	NR_TDD_FR1_A						
	NR_FDD_FR1_B						-84.78
	NR_TDD_FR1_C		dBm/			(Io for	-84.28
	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2	9.36MH	-56.28		Channel 2	-83.78
	NR_FDD_FR1_E,		Z			+19.75dB)	-83.28
Io ^{Note3}	NR_TDD_FR1_E						
10	NR_FDD_FR1_G						-82.28
	NR_FDD_FR1_H NR_FDD_FR1_A,						-81.78 -79.19
	NR_TDD_FR1_A						-13.13
	NOTE 5,		dBm/			(Io for	70.00
	NR_FDD_FR1_B	3	38.16M	-50.19		Channel 2 +19.75dB)	-78.69 -78.19
	NR_TDD_FR1_C NR_FDD_FR1_D,		Hz			+19.73 GD)	-78.19 -77.69
	NR_TDD_FR1_D						77.00

NR_FDD_FR1_E,						-77.19
NR_TDD_FR1_E						
NR_FDD_FR1_G						-76.19
NR_FDD_FR1_H						-75.69
\hat{E}_s/N_{oc}	1~3	dB	10	10	13	-3
Propagation condition	1~3	-	AWGN		AWGN	
Antenna configuration	1~3		1x2		1x2	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.6.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the absolute requirement in clause 10.1.4.1.1 and relative requirement in clause 10.1.4.1.2.

A.6.7.1.3 Void

A.6.7.2 SS-RSRQ

A.6.7.2.1 SA: Intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.7.1.1.

A.6.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.6.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is tested by using the parameters in Table A.6.7.2.1.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

Table A.6.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

Table A.6.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3	
		Onit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN			freq1 fre			q1	fre	q1
Duplex mode	Config 1		FDD					

	Config 2,3	1			TD	<u> </u>				
	Config 1				Not App					
TDD configuration	Config 2				TDDCo					
122 comigaration	Config 3				TDDCo					
	Config 1				10: N _{RB}					
BWchannel	Config 2	- MHz	10: N _{RB,c} = 52							
D V Chamer	Config 3	2	40: N _{RB,c} = 106							
Gap Pattern ID	Gorning o				0					
oup r alloin is	Initial DL BWP				DLBW					
	Dedicated DL BWP				DLBW					
BWP configuration	Initial UL BWP		ULBWP.0.1							
	Dedicated UL BWP				ULBW	P.1.1				
DRX Cycle	1	ms			Not App	licable				
	Config 1		SR.1.1 FDD		SR.1.1 FDD		SR.1. 1 FDD			
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1. 1 TDD	-		
	Config 3		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD			
	Config 1		CR.1.1 FDD		CR.1.1 FDD		CR.1. 1 FDD			
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD	-	CR.1.1 TDD	-	CR.1. 1 TDD			
	Config 3		CR.2.1 TDD		CR.2.1 TDD		CR.2. 1 TDD			
	Config 1		CCR.1. 1 FDD		CCR.1. 1 FDD		CCR. 1.1 FDD			
Control Channel RMC	Config 2		CCR.1. 1 TDD	-	CCR.1. 1 TDD	-	CCR. 1.1 TDD	-		
	Config 3		CCR.2. 1 TDD		CCR.2. 1 TDD		CCR. 2.1 TDD			
	Config 1		TRS.1.1 FDD		TRS.1.1 FDD		TRS.1. 1 FDD			
TRS Configuration	Config 2		TRS.1.1 TDD	-	TRS.1.1 TDD	-	TRS.1. 1 TDD	-		
	Config 3		TRS.1.2 TDD		TRS.1.2 TDD		TRS.1. 2 TDD			
OCNG Patterns					OP.	. 1				
SS-RSSI-Measurement					Not App	licable				
Time offset with Cell 1	Config 1	ms	-	3	-	3	-	3		
THIC OHSOL WILL OUT	Config 2,3	μs	-	3	-	3	-	3		
SMTC configuration	Config 1				SMT	C.2				

		Config 2,3				SMT	C 1		
		_							
SSB config	guration	Config 1,2 Config 3				SSB.1 SSB.2			
CSI-RS for	· tracking	Config 1				TRS.1.			
		Config 2				TRS.1.			
		Config 3				TRS.1.2			
PDSCH/PE	OCCH	Config 1,2				15 k	Hz		
subcarrier		Config 3	kHz			30kl	Hz		
EPRE ratio	of PSS to SS	SS							
	of PBCH DM								
	of PBCH to F								
	of PDCCH D								
		PDCCH DMRS	dB	0	0	0	0	0	0
	of PDSCH to								
	EPRE ratio of PDSCH to PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1)								
	EPRE ratio of OCNG to OCNG DMRS (Note								
1)		00.10 210 (
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6						-1	14
		NR_FDD_FR1_B				-101		-113.5	
		NR_TDD_FR1_C	dBm/15kH z					-113	
	Config 1,2	NR_FDD_FR1_D,		-8	35			-112.5	
		NR_TDD_FR1_D						-11	2.5
		NR_FDD_FR1_E,						-1	12
		NR_TDD_FR1_E NR_FDD_FR1_G						1	11
Note2		NR_FDD_FR1_H							0.5
N oc		NR_FDD_FR1_A,							0.0
		NR_TDD_FR1_A						-1	14
		NR_FDD_FR1_B							3.5
	0 " 0	NR_TDD_FR1_C						-1	13
	Config 3	NR_FDD_FR1_D, NR_TDD_FR1_D		-91		-		-11	2.5
		NR_FDD_FR1_E, NR_TDD_FR1_E						-1	12
		NR_FDD_FR1_G						-1	11
		NR_FDD_FR1_H						-11	0.5
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6							
		NR_FDD_FR1_B							14 3.5
		NR TDD FR1 C							3.5 13
	Config 1,2	NR_FDD_FR1_D,		-8	35	-1	01		2.5
	J ,	NR_TDD_FR1_D						-1	12
Note2		NR_FDD_FR1_E,	dBm/SCS						11
N oc		NR_TDD_FR1_E	abiii/000					-11	0.5
		NR_FDD_FR1_G							
		NR_FDD_FR1_H NR_FDD_FR1_A,							
		NR_TDD_FR1_A,						-1	11
	Config 3	NOTE 6		-8	88		-		-
		NR_FDD_FR1_B		-00				-110.5	
		NR_TDD_FR1_C						-1	10

		NR_FDD_FR1_D, NR_TDD_FR1_D						-109.5	
		NR_FDD_FR1_E, NR_TDD_FR1_E						-109	
		NR_FDD_FR1_G						-108	
RR_FDD_FR1_H		dB	-1.76		-4.7		-546	7.5 -5.46	
\hat{E}_s/Γ_{oc} \hat{E}_s/N_{oc}		dB	3	3	-2.9	-2.9	-4	-4	
	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6	dBm/SCS	-82	-82	-103.9	-103.9	-118	-118
		NR_FDD_FR1_B						-117.5	-117.5
		NR_TDD_FR1_C						-117	-117
		NR_FDD_FR1_D, NR_TDD_FR1_D						-116.5	-116.5
		NR_FDD_FR1_E,							
		NR_TDD_FR1_E						-116	-116
SS-		NR_FDD_FR1_G						-115	-115
RSRPNote		NR_FDD_FR1_H NR_FDD_FR1_A,						-114.5	-114.5
3	Config 3	NR_TDD_FR1_A, NR_TDD_FR1_A NOTE 6		-85	-85	-	-	-115	-115
		NR_FDD_FR1_B						-114.5	-114.5
		NR_TDD_FR1_C NR_FDD_FR1_D,						-114	-114
		NR_TDD_FR1_D						-113.5	-113.5
		NR_FDD_FR1_E,						-113	-113
		NR_TDD_FR1_E							
		NR_FDD_FR1_G NR_FDD_FR1_H						-112 -111.5	-112 -111.5
		NR_FDD_FR1_A, NR_TDD_FR1_A						11110	11110
		NR_FDD_FR1_B NR_TDD_FR1_C	dB	-14.77	-14.77	-16.76	-16.76		
SS-RSRQ	Note3	NR_FDD_FR1_D,						-17.34	-17.34
		NR_TDD_FR1_D							
		NR_FDD_FR1_E, NR_TDD_FR1_E							
		NR_FDD_FR1_G							
	T	NR_FDD_FR1_H			<u></u>		<u> </u>		
	Config 1,2	NR_FDD_FR1_A, NR_TDD_FR1_A	dBm/ 9.36MHz					-83.5	
		NOTE 6		-50				-63.5	
		NR_FDD_FR1_B						-83	
Io ^{Note3}		NR_TDD_FR1_C						-82	2.5
		NR_FDD_FR1_D,				-7	70	-8	32
		NR_TDD_FR1_D NR_FDD_FR1_E,							
		NR_TDD_FR1_E						-81.5	
		NR_FDD_FR1_G						-80.5	
		NR_FDD_FR1_H						-80	
	Config 3	NR_FDD_FR1_A, NR_TDD_FR1_A		-50		-		-77.4	
		NOTE 6	dBm/					-11.4	
		NR_FDD_FR1_B	38.16MHz					-76.9	
		NR_TDD_FR1_C NR_FDD_FR1_D,	-					-76.4 -75.9	
		NR_TDD_FR1_D							

NR_FDD_FR1_E, NR_TDD_FR1_E						-7	5.4
NR_FDD_FR1_G						-74	4.4
NR_FDD_FR1_H						-7:	3.9
Propagation condition	-	AWGN	AWGN	AWGN	AWGN	AWG N	AWG N
Antenna configuration		1x2	1x2	1x2	1x2	1x2	1x2

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_N$ to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.6.7.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.7.1.1.

A.6.7.2.2 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.9.1.1 and 10.1.9.1.2.

A.6.7.2.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.6.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.6.7.2.2.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.6.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only	required to be tested in one of the supported test configurations

Table A.6.7.2.2.2-2: SS-RSRQ Inter frequency test parameters

Parameter		Unit	Test 1		Test 2		Test 3		
			Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN			freq1	freq2	freq1	freq2	freq1	freq2	
Dupley mode	Config 1		FDD						
Duplex mode	Config 2,3		TDD						
	Config 1	Not Applicable							
TDD configuration	Config 2		TDDConf.1.1						
	Config 3				TDDCc	onf.2.1			

	Config 1				10: N _{RE}	s,c = 52		
BW _{channel}	Config 2	MHz			10: N _{RE}			
	Config 3				40: N _{RB}	c = 106		
Gap pattern ID	Config 1,2,3				C	l		
	Config 1				10: N _{RE}	s,c = 52		
BWP BW	Config 2				10: N _{RE}			
	Config 3				40: NRB			
DRX Cycle		ms			Not App	licable		
	Config 1,4		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD	
PDSCH Reference measurement channel	Config 2,5		SR.1.1 TDD	-	SR.1.1 TDD	-	SR.1.1 TDD	-
	Config 3,6		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD	
	Config 1		CR.1.1 FDD	-	R.1.1 FDD	-	CR.1.1 FDD	
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD		CR.1.1 TDD		CR.1.1 TDD	
	Config 3		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD	
	Config 1		CCR.1 .1 FDD		CCR.1. 1 FDD		CCR.1. 1 FDD	
Dedicated CORESET Reference Channel	Config 2		CCR.1 .1 TDD	-	CCR.1. 1 TDD	-	CCR.1. 1 TDD	-
	Config 3		CCR2. 1 TDD		CCR2.1 TDD		CCR2. 1 TDD	
	Config 1		TRS.1. 1 FDD		TRS.1.1 FDD		TRS.1. 1 FDD	
TRS Configuration	Config 2		TRS.1. 1 TDD	-	TRS.1.1 TDD	-	TRS.1. 1 TDD	-
	Config 3		TRS.1. 2 TDD		TRS.1.2 TDD		TRS.1. 2 TDD	
OCNG Patterns					OCNG p	attern 1		•
Time offset with Cell 1	Config 1	ms	-	3	-	3	-	3
Time onset with Cell 1	Config 2,3	μs	-	3	-	3	-	3
SMTC configuration	Config 1				SMTC p			
	Config 2,3 Config 1,2				SMTC p SSB patter		1	
SSB configuration	Config 1,2				SSB patter			
CSI-RS for tracking	Config 1		TRS.1.1 FDD					
	Config 2		TRS.1.1 TDD					
DDCCH/DDCCH	Config 3 Config 1,2		TRS.1.2 TDD 15 kHz					
PDSCH/PDCCH subcarrier spacing	Config 3	kHz	Hz 30 kHz					
EPRE ratio of PSS to SSS		1		30 F	12			
EPRE ratio of PBCH DMRS	PRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBC EPRE ratio of PDCCH DMF EPRE ratio of PDCCH to PI	dB	0	0	0	0	0	0	
EPRE ratio of PDSCH DMF	RS to SSS							<u> </u>

EPRE ratio	of PDSCH to PD	SCH							
EPRE ratio	of OCNG DMRS	to SSS(Note 1)							
EPRE ratio	of OCNG to OCI	NG DMRS (Note 1)							
Note2	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dBm/15kHz	-80).18	-10	06	-11: -11: -11: -11: -11: -11:	5.5 15 4.5 14
Note2	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dBm/15kHz	-86	3.27	-1	13	-11 -11: -11: -11: -11: -11:	16 5.5 15 4.5
Note2	Config 1,2	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dPm/4511 l=	-80.18		-106		-116 -115.5 -115 -114.5 -114 -113 -112.5	
N oc	Config 3	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6 NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_TDD_FR1_E NR_TDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dBm/15kHz	-83.27		-110		-11 -11: -11 -11 -11 -1:	2.5 12 1.5 11
Ê , /I ot		<u>,</u>	dB	-1	.75	-1.	75	3	-1.75
\hat{E}_{s}/N_{oc}			dB		.75 .75			3	-1.75
s / · · oc		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	uD.	1		-1.	- 107.75	-113	-1.73 - 117.7 5
SS- RSRP ^{Not} e3	Config 1,2	NR_FDD_FR1_B	dBm/SCS	-81.93	-81.93	- 107.75		-112.5	117.2
	<u> </u>	NR_TDD_FR1_C NR_FDD_FR1_D						-112	116.7
		NR_TDD_FR1_D						-111.5	116.2 5

_		I	ı	1				1	1
		NR_FDD_FR1_E NR_TDD_FR1_E						-111	- 115.7 5
		NR_FDD_FR1_G						-110	- 114.7 5
		NR_FDD_FR1_H						-109.5	- 114.2 5
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6						-110	- 114.7 5
		NR_FDD_FR1_B						-109.5	- 114.2 5
		NR_TDD_FR1_C						-109	- 113.7 5
	Config 3	NR_FDD_FR1_D NR_TDD_FR1_D		-85.02	-85.02	- 111.75	- 111.75	-108.5	- 113.2 5
		NR_FDD_FR1_E NR_TDD_FR1_E						-108	- 112.7 5
		NR_FDD_FR1_G						-107	111.7 5
		NR_FDD_FR1_H						-106.5	- 111.2 5
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6							
SS-RSRQ	Note3	NR_FDD_FR1_B NR_TDD_FR1_C NR_FDD_FR1_D NR_TDD_FR1_D NR_FDD_FR1_E NR_TDD_FR1_E NR_FDD_FR1_G NR_FDD_FR1_H	dB	-14.77	-14.77	-40.59	-40.59	12.56T	14.76 T
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6						-83.28	- 85.83
		NR_FDD_FR1_B						-82.78	- 85.33
	Config 1,2	NR_TDD_FR1_C NR_FDD_FR1_D		ب_	50	-75	83	-82.28	84.83
	301111g 1,2	NR_TDD_FR1_D NR_FDD_FR1_E			50	70	.00	-81.78	84.33
Io ^{Note3}		NR_TDD_FR1_E NR_FDD_FR1_G	dBm/SCS					-81.28 -80.28	83.83
		NR_FDD_FR1_H						-79.78	82.83
	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6						-77.19	82.33 - 79.73	
	Config 3	NR_FDD_FR1_B		-50		-76.73		-76.69	- 79.23
		NR_TDD_FR1_C						-76.19	78.73

		NR_FDD_FR1_D NR_TDD_FR1_D						-75.69	- 78.23
		NR_FDD_FR1_E NR_TDD_FR1_E						-75.19	- 77.73
		NR_FDD_FR1_G						-74.19	- 76.73
		NR_FDD_FR1_H						-73.69	- 76.53
Propagation	on condition		-	AWG N	AWGN	AWGN	AWGN	AWG N	AWG N
Antenna c	onfiguration			1x2	1x2	1x2	1x2	1x2	1x2

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_N$ to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.6.7.2.2.3 Test Requirements

The SS-RSRQ measurement accuracy shall fulfil the requirements in clause 10.1.9.1.1 and 10.1.9.1.2.

A.6.7.3 SS-SINR

A.6.7.3.1 SA intra-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.12.1.1.

A.6.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configuration are shown in Table A.6.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is tested by using the parameters in Table A.6.7.3.1.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is the target cell.

Table A.6.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

Table A.6.7.3.1.2-2: SS-SINR Intra frequency test parameters

Parameter		Unit	Tes	t 1	Test 2		
F	arameter	Onit	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN			fred	1	freq1		
Duplex mode	Config 1		FDD				

	Config 2,3			Т	DD			
	Config 1				pplicable			
TDD configuration	Config 2				Conf.1.1			
· ·	Config 3			TDD	Conf.2.1			
Downlink initial BWP co					WP.0.1			
Downlink dedicated BV			DLBWP.1.1					
Uplink initial BWP conf			ULBWP.0.1					
Uplink dedicated BWP	-			ULBWP.1.1				
DRX Cycle configuration		ms		Not A	pplicable			
TRS configuration	Config 1	1113	TRS.1.1 FDD	140174	TRS.1.1 FDD			
	Config 2		TRS.1.1 TDD	-	TRS.1.1 TDD	-		
	Config 3		TRS.1.2 TDD		TRS.1.2 TDD			
DDOOLI Dafaaaaa	Config 1		SR.1.1 FDD		SR.1.1 FDD			
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD	-	SR.1.1 TDD	-		
	Config 3		SR.2.1 TDD		SR2.1 TDD			
	Config 1		CR.1.1 FDD		CR.1.1 FDD			
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD	-	CR.1.1 TDD			
	Config 3		CR.2.1 TDD		CR.2.1 TDD			
	Config 1		CCR.1.1 FDD		CCR.1.1 FDD			
Dedicated CORESET Reference Channel	Config 2		CCR.1.1 TDD	-	CCR.1.1 TDD	-		
	Config 3		CCR.2.1 TDD		CCR.2.1 TDD			
OCNG Patterns				C)P.1			
SS-RSSI-Measuremen	t			Not A	pplicable			
Time offset with Cell	Config 1	ms	-	3	-	3		
1	Config 2,3	μs	-	3	-	3		
CMTC configuration	Config 1			SM	ITC.2			
SMTC configuration	Config 2,3			SM	ITC.1			
000	Config 1,2			SSB	.1 FR1			
SSB configuration	SSB configuration Config 3			SSB	.2 FR1			
PDSCH/PDCCH	2 "				15			
subcarrier spacing	kHz			30				
EPRE ratio of PSS to SSS								
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS		\dashv						
EPRE ratio of PDCCH DMRS to SSS				_	_	_		
EPRE ratio of PDCCH to PDCCH DMRS		dB	0	0	0	0		
EPRE ratio of PDSCH DM		_						
EPRE ratio of PDSCH to I		\dashv						
LI INE IGNO DI CONO DIVI	10 10 000(11010 1)	i	1		l			

FPRF ratio	of OCNG to C	CNG DMRS (Note 1)					
LI IXL IAIIO	<u></u>	NR_FDD_FR1_A,			1	-11	6
		NR_TDD_FR1_A					-
		NOTE 6					
		NR_FDD_FR1_B				-115	.5
NeteO		NR_TDD_FR1_C	dBm/15kH			-115	
Note2		NR_FDD_FR1_D,	Z	-9:	3	-114	.5
		NR_TDD_FR1_D	_				
		NR_FDD_FR1_E,				-11	4
		NR_TDD_FR1_E NR_FDD_FR1_G	-			-11	<u> </u>
		NR FDD FR1 H	+			-112	
		1411_1 00_1 1(1_11				Same as	
	Config 1,2			-93	3	15 kl	
		NR_FDD_FR1_A,					
		NR_TDD_FR1_A				-11	3
		NOTE 6					
Note2		NR_FDD_FR1_B				-112	
N oc	Confin 2	NR_TDD_FR1_C	dBm/SCS			-11	2
	Config 3	NR_FDD_FR1_D, NR_TDD_FR1_D		-90	J	-111	.5
		NR FDD FR1 E,	1				
		NR_TDD_FR1_E				-11	1
		NR_FDD_FR1_G	1			-11	0
		NR_FDD_FR1_H			·	-109	.5
\hat{E}_{s}/I_{ot}		•	dB	0	-3.19	-5.46	-5.46
\hat{E}_{s}/N_{oc}			dB	4.54	2.66	-4	-4
		NR_FDD_FR1_A,					
		NR_TDD_FR1_A NOTE 6				-120	-120
			1			440.5	440.5
		NR_FDD_FR1_B NR_TDD_FR1_C	-			-119.5 -119	-119.5 -119
	Config 1,2	NR_FDD_FR1_D,	-	-88.46	-	-119	-119
		NR_TDD_FR1_D		-00.40	90.34	-118.5	-118.5
		NR_FDD_FR1_E,				110	4.4.0
		NR_TDD_FR1_E				-118	-118
SS-		NR_FDD_FR1_G				-117	-117
RSRP ^{Not}		NR_FDD_FR1_H	dBm/SCS			-116.5	-116.5
e3		NR_FDD_FR1_A,	dbiii/oco				
		NR_TDD_FR1_A NOTE 6				-117	-117
			4			116 5	146.5
		NR_FDD_FR1_B NR_TDD_FR1_C	1]	-116.5 -116	-116.5 -116
	Config 3	NR_FDD_FR1_D,	1	-85.46	<u>-</u>	-115.5	-115.5
	Joining	NR_TDD_FR1_D		55.70	87.34	110.0	1.10.0
		NR_FDD_FR1_E,	1			-115	-115
		NR_TDD_FR1_E]				
		NR_FDD_FR1_G	1		[-114	-114
		NR_FDD_FR1_H				-113.5	-113.5
		NR_FDD_FR1_A,					
		NR_TDD_FR1_A NOTE 6					
		NR_FDD_FR1_B	1				
		NR_TDD_FR1_C	1				
SS-SINR N	lote3	NR_FDD_FR1_D,	dB	0	-3.19	-5.46	-5.46
		NR_TDD_FR1_D				5.10	0.10
		NR_FDD_FR1_E,	1				
		NR_TDD_FR1_E]				
		NR_FDD_FR1_G	1				
		NR FDD FR1 H		l	1		

		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6			-85.51
		NR_FDD_FR1_B			-85.01
		NR_TDD_FR1_C			-84.51
	Config 1,2	NR_FDD_FR1_D, NR_TDD_FR1_D	dBm/ 9.36MHz	-57.5	-84.01
		NR_FDD_FR1_E, NR_TDD_FR1_E			-83.51
		NR_FDD_FR1_G			-82.51
Io ^{Note3}		NR_FDD_FR1_H			-82.01
		NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 6			-79.41
		NR_FDD_FR1_B			-78.91
		NR_TDD_FR1_C	dBm/		-78.41
	Config 3	NR_FDD_FR1_D, NR_TDD_FR1_D	38.16MHz	-51.41	-77.91
		NR_FDD_FR1_E, NR_TDD_FR1_E			-77.41
		NR_FDD_FR1_G			-76.41
		NR_FDD_FR1_H			-75.91
	n condition		-		VGN
	onfiguration		-	1	x2

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_N$ to be fulfilled.
- Note 3: SS-SINR, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test

on band n51 in this release of the specification

A.6.7.3.1.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.12.1.1.

A.6.7.3.2 SA Inter-frequency measurement accuracy with FR1 serving cell and FR1 target cell

A.6.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.14.1.1 and 10.1.14.1.2.

A.6.7.3.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.6.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table A.6.7.3.2.2-2. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.6.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only	required to be tested in one of the supported test configurations

Table A.6.7.3.2.2-2: SS-SINR Inter frequency test parameters

Parame	tor	Unit	Tes		Tes		Test 3	
	itei	Oilit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
SSB ARFCN	Config 1		freq1	freq2	freq1	freq2 DD	freq1	freq2
Duplex mode	Config 1 Config 2,3	-			TE			
	Config 1				Not Ap			
TDD configuration	Config 2	1			TDDC			
-	Config 3				TDDC	onf.2.1		
Downlink initial BWP con				DLBW	/P.0.1			
Downlink dedicated BWF	configuration				DLBW			
Uplink initial BWP config	uration				ULBW			
Uplink dedicated BWP co	onfiguration				ULBW	/P.1.1		
DRX Cycle configuration		ms			Not App	plicable		
Gap pattern ID			0	-	0	-	0	-
TRS Configuration	Config 1		TRS.1. 1 FDD		TRS.1.1 FDD		TRS.1.1 FDD	
	Config 2		TRS.1.	-	TRS.1.1	-	TRS.1.1	-
	Config 3		1 TDD TRS.1.	1	TDD TRS.1.2	1	TDD TRS.1.2	
	Corning 3		2 TDD		TDD		TDD	
	Config 1		SR.1.1 FDD		SR.1.1 FDD		SR.1.1 FDD	
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD	_	SR.1.1 TDD	_	SR.1.1 TDD	-
	Config 3		SR2.1 TDD		SR2.1 TDD		SR2.1 TDD	
	Config 1		CR.1.1 FDD	-	CR.1.1 FDD	-	CR.1.1 FDD	
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD		CR.1.1 TDD		CR.1.1 TDD	
	Config 3		CR2.1 TDD		CR2.1 TDD		CR2.1 TDD	
	Config 1		CCR.1. 1 FDD		CCR.1.1 FDD		CCR.1.1 FDD	
Dedicated CORESET Reference Channel	Config 2		CCR.1. 1 TDD	-	CCR.1.1 TDD	_	CCR.1.1 TDD	-
	Config 3		CCR2. 1 TDD		CCR2.1 TDD		CCR2.1 TDD	
OCNG Patterns		OP.1				-		
SS-RSSI-Measurement		Not Applicable						
Time offset with Cell 1	Config 1	ms	-	3	-	3	-	3
THE OHSEL WILL OCH T	Config 2,3	μs	-	3	-	3	-	3

OME		Config 1				SMTC p	attern 2				
SMTC con	figuration	Config 2,3				SMTC p					
SSB confi	guration	Config 1,2				SSB.	l FR1				
336 (01111	guration	Config 3				SSB.2	2 FR1				
PDSCH/PI	ОССН	Config 1,2				15					
subcarrier	spacing	Config 3	kHz			30					
	of PSS to SSS	1. 000									
	of PBCH DMRS of PBCH to PBC										
	of PDCCH DMR										
	of PDCCH to PD		dB	0	0	0	0	0	0		
EPRE ratio	of PDSCH DMR	S to SSS									
EPRE ratio	of PDSCH to PD	SCH (1)									
	EPRE ratio of OCNG DMRS to SSS(Note 1)										
EFRE Tallo	EPRE ratio of OCNG to OCNG DMRS (Note 1) NR_FDD_FR1_A										
	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6							-119	9.5		
		NR_FDD_FR1_B						-11			
Note2	0 "	NR_TDD_FR1_C	ID (4-:	_	•			-118	3.5		
N oc	Config 1,2	NR_FDD_FR1_D	dBm/15kHz	-88		-88		-88 -108.5		-11	8
		NR_TDD_FR1_D NR_FDD_FR1_E						-117.5			
		NR_TDD_FR1_E						-117.5			
		NR_FDD_FR1_G									
		NR_FDD_FR1_H						-116			
News	Config 1,2			-88		-108.5		Same as 15k			
Note2		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/SCS					-116.5			
		NR_FDD_FR1_B	1					-11	6		
		NR_TDD_FR1_C						-115			
	Config 3	NR_FDD_FR1_D		-8	5	-105	5.5	-11	5		
		NR_TDD_FR1_D						ļ			
		NR_FDD_FR1_E NR_TDD_FR1_E						-114	1.5		
		NR_FDD_FR1_E	1					-114	1.5		
		NR_FDD_FR1_H	1					-112			
\hat{E}_s/I_{ot}		<u> 00 </u>	dB	-1.75	-1.75	20	20	-4.0	-4.0		
\hat{E}_s/N_{oc}			dB	-1.7	75	20)	-4.	0		
SS-		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6						-123	3.5		
RSRP	Config 1,2	NR_FDD_FR1_B	dBm/SCS	-89.	.75	-88	.5	-12			
Note3		NR_TDD_FR1_C						-122	2.5		
		NR_FDD_FR1_D NR_TDD_FR1_D					-122				

	1	1	1	T		
		NR_FDD_FR1_E				-121.5
		NR_TDD_FR1_E NR_FDD_FR1_G				-120.5
		NR_FDD_FR1_H				-120.5
		NR_FDD_FR1_A	İ			120
		NR_TDD_FR1_A				-120.5
		NR_FDD_FR1_B	-			-120
		NR_TDD_FR1_C				-119.5
	Config 3	NR_FDD_FR1_D		-86.75	-85.5	-119
		NR_TDD_FR1_D				
		NR_FDD_FR1_E				-118.5
		NR_TDD_FR1_E NR_FDD_FR1_G				117 5
		NR_FDD_FR1_H				-117.5 -117
		NR_FDD_FR1_A				-117
		NR_TDD_FR1_A				
		NR_FDD_FR1_B	dB	-1.75	20	
		NR_TDD_FR1_C				
SS-SINR ^N	lote3	NR_FDD_FR1_D				-4.0
		NR_TDD_FR1_D				
		NR_FDD_FR1_E				
		NR_TDD_FR1_E				
		NR_FDD_FR1_G				
		NR_FDD_FR1_H NR_FDD_FR1_A				
		NR_TDD_FR1_A				-90.09
		NR_FDD_FR1_B	1	-57.83	-60.5	-89.59
		NR_TDD_FR1_C	dBm/			-89.09
	Config 1,2	NR_FDD_FR1_D	9.36MHz			-88.59
		NR_TDD_FR1_D	0.001/11/12			00.00
		NR_FDD_FR1_E				-88.09
		NR_TDD_FR1_E NR_FDD_FR1_G			-	-87.09
		NR_FDD_FR1_H				-86.59
Io ^{Note3}		NR_FDD_FR1_A				00.00
		NR_TDD_FR1_A				-84
		NR_FDD_FR1_B				-83.5
		NR_TDD_FR1_C	dDm/			-83
	Config 3	NR_FDD_FR1_D NR_TDD_FR1_D	dBm/ 38.16MHz	-51.73	-54.41	-82.5
		NR_FDD_FR1_E NR_TDD_FR1_E				-82
		NR_FDD_FR1_G				-81
NR_FDD_FR1_H					A1A/O14	-80.5
	on condition		-		AWGN	
Antenna c	configuration			<u> </u>	1x2	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.

Note 3: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 5: NR operating band groups are as defined in clause 3.5.2.

Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.6.7.3.2.3 Test Requirements

The SS-SINR measurement accuracy shall fulfil the requirements in clause 10.1.14.1.1 and 10.1.14.1.2.

A.6.7.4 L1-RSRP measurement for beam reporting

A.6.7.4.1 SSB based L1-RSRP measurement

A.6.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.5.2 and clause 10.1.19.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.6.7.4.1.1-1.

Table A.6.7.4.1.1-1: Applicable NR configurations for FR1 SSB based L1-RSRP test

	Config	Description
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band

A.6.7.4.1.2 Test parameters

In this set of test cases there one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.7.4.1.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.6.7.4.1.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.6.7.4.1.2-1: FR1 SSB based L1-RSRP test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~3		freq1	freq1
	1		FDD	FDD
Duplex mode	2		TDD	TDD
	3		TDD	TDD
	1		N/A	N/A
TDD Configuration	2		TDDConf.1.1	TDDConf.1.1
	3		TDDConf.2.1	TDDConf.2.1
	1		10: N _{RB,c} = 52	10: N _{RB,c} = 52
BW _{channel}	2	MHz	10: N _{RB,c} = 52	10: N _{RB,c} = 52
	3		40: N _{RB,c} = 106	40: N _{RB,c} = 106
PDSCH Reference	1		SR.1.1 FDD	SR.1.1 FDD
measurement channel	2		SR.1.1 TDD	SR.1.1 TDD
measurement channel	3		SR.2.1 TDD	SR.2.1 TDD
PMCI CORECET Reference	1		CR.1.1 FDD	CR.1.1 FDD
RMSI CORESET Reference Channel	2		CR.1.1 TDD	CR.1.1 TDD
Chamilei	3		CR.2.1 TDD	CR.2.1 TDD
	1		CCR.1.1 FDD	CCR.1.1 FDD

Dadiasts	4 CODECET	2	1	CCD 1 1 TDD	CCD 4 4 TDD
	ed CORESET	2	-	CCR.1.1 TDD	CCR.1.1 TDD
Reference Channel		3		CCR.2.1 TDD	CCR.2.1 TDD
000 6 6		1	<u> </u>	SSB.3 FR1	SSB.3 FR1
SSR con	figuration	2	<u> </u>	SSB.3 FR1	SSB.3 FR1
0010	20110	3		SSB.4 FR1	SSB.4 FR1
OCNG F	atterns	1~3		OP.1	OP.1
Initial BV	VP Configuration	1~3		DLBWP.0.1	DLBWP.0.1
	3			ULBWP.0.1	ULBWP.0.1
		1	ļ	TRS.1.1 FDD	TRS.1.1 FDD
TRS con	figuration	2	ļ	TRS.1.1 TDD	TRS.1.1 TDD
		3		TRS.1.2 TDD	TRS.1.2 TDD
Dedicate	ed BWP configuration	1~3		DLBWP.1.1	DLBWP.1.1
	· ·			ULBWP.1.1	ULBWP.1.1
	onfiguration	1~3		SMTC.1	SMTC.1
	onfigType	1~3		periodic	periodic
reportQu		1~3		ssb-Index-RSRP	ssb-Index-RSRP
	of reported RS	1~3		2	2
	P reporting period	1~3		slot80	slot80
	o of PSS to SSS				
EPRE ratio	o of PBCH DMRS to SSS				
FPRF ratio	o of PBCH to PBCH DMRS o of PDCCH DMRS to SSS				
	o of PDCCH to PDCCH				
DMRS					
EPRE ratio	o of PDSCH DMRS to SSS	1~3	dB	0	0
	o of PDSCH to PDSCH				
DMRS	o of OCNG DMRS to				
SSSNote 1	o of OCNG DIMRS to				
	o of OCNG to OCNG				
DMRS Note					
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-117
	NOTE 5				
	NR_FDD_FR1_B				-116.5
N_{oc}	NR_TDD_FR1_C				-116
Note2	NR_FDD_FR1_D,	1~3	dBm/15kHz	-94.65	-115.5
	NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				-115
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H				-113.5
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A				-117
	NOTE 5				
	NR_FDD_FR1_B				-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,	1,2		-94.65	445.5
	NR_TDD_FR1_D	,			-115.5
	NR_FDD_FR1_E,				445
	NR_TDD_FR1_E		JD (CCD		-115
N_{oc}	NR_FDD_FR1_G		dBm/SSB		-114
Note2	NR_FDD_FR1_H		SCS		-113.5
	NR_FDD_FR1_A,		1		
	NR_TDD_FR1_A				-114
	NOTE 5				
	NR_FDD_FR1_B				-113.5
	NR_TDD_FR1_C	3		-91.65	-114
	NR_FDD_FR1_D,	-			
	NR_TDD_FR1_D				-112.5
	NR_FDD_FR1_E,				4.10
	NR_TDD_FR1_E				-112

	ND EDD ED4 C		1	T	444
	NR_FDD_FR1_G				-111
^ /	NR_FDD_FR1_H				-110.5
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		1~3	dB	10	-3
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-120
	NR_FDD_FR1_B NR_TDD_FR1_C				-119.5 -119
	NR_FDD_FR1_D,	1,2		-84.65	-118.5
	NR_TDD_FR1_D NR_FDD_FR1_E,				-118
	NR_TDD_FR1_E NR_FDD_FR1_G				-116
SSB RSRP	NR_FDD_FR1_H		dBm/SSB		-116.5
Note3	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5		SCS		-117
	NR_FDD_FR1_B NR_TDD_FR1_C				-116.5 -116
	NR_FDD_FR1_D,	3		-81.65	-115.5
	NR_TDD_FR1_D NR_FDD_FR1_E,				
	NR_TDD_FR1_E NR_FDD_FR1_G				-115 -114
	NR FDD FR1 H				-113.5
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-87.28
	NR_FDD_FR1_B			-56.28	-86.78
	NR_TDD_FR1_C		dBm/9.36		-86.28
	NR_FDD_FR1_D, NR_TDD_FR1_D	1,2	MHz		-85.78
	NR_FDD_FR1_E, NR_TDD_FR1_E				-85.28
	NR_FDD_FR1_G				-84.28
lo Note3	NR_FDD_FR1_H				-83.78
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-81.19
	NR_FDD_FR1_B				-80.69
	NR_TDD_FR1_C		dD/00-40		-80.19
	NR_FDD_FR1_D, NR_TDD_FR1_D	3	dBm/38.16 MHz	-50.19	-79.69
	NR_FDD_FR1_E, NR_TDD_FR1_E				-79.19
	NR_FDD_FR1_G				-78.19
	NR_FDD_FR1_H				-77.69
\hat{E}_s/N_{oc}		1~3	dB	10	-3
	tion condition	1~3		AWGN	AWGN
Antenna configuration		1~3		1x2	1x2

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{\ \ ec}$ to be fulfilled.

Note 3: RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4:	RSRP minimum requirements are specified assuming independent interference and noise
	at each receiver antenna port.
Note 5:	The test configuration excludes support for band n51 and it is not required to run this test
	on band n51 in this release of the specification.

A.6.7.4.1.3 Test Requirements

The L1-RSRP measurement accuracy for SSB resource reported by UE in L1-RSRP report (SSB#0 or SSB#1) of Cell 2 shall fulfil the requirements in clauses 10.1.19.1.

A.6.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

A.6.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.5.3 and clause 10.1.19.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.6.7.4.2.1-1.

Table A.6.7.4.2.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

	Config	Description
1		NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, FDD duplex mode
2		NR 15 kHz CSI-RS SCS, 10 MHz bandwidth, TDD duplex mode
3		NR 30kHz CSI-RS SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only r	equired to be tested in one of the supported test configurations in each supported band

A.6.7.4.2.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.6.7.4.2.2-1 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.6.7.4.2.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.6.7.4.2.2-1: FR1 CSI-RS based L1-RSRP test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~3		freq1	freq1
	1		FDD	FDD
Duplex mode	2		TDD	TDD
	3		TDD	TDD
	1		N/A	N/A
TDD Configuration	2		TDDConf.1.1	TDDConf.1.1
	3		TDDConf.2.1	TDDConf.2.1
	1		10: N _{RB,c} = 52	10: N _{RB,c} = 52
BW _{channel}	2	MHz	10: N _{RB,c} = 52	10: N _{RB,c} = 52
	3		40: N _{RB,c} = 106	40: N _{RB,c} = 106
PDSCH Reference	1		SR.1.1 FDD	SR.1.1 FDD
measurement channel	2		SR.1.1 TDD	SR.1.1 TDD
measurement channel	3		SR.2.1 TDD	SR.2.1 TDD
RMSI CORESET Reference	1		CR.1.1 FDD	CR.1.1 FDD
Channel	2]	CR.1.1 TDD	CR.1.1 TDD
Chamie	3		CR.2.1 TDD	CR.2.1 TDD
	1		CCR.1.1 FDD	CCR.1.1 FDD

Dedicated CORESET	2		CCR.1.1 TDD	CCR.1.1 TDD
Reference Channel	3		CCR.2.1 TDD	CCR.1.1 TDD
1.c.o.o.o.o.o.o.o.o.o.o.o.o.o.o.o.o.o.o.	1		SSB.3 FR1	SSB.3 FR1
SSB configuration	2	}	SSB.3 FR1	SSB.3 FR1
COD Corniguration	3		SSB.4 FR1	SSB.4 FR1
OCNG Patterns	1~3		OP.1	OP.1
CONC LAGONO	1		TRS.1.1 FDD	TRS.1.1 FDD
TRS configuration	2		TRS.1.1 TDD	TRS.1.1 TDD
	3		TRS.1.2 TDD	TRS.1.2 TDD
Initial BWP Configuration	1~3		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~3		DLBWP.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
SMTC configuration	1~3		SMTC.1	SMTC.1
SW10 comigaration	1		CSI-RS 1.2 FDD	CSI-RS 1.2 FDD
CSI-RS	2		CSI-RS 1.2 TDD	CSI-RS 1.2 TDD
oor Ke	3		CSI-RS 2.2 TDD	CSI-RS 2.2 FDD
reportConfigType	1~3		periodic	periodic
reportQuantity	1~3		cri-RSRP	cri-RSRP
Number of reported RS	1~3		2	2
L1-RSRP reporting period	1~3		slot80	slot80
EPRE ratio of PSS to SSS			0.0100	0.0100
EPRE ratio of PBCH DMRS to SSS]			
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS			0	
EPRE ratio of PDCCH to PDCCH DMRS		dB		
EPRE ratio of PDSCH DMRS to SSS	1~3			0
EPRE ratio of PDSCH to PDSCH	1 ' 0			
DMRS				
EPRE ratio of OCNG DMRS to SSS ^{Note 1}				
EPRE ratio of OCNG to OCNG DMRS Note 1	-			
NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-117
NR FDD FR1 B				-116.5
N_{oc} NR_TDD_FR1_C	1		-94.65	-116
Note2 NR_FDD_FR1_D, NR_TDD_FR1_D	1~3	dBm/15kHz		-115.5
NR_FDD_FR1_E,	-			-115
NR_TDD_FR1_E NR_FDD_FR1_G	1			_11/
NR_FDD_FR1_H	1			-114 -113.5
 	-			-113.5
NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5				-117
	1			-116.5
NR_FDD_FR1_B NR_TDD_FR1_C	1			-116.5
NR_FDD_FR1_D,	1,2		-94.65	-110
NR_TDD_FR1_D	1,4	4D (CC) -DC	-34.00	-115.5
NR_FDD_FR1_E, Note2 NR_TDD_FR1_E		dBm/CSI-RS SCS		-115
NR FDD FR1 G	1			-114
NR_FDD_FR1_H	†			-113.5
NR_FDD_FR1_A,		1		-
NR_TDD_FR1_A	3		-91.65	-114
NR_FDD_FR1_B	3		-91.00	-113.5
NR_TDD_FR1_C	1			-114

			,	T	1
	NR_FDD_FR1_D,				-112.5
	NR_TDD_FR1_D				_
	NR_FDD_FR1_E, NR_TDD_FR1_E				-112
	NR_FDD_FR1_G				-111
	NR FDD FR1 H				-110.5
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	NIC_LDD_LICI_II	1~3	dB	10	-3
L _s / I _{ot}	ND EDD ED4 A	1~3	uБ	10	-5
	NR_FDD_FR1_A, NR_TDD_FR1_A				-120
	NOTE 5				
	NR_FDD_FR1_B				-119.5
	NR_TDD_FR1_C				-119
	NR_FDD_FR1_D,	1,2		-84.65	-118.5
	NR_TDD_FR1_D				-110.5
	NR_FDD_FR1_E,				-118
	NR_TDD_FR1_E NR_FDD_FR1_G				-117
CSI-RS	NR_FDD_FR1_H		dBm/CSI-RS		-116.5
RSRP	NR_FDD_FR1_A,		SCS		-110.5
Note3	NR_TDD_FR1_A	3	303		-117
	NR FDD FR1 B			-81.65	-116.5
	NR_TDD_FR1_C				-116
	NR_FDD_FR1_D,				-115.5
	NR_TDD_FR1_D				-115.5
	NR_FDD_FR1_E,				-115
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				-114
	NR_FDD_FR1_H NR_FDD_FR1_A,				-113.5
	NR_TDD_FR1_A				-87.28
	NOTE 5	-	dBm/9.36 MHz	-56.28	07.20
	NR_FDD_FR1_B				-86.78
	NR_TDD_FR1_C				-86.28
	NR_FDD_FR1_D,	1,2			-85.78
	NR_TDD_FR1_D				00.70
	NR_FDD_FR1_E,				-85.28
	NR_TDD_FR1_E				04.00
	NR_FDD_FR1_G NR_FDD_FR1_H				-84.28 -83.78
lo Note3	NR_FDD_FR1_A,				-03.70
	NR_TDD_FR1_A				-81.19
	NOTE 5				
	NR_FDD_FR1_B				-80.69
	NR_TDD_FR1_C		dBm/38.16		-80.19
	NR_FDD_FR1_D,	3	MHz	-50.19	-79.69
	NR_TDD_FR1_D	-			. 5.55
	NR_FDD_FR1_E, NR_TDD_FR1_E				-79.19
	NR_FDD_FR1_G				-78.19
	NR FDD FR1 H				-77.69
\hat{E}_s/N_{oc}			dB	10	-3
	ion condition	1~3 1~3		AWGN	AWGN
	configuration	1~3		1x2	1x2
	•			•	

transmitted power spectral density is achieved for all OFDM symbols. Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3:	RSRP and lo levels have been derived from other parameters for information purposes.
	They are not settable parameters themselves.
Note 4:	RSRP minimum requirements are specified assuming independent interference and noise
	at each receiver antenna port.
Note 5:	The test configuration excludes support for band n51 and it is not required to run this test
	on band n51 in this release of the specification.

A.6.7.4.2.3 Test Requirements

The L1-RSRP measurement accuracy for CSI-RS resource reported by UE in L1-RSRP report (CSI-RS#0 or CSI-RS#1) of Cell 1 shall fulfil the requirements in clause 10.1.19.2.

A.6.7.5 E-UTRAN RSRP

A.6.7.5.1 SA: inter-RAT measurement accuracy with FR1 serving cell

A.6.7.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.2.2 for SA inter-RAT E-UTRAN RSRP measurements.

A.6.7.5.1.2 Test parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an E-UTRAN inter-RAT neighbour cell. Supported test configurations are shown in table A.6.7.5.1.2-1. The measurement accuracy of SA inter-RAT E-UTRAN RSRP are tested by using the parameters in A.6.7.5.1.2-2 and A.6.7.5.1.2-3.

Table A.6.7.5.1.2-1: Inter-RAT E-UTRAN RSRP supported test configurations with FR1 serving cell

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
Note: The UE is	only required to be tested in one of the supported test configurations

Table A.6.7.5.1.2-2: NR Cell specific test parameters for SA Inter-RAT E-UTRAN RSRP test parameters

Parameter		Unit	Cell 1
NR RF channel number			1
Duplex mode	Config 1, 4		FDD
Duplex filode	Config 2, 3, 5, 6		TDD
	Config 1, 4		N/A
TDD Configuration	Config 2, 5		TDDConf.1.1
_	Config 3, 6		TDDConf.2.1
	Config 1, 4		10: N _{RB,c} = 52 (FDD)
BW _{channel}	Config 2, 5	MHz	10: N _{RB,c} = 52 (TDD)
	Config 3, 6		40: N _{RB,c} = 106 (TDD)
Gap pattern Id			0
PDSCH reference measurement	Config 1, 4		SR.1.1 FDD
channel	Config 2, 5		SR.1.1 TDD
Channel	Config 3, 6		SR.2.1 TDD
RMSI CORSET reference channel	Config 1, 4		CR.1.1 FDD
RIVISI CORSE I Telefence channel	Config 2, 5		CR.1.1 TDD

	Config 3, 6	1	CR.2.1 TDD
Config 5, 6 Config 1, 4			CCR.1.1 FDD
Dedicated CORSET reference	Config 1, 4	-	CCR.1.1 TDD
channel	Config 3, 6	-	CCR.2.1 TDD
CSI-RS for tracking			TRS.1.1 FDD
CSI-RS for tracking	Config 1, 4	-	
	Config 2, 5	-	TRS.1.1 TDD
	Config 3, 6 Initial DL BWP		TRS.1.2 TDD DLBWP.0.1
BWP configurations	Dedicated DL BWP		DLBWP.1.1
	Initial UL BWP		ULBWP.0.1
No.	Dedicated UL BWP		ULBWP.1.1
OCNG pattern ^{Note1}			OP.1
SMTC configuration	T =		SMTC.1
SSB configuration	Config 1, 2, 4, 5		SSB.1 FR1
	Config 3, 6		SSB.2 FR1
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH_DMRS to SSS			
EPRE ratio of PBCH to PBCH_DMR	S		
EPRE ratio of PDCCH_DMRS to SS	<u>S</u>		
EPRE ratio of PDCCH to PDCCH_D	MRS	dB	0
EPRE ratio of PDSCH_DMRS to SS	S		
EPRE ratio of PDSCH to PDSCH_DI	MRS		
EPRE ratio of OCNG DMRS to SSS			
EPRE ratio of OCNG to OCNG DMR	S		
N _{oc} Note2		dBm/15 kHz	-104
N _{oc} Note2	Config 1, 2, 4, 5	-ID/CCC	-104
Nochote	Config 3, 6	dBm/SCS	-101
Ê _s /N _{oc}		dB	17
Ês/lot ^{Note3}		dB	17
	Config 1, 2, 4, 5	ID (000	-87
SS-RSRP ^{Note3}	Config 3, 6	dBm/SCS	-84
OOD DDNote2	Config 1, 2, 4, 5	JD (000	-87
SSB_RP ^{Note3}	Config 3, 6	dBm/SCS	-84
L Note2	Config 1, 2, 4, 5	dBm/9.36 MHz	-58.96
Io ^{Note3}	Config 3, 6	dBm/38.16 MHz	-52.87
Propagation condition	··· g -, -		AWGN
Antenna Configuration and Correlation	on Matrix		1x2
Note 1: OCNG shall be used such		illy allocated and a c	

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{cc} to be

Note 3: \hat{E}_s/I_{ot} , SS-RSRP, SSB_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.7.5.1.2-3: E-UTRAN Cell specific test parameters for SA Inter-RAT E-UTRAN RSRP test parameters

Parameter		Unit	Cell 2		
			Test 1	Test 2	
E-UTRA RF channel number	er		1		
Duplex mode	Config 1, 2, 3		FDD		
	Config 4, 5, 6		TDD		
TDD special subframe	Config 1, 2, 3		N/A		
configuration ^{Note1}	Config 4, 5, 6		3		
TDD uplink-downlink	Config 1, 2, 3		N/A		
configuration ^{Note1}	Config 4, 5, 6		1		
BWchannel		MHz	5 MHz: N	RB.c = 25	

			40 MHz.	J 50
			10 MHz: ľ 20 MHz: N	
PDSCH parameters:			20 1911 12. 19	
DL Reference Measureme				
PCFICH/PDCCH/PHICH	Config 1, 2, 3		5 MHz: R	
1 .	parameters:		10 MHz:	
DL Reference			20 MHz: F	
Measurement Channel ^{Note2}	Config 4, 5, 6		5 MHz: R 10 MHz:	
Gharmer			20 MHz: F	
OCNG Patterns ^{Note2}	Config 1, 2, 3		5 MHz: O	
			10 MHz: (
			20 MHz: C	
	Config 4, 5, 6		5 MHz: O	
			10 MHz: (20 MHz: (
PBCH_RA			20 1011 12.	0 100
PBCH_RB				
PSS_RA				
SSS_RA				
PCFICH_RB				
PHICH_RA				
PHICH_RB		dB	()
PDCCH_RA PDCCH_RB				
PDSCH_RA		•		
PDSCH_RB				
OCNG_RA ^{Note3}				
OCNG_RB ^{Note3}				
	Bands FDD_A Note 9, TDD_A			-117
	Bands FDD_B1, FDD_B2 Note 10			-116.5
N _{oc} Note4	Bands FDD_C, TDD_C	JD /451.11-	04.05	-116
Noc. 1845	Bands FDD_D	dBm/15kHz	-91.65	-115.5
	Bands FDD_E, FDD_F			-115
	Note 7, TDD_E			
	Bands FDD_G Note 8 Bands FDD H			-114 -113.5
Ê _s /N _{oc}	Danus FDD_H	dB	10	-113.5 -4
Ê _s /I _{ot} Note5		dB	10	-4
	Bands FDD_A Note 9, TDD_A			-121
	Bands FDD_B1, FDD_B2 Note 10			-120.5
RSRP ^{Note5}	Bands FDD_C, TDD_C	dBm/15kHz	-81.65	-120
1.0111	Bands FDD_D	GDIII, IORI IZ	01.00	-119.5
	Bands FDD_E, FDD_F Note 7, TDD_E			-119
	Bands FDD_G Note 8			-118
	Bands FDD_H			-117.5
	Bands FDD_A Note 9, TDD_A			-121
	Bands FDD_B1, FDD_B2 Note 10			-120.5
SCH_RP ^{Note5}	Bands FDD_C, TDD_C	dBm/15kHz	-81.65	-120
	Bands FDD_D			-119.5
	Bands FDD_E, FDD_F Note 7, TDD_E			-119
	Bands FDD_G Note 8			-118

	Bands FDD_H			-117.5
IO ^{Note5}	Bands FDD_A Note 9, TDD_A Bands FDD_B1, FDD_B2 Note 10 Bands FDD_C, TDD_C Bands FDD_D Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E Bands FDD_G Note 8 Bands FDD_H	dBm/Ch BW	-53.45 + 10log(N _{RB,⊄} /50)	-87.76 + 10log(N _{RB,c} /50) -87.26 + 10log(N _{RB,c} /50) -86.76 + 10log(N _{RB,c} /50) -86.26 + 10log(N _{RB,c} /50) -85.76 + 10log(N _{RB,c} /50) -84.76 + 10log(N _{RB,c} /50) -84.76 + 10log(N _{RB,c} /50)
Propagation Condition			AW	• • • • • • • • • • • • • • • • • • • •
Antenna Configuration and	Correlation Matrix		1x2	

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.
- Note 5: \hat{E}_s/I_{ot} , RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 6: E-UTRA operating band groups are as defined in clause 3.5 of TS 36.133 [15].
- Note 7: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.
- Note 8: Except Band 29.
- Note 9: Except Band 32, Band 75 and Band 76.
- Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

A.6.7.5.1.3 Test Requirements

The SA inter-RAT E-UTRAN RSRP measurement accuracy for cell 2 shall fulfil absolute requirement in clause 10.2.2.

A.6.7.6 E-UTRAN RSRQ

A.6.7.6.1 SA: inter-RAT measurement accuracy with FR1 serving cell

A.6.7.6.1.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.2.3 for SA inter-RAT E-UTRAN RSRQ measurements.

A.6.7.6.1.2 Test parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an E-UTRAN inter-RAT neighbour cell. Supported test configurations are shown in table A.6.7.6.1.2-1. The measurement accuracy of SA inter-RAT E-UTRAN RSRQ are tested by using the parameters in A.6.7.6.1.2-2 and A.6.7.6.1.2-3.

Table A.6.7.6.1.2-1: Inter-RAT E-UTRAN RSRQ supported test configurations with FR1 serving cell

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN FDD

4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
Note:	The UE is only required to be tested in one of the supported test configurations

Table A.6.7.6.1.2-2: NR Cell specific test parameters for SA Inter-RAT E-UTRAN RSRQ test parameters

Parameter		Unit Cell 1	
NR RF channel number			1
Duplex mode Config 1, 4			FDD
Duplex mode	Config 2, 3, 5, 6		TDD
	Config 1, 4		N/A
TDD Configuration	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.1.2
	Config 1, 4		10: N _{RB,c} = 52 (FDD)
BWchannel	Config 2, 5	MHz	10: N _{RB,c} = 52 (TDD)
	Config 3, 6		40: N _{RB,c} = 106 (TDD)
Gap pattern Id	_		0
PDSCH reference measurement	Config 1, 4		SR.1.1 FDD
channel	Config 2, 5		SR.1.1 TDD
Charlie	Config 3, 6		SR.2.1 TDD
	Config 1, 4		CR.1.1 FDD
RMSI CORSET reference channel	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
Dedicated CORSET reference	Config 1, 4		CCR.1.1 FDD
channel	Config 2, 5		CCR.1.1 TDD
	Config 3, 6		CCR.2.1 TDD
CSI-RS for tracking	Config 1, 4		TRS.1.1 FDD
	Config 2, 5		TRS.1.1 TDD
	Config 3, 6		TRS.1.2 TDD
	Initial DL BWP		DLBWP.0.1
BWP configurations	Dedicated DL BWP		DLBWP.1.1
BVVP Cornigurations	Initial UL BWP		ULBWP.0.1
	Dedicated UL BWP		ULBWP.1.1
OCNG pattern ^{Note1}			OP.1
SMTC configuration			SMTC.1
SSB configuration	Config 1, 2, 4, 5		SSB.1 FR1
33B Corniguration	Config 3, 6		SSB.2 FR1
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH_DMRS to SSS			
EPRE ratio of PBCH to PBCH_DMR	S		
EPRE ratio of PDCCH_DMRS to SS			
EPRE ratio of PDCCH to PDCCH_D	MRS	dB	0
EPRE ratio of PDSCH_DMRS to SS	S		
EPRE ratio of PDSCH to PDSCH_DI	MRS		
EPRE ratio of OCNG DMRS to SSS			
EPRE ratio of OCNG to OCNG DMRS			
N _{oc} Note2		dBm/15 kHz	-104
N _{oc} Note2	Config 1, 2, 4, 5	dBm/SCS	-104
I VOC	Config 3, 6	ubiii/303	-101
Ê _s /N _{oc}		dB	17
Ë _s /I _{ot} ^{Note3}	Ê _s /I _{ot} Note3		17
SS-RSRQ ^{Note3}	Config 1, 2, 4, 5	dBm/SCS	-87
	Config 3, 6	ubili/303	-84
	Config 3, 6 Config 1, 2, 4, 5		-84 -87
SSB_RP ^{Note3}	Config 3, 6	dBm/SCS - dBm/9.36 MHz	

		Config 3, 6	dBm/38.16 MHz	-52.87
Propagation condition			AWGN	
Antenna	Configuration and Correlation	n Matrix		1x2
Note 1:	OCNG shall be used such spectral density is achieve			constant total transmitted power
Note 2:				
Note 3:	fulfilled. Ê _s /l _{ot} , SS-RSRQ, SSB_RP purposes. They are not se			ther parameters for information

Table A.6.7.6.1.2-3: E-UTRAN Cell specific test parameters for SA Inter-RAT E-UTRAN RSRQ test parameters

Parameter		Unit	Cell 2		
			Test 1	Test 2	Test 3
E-UTRA RF channel numb	E-UTRA RF channel number		1		
Duplex mode	Config 1, 2, 3		FDD		
	Config 4, 5, 6	Ţ [TDD	
TDD special subframe	Config 1, 2, 3			N/A	
configuration ^{Note1}	Config 4, 5, 6	1		6	
TDD uplink-downlink	Config 1, 2, 3			N/A	
configuration ^{Note1}	Config 4, 5, 6	1		1	
BW _{channel}	 	MHz		5 MHz: N _{RB,c} = 25	5
			1	10 MHz: N _{RB,c} = 5	0
			2	0 MHz: N _{RB,c} = 10	00
PDSCH parameters:				-	
DL Reference Measureme	nt Channel ^{Note2}				
PCFICH/PDCCH/PHICH	Config 1, 2, 3			5 MHz: R.11 FD)
parameters:				10 MHz: R.6 FDE)
DL Reference			2	20 MHz: R.10 FD	D
Measurement	Config 4, 5, 6			5 MHz: R.11 TDE)
Channel ^{Note2}				10 MHz: R.6 TDE)
			2	20 MHz: R.10 TD	D
OCNG Patterns ^{Note2}	Config 1, 2, 3		5	MHz: OP.19 FD	D
				10 MHz: OP.6 FD	
			20 MHz: OP.14 FDD)D
	Config 4, 5, 6		5 MHz: OP.10 TDD		
			10 MHz: OP.2 TDD		
			2	20 MHz: OP.8 TD	D
PBCH_RA		<u> </u>			
PBCH_RB		_			
PSS_RA		_			
SSS_RA		_			
PCFICH_RB		<u> </u>			
PHICH_RA		<u> </u>			
PHICH_RB		dB	0		
PDCCH_RA		_			
PDCCH_RB		_			
PDSCH_RA		_			
PDSCH_RB		<u> </u>			
OCNG_RANote3		<u> </u>			
OCNG_RB ^{Note3}	T			T.	ı
	Bands FDD_A Note 9,				-119.5
	TDD_A	<u> </u>			
N _{oc} Note4	Bands FDD_B1,	dBm/15kHz	-83	-104.70	-119
	FDD_B2 Note 10		33	101.70	
	Bands FDD_C, TDD_C				-118.5
Bands FDD_D			-118		

	Dondo EDD E EDD E				I
	Bands FDD_E, FDD_F Note 7, TDD_E				-117.5
	Bands FDD_G Note 8				-116.5
Δ	Bands FDD_H				-116
Ê _s /N _{oc}		dB	-1.75	-4.0	-4.0
Ê _s /I _{ot} Note5	Bands FDD_A Note 9,	dB	-1.75	-4.0	-4.0
	TDD_A				-123.5
	Bands FDD_B1, FDD_B2 Note 10				-123
RSRP ^{Note5}	Bands FDD_C, TDD_C Bands FDD_D	dBm/15kHz	-84.75	-108.70	-122.5 -122
	Bands FDD_E, FDD_F Note 7, TDD_E				-121.5
	Bands FDD_G Note 8				-120.5
	Bands FDD_H				-120
	Bands FDD_A Note 9, TDD_A				
	Bands FDD_B1, FDD_B2 Note 10				
RSRQ ^{Note5}	Bands FDD_C, TDD_C	dB	-14.76	-16.25	-16.25
	Bands FDD_D Bands FDD_E, FDD_F Note 7, TDD_E			10.20	
	Bands FDD_G Note 8 Bands FDD_H				
	Bands FDD_A Note 9, TDD_A				-90.26 + 10log(N _{RB,c} /50)
	Bands FDD_B1, FDD_B2 Note 10				-89.76 + 10log(N _{RB,c} /50)
	Bands FDD_C, TDD_C				-89.26 + 10log(N _{RB,c} /50)
Io ^{Note5}	Bands FDD_D	dBm/Ch BW	-53 + 10log(N _{RB,c} /50)	-75.46 + 10log(N _{RB,c} /50)	-88.76 + 10log(N _{RB,c} /50)
	Bands FDD_E, FDD_F Note 7, TDD_E				-88.26 + 10log(N _{RB,c} /50)
	Bands FDD_G Note 8				-87.26 + 10log(N _{RB,c} /50)
	Bands FDD_H				-86.76 + 10log(N _{RB,c} /50)
Propagation Condition	l			AWGN	- /
Antenna Configuration ar	nd Correlation Matrix			1x2	

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 5: \hat{E}_s/I_{ot} , RSRP, RSRQ and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 6: E-UTRA operating band groups are as defined in clause 3.5 of TS 36.133 [15].

Note 7: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.

Note 8: Except Band 29.

Note 9: Except Band 32, Band 75 and Band 76.

Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

A.6.7.6.1.3 Test Requirements

The SA inter-RAT E-UTRAN RSRQ measurement accuracy for cell 2 shall fulfil absolute requirement in clause 10.2.3.

A.6.7.7 E-UTRAN RS-SINR

A.6.7.7.1 SA: inter-RAT measurement accuracy with FR1 serving cell

A.6.7.7.1.1 Test Purpose and Environment

The purpose of this test is to verify that the E-UTRAN RS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.2.4 for SA inter-RAT E-UTRAN RS-SINR measurements.

A.6.7.7.1.2 Test parameters

In each test there are two cells: Cell 1 and Cell 2. Cell 1 is the NR PCell and Cell 2 is an E-UTRAN inter-RAT neighbour cell. Supported test configurations are shown in table A.6.7.7.1.2-1. The measurement accuracy of SA inter-RAT E-UTRAN RS-SINR are tested by using the parameters in A.6.7.7.1.2-2 and A.6.7.7.1.2-3.

Table A.6.7.7.1.2-1: Inter-RAT E-UTRAN RS-SINR supported test configurations with FR1 serving cell

Configuration	Description
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN FDD
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN FDD
4	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, E-UTRAN TDD
5	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
6	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, E-UTRAN TDD
Note: The UE is	s only required to be tested in one of the supported test configurations

Table A.6.7.7.1.2-2: NR Cell specific test parameters for SA Inter-RAT E-UTRAN RS-SINR test parameters

Parameter		Unit	Cell 1
NR RF channel number			1
Duplex mode	Config 1, 4		FDD
Duplex filode	Config 2, 3, 5, 6		TDD
	Config 1, 4		N/A
TDD Configuration	Config 2, 5		TDDConf.1.1
	Config 3, 6		TDDConf.2.1
	Config 1, 4		10: N _{RB,c} = 52 (FDD)
BW _{channel}	Config 2, 5	MHz	10: N _{RB,c} = 52 (TDD)
	Config 3, 6		40: N _{RB,c} = 106 (TDD)
Gap pattern Id			0
PDSCH reference measurement	Config 1, 4		SR.1.1 FDD
channel	Config 2, 5		SR.1.1 TDD
Channel	Config 3, 6		SR.2.1 TDD
	Config 1, 4		CR.1.1 FDD
RMSI CORSET reference channel	Config 2, 5		CR.1.1 TDD
	Config 3, 6		CR.2.1 TDD
	Config 1, 4		CCR.1.1 FDD

Dedicated CORSET reference	Config 2, 5		CCR.1.1 TDD
channel	Config 3, 6	=	CCR.2.1 TDD
CSI-RS for tracking	Config 1, 4		TRS.1.1 FDD
3	Config 2, 5		TRS.1.1 TDD
	Config 3, 6	=	TRS.1.2 TDD
	Initial DL BWP		DLBWP.0.1
	Dedicated DL BWP		DLBWP.1.1
BWP configurations	Initial UL BWP		ULBWP.0.1
	Dedicated UL BWP		ULBWP.1.1
OCNG pattern ^{Note1}			OP.1
SMTC configuration			SMTC.1
<u>-</u>	Config 1, 2, 4, 5		SSB.1 FR1
SSB configuration	Config 3, 6		SSB.2 FR1
EPRE ratio of PSS to SSS	,		
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH_DMR	S		
EPRE ratio of PDCCH_DMRS to SS			
EPRE ratio of PDCCH to PDCCH_D		dB	0
EPRE ratio of PDSCH_DMRS to SS	S		
EPRE ratio of PDSCH to PDSCH_DI	MRS		
EPRE ratio of OCNG DMRS to SSS			
EPRE ratio of OCNG to OCNG DMR	:S		
N _{oc} Note2		dBm/15 kHz	-104
NocNote2	Config 1, 2, 4, 5	dDm/CCC	-104
Noc	Config 3, 6	dBm/SCS	-101
Ê _s /N _{oc}		dB	17
Ê _s /I _{ot} Note3		dB	17
SS-RS-SINR ^{Note3}	Config 1, 2, 4, 5	dBm/SCS	-87
33-R3-3IINK*****	Config 3, 6	ubiii/SCS	-84
SSB_RP ^{Note3}	Config 1, 2, 4, 5	dBm/SCS	-87
33B_KF ****	Config 3, 6	ubiii/303	-84
Io ^{Note3}	Config 1, 2, 4, 5	dBm/9.36 MHz	-58.96
	Config 3, 6	dBm/38.16 MHz	-52.87
Propagation condition			AWGN
A - (O C C O	on Matrix		1x2
Antenna Configuration and Correlation Note 1: OCNG shall be used such			constant total transmitted power

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{cc} to be

Note 3: \hat{E}_s/I_{ot} , SS-RS-SINR, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.6.7.7.1.2-3: E-UTRAN Cell specific test parameters for SA Inter-RAT E-UTRAN RS-SINR test parameters

Param	Unit		Cell 2			
			Test 1	Test 2	Test 3	
E-UTRA RF channel number	er			1		
Duplex mode	Config 1, 2, 3			FDD		
	Config 4, 5, 6					
TDD special subframe	Config 1, 2, 3		N/A			
configuration ^{Note1}	Config 4, 5, 6		6			
TDD uplink-downlink	Config 1, 2, 3			N/A		
configuration ^{Note1} Config 4, 5, 6			1			
BW _{channel}		MHz		5 MHz: N _{RB,c} = 25	5	
				10 MHz: N _{RB,c} = 5	0	
			2	$20 \text{ MHz: } N_{RB,c} = 10$	00	

- BBOOLL		1				
PDSCH parameters:	ot ChannalNote?			-		
DL Reference Measuremen				C MUL. D 44 EDS	<u> </u>	
PCFICH/PDCCH/PHICH	Config 1, 2, 3			5 MHz: R.11 FDE		
parameters:			10 MHz: R.6 FDD			
DL Reference	0 " 1 5 0	+		20 MHz: R.10 FD		
Measurement	Config 4, 5, 6			5 MHz: R.11 TDE		
Channel ^{Note2}				10 MHz: R.6 TDE		
				20 MHz: R.10 TD		
OCNG Patterns ^{Note2}	Config 1, 2, 3			MHz: OP.19 FD		
				0 MHz: OP.6 FD		
		<u> </u>		0 MHz: OP.14 FC		
	Config 4, 5, 6			MHz: OP.10 TD		
				0 MHz: OP.2 TD		
			2	20 MHz: OP.8 TD	D	
PBCH_RA		<u> </u>				
PBCH_RB						
PSS_RA		<u> </u>				
SSS_RA		<u> </u>				
PCFICH_RB		1				
PHICH_RA		<u> </u>				
PHICH_RB		dB		0		
PDCCH_RA		1				
PDCCH_RB]				
PDSCH_RA						
PDSCH_RB						
OCNG RA ^{Note3}		†				
OCNG_RB ^{Note3}		†				
	Bands FDD_A Note 9,					
	TDD_A				-119.5	
	Bands FDD_B1,	dBm/15kHz	-88			
	FDD_B2 Note 10				-119	
an Nova	Bands FDD_C, TDD_C				-118.5	
N _{oc} Note4	Bands FDD_D			-108.50	-118	
	Bands FDD_E, FDD_F					
	Note 7, TDD_E				-117.5	
	Bands FDD_G Note 8	†			-116.5	
	Bands FDD_H	†			-116	
CRS Ê _s /N _{oc1}	Bande i BB_ii	dB	-1.75	20.0	-4.0	
CRS Ê _s /I _{ot} Note5		dB	-1.75	20.0	-4.0	
	Bands FDD_A Note 9,		3			
	TDD_A				-123.5	
	Bands FDD_B1,	†				
	FDD_B2 Note 10				-123	
New 5	Bands FDD_C, TDD_C	†			-122.5	
RSRP ^{Note5}	Bands FDD_D	dBm/15kHz	-89.75	-88.50	-122	
	Bands FDD_E, FDD_F	†				
	Note 7, TDD_E				-121.5	
	Bands FDD_G Note 8	†			-120.5	
	Bands FDD_H	†			-120.3	
	Bands FDD_A Note 9,				120	
	TDD_A					
	Bands FDD_B1,	†				
	FDD_B2 Note 10					
	Bands FDD_C, TDD_C	†				
RS-SINR ^{Note5}	Bands FDD_C, TDD_C	dB	-1.75	20	-4.0	
	Bands FDD_E, FDD_F	1				
	Note 7, TDD_E					
	Bands FDD_G Note 8	1				
		1				
	Bands FDD_H					

Io ^{Note5}	Bands FDD_A Note 9, TDD_A		-53.79 + 10log(N _{RB,c} /50)		-93.48 + 10log(N _{RB,c} /50)		
	Bands FDD_B1, FDD_B2 Note 10			-60.56 + 10log(N _{RB,c} /50)	-92.98 + 10log(N _{RB,c} /50)		
	Bands FDD_C, TDD_C				-92.48 + 10log(N _{RB,c} /50)		
	Bands FDD_D	dBm/Ch BW			-91.98 + 10log(N _{RB,c} /50)		
	Bands FDD_E, FDD_F				-91.48 + 10log(N _{RB,c} /50)		
	Bands FDD_G Note 8				-90.48 + 10log(N _{RB,c} /50)		
	Bands FDD_H				-89.98 + 10log(N _{RB,c} /50)		
Propagation Condition			AWGN				
Antenna Configuration and	Correlation Matrix			1x2			

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over CRS subcarriers and time and shall be modelled as AWGN of appropriate power for Noc1 to be fulfilled.
- Note 4a: Void.
- Note 5: CRS \hat{E}_s/I_{ot} , RSRP, RS-SINR and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 6: E-UTRA operating band groups are as defined in clause 3.5 of TS 36.133 [15].
- Note 7: For Band 26, the tests shall be performed with the carrier frequency of assigned E-UTRA channel bandwidth within 865-894 MHz.
- Note 8: Except Band 29.
- Note 9: Except Band 32, Band 75 and Band 76.
- Note 10: For Band 74, the tests shall be performed with the carrier frequency of the assigned E-UTRA channel bandwidth within 1475.9-1510.9 MHz.

A.6.7.7.1.3 Test Requirements

The SA inter-RAT E-UTRAN RS-SINR measurement accuracy for cell 2 shall fulfil absolute requirement in clause 10.2.4.

A.7 NR standalone tests with one or more NR cells in FR2

A.7.1 SA: RRC_IDLE state mobility

A.7.1.1 Cell re-selection to NR

A.7.1.1.1 Cell reselection to FR2 intra-frequency NR case

A.7.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the intra frequency NR cell reselection requirements specified in clause 4.2.2.3.

A.7.1.1.2 Test Parameters

The test scenario comprises of 1 NR carrier and 2 cells as given in tables A.7.1.1.1.2-1, A.7.1.1.1.2-2 and A.7.1.1.1.2-3. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. Only cell 1 is already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.7.1.1.2-1: Supported test configurations

Co	onfiguration	Description			
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note:	The UE is only required to be tested in one of the supported test configurations.				

Table A.7.1.1.1.2-2: General test parameters for intra frequency NR cell re-selection test case

	Parameter		Test configuration	Value	Comment
Initial condition	Active cell		1, 2	Cell1	
T2 end	Active cell		1, 2	Cell2	
condition	Neighbour cells		1, 2	Cell1	
Final	Active cell		1, 2	Cell1	
condition	Neighbour cell		1, 2	Cell2	
RF Channe	el Number		1, 2	1	
Time offset	t between cells		1, 2	3 μs	Synchronous cells
Access Ba	rring Information	-	1, 2	Not Sent	No additional delays in random access procedure.
SMTC con	figuration		1, 2	SMTC.1	
DRX cycle	length	S	1, 2	1.28	The value shall be used for all cells in the test.
PRACH co	nfiguration index		1, 2	190	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBe	estCell		1, 2	Not configured	
T1		S	1, 2	>7	During T1, Cell 2 shall be powered off, and during the off time the physical cell identity shall be changed, The intention is to ensure that Cell 2 has not been detected by the UE prior to the start of period T2

T2	S	1, 2	135	T2 needs to be defined so that cell re- selection reaction time is taken into account.
ТЗ	S	1, 2	35	T3 needs to be defined so that cell re- selection reaction time is taken into account.

Table A.7.1.1.2-3: Cell specific test parameters for intra frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test	Cell 1				Cell 2		
		configuration	T1	T2	Т3	T1	T2 T3		
TDD configuration		1, 2		DDConf.3.		TDDConf.3.1			
PDSCH RMC		1		SR.3.1 TDI		SR.3.1 TDD			
configuration		2	,	SR.3.1 TDI)	,	SR.3.1 TDI)	
RMSI CORESET		1	(CR.3.1 TDI)	(CR.3.1 TDI)	
RMC configuration		2	(CR.3.1 TDI)	(CR.3.1 TDI)	
Dedicated CORESET		1	C	CR.3.1 TD	D		CR.3.1 TD		
RMC configuration		2		CR.3.1 TD			CR.3.1 TD		
SSB configuration		1		SSB.3 FR2	2		SSB.7 FR2	-	
		2		SSB.4 FR2	2		SSB.8 FR2	<u> </u>	
OCNG Pattern		1, 2		OP.4			OP.4		
BW _{channel}	MHz	1, 2	10	00: N _{RB,c} =	66	10	$00: N_{RB,c} =$	66	
Data RBs allocated		1, 2		66			66		
Initial DL BWP		1, 2		DLBWP.0.	1		DLBWP.0.		
configuration									
Initial UL BWP		1, 2		ULBWP.0.	1		ULBWP.0.		
configuration									
RLM-RS		1, 2		SSB			SSB		
Qrxlevmin	dBm/SCS	1		-138		-138			
		2		-135		-135			
Pcompensation	dB	1, 2		0		0			
Qhysts	dB	1, 2		0		0			
Qoffset _{s, n}	dB	1, 2		0		0			
Cell_selection_and_ reselection_quality_m easurement		1, 2		SS-RSRP		SS-RSRP			
AoA setup		1, 2	Setup 1	defined in	A.3.15.1	Setup 1	tup 1 defined in A.3.15.1		
Beam assumption ^{Note}		1,2		Rough		Rough			
$\hat{E}_{\scriptscriptstyle S}/I_{ot~{ m BB}}$ Note 5	dB	1	7.45	-3.55	0.95	-infinity	0.95	-3.55	
5. Gt 22		2							
N_{oc} Note2	dBm/SCS	1				93			
		2			-(90			
N_{oc} Note2	dBm/15 kHz	1	-102						
		2						1	
Ê s / N oc	dB	1	8 -3 1.5		-infinity	1.5	-3		
		2							
SS-RSRP Note3	dBm/SCS	1	-85 -96 -91.5 -infinity -91.5			-96			
		2			-88.5	-93			
Io on SSB symbols of	dBm/95.04 MHz	1	-60.53	-67.40	-65.34	-69.17	-65.34	-67.40	
each cell		2	-57.52	-64.39	-62.33	-66.16	-62.33	-64.39	
Treselection	S	1, 2	0	0	0	0	0	0	
SintrasearchP	dB	1, 2		50]	50		

Propaga	tion		1, 2	AWGN			
Condition	1		·				
Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.							
Note 2:	,						
Note 3:	subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled. state 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable						
Note 4:	parameters themselves. 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation						
Note 5:	I e e e e e e e e e e e e e e e e e e e						

A.7.1.1.3 Test Requirements

The cell reselection delay to a newly detectable cell is defined as the time from the beginning of time period T2, to the moment when the UE camps on Cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on Cell 2

The cell re-selection delay to a newly detectable cell shall be less than 130 s.

The cell reselection delay to an already detected cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on cell 1

The cell re-selection delay to an already detected cell shall be less than 27 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a newly detectable cell can be expressed as: $T_{\text{detect, NR_Intra}} + T_{\text{SI-NR}}$, and to an already detected cell can be expressed as: $T_{\text{evaluate, NR_intra}} + T_{\text{SI-NR}}$,

Where:

 $T_{\text{detect, NR_Intra}} \hspace{1.5cm} \text{See Table 4.2.2.3-1 in clause 4.2.2.3} \\ T_{\text{evaluate, NR_intra}} \hspace{1.5cm} \text{See Table 4.2.2.3-1 in clause 4.2.2.3} \\$

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 129.28 s, allow 130 s for the cell re-selection delay to a newly detectable cell and 26.88 s for the cell re-selection delay to an already detected cell in the test case, which we allow 27 s.

A.7.1.1.2 Cell reselection to FR2 inter-frequency NR case

A.7.1.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the inter frequency NR cell reselection requirements specified in clause 4.2.2.4.

A.7.1.1.2.2 Test Parameters

The test scenario comprises of 2 cells on 2 different NR carriers respectively as given in tables A.7.1.1.2.2-1, A.7.1.1.2.2-2 and A.7.1.1.2.2-3. The test consists of three successive time periods, with time duration of T1, T2, and

T3 respectively. Both cell 1 and cell 2 are already identified by the UE prior to the start of the test. Cell 1 and cell 2 belong to different tracking areas and cell 2 is of higher priority than cell 1. Furthermore, UE has not registered with network for the tracking area containing cell 2.

Table A.7.1.1.2.2-1: Supported test configurations

Configuration	Description for serving cell	Description for target cell				
1	120 kHz SSB SCS, 100 MHz bandwidth,	120 kHz SSB SCS, 100 MHz bandwidth, TDD				
	TDD duplex mode	duplex mode				
2	240 kHz SSB SCS, 100 MHz bandwidth,	240 kHz SSB SCS, 100 MHz bandwidth, TDD				
	TDD duplex mode duplex mode					
Note: The UE is	Note: The UE is only required to be tested in one of the supported test configurations.					

Table A.7.1.1.2.2-2: General test parameters for FR2 inter frequency NR cell re-selection test case

Parameter		Unit	Test	Value	Comment
1 14 1	T & 21 11		configuration	0 110	T. 115
Initial	Active cell	_	1, 2 1, 2	Cell2	The UE camps on cell 2 in the initial
condition	Neighbour cell		1, 2	Cell1	phase and during T1 period the UE
		_			reselects to cell 1
T1 end	Active cell		1, 2	Cell1	The UE shall perform reselection to cell 1
condition	Neighbour cells		1, 2	Cell2	during T1
T3 end	Active cell		1, 2	Cell2	The UE shall perform reselection to cell 2
condition	Neighbour cell		1, 2	Cell1	with higher priority during T3
RF Channe			1, 2	1, 2	
Time offset	t between cells		1, 2	3 μs	Synchronous cells
Access Ba	rring Information	-	1, 2	Not Sent	No additional delays in random access
	_				procedure.
SSB config	juration		1	SSB.1 FR2	
			2	SSB.2 FR2	
SMTC conf	SMTC configuration		1, 2	SMTC.1	
	DRX cycle length		1, 2	1.28	The value shall be used for all cells in the test.
PRACH co	nfiguration index		1, 2	190	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
rangeToBe	estCell		1, 2	Not	
				configured	
T1		S	1, 2	35	T1 needs to be defined so that cell reselection reaction time is taken into account.
T2		S	1, 2	>7	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.
Т3		S	1, 2	95	T3 needs to be defined so that cell reselection reaction time is taken into account.

Table A.7.1.1.2.2-3: Cell specific test parameters for FR2 inter frequency NR cell re-selection test case in AWGN

Parameter	Unit	Test	Cell 1			Cell 2		
		configuration	T1	T2	Т3	T1	T2	T3
TDD configuration		1, 2	TDDConf.3.1		TDDConf.3.1			
PDSCH RMC		1, 2	SR.3.1 TDD		SR.3.1 TDD			
configuration								

CR.3.1 TDD

CR.3.1 TDD

RMSI CORESET

1, 2

KIVISI CORESET	1	1, ∠		N.3.1 100			טטו ו.ט.	1
parameters								
RMSI CORESET		1, 2	CCR.3.1 TDD CCR.3.1 TDD)		
RMC configuration								
OCNG Pattern		1, 2	OP.1 defined in A.3.2.1 OP.1 defined			efined in A	.3.2.1	
Initial DL BWP		1, 2	D	LBWP.0.1			DLBWP.0.1	
configuration								
Initial UL BWP		1, 2	U	LBWP.0.1		l	JLBWP.0.1	
configuration								
RLM-RS		1, 2		SSB			SSB	
Qrxlevmin	dBm/SCS	1		-140			-140	
	i T	2		-137			-137	
Pcompensation	dB	1, 2		0			0	
Qhysts	dB	1, 2		0			0	
Qoffset _{s, n}	dB	1, 2		0			0	
Cell_selection_and_	<u> </u>	1, 2						
reselection_quality_		., _		SS-RSRP			SS-RSRP	
measurement			· ·	50 110111			00 110111	
AoA setup		1 2	Setup 1 d	defined in A	3 15 1	Setup 1	defined in A	3 15 1
Beam assumption Note		1, 2 1,2	- Cotap i c	Setup 1 defined in A.3.15.1 Setu Rough		Octup 1	Rough	
4		1,2		rtougn			rtougn	
$\hat{E}_{s}/I_{ot \; \mathrm{BB}}$ Note 5	dB	1	9.95	9.95	7.45	-11.05	-infinity	7.95
Ls / Tot BB	i	2						
7.7	dBm/SCS	<u></u>		-93			-93	1
$N_{\!oc}$ Note2		2		-90			-90	
3.7	dBm/15 kHz	1	-102 -102					
$N_{_{\! OC}}$ Note2		2		. 52				
\hat{E}_{s}/N_{oc}	dB	1	10.5	10.5	8	-10.5	-infinity	8.5
2 5 / 11 00	l QD	2	10.5	10.5		10.5	ii ii ii ii ii y	0.5
SS-RSRP Note3	dBm/SCS	1	-82.5	-82.5	-85	-103.5	-infinity	-84.5
oo koki	dBill/000	2	-79.5	-79.5	-82	-100.5	-infinity	-81.5
lo	dBm/95.04 MHz	1, 2	-53.11	-53.11	-55.34	-63.61	-63.98	-54.91
Treselection	S S	1, 2	0	0	0	0	0	0
SnonintrasearchP	dB	1, 2	0	50		0	50	
Thresh _{x, highP}	dB	1, 2		48			48	
				44				
Thresh _{serving, lowP}	dB	1, 2					44	
Thresh _{x, lowP}	dB	1, 2 1, 2	50 50					
Propagation Condition		1, 2		AWGN			AWGN	
	be used such that both	cells are fully al	located and a	constant t	otal transi	nitted powe	r spectral o	density
	for all OFDM symbols.	,						,
	from other cells and no	ise sources not	specified in th	ne test is as	ssumed to	be constar	it over subo	carriers
			•					
				$N_{\cdot \cdot \cdot}$				

and time and shall be modelled as AWGN of appropriate power for ${}^{IV}_{oc}$ to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 5: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.1.1.2.3 Test Requirements

The cell reselection delay to a higher priority cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on cell 2.

The cell re-selection delay to a higher priority cell shall be less than 87 s.

The cell reselection delay to a lower priority cell is defined as the time from the beginning of time period T1, to the moment when the UE camps on cell 1, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Tracking Area Update procedure on cell 1.

The cell re-selection delay to a lower priority cell shall be less than 27 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate, NR_inter} + T_{SI-NR}$, and to a lower priority cell can be expressed as: $T_{evaluate, NR_inter} + T_{SI-NR}$,

Where:

Thigher_priority_search See clause 4.2.2.7

T_{evaluate, NR_ inter} See Table 4.2.2.4-1 in clause 4.2.2.4

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE

to camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 86.88 s, allow 87 s for the cell re-selection delay to a higher priority cell and 26.88 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 27 s.

A.7.2 SA: RRC INACTIVE state mobility

A.7.3 RRC_CONNECTED state mobility

A.7.3.1 Handover

A.7.3.1.1 Inter-frequency handover from FR1 to FR2; unknown target cell

A.7.3.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR1-NR FR2 inter frequency handover requirements specified in clause 6.1.1.5.

A.7.3.1.1.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.1.2-2, and A.7.3.1.1.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.1.2-1: Inter-frequency handover from FR1 to FR2 test configurations

С	onfig	Description
1		Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
		Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		Source cell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
		Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
3		Source cell: NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
		Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only r	equired to be tested in one of the supported test configurations

Table A.7.3.1.1.2-2: General test parameters Inter-frequency handover from FR1 to FR2

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 µs	Synchronous cells
T1		S	5	
T2		S	≤10	

Table A.7.3.1.1.2-3: Cell specific test parameters for NR FR1-FR2 Inter frequency handover test case

Parameter		1124	Cell 1	Cell 2	
		Unit	T1 T2	T1 T2	
Assumption for UE beams ^{Note 6}			N/A	Rough	
AoA setup			NA	Setup 1 as defined in A.3.15	
NR RF Channel Number	•		1	2	
Duplex mode	Config 1		FDD	TDD	
	Config 2,3		TDD	TDD	
	Config 1		Not Applicable	TDDConf.3.1	
TDD configuration	Config 2		TDDConf.1.1	TDDConf.3.1	
	Config 3		TDDConf.2.1	TDDConf.3.1	
	Config 1		10: N _{RB,c} = 52	100: N _{RB,c} = 66	
BW _{channel}	Config 2	MHz	10: N _{RB,c} = 52	100: N _{RB,c} = 66	
	Config 3		40: N _{RB,c} = 106	100: N _{RB,c} = 66	
	Config 1		10: N _{RB,c} = 52	100: N _{RB,c} = 66	
BWP BW	Config 2	MHz	10: N _{RB,c} = 52	100: N _{RB,c} = 66	
	Config 3		40: N _{RB,c} = 106	100: N _{RB,c} = 66	
	Config 1		52	66	
Data RBs allocated	Config 2		52	66	
	Config 3		106	66	
DRx Cycle		ms	Not A	pplicable	
	Config 1		SR.1.1 FDD	SR.3.1 TDD	
PDSCH Reference measurement channel	Config 2		SR.1.1 TDD	SR.3.1 TDD	
	Config 3		SR2.1 TDD	SR.3.1 TDD	
	Config 1		CR.1.1 FDD	CR.3.1 TDD	
RMSI CORESET Reference Channel	Config 2		CR.1.1 TDD	CR.3.1 TDD	
	Config 3		CR2.1 TDD	CR.3.1 TDD	

		T	T	ı		
Control Channel RM	C Config 1		CCR.1.1 FDD	CCR.3.	1 TDD	
	Config 2		CCR.1.1 TDD	CCR.3.	1 TDD	
	Config 3		CCR.2.1 TDD	CCR.3.	.1 TDD	
OCNG Patterns	OCNG Patterns		OF	P.1		
	Config 1,2		SSB.1 FR1	SSB.3	3 FR2	
SSB configuration	Config 3		SSB.2 FR1	SSB.3	3 FR2	
	Config 1,2		SSB.1 FR1	SSB.3 FR2		
SSB configuration	Config 3	=	SSB.2 FR1	SSB.3	3 FR2	
_	Config 1,2		SMTC.1	SMTC.1		
SMTC configuration	Config 3		SMTC.2	SMT		
PDSCH/PDCCH	Config 1,2		15 kHz	120		
subcarrier spacing	Config 3	kHz	30 kHz	120		
PUCCH/PUSCH	Config 1,2		15 kHz	120		
subcarrier spacing	Config 3	kHz	30 kHz	120 kHz		
PRACH configuration	•		FR1 PRACH configuration	FR2 PRACH	configuration	
TRS configuration	Config 1		TRS.1.1 FDD	TRS.2.		
	Config 2		TRS.1.1 TDD	TRS.2.		
PDSCH/PDCCH TCI	Config 3		TRS.1.2 TDD N/A	TRS.2. TCI.S		
BWP configuration	Initial DL BWP		DLBWP.0.1	DLBW		
	Dedicated DL BWP		DLBWP.1.1	DLBW		
	Initial UL BWP		ULBWP.0.1	ULBW		
	Dedicated UL BWP		ULBWP.1.1	ULBW	/P.1.1	
EPRE ratio of PSS to						
EPRE ratio of PBCH						
EPRE ratio of PBCH EPRE ratio of PDCC		-				
EPRE ratio of PDCC		- 10		0		
EPRE ratio of PDSC	H DMRS to SSS	dB	0			
EPRE ratio of PDSC		=				
	DMRS to SSS(Note 1) to OCNG DMRS (Note	-				
1)	O OOIO DIVINO (Note					
Note2		dBm/15kH z		-10	4.7	
Note2 Config 1,2				-95.7		
Config 3		dBm/SCS		-95.7		
Ê , /I ot	Ê , /I ot		Link only, see clause A.3.7A -Infinity		10	
\hat{E}_{s}/N_{oc}		dB dB	A.3.7A Infini		10	
Config 1	2	dBm/ BW	1	-66.7	-56.3	
Io ^{Note3} Config 3	Io ^{Note3}			-66.7	-56.3	
	•	BW	-	A14/	CN	
Propagation condition	<u> </u>	-		AW	GN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral
	density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_{N_{cc}}$ to be fulfilled.
Note 3:	lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 5:	As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 6:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.3.1.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 572 ms from the beginning of time period T2. The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 562$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.5.2.

This gives a total of 572 ms.

A.7.3.1.2 Intra-frequency handover from FR2 to FR2; unknown target cell

A.7.3.1.2.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 intra frequency handover requirements specified in clause 6.1.1.4.

A.7.3.1.2.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.2.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.2.2-2, and A.7.3.1.2.2-3.

The test scenario comprises of carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.2.2-1: Intra-frequency handover from FR2 to FR2 test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.1.2.2-2: General test parameters Intra-frequency handover from FR2 to FR2

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 µs	Synchronous cells
T1		S	5	

T2	s	≤10	

Table A.7.3.1.2.2-3: Cell specific test parameters for NR FR2-FR2 Intra frequency handover test case

Para	meter	Unit	Ce T1	II 1 T2	Ce T1	II 2 T2	
Assumption for UE bea	ams ^{Note 6}		Rou		Rou		
AoA setup				Setup 1 as de	fined in A.3.15		
NR RF Channel Numb	er		1				
Duplex mode							
TDD configuration				TDDC			
BWP BW		MHz			RB,c = 66		
	MHz			RB,c = 66			
Data RBs allocated				6			
DRx Cycle		ms			plicable		
PDSCH Reference me				CR.3.	1 TDD		
Control Channel RMC	iterice Chariner				.1 TDD		
OCNG Patterns				OF			
SMTC Configuration				SMTC p			
SSB Configuration PDSCH/PDCCH subc		lel I=			3 FR2 kHz		
PUCCH/PUSCH subc		kHz kHz			kHz		
PRACH configuration	amer spacing	KIIZ		FR2 PRACH (
TRS configuration							
	PDSCH/PDCCH TCI state			TRS.2.1 TDD TCI.State.2			
BWP configuration Initial DL BWP				DLBWP.0.1			
Dedicated DL BWP Initial UL BWP				DLBW			
				ULBW	/P.0.1		
	Dedicated UL BWP			ULBW	/P.1.1		
EPRE ratio of PSS to							
EPRE ratio of PBCH D							
EPRE ratio of PBCH to							
EPRE ratio of PDCCH			0		0		
EPRE ratio of PDCCH		dB					
EPRE ratio of PDSCH EPRE ratio of PDSCH							
EPRE ratio of OCNG I							
EPRE ratio of OCNG t							
1)	OOON DIMING (NOIC						
Note2		dBm/15kH		-104.7			
N oc		Z					
Note?							
N_{oc} Note2				-95.7			
		dBm/SCS		-93.1			
Ê , /I ,,		dB	6	-1.8	-Infinity	0	
Ê s /N oc		dB	6	6	-Infinity	7	
Io ^{Note3}		dBm/				- c -	
		BW	-59.7	-56.7	-59.7	-56.7	
Propagation condition		-	AW	GN	AW	GN	

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral
	density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_{N_{oc}}$ to be fulfilled.
Note 3:	lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 5:	As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 6:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.3.1.2.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 232 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + T_{interrupt}, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 222 \text{ ms in the test. } T_{interrupt} \text{ is defined in clause } 6.1.1.4.2.$

This gives a total of 232 ms.

A.7.3.1.3 Inter-frequency handover from FR2 to FR2; unknown target cell

A.7.3.1.3.1 Test Purpose and Environment

This test is to verify the requirement for the NR FR2-NR FR2 inter frequency handover requirements specified in clause 6.1.1.4.

A.7.3.1.3.2 Test Parameters

Supported test configurations are shown in table A.7.3.1.3.2-1. Both handover delay and interruption length are tested by using the parameters in table A.7.3.1.3.2-2, and A.7.3.1.3.2-3.

The test scenario comprises of two carriers and one cell on each carrier. No gap patterns are configured in the test case. The test consists of two successive time periods, with time durations of T1, T2 respectively. At the start of time duration T1, the UE does not have any timing information of cell 2. Starting T2, cell 2 becomes detectable and the UE receives a RRC handover command from the network. The start of T2 is the instant when the last TTI containing the RRC message implying handover is sent to the UE.

Table A.7.3.1.3.2-1: Inter-frequency handover from FR2 to FR2 test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.1.3.2-2: General test parameters Inter-frequency handover from FR2 to FR2

Parameter		Unit	Value	Comment
Initial conditions Active cell			Cell 1	
Neighbouring cell			Cell 2	
Final condition			Cell 2	
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 µs	Synchronous cells

T1	S	5	
T2	S	≤10	

Table A.7.3.1.3.2-3: Cell specific test parameters for NR FR2-FR2 Inter frequency handover test case

Para	meter	Unit	Се		Се	II 2		
		Offic	T1	T2	T1	T2		
Assumption for UE be	ams ^{Note 6}		Ro	ugh		ugh		
AoA setup				Setup 1 as defined in A.3.15				
NR RF Channel Numb	per		1 2					
Duplex mode TDD configuration			TDD TDDConf.3.1					
BW _{channel}		MHz			B _{B,c} = 66			
BWP BW	MHz		100: N _R					
Data RBs allocated		IVII IZ		6	•			
DRx Cycle		ms		Not Ap				
PDSCH Reference me	easurement channel			SR.3.				
RMSI CORESET Refe				CR.3.				
Control Channel RMC				CCR.3				
OCNG Patterns				OF				
SMTC Configuration				SMTC p	attern 1			
SSB Configuration				SSB.3	3 FR2			
PDSCH/PDCCH subc	arrier spacing	kHz			kHz			
PUCCH/PUSCH subc	arrier spacing	kHz		120	kHz			
PRACH configuration			FR2 PRACH configuration 1					
TRS configuration			TRS.2.1 TDD					
PDSCH/PDCCH TCI s			TCI.State.2					
BWP configuraiton	BWP configuration Initial DL BWP		DLBWP.0.1					
	Dedicated DL BWP		DLBWP.1.1					
	Initial UL BWP		ULBWP.0.1 ULBWP.1.1					
EDDE (; (D00)	Dedicated UL BWP			ULBW	/P.1.1			
EPRE ratio of PSS to								
EPRE ratio of PBCH to EPRE ratio of PBCH to								
EPRE ratio of PDCCH			0					
EPRE ratio of PDCCH								
EPRE ratio of PDSCH		dB			0			
EPRE ratio of PDSCH								
EPRE ratio of OCNG								
	to OCNG DMRS (Note							
1)								
Note2		dBm/15kH	-10	4.7	-104.7			
		Z						
Note2			-95	5.7	-95.7			
		dBm/SCS	-90	<i>J.1</i>	-3.). I		
Ê , /I ot		dB	5	5	-Infinity	5		
\hat{E}_{s}/N_{oc}		dB	5	5	-Infinity	5		
Io ^{Note3}		dBm/ BW	-60.5	-60.5	-66.7	-60.5		
			A * * *	011				
Propagation condition Note 1: OCNG shall	I be used such that both		AW		AW			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{m} to be fulfilled.
Note 3:	lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 5:	As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 6:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test
	system implementation

A.7.3.1.3.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 552 ms from the beginning of time period T2.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 10 ms and is specified in clause 12 in TS 38.331 [2].

 $T_{interrupt} = 542$ ms in the test. $T_{interrupt}$ is defined in clause 6.1.1.4.2.

This gives a total of 552 ms.

A.7.3.2 RRC Connection Mobility Control

A.7.3.2.1 SA: RRC Re-establishment

A.7.3.2.1.1 Intra-frequency RRC Re-establishment in FR2

A.7.3.2.1.1.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR2 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.1.1-1, table A.7.3.2.1.1.1-2 and table A.7.3.2.1.1.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure.

Table A.7.3.2.1.1.1-1: Supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.1.1.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2

	Parameter	Unit	Test configuration	Value	Comment
Initial	Active cell		1	Cell1	
condition	Neighbour cells		1	Cell2	
Final condition	Active cell		1	Cell2	
RF Channel Number			1	1	
Time offset	t between cells		1	3 µs	Synchronous cells

N310	-	1	1	Maximum consecutive out-of-sync
				indications from lower layers
N311	-	1	1	Minimum consecutive in-sync indications
				from lower layers
T310	ms	1	0	Radio link failure timer; T310 is disabled
T311	ms	1	5000	RRC re-establishment timer
Access Barring Information	-	1	Not Sent	No additional delays in random access
				procedure.
SSB configuration		1	SSB.1 FR2	
SMTC configuration		1	SMTC	
			pattern 1	
DRX cycle length	S	1	OFF	
PRACH configuration		1	FR2	Table A.3.8.3.1-1
			PRACH	
			configurati	
			on 1	
T1	S	1	5	
T2	S	1	5	Time for the UE to detect RLF
T3	S	1	5	

Table A.7.3.2.1.1.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter	Unit	Test		Cell 1			Cell 2	
		configuration	T1	T2	Т3	T1	T2	Т3
Assumption for UE beams ^{Note 4}			Rough			Rough		
TDD configuration		1	TDDConf.3.1			Т	DDConf.3	.1
BW _{channel}	MHz	1	10	0: N _{RB,c} = 6	66	10	0: N _{RB,c} =	66
Data RBs allocated		1		24			24	
PDSCH RMC configuration		1	S	SR.3.1 TDD)		N/A	
RMSI CORESET RMC configuration		1	C	R.3.1 TDD)	(CR.3.1 TDI)
Dedicated CORESET RMC configuration		1	C	CR.3.1 TDI	D	С	CR.3.1 TD	D
TRS configuration		1	TI	RS.2.1 TDI)	N/A		
PDSCH/PDCCH TCI state		1	TCI.State.2		N/A			
OCNG Pattern		1	OP.1 c	defined in A	.3.2.1	OP.1 defined in A.3.2.1		
Initial DL BWP configuration		1	С	DLBWP.0.1		DLBWP.0.1		
Initial UL BWP configuration		1	ι	JLBWP.0.1		ULBWP.0.1		1
RLM-RS		1		SSB		SSB		
AoA setup		1	Setup 1	defined in /	4.3.15.1	Setup 1	defined in	A.3.15.1
Ê s /I ot	dB	1	-0.12	-infinity	-infinity	-3.46	2	2
N_{oc} Note2	dBm/15 kHz	1			-104.	.7		
N_{oc} Note2	dBm/SCS	1	-95.7		7			
\hat{E}_{s}/N_{oc}	dB	1	4 -infinity -infinity		2	2	2	
SS-RSRP Note3	dBm/SCS	1	-91.7	-infinity	-infinity	-93.7	-93.7	-93.7
lo	dBm/95.04 MHz	1	-59.64	-62.59	-62.59	-59.94	-62.59	-62.59
Propagation Condition		1	AWGN					

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density
	is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable

parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system

implementation

A.7.3.2.1.1.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell shall be less than 5 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{re\text{-establish_delay}} = T_{UL_grant} + T_{UE_re\text{-establish_delay}}.$$

Where:

 $T_{UL_grant} = It$ is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \text{ ms} + T_{identify_intra_NR} + \sum_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{freq} = 1$

 $T_{identify\ intra\ NR} = 3250\ ms$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target intra-frequency NR cell.

T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 4865 ms, allow 5 s in the test case.

A.7.3.2.1.2 Inter-frequency RRC Re-establishment in FR2

A.7.3.2.1.2.1 Test Purpose and Environment

The purpose is to verify that the NR inter-frequency RRC re-establishment delay in FR2 without known target cell is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.2.1-1, table A.7.3.2.1.2.1-2 and table A.7.3.2.1.2.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, becomes inactive. The time period T3 starts after the occurrence of the radio link failure. During T1, the UE shall be configured with the carrier frequency of cell 2 (with RF Channel Number #2) to ensure that the UE has the context of the carrier frequency of cell 2 by the end of T1.

Table A.7.3.2.1.2.1-1: Supported test configurations

Config	Description				
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				

Table A.7.3.2.1.2.1-2: General test parameters for NR inter-frequency RRC Re-establishment test case in FR2

Parameter		Unit	Test configuration	Value	Comment
Initial	Active cell		1	Cell1	
condition	Neighbour cells		1	Cell2	
Final condition	Active cell		1	Cell2	
RF Channe	el Number		1	1, 2	
Time offset	between cells		1	3 μs	Synchronous cells
N310		-	1	1	Maximum consecutive out-of-sync indications from lower layers
N311		-	1	1	Minimum consecutive in-sync indications from lower layers
T310		ms	1	0	Radio link failure timer; T310 is disabled
T311		ms	1	5000	RRC re-establishment timer
Access Bar	rring Information	-	1	Not Sent	No additional delays in random access procedure.
SSB config	uration		1	SSB.1 FR2	·
SMTC conf	figuration		1	SMTC	
				pattern 1	
DRX cycle	length	S	1	OFF	
PRACH co	nfiguration		1	FR2 PRACH configurati on 1	Table A.3.8.3.1-1
T1		S	1	5	
T2		S	1	5	Time for the UE to detect RLF
T3		S	1	6	

Table A.7.3.2.1.2.1-3: Cell specific test parameters for NR inter-frequency RRC Re-establishment test case in FR2

Parameter	Unit	Test	Cell 1			Cell 2		
		configuration	T1	T2	T3	T1	T2	T3
Assumption for UE beams ^{Note 4}			Rough			Rough		
AoA setup		1		Setup 3 a	as specified	in clause	A.3.15	
				AoA1			AoA2	
TDD configuration		1	Т	DDConf.3.	1	TDDConf.3.1		
BW _{channel}	MHz	1	10	$N_{RB,c} = 0$	66	100: N _{RB,c} = 66		
Data RBs allocated		1	24			24		
PDSCH RMC		1	;	SR.3.2 TDE)	N/A		
configuration								
RMSI CORESET		1	(CR.3.1 TDE)	CR.3.1 TDD		
RMC configuration								
Dedicated CORESET		1	CCR.3.1 TDD		D	CCR.3.1 TDD		D
RMC configuration								
TRS configuration		1	TRS.2.1 TDD		N/A			
PDSCH/PDCCH TCI		1	TCI.State.2		N/A			
state								

OCNG Pattern		1	OP.3	OP.3 defined in A.3.2.1 OP.3 defined in A.3				A.3.2.1	
Initial DL BWP		1		DLBWP.0.1		I	DLBWP.0.1		
configuration									
Initial UL BWP		1		ULBWP.0.1		l	JLBWP.0.	1	
configuration									
RLM-RS		1		SSB			SSB		
N_{oc} Note2	dBm/15 kHz	1		-92.1			-92.1		
$N_{_{OC}}$ Note2	dBm/SCS	1		-83.1		-83.1			
\hat{E}_{s}/N_{oc}	dB	1	0	-infinity	-infinity	-	-infinity	0	
					-	infinity	-		
\hat{E}_{s}/I_{ot}_{BB} Note 5	dB	1	-1.01	-infinity	-infinity	-	-infinity	-1.01	
BB Note 5						infinity			
SSB_RP Note3	dBm/SCS	1	-83.1	-infinity	-infinity	-	-infinity	-83.1	
					-	infinity			
lo	dBm/95.04 MHz	1	-55.46	-58.51	-58.51	-58.51	-58.51	-55.46	
Propagation		1		AWGN			AWGN		
Condition									

Note 1: OCNG shall be used such that a constant total transmitted power is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled

Note 3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 5: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.3.2.1.2.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR inter frequency cell shall be less than 6 s.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

$$T_{\text{re-establish_delay}} = T_{\text{UL_grant}} + T_{\text{UE_re-establish_delay}}.$$

Where:

 $T_{UL_grant} = It$ is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \text{ ms} + T_{identify_intra_NR} + \sum\nolimits_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{\text{freq}} = 2\,$

 $T_{identify_intra_NR} = 1600 \text{ ms}$

 $T_{identify_inter_NR} = 2080 \text{ ms}$

 $T_{SI} = 1280$ ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target inter-frequency NR cell.

 T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 5025 ms, allow 6 s in the test case.

A.7.3.2.1.3 Intra-frequency RRC Re-establishment in FR2 without serving cell timing

A.7.3.2.1.3.1 Test Purpose and Environment

The purpose is to verify that the NR intra-frequency RRC re-establishment delay in FR2 without serving cell timing is within the specified limits. These tests will verify the requirements in clause 6.2.1.

The test parameters are given in table A.7.3.2.1.3.1-1, table A.7.3.2.1.3.1-2 and table A.7.3.2.1.3.1-3 below. The test consists of 3 successive time periods, with time duration of T1, T2 and T3 respectively. At the start of time period T2, cell 1, which is the active cell, is deactivated. The time period T3 starts after the occurrence of the radio link failure.

Table A.7.3.2.1.3.1-1: Supported test configurations

Configuration	Description				
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				

Table A.7.3.2.1.3.1-2: General test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter		Unit	Test configuration	Value	Comment
Initial	Active cell		1	Cell1	
condition	Neighbour cells		1	Cell2	
Final	Active cell		1	Cell2	
condition	al Nicosala a v		1	4	
RF Channe			1	1	0
	t between cells		1	3 µs	Synchronous cells
N310		-	1	1	Maximum consecutive out-of-sync
					indications from lower layers
N311		-	1	1	Minimum consecutive in-sync indications
					from lower layers
T310	T310		1	6000	Radio link failure timer configured by
					RLF-TimersAndConstants
T311	T311		1	5000	RRC re-establishment timer
Access Ba	rring Information	-	1	Not Sent	No additional delays in random access
	· ·				procedure.
SSB config	juration		1	SSB.1 FR2	·
SMTC con			1	SMTC	
				pattern 1	
DRX cycle	length	S	1	OFF	
PRACH co			1	FR2	Table A.3.8.3.1-1
	-			PRACH	
				configurati	
				on 1	
T1		S	1	5	
T2		s	1	11	Time for the UE to detect RLF
T3		S	1	5	

Table A.7.3.2.1.3.1-3: Cell specific test parameters for NR intra-frequency RRC Re-establishment test case in FR2

Parameter	Unit	Test	Cell 1			Cell 2		
		configuration	T1	T2	T3	T1	T2	T3
Assumption for UE beams ^{Note 4}			Rough			Rough		
TDD configuration		1	Т	DDConf.3.	1	Т	DDConf.3.	1
PDSCH RMC		1	S	R.3.1 TDD)		N/A	
configuration								
RMSI CORESET		1	C	CR.3.1 FDD)		R.3.1 FD)
RMC configuration								
Dedicated CORESET		1	C	CR.3.1 FDI)	С	CR.3.1 FD	D
RMC configuration								
TRS configuration		1		RS.2.1 TDI			N/A	
PDSCH/PDCCH TCI		1	٦	ΓCI.State.2		N/A		
state								
OCNG Pattern		1		defined in A		OP.1 defined in A.3.2.1		
Initial DL BWP		1		DLBWP.0.1		DLBWP.0.1		
configuration								
Initial UL BWP		1	ι	JLBWP.0.1		ι	JLBWP.0.1	
configuration								
RLM-RS		1		SSB			SSB	
AoA setup		1		defined in A			defined in A.3.15.1	
Ê s /I ot	dB	1	5	-infinity	-infinity	-infinity	-infinity	5
N_{oc} Note2	dBm/15kHz	1	-104.7					
$N_{_{OC}}$ Note2	dBm/SCS	1	-95.7					
\hat{E}_{s}/N_{oc}	dB	1	5	-infinity	-infinity	-infinity	-infinity	5
SS-RSRP Note3	dBm/SCS	1	-90.7	-infinity	-infinity	-infinity	-infinity	-90.7
lo	dBm/95.04 MHz	1	-60.52	-66.71	-60.52	-60.52	-66.71	-60.52
Propagation		1	AWGN					
Condition								

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers

and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.3.2.1.3.2 Test Requirements

The RRC re-establishment delay is defined as the time from the start of time period T3, to the moment when the UE starts to send PRACH preambles to cell 2 for sending the *RRCReestablishmentRequest* message to cell 2.

The RRC re-establishment delay to an unknown NR intra frequency cell without serving cell timing shall be less than $5\,\mathrm{s}$.

The rate of correct RRC re-establishments observed during repeated tests shall be at least 90%.

NOTE: The RRC re-establishment delay in the test is derived from the following expression:

 $T_{re\text{-establish_delay}} = T_{UL_grant} + T_{UE_re\text{-establish_delay}}.$

Where:

 $T_{UL_grant} = It$ is the time required to acquire and process uplink grant from the target cell. The PRACH reception at the system simulator is used as a trigger for the completion of the test; hence T_{UL_grant} is not used.

$$T_{UE_re-establish_delay} = 50 \text{ ms} + T_{identify_intra_NR} + \sum_{i=1}^{Nfreq-1} T_{identify_inter_NR,i} + T_{SI-NR} + T_{PRACH}$$

 $N_{freq} = 1$

 $T_{identify\ intra\ NR} = 3520\ ms$

T_{SI} = 1280 ms; it is the time required for receiving all the relevant system information as defined in TS 38.331 [2] for the target intra-frequency NR cell.

 T_{PRACH} = 15 ms; it is the additional delay caused by the random access procedure.

This gives a total of 4865 ms, allow 5 s in the test case.

A.7.3.2.2 Random Access

A.7.3.2.2.1 Contention based random access test in FR2 for NR Standalone

A.7.3.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.1.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.1.1-2 and Table A.7.3.2.2.1.1-3.

Table A.7.3.2.2.1.1-1: Supported test configurations for contention based random access test in FR2 for NR Standalone

Config	Description					
1	NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					

Table A.7.3.2.2.1.1-2: General test parameters for contention based random access test in FR2 for NR Standalone

Paramet	er	Unit	Test-1	Comments
SSB Configuration	Config 1		SSB.1 FR2	As defined in A.3.10
CSI-RS for tracking	Config 1		TRS.2.1 TDD	
Duplex Mode for Cell 1	Config 1		TDD	
TDD Configuration	Config 1		TDDConf.3.1	As defined in A.3.1.4
BW _{channel}	Config 1	MHz	100: N _{RB,c} = 66	
Data RBs allocated	Config 1		24	
OCNG Pattern Note 1			OP.3	As defined in A.3.2.1.
PDSCH Reference	Config 1		SR.3.1 TDD	As defined in A.3.1.1.
Channel Note 2				
RMSI CORESET	Config 1		CR.3.1 TDD	As defined in A.3.1.2
Reference Channel				
NR RF Channel Number			1	
EPRE ratio of PSS to SS	EPRE ratio of PSS to SSS			
EPRE ratio of PBCH_DMRS to SSS		dB		
EPRE ratio of PBCH to PBCH_DMRS		dB	0	
EPRE ratio of PDCCH_D	MRS to SSS	dB		
EPRE ratio of PDCCH to	PDCCH_DMRS	dB		

EPRE ratio of PDSCH_DMRS to SSS	dB		
EPRE ratio of PDSCH to PDSCH_DMRS	dB		
ss-PBCH-BlockPower	dBm/ SCS	+20 +Δ _{UL}	As defined in TS 38.331 [2]. Δ _{UL} is derived from the uplink calibration process Note 3
Configured UE transmitted power (PCMAX. f. c.)	dBm	maximum value configurable for certain power class	As defined in clause 6.2.4 in TS 38.101-2 [19]
PRACH Configuration		FR2 PRACH configuration 1	As defined in A.3.8.3, with exceptions as defined below
rsrp-ThresholdSSB	dBm	RSRP_69 +∆dl	RSRP_69 corresponds to -88dBm. Δ_{DL} is derived from the downlink calibration process Note 4
preambleReceivedTargetPower	dBm	-100	As defined in TS 38.331 [2]

- Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.
- Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.
- Note 3: The ΔυL value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, preambleReceivedTargetPower = -100dBm and ss-PBCH-BlockPower = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.
- Note 4: The Δ_{DL} value is calculated as (RSRP_REP RSRP_76), where RSRP_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP_x, x is treated as a positive integer value.

Table A.7.3.2.2.1.1-3: OTA-related test parameters for contention based random access test in FR2 for NR Standalone

	Parameter	Unit	Test-1	Comments
AoA setup			Setup 1	As defined in A.3.15.1
Assumption	for UE beams ^{Note 3}	Rough		
-	Es Note1	dBm/SCS	-80.6	Power of SSB with index
	SSB_RP	dBm/SCS	-80.6	0 is set to be above
SSB with				configured rsrp- ThresholdSSB
index 0	Es/lot _{BB}	dB	21.09	
	lo	dBm/95.04	-56.01	lo in symbols containing
		MHz		SSB index 0
	Es Note1	dBm/SCS	-95.0	Power of SSB with index
	SSB_RP	dBm/SCS	-95.0	1 is set to be below
CCD:4h				configured rsrp-
SSB with				ThresholdSSB
index 1	Es/lot _{BB}	dB	6.69	
	lo	dBm/95.04	-70.41	lo in symbols containing
		MHz		SSB index 1
Propagation	Condition	-	AWGN	

Note 1: No articial noise is applied in this test.

Note 2: Void.

Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.3.2.2.1.2 Test Requirements

Contention based random access is triggered by *not* explicitly assigning a random access preamble via dedicated signalling in the downlink.

A.7.3.2.2.1.2.1 Random Access Preamble Transmission

To test the UE behavior specified in Clause 6.2.2.2.1.1 the System Simulator shall receive the Random Access Preamble which belongs to one of the Random Access Preambles associated with the SSB with index 0, which has SS-RSRP above the configured *rsrp-ThresholdSSB*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.1.2.2 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.1.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) and shall transmit the msg3 if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.1.2.3 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.1.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.1.2.4 Receiving an UL grant for msg3 retransmission

To test the UE behavior specified in clause 6.2.2.2.1.4 the System Simulator shall provide an UL grant for msg3 retransmission following a successful Random Access Response.

The UE shall re-transmit the msg3 upon the reception of an UL grant for msg3 retransmission.

A.7.3.2.2.1.2.5 Reception of an Incorrect Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element *not* matching the CCCH SDU transmitted in msg3 uplink message.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires unless the received message includes a UE Contention Resolution Identity MAC control element and the UE Contention Resolution Identity included in the MAC control element matches the CCCH SDU transmitted in the uplink message.

A.7.3.2.2.1.2.6 Reception of a Correct Message over Temporary C-RNTI

To test the UE behavior specified in Clause 6.2.2.2.1.5 the System Simulator shall send a message addressed to the temporary C-RNTI with a UE Contention Resolution Identity included in the MAC control element matching the CCCH SDU transmitted in the msg3 uplink message.

The UE shall send ACK if the Contention Resolution is successful.

A.7.3.2.2.1.2.7 Contention Resolution Timer expiry

To test the UE behavior specified in Clause 6.2.2.2.1.6 the System Simulator shall *not* send a response to a msg3.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if the Contention Resolution Timer expires.

A.7.3.2.2.2 Non-contention based random access test in FR2 for NR Standalone

A.7.3.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the behavior of the random access procedure is according to the requirements and that the PRACH power settings and timing are within specified limits. This test will verify the requirements in Clause 6.2.2.2 and Clause 7.1.2 in an AWGN model.

For this test one cell is used, with the configuration of Cell 1 configured as PCell or SCell in FR2. Supported test parameters are shown in Table A.7.3.2.2.2.1-1. UE capable of SA with PCell or SCell in FR2 needs to be tested by using the parameters in Table A.7.3.2.2.2.1-2 and Table A.7.3.2.2.2.1-3 for SSB-based non-contention based random access test (Test 1) and CSI-RS-based non-contention based random access test (Test 2). Test 2 is only applicable to UE which supports csi-RSRP-AndRSRQ-MeasWithSSB or csi-RSRP-AndRSRQ-MeasWithoutSSB.

Table A.7.3.2.2.2.1-1: Supported test configurations for non-contention based random access test in FR2 for NR Standalone

Config	Description
1	NR PSCell/SCell 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.2.2.1-2: General test parameters for non-contention based random access test in FR2 for NR Standalone

Parameter		Unit	Test-1	Test-2	Comments
SSB Configuration	Config 1		SSB.1 FR2	SSB.1 FR2	As defined in A.3.10
CSI-RS for tracking	Config 1		TRS.2.1 TDD	TRS.2.1 TDD	
CSI-RS Configuration	Config 1		N/A	CSI-RS.3.1 TDD	As defined in A.3.1.4
Duplex Mode for Cell 1	Config 1		TDD	TDD	
TDD Configuration	Config 1		TDDConf.3.1	TDDConf.3.1	
BW _{channel}	Config 1	MHz	100: N _{RB,c} = 66	100: N _{RB,c} =66	
Data RBs allocated	Config 1		24	24	
OCNG Pattern Note 1			OP.3	OP.3	As defined in A.3.2.1.
PDSCH Reference Channel Note 2	Config 1		SR3.1 TDD	SR3.1 TDD	As defined in A.3.1.1.
RMSI CORESET Refer	rence	Config 1		CR.3.1 TDD	CR.3.1 TDD
NR RF Channel Number	ər		1	1	
EPRE ratio of PSS to S	SSS	dB			
EPRE ratio of PBCH_D	MRS to SSS	dB			
EPRE ratio of PBCH to PBCH_DMRS	ı	dB			
EPRE ratio of PDCCH_ SSS	_	dB	0	0	
EPRE ratio of PDCCH PDCCH_DMRS		dB	U	U	
SSS	EPRE ratio of PDSCH_DMRS to SSS				
EPRE ratio of PDSCH PDSCH_DMRS	to	dB			
ss-PBCH-BlockPower		dBm/ SCS	+20 +Δul	+20 +Δul	As defined in TS 38.331 [2]. Δ _{UL} is derived from the uplink calibration process ^{Note 3}
Configured UE transmit $P_{\text{CMAX}, f, c}$)	tted power (dBm	maximum value configurable for certain power class	maximum value configurable for certain power class	As defined in clause 6.2.4 in TS 38.101-2 [19]
PRACH Configuration			FR2 PRACH configuration 2	FR2 PRACH configuration 3	As defined in A.3.8.3, with exceptions as defined below.
rsrp-ThresholdSSB		dBm	RSRP_69 +∆ _{DL}	RSRP_69 +∆ _{DL}	RSRP_69 corresponds to -88dBm. Δ _{DL} is derived from the downlink calibration process Note 4
preambleReceivedTargetPower		dBm	-100	-100	As defined in TS 38.331 [2]

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols. The OCNG pattern is chosen during the test according to the presence of a DL reference measurement channel.

Note 2: The DL PDSCH reference measurement channel is used in the test only when a downlink transmission dedicated to the UE under test is required.

Note 3: The ΔυL value is calculated as -ROUND(PPRACH0 -1), where PPRACH0 is the measured first PRACH power with -80.6dBm/SCS applied, preambleReceivedTargetPower = -100dBm and ss-PBCH-BlockPower = 20dBm. These values are used during the uplink calibration process carried out before the test case is run, with the UE configured to send PRACH.

Note 4: The Δ_{DL} value is calculated as (RSRP_REP - RSRP_76), where RSRP_REP is the SS-RSRP Reported value in Table 10.1.6.1-1 with -80.6dBm/SCS applied. These values are used during the downlink calibration process carried out before the test case is run, with the UE configured to report SS-RSRP. For a Reported value RSRP_x, x is treated as a positive integer value.

Table A.7.3.2.2.2.1-3: OTA-related test parameters for non-contention based random access test in FR2 for NR Standalone

Parameter		Unit	Test-1	Test-2	Comments
AoA setup			Setup 1	Setup 1	As defined in A.3.15.1
Assumption	for UE beams ^{Note 3}		Rough	Rough	
	Es Note1	dBm/SC S	-80.6	-80.6	Power of SSB with index 0 is set to be above
SSB with	SSB_RP	dBm/SC S	-80.6	-80.6	configured rsrp- ThresholdSSB
index 0	Es/lot _{BB}	dB	21.09	21.09	
	lo	dBm/95.0 4 MHz	-56.01	-56.01	lo in symbols containing SSB index 0
	Es Note1	dBm/SC S	-95.0	-95.0	Power of SSB with index 1 is set to be below
SSB with	SSB_RP	dBm/SC S	-95.0	-95.0	configured rsrp- ThresholdSSB
index 1	Es/lot _{BB}	dB	6.69	6.69	
	lo	dBm/95.0 4 MHz	-70.41	-70.41	lo in symbols containing SSB index 1
Propagation	Condition	-	AWGN	AWGN	

Note 1: No articial noise is applied in this test.

Note 2: void.

Note 3: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system

implementation

A.7.3.2.2.2.2 Test Requirements

Non-Contention based random access is triggered by explicitly assigning a random access preamble via dedicated signalling in the downlink. In the test, the non-contention based random access procedure is not initialized for Other SI requested from UE or beam failure recovery.

A.7.3.2.2.2.2.1 SSB-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for SSB-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with SSBs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the SSB with index 0.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the SSB with index 0, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.2.2.2 CSI-RS-based Random Access Preamble Transmission

In Test-1, to test the UE behavior specified in Clause 6.2.2.2.2.1 for CSI-RS-based Random Access Preamble transsision, with the contention-free Random Access Resources and the contention-free PRACH occasions associated with CSI-RSs configured, the System Simulator shall receive the Random Access Preamble which has the Preamble Index associated with the CSI-RS configured.

In addition, the System Simulator shall receive the Random Access Preamble on the PRACH occasion which belongs to the PRACH occasions corresponding to the CSI-RS configured, and the selected PRACH occasion shall belongs to the PRACH occasions permitted by the restrictions given by the *ra-OccasionList*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.2.3 Random Access Response Reception

To test the UE behavior specified in Clause 6.2.2.2.2.2 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. In response to the first 2 preambles, the System Simulator shall transmit a Random Access Response *not* corresponding to the transmitted Random Access Preamble.

The UE may stop monitoring for Random Access Response(s) if the Random Access Response contains a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power if all received Random Access Responses contain Random Access Preamble identifiers that do not match the transmitted Random Access Preamble.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.2.2.4 No Random Access Response Reception

To test the UE behavior specified in clause 6.2.2.2.2.3 the System Simulator shall transmit a Random Access Response containing a Random Access Preamble identifier corresponding to the transmitted Random Access Preamble after 3 preambles have been received by the System Simulator. The System Simulator shall *not* respond to the first 2 preambles.

The UE shall again perform the Random Access Resource selection procedure specified in clause 5.1.2 in TS 38.321 [7], and transmit with the calculated PRACH transmission power when the backoff time expires if no Random Access Response is received within the RA Response window configured in *RACH-ConfigCommon*.

In addition, the power applied to all preambles shall be in accordance with what is specified in Clause 6.2.2.2. The power of the first preamble shall be 0.6 dBm to be received at TE with an accuracy specified in clause 6.3.4.2 of TS 38.101-2 [19]. The relative power applied to additional preambles shall have an accuracy specified in clause 6.3.4.3 of TS 38.101-2 [19].

The transmit timing of all PRACH transmissions shall be within the accuracy specified in Clause 7.1.2.

A.7.3.2.3 SA: RRC Connection Release with Redirection

A.7.3.2.3.1 Redirection from NR in FR2 to NR in FR2

A.7.3.2.3.1.1 Test Purpose and Environment

This test is to verify RRC connection release with redirection from NR to NR requirements specified in clause 6.2.3.2.1.

A.7.3.2.3.1.2 Test Parameters

Supported test configurations are shown in table A.7.3.2.3.1.2-1. The time delay is tested by using the parameters in table A.7.3.2.3.1.2-2, and A.7.3.2.3.1.2-3.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. The *RRCRelease* message shall be sent to the UE during period T1 and the start of T2 is the instant when the last TTI containing the RRC message is sent to the UE. Prior to time duration T2, the UE shall not have any timing information of Cell 2. Cell 2 is powered up at the beginning of the T2.

Table A.7.3.2.3.1.2-1: Redirection from NR to NR test configurations

Config	Description
1	Source cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
	Target cell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.3.2.3.1.2-2: General test parameters for Redirection from NR to NR test case

Parameter		Unit	Value	Comment
Initial conditions	Active cell		Cell 1	
	Neighbouring cell		Cell 2	
Final condition	Active cell		Cell 2	
Filter coefficient			0	L3 filtering is not used
Access Barring Information		-	Not Sent	No additional delays in random access procedure.
Time offset between cells			3 μs	Synchronous cells
T1		S	5	
T2		S	3.2	

Table A.7.3.2.3.1.2-3: Cell specific test parameters for Redirection from NR to NR test case

Parameter	Unit	Ce	ell 1	Cell 2	
raiameter	Unit	T1	T2	T1	T2
Assumption for UE beams ^{Note 6}		Ro	ugh		ugh
AoA setup			Setup 1 as def	fined in A.3.15	
NR RF Channel Number			1		2
Duplex mode			TD	DD	
TDD configuration			TDDC	onf.3.1	
BW _{channel}	MHz		100: N _R	B,c = 66	
BWP BW	MHz	100: N _{RB,c} = 66			
Data RBs allocated		66			
DRx Cycle	ms		Not App	olicable	
PDSCH Reference measurement channel			SR.3.	1 TDD	
RMSI CORESET Reference Channel			CR.3.	1 TDD	
Control Channel RMC			CCR.3	.1 TDD	
OCNG Patterns		OP.1			
SMTC configuration		SMTC.1 FR2			
SSB Configuration			SSB.3	3 FR2	

PDSCH/PDCCH subcar	rier spacing	kHz		120	kHz	
PUCCH/PUSCH subcarrier spacing		kHz	120 kHz			
PRACH configuration			FR2 PRACH configuration 1			
TRS configuration			TRS.2.1 TDD			
PDSCH/PDCCH TCI sta	ate		TCI.State.2			
BWP configuration	Initial DL BWP			DLBV	/P.0.1	
	Dedicated DL BWP			DLBW	/P.1.1	
	Initial UL BWP			ULBW		
	Dedicated UL BWP			ULBV	/P.1.1	
EPRE ratio of PSS to S						
EPRE ratio of PBCH DN						
EPRE ratio of PBCH to						
EPRE ratio of PDCCH D						
EPRE ratio of PDCCH to		dB	(0	0	
EPRE ratio of PDSCH D		""	`	•		
EPRE ratio of PDSCH to						
EPRE ratio of OCNG DI						
EPRE ratio of OCNG to	OCNG DMRS (Note					
1)						
$N_{oc}^{ m Note2}$		dBm/15kH	-10)4.7	-10	4.7
		Z				
$N_{oc}^{ m Note2}$		ID (000	-9	5.7	-95	5.7
		dBm/SCS				
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$		dB	5	5	-Infinity	5
\hat{E}_s/N_{oc}		dB	5	5	-Infinity	5
Io ^{Note3}		dBm/ BW	-60.5	-60.5	-66.7	-60.5
Propagation condition		_	AW	/GN	AW	GN
	be used such that both	cells are fully a				
	nieved for all OFDM sy					
Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over						
	nd time and shall be m					

- Note 3: lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zonee
- Note 6: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.3.2.3.1.3 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 3160 ms from the beginning of time period T2.

The rate of correct RRC connection release redirection to NR observed during repeated tests shall be at least 90%.

NOTE: The redirection delay can be expressed as:

 $T_{connection_release_redirect_NR} = T_{RRC_procedure_delay} + T_{identify_NR} + T_{SI_NR} + T_{RACH},$

where:

 $T_{RRC_procedure_delay} = 110 \text{ ms in the test.}$

 $T_{identify-NR} = 1760$ ms in the test.

 $T_{SI-NR} = 1280$ ms, it is the time required for receiving all the relevant system information as defined in TS 38.331 for the target NR cell.

 $T_{RACH} = 10 \text{ ms in the test.}$

This gives a total of 3160 ms.

A.7.4 Timing

A.7.4.1 UE transmit timing

A.7.4.1.1 NR UE Transmit Timing Test for FR2

A.7.4.1.1.1 Test Purpose and environment

The purpose of this test is to verify that the UE can follow frame timing change of the connected gNodeb and that the UE initial transmit timing accuracy, maximum amount of timing change in one adjustment, minimum and maximum adjustment rate are within the specified limits. This test will verify the requirements in clause 7.1.2.

Supported test configurations are shown in Table 7.4.1.1.1-1.

Table A.7.4.1.1-1: Supported test configurations for FR2 PCell

Configuration	Description			
1	NR TDD, SSB SCS 240 kHz, data SCS 120 kHz, BW 100 MHz			

For this test a single NR cell is used. Tables A.7.4.1.1.1-2 and A.7.4.1.1.1-2A define the parameters to be configured and strength of the transmitted signals. The transmit timing is verified by the UE transmitting SRS using the configuration defined in Table A.7.4.1.1.1-3.

Table A.7.4.1.1.1-2: Cell Specific Test Parameters for UL Transmit Timing test

Parameter	Unit	Config	Test1	Test2
SSB ARFCN		1	Freq1	Freq1
TDD configuration		1	TDDConf.3.1	
BWchannel	MHz	1	100: N _{RB,c} = 66	
Data RBs allocated		1	66	
Initial BWP Configuration		1	DLBWP.0.1 ULBWP.0.1	
Dedicated BWP Configuration		1	DLBWP.1.1 ULBWP.1.1	
TRS Configuration		1	TRS.2.1 TDD	
PDSCH/PDCCH TCI state		1	TCI.State.2	
DRx Cycle	ms	1	N/A DRX.8 ^{Note5}	
PDSCH Reference measurement channel		1	SR.3.3 TDD	

RMSI CORESET Reference Channel		1	CR.3.2 TDD	
Dedicated CORESET Reference Channel		1	CCR.3.7 TDD	
OCNG Patterns		1		DP.1
SSB Configuration		1		3.4 FR2
SMTC Configuration		1	SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1	120	
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH TO PDSCH EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)	dB	1	0	0
Propagation condition		1	A۱	WGN
SRS Config		1	SRSConf.1 ^{Note6}	SRSConf.2 ^{Note6}

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total

transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Note 5: DRx related parameters are given in Table A.3.3.8-1

Note 6: SRS configs are given in Table A.7.4.1.1.1-3

Table A.7.4.1.1.1-2A: OTA related test parameters

Parameter	Unit	Test 1	Test 2	
Angle of arrival configuration		Setup 1 according to clause A.3.15.1		
Assumption for UE beams ^{Note}		Fine		
Note1 N_{oc}	dBm/15kHz ^{Note4}	-112		
Note1 N_{oc}	dBm/SCS ^{Note3}	-100		
\hat{E}_s/N_{oc}	dB	dB 4		
SSB_RP ^{Note2}	dBm/SCS Note4	-96		
Ê s /I ot	dB 4		4	
Io ^{Note2}	dBm/95.04 MHz ^{Note4} -68.5			

Note 1:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{N_{out}}$ to be fulfilled.
Note 2:	SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 3:	Void
Note 4:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
Note 5:	As observed with 0dBi gain antenna at the centre of the quiet zone
Note 6:	Information about types of UE beam is given in B.2.1.3, and does not limit UE
	implementation or test system implementation

Table A.7.4.1.1.3: SRS Configuration for Timing Accuracy Test

	Field	SRSConf.1	SRSConf.2	Comments
SRS-ResourceSet	srs-ResourceSetId	0	0	
	srs-ResourceldList	0	0	
	resourceType	Periodic	Periodic	
	Usage	Codebook	Codebook	
SRS-Resource	SRS-Resourceld	0	0	
	nrofSRS-Ports	Port1	Port1	
	transmissionComb	n2	n2	
	combOffset-n2	0	0	
	cyclicShift-n2	0	0	
	resourceMapping startPosition	0	0	
	resourceMapping nrofSymbols	n1	n1	
	resourceMapping repetitionFactor	n1	n1	
	freqDomainPosition	0	0	
	freqDomainShift	0	0	
	freqHopping c-SRS	17	17	Matches N _{RB,c}
	freqHopping b-SRS	0	0	
	freqHopping b-hop	0	0	
	groupOrSequenceHopping	Neither	Neither	
	resourceType	Periodic	Periodic	
	periodicityAndOffset-p	sl1, 0	sl2560, 4	Offset to align with DRx periodicity
	sequenceld	0	0	Any 10 bit number

Table A.7.4.1.1.4: Void

A.7.4.1.1.2 Test requirements

The test sequence shall be carried out in RRC_CONNECTED for every test case.

Following will be the test sequence for this test:

1) Setup NR PCell according to parameters given in Table A.7.4.1.1.1-1.

- 2) After connection set up with the cell, the test equipment will verify that the timing of the NR cell is within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB.
 - a. The N_{TA} offset value (in T_c units) is 13792
 - b. The T_e values depend on the DL and UL SCS for which the test is being run and are given in Table 7.1.2-1
- 3) The test system shall adjust the timing of the DL path by values given in Table A.7.4.1.1.2-1

Table A.7.4.1.1.2-1 Adjustment Value for DL Timing

SCS of SSB signals (kHz)	Adjustment Value			
	Test1	Test2		
240	+8*64T _c	+4*64T _c		

- 4) The test system shall verify that the adjustment step size and the adjustment rate shall be according to requirements specified in clause 7.1.2 Table 7.1.2.1-1 until the UE transmit timing offset is within ($N_{TA} + N_{TA_offset}$) $\times T_c \pm T_e$ respective to the first detected path (in time) of DL SSB. Skip this step for test 2 with DRX confiured.
- 5) The test system shall verify that the UE transmit timing offset stays within $(N_{TA} + N_{TA_offset}) \times T_c \pm T_e$ of the first detected path of DL SSB. For Test 2 the UE transmit timing offset shall be verified for the first transmission in the DRX cycle immediately after DL timing adjustment.

A.7.4.2 UE timer accuracy

A.7.4.3 Timing advance

A.7.4.3.1 SA FR2 timing advance adjustment accuracy

A.7.4.3.1.1 Test Purpose and Environment

The purpose of the test is to verify UE Timing Advance adjustment delay and accuracy requirement defined in clause 7.3.

A.7.4.3.1.2 Test Parameters

Supported test configurations are shown in table A.7.4.3.1.2-1. Both timing advance adjustment delay and accuracy are tested by using the parameters in table A.7.4.3.1.2-2, A.7.4.3.1.2-3 and A.7.4.3.1.2-4.

In all test cases, single cell is used. Each test consists of two successive time periods, with time duration of T1 and T2 respectively. In each time period, timing advance commands are sent to the UE and Sounding Reference Signals (SRS), as specified in table A.7.4.3.1.2-3, are sent from the UE and received by the test equipment. By measuring the reception of the SRS, the transmit timing, and hence the timing advance adjustment accuracy, can be measured.

During time period T1, the test equipment shall send one message with a Timing Advance Command MAC Control Element, as specified in clause 6.1.3.4 in TS 38.321 [7]. The Timing Advance Command value shall be set to 31, which according to clause 4.2 in TS 38.213 [3] results in zero adjustment of the Timing Advance. In this way, a reference value for the timing advance used by the UE is established.

During time period T2, the test equipment shall send a sequence of messages with Timing Advance Command MAC Control Elements, with Timing Advance Command value specified in table A.7.4.3.1.2-2. This value shall result in changes of the timing advance used by the UE, and the accuracy of the change shall then be measured, using the SRS sent from the UE.

As specified in Clause 7.3.2.1, the UE adjusts its uplink timing at slot n+k+1 for a timing advance command received in slot n. This delay must be taken into account when measuring the timing advance adjustment accuracy, via the SRS sent from the UE.

The UE Time Alignment Timer, described in Clause 5.2 in TS 38.321 [7], shall be configured so that it does not expire in the duration of the test.

Table A.7.4.3.1.2-1: Timing advance supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.4.3.1.2-2: General test parameters for timing advance

Parameter	Unit	Value	Comment
RF channel number		1	
Initial DL BWP		DLBWP.0.1	As specified in Table A.3.9.2.1-1
Dedicated DL BWP		DLBWP.1.1	As specified in Table A.3.9.2.2-1
Initial UL BWP		ULBWP.0.1	As specified in Table A.3.9.3.1-1
Dedicated UL BWP		ULBWP.1.1	As specified in Table A.3.9.3.2-1
Timing Advance Command (T _A) value during T1		31	$N_{TA_new} = N_{TA_old}$ for the purpose of establishing a reference value from which the timing advance adjustment accuracy can be measured during T2
Timing Advance Command (T _A) value during T2		39	For 120 kHz SCS $N_{TA_new} = N_{TA_old} + 1024*T_c$ (based on equation in clause 4.2 of TS 38.213 [3])
T1	S	5	
T2	S	5	

Table A.7.4.3.1.2-3: Cell specific test parameters for timing advance

Parameter	Unit	Test1
Farameter	Onit	T1 T2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
BW _{channel}	MHz	100: N _{RB,c} = 66
BWP BW	MHz	100: N _{RB,c} = 66
DRx Cycle	ms	Not Applicable
PDSCH Reference measurement channel		SR.3.1 TDD
CORESET Reference Channel		CR.3.1 TDD
OCNG Patterns		OCNG pattern 1
TRS configuration		TRS.2.1 TDD
PDSCH/PDCCH TCI state		TCI.State.2
SMTC configuration		SMTC.1 FR2
SSB Configuration		SSB.3 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120 kHz
PUCCH/PUSCH subcarrier spacing	kHz	120 kHz
EPRE ratio of PSS to SSS		
EPRE ratio of PBCH DMRS to SSS		
EPRE ratio of PBCH to PBCH DMRS		
EPRE ratio of PDCCH DMRS to SSS	dB	0
EPRE ratio of PDCCH to PDCCH DMRS	uБ	0
EPRE ratio of PDSCH DMRS to SSS		
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS(Note 1)		

EPRE rat	EPRE ratio of OCNG to OCNG DMRS (Note				
1)					
Propagat	ion condition	on condition - AWGN			
Note 1:	Note 1: OCNG shall be used such that the retransmitted power spectral density is				
Note 2:	Interference from other cells and no	ise sources not specified in the test is assumed to be constant over			
	subcarriers and time and shall be m	odelled as AW	/GN of appropriate power for $N_{\!oc}$ to be fulfilled.		
Note 3:	lo levels have been derived from oth parameters themselves.	ner parameters	s for information purposes. They are not settable		
Note 4:	Equivalent power received by an an	ntenna with 0 dBi gain at the centre of the quiet zone			
Note 5:	As observed with 0 dBi gain antenna	a at the centre	of the quiet zone		

Table A.7.4.3.1.2-3A: OTA related test parameters

	Parameter	Unit	Tes	st 1	
			T1	T2	
	arrival configuration		Setup 1 according	to clause A.3.15.1	
Assumpt	ion for UE beams ^{Note}		Fi	ne	
N_{oc} Note:		dBm/15kHz ^{Note4}	-112		
N_{oc} Note:	ı	dBm/SCS ^{Note3}	-1	03	
\hat{E}_s/N_{oc}		dB	4		
SS-RSR	DNote2	dBm/SCS Note4	-6	99	
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$		dB	4	4	
Io ^{Note2}		dBm/95.04 MHz Note4	-68	8.5	
Note 1:		ner cells and noise sources no rriers and time and shall be n			
	for $N_{\!oc}$ to be fulfille	d.			
Note 2:		els have been derived from one of settable parameters them		nformation	
Note 3:	SS-RSRP minimum noise at each receive	requirements are specified as er antenna port.	ssuming independent	interference and	
Note 4:	Equivalent power red	ceived by an antenna with 0d		of the quiet zone	
Note 5:		Bi gain antenna at the centre			
Note 6:		bes of UE beam is given in Bast system implementation	.2.1.3, and does not li	imit UE	

Table A.7.4.3.1.2-4: Sounding Reference Symbol Configuration for timing advance

Field	Value	Comment		
c-SRS	16	Francisco de ameio e in dischlad		
b-SRS	0	Frequency hopping is disabled		
b-hop	0			
freqDomainPosition	0	Frequency domain position of SRS		
freqDomainShift	0			
groupOrSequenceHopping	neither	No group or sequence hopping		
SRS-PeriodicityAndOffset	sl5=4	Once every 5 slots		

pathlossReferenceRS	ssb-Index=0	SSB #0 is used for SRS path loss estimation		
usage	Codebook	Codebook based UL transmission		
startPosition	0	resourceMapping setting. SRS on last		
nrofSymbols	n1	symbol of slot, and 1symbols for SRS		
repetitionFactor	n1	without repetition.		
combOffset-n2	0	transmissionComb setting		
cyclicShift-n2	0	transmissionComb setting		
nrofSRS-Ports	port1	Number of antenna ports used for SRS		
		transmission		
Note: For further information see cla	use 6.3.2 in TS 38	.331 [2].		

A.7.4.3.1.3 Test Requirements

The UE shall apply the signalled Timing Advance value to the transmission timing at the designated activation time i.e. k+1 slots after the reception of the timing advance command, where k = 11.

The Timing Advance adjustment accuracy shall be within the limits specified in clause 7.3.2.2.

The rate of correct Timing Advance adjustments observed during repeated tests shall be at least 90%.

A.7.5 Signaling characteristics

A.7.5.1 Radio link Monitoring

In the following clause, any uplink signal transmitted by the UE is used for detecting the In-/Out-of-Sync state of the UE. In terms of measurement, the uplink signal is verified on the basis of the UE output power:

Editor note: The metric for the detection of the UE UL transmitted signal by the TE is FFS.

A.7.5.1.1 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in non-DRX mode

A.7.5.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.7.5.1.1.1-1. The test parameters are given in Tables A.7.5.1.1.1-2, A.7.5.1.1.1-3, and A.7.5.1.1.1-4 below. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.1.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.7.5.1.1.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In addition to RLM-RS radio link monitoring using SSB index 0 and SSB index 1, the UE is configured to perform inter-frequency measurements using Gap Pattern ID #0 (40ms) in test 1.

Table A.7.5.1.1.1-1: Supported test configurations for FR2 PCell

	Configuration	Description
•	1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz

Table A.7.5.1.1.1-2: General test parameters for FR2 out-of-sync testing in non-DRX mode

	Parameter		Unit	Value		
				Test 1		
Active DCell				Call 4		
Active PCell RF Channel Nur	mhor			Cell 1 1		
	nbei	Confin 1		TDD		
Duplex mode BW _{channel}		Config 1 Config 1		100: N _{RB,c} = 66		
Data RBs allocated						
DL initial BWP c		Config 1 Config 1		24 DLBWP.0.1		
	WP configuration	Config 1	+	DLBWP.0.1 DLBWP.1.1		
UL initial BWP c		Config 1	+	ULBWP.0.1		
UL dedicated BV		Config 1		ULBWP.1.1		
TDD Configurati		Config 1	+	TDDConf.3.1		
RMSI CORESE		Config 1	+	CR.3.1 TDD		
Channel	Reference	Corning		CR.S.T TDD		
	ESET Reference	Config 1		CCR.3.4 TDD		
Channel	ESET Reference	Corning		CCR.3.4 TDD		
SSB Configuration	on	Config 1		SSB.1 FR2		
SMTC Configura		Config 1		SMTC.1		
PDSCH/PDCCH		Config 1	+	120 KHz		
spacing	Subcarrier	Coming		120 KHZ		
PRACH Configu	ration	Config 1		Table A.3.8.3.1		
SSB index assig		Config 1		0,1		
OCNG paramete		Coming i		OP.5		
CP length	515			Normal		
Out of sync	DCI format			1-0		
transmission		rol OFDM symbols		2		
parameters	Aggregation lev		CCE	8		
paramotoro		etical PDCCH RE	dB	4		
		ge SSS RE energy	ub l	4		
	Ratio of hypothe	etical PDCCH DMRS	dB	4		
		ge SSS RE energy		-		
	DMRS precoder			REG bundle size		
	REG bundle size			6		
DRX	TREE Barraio GIE	<u> </u>		OFF		
Gap pattern ID				gp0		
Layer 3 filtering				Enabled		
T310 timer			ms	0		
T311 timer			ms	1000		
N310				1		
N311				1		
CSI-RS for CSI		Config 1		CSI-RS.3.1 TDD		
reportConfigTyp	е			periodic		
reportQuantity				cri-RI-PMI-CQI		
CSI reporting periodicity			slot	40		
CSI reporting offset		slot	4			
TCI states for PI				TCI.State.2		
CSI-RS for track	ring	Config 1		TRS.2.1 TDD		
T1			s	0.2		
T2			S	9.68		
T3			S	9.68		
D1			S	9.64		
Note 1: All co	nfigurations are as	signed to the UE prior	to the start of tin	ne period T1.		

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Note 6:

Table A.7.5.1.1.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for out-of-sync radio link monitoring tests in non-DRX mode

	Paran	neter	Unit			Te	st 1		
				T1	T2	Т3	T1	T2	Т3
AoA setu	p				Setup 3 defined in A.3.15				
				AoA1	•		AoA2		
Assumpti	Assumption for UE beams Note 5				Rough Rough				
EPRE rat	io of PDCCH	DMRS to SSS	dB		4			Not sent	
EPRE rat	io of PDCCH	to PDCCH DMRS	dB		0				
EPRE rat	io of PBCH D	MRS to SSS	dB						
EPRE rat	io of PBCH to	PBCH DMRS	dB						
EPRE rat	io of PSS to	SSS	dB						
EPRE rat	io of PDSCH	DMRS to SSS	dB						
EPRE rat	io of PDSCH	to PDSCH DMRS	dB						
EPRE rat	io of OCNG [DMRS to SSS	dB						
EPRE rat	io of OCNG t	o OCNG DMRS	dB						
ssb-Index	0 SNR	Config 1	dB	2 ^{Note 6}	-6 ^{Note 6}	-15			
ssb-Index	(1 SNR	Config 1			Not sent		2 ^{Note 6}	-15	-15
N_{oc}		Config 1	dBm/		-92.1			-92.1	
OC .			15kHz						
	tiplexing of th				Define	ed in Figu	re A.7.5.	1.1.1-2	
transmiss	sions from ea	ch AoA							
	ion condition				A 30ns 7			A 30ns	
Note 1:		I be used such that a o	constant to	otal trans	mitted pov	ver spect	ral densit	y is achie	ved for
	all OFDM s		_			_			
Note 2:		contains PDCCH for U					s part of (OCNG.	
Note 3:			er the SS				_		
Note 4:			supports			ne band. I	For		
		UE which supports 4R							
Note 5:		about types of UE bea	am is give	n in B.2.	1.3 and do	es not lin	nit UE imp	olementat	ion or
	test system	implementation.							

Table A.7.5.1.1.1-4: Measurement gap configuration for out-of-sync tests in non-DRX mode

This value allows up to 1dB degradation from applied SNR to UE baseband

Field	Test 1		
Field	Value		
gapOffset	0		

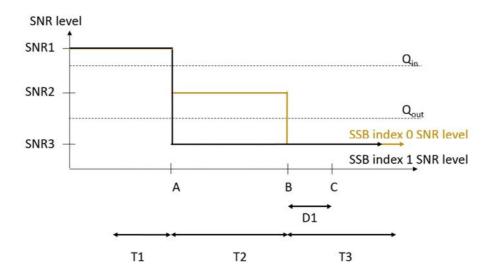


Figure A.7.5.1.1.1-1: SNR variation for out-of-sync testing

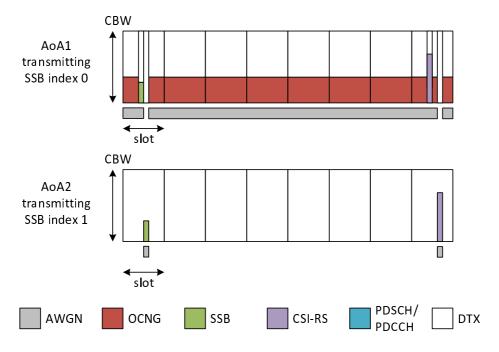


Figure A.7.5.1.1.1-2: Time multiplexed downlink transmissions

A.7.5.1.1.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.2 Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in non-DRX mode

A.7.5.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.7.5.1.2.1-1. The test parameters are given in Tables A.7.5.1.2.1-2, and A.7.5.1.2.1-3 below. There is one cell (Cell 1), which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.2.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states, and Figure A.7.5.1.2.1-2 shows the Time multiplexed downlink transmissions from each Angle of Arrival. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. Prior to the start of the time duration T1, the UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms.

Table A.7.5.1.2.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz

Table A.7.5.1.2.1-2: General test parameters for FR2 in-sync testing in non-DRX mode

Paramete	r	Unit	Value		
			Test 1		
Anti-un DCnII			Call 4		
Active PCell			Cell 1		
RF Channel Number	0 0 - 4		1		
Duplex mode	Config 1		TDD		
BW _{channel}	Config 1		100: N _{RB,c} = 66		
Data RBs allocated	Config 1		24		
DL initial BWP configuration	Config 1		DLBWP.0.1		
DL dedicated BWP	Config 1		DLBWP.1.1		
configuration					
UL initial BWP configuration	Config 1		ULBWP.0.1		
UL dedicated BWP	Config 1		ULBWP.1.1		
configuration					
TDD Configuration	Config 1		TDDConf.3.1		
RMSI CORESET Reference	Config 1	CR.3.1 TDD			
Channel					
Dedicated CORESET	Config 1	CCR.3.1 TDD			
Reference Channel					
SSB Configuration	Config 1		SSB.1 FR2		
SMTC Configuration	Config 1		SMTC.3		
PDSCH/PDCCH subcarrier	Config 1	120 KHz			
spacing					
PRACH Configuration	Config 1		Table A.3.8.3.1		
SSB index assigned as RLM	Config 1	0,1			
RS			,		
OCNG parameters	•		OP.5		
CP length			Normal		
DCI format			1-0		
Number of Co	ntrol OFDM symbols		2		

In sync transmission parameters Ratio of hypothetical PDCCH RE energy to average SSS RE energy	1		
Darameters	4		
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size Out of sync transmission parameters DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer MS N310 N311 CSI-RS for CSI reporting CSI-RS for CSI reporting CSI reporting periodicity CSI reporting periodicity CSI reporting periodicity SI tastes for PDCCH/PDSCH CSI-RS for tracking Config 1 S T2 S S	0		
DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size Out of sync transmission parameters REG bundle size DCI format Number of Control OFDM symbols Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size DRX Gap pattern ID Layer 3 filtering T310 timer T310 timer T310 timer T310 timer T310 timer T310 timer T310 timer T310 timer T310 timer T310 timer T310 timer T310 timer T311 timer MS N310 N311 CSI-RS for CSI reporting Config 1 reportConfigType reportQuantity CSI reporting periodicity CSI reporting periodicity SI reporting offset TCI states for PDCCH/PDSCH CSI-RS for tracking Config 1 T1 S T2	0		
DMRS precoder granularity REG bundle size DCI format	U		
DMRS precoder granularity REG bundle size			
REG bundle size	DEC horadia sina		
Out of sync transmission parameters Number of Control OFDM symbols Aggregation level CCE Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size DRX Gap pattern ID Layer 3 filtering T310 timer ms T311 timer ms T311 timer ms N310 N311 CSI-RS for CSI reporting Config 1 reportConfigType reportQuantity CSI reporting periodicity CSI reporting periodicity Slot CSI-RS for tracking Config 1 T1 S T2 S T2 S S T2 S S T2 T1 T1 T1 T1 T1 T1 T1	REG bundle size		
transmission parameters Number of Control OFDM symbols Aggregation level CCE Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size DRX Gap pattern ID Layer 3 filtering T310 timer ms T311 timer ms T311 timer ms T311 timer ms T311 timer ms T311 timer ms T311 timer ms T311 timer ms T311 timer ms T311 timer ms T311 timer	6		
Parameters Aggregation level Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size DRX Gap pattern ID Layer 3 filtering T310 timer ms T311 timer ms N310 N311 CSI-RS for CSI reporting Config 1 reportConfigType reportQuantity CSI reporting periodicity CSI reporting offset slot TCI states for PDCCH/PDSCH CSI-RS for tracking Config 1 T1 s T2 S T2	1-0		
Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer MS N310 N311 CSI-RS for CSI reporting Config 1 reportConfigType reportQuantity CSI reporting periodicity CSI reporting offset TCI states for PDCCH/PDSCH CSI-RS for tracking Config 1 T1 S T2 S	2		
energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer MS N310 N311 CSI-RS for CSI reporting reportConfigType reportQuantity CSI reporting periodicity CSI reporting offset TCI states for PDCCH/PDSCH CSI-RS for tracking Config 1 T1 S T2 S	8		
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer MS N310 N311 CSI-RS for CSI reporting reportConfigType reportQuantity CSI reporting periodicity CSI reporting offset TCI states for PDCCH/PDSCH CSI-RS for tracking Config 1 S T2 S	4		
DMRS energy to average SSS RE energy DMRS precoder granularity REG bundle size DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer MS N310 N311 CSI-RS for CSI reporting reportConfigType reportQuantity CSI reporting periodicity CSI reporting offset TCI states for PDCCH/PDSCH CSI-RS for tracking Config 1 S T2 S			
energy DMRS precoder granularity REG bundle size DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer MS N310 N311 CSI-RS for CSI reporting reportConfigType reportQuantity CSI reporting periodicity CSI reporting offset TCI states for PDCCH/PDSCH CSI-RS for tracking Config 1 S T2 S	4		
DMRS precoder granularity REG bundle size DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer MS N310 N311 CSI-RS for CSI reporting reportConfigType reportQuantity CSI reporting periodicity CSI reporting offset TCI states for PDCCH/PDSCH CSI-RS for tracking T1 S T2 S			
REG bundle size DRX Gap pattern ID Layer 3 filtering T310 timer T311 timer MS N310 N311 CSI-RS for CSI reporting reportConfigType reportQuantity CSI reporting periodicity CSI reporting offset TCI states for PDCCH/PDSCH CSI-RS for tracking T1 S T2 S	DEC. III :		
DRX Gap pattern ID Layer 3 filtering T310 timer ms T311 timer ms N310 N311 CSI-RS for CSI reporting reportConfigType reportQuantity CSI reporting periodicity CSI reporting offset TCI states for PDCCH/PDSCH CSI-RS for tracking T1 S T2 S	REG bundle size		
Gap pattern ID Layer 3 filtering T310 timer ms T311 timer ms N310 N311 CSI-RS for CSI reporting Config 1 reportConfigType reportQuantity CSI reporting periodicity slot CSI reporting offset slot TCI states for PDCCH/PDSCH CSI-RS for tracking Config 1 T1 s T2 s	6		
Layer 3 filtering T310 timer ms T311 timer ms N310 N311 CSI-RS for CSI reporting Config 1 reportConfigType reportQuantity CSI reporting periodicity slot CSI reporting offset TCI states for PDCCH/PDSCH CSI-RS for tracking Config 1 T1 s T2 s	OFF		
Layer 3 filtering T310 timer ms T311 timer ms N310 N311 CSI-RS for CSI reporting Config 1 reportConfigType reportQuantity CSI reporting periodicity slot CSI reporting offset TCI states for PDCCH/PDSCH CSI-RS for tracking Config 1 T1 s T2 s	N.A.		
T311 timer ms N310 N311 CSI-RS for CSI reporting reportConfigType Config 1 reportQuantity slot CSI reporting periodicity slot CSI reporting offset slot TCI states for PDCCH/PDSCH Config 1 T1 s T2 s	Enabled		
T311 timer ms N310 N311 CSI-RS for CSI reporting reportConfigType Config 1 reportQuantity slot CSI reporting periodicity slot CSI reporting offset slot TCI states for PDCCH/PDSCH Config 1 T1 s T2 s	4000		
N311 CSI-RS for CSI reporting Config 1 reportConfigType reportQuantity CSI reporting periodicity slot CSI reporting offset slot TCI states for PDCCH/PDSCH CSI-RS for tracking Config 1 T1 s T2 s	1000		
CSI-RS for CSI reporting Config 1 reportConfigType reportQuantity CSI reporting periodicity slot CSI reporting offset slot TCI states for PDCCH/PDSCH CSI-RS for tracking Config 1 T1 s T2 s	1		
reportConfigType reportQuantity CSI reporting periodicity CSI reporting offset Slot TCI states for PDCCH/PDSCH CSI-RS for tracking T1 S T2 S	1		
reportConfigType reportQuantity CSI reporting periodicity CSI reporting offset Slot TCI states for PDCCH/PDSCH CSI-RS for tracking T1 S T2 S	CSI-RS.3.1 TDD		
reportQuantity CSI reporting periodicity CSI reporting offset TCI states for PDCCH/PDSCH CSI-RS for tracking T1 S T2 S S S S S S S S S S S S S	periodic		
CSI reporting periodicity slot CSI reporting offset slot TCI states for PDCCH/PDSCH CSI-RS for tracking Config 1 T1 s T2 s	cri-RI-PMI-CQI		
CSI reporting offset slot TCI states for PDCCH/PDSCH CSI-RS for tracking T1 s T2 s	40		
TCI states for PDCCH/PDSCH CSI-RS for tracking Config 1 T1 s T2 s	4		
CSI-RS for tracking Config 1 T1 s T2 s	TCI.State.2		
T1 s s s s	TRS.2.1 TDD		
T2 s	0.2		
	0.2		
	1.88		
T4 s	0.2		
T5 s	3.84		
D1 s	3.8		
Note 1: All configurations are assigned to the UE prior to the start of time			

Note 1: All configurations are assigned to the GE prior to the start of time period 11.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.7.5.1.2.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for in-sync radio link monitoring tests in non-DRX mode

Parameter	Unit	Test 1									
		T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
AoA setup			Setup 3 defined in A.3.15								
				AoA1					AoA2		
Assumption for UE beams Note 5			Rough Rough								
EPRE ratio of PDCCH DMRS to SSS	dB		0			Not sent					
EPRE ratio of PDCCH to PDCCH DMRS	dB		0								
EPRE ratio of PBCH DMRS to SSS	dB										
EPRE ratio of PBCH to PBCH DMRS	dB										
EPRE ratio of PSS to SSS	dB										
FPRF ratio of PDSCH DMRS to SSS	dB	1									

EPRE ratio of PDSCH	to PDSCH DMRS	dB										
EPRE ratio of OCNG I	DMRS to SSS	dB										
EPRE ratio of OCNG t	to OCNG DMRS	dB										
ssb-Index 0 SNR	Config 1	dB	2 ^{Note 6}	-6 ^{Note 6}	-15	-4.5	2 ^{Note 6}					
ssb-Index 1 SNR	Config 1			Not sent		2 ^{Note 6}	-15	-15	-15	-15		
N_{oc}	Config 1	dBm/			-92.1				-92.1			
<i>oc</i>		15kHz										
Time multiplexing of the	ne downlink		Defined in Figure A.7.5.1.2.1-2									
transmissions from ea	ch AoA											
Propagation condition				TDL-A 30ns 75Hz TDL-A 30ns 75Hz					TDL	-A 30ns 7		

- Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.
- Note 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.7.5.1.2.1-4: Void

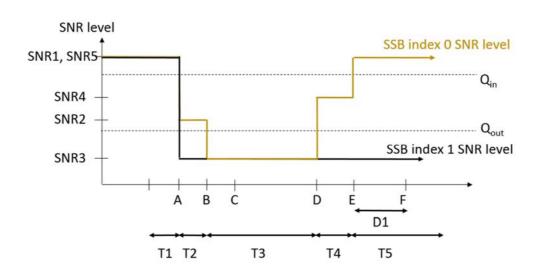


Figure A.7.5.1.2.1-1: SNR variation for in-sync testing

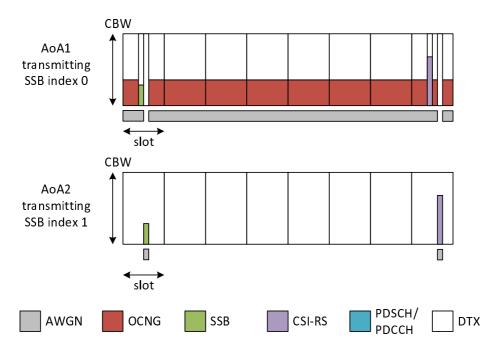


Figure A.7.5.1.2.1-2: Time multiplexed downlink transmissions

A.7.5.1.2.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.3 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode

A.7.5.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.7.5.1.3.1-1. The test parameters are given in Tables A.7.5.1.3.1-2, and A.7.5.1.3.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.3.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.1.3.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD, SSB SCS 120 KHz, data SCS 120KHz, BW 100 MHz

Table A.7.5.1.3.1-2: General test parameters for FR2 out-of-sync testing in DRX mode

	Parameter	Unit		Value
				Test 1
Active PCell				Cell 1
	RF Channel Number			1
Duplex mode		Config 1		TDD
BW _{channel}		Config 1		100: N _{RB,c} = 66
Data RBs alloc	ated	Config 1		66
DL initial BWP	configuration	Config 1		DLBWP.0.1
DL dedicated E	BWP	Config 1		DLBWP.1.1
configuration				
UL initial BWP		Config 1		ULBWP.0.1
UL dedicated E	BWP	Config 1		ULBWP.1.1
configuration				
TDD Configura		Config 1		TDDConf.3.1
RMSI CORESE	ET Reference	Config 1		CR.3.1 TDD
Channel				
Dedicated COF	_	Config 1		CCR.3.4 TDD
Reference Cha				
SSB Configura		Config 1		SSB.1 FR2
SMTC Configu		Config 1		SMTC.1
PDSCH/PDCC	H subcarrier	Config 1		120 KHz
spacing				
PRACH Config		Config 1		Table A.3.8.3.1
SSB index assi RS	SB index assigned as RLM Config 1			0,1
OCNG parame	OCNG parameters			OP.1
CP length				Normal
Out of sync				1-0
transmission		ntrol OFDM symbols		2
parameters	Aggregation le		CCE	8
		netical PDCCH RE age SSS RE energy	dB	4
			dB	4
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE		GB	7
	energy	to avolage eee re		
	DMRS precoder granularity			REG bundle size
	REG bundle size			6
DRX Configura	DRX Configuration			DRX.3
	Gap pattern ID			N.A.
	Layer 3 filtering			Enabled
T310 timer				0
T311 timer				1000
N310				1
N311				1
CSI-RS for CS	reporting	Config 1		CSI-RS.3.1 TDD
reportConfigTy				periodic
reportQuantity				cri-RI-PMI-CQI
CSI reporting p	eriodicity		slot	40
CSI reporting of			slot	4
	PDCCH/PDSCH			TCI.State.2

CSI-RS for tracking Config 1		TRS.2.1 TDD
T1	S	0.2
T2	S	14.48
T3	S	14.48
D1	S	14.44

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.7.5.1.3.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for out-of-sync radio link monitoring tests in DRX mode

Paramete	er	Unit	Test 1				
		T1	T2	Т3			
AoA setup			Setup 1 defined in A.3.15				
Assumption for UE beams	Note 5		Rough				
EPRE ratio of PDCCH DM	RS to SSS	dB	4				
EPRE ratio of PDCCH to P	DCCH DMRS	dB		0			
EPRE ratio of PBCH DMR	S to SSS	dB					
EPRE ratio of PBCH to PB	CH DMRS	dB					
EPRE ratio of PSS to SSS	dB						
EPRE ratio of PDSCH DMI	dB	0					
EPRE ratio of PDSCH to P	DSCH DMRS	dB					
EPRE ratio of OCNG DMR	S to SSS	dB					
EPRE ratio of OCNG to OC	dB						
ssb-Index 0 SNR	Config 1	dB	2 ^{Note 6} -6 ^{Note 6}				
ssb-Index 1 SNR	Config 1		2 ^{Note 6}	-15	-15		
N_{oc}	Config 1	dBm/15K Hz	-104.7dBm				
Propagation condition			TDL-A 30ns 75Hz				
	used such that the r				nstant total		
transmitted power spectral density is achieved for all OFDM symbols. Note 2: The signal contains PDCCH for UEs other than the device under test as part of OCNG.							

SNR levels correspond to the signal to noise ratio over the SSS REs. Note 3:

Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Information about types of UE beams is given in B.2.1.3 and does not limit UE implementation Note 5: or test system implementation.

Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.7.5.1.3.1-4: Void

Table A.7.5.1.3.1-5: Void

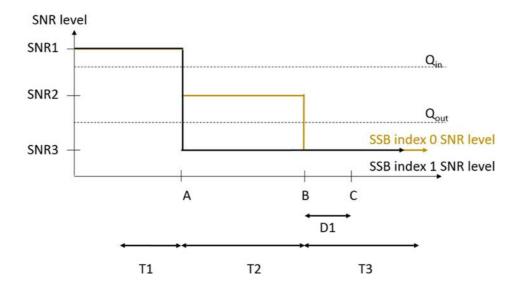


Figure A.7.5.1.3.1-1: SNR variation for out-of-sync testing

A.7.5.1.3.2 Test Requirements

The UE behavior in each test during time durations T1, T2 and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The UE shall stop transmitting uplink signal no later than time point C (D1 second after the start of the time duration T3).

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.4 Radio Link Monitoring In-sync Test for FR2 PCell configured with SSB-based RLM RS in DRX mode

A.7.5.1.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync and in sync for the purpose of monitoring downlink radio link quality of the PCell when DRX is used. This test will partly verify the FR2 radio link monitoring requirements in clause 8.1.

In the test, UE is configured to perform RLM on SSB, with *detectionResource* included in *RadioLinkMonitoringRS* set to SSB#0 and SSB#1, and *purpose* set to 'rlf'. Supported test configurations are shown in table A.7.5.1.4.1-1. The test parameters are given in Tables A.7.5.1.4.1-2, and A.7.5.1.4.1-3. There is one cell (Cell 1), which is the active NR cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.4.1-1 shows the variation of the downlink SNR in the active cell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to Cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CSI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.1.4.1-1: Supported test configurations for FR2 PCell

Configuration Description

Table A.7.5.1.4.1-2: General test parameters for FR2 in-sync testing in DRX mode

Parameter		Unit	Value	
Asther DOsll				Test 1
Active PCell				Cell 1
RF Channel Nu	umber	Config 1		1
Duplex mode				TDD
BW _{channel}		Config 1		100: N _{RB,c} = 66
Data RBs alloc		Config 1		66
DL initial BWP		Config 1		DLBWP.0.1
DL dedicated E	3WP	Config 1		DLBWP.1.1
configuration	aanfinuration	Confin 1		ULBWP.0.1
UL initial BWP UL dedicated B		Config 1		ULBWP.1.1
configuration	SVVP	Config 1		ULBWP.1.1
TDD Configura	tion	Config 1		TDDConf.3.1
RMSI CORESE	T Poforonco	Config 1 Config 1		CR.3.1 TDD
Channel	I Reference	Coning i		CK.3.1 100
Dedicated COF	RESET	Config 1		CCR.3.1 TDD
Reference Cha		Oorning 1		0011.0.1 100
SSB Configura		Config 1		SSB.1 FR2
SMTC Configur		Config 1		SMTC.3
PDSCH/PDCC		Config 1		120 KHz
spacing	i i Subcamer	Coning 1		120 1(1)2
PRACH Config	uration	Config 1		Table A.3.8.3.1
SSB index assi		Config 1		0,1
RS				<u> </u>
OCNG parame	ters			OP.1
CP length				Normal
In sync	DCI format			1-0
transmission		ntrol OFDM symbols		2
parameters	Aggregation le		CCE	4
		netical PDCCH RE	dB	0
		age SSS RE energy		_
	Ratio of hypoth		dB	0
		to average SSS RE		
	energy			DEO hamalla a'aa
	DMRS precode			REG bundle size
Out of our	REG bundle si	ze		6
Out of sync transmission	DCI format	stual OCDM as usala ala		1-0
parameters		ntrol OFDM symbols	005	2
parameters	Aggregation le		CCE	<u>8</u> 4
		netical PDCCH RE	dB	4
	Ratio of hypoth	age SSS RE energy	dB	4
		to average SSS RE	uБ	4
<u> </u>		to average 555 INL		
energy DMRS precode		er granularity		REG bundle size
REG bundle size				6
DRX Configuration			DRX.11	
Gap pattern ID			N.A.	
Layer 3 filtering			Enabled	
T310 timer	1		ms	4000
T311 timer			ms	1000
N310			0	1
N311				1
INOTT			·	

CSI-RS for CSI reporting	Config 1		CSI-RS.3.1 TDD	
reportConfigType			periodic	
reportQuantity			cri-RI-PMI-CQI	
CSI reporting periodicity		slot	40	
CSI reporting offset		slot	4	
TCI states for PDCCH/PDSCH			TCI.State.2	
CSI-RS for tracking	Config 1		TRS.2.1 TDD	
T1		S	0.2	
T2		S	0.2	
T3		S	2.8	
T4		S	0.2	
T5		S	3.88	
D1	•	S	3.84	
Note 1: All configurations are assigned to the UE prior to the start of time period T1.				
Note 2: UE-specific PDCCH is not transmitted after T1 starts.				

Table A.7.5.1.4.1-3: OTA related cell specific test parameters for FR2 (Cell 1) for in-sync radio link monitoring test in DRX mode

Parameter		Unit			Test 1			
				T1	T2	T3	T4	T5
AoA setu	р				Setup 1	defined	in A.3.1	15
Assumpti	on for UE bear	ms Note 5			•	Rough		
EPRE rat	tio of PDCCH [DMRS to SSS	dB			0		
EPRE rat	tio of PDCCH to	o PDCCH DMRS	dB			0		
EPRE rat	tio of PBCH DN	MRS to SSS	dB					
EPRE rat	tio of PBCH to	PBCH DMRS	dB					
EPRE rat	tio of PSS to S	SS	dB					
EPRE rat	tio of PDSCH D	OMRS to SSS	dB			0		
EPRE rat	tio of PDSCH to	o PDSCH DMRS	dB					
EPRE ratio of OCNG DMRS to SSS		dB						
EPRE ratio of OCNG to OCNG DMRS		dB						
ssb-Index	x 0 SNR	Config 1	dB	2 ^{Note}	- - Note	-15	-4.5	2 ^{Note 6}
				6	6 ^{Note}			
ssb-Index	x 1 SNR	Config 1	1	2 ^{Note}	-15	-15	-15	-15
N_{oc} Config 1		dBm/1 5KHz	-104.7dBm					
Propagat	ion condition				TDL	-A 30ns	75Hz	
Note 1: OCNG shall be used such that the res			sources in	Cell 1 a	are fully	allocate	d and a	
constant total transmitted power spect								
Note 2: The signal contains PDCCH for UEs of		other than	the dev	ice unde	er test as	s part of		
OCNG.3								
Note 3: SNR levels correspond to the signal to noise ratio over the SSS REs.								
Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one								

Note 4: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.

Note 5: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.

Note 6: This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.7.5.1.4.1-4: Void Table A.7.5.1.4.1-5: Void

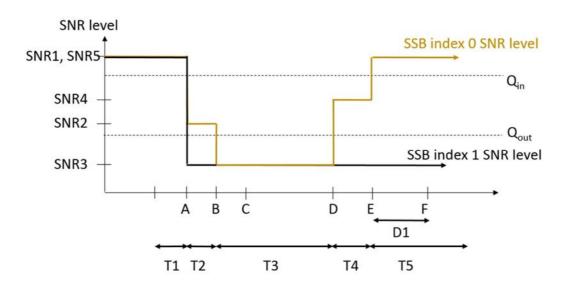


Figure A.7.5.1.4.1-1: SNR variation for in-sync testing

A.7.5.1.4.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.5 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

A.7.5.1.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR2 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.5.1-1, A.7.5.1.5.1-2, A.7.5.1.5.1-3 and A.7.5.1.5.1-4 below. There is one cell, cell 1 which is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.5.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.5.1-1: Supported test configurations for FR2 PCell

Configuration	Description

Table A.7.5.1.5.1-2: General test parameters for FR2 PCeII for CSI-RS out-of-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
BW _{channel}	Config 1		100: N _{RB,c} = 66
Data RBs allocated	Config 1		24
BW _{occupied}	Config 1		24
DL initial BWP	Config 1		DLBWP.0.1
configuration			
DL dedicated BWP	Config 1		DLBWP.1.4
configuration			
UL initial BWP	Config 1		ULBWP.0.1
configuration			
UL dedicated BWP	Config 1		ULBWP.1.4
configuration			
RMSI CORESET	Config 1		CR.3.1 TDD
Reference Channel			
Dedicated	Config 1		CCR.3.4 TDD
CORESET			CCR.3.6 TDD
Reference Channel			
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing			
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD
			Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD
			TRS.2.2 TDD
TCI configuration for F			TCI.State.2
TCI configuration for F	PDCCH#2		TCI.State.3
OCNG parameters			OP.5
CP length			Normal
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE	dB	4
	energy to average CSI-RS RE		
	energy	ID.	
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average CSI-RS		
	RE energy		DEO harrelle elle
	DMRS precoder granularity		REG bundle size
DDV	REG bundle size		6 OFF
DRX			
Gap pattern ID			*gp0
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1

CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting			
reportConfigType			periodic
reportQuantity			cri-RI-PMI-CQI
CSI reporting periodicity		slot	40
CSI reporting offset		slot	4
T1		S	0.2
T2		S	0.35
T3		S	0.35
D1		S	0.31
Note 1: UE-specific PDCCH is not transmitted after T1 starts.			

Table A.7.5.1.5.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in non-DRX mode

Parameter		Unit	Test 1					
			T1	T2	T3	T1	T2	Т3
AoA setup				Setup 3 defined in A.3.15				
			AoA1				AoA2	
Assumption for UE be	eams Note 10			Rough			Rough	
EPRE ratio of PDCCH	I DMRS to SSS	dB		4				
EPRE ratio of PDCCH	to PDCCH DMRS	dB						
EPRE ratio of PBCH	DMRS to SSS	dB						
EPRE ratio of PBCH	o PBCH DMRS	dB						
EPRE ratio of PSS to	SSS	dB						
EPRE ratio of PDSCH	I DMRS to SSS	dB		0			Not sent	
EPRE ratio of PDSCH	to PDSCH DMRS	dB						
EPRE ratio of OCNG	DMRS to SSS	dB						
EPRE ratio of OCNG	to OCNG DMRS	dB						
SNR on RLM-RS1	Config 1	dB	2 ^{Note 11}	-6 ^{Note}	-15			
SNR on RLM-RS2	Config 1			Not sent	I	2 ^{Note 11}	-14	-15
N_{oc}	Config 1	dBm/ 15kHz		-92.1			-92.1	
Propagation condition			TDL-C 300ns 100Hz TDL-C 30		C 300ns 1	00Hz		

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2 and T3 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.1.5.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.
- Note 10: Information about types of UE beams is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband.

Table A.7.5.1.5.1-4: Measurement gap configuration for FR2 CSI-RS out-of-sync radio link monitoring in non-DRX mode

	Field		
	Field		
	gapOffset	0	
Note 1:	RLM RS is partially overlapped with		
measurement gap			

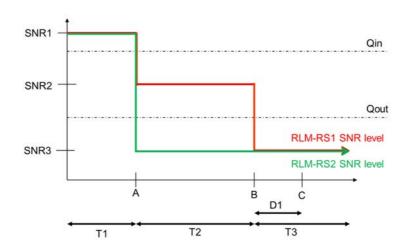


Figure A.7.5.1.5.1-1: SNR variation for CSI-RS out-of-sync testing

A.7.5.1.5.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 no later than time point C (D_1 second after the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.6 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in non-DRX mode

A.7.5.1.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when no DRX is used. This test will partly verify the FR2 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.6.1-1, A.7.5.1.6.1-2 and A.7.5.1.6.1-3 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.6.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, DRX configuration is not enabled. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.6.1-1: Supported test configurations for FR2 PCell

Configuration	Description	
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth	

Table A.7.5.1.6.1-2: General test parameters for FR2 PCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
BW _{channel}	Config 1		100: N _{RB,c} = 66
Data RBs allocated	Config 1		24
BW _{occupied}	Config 1		24
DL initial BWP	Config 1		DLBWP.0.1
configuration			
DL dedicated BWP	Config 1		DLBWP.1.4
configuration			
UL initial BWP	Config 1		ULBWP.0.1
configuration			
UL dedicated BWP	Config 1		ULBWP.1.4
configuration			
RMSI CORESET	Config 1		CR.3.1 TDD
Reference Channel			
Dedicated	Config 1		CCR.3.1 TDD
CORESET			CCR.3.3 TDD
Reference Channel			
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing			
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD
			Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD
			TRS.2.2 TDD
TCI configuration for F			TCI.State.2
TCI configuration for F	PDCCH#2		TCI.State.3
OCNG parameters			OP.5
CP length			Normal
Out of sync	DCI format		1-0
transmission	Number of Control OFDM		2
parameters	symbols		
	Aggregation level	CCE	8
	Ratio of hypothetical PDCCH RE	dB	4
	energy to average CSI-RS RE		
	energy		
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average CSI-RS		
	RE energy		DEC by "
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync transmission	DCI format		1-0
parameters	Number of Control OFDM		2
	symbols	005	+
	Aggregation level	CCE	4

	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	0
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	0
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			OFF
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	1000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI reporting	Config 1		CSI-RS.3.1 TDD
reportConfigType			periodic
reportQuantity			cri-RI-PMI-CQI
CSI reporting periodic	ity	slot	40
CSI reporting offset		slot	4
T1		S	0.2
T2		S	0.2
T3		S	0.24
T4		S	0.2
T5		S	0.88
D1		S	0.84
Note 1: UE-specific	PDCCH is not transmitted after T1 sta	arts.	

Table A.7.5.1.6.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter	Unit	Test 1									
		T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
AoA setup					Setu	p 3 defi	ned in A	۸.3.15			
				AoA1					AoA2		
Assumption for UE beams Note				Rough					Rough		
EPRE ratio of PDCCH DMRS to SSS	dB			0							
EPRE ratio of PDCCH to PDCCH DMRS	dB										
EPRE ratio of PBCH DMRS to SSS	dB										
EPRE ratio of PBCH to PBCH DMRS	dB										
EPRE ratio of PSS to SSS	dB								Not sen	ıt	
EPRE ratio of PDSCH DMRS	dB										
to SSS				0							
EPRE ratio of PDSCH to PDSCH DMRS	dB										
EPRE ratio of OCNG DMRS to SSS	dB										
EPRE ratio of OCNG to OCNG DMRS	dB										

SNR on RS1	RLM-	Config 1	dB	2 ^{Note} 11	- 6 ^{Note} 11	-15	-4.5	2 ^{Note} 11					
SNR on RS2	RLM-	Config 1				Not sen	t		2 ^{Note}	-14	-15	-15	-14
N_{oc}		Config 1	dBm/ 15KHz		-92.1			-92.1					
Propaga	ation condition				TDL-C	300ns	100Hz			TDL-C	300ns	100Hz	
Note 1:	OCNG	shall be used s	such that t	he reso	urces ir	n Cell 1	are full	y alloca	ted and	a cons	tant tot	al	
	transm	itted power spe	ctral dens	ity is ac	hieved	for all (DFDM s	ymbols					
Note 2:	The up	link resources f	or CSI rep	orting a	are assi	igned to	the UE	E prior to	o the st	art of tir	ne perio	od T1.	
Note 3:													
Note 4:	Measu	rement gap cor	figuration	juration is assigned to the UE prior to the start of time period T1.									
Note 5:	The tim	ners and layer 3	filtering r	elated p	lated parameters are configured prior to the start of time period T1.								
Note 6:	The sig	nal contains Pl	OCCH for	UEs oti	ner thar	the de	vice un	der test	as par	t of OCI	NG.		
Note 7:	SNID IO	vels correspon	d to the si	ot lean	nnica ra	atio ove	r the SS	SS RFc	-				

- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.5.1.6.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband

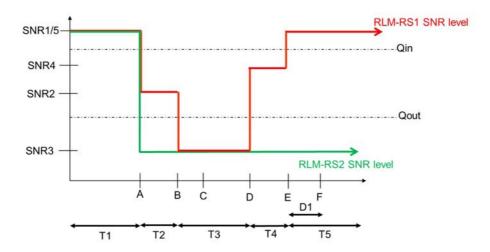


Figure A.7.5.1.6.1-1: SNR variation for CSI-RS in-sync testing

A.7.5.1.6.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.7 Radio Link Monitoring Out-of-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode

A.7.5.1.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the out of sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR2 PCell CSI-RS Out-of-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.7.1-1, A.7.5.1.7.1-2, and A.7.5.1.7.1-3 below. There is one cell, cell 1 is the PCell, in the test. The test consists of three successive time periods, with time duration of T1, T2 and T3 respectively. Figure A.7.5.1.7.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.7.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.1.7.1-2: General test parameters for FR2 PCell for CSI-RS out-of-sync testing in DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
DL initial BWP	Config 1		DLBWP.0.1
configuration			
DL dedicated BWP	Config 1		DLBWP.1.1
configuration			
UL initial BWP	Config 1		ULBWP.0.1
configuration			
UL dedicated BWP	Config 1		ULBWP.1.1
configuration			
RMSI CORESET	Config 1		CR.3.1 TDD
Reference Channel			
Dedicated	Config 1		CCR.3.4 TDD
CORESET			CCR.3.6 TDD
Reference Channel			000 4 500
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH	Config 1		120 KHz
subcarrier spacing			
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD
			Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD
			TRS.2.2 TDD
TCI configuration for F			TCI.State.2
TCI configuration for F	PDCCH#2		TCI.State.3
OCNG parameters			OP.1
CP length			Normal
	DCI format		1-0

Out of sync transmission	Number of Control OFDM		2
parameters	symbols Aggregation level	CCE	8
parameters	Ratio of hypothetical PDCCH RE energy to average CSI-RS RE energy	dB	4
	Ratio of hypothetical PDCCH DMRS energy to average CSI-RS RE energy	dB	4
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			N.A.
Layer 3 filtering			Enabled
T310 timer		ms	0
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting			n o vio di o
reportConfigType reportQuantity			periodic cri-RI-PMI-CQI
CSI reporting periodic	ity	slot	40
CSI reporting offset	ny .	slot	4
T1		S	0.2
T2		S	1.28
T3		S	1.28
D1		S	1.24
	PDCCH is not transmitted after T1 sta	_	

Table A.7.5.1.7.1-3: Cell specific test parameters for FR2 for CSI-RS out-of-sync radio link monitoring in DRX mode

Parameter	Unit	Test 1						
		T1	T2	T3				
AoA setup	dB	S	etup 1 defined in A.3.	15				
Assumption for UE beams Note 10			Rough					
EPRE ratio of PDCCH DMRS to SSS	dB		4					
EPRE ratio of PDCCH to PDCCH DMRS	dB							
EPRE ratio of PBCH DMRS to SSS	dB							
EPRE ratio of PBCH to PBCH DMRS	dB							
EPRE ratio of PSS to SSS	dB							
EPRE ratio of PDSCH DMRS to SSS	dB		0					
EPRE ratio of PDSCH to PDSCH DMRS	dB							
EPRE ratio of OCNG DMRS to SSS	dB							
EPRE ratio of OCNG to OCNG DMRS	dB							
SNR on Config 1 RLM-RS1	dB	2 ^{Note 11}	-6 ^{Note 11}	-15				

SNR on RLM-RS2	Config 1	dB	2 ^{Note 11}	-14	-15	
N_{oc}	Config 1	dBm/15KHz	-104.7			
Propagat	ion condition			TDL-C 300ns 100Hz		
Note 1:	OCNG shall be used su	ch that the resources	in Cell 1 are fully alloc	cated and a constant t	otal transmitted	
	power spectral density is	s achieved for all OFD	OM symbols.			
Note 2:	The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.				eriod T1.	
Note 3:	NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of t					
	period T1.	· ·		•		
Note 4:	Measurement gap config	guration is assigned to	o the UE prior to the s	tart of time period T1.		
Note 5:	The timers and layer 3 fi	iltering related parame	eters are configured p	rior to the start of time	e period T1.	
Note 6:	The signal contains PD0	CCH for UEs other tha	an the device under te	st as part of OCNG.	,	
Note 7:	SNR levels correspond	to the signal to noise	ratio over the SSS RE	s. '		
Note 8:	The SNR in time periods	s T1, T2 and T3 is der	noted as SNR1, SNR2	2 and SNR3 respective	ely in figure	
	A.7.5.1.7.1-1.			•	, ,	
Note 9:						
Note 10:	Information about types implementation.				ation or test system	

This value allows up to 1dB degradation from applied SNR to UE baseband

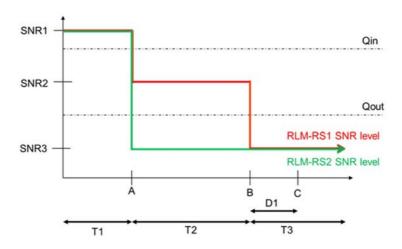


Figure A.7.5.1.7.1-1: SNR variation for CSI-RS out-of-sync testing

A.7.5.1.7.2 Test Requirements

The UE behaviour during time durations T1, T2, and T3 shall be as follows:

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 (PCell) at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

The UE shall stop transmitting uplink signal in Cell 1 (PCell) no later than time point C (D_1 secondafter the start of the time duration T3) on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.8 Radio Link Monitoring In-sync Test for FR2 PCell configured with CSI-RS-based RLM in DRX mode

A.7.5.1.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects the in sync for the purpose of monitoring downlink CSI-RS based radio link quality of the PCell when DRX is used. This test will partly verify the FR2 PCell CSI-RS In-sync radio link monitoring requirements in clause 8.1.

The test parameters are given in Tables A.7.5.1.8.1-1, A.7.5.1.8.1-2, A.7.5.1.8.1-3 and A.7.5.1.8.1-4 below. There is one cells, cell 1which is the PCell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.1.8.1-1 shows the variation of the downlink SNR in the PCell to emulate out-of-sync and in-sync states. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 10 ms. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test. In the test, SSB0 and SSB1 are configured as BFD-RS.

Table A.7.5.1.8.1-1: Supported test configurations for FR2 PSCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.1.8.1-2: General test parameters for FR2 PCell for CSI-RS in-sync testing in non-DRX mode

	Parameter	Unit	Value
			Test 1
Active PCell			Cell 1
RF Channel Number			1
Duplex mode	Config 1		TDD
TDD Configuration	Config 1		TDDConf.3.1
DL initial BWP configuration	Config 1		DLBWP.0.1
DL dedicated BWP configuration	Config 1		DLBWP.1.1
UL initial BWP configuration	Config 1		ULBWP.0.1
UL dedicated BWP configuration	Config 1		ULBWP.1.1
RMSI CORESET Reference Channel	Config 1		CR.3.1 TDD
Dedicated CORESET Reference Channel	Config 1		CCR.3.1 TDD CCR.3.3 TDD
SSB Configuration	Config 1		SSB.1 FR2
SMTC Configuration	Config 1		SMTC.1
PDSCH/PDCCH subcarrier spacing	Config 1		120 KHz
CSI-RS for RLM	Config 1		Resource #4 in TRS.2.1 TDD Resource #4 in TRS.2.2 TDD
TRS configuration			TRS.2.1 TDD TRS.2.2 TDD
TCI configuration for F	PDCCH#1/PDSCH		TCI.State.2
TCI configuration for F			TCI.State.3
OCNG parameters			OP.1
CP length			Normal
-	DCI format		1-0

Out of sync	Number of Control OFDM		2
transmission	symbols		2
parameters	Aggregation level	CCE	8
parameters	Ratio of hypothetical PDCCH RE	dB	4
	energy to average CSI-RS RE	uБ	4
	energy		
	Ratio of hypothetical PDCCH	dB	4
	DMRS energy to average CSI-RS	uБ	4
	RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
In sync transmission	DCI format		1-0
parameters	Number of Control OFDM		2
paramotoro	symbols		2
	Aggregation level	CCE	4
	Ratio of hypothetical PDCCH RE	dB	0
	energy to average CSI-RS RE	45	Ğ
	energy		
	Ratio of hypothetical PDCCH	dB	0
	DMRS energy to average CSI-RS		_
	RE energy		
	DMRS precoder granularity		REG bundle size
	REG bundle size		6
DRX			DRX.3
Gap pattern ID			*gp0
Layer 3 filtering			Enabled
T310 timer		ms	2000
T311 timer		ms	1000
N310			1
N311			1
CSI-RS for CSI	Config 1		CSI-RS.3.1 TDD
reporting			
reportConfigType			periodic
reportQuantity			cri-RI-PMI-CQI
CSI reporting periodic	ity	slot	40
CSI reporting offset		slot	4
T1		S	0.2
T2		S	0.2
T3		S	1.64
T4		S	0.2
T5		S	1.88
D1		S	1.84
Note 1: UE-specific	PDCCH is not transmitted after T1 sta	arts.	

Table A.7.5.1.8.1-3: Cell specific test parameters for FR2 for CSI-RS in-sync radio link monitoring in non-DRX mode

Parameter	Unit	Test 1						
		T1	T2	T3	T4	T5		
AoA setup	dB		Setu	o 1 defined in A	A.3.15			
Assumption for UE beams Note 10				Rough				
EPRE ratio of PDCCH DMRS to SSS	dB		0					
EPRE ratio of PDCCH to PDCCH DMRS	dB							
EPRE ratio of PBCH DMRS to SSS	dB							
EPRE ratio of PBCH to PBCH DMRS	dB			0				

EPRE ratio of PSS to SSS		dB					
EPRE ratio of PDSCH DMRS to SSS		dB					
EPRE ratio of PDSCH to PDSCH DMRS		dB					
EPRE ratio of OCNG DMRS to SSS		dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR on RLM-RS1	Config 1	dB	2 ^{Note 11}	-6 ^{Note 11}	-15	-4.5	2 ^{Note 11}
SNR on RLM-RS2	Config 1	dB	2 ^{Note 11}	-14	-15	-15	-14
N_{oc} Config 1 dB		dBm/15KHz	-104.7				
Propagation condition			TDL-C 300ns 100Hz				

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Measurement gap configuration is assigned to the UE prior to the start of time period T1.
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2, SNR3, SNR4 and SNR5 respectively in figure A.7.5.1.8.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is A.3.6.
- Note 10: Information about types of UE beams is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband.

Table A.7.5.1.8.1-4: Measurement gap configuration for FR2 CSI-RS in-sync radio link monitoring in non-DRX mode

	Field	Test 1			
	Field				
	gapOffset	0			
Note 1:	RLM RS is partially overlapped with				
	measurement gap				

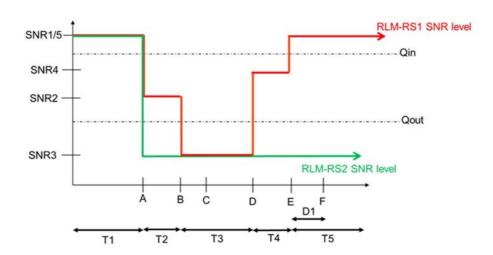


Figure A.7.5.1.8.1-1: SNR variation for CSI-RS in-sync testing

A.7.5.1.8.2 Test Requirements

The UE behaviour in each test during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the period from time point A to time point F (D1 second after the start of time duration T5) the UE shall transmit uplink signal at least in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting on the PCell.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.1.9 UE Radio Link Monitoring Scheduling Restrictions on FR2

A.7.5.1.9.1 Test Purpose and Environment

The purpose is to verify that the NR UE correctly follows the RLM scheduling restrictions requirements defined in clause 8.1.7. This test verifies that the UE correctly receive the PDCCH scheduled on the symbols right before the RLM SSB symbols without overlap so that it sends ACK/NACK correctly. The test case is only applicable to UE which supports pdcch-MonitoringAnyOccasions or pdcch-MonitoringAnyOccasionsWithSpanGap.

The test parameters are given in table A.7.5.1.9.1-1, table A.7.5.1.9.1-2 and table A.7.5.1.9.1-3 below. The UE is required during time period T1 to transmit ACK/NACK correctly upon scheduling of PDSCH.

Table A.7.5.1.9.1-1: Supported test configurations

Configuration	Description				
1	120 kHz SSB SCS, 120 kHz RMC SCS, 100 MHz bandwidth, TDD duplex mode				

Table A.7.5.1.9.1-2: General test parameters for NR RLM scheduling restriction test case in FR2

Parameter	Unit	Test	Value	Comment
		configuration		
RF Channel Number		1	1	
SSB configuration		1	SSB.1 FR2	
SMTC configuration		1	SMTC	
			pattern 1	
DRX cycle length	S	1	OFF	

T1	S	1	5	During T1 the UE is required to correctly
				transmit ACK/NACK

Table A.7.5.1.9.1-3: Cell specific test parameters for NR RLM scheduling restriction test case in FR2

Parameter	Unit	Test	Cell 1	
		configuration		
AoA setup		1	Setup 3 defined in A.3.15.3	
			AoA1	AoA2
Assumption for UE			Rough	Rough
beams Note 1				
TDD configuration		1	TDDC	
BW _{channel}	MHz	1		RB,c = 66
Data RBs allocated		1	_	4
PDSCH Reference		1	SR.3.2 TDD	Not sent
measurement				
channel				
RMSI CORESET		1	CR.3.1 TDD	Not sent
RMC configuration				
Dedicated CORESET		1	CCR.3.2 TDD	Not sent
RMC configuration				
TRS configuration		1	TRS.2.1 TDD	TRS.2.2 TDD
PDCCH/PDSCH TCI		1	TCI.State.2	N/A
state				
OCNG Pattern		1	OP.5 defined in	Not sent
			A.3.2.1	
Initial DL BWP		1	DLBV	/P.0.1
configuration				
Initial UL BWP		1	ULBWP.0.1	
configuration				
RLM-RS		1	SSB with index 0	SSB with index 1
N/	dBm/15kHz	1	-92.1	-92.1
N_{oc}				
N_{oc} Note2	dBm/SCS	1	-83.1	-83.1
TV _{oc} Note				
\hat{E}_s/N_{oc}	dB	1	2	2
Ê _s /I _{ot BB} Note 4	dB	1	1	1
- s / * ot BB Note 4	ID (0.00		04.4	24.4
SSB_RP Note3	dBm/SCS	1	-81.1	-81.1
lo	dBm/95.04 MHz	1	-54.35	-54.35
Time multiplexing		1	Defined in Figure A.7.5.1.9.1-1	
transmissions fr	rom each AoA		_	
Propagation		1	AWGN	AWGN
Condition				

Note 1: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

or N_{oc} to be fulfilled.

Note 3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

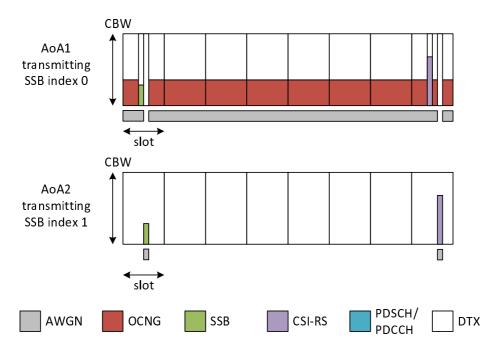


Figure A.7.5.1.9.1-1: Time multiplexed downlink transmissions

A.7.5.1.9.2 Test Requirements

The UE behaviour follows the requirements defined in clause 8.1.7.3.

A.7.5.2 Interruption

A.7.5.2.1 Interruptions during measurements on deactivated NR SCC in FR2

A.7.5.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE missed ACK/NACK rate does not exceed the limits at NR PSCell interruptions during the measurement on the deactivated NR SCC. This test will verify the missed ACK/NACK rate for PCell in standalone NR specified in clause 8.2.2.2. Supported test configurations are shown in table A.7.5.2.1.1-1.

The general test parameters and NR cell specific test parameters are given in Table A.7.5.2.1.1-2 and A.7.5.2.1.1-3 below. In the test there are two cells: Cell1 and Cell2. Cell1 is PCell, Cell2 is an NR deactivated SCell. Cell1 shall be configured as PCell and Cell2 shall be configured as SCell.

The test consists of one time period, with duration of T1. Prior to the start of the time duration T1, the UE is connected to Cell1 and Cell2. The point in time at which the RRC message including *measCycleSCell* or *allowInterruptions* for the deactivated NR SCells is received at the UE antenna connector, defines the start of time period T1. During T1, PCell is continuously scheduled in DL.

Table A.7.5.2.1.1-1: Interruptions during measurements on deactivated NR SCC supported test configurations

Config	Description				
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD – TDD duplex mode				

Table A.7.5.2.1.1-2: General test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	Two NR RF channels
Active PCell		Cell1	PCell on NR RF channel number 1.
Configured deactivated SCell		Cell2	Deactivated SCell on NR RF channel number 2.
CP length		Normal	Applicable to Cell1 and Cell2
DRX		OFF	
Measurement gap pattern Id		OFF	
SCell measurement cycle (measCycleSCell)	ms	640	
T1	S	10	

Table A.7.5.2.1.1-3: NR cell specific test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter		Unit	Cell1	Cell2	
Frequency Range			FR2		
Duplex mode			TDD		
TDD configuration			TDDC	onf.3.1	
BW _{channel}			100 MHz:	N _{RB,c} = 66	
Data RBs allocated				66	
Initial DL BWP			DLBWF	P.0.2 ^{Note4}	
Configuration					
Initial UL BWP			ULBWF	P.O.2 Note6	
Configuration					
Downlink dedicated			DLBV	VP.1.1	
BWP Configuration					
Uplink dedicated			ULBV	VP.1.1	
BWP configuration					
PDSCH Reference			SR.3.	1 TDD	
measurement					
channel					
RMSI CORESET			CR.3.1 TDD		
parameters					
Dedicated			CCR.3.1 TDD		
CORESET					
parameters					
OCNG Patterns			0	P.1	
SMTC Configuration			SM	TC.1	
SSB Configuration				1 FR2	
TCI State			TCI.State.0		
TRS Configuration			TRS.2.1 TDD		
Correlation Matrix and	d Antenna		1x2 Low		
Configuration					
EPRE ratio of PSS to	SSS				
EPRE ratio of PBCH	EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH		1			
DMRS					
EPRE ratio of PDCCH DMRS to					
SSS		dB	0	0	
EPRE ratio of PDCCH to PDCCH					
DMRS					
EPRE ratio of PDSCH DMRS to					
SSS					
EPRE ratio of PDSCI	H to PDSCH				

defined in clause 12 of of TS 38.213 [3].

EPRE ra	tio of OCNG DMRS to				
SSS(Note 1)					
EPRE ra	tio of OCNG to OCNG				
DMRS (I	Note 1)				
Time offs	Time offset to Cell1 Note 3		-	3	
Propagation Condition			AWGN		
Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.				
Note 2:	Void				
Note 3:	Receive time difference between slot boundaries of signals received from the two cells at the UE antenna connector including time alignment error between the two cells.				
Note 4:	For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2 is linked with ULBWP.0.2				

Table A.7.5.2.1.1-4: OTA related test parameters for interruptions during measurements on deactivated NR SCC in standalone NR

Parameter		Unit	Cell 1	Cell 2	
Angle of arrival configuration			Setup1 according	Setup 1according	
-			to table A.3.15.1	to table A.3.15.1	
Assumption for UE	beams Note 6		Rough	Rough	
	NR_TDD_FR2_A				
	NR_TDD_FR2_B			-104.7	
N_{oc} Note1	NR_TDD_FR2_F	dBm/15kHz	-104.7		
	NR_TDD_FR2_G	dbiii/15ki iz	-104.7	-10-1.7	
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
	NR_TDD_FR2_A				
	NR_TDD_FR2_B		-95.7	-95.7	
N_{oc} Note1	NR_TDD_FR2_F	dBm/SCS			
OC .	NR_TDD_FR2_G	ubiii/303			
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
	NR_TDD_FR2_A			-88.7	
	NR_TDD_FR2_B				
SS-RSRPNote2	NR_TDD_FR2_F	dBm/120KH	-88.7		
33-N3NF	NR_TDD_FR2_G	z Note3			
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
\hat{E}_s/N_{oc} \hat{E}_s/I_{ot}		dB	7	7	
\hat{E}_{s}/I_{ot}		dB	7	7	
	NR_TDD_FR2_A				
Io ^{Note2}	NR_TDD_FR2_B			-58.92	
	NR_TDD_FR2_F	dBm/95.04	50.00		
	NR_TDD_FR2_G	MHz Note4	-58.92		
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
Note 1: Interfere	nce from other cells and	noice cources n	at appoified in the too	t is seemmed to be	

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone

Note 6:	Information about types of UE beams is given in B.2.1.3 and does not limit UE
	implementation or test system implementation.

A.7.5.2.1.2 Test Requirements

The UE shall be continuously scheduled on PCell during the entire length of T1. During the time duration T1 the UE shall transmit at least 99.5% of ACK/NACK on PCell.

If the NR PCell is not in the same band as the deactivated SCell, the UE is only allowed to cause interruptions on NR PCell immediately before and immediately after an SMTC. Each interruption on NR PCell shall not exceed the value defined in Table A.7.5.2.1.2-1.

If the NR PCell is in the same band as the deactivated SCell, the UE is only allowed to cause an interruption on PCell no earlier than 4 slots before an SMTC and no later than 4 slots after the SMTC. The interruption on NR PCell shall not exceed the value defined in Table A.7.5.2.1.2-2.

Table A.7.5.2.1.2-1: Interruption duration if the PCell is not in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	4

Table A.7.5.2.1.2-2: Interruption duration if the PCell is in the same band as the deactivated SCell

μ	NR Slot length (ms)	Interruption length (slot)
3	0.125	8 + SMTC duration

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.3 SCell Activation and Deactivation Delay

A.7.5.3.1 SCell Activation and deactivation for SCell in FR2 intra-band in non-DRX

A.7.5.3.1.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.6.5.3.1.1 except the PCell and SCell are in FR2 intra-band.

The supported test configurations are shown in table A.7.5.3.1.1-1 below. The general test parameters are the same as defined in Table A.6.5.3.1.1-2 except those described in Tables A.7.5.3.1.1-2, and cell specific test parameters are described in Tables A.7.5.3.1.1-3. OTA related test parameters are shown in table A.7.5.3.1.1-4 below.

Table A.7.5.3.1.1-1: Supported test configurations for FR2 SCell activation case

Configuration	Description
1	NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode

Table A.7.5.3.1.1-2: General test parameters for FR2 SCell activation case

Parameter	Unit	Value	Comment

RF Channel Number		Two NR radio channels are used for this
	1,2	test, cell 1 and cell2 use RF channel 1 and
		2, respectively.

Table A.7.5.3.1.1-3: Cell specific test parameters for FR2 SCell activation case

Parameter ^{Note 5}	Unit		Cell 1		Cell 2			
Parameter	Unit	T1	T1 T2 T		T1	T2	T3	
SSB ARFCN			freq1			freq2		
Duplex mode				TI	DD			
TDD configuration		TDDConf.3.1						
Downlink initial BWP Configuration		DLBWP.0.1						
Downlink dedicated BWP Configuration		DLBWP.1.1						
Uplink initial BWP configuration				ULBV	VP.0.1			
Uplink dedicated BWP configuration				ULBV	VP.1.1			
TRS configuration				TRS.2	.1 TDD			
TCI state				TCI.S	state.0			
BWchannel	MHz			100: N	00: N _{RB,c} = 66			
Data RBs allocated			66			66		
PDSCH Reference measurement channel		;	SR.3.1 TDI)		-		
RMSI CORESET Parameters		(CR.3.1 TDI)	-			
Dedicated CORESET Parameters		C	CR.3.1 TD	D D	-			
OCNG Patterns					P.1			
SSB Configuration				SSB.	B.1 FR2			
SMTC Configuration			SMTC.1					
CSI-RS configuration for CSI reporting				CSI-RS.	3.1 TDD			
reportConfigType			periodic			N/A		
reportQuantity		C	ri-RI-PMI-C	:QI		N/A		
CSI reporting periodicity	slot		40			N/A		
CSI reporting offset	slot		4			N/A		
EPRE ratio of PSS to SSS								
EPRE ratio of PBCH_DMRS to SSS								
EPRE ratio of PBCH to PBCH_DMRS								
EPRE ratio of PDCCH_DMRS to SSS								
EPRE ratio of PDCCH to PDCCH_DMRS	dB				n			
EPRE ratio of PDSCH_DMRS to SSS	uБ	0						
EPRE ratio of PDSCH to PDSCH_DMRS								
EPRE ratio of OCNG DMRS to SSSNote 1								
EPRE ratio of OCNG to OCNG DMRS Note								
1								
Propagation conditions					'GN			
Note 1: OCNG shall be used such that bot	h cells are full	y allocated	and a cons	stant total t	ransmitted	power spe	ectral	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void Note 5: Void

Table A.7.5.3.1.1-4: OTA related test parameters for FR2 SCell activation case

Parameter	Unit	Cell 1			Cell 2		
Faranietei	Offic	T1	T2	T3	T1	T2	Т3
Angle of arrival configuration		Setup 1 according to table A.3.15.1			Setup 1 according to table A.3.15.1		
Assumption for UE beams Note 7		Rough		Rough			
Note1	dBm/15kHz ^N		-104.7			-104.7	

Note1	dBm/SCS ^{Note}	-95.7	-95.7
\hat{E}_s/N_{oc}	dB	7	7
SSB_RPNote2	dBm/SCS Note4	-88.7	-88.7
\hat{E}_{s}/I_{ot}	dB	7	7
Io ^{Note2}	dBm/95.04 MHz Note4	-58.92	-58.92

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for to be fulfilled.

Note 2: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: Void

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: Void Note 6: Void

Note 7: Implementation about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test

system implementation.

A.7.5.3.1.2 Test Requirements

The test requirements defined in clause A.6.5.3.1.2 shall apply to this test case, except $T_{activation_time}$ will be replaced with the value $T_{FirstSSB} + 5ms$ as defined in clause 8.3.

A.7.5.3.2 SCell Activation and deactivation for FR1+FR2 inter-band with target SCell in FR2

A.7.5.3.2.1 Test Purpose and Environment

The purpose of this test case is the same as for the test defined in clause A.7.5.3.1.1 except the PCell is in FR1 and SCell is in FR2.

The supported test configurations are defined in Table A.7.5.3.2.1-1. The general test parameters are the same as defined in Table A.6.5.3.1.1-2 except that the length of T2 is 2s. And cell specific test parameters are described in Tables A.7.5.3.2.1-2. OTA related test parameters are defined in Table A.7.5.3.2.1-3.

At the beginning of T1 the UE receives an RRC message by which the SCell (Cell 2) becomes configured on NR. During T1 the SCell is powered off and UE is not aware of SCell.

A MAC message for activation of SCell is sent by the test equipment 100ms after the RRC message, in a slot # denoted m. The point in time at which the MAC message for activation of SCell is received at the UE antenna connector defines the start of time period T2.

During T2, the test equipment monitors the L1-RSRP measurement reporting for the SCell. The time when test equipment receives a valid L1-RSRP report is denoted as slot $m+T_{L1-RSRP}$. In the next DL slot after slot $m+T_{L1-RSRP}$, the test equipment sends a MAC message for the activation of the TCI state of the RMC CORESET of the SCell. In the same slot, the test equipment also sends an RRC message to configure the CSI-RS resources for SCell.

Time period T3 starts when a MAC message for deactivation of the SCell, sent from the test equipment to the UE in a slot # denoted n, is received at the UE antenna connector.

The test equipment verifies that potential interruption is carried out in the correct time span by monitoring ACK/NACK sent in PCell and PCell during activation of SCell, respectively.

The test equipment verifies the activation time by counting the slots from the time when the SCell activation command is sent until a CSI report with other than CQI index 0 is received.

The test equipment verifies the deactivation time by counting the slots from the time when the SCell1 deactivation command is sent until CSI reporting for SCell1 is discontinued.

Table A.7.5.3.2.1-1: Supported test configurations for FR2 SCell activation case

Configuration	Description				
1	PCell: 15 kHz SSB SCS, 10MHz bandwidth, FDD duplex mode				
	Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
2	PCell: 15 kHz SSB SCS, 10MHz bandwidth, TDD duplex mode				
	Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
3	PCell: 30kHz SSB SCS, 40MHz bandwidth, TDD duplex mode				
	Target SCell: 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode				
Note: The UE is on	Note: The UE is only required to pass in one of the supported test configurations				

Table A.7.5.3.2.1-2: Cell specific test parameters for FR2 SCell activation case

Darame	ParameterNote 5		Cell 1			Cell 2		
	etel	Unit	T1	T2	T3	T1	T2	Т3
SSB ARFCN				Freq1			Freq2	
Duplex mode	Config 1			FDD			TDD	
	Config 2,3	TDD)			
	Config 1		Not Applicable					
TDD configuration	Config 2		TDDConf.1.1			TDDConf.3	.1	
	Config 3		TDDConf.2.1					
Downlink initial BWP Configuration	Config 1,2,3				DLBWP	.0.1		
Downlink dedicated BWP Configuration	Config 1,2,3				DLBWP	.1.1		
Uplink initial BWP configuration	Config 1,2,3				ULBWP	.0.1		
Uplink dedicated BWP configuration	Config 1,2,3				ULBWP	.1.1		
TRS configuration	Config 1,2,3		N/A			TRS.2.1 TDD		
TCI state	Config 1,2,3				TCI.Sta	te.0		
BW _{channel}	Config 1,2	MHz	10: N _{RB,c} = 52			100: N _{RB,c} = 66		
	Config 3	IVITZ	40: Nrb,c = 106					
Data RBs allocated	Config 1,2		52	66	52	66	52	66
	Config 3		106		106		106	
PDSCH Reference	Config 1			SR.1.1 FDD				
measurement	Config 2			SR.1.1 TDD		-		
channel	Config 3			SR.2.1 TDD				
DMOLOODEOET	Config 1			CR.1.1 FDD				
RMSI CORESET	Config 2			CR.1.1 TDD			-	
Parameters	Config 3			CR.2.1 TDD				
Dedicated	Config 1			CCR.1.1 FDD)			
CORESET	Config 2			CCR.1.1 TDD)		-	
Parameters	Config 3			CCR.2.1 TDD				
OCNG Patterns					OP.			
000	Config 1,2			SSB.1 FR1			000 0 50	`
SSB configuration	Config 3			SSB.2 FR1			SSB.3 FR	2
CSI-RS configuration for CSI reporting	Config 1~3			N/A		N/A	CSI- RS.3.1 TDD Note 6	CSI- RS.3.1 TDD
reportConfigType for CSI reporting			periodic N/A			•		
reportConfigType for L1-RSRP				periodic			N/A	

reportQuantity for CSI reporting			cri-RI-PMI-CQI	N/A		
reportQuantity for L1-RSRP			ssb-Index-RSRP	N/A		
CSI reporting periodicity	Config 1,2 Config 3	slot	5 10	N/A		
L1-RSRP reporting periodicity Note 7	Config 1,2 Config 3	slot	5 10	N/A		
CSI reporting offset	Config 1,2 Config 3	slot	2 4	N/A		
L1-RSRP reporting offset	Config 1,2 Config 3	slot	2 4	N/A		
SMTC configuration	<u> </u>		SMTC.1			
EPRE ratio of PSS to						
EPRE ratio of PBCH			0			
EPRE ratio of PDCCI	H_DMRS to SSS					
EPRE ratio of PDCCI	H to PDCCH_DMRS	dB				
EPRE ratio of PDSCI	_	u u u	Ŭ			
EPRE ratio of PDSCI						
EPRE ratio of OCNG DMRS to SSSNote 1		ļ				
EPRE ratio of OCNG	EPRE ratio of OCNG to OCNG DMRS Note					
Propagation condition	าร		N/A Link only, see clause A.3.7A	AWGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Note 5: All parameters apply for configuration 1 and 2.

Note 6: CSI-RS for CSI measurement is (re)configured in the next DL slot after slot m+T_{L1-RSRP} during T2.

Note 7: L1-RSRP measurement and reporting are configured to the UE prior to the start of time period T1.

Table A.7.5.3.2.1-3: OTA related test parameters for FR1 PCell activation case with FR2 SCell

Para	meter	Unit		Cell 1		Cell 2		
raia	illetei	Offic	T1	T2	T3	T1	T2	T3
Angle of arrival configuration			N/A		According to clause A.3.15.1			
Assumption for UE b	eams ^{Note 7}			N/A			Rough	
$N_{oc}^{}$ Note 1	Config 1,2,3	dBm/15kHz			-104.7			
$N_{oc}^{}$ Note 1	Config 1,2,3	dBm/SCS				-95.7		
\hat{E}_s/N_{oc}	Config 1,2,3	dB	Link only, see clause A.3.7A		-∞	7	7	
Ê , /I , ,	Config 1,2,3	dB			-∞	7	7	
SSB_RPNote 2, Note 4	Config 1,2,3	dBm/SCS				-∞	-88.7	-88.7
Io ^{Note 2, Note 4}	Config 1,2,3	dBm/95.04 MHz				-66.68	-58.92	-58.92

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 2: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3.	Void
Note 4:	Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: Void Note 6: Void

Note 7: Information about types of UE beam is given in B.2.1.3 and does not imit UE implementation or test system implementation.

A.7.5.3.2.2 Test Requirements

During T2 the UE shall send the first CSI report for SCell in the first available uplink resource after at least one CSI-RS transmission occasion for channel measurement and reporting after slot (m+k). UE is allowed to postpone CSI report to next available UL resource if an available uplink resource is subject to interruption. Whether CSI report in a slot was interrupted is checked by monitoring ACK/NACK sent in PCell in the slot.

During T2 the UE shall start sending valid L1-RSRP report for the SCell in the configured slots for CSI reporting after slot ($m+T_{L1-RSRP}$), where $T_{L1-RSRP}$ is no larger than

$$3ms + T_{FirstSSB_MAX} + 15*T_{SMTC_MAX} + 8*T_{rs} + T_{L1\text{-RSRP, measure}} + T_{L1\text{-RSRP, report}}$$

as defined in clause 8.3.2. For this test case, $T_{FirstSSB_MAX} = T_{SMTC_MAX} = T_{rs} = 20ms$; $T_{L1-RSRP, measure} = 160ms$ and $T_{L1-RSRP, report} = 5ms$, which allows $T_{L1-RSRP}$ 680 ms.

During T2 the UE shall start sending CSI reports for the SCell with non-zero CQI index in the configured slots for CSI reporting no later than slot $m + \frac{T_{HARQ} + T_{activtion,time} + T_{CSI_Reporting}}{NR \, slot \, length}$, where

- T_{HARQ} is defined in Table A.5.5.3.1.1-2
- $-T_{activation_time} = 3ms + T_{FirstSSB_MAX} + 15*T_{SMTC_MAX} + 8*T_{rs} + T_{L1-RSRP, measure} + T_{L1-RSRP, report} + max \left\{ (T_{HARQ} + T_{uncertainty_MAC} + 5ms + T_{FineTiming}), (T_{uncertainty_RRC} + T_{RRC_delay}) \right\}, which allows 710 ms$
- T_{CSI_Reporting} = 10ms
- NR slot length is 0.125ms for this test case.

During T3 the UE shall stop sending CSI reports for both SCells no later than slot $n + \frac{T_{HARQ} + 3ms}{NR \ slot \ length}$, as defined in clause 8.3.

During T2 interruption of PCell during SCell activation shall not happen outside the slot $m+1+\frac{T_{\text{HARQ}}}{\text{NR slot length}}$ to $m+1+\frac{T_{\text{HARQ}}+3\,\text{ms}+T_{\text{X}}}{\text{NR slot length}}$, as defined in clause 8.3, where T_{X} =20ms.

During T3 the starting point of interruption of PCell during SCell deactivation shall not happen outside the slot $n + 1 + \frac{T_{HARQ}}{NR \, slot \, length}$ to $n + 1 + \frac{T_{HARQ} + 3ms}{NR \, slot \, length}$, as defined in clause 8.3.

The interruption of PCell due to activation of SCell shall not be more than the values specified for SA in Clause 8.2.2.2.7.

A.7.5.4 Void

A.7.5.5 Beam Failure Detection and Link recovery procedures

A.7.5.5.1 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode

A.7.5.5.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.1.1-1, A.7.5.5.1.1-2, A.7.5.5.1.1-3 and A.7.5.5.1.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.1.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.7.5.5.1.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled. The UE is configured to perform inter-frequency measurements using GP ID #0 (40ms) in test 1.

Table A.7.5.5.1.1-1: Supported test configurations for FR2 PCell

Configuration	Description			
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth			
2	TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth			
Note: The UE is only required to pass in one of the supported test configurations in FR2				

Table A.7.5.5.1.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Test Config.	Unit	Value	Comment
			Test 1	
Active PCell	1-2		Cell 1	
RF Channel Number	1-2		1	
Duplex mode	1-2		TDD	
TDD Configuration	1-2		TDDConf.3.1	
BW _{channel}	1-2		100: N _{RB,c} = 66	
Data RBs allocated	1-2		66	
PDSCH/PDCCH subcarrier spacing	1-2	kHz	120	
DL initial BWP configuration	1-2		DLBWP.0.1	
DL dedicated BWP configuration	1-2		DLBWP.1.1	
UL initial BWP configuration	1-2		ULBWP.0.1	
UL dedicated BWP configuration	1-2		ULBWP.1.1	
PDSCH Reference Channel	1		SR.3.2 TDD	
	2		SR.3.3 TDD	
RMSI CORESET Reference Channel	1		CR.3.1 TDD	
	2		CR.3.2 TDD	
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD	
	2		CCR.3.7 TDD	
OCNG parameters	1-2		OP.1	

001 4					1
CP length		1-2		Normal	
PDSCH/PDCCH TCI s	state	1-2		TCI.State.0	
CSI-RS for tracking		1-2		TRS.2.1 TDD	
SSB Configuration		1		SSB.1 FR2	
		2		SSB.2 FR2	
SMTC Configuration		1-2		SMTC.3	
PRACH Configuration				FR2 PRACH	
3	1-2		configuration 2	A.3.8.3.2	
DRX configuration	1-2		OFF		
SSB index assigned a	s BED RS (g ₀)	1-2		0	
SSB index assigned a		1-2		1	
SSB index assigned a		1-2		0,1	
Beam failure	DCI format	1-2		1-0	
		1-2		1-0	
detection	Number of Control	1-2		2	
transmission	OFDM symbols				
parameters	Aggregation level	1-2	CCE	8	
	Ratio of hypothetical PDCCH RE energy to	1-2	dB	0	
	average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	1-2	dB	0	
	DMRS precoder			REG bundle	
	granularity	1-2		size	
	REG bundle size	1-2		6	
Gap pattern ID	INEO bullule size	1-2		gp0	
		1-2	ma	<u>дро</u> 0	
gapOffset	*hh. = 1.d	1-2	ms	U	Makes O in analiad
rlmInSyncOutOfSyncT	nresnoid	1-2		absent	Value 0 is applied. (Table 8.1.1-1).
rsrp-ThresholdSSB		1	dBm/SCS	-95	Threshold used for
		2	ubili/303	-92	Qin_LR_SSB
powerControlOffsetSS		1-2		db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceN	MaxCount	1-2		n1	see TS 38.321 [7], clause 5.17
beamFailureDetection	Timer	1-2		pbfd4	see TS 38.321 [7], clause 5.17
CSI-RS configuration	for CSI reporting	1-2		CSI-RS.3.1 TDD	
reportConfigType		1-2		periodic	
reportQuantity		1-2		cri-RI-PMI-CQI	
CSI reporting periodic	itv	1-2	slot	40	
CSI reporting offset		1-2	slot	4	
T310		1-2	ms	1000	
N310		1-2	1110	2	
T1		1-2	S	1	The UE shall be fully synchronized to cell 1 during T1
T2		1-2	S	2.61	
T3		1-2	S	1.64	
T4		1-2	S	0	
T5		1-2	S	1.01	
D1		1-2	S	0.97	
	ations are assigned to the L				<u>l</u>
	DDCCH is not transmitted			no ponou i i.	

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.7.5.5.1.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Paramete	r	Unit			Test 1			
			T1	T2	Т3	T4	T5	
AoA setup				Setup	1 defined in	1 A.3.15		
Assumption for UE beams	Note 10		Rough					
EPRE ratio of PDCCH DN		dB			0			
EPRE ratio of PDCCH to	PDCCH DMRS	dB						
EPRE ratio of PBCH DMF	RS to SSS	dB						
EPRE ratio of PBCH to PI	BCH DMRS	dB						
EPRE ratio of PSS to SSS	6	dB						
EPRE ratio of PDSCH DM	IRS to SSS	dB						
EPRE ratio of PDSCH to	PDSCH DMRS	dB						
EPRE ratio of OCNG DMI	RS to SSS	dB						
EPRE ratio of OCNG to C	CNG DMRS	dB						
SNR_SSB of set q ₀	Config 1-2	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12	
SNR_SSB of set q ₁	Config 1-2	dB	0.2	0.2	20.2	20.2	20.2	
SSB_RP of set q ₁	Config 1	dBm/	-104.5	-104.5	-84.5	-84.5	-84.5	
	Config 2	SCS	-101.5	-101.5	-81.5	-81.5	-81.5	
λī	Config 1,2	dBm/120	-104.7					
N_{oc}	KHz							
Propagation condition			TDL-A 30ns 75Hz					
Note 1: OCNG shall be	used such that the resources in Cell 1 are fully allocated and a constant total							
transmitted pov	ver spectral densi	ty is achieved	d for all OF	FDM symbo	ls.			
Note 2: The uplink reso	ources for CSI repo	orting are ass	signed to t	he UE prior	to the star	t of time pe	riod T1.	

- NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start Note 3: of time period T1.
- Measurement gap configuration is assigned to the UE prior to the start of time period T1. Note 4:
- The timers and layer 3 filtering related parameters are configured prior to the start of time period Note 5:
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 Note 8: respectively in figure A.7.5.5.1.1-1.
- The SNR values are specified for testing a UE which supports 2RX on at least one band. For Note 9: testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- This value allows up to 1dB degradation from applied SNR to UE baseband

Table A.7.5.5.1.1-4: Void

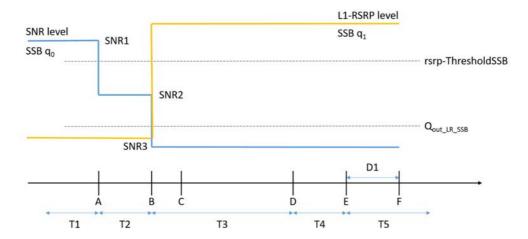


Figure A.7.5.5.1.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.1.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 960+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.2 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with SSB-based BFD and LR in DRX mode

A.7.5.5.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects SSB-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct SSB-based link recovery based on beam candidate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the SSB based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.2.1-1, A.7.5.5.2.1-2, A.7.5.5.2.1-3, A.7.5.5.2.1-4 and A.7.5.5.2.1-5 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.2.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.7.5.5.2.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCell and

DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.5.2.1-1: Supported test configurations for FR2 PCell

Configuration		Description		
1		TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth		
2		TDD duplex mode, 240 kHz SSB SCS, 100 MHz bandwidth		
Note: The UE is only required to pass in one of the supported test configurations in FR2				

Table A.7.5.5.2.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Pa	rameter	Test Config.	Unit	Value	Comment
				Test 1	
Active PCell		1-2		Cell 1	
RF Channel Number		1-2		1	
Duplex mode		1-2		TDD	
TDD Configuration		1-2		TDDConf.3.1	
BW _{channel}		1-2		100: N _{RB,c} = 66	
Data RBs allocated		1-2		66	
PDSCH/PDCCH subc	carrier spacing	1-2	kHz	120	
DL initial BWP configu		1-2		DLBWP.0.1	
DL dedicated BWP co	onfiguration	1-2		DLBWP.1.1	
UL initial BWP configu		1-2		ULBWP.0.1	
UL dedicated BWP co	onfiguration	1-2		ULBWP.1.1	
PDSCH Reference Ch	nannel	1		SR.3.2 TDD	
		2		SR.3.3 TDD	
RMSI CORESET Refe	erence Channel	1		CR.3.1 TDD	
		2		CR.3.2 TDD	
Dedicated CORESET	Reference Channel	1		CCR.3.1 TDD	
		2		CCR.3.7 TDD	
OCNG parameters		1-2		OP.1	
CP length		1-2		Normal	
PDSCH/PDCCH TCI:	state	1-2		TCI.State.0	
CSI-RS for tracking		1-2		TRS.2.1 TDD	
SSB Configuration		1		SSB.1 FR2	
_		2		SSB.2 FR2	
SMTC Configuration		1-2		SMTC.3	
PRACH Configuration	1	1-2		FR2 PRACH	A.3.8.3.2
-		1-2		configuration 2	A.3.6.3.2
DRX configuration		1-2		DRX.3	A.3.3.3
SSB index assigned a		1-2		0	
SSB index assigned a		1-2		1	
SSB index assigned a	as RLM RS	1-2		0,1	
Beam failure	DCI format	1-2		1-0	
detection	Number of Control	1-2		2	
transmission	OFDM symbols				
parameters	Aggregation level	1-2	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	1-2	dB	0	
	Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy	1-2	dB	0	

	DMRS precoder granularity	1-2		REG bundle size	
	REG bundle size	1-2		6	
Gap pattern ID	NEG bullule size	1-2		N/A	
rlmInSyncOutOfSyncT	hreshold	1-2		absent	Value 0 is applied. (Table 8.1.1-1).
rsrp-ThresholdSSB		1	dBm/SCS	-95	Threshold used for
		2	ubiii/3C3	-92	Qin_LR_SSB
powerControlOffsetSS		1-2		db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceN	/laxCount	1-2		n1	see TS 38.321 [7], clause 5.17
beamFailureDetection	Timer	1-2		pbfd4	see TS 38.321 [7], clause 5.17
CSI-RS configuration f	or CSI reporting	1-2		CSI-RS.3.1 TDD	
reportConfigType		1-2		periodic	
reportQuantity		1-2		cri-RI-PMI-CQI	
CSI reporting periodici	ty	1-2	slot	40	
CSI reporting offset		1-2	slot	4	
T310		1-2	ms	1000	
N310		1-2		2	
T1		1-2	S	1	The UE shall be fully synchronized to cell 1 during T1
T2		1-2	S	3.37	-
T3		1-2	S	2.8	
T4		1-2	S	0	
T5		1-2	S	0.61	
D1	1-2	s	0.57		
Note 1: All configura Note 2: UE-specific	ations are assigned to the PDCCH is not transmitted	e UE prior to ed after T1 st	the start of tir arts.	ne period T1.	

Table A.7.5.5.2.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in DRX mode

Parame	Unit			Test 1			
			T1	T2	Т3	T4	T5
AoA setup				Setup 1	defined in	n A.3.15	
Assumption for UE bear	ns ^{Note 10}				Rough		
EPRE ratio of PDCCH D	MRS to SSS	dB			0		
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DM	IRS to SSS	dB					
EPRE ratio of PBCH to	PBCH DMRS	dB					
EPRE ratio of PSS to SS	SS	dB					
EPRE ratio of PDSCH D	MRS to SSS	dB					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DN	/IRS to SSS	dB					
EPRE ratio of OCNG to	OCNG DMRS	dB					
SNR_SSB of set q ₀	Config 1,2	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
SNR_SSB of set q ₁	Config 1-2	dB	0.2	0.2	20.2	20.2	20.2
SSB_RP of set q ₁	Config 1	dBm/SCS	-104.5	-104.5	-84.5	-84.5	-84.5
	Config 2		-101.5	-101.5	-81.5	-81.5	-81.5

N_{oc}		Config 1-2	dBm/120 KHz	-104.7			
Propagati	on condition			TDL-A 30ns 75Hz			
Note 1:	OCNG shall be u	used such that the	e resources in	Cell 1 are fully allocated and a constant total			
	transmitted power	er spectral densit	y is achieved f	for all OFDM symbols.			
Note 2:	The uplink resou	irces for CSI repo	orting are assig	gned to the UE prior to the start of time period T1.			
Note 3:	NZP CSI-RS res	ource set configu	ration for CSI	reporting are assigned to the UE prior to the start			
	of time period T1	l.					
Note 4:	Void						
Note 5:		ayer 3 filtering re	lated paramete	ers are configured prior to the start of time period			
	T1.						
Note 6:	•			the device under test as part of OCNG.			
Note 7:				tio over the SSS REs.			
Note 8:		. , ,	,	is denoted as SNR1, SNR2 and SNR3			
		gure A.7.5.5.1.1-					
Note 9:		•	•	which supports 2RX on at least one band. For			
	0	vhich supports 4F	RX on all band	s, the SNR during T3 is modified as specified in			
	clause A.3.6.						
Note 10:		nformation about types of UE beam is given in B.2.1.3 and does not limit UE implementation or					
1	test system imple						
Note 11:	This value allows	s up to 1dB degra	adation from a	pplied SNR to UE baseband.			

Table A.7.5.5.2.1-4: Void

Table A.7.5.5.2.1-5: Void

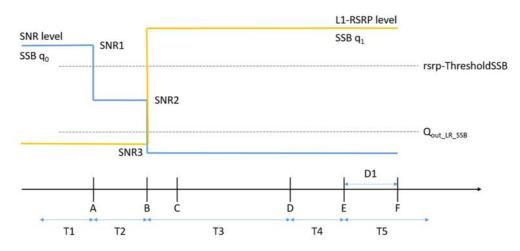


Figure A.7.5.5.2.1-1: SNR and L1-RSRP variation for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.2.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiate link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 560+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.3 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in non-DRX mode

A.7.5.5.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q₀ configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q₁. The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when no DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.3.1-1, A.7.5.5.3.1-2, and A.7.5.5.3.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.3.1-1 shows the variation of the downlink SNR of the CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.7.5.5.3.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is not enabled.

Table A.7.5.5.3.1-1: Supported test configurations for FR2 PCell

Configuration	Description				
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth				

Table A.7.5.5.3.1-2: General test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Test Config.	Unit	Value	Comment
			Test 1	
Active PCell	1		Cell 1	
RF Channel Number	1		1	
Duplex mode	1		TDD	
TDD Configuration	1		TDDConf.3.1	
BW _{channel}	1		100: N _{RB,c} = 66	
Data RBs allocated	1		66	
PDSCH/PDCCH subcarrier spacing	1	kHz	120	
DL initial BWP configuration	1		DLBWP.0.1	
DL dedicated BWP configuration	1		DLBWP.1.1	
UL initial BWP configuration	1		ULBWP.0.1	
UL dedicated BWP configuration	1		ULBWP.1.1	
PDSCH Reference Channel	1		SR.3.2 TDD	
RMSI CORESET Reference Channel	1		CR.3.1 TDD	
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD	
OCNG parameters	1		OP.1	
CP length	1		Normal	
PDSCH/PDCCH TCI state	1		TCI.State.0	

CS-RS for fractions	OOL DO (an invalidado		- 4	I	TDO 0 4 TDD	T
SMTC Configuration	CSI-RS for tracking		1	TRS.2.1 TDD		
PRACH Configuration						
DRX configuration			1			
DRX configuration	Ţ.		1			A.3.8.3.4
CSI-RS configuration for BFD/CBD/RLM 1						7
CSI-RS index assigned as BFD RS (q ₀)			1			
CSI-RS index assigned as BFD RS (q ₀)	CSI-RS configuration	for BFD/CBD/RLM	1 1			A.3.14.2
CSI-RS index assigned as CBD RS (q ₁)						7.1011.112
Deam Failure Deam						
Beam failure detection detection transmission parameters						
Number of Control OFDM symbols 1						
Parameters			1		1-0	
Parameters			1		2	
Ratio of hypothetical PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy 1						
PDCCH RE energy to average SSS RE energy Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy to average SSS RE energy DMRS precoder granularity REG bundle size 1	parameters		1	CCE	8	
Average SSS RE energy			1 dB			
Ratio of hypothetical PDCCH DMRS energy to average SSS RE energy 1					0	
PDCCH DMRS energy to average SSS RE energy						
The state of the						
energy			1	dB	0	
DMRS precoder granularity REG bundle size 1						
granularity 1					DEC bundle	
REG bundle size			1		_	
Sap pattern ID			1			
TiminSyncOutOfSyncThreshold 1	Con nottorn ID	REG buildle size				
Table 8.1.1-1). Table 9.5 Tabl	rimin Syna Out Of Syna T	hrashald	Į.		IN/A	Value O is applied
Threshold used for Qln_LR_SSB 1 dBm/SCS -95 Threshold used for Qln_LR_SSB 1 db0 Used for deriving rsp-ThresholdCSI-RS Used for deriving rsp-ThresholdCSI-RS DeamFailureInstanceMaxCount 1 n1 see TS_38.321_[7], clause 5.17 See TS_38.321_[7], clause 5.17 See TS_38.321_[7], clause 5.17 See TS_38.321_[7], clause 5.17 CSI-RS_configuration for CSI reporting 1 CSI-RS_3.1		niesnoid	1		absent	
DeamFailureInstanceMaxCount 1	rsrp-ThresholdSSB					
DeamFailureInstanceMaxCount 1			1	dBm/SCS	-95	
1	nowarControlOffootCC					
DeamFailureInstanceMaxCount	powercontrolonsetoc	•	1		db0	
beamFailureInstanceMaxCount 1 n1 see TS 38.321 [7], clause 5.17 beamFailureDetectionTimer 1 pbfd4 see TS 38.321 [7], clause 5.17 CSI-RS configuration for CSI reporting 1 CSI-RS.3.1 TDD A.3.14.2 reportConfigType 1 periodic reportQuantity 1 slot 40 CSI reporting periodicity 1 slot 4 CSI reporting offset 1 slot 4 T310 1 ms 1000 N310 1 2 The UE shall be fully synchronized to cell 1 during T1 T2 1 s 1.17 T3 1 s 0.9 T4 1 s 0.9 T4 1 s 0.31 D1 1 s 0.27			' '		abo	
Clause 5.17 DeamFailure Detection Timer 1 DeamFailure Detection Ti	heamFailureInstanceMayCount					
beamFailureDetectionTimer 1 pbfd4 see TS 38.321 [7], clause 5.17 CSI-RS configuration for CSI reporting 1 CSI-RS.3.1 TDD A.3.14.2 reportConfigType 1 periodic reportQuantity 1 cri-RI-PMI-CQI CSI reporting periodicity 1 slot 4 CSI reporting offset 1 slot 4 T310 1 ms 1000 N310 1 2 The UE shall be fully synchronized to cell 1 during T1 T2 1 s 1.17 T3 1 s 0.9 T4 1 s 0.9 T4 1 s 0.31 D1 1 s 0.27	bearin andremstancewaxcodin		1		n1	
CSI-RS configuration for CSI reporting	beamFailureDetectionTimer		1			
CSI-RS configuration for CSI reporting 1 CSI-RS.3.1 TDD A.3.14.2 reportConfigType 1 periodic reportQuantity 1 cri-RI-PMI-CQI CSI reporting periodicity 1 slot 40 CSI reporting offset 1 slot 4 T310 1 ms 1000 N310 1 2 T1 1 s 1 T1 1 s 1 T2 1 s 1.17 T3 1 s 0.9 T4 1 s 0.31 T5 1 s 0.31 D1 1 s 0.27					pbfd4	
TDD A.S. 14.2					CSI-RS.3.1	
reportConfigType 1 periodic reportQuantity 1 cri-RI-PMI-CQI CSI reporting periodicity 1 slot 40 CSI reporting offset 1 slot 4 T310 1 ms 1000 N310 1 2 T1 1 s 1 T2 1 s 1.17 T3 1 s 0.9 T4 1 s 0.31 D1 1 s 0.27			1			A.3.14.2
reportQuantity 1 cri-RI-PMI-CQI CSI reporting periodicity 1 slot 40 CSI reporting offset 1 slot 4 T310 1 ms 1000 N310 1 2 T1 The UE shall be fully synchronized to cell 1 during T1 T2 1 s 1.17 T3 1 s 0.9 T4 1 s 0.31 D1 1 s 0.27			1		periodic	
CSI reporting periodicity 1 slot 40 CSI reporting offset 1 slot 4 T310 1 ms 1000 N310 1 2 T1 The UE shall be fully synchronized to cell 1 during T1 T2 1 s 1.17 T3 1 s 0.9 T4 1 s 0 T5 1 s 0.31 D1 1 s 0.27	reportQuantity					
CSI reporting offset 1 slot 4 T310 1 ms 1000 N310 1 2 T1 The UE shall be fully synchronized to cell 1 during T1 T2 1 s 1.17 T3 1 s 0.9 T4 1 s 0 T5 1 s 0.31 D1 1 s 0.27				slot		
T310 1 ms 1000 N310 1 2 T1 1 s The UE shall be fully synchronized to cell 1 during T1 T2 1 s 1.17 T3 1 s 0.9 T4 1 s 0 T5 1 s 0.31 D1 1 s 0.27						
N310 1 2 T1 1 s 1 The UE shall be fully synchronized to cell 1 during T1 T2 1 s 1.17						
T1 1 s 1 The UE shall be fully synchronized to cell 1 during T1 T2 1 s 1.17 T3 1 s 0.9 T4 1 s 0 T5 1 s 0.31 D1 1 s 0.27						
1 s 1 synchronized to cell 1 during T1 T2 1 s 1.17 T3 1 s 0.9 T4 1 s 0 T5 1 s 0.31 D1 1 s 0.27				S		The UE shall be fully
T2 1 s 1.17 T3 1 s 0.9 T4 1 s 0 T5 1 s 0.31 D1 1 s 0.27						synchronized to cell 1
T2 1 s 1.17 T3 1 s 0.9 T4 1 s 0 T5 1 s 0.31 D1 1 s 0.27						
T3 1 s 0.9 T4 1 s 0 T5 1 s 0.31 D1 1 s 0.27	T2		1	s	1.17	
T4 1 s 0 T5 1 s 0.31 D1 1 s 0.27						
T5 1 s 0.31 D1 1 s 0.27						
D1 1 s 0.27						
		PDCCH is not transmitted a	after T1 sta			•

Table A.7.5.5.3.1-3: Cell specific test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit		Test 1					
			T1	T2	Т3	T4	T5		
AoA setup			Setup 1 defined in A.3.15						
Assumption for UE beams Note 10			Rough						
EPRE ratio of PDCCH DMRS to SSS		dB			0				
EPRE ratio of PDCCH to PDCCH DMRS		dB							
EPRE ratio of PBCH DMRS to SSS		dB							
EPRE ratio of PBCH to PBCH DMRS		dB							
EPRE ratio of PSS to SSS		dB							
EPRE ratio of PDSCH DMRS to SSS		dB							
EPRE ratio of PDSCH to PDSCH DMRS		dB							
EPRE ratio of OCNG DMRS to SSS		dB							
EPRE ratio of OCNG to OCNG DMRS		dB							
SNR_CSI-RS of set q ₀	Config 1	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12		
SNR_CSI-RS of set q ₁	Config 1	dB	0.2	0.2	20.2	20.2	20.2		
CSI-RS_RP of set q ₁	Config 1	dBm/S	-104.5	-104.5	-84.5	-84.5	-84.5		
		CS							
N_{oc} Config 1		dBm/12	-104.7						
¹ Voc		0 KHz							
Propagation condition			TDL-A 30ns 75Hz						

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the REs carrying CSI-RS.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.3.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband.

Table A.7.5.5.3.1-4: Void Table A.7.5.5.3.1-5: Void

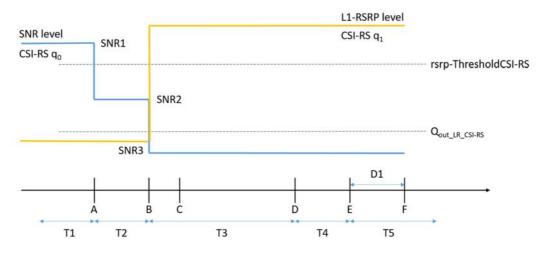


Figure A.7.5.5.3.1-1: SNR and L1-RSRP variation for CSI-RS based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.3.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q_1 .

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.4 Beam Failure Detection and Link Recovery Test for FR2 PCell configured with CSI-RS-based BFD and LR in DRX mode

A.7.5.5.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE properly detects CSI-RS-based beam failure in the set q_0 configured for a serving cell and that the UE performs correct CSI-RS-based link recovery based on beam candicate set q_1 . The purpose is to test the downlink monitoring for beam failure detection within the UEs active DL BWP, during the evaluation period, and link recovery, when DRX is used. This test will partly verify the CSI-RS based beam failure detection and link recovery for an FR2 serving cell requirements in clause 8.5.

The test parameters are given in Tables A.7.5.5.4.1-1, A.7.5.5.4.1-2, A.7.5.5.4.1-3, and A.7.5.5.4.1-4 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.4.1-1 shows the variation of the downlink SNR of the

CSI-RS in set q_0 in the active cell to emulate CSI-RS based beam failure. Figure A.7.5.5.4.1-1 additionally shows the variation of the downlink L1-RSRP of the CSI-RS in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5 ms. In the test, DRX configuration is enabled in PCell and DRX inactivity timer has already been expired, i.e. UE tries to decode PDCCH and to send periodic CQI during the period when On-duration timer is running. Time alignment timers shall be set to "infinity" so that UL timing alignment is maintained during the test.

Table A.7.5.5.4.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	TDD duplex mode, 120 kHz SSB SCS, 100 MHz bandwidth

Table A.7.5.5.4.1-2: General test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Par	rameter	Test Config.	Unit	Value	Comment
				Test 1	
Active PCell		1		Cell 1	
RF Channel Number		1		1	
Duplex mode		1		TDD	
TDD Configuration		1		TDDConf.3.1	
BW _{channel}		1		100: N _{RB,c} = 66	
Data RBs allocated		1		66	
PDSCH/PDCCH subc	arrier spacing	1	kHz	120	
DL initial BWP configu		1		DLBWP.0.1	
DL dedicated BWP co	nfiguration	1		DLBWP.1.1	
UL initial BWP configu	ration	1		ULBWP.0.1	
UL dedicated BWP co		1		ULBWP.1.1	
PDSCH Reference Ch	nannel	1		SR.3.2 TDD	
RMSI CORESET Refe	erence Channel	1		CR.3.1 TDD	
Dedicated CORESET	Reference Channel	1		CCR.3.1 TDD	
OCNG parameters		1		OP.1	
CP length		1		Normal	
PDSCH/PDCCH TCI s	state	1		TCI.State.0	
CSI-RS for tracking		1		TRS.2.1 TDD	
SSB Configuration		1		SSB.1 FR2	
SMTC Configuration		1		SMTC.3	
PRACH Configuration		1		FR2 PRACH configuration 4	A.3.8.3.4
DRX configuration		1		DRX.3	A.3.3.3
CSI-RS configuration	for BFD/CBD/RLM	1		CSI-RS.3.2 TDD	A.3.14.2
CSI-RS index assigne	d as BFD RS (q ₀)	1		0	
CSI-RS index assigne		1		1	
CSI-RS index assigne	d as RLM RS	1		0,1	
Beam failure	DCI format	1		1-0	
detection transmission	Number of Control OFDM symbols	1		2	
parameters	Aggregation level	1	CCE	8	
	Ratio of hypothetical PDCCH RE energy to average SSS RE energy	1	dB	0	
	Ratio of hypothetical PDCCH DMRS energy	1	dB	0	

12 2000 DE	1	1		T
to average SSS RE				
energy DMRS precoder			REG bundle	
granularity	1		size	
REG bundle size	1		6	
Gap pattern ID	1		N/A	
rlmlnSyncOutOfSyncThreshold	1		absent	Value 0 is applied. (Table 8.1.1-1).
rsrp-ThresholdSSB	1	dBm/SCS	-95	Threshold used for Qin_LR_SSB
powerControlOffsetSS	1		db0	Used for deriving rsrp-ThresholdCSI-RS
beamFailureInstanceMaxCount	1		n1	see TS 38.321 [7], clause 5.17
beamFailureDetectionTimer	1		pbfd4	see TS 38.321 [7], clause 5.17
CSI-RS configuration for CSI reporting	1		CSI-RS.3.1 TDD	A.3.14.2
reportConfigType	1		periodic	
reportQuantity	1		cri-RI-PMI-CQI	
CSI reporting periodicity	1	slot	40	
CSI reporting offset	1	slot	4	
T310	1	ms	1000	
N310	1		2	
T1	1	S	1	The UE shall be fully synchronized to cell 1 during T1
T2	1	S	5.43	-
T3	1	S	5.16	
T4	1	S	0	
T5	1	S	0.31	
D1	1	S	0.27	
Note 1: UE-specific PDCCH is not transmitted a	after T1 sta	arts.		

Table A.7.5.5.4.1-3: Cell specific test parameters for FR2 PCell for CSI-RS-based beam failure detection and link recovery testing in DRX mode

Parameter		Unit			Test 1		
			T1	T2	Т3	T4	T5
AoA setup				Setup 1	l defined in	A.3.15	
Assumption for UE beams	Note 10				Rough		
EPRE ratio of PDCCH DM	RS to SSS	dB			0		
EPRE ratio of PDCCH to F	PDCCH DMRS	dB					
EPRE ratio of PBCH DMR	S to SSS	dB					
EPRE ratio of PBCH to PE	CH DMRS	dB					
EPRE ratio of PSS to SSS) 	dB					
EPRE ratio of PDSCH DM	RS to SSS	dB					
EPRE ratio of PDSCH to P	PDSCH DMRS	dB					
EPRE ratio of OCNG DMR	RS to SSS	dB					
EPRE ratio of OCNG to OCNG DMRS		dB					
SNR_CSI-RS of set q ₀	Config 1	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
SNR_CSI-RS of set q ₁	Config 1	dB	0.2	0.2	20.2	20.2	20.2
CSI-RS_RP of set q ₁	Config 1	dBm/S CS	-104.5	-104.5	-84.5	-84.5	-84.5

N_{oc}		Config 1	dBm/12 0 KHz	-104.7
Propagati	on condition			TDL-A 30ns 75Hz
Note 1:	OCNG shall be u	used such that the	resources	in Cell 1 are fully allocated and a constant total
	transmitted power	er spectral density	is achieve	ed for all OFDM symbols.
Note 2:				ssigned to the UE prior to the start of time period T1.
Note 3:	NZP CSI-RS res	ource set configu	ration for C	SI reporting are assigned to the UE prior to the start
	of time period T1	l.		
Note 4:	Void			
Note 5:	The timers and la	ayer 3 filtering rela	ated param	neters are configured prior to the start of time period
	T1.			
Note 6:	•			an the device under test as part of OCNG.
Note 7:		1		ratio over the REs carrying CSI-RS.
Note 8:		' '	,	T5 is denoted as SNR1, SNR2 and SNR3
	. ,	gure A.7.5.5.4.1-1		
Note 9:				E which supports 2RX on at least one band. For
	•	hich supports 4R	X on all ba	nds, the SNR during T3 is modified as specified in
	clause A.3.6.			
Note 10:	ji 5			
	test system imple			
Note 11:	This value allows	s up to 1dB degra	dation from	n applied SNR to UE baseband.

Table A.7.5.5.4.1-4: Void

Table A.7.5.5.4.1-5: Void

Table A.7.5.5.4.1-6: Void

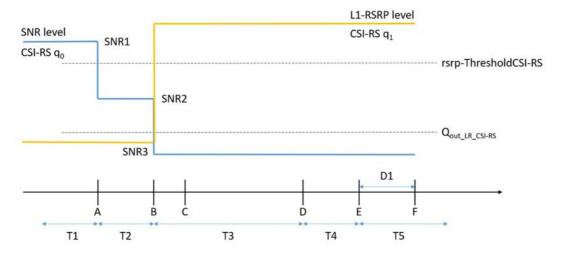


Figure A.7.5.5.4.1-1: SNR and L1-RSRP variation for CSI-RS-based beam failure detection and link recovery testing in DRX mode

A.7.5.5.4.2 Test Requirements

The UE behaviour during time durations T1, T2, T3, T4 and T5 shall be as follows:

During the time duration T1 and T2, the UE shall transmit uplink signal at least in all subframes configured for CSI transmission on Cell 1.

During the period from time point A to time point B the UE shall transmit uplink signal in Cell 1 in all uplink slots configured for CSI transmission according to the configured periodic CSI reporting for Cell 1.

During T3 the UE shall detect beam failure and initiat link recovery. During T4 and T5 the UE measures and evaluate beam candidate from beam candidate set q₁.

No later than time point F occurring no later than D1 = 260+10 ms after the start of T5, the UE shall transmit preamble on a beam associated with the candidate beam set q_1 . The UE shall not transmit preamble on a beam associated with the candidate beam set q_1 earlier than time point B.

Test is concluded once the test equipment has received the initial preamble transmission from the UE. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.5.5 Scheduling availability restriction during Beam Failure Detection and Link Recovery for FR2 PCell configured with SSB-based BFD and LR in non-DRX mode

A.7.5.5.5.1 Test Purpose and Environment

The purpose is to test scheduling availability restrictions when the UE is performing beam failure detection or when the UE is performing L1-RSRP measurement for candidate beam detection, when no DRX is used. This test will verify the scheduling availability restriction requirements in clause 8.5.7 and 8.5.8.

The test parameters are given in Tables A.7.5.5.5.1-1, A.7.5.5.5.1-2 and A.7.5.5.5.1-3 below. There is one cell, cell 1 which is the active cell, in the test. The test consists of five successive time periods, with time duration of T1, T2, T3, T4 and T5 respectively. Figure A.7.5.5.5.1-1 shows the variation of the downlink SNR of the SSB in set q_0 in the active cell to emulate SSB based beam failure. Figure A.7.5.5.5.1-1 additionally shows the variation of the downlink L1-RSRP of the SSB in set q_1 of the candidate beam used for link recovery. Prior to the start of the time duration T1, the UE shall be fully synchronized to cell 1. The UE shall be configured for periodic CSI reporting with a reporting periodicity of 5ms. This test will focus on the scheduling availability during beam failure detection) and candidate beam detection. In the test, DRX configuration is not enabled. Test is to test the scheduling availability restriction of UE performing beam failure detection and candidate beam detection when SSB RS configured for Beam failure detection and candidate beam detection when SSB RS configured for Beam failure detection and candidate beam detection when SSB RS configured for Beam failure detection and candidate beam detection transmit continuously in UL.

Table A.7.5.5.5.1-1: Supported test configurations for FR2 PCell

Configuration	Description
1	NR 120 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
2	NR 240 kHz SSB SCS, 100MHz bandwidth, TDD duplex mode
Note: The UE is	s only required to be tested in one of the supported test configurations

Table A.7.5.5.5.1-2: General test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter	Test Config.	Unit	Value	Comment
			Test 1	
Active PCell	1-2		Cell 1	
RF Channel Number	1-2		1	
Duplex mode	1-2		TDD	
TDD Configuration	1-2		TDDConf.3.1	
BW _{channel}	1-2		100: N _{RB,c} = 66	
Data RBs allocated	1-2		66	
PDSCH/PDCCH subcarrier spacing	1-2	kHz	120	
DL initial BWP configuration	1-2		DLBWP.0.1	
DL dedicated BWP configuration	1-2		DLBWP.1.1	
UL initial BWP configuration	1-2		ULBWP.0.1	
UL dedicated BWP configuration	1-2	•	ULBWP.1.1	
PDSCH Reference Channel	1		SR.3.2 TDD	

		2		SR.3.3 TDD	
RMSI CORESET Refe	erence Channel	1		CR.3.1 TDD	
		2		CR.3.2 TDD	
Dedicated CORESET Reference Channel				CCR.3.1 TDD	
			1	CCR.3.7 TDD	
OCNG parameters		2 1-2		OP.1	
CP length		1-2		Normal	
	-1-1-				
PDSCH/PDCCH TCI	state	1-2		TCI.State.0	
CSI-RS for tracking		1-2		TRS.2.1 TDD	
SSB Configuration		1		SSB.1 FR2	
		2		SSB.2 FR2	
SMTC Configuration		1-2		SMTC.1	
PRACH Configuration				FR2 PRACH	
		1-2		configuration 2	A.3.8.3.2
DRX configuration		1-2		OFF	
SSB index assigned a	o DED DC (g.)	1-2		0	
SSB index assigned a		1-2		1	
Beam failure	DCI format	1-2		1-0	
detection	Number of Control	1-2		2	
transmission	OFDM symbols			۷	
parameters	Aggregation level	1-2	CCE	8	
	Ratio of hypothetical				
	PDCCH RE energy to	1-2	dB	0	
	average SSS RE energy		<u></u>	· ·	
	Ratio of hypothetical				
	PDCCH DMRS energy	1-2	dB	0	
	to average SSS RE				
	energy				
	DMRS precoder	1-2		REG bundle	
	granularity	1-2		size	
	REG bundle size	1-2		6	
Gap pattern ID		1-2		N/A	
rlmlnSyncOutOfSync	Threshold				Value 0 is applied.
		1-2		absent	(Table 8.1.1-1).
rsrp-ThresholdSSB					(145.6 6.1.1 1).
131P THICSHOIGEOD		1	4D/CCC	-95	Threshold used for
		2	dBm/SCS	-92	Qin_LR_SSB
				-92	
powerControlOffsetSS	3				Used for deriving
		1-2		db0	rsrp-ThresholdCSI-
				abo	
beamFailureInstanceMaxCount					RS
beamFailureInstanceI	MaxCount	1-2		n1	RS see TS 38.321 [7],
		1-2			RS see TS 38.321 [7], clause 5.17
beamFailureInstanceIns		1-2		n1	RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureDetection	Timer			n1 pbfd4	RS see TS 38.321 [7], clause 5.17
	Timer	1-2		n1 pbfd4 CSI-RS.3.1	RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureDetection CSI-RS configuration	Timer	1-2		n1 pbfd4 CSI-RS.3.1 TDD	RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureDetection	Timer	1-2		n1 pbfd4 CSI-RS.3.1 TDD periodic	RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureDetection CSI-RS configuration reportConfigType	Timer	1-2		n1 pbfd4 CSI-RS.3.1 TDD periodic	RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureDetection CSI-RS configuration reportConfigType reportQuantity	Timer for CSI reporting	1-2 1-2 1-2 1-2	slot	n1 pbfd4 CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI	RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureDetection CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic	Timer for CSI reporting	1-2 1-2 1-2 1-2 1-2	slot	n1 pbfd4 CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40	RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureDetection CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset	Timer for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2	slot	n1 pbfd4 CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4	RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureDetection CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310	Timer for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2		n1 pbfd4 CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000	RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7],
beamFailureDetection CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310	Timer for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2	slot	n1 pbfd4 CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4	RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17
beamFailureDetection CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310	Timer for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot	n1 pbfd4 CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2	RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17 The UE shall be fully
beamFailureDetection CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310	Timer for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot	n1 pbfd4 CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000	RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17 The UE shall be fully synchronized to cell 1
beamFailureDetection CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310	Timer for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms	n1 pbfd4 CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2	RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17 The UE shall be fully
beamFailureDetection CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310 T1	Timer for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms	n1 pbfd4 CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2	RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17 The UE shall be fully synchronized to cell 1
beamFailureDetection CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310 T1	Timer for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms	n1 pbfd4 CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2 1	RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17 The UE shall be fully synchronized to cell 1
beamFailureDetection CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310 T1 T2 T3	Timer for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms s	n1 pbfd4 CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2 1 2.6 1.64	RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17 The UE shall be fully synchronized to cell 1
beamFailureDetection CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310 T1 T2 T3 T4	Timer for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms s s	n1 pbfd4 CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2 1 2.6 1.64 0	RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17 The UE shall be fully synchronized to cell 1
beamFailureDetection CSI-RS configuration reportConfigType reportQuantity CSI reporting periodic CSI reporting offset T310 N310 T1 T2 T3	Timer for CSI reporting	1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2 1-2	slot ms s	n1 pbfd4 CSI-RS.3.1 TDD periodic cri-RI-PMI-CQI 40 4 1000 2 1 2.6 1.64	RS see TS 38.321 [7], clause 5.17 see TS 38.321 [7], clause 5.17 The UE shall be fully synchronized to cell 1

Note 1: All configurations are assigned to the UE prior to the start of time period T1.

Note 2: UE-specific PDCCH is not transmitted after T1 starts.

Table A.7.5.5.5.1-3: Cell specific test parameters for FR2 PCell for SSB-based beam failure detection and link recovery testing in non-DRX mode

Parameter		Unit			Test 1		
			T1	T2	Т3	T4	T5
AoA Setup				Setup1	defined in A	A.3.15.1	•
Assumption for UE beam	S Note 10				Rough		
EPRE ratio of PDCCH D	MRS to SSS	dB			0		
EPRE ratio of PDCCH to	PDCCH DMRS	dB					
EPRE ratio of PBCH DM	RS to SSS	dB					
EPRE ratio of PBCH to P	BCH DMRS	dB					
EPRE ratio of PSS to SS	S	dB					
EPRE ratio of PDSCH DI	MRS to SSS	dB					
EPRE ratio of PDSCH to	PDSCH DMRS	dB					
EPRE ratio of OCNG DM	RS to SSS	dB					
EPRE ratio of OCNG to 0	OCNG DMRS	dB					
SNR_SSB of set q ₀	Config 1-2	dB	5 ^{Note 11}	-3 ^{Note 11}	-12	-12	-12
SNR_SSB of set q ₁	Config 1-2	dB	0.2	0.2	20.2	20.2	20.2
SSB_RP of set q ₁	Config 1	dBm/S	-104.5	-104.5	-84.5	-84.5	-84.5
	Config 2	CS	-101.5	-101.5	-81.5	-81.5	-81.5
N/ Config 1-2		dBm/12			-104.7		
N_{oc}		0 kHz					
Propagation condition				TDI	L-A 30ns 7	5Hz	

- Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: The uplink resources for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 3: NZP CSI-RS resource set configuration for CSI reporting are assigned to the UE prior to the start of time period T1.
- Note 4: Void
- Note 5: The timers and layer 3 filtering related parameters are configured prior to the start of time period T1.
- Note 6: The signal contains PDCCH for UEs other than the device under test as part of OCNG.
- Note 7: SNR levels correspond to the signal to noise ratio over the SSS REs.
- Note 8: The SNR in time periods T1, T2, T3, T4 and T5 is denoted as SNR1, SNR2 and SNR3 respectively in figure A.7.5.5.5.1-1.
- Note 9: The SNR values are specified for testing a UE which supports 2RX on at least one band. For testing of a UE which supports 4RX on all bands, the SNR during T3 is modified as specified in clause A.3.6.
- Note 10: Information about types of UE beam given in B.2.1.3 and does not limit UE implementation or test system implementation
- Note 11: This value allows up to 1dB degradation from applied SNR to UE baseband.

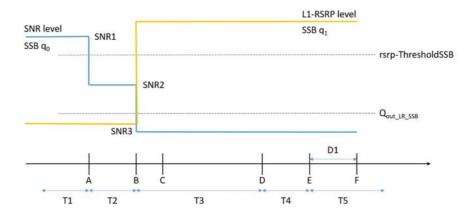


Figure A.7.5.5.5.1-1: SNR and L1-RSRP variation SSB for SSB-based beam failure detection and link recovery testing in non-DRX mode

A.7.5.5.5.2 Test Requirements

The UE behaviour during time duration T3 follows the requirements defined in clause 8.5.7.3:

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on BFD-RS symbols to be measured for beam failure detection.

The UE behaviour during time durations T4 and T5 follows the requirements defined in clause 8.5.8.3:

- The UE is not expected to transmit PUCCH/PUSCH or receive PDCCH/PDSCH on reference symbols to be measured for candidate beam detection.

A.7.5.6 Active BWP switch

A.7.5.6.1 DCI-based and Timer-based Active BWP Switch

A.7.5.6.1.1 NR FR2- NR FR2 DL active BWP switch of SCell with non-DRX in SA

A.7.5.6.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.7.5.6.1.1.1-1 below. The test scenario comprises of one PCell (Cell 1) and one SCell (Cell 2) as given in Table A.7.5.6.1.1.1-2. NR Cell-specific parameters are specified in Table A.7.5.6.1.1.1-3 below. OTA related test parameters are shown in table A.7.5.6.1.1.1-4 below.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).

UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PSCell, BWP-0 in Cell 1 before starting the test.

UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in SCell.

UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-0 in PCell.

UE is configured with a bwp-InactivityTimer timer value for SCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of SCell's DL slot ($i+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell no later than the first UL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}+k_1$). The UE shall be continuously scheduled on SCell's BWP-2 no later than the first DL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}$).

The starting time of PCell (Cell 1) interruption due to BWP switch on SCell shall occur within the BWP switch delay.

During T2, the test equipment won't transmit DCI format for PDSCH reception on SCell (Cell 2).

During T3,

The time period T3 starts from the slot #j, where j is the first slot of the half subframe immediately after *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of SCell's DL slot (j+T_{BWPswitchDelay}) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell at latest on the first UL slot that occurs after the beginning of slot (j+T_{BWPswitchDelay}+ k_1). The UE shall be continuously scheduled on SCell's BWP-1 no later than the first DL slot that occurs after the beginning of slot (j+T_{BWPswitchDelay}).

The starting time of PCell (Cell 1) interruption due to BWP switch of SCell shall occur within the BWP switch delay.

The test equipment verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of SCell, respectively.

Table A.7.5.6.1.1.1-1: DL BWP switch supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD -TDD duplex mode

Table A.7.5.6.1.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment

NR RF Channel Number		1, 2	Two NR radio channels are used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2	SCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and SCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.7.5.6.1.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter	Unit	Cell 1	Cell2	
Frequency Range		FR2	FR2	
Duplex mode		Т	DD	
TDD configuration		TDDConf.3.1		
BW _{channel}		100 MHz	: N _{RB,c} = 66	
Active BWP ID		0	1, 2	
Downlink initial BWP Configuration		DLB\	WP.0.2	
Uplink initial BWP Configuration		ULBWP.0.2	N.A.	
Downlink active BWP-0 Configuration		DLBWP.0.2	-	
Downlink active BWP-1 Configuration		N.A.	DLBWP.1.1	
Downlink active BWP-2 Configuration		N.A.	DLBWP.1.3	
Uplink active BWP-0 Configuration		ULBWP.0.2	N.A.	
Uplink active BWP-1 Configuration		N.A.	N.A.	
Uplink active BWP-2 Configuration		N.A.	N.A.	
PDSCH Reference measurement channel		SR.3	.1 TDD	
TRS configuration		TRS.2.1 TDD		
TCI state		TCI.State.0		
RMSI CORESET parameters		CR.3.1 TDD		
Dedicated CORESET parameters		CCR.3.1 TDD		
OCNG Patterns		0	P.1	
SSB Configuration		SSB	.1 FR2	
SMTC Configuration		SMTC.1		
Correlation Matrix and Antenna		1x2	! Low	
Configuration				
EPRE ratio of PSS to SSS	dB	0	0	
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note				
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				

Propagat	ion Condition		AWGN	AWGN
Note 1:	OCNG shall be used such that both	th cells are full	y allocated and a constant total t	ransmitted power spectral
	density is achieved for all OFDM s	symbols.	-	

Table A.7.5.6.1.1.1-4: OTA related test parameters for BWP switching test case

Parameter	Unit	Cell 1	Cell 2
Angle of arrival configuration		Setup 1 defined i	n clause A.3.15.1
Assumption for UE beams Note 6		Fine	Fine
$N_{oc}^{}$ Note1	dBm/15kHz	-112	-112
$N_{oc}^{}$ Note1	dBm/SCS	-103	-103
SS-RSRP ^{Note2}	dBm/SCS Note3	-85	-85
$\hat{E}_{\scriptscriptstyle{\mathrm{s}}}/I_{\scriptscriptstyle{\mathrm{ot}}}$	dB	18	18
Io ^{Note4}	dBm/95.04 MHz ^{Note4}	-56	-56

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.
- Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.

A.7.5.6.1.1.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for SCell on PCell from the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+k_1)$.

During T3, the UE shall start to send the ACK/NACK for SCell on PCell from the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+k_1)$.

Where, k_1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability bwp-SwitchingDelay [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed SCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

During T1 and T3, the start time of PCell interruption during SCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of PCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

All of the above test requirements shall be fulfilled in order for the observed SCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK in the first UL slot that occurs after the beginning of DL slot (i+ $T_{BWPswitchDelay}$ + k_1), (j+ $T_{BWPswitchDelay}$ + k_1), then the UE shall use the next available uplink resource for reporting the corresponding ACK.

A.7.5.6.1.2 NR FR1- NR FR2 DL active BWP switch of SCell with non-DRX in SA

A.7.5.6.1.2.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6, and interruption requirement on other active serving cell defined in clause 8.2.2.2.5.

The supported test configurations are shown in Table A.7.5.6.1.2.1-1 below. The test scenario comprises of one NR PCell (Cell 1) and one NR SCell (Cell 2). The general parameters are given in Table A.7.5.6.1.2.1-2. NR Cell-specific parameters are specified in Table A.7.5.6.1.2.1-3 below. OTA related test parameters are shown in table A.7.5.6.1.2.1-4 below.

PDCCHs indicating new transmissions shall be sent continuously on SCell (Cell 2) to ensure that the UE would have ACK/NACK sending except for the time duration when BWP is switching on Cell 2 and the time duration of T2.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

UE is connected to Cell 1 (PCell) on radio channel 1 (PCC), and Cell 2 (SCell) on radio channel 2 (SCC).

UE is configured with 2 different UE-specific downlink bandwidth parts for SCell, BWP-1 and BWP-2, in Cell 2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.

UE is configured with 1 UE-specific downlink bandwidth parts the same as initial BWP for PCell, BWP-0 in Cell 1 before starting the test.

UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-1 in SCell.

UE is indicated in firstActiveDownlinkBWP-Id that the active DL BWP is BWP-0 in PCell.

UE is configured with a bwp-InactivityTimer timer value for SCell.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for SCell DL BWP switch, sent from the test equipment to the UE, is received at the UE side in SCell's slot # denoted *i*. The UE shall switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of SCell's DL slot ($i+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell no later than the first UL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}+k_1$). The UE shall be continuously scheduled on SCell's BWP-2 no later than the first DL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}$).

The starting time of PCell (Cell 1) interruption due to BWP switch on SCell shall occur within the BWP switch delay if the UE doesn't support per-FR gap, otherwise no interruption due to BWP switch on PCell is allowed.

During T2, the test equipment won't transmit DCI format for PDSCH reception on SCell (Cell 2).

During T3,

The time period T3 starts from the slot #*j*, where j is the first slot of the half subframe immediately after *bwp-InactivityTimer* timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH no later than the first DL slot that occurs after the beginning of SCell's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the SCell on PCell at latest on the first UL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay}+k_1)$. The UE shall be continuously scheduled on SCell's BWP-1 no later than the first DL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay})$.

The starting time of PCell (Cell 1) interruption due to BWP switch of SCell shall occur within the BWP switch delay if the UE doesn't support per-FR gap, otherwise no interruption due to BWP switch on PCell is allowed.

The test equipment verifies the DL BWP switch time in SCell by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK/NACK is received.

The test equipment verifies that potential interruption to PCell is carried out in the correct time span by monitoring ACK/NACK sent in PCell during BWP switch of SCell, respectively.

Table A.7.5.6.1.2.1-1: DL BWP switch supported test configurations

Config	Description	
1	PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	
	SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
2	PCell: NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
	SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
3	PCell: NR 30 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	
	SCell: NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode	
Note 1: The UE is only required to be tested in one of the supported test configurations		

Table A.7.5.6.1.2.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		2	Two NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
Active SCell		Cell 2	SCell on RF channel number 2.
CP length		Normal	
DRX		OFF	For both PCell and SCell
bwp-InactivityTimer	ms	200	
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on SCC.
Cell-individual offset for cells on RF channel number 2	dB	0	Individual offset for cells on PSCC.
Cell2 timing offset to cell1	μs	3	Time alignment error as specified in TS 38.104 [13] clause 6.5.3.1.
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.7.5.6.1.2.1-3: NR Cell specific test parameters for DL BWP switch in SA

Para	ımeter	Unit	Cell 1	Cell2
Frequency Range			FR1	FR2
Duplex mode	Config 1		FDD	TDD
•	Config 2,3		TDD	
TDD configuration	Config 1		Not Applicable	TDDConf.3.1
_	Config 2		TDDConf.1.1	
	Config 3		TDDConf.2.1	
BW _{channel}	Config 1,2	MHz	10 MHz: N _{RB,c} = 52	100 MHz: N _{RB,c} = 66
	Config 3		40 MHz: N _{RB,c} = 106	
Active BWP ID			0	1, 2
Downlink initial BWP	Configuration		DLBWF	P.0.2
Uplink initial BWP Co	onfiguration		ULBWP.0.2	N.A.
Downlink active BWF	P-0 Configuration		DLBWP.0.2	-
Downlink active BWF	P-1 Configuration		-	DLBWP.1.1
Downlink active BWF	P-2 Configuration		-	DLBWP.1.3
Uplink active BWP-0	Configuration		ULBWP.0.2	-
Uplink active BWP-1	Configuration		-	N.A.
Uplink active BWP-2	Configuration		-	N.A.
PDSCH Reference	Config 1		SR.1.1 FDD	SR.3.1 TDD
measurement	Config 2		SR.1.1 TDD	
channel	Config 3		SR.2.1 TDD	
RMSI CORESET	Config 1		CR.1.1 FDD	CR.3.1 TDD
parameters	Config 2		CR.1.1 TDD	
•	Config 3		CR.2.1 TDD	
Dedicated	Config 1		CCR.1.1 FDD	CCR.3.1 TDD
CORESET	Config 2		CCR.1.1 TDD	
parameters	Config 3		CCR.2.1 TDD	
OCNG Patterns			OP.1	
SSB Configuration	Config 1,2		SSB.1 FR1	SSB.1 FR2
	Config 3		SSB.2 FR1	
TRS configuration	Config 1,2,3		-	TRS.2.1 TDD
TCI state	Config 1,2,3		TCI.State.0	TCI.State.0
SMTC Configuration			SMTC	
Correlation Matrix an	nd Antenna		NA	1x2 Low
Configuration			Link only, see clause A.3.7A	
EPRE ratio of PSS to		dB	0	0
EPRE ratio of PBCH	DMRS to SSS			
EPRE ratio of PBCH				
EPRE ratio of PDCC				
EPRE ratio of PDCC	H to PDCCH DMRS			
EPRE ratio of PDSC				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG	DMRS to SSS(Note			
1)				
EPRE ratio of OCNG	to OCNG DMRS			
(Note 1)				
Propagation Condition	on		NA NA	AWGN
			Link only, see clause A.3.7A	

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 3: SS-RSRP and SCH_RP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Table A.7.5.6.1.2.1-4: OTA related test parameters for BWP switching test case

Parameter	Unit	Cell 1	Cell 2
Angle of arrival configuration			Setup 1 defined in
Angle of arrival configuration			clause A.3.15.1
Assumption for UE beams Note 6			Fine
Note1	dBm/15kHz		-112
Note1	dBm/SCS	NA Link only, see clause	-103
SS-RSRP ^{Note2}	dBm/SCS Note3	A.3.7A	-85
\hat{E}_{s}/I_{ot}	dB		18
Io ^{Note4}	dBm/95.04 MHz ^{Note4}		-56
Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled. Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not			

- Note 2: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone.
- Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.

A.7.5.6.1.2.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+k1)$.

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+k1)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

If the UE doesn't support per-FR gap,

During T1 and T3, the start time of SCell interruption during PCell active BWP switch shall not happen outside the BWP switch delay.

The interruption of SCell shall not be longer than the interruption duration specified for active BWP switch in clause 8.2.2.2.5.

Otherwise no interruption due to BWP switch on SCell is allowed.

All of the above test requirements shall be fulfilled in order for the observed SCell active BWP switch interruption to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after the beginning of DL slot $(i + T_{BWPswitchDelay} + kI)$, $(j + T_{BWPswitchDelay} + kI)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.7.5.6.1.3 NR FR2 DL active BWP switch with non-DRX in SA

A.7.5.6.1.3.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement defined in clause 8.6. Supported test configurations are shown in Table A.7.5.6.1.3.1-1.

The test scenario comprises of one cell (Cell 1) as given in Table A.7.5.6.1.3.1-2. Cell-specific parameters of NR PCell is specified in Table A.7.5.6.1.3.1-3 below. The OTA related test parameters for FR2 is shown in Table A.7.5.6.1.3.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 on radio channel 1.
- UE is configured with 2 different UE-specific downlink bandwidth parts, BWP-1 and BWP-2 before starting the test. BWP-1 and BWP-2 always include bandwidth of the initial DL BWP and SSB.
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1.
- UE is configured with a bwp-InactivityTimer timer value for Cell1.

All cells have constant signal levels throughout the test.

The test consists of 3 successive time periods, with durations of T1, T2, and T3, respectively.

During T1,

Time period T1 starts when a DCI format 1_1 command for DL BWP switch, sent from the test equipment to the UE, is received at the UE side in Cell 1's slot # denoted *i*. The UE should switch its bandwidth part from BWP-1 to BWP-2.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell 1's DL slot ($i+T_{BWPswitchDelay}$) as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell 1 no later than the first UL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}+k1$). The UE shall be continuously scheduled on Cell 1's BWP-2 starting from the first DL slot that occurs after the beginning of slot ($i+T_{BWPswitchDelay}$).

During T2, the test equipment won't transmit DCI format for PDSCH reception on Cell 1.

During T3,

The time period T3 starts from the slot #j, where j is the first slot of the half subframe immediately after bwp-InactivityTimer timer expires. The UE should switch its bandwidth part from BWP-2 back to the default bandwidth part – BWP-1.

The UE shall be able to receive PDSCH on the first DL slot that occurs after the beginning of Cell 1's DL slot $(j+T_{BWPswitchDelay})$ as defined in clause 8.6 and starts to report valid ACK/NACK for the Cell 1 at latest on

the first UL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay}+k1)$. The UE shall be continuously scheduled on Cell 1's BWP-1 starting from the first DL slot that occurs after the beginning of slot $(j+T_{BWPswitchDelay})$.

The test equipment verifies the DL BWP switch time by counting the slots from the time when the BWP switch command is received or *bwp-InactivityTimer* timer expires till an ACK is received.

Table A.7.5.6.1.3.1-1: DL BWP switch supported test configurations

	Config	Description				
	1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note 1:	1: Void.					
Note 2:	2: A UE which fulfils the requirements in test case A.7.5.6.1.1 or A.7.5.6.1.2 can skip the test cases in					
	A.7.5.6.1.3.					

Table A.7.5.6.1.3.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active Cell		Cell 1	Cell on RF channel number 1.
CP length		Normal	
DRX		OFF	For both PCell and PSCell
bwp-InactivityTimer	ms	200	
T1	S	0.2	
T2	S	0.2	
T3	S	0.2	

Table A.7.5.6.1.3.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter	Unit	Cell 1
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
BW _{channel}		100 MHz: N _{RB,c} = 66
Active BWP ID		1, 2
Initial DL BWP Configuration		DLBWP.0.2 Note 2
Active DL BWP-1 Configuration		DLBWP.1.1 Note 2
Active DL BWP-2 Configuration		DLBWP.1.3 Note 2
Initial UL BWP Configuration		ULBWP.0.2 Note 2
Active UL BWP-1 Configuration		ULBWP.1.1 Note 2
Active UL BWP-2 Configuration		ULBWP.1.3 Note 2
PDSCH Reference measurement channel		SR.3.1 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP.1
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State		TCI.State.0
TRS Configuration		TRS.2.1 TDD
Correlation Matrix and Antenna		1x2 Low
Configuration		
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH DMRS to SSS	_	
EPRE ratio of PBCH to PBCH DMRS	_	
EPRE ratio of PDCCH DMRS to SSS	_	
EPRE ratio of PDCCH to PDCCH DMRS	_	
EPRE ratio of PDSCH DMRS to SSS		

EPRE rat	tio of PDSCH to PDSCH		
EPRE rat	tio of OCNG DMRS to SSS(Note 1)		
EPRE rat	tio of OCNG to OCNG DMRS (Note		
1)	•		
Propagat	ion Condition		AWGN
Note 1:	OCNG shall be used such that the o		
	transmitted power spectral density is	s achieved fo	or all OFDM symbols.
Note 2:	For unpaired spectrum, a DL BWP is	s linked with	an UL BWP. DLBWP.0.2 is
linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1; DLBWP.1.3 is			
	linked with ULBWP.1.3 defined in cl	ause 12 of T	S 38.213 [3].

Table A.7.5.6.1.3.1-4: OTA related test parameters for DL BWP switch in SA

	Parameter	Unit	Cell 2
Angle of	Angle of arrival configuration		Setup 1 defined in
			clause A.3.15.1
Assumpt	ion for UE beams Note 6		Fine
Noc ^{Note 1}		dBm/15	-112
		kHz	-112
Noc ^{Note 1}		dBm/SCS	-103
SS-RSRI	Note 2	dBm/120	-85
		kHz Note3	-00
Ês/Iot		dB	18
Ês/Noc Not	e 5	dB	18
Io ^{Note2}		dBm/95.04	-56
		MHz Note4	-50
Note 1:	Interference from other cells and r		
	assumed to be constant over subo		
	AWGN of appropriate power for N		
Note 2:	SS-RSRP and lo levels have beer		
	information purposes. They are no		
Note 3:	SS-RSRP minimum requirements		
	interference and noise at each receiver antenna port.		
Note 4:	1		
l	quiet zone		
Note 5:			
Note 6:	Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.		

A.7.5.6.1.3.2 Test Requirements

During T1, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+k1)$.

During T3, the UE shall start to send the ACK/NACK for PCell from the first UL slot that occurs after the beginning of DL slot $(j+T_{BWPswitchDelay}+kI)$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

Depending on UE capability *bwp-SwitchingDelay* [2], UE shall finish BWP switch within the time duration $T_{BWPswitchDelay}$ defined in Table 8.6.2-1.

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: During T1, T3 if there are no uplink resources for reporting the ACK/NACK in the first UL slot that occurs after the beginning of DL slot $(i+T_{BWPswitchDelay}+kI)$, $(j+T_{BWPswitchDelay}+kI)$, then the UE shall use the next available uplink resource for reporting the corresponding ACK/NACK.

A.7.5.6.2 RRC-based Active BWP Switch

A.7.5.6.2.1 NR FR2 DL active BWP switch of PCell with non-DRX in SA

A.7.5.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the DL BWP switch delay requirement for RRC-based BWP switch defined in clause 8.6.3. Supported test configurations are shown in Table A.7.5.6.2.1.1-1.

The test scenario comprises of one PCell (Cell 1) as given in Table A.7.5.6.2.1.1-2. Cell-specific parameters of PCell are specified in Table A.7.5.6.2.1.1-3 below.

PDCCHs indicating new transmissions shall be sent continuously on PCell (Cell 1) to ensure that the UE will have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).
- UE has bandwidth part BWP-1 in its RRC-configuration for Cell 1 (PCell).
- UE is indicated in *firstActiveDownlinkBWP-Id* that the active DL BWP is BWP-1 of initial condition in PCell.

All cells have constant signal levels throughout the test.

The test consists of 1 time period, with duration of T1.

During T1,

Time period T1 starts when a *RRCReconfiguration* with updated bandwidth part configuration, sent from the test equipment to the UE, is received at the UE side in PCell's slot # denoted *i*. The UE shall reconfigure its bandwidth part with the updated bandwidth part BWP-1 of final condition.

The UE shall be able to completely receive PDSCH on PCell from the first DL slot that occurs after the beginning of DL slot i + $\frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \ Slot \ length}$ as defined in clause 8.6.3 and starts to report valid ACK/NACK for the PCell from the first UL slot that occurs after the beginning of DL slot i + $\frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \ Slot \ length} + k1.$ The UE shall be continuously scheduled on PCell's BWP-1 starting from the first DL slot that occurs after the beginning of DL slot i + $\frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}$

NR Slot length

 $T_{RRCprocessingDelay}$ and $T_{BWPswitchDelayRRC}$ are defined in clause 8.6.3.

The test equipment verifies the DL BWP switch time in PCell by counting the time from the time when the RRC Reconfiguration message including updated BWP configuration is sent till the time when RRC Reconfiguration Complete message is received.

Table A.7.5.6.2.1.1-1: DL BWP switch supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.5.6.2.1.1-2: General test parameters for DL BWP switch in SA

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
CP length		Normal	
DRX		OFF	
Cell-individual offset for cells on RF channel number 1	dB	0	Individual offset for cells on PCC.
T1	S	0.2	

Table A.7.5.6.2.1.1-3: NR Cell specific test parameters for DL BWP switch in SA

Parameter		Unit	Cell 1
Frequency Range			FR2
Duplex mode			TDD
TDD configuration			TDDConf.3.1
BW _{channel}			100 MHz: N _{RB,c} = 66
Active BWP ID			1
Initial DL BWP Confi	guration		DLBWP.0.2
Initial UL BWP Confi			ULBWP.0.2
Initial Condition	Active DL BWP-1		DLBWP.1.3
	Configuration		
	Active UL BWP-1		ULBWP.1.3
	Configuration		
Final	Active DL BWP-1		DLBWP.1.1
Condition	Configuration		
	Active UL BWP-1		ULBWP.1.1
	Configuration		
PDSCH Reference n	neasurement channel		SR.3.1 TDD
RMSI CORESET par	rameters		CR.3.1 TDD
Dedicated CORESE	T parameters		CCR.3.1 TDD
OCNG Patterns			OP.1
SSB Configuration			SSB.1 FR2
SMTC Configuration			SMTC.1
TCI State			TCI.State.0
TRS Configuration			TRS.2.1 TDD
Antenna Configuration	on		1x2
Propagation Condition			AWGN
EPRE ratio of PSS to S		dB	0
EPRE ratio of PBCH DI			
EPRE ratio of PBCH to PBCH DMRS]	
EPRE ratio of PDCCH DMRS to SSS]	
EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS]	
EPRE ratio of PDSCH t			
EPRE ratio of OCNG D			
EPRE ratio of OCNG to	OCNG DMRS (Note 1)		

Note 1:	· · · · · · · · · · · · · · · ·
	and a constant total transmitted power spectral density is achieved for all
	OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is
	assumed to be constant over subcarriers and time and shall be modelled
	as AWGN of appropriate power for N₀c to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for
	information purposes. They are not settable parameters themselves.
Note 4:	For unpaired spectrum, a DL BWP is linked with an UL BWP. DLBWP.0.2
	is linked with ULBWP.0.2; DLBWP.1.1 is linked with ULBWP.1.1;
	DLBWP.1.3 is linked with ULBWP.1.3 defined in clause 12 of TS 38.213
	[3].

Table A.7.5.6.2.1.1-4: OTA related test parameters for BWP switching test case

Para	meter	Unit	Cell 1		
Angle of arrival configuration			Setup 1 according to table		
_	_		A.3.15		
Assumption for UE b			Fine		
	NR_TDD_FR2_A				
Note1	NR_TDD_FR2_B				
N oc	NR_TDD_FR2_F	dBm/15kHz	-112		
	NR_TDD_FR2_G	GB111, 1011112			
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
	NR_TDD_FR2_A				
Note1	NR_TDD_FR2_B				
N oc	NR_TDD_FR2_F	dBm/SCS	-103		
	NR_TDD_FR2_G	dBiii, CCC			
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
	NR_TDD_FR2_A				
	NR_TDD_FR2_B				
SS-RSRP ^{Note2}	NR_TDD_FR2_F	dBm/SCS Note3	-85		
	NR_TDD_FR2_G	Notes			
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y		10		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$		dB	18		
	NR_TDD_FR2_A				
	NR_TDD_FR2_B				
Io ^{Note2}	NR_TDD_FR2_F	dBm/95.04	-56		
10	NR_TDD_FR2_G	MHz Note4			
	NR_TDD_FR2_T				
	NR_TDD_FR2_Y				
			ot specified in the test is		
			e and shall be modelled as		
AWGN of appropriate power for N_{∞} to be fulfilled.					
Note 2: SS-RSRP	and lo levels have bee	n derived from c	ther parameters for		
	n purposes. They are n				
Note 3: SS-RSRP minimum requirements are specified assuming independent					
interference and noise at each receiver antenna port.					
Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone					
Note 5: Information	·				
implementation or test system implementation.					

A.7.5.6.2.1.2 Test Requirements

During T1, the UE shall be ready for the reception of uplink grant for PCell from the first DL slot that occurs after the beginning of slot $i + \frac{T_{RRCprocessingDelay} + T_{BWPswitchDelayRRC}}{NR \, Slot \, length}$ and starts to report valid ACK/NACK for the PCell

from the first UL slot that occurs after the beginning of DL slot $i + \frac{r_{RRCprocessingDelay} + r_{BWPswitchDelayRRC}}{NR \, Slot \, length} + k1$.

Where, k1 is the timing between DL data receiving and acknowledgement as specified in [7].

All of the above test requirements shall be fulfilled in order for the observed PCell active BWP switch delay to be counted as correct.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.7 PSCell addition and release delay

A.7.5.7.1 Addition and Release Delay of known NR PSCell

A.7.5.7.1.1 Test Purpose and Environment

The purpose of this test is to verify the PSCell addition and release delay requirements defined in clauses 8.9.2 and 8.9.3, respectively, for the case where the PSCell is known to the UE at the time of addition.

The supported test configurations are given in Table A.7.5.7.1.1-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2, respectively. Test parameters are given in Tables A.7.5.7.1.1-2, A.7.5.7.1.1-3 and A.7.5.7.1.1-4 below. The test consists of five time periods with durations T1, T2, T3, T4 and T5, respectively.

At the start of T1, the UE shall be connected to Cell 1 (PCell) on radio channel 1 (PCC) and shall only monitor PCC and hence be unaware of Cell 2 (PSCell-to-be) on radio channel 2. Before the start of T2, the test system shall send measurement control information including measurement gap configuration and event-triggered reporting configuration for measurements on radio channel 2.

During T2, the Cell2 becomes known to the UE. Therefore, during T2 the UE shall report Event triggered report.

The point in time at which the RRC message to release measurement gap is transmitted from the test system defines the start of period T3. During T3, after measurement gap is released, the test system transmits the RRC message to the UE to add PSCell on radio channel 2. The RRC message (to add PSCell) also includes a request for the UE to start periodic CSI reporting for the PSCell after the PSCell has been successfully added.

The point in time at which the RRC message to add PSCell (Cell2) is received at the UE antenna connector defines the start of period T4.

During T4, the UE shall carry out random access towards the PSCell. Reception by the test system of the PRACH preamble defines the start of T5.

During T5, the UE shall send periodic CSI reports in PSCell. After having received at least one such report, the test system shall send a RRC message instructing the UE to release the PSCell. Reception by the UE of the RRC message defines the start of T6.

During T6, the UE shall release the PSCell.

Table A.7.5.7.1.1-1: Supported test configurations for FR2 PSCell

Config	Description				
1	FR1 FDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz				
2	FR1 TDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz				
3	FR1 TDD SSB SCS 30kHz BW 40MHz – FR2 TDD SSB SCS 240kHz BW 100MHz				
Note 1: The UE is only re	Note 1: The UE is only required to be tested in one of the supported test configurations				

Table A.7.5.7.1.1-2: General test parameters for PSCell addition and release delay

	Parameter		Value	Comment
RF Ch	annel Number		1, 2	Two radio channels are used for this test
Active	PCell		Cell 1	PCell on RF channel number 1 in FR1
Neight	oour cell		Cell 2	Neighbour cell (PSCell-to-be) on RF channel number 2 in FR2
A4	Hysteresis	dB	0	Hysteresis for event A4
	Threshold RSRP	dBm	-118	Threshold for event A4
	Time to Trigger	S	0	Time to trigger for event A4
DRX			OFF	For both PCell and PSCell once activated
Measu	rement gap pattern ID		0	Gaps are configured before T2 and released before T3.
PRAC	H configuration in Cell 2		FR2 PRACH configuration 2	PRACH configuration as specified in Clause A.3.8.3.2.
	porting periodicity and configuration for Cell 2	ms	2	
T1		S	5	During this time the PCell is known and Cell 2 is unknown.
T2		S	1	During this time the UE shall identify neighbour cell 2 and report event B1.
T3		s	3.5	During this time the test system transmits the RRC messages to release measurement gap and add PSCell.
T4	4 s 1		1	During this time the UE adds the PSCell.
T5		s	1	During this time the UE sends CSI reports for PSCell.
T6		S	1	During this time the UE releases the PSCell.

Table A.7.5.7.1.1-3: NR Cell specific test parameters for PSCell addition and release delay

Parameter	Unit	Config	Cell 1	Cell		Cell2		
				T1	T2	T3	T4	T5
Frequency Range		1,2,3	FR1		•	FR2	•	
Duplex mode		1	FDD			TDD		
		2,3	TDD			טטו		
TDD configuration		1	_					
		2	TDDConf.1.1		TD	DConf.	3.1	
		3	TDDConf.2.1					
BW _{channel}	NAL I	1,2	10: N _{RB,c} = 52	100: N _{RB,c} = 66				
	MHz	3	40: N _{RB,c} = 106					
Data RBs allocated		1,2	52			40		
		3	106			48		
Initial Downlink BWP configuration		1,2,3	DLBWP.0.1		DL	BWP.0	0.1	
Initial Uplink BWP configuration		1,2,3	ULBWP.0.1		UL	BWP.0	0.1	
Dedicated Downlink BWP configuration		1,2,3	DLBWP.1.1		DL	BWP.	1.1	
Dedicated Uplink BWP configuration		1.2.3	ULBWP.1.1		UL	BWP.	1.1	

PDSCH Reference Measurement		1	SR.1.1 FDD	
Channel		2	SR.1.1 TDD	SR.3.3 TDD
		3	SR.2.1 TDD	
TRS configuration		1,2,3		TRS.2.1 TDD
TCI state		1,2,3	_	TCI.State.0
RMSI CORESET parameters		1	CR.1.1 FDD	
		2	CR.1.1 TDD	CR.3.2 TDD
		3	CR.2.1 TDD	
Dedicated CORESET parameters		1	CCR.1.1 FDD	
		2	CCR.1.1 TDD	CCR.3.7 TDD
		3	CCR.2.1 TDD	
OCNG Patterns ^{Note1}		1,2,3	OP.1	OP.3
SSB configuration		1,2	SSB.1 FR1	SSB.2 FR2
		3	SSB.2 FR1	
SMTC configuration		1,2,3	SMTC.2	SMTC.1
PDSCH/PDCCH subcarrier spacing	kHz	1,2	15	120
		3	30	
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS	dB	1,2,3	0	0
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS				
EPRE ratio of OCNG to OCNG DMRS				
Propagation Condition		1,2,3	N/A	AWGN

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Note 3: Void

Note 4: Void

Note 5: Void

Table A.7.5.7.1.1-4: OTA related test parameters for PSCell addition and release delay

Parameter	Unit	Unit Config		Cell 2					
				T1	T2	T3	T4	T5	
Angle of arrival configuration		1,2,3		Setup 2a according to clause A.3.15.2.1			use		
Assumption for UE beams Note 3				Rough					
Ês	dBm/SCS	1,2,3	Link only,	-∞ -81					
SSB_RP Note1, Note2	dBm/SCS	1,2,3	see clause	-∞ -81					
$\hat{E}_{_{\mathrm{S}}}/\mathrm{I}_{_{\mathrm{ot}}}$ BB Note1, Note 4	dB	1,2,3	A.3.7A	-∞ 4.88					
Io Note 1, Note2	dBm/95.04 MHz	1,2,3		N/A -56.41					

Note 1: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.

Note 3: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.

Note 4: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.5.7.1.2 Test Requirements

The UE shall transmit the PRACH preamble to PSCell at latest 112 ms into T3.

The UE shall transmit at least one periodic CSI report for PSCell during T4.

The UE shall stop transmitting CSI reports for PSCell at latest 20 ms into T5.

All of the above test requirements shall be fulfilled in order for the observed PSCell addition and release delay to be counted as correct. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.7.2 Addition and Release Delay of unknown NR PSCell

A.7.5.7.2.1 Test Purpose and Environment

The purpose of this test is to verify the PSCell addition and release delay requirements defined in clauses 8.9.2 and 8.9.3, respectively, for the case where the PSCell is unknown to the UE at the time of addition.

The supported test configurations are given in Table A.7.5.7.2.1-1. The test scenario comprises two NR cells, Cell 1 and Cell 2, on radio channel 1 in FR1 and radio channel 2 in FR2, respectively. Test parameters are given in Tables A.7.5.7.2.1-2, A.7.5.7.2.1-3 and A.7.5.7.2.1-4 below. The test consists of four time periods with durations T1, T2, T3 and T4, respectively.

At the start of T1, the UE shall be connected to Cell 1 (PCell) on radio channel 1 (PCC) and shall only monitor PCC and hence be unaware of Cell 2 (PSCell-to-be) on radio channel 2. At the end of T1, the test system shall send a RRC message instructing the UE to add PSCell (Cell 2), and further instructing the UE to report CSI periodically in the PSCell once it has been added. Reception by the UE of this RRC message defines the start of T2.

During T2, the UE shall identify PSCell and carry out random access towards the PSCell. Reception by the test system of the PRACH preamble defines the start of T3.

During T3, the UE shall send periodic CSI reports in PSCell. After having received at least one such report, the test system shall send a RRC message instructing the UE to release the PSCell. Reception by the UE of the RRC message defines the start of T4.

During T4, the UE shall release the PSCell.

Table A.7.5.7.2.1-1: Supported test configurations for FR2 PSCell

Config	Description
1	FR1 FDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz
2	FR1 TDD SSB SCS 15kHz BW 10MHz – FR2 TDD SSB SCS 240kHz BW 100MHz
3	FR1 TDD SSB SCS 30kHz BW 40MHz – FR2 TDD SSB SCS 240kHz BW 100MHz
Note 1: The UE is only re	equired to be tested in one of the supported test configurations

Table A.7.5.7.2.1-2: General test parameters for PSCell addition and release delay

Parameter	Unit	Value	Comment
RF Channel Number		1, 2	Two radio channels are used for this test
Active PCell		Cell 1	PCell on RF channel number 1 in FR1
Neighbour cell		Cell 2	Neighbour cell (PSCell-to-be) on RF
		Cell 2	channel number 2 in FR2
DRX		OFF	For both PCell and PSCell once activated
PRACH configuration in Cell 2		FR2 PRACH configuration 2	PRACH configuration as specified in
		FRZ FRACH Configuration 2	Clause A.3.8.3.2.

CSI reporting periodicity and offset configuration for Cell 2	ms	[2]	
T1	S	5	During this time the PCell is known and Cell 2 is unknown.
T2	S	1	During this time the UE adds the PSCell.
T3	S	1	During this time the UE sends CSI reports for PSCell.
T4	S	1	During this time the UE releases the PSCell.

Table A.7.5.7.2.1-3: NR Cell specific test parameters for PSCell addition and release delay

Parameter	Unit	Config	Cell 1	Cell2		
				T1 T2 T3 T4		
Frequency Range		1,2,3	FR1	FR2		
Duplex mode		1	FDD	TDD		
·		2,3	TDD	TDD		
TDD configuration		1	_			
		2	TDDConf.1.1	TDDConf.3.1		
		3	TDDConf.2.1			
BW _{channel}	MHz	1,2	10: N _{RB,c} = 52	100: N _{RB.c} = 66		
	IVII IZ	3	40: N _{RB,c} = 106	100. NRB,c – 00		
Data RBs allocated		1,2	52	48		
		3	106	48		
Initial Downlink BWP configuration		1,2,3	DLBWP.0.1	DLBWP.0.1		
Initial Uplink BWP configuration		1,2,3	ULBWP.0.1	ULBWP.0.1		
Dedicated Downlink BWP configuration		1,2,3	DLBWP.1.1	DLBWP.1.1		
Dedicated Uplink BWP configuration		1,2,3	ULBWP.1.1	ULBWP.1.1		
PDSCH Reference Measurement		1	SR.1.1 FDD			
Channel		2	SR.1.1 TDD	SR.3.3 TDD		
		3	SR.2.1 TDD			
TRS configuration		1,2,3	_	TRS.2.1 TDD		
TCI state		1,2,3	_	TCI.State.0		
RMSI CORESET parameters		1	CR.1.1 FDD			
		2	CR.1.1 TDD	CR.3.2 TDD		
		3	CR.2.1 TDD			
Dedicated CORESET parameters		1	CCR.1.1 FDD			
		2	CCR.1.1 TDD	CCR.3.7 TDD		
		3	CCR.2.1 TDD			
OCNG Patterns ^{Note1}		1,2,3	OP.1	OP.3		
SSB configuration		1,2	SSB.1 FR1	SSB.2 FR2		
		3	SSB.2 FR1			
SMTC configuration		1,2,3	SMTC.2	SMTC.1		
PDSCH/PDCCH subcarrier spacing	kHz	1,2	15	120		
		3	30			
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS						
EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS	dB	1,2,3	0	0		
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS						
EPRE ratio of OCNG to OCNG DMRS						
Propagation Condition		1,2,3	AWGN	AWGN		

Note 1:	OCNG shall be used such that and a constant total transmitted power spectral density is achieved for all
	OFDM symbols.
Note 2:	Void
Note 3:	Void
Note 4:	Void
Note 5:	Void

Table A.7.5.7.2.1-4: OTA related test parameters for PSCell addition and release delay

Parameter	Unit	Config	Cell 1	Cell 2		Cell 2	
				T1	T2	T3	T4
Angle of arrival configuration		1,2,3		Setup 2a according to clause A.3.15.2.1			clause
Assumption for UE beams Note 3				Rough			
Ês	dBm/SCS	1,2,3	Link only,	-∞		-81	
SSB_RP Note1, Note 2	dBm/SCS	1,2,3	see clause	-∞		-81	
$\hat{E}_{_{\!s}}/I_{_{\!ot\ BB}}$ Note1, Note 4	dB	1,2,3	A.3.7A			4.88	
lo Note 1, Note 2	dBm/95.04	1,2,3	1	N/A		-56.41	
	MHz						

- Note 1: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 2: Equivalent power received by an antenna with 0dBi gain at the centre of the guiet zone.
- Note 3: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 4: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.5.7.2.2 Test Requirements

The UE shall transmit the PRACH preamble to PSCell at latest 572 ms into T2.

The UE shall transmit at least one periodic CSI report for PSCell during T3.

The UE shall stop transmitting CSI reports for PSCell at latest 20 ms into T4.

All of the above test requirements shall be fulfilled in order for the observed PSCell addition and release delay to be counted as correct. The rate of correct events observed during repeated tests shall be at least 90%.

A.7.5.8 Active TCI state switch delay

A.7.5.8.1 MAC-CE based active TCI state switch

A.7.5.8.1.1 NR PCell FR2 active TCI state switch for a known TCI state

A.7.5.8.1.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3. Supported test configuration is shown in Table A.7.5.8.1.1.1-1.

The test scenario comprises of one NR PCell (Cell 1) as given in Table A.7.5.8.1.1.1-2. Cell-specific parameters of NR PCell are specified in Table A.7.5.8.1.1.1-3 below. The OTA related test parameters for FR2 are shown in Table A.7.5.8.1.1.1-4.

PDCCHs indicating new transmissions shall be sent continuously on PCell to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).
- UE is configured with 2 different TCI states for PCell, PDCCH TCI state 0 (QCL'd to SSB0) and TCIstate 1 (QCL'd to SSB1), in Cell 1 before starting the test.
- UE is indicated in TCI state 0 as the active PDCCH TCI state

The test consists of two time periods, T1 and T2. Figure A.7.5.8.1.1.1-1 and Figure A.7.5.8.1.1.1-2 show the Time multiplexed (allocation in Frequency is symbolic) downlink transmissions from each Angle of Arrival. During T1 only SSB to which PDCCH-TCI-state0 is QCL'd is transmitted. At the beginning of T2, the SSB corresponding to TCI state 1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a MAC-CE command indicating a switch to TCI state 1. *tci-PresentInDCI* is not configured in the PDSCH configuration, i.e. TCI state for the PDSCH is identical to the PDCCH TCI state.

The test equipment verifies that UE can be scheduled on PCell on TCI state 0 till n+ T_{HARQ} +3 ms. The test equipment also verifies the TCI state switch time in PCell by scheduling the UE on TCI state 1 after n+ T_{HARQ} +3 ms + ($T_{first-SSB}$ + $T_{SSB-proc}$).

Table A.7.5.8.1.1.1-1: Supported test configurations

Config	Description
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.5.8.1.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this
Active PCell		Cell 1	PCell on RF channel number 1.
CP length		Normal	r Cell Off Kr Charline Humber 1.
DRX		OFF	
T1	S	0.2	
T2	S	0.2	

Table A.7.5.8.1.1.1-3: NR Cell specific test parameters for TCI state switch

Parameter	Unit	Cell 1
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
BW _{channel}		100 MHz: N _{RB,c} = 66
Data RBs allocated		66
Initial DL BWP Configuration		DLBWP.0.2
Dedicated DL BWP Configuration		DLBWP.1.1
Initial UL BWP Configuration		ULBWP.0.2
Dedicated UL BWP Configuration		ULBWP.1.1
PDSCH Reference measurement channel		SR.3.2 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP.5
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State 0		TC. State.2

TOLO: 4		TOLO:		
TCI State 1		TCI.State.3		
TRS Configuration		TRS.2.1 TDD		
		TRS.2.2 TDD		
Correlation Matrix and Antenna		1x2 Low		
Configuration				
EPRE ratio of PSS to SSS	dB	0		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS(Note 1)				
EPRE ratio of OCNG to OCNG DMRS (Note				
1)				
Propagation Condition		AWGN		
Note 1: OCNG shall be used such that a constant total transmitted power spectral				

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.7.5.8.1.1.1-4: OTA related test parameters for TCI state switch

Paran	neter	Unit		С	ell 1				
			SSB0		S	SB1			
			T1	T2	T1	T2			
Angle of a	arrival		Setup 3 According to clause A.3.15.3			A.3.15.3			
configura	tion								
			Ao	A1	A	oA2			
Assumpti UE beam			Ro	ugh	R	ough			
Ês		dBm/SCS	-80.6	-80.6	-Infinity	-80.6			
SSB-RP1	Note 2	dBm/SCS	-80.6	-80.6	-Infinity	-80.6			
$\hat{E}_{_{s}}/I_{_{\mathrm{ot}}}$ BB Note	7	dB	8.3	8.3	-Infinity	8.3			
lo Note2		dBm/95.04 MHz Note4	-56.0	-56.0	- Infinity	-56.0			
Note 1:	Void								
Note 2:	SSB-RP	and lo levels have been derived from other parameters for information							
		s. They are not settable p	parameters t	themselves	S.				
Note 3:	Void		_						
Note 4:	Equivale quiet zo	ent power received by an	antenna wit	th 0 dBi gai	in at the cen	tre of the			
Note 5:	Às obse	rved with 0dBi gain anter	nna at the ce	enter of the	quiet zone.				
Note 6:	Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE					t limit UE			
	implementation or test system implementation.								
Note 7:	7: Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value								
	assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-								
	2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB _P from								
	TS 38.1	01-2 [19] Table 6.2.1.3-4.	TS 38.101-2 [19] Table 6.2.1.3-4.						

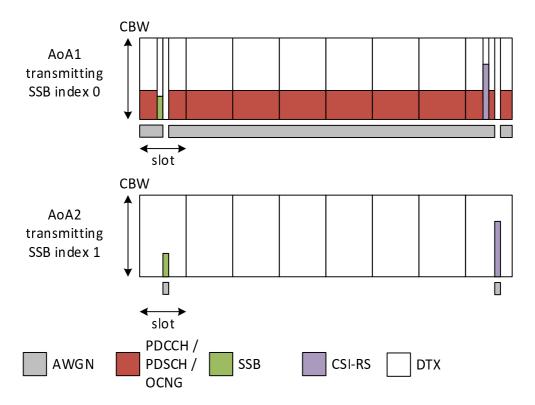


Figure A.7.5.8.1.1.1-1: Time multiplexed downlink transmissions during T1

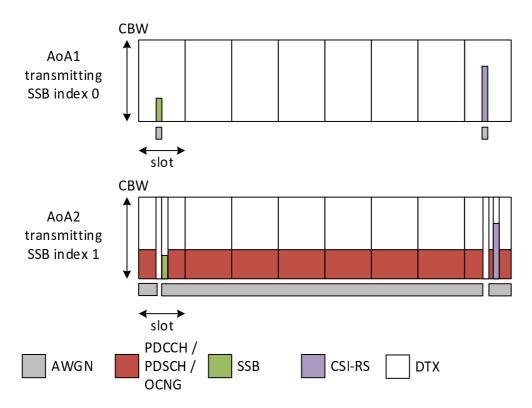


Figure A.7.5.8.1.1.1-2: Time multiplexed downlink transmissions during T2

A.7.5.8.1.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with results for both SSB0 and SSB1.

After receiving MAC-CE command in slot n, UE shall:

- be able to continue to receive on TCI state 0 till $n+T_{HARQ}+3 ms$
- be able to start receiving on TCI state 1 after n+ T_{HARQ} +5 ms + $T_{first-SSB}$

A.7.5.8.2 RRC based active TCI state switch

A.7.5.8.2.1 NR PCell FR2 active TCI state switch for a known TCI state

A.7.5.8.2.1.1 Test Purpose and Environment

The purpose of this test is to verify the active TCI state switch delay requirement defined in clause 8.10.3. Supported test configuration is shown in Table A.7.5.8.2.1.1-1.

The test scenario comprises of one NR PCell as given in Table A.7.5.8.2.1.1-2. Cell-specific parameters of NR PCell is specified in Table A.7.5.8.2.1.1-3 below. The OTA related test parameters for FR2 is shown in Table A.7.5.8.2.1.1-4

PDCCHs indicating new transmissions shall be sent continuously on PCell to ensure that the UE would have ACK/NACK sending.

Before the test starts,

- UE is connected to Cell 1 (PCell) on radio channel 1 (PCC).
- UE is configured with 1 TCI state for PCell, PDCCH-TCI-state0 (QCL'd to SSB0)
- UE is indicated in TCI state0 as the active TCI state

The test consists of two time periods, T1 and T2. Figure A.7.5.8.2.1.1-1 and Figure A.7.5.8.2.1.1-2 show the Time multiplexed (allocation in Frequency is symbolic) downlink transmissions from each Angle of Arrival. During T1 only SSB to which TCI-state0 is QCL'd is transmitted. At the beginning of T2, the SSB corresponding to TCI-state1 starts transmitting. The UE is configured to provide periodic L1-RSRP reports. In slot n which is within 1280 ms of UE providing L1-RSRP report with results for both SSB0 and SSB1, UE receives a RRC command indicating a switch to TCI-state1.

The test equipment verifies the TCI state switch time in PCell by scheduling the UE on TCI state 1 after n+ $T_{RRC_processing} + T_{first-SSB} + 2ms$.

Table A.7.5.8.2.1.1-1: Supported test configurations

Config	Description		
1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		

Table A.7.5.8.2.1.1-2: General test parameters for TCI state switch

Parameter	Unit	Value	Comment
NR RF Channel Number		1	One NR radio channel is used for this test
Active PCell		Cell 1	PCell on RF channel number 1.
CP length		Normal	
DRX		OFF	
T1	S	0.2	
T2	S	0.2	

Table A.7.5.8.2.1.1-3: NR Cell specific test parameters for TCl state switch

Parameter	Unit	Cell 1
Frequency Range		FR2
Duplex mode		TDD
TDD configuration		TDDConf.3.1
BW _{channel}		100 MHz: N _{RB,c} = 66
Data RBs allocated		66
Initial DL BWP Configuration		DLBWP.0.2
Dedicated DL BWP Configuration		DLBWP.1.1
Initial UL BWP Configuration		ULBWP.0.2
Dedicated UL BWP Configuration		ULBWP.1.1
PDSCH Reference measurement channel		SR.3.2 TDD
RMSI CORESET parameters		CR.3.1 TDD
Dedicated CORESET parameters		CCR.3.1 TDD
OCNG Patterns		OP.5
SSB Configuration		SSB.1 FR2
SMTC Configuration		SMTC.1
TCI State 0		TC. State.2
TCI State 1		TCI.State.3
reportConfigType		ssb-Index-RSRP
reportConfigType		periodic

Number of reported RS		2
L1-RSRP reporting period	slot	640
timeRestrictionForChannelMeasurements		configured
TRS Configuration		TRS.2.1 TDD
		TRS.2.2 TDD
Correlation Matrix and Antenna		1x2 Low
Configuration		
EPRE ratio of PSS to SSS	dB	0
EPRE ratio of PBCH DMRS to SSS		
EPRE ratio of PBCH to PBCH DMRS		
EPRE ratio of PDCCH DMRS to SSS		
EPRE ratio of PDCCH to PDCCH DMRS		
EPRE ratio of PDSCH DMRS to SSS		
EPRE ratio of PDSCH to PDSCH		
EPRE ratio of OCNG DMRS to SSS(Note 1)		
EPRE ratio of OCNG to OCNG DMRS (Note]	
1)		
Propagation Condition		AWGN

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.7.5.8.2.1.1-4: OTA related test parameters for TCI state switch

Parameter	Unit	Cell 1					
		SSB0		SSB1			
		T1	T2	T1	T2		
Angle of arrival		Setup 3 According to clause A.3.15.3					
configuration		Ao	A1	AoA2			
Assumption for		Rough		Rough			
UE beams Note 6							
Ês	dBm/SCS	-80.6	-80.6	-Infinity	-80.6		
SSB-RP Note 2	dBm/SCS	-80.6	-80.6	-Infinity	-80.6		
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}BB$ Note 7	dB	8.3	8.3	-Infinity	8.3		
lo Note2	dBm/95.04 MHz Note4	-56.0	-56.0	- Infinity	-56.0		

- Note 1: Void
- Note 2: SSB-RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: Void
- Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the center of the quiet zone.
- Note 6: Information about types of UE beam is given in B.2.1.3 and does not limit UE implementation or test system implementation.
- Note 7: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

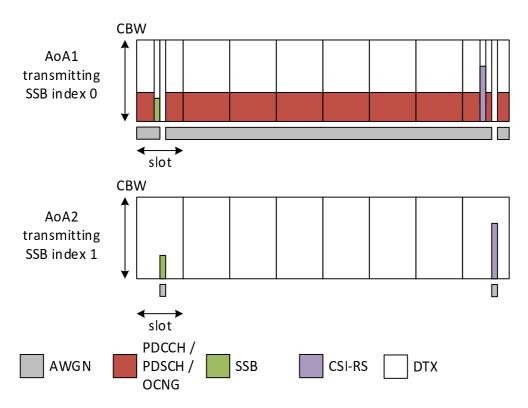


Figure A.7.5.8.2.1.1-1: Time multiplexed downlink transmissions during T1

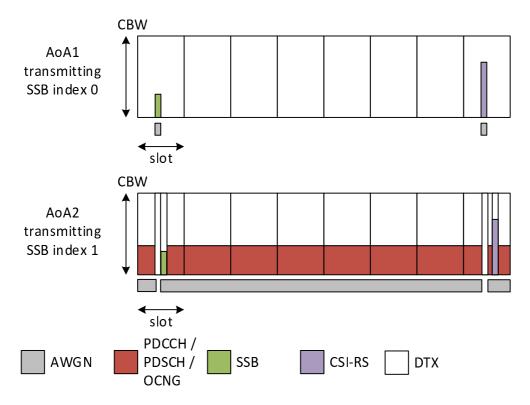


Figure A.7.5.8.2.1.1-2: Time multiplexed downlink transmissions during T2

A.7.5.8.2.1.2 Test Requirements

During T2, UE shall send L1-RSRP report with both SSB0 and SSB1.

After receiving RRC command in slot n, UE shall be able to start receiving on TCI state 1 after n+ $T_{RRC_processing}$ + T_{first_SSB} + 2ms.

A.7.6 Measurement procedure

A.7.6.1 Intra-frequency Measurements

A.7.6.1.1 SA event triggered reporting test without gap under non-DRX

A.7.6.1.1.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.1.1-1.

Table A.7.6.1.1.1-1: supported test configurations

Co	nfiguration	Description				
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note: The UF is only required to be tested in one of the supported test configurations.						

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.1.1-2, A.7.6.1.1.1-3 and A.7.6.1.1.1-4 below.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6.1.1.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

Parameter	Unit	Config	Value	Comment
Active cell		1, 2	PCell (Cell 1)	
Neighbour cell		1, 2	Cell 2	Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 and Cell 2	One TDD carrier frequency is used for the NR cells.
SMTC configuration		1, 2	SMTC.1	
A3-Offset	dB	1, 2	-11	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	S	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	OFF	
Time offset between Cell 1 and Cell 2		1, 2	3 μs	Synchronous cells
T1	S	1, 2	5	
T2	S	1, 2	5	

Table A.7.6.1.1.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

Parameter	Unit	Config	Cell 1		Cell 2		
			T1	T2	T1	T2	
TDD configuration		1, 2	TDDConf.3.1		TDDConf.3.1		
BW _{channel}	MHz	1, 2	100: N	100: N _{RB,c} = 66		100: N _{RB,c} = 66	
Data RBs allocated		1	2	24		24	
		2	48		48		
Intial BWP configuration		1, 2	DLBV	DLBWP.0.1		VP.0.1	
			ULBV	VP.0.1	ULBWP.0.1		
Active DL BWP configuration		1, 2	DLBV	VP.1.1	DLBWP.1.1		
Active UL BWP configuration		1, 2	ULBV	ULBWP.1.1		ULBWP.1.1	
RLM-RS		1, 2	S	SSB		SSB	
PDSCH RMC configuration		1	SR.3.	SR.3.2 TDD		N/A	
		2	SR.3.	3 TDD			
RMSI CORESET RMC configuration		1	CR.3.1 TDD		N	/A	
Corniguration		2	CR.3.	2 TDD	N	/A	
Dedicated CORESET RMC configuration		1	CCR.3	.1 TDD	N	/A	
Comigaration		2	CCR.3	.7 TDD	N	/A	
TRS configuration		1, 2	TRS.2.1 TDD N/A		/A		
PDSCH/PDCCH TCI states		1, 2	TCI.State.2 N/A		/A		

PDSCH/PDCCH subcarrier	kHz	1, 2	120	120
spacing				
OCNG Patterns		1, 2	OP.5	N/A
cellIndividualOffset	dB	1~2	N/A	16
SSB		1	SSB.3 FR2	SSB.7 FR2
		2	SSB.4 FR2	SSB.8 FR2
Propagation Condition		1, 2	AWGN	AWGN

Table A.7.6.1.1.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap without DRX

Parameter	Unit	Config	Се	II 1	Cell 2		
			T1	T2	T1	T2	
AoA setup		1, 2	Se	etup 3 defir	ned in A.3.1	5.3	
			Ao	A1	Ad	oA2	
Beam assumption Note 4		1,2	Ro	Rough		Rough	
Es	dBm/SCS	1	-89	-89	-Infinity	-89	
		2	-86	-86	-Infinity	-86	
$\hat{E}_{_{s}}/I_{_{ot\ BB\ Note\ 5}}$	dB	1, 2	-0.12	-0.12	-Infinity	-0.12	
SSB_RP	dBm/SCS	1	-89	-89	-Infinity	-89	
		<u>2</u>	-86	-86	-Infinity	-86	
Io	dBm/95.04MHz	1	-64.41	-64.41	-Infinity	-64.41	
-		2	-61.41	-61.41	-Infinity	-61.41	
Time multiplexing of the downlink transmissions from each AoA		1, 2	Defi	Defined in Figure A.7.6.1.1.1-1			

- Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
- Note 2: Void
- Note 3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 5: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

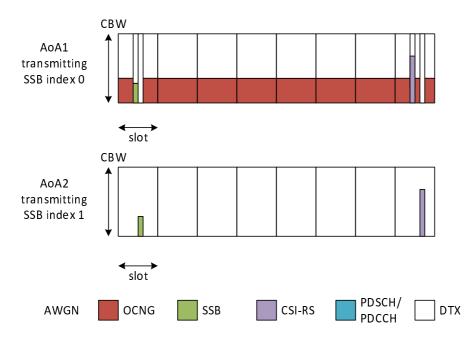


Figure A.7.6.1.1.1: Time multiplexed downlink transmissions (Config 1 example)

A.7.6.1.1.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 2.4s for a UE supporting power class 1,
- 1.44s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.1.2 SA event triggered reporting test without gap under DRX

A.7.6.1.2.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.2.1-1.

Table A.7.6.1.2.1-1: supported test configurations

Cor	nfiguration	Description				
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
Note:	The UE is only required to be tested in one of the supported test configurations.					

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.2.1-2 \sim 6.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6.1.2.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Value	Comment
		_	Test 1 Test 2	
Active cell		1, 2	PCell (Cell 1)	
Neighbour cell		1, 2	Cell 2	Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 and Cell 2	One TDD carrier frequency is used for the NR cells.
SMTC configuration		1, 2	SMTC.1	
A3-Offset	dB	1, 2	-6	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	S	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	DRX.1 DRX.7	DRX related parameters are defined in Table A.7.6.1.2.1-5
Time offset between Cell 1 and Cell 2		1, 2	3 μs	Synchronous cells
T1	S	1, 2	5	
T2	S	1, 2	10 52	

Table A.7.6.1.2.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Cell 1	Cell 2
			T1 T2	T1 T2
TDD configuration		1, 2	TDDConf.3.1	TDDConf.3.1
BW _{channel}	MHz	1, 2	100: N _{RB,c} = 66	6 100: N _{RB,c} = 66
Data RBs		1, 2	66	66
allocated				
Intial BWP		1, 2	DLBWP.0.1	DLBWP.0.1
configuration			ULBWP.0.1	ULBWP.0.1
Active DL BWP		1, 2	DLBWP.1.1	DLBWP.1.1
configuration				
Active UL BWP		1, 2	ULBWP.1.1	ULBWP.1.1
configuration				
RLM-RS		1, 2	SSB	SSB
PDSCH RMC		1	SR.3.2 TDD	N/A
configuration		2	SR.3.3 TDD	
RMSI CORESET RMC		1	CR.3.1 TDD	N/A
configuration		2	CR.3.2 TDD	N/A
Dedicated CORESET RMC		1	CCR.3.1 TDD	N/A
configuration		2	CCR.3.7 TDD	N/A
TRS configuration		1, 2	TRS.2.1 TDD	N/A
PDSCH/PDCCH TCI states		1, 2	TCI.State.2	N/A
PDSCH/PDCCH	kHz	1, 2	120	120
subcarrier		•		
spacing				
OCNG Patterns		1, 2	OP.1	OP.1
SSB		1	SSB.3 FR2	SSB.3 FR2
		2	SSB.4 FR2	SSB.4 FR2
Propagation Condition		1, 2	AWGN	AWGN

Table A.7.6.1.2.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 without gap with DRX

Parameter	Unit	Config	Ce	Cell 1		Cell 2	
			T1	T2	T1	T2	
AoA setup		1, 2	S	etup 1 defi	ned in A.3.1	5.1	
Beam assumption Note 4		1,2		Rough			
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 5	dB	1, 2	3.77	-1.52	-Infinity	-1.52	
N_{oc} Note 2	dBm/15 KHz	1, 2		-98			
Note 2	dBm/SCS	1	-89		-89		
oc oc		2			-86		
SSB_RP	dBm/SCS	1	-85	-85	-Infinity	-85	
		2	-82	-82	-Infinity	-82	

\hat{E}_s/N_{oc}		dB	1, 2	4	4	-Infinity	4
Io		dBm/95.04MHz	1, 2	-54.53	-52.18	See Cell	1 columns
Note 1:	The reso	ources for uplink trans	mission are assigned	to the UE	orior to the	start of time	period
Note 2:	Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for						
	N_{oc} to	be fulfilled.					
Note 3:	,	SB_RP and lo levels labels. They are not settab			rameters f	or information	on
Note 4:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation						
Note 5:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB _P from TS 38.101-2 [19] Table 6.2.1.3-4.						

Table A.7.6.1.2.1-5: Void

Table A.7.6.1.2.1-6: Void

A.7.6.1.2.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,
- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.1.3 SA event triggered reporting test with per-UE gaps under non-DRX

A.7.6.1.3.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.3.1-1.

Table A.7.6.1.3.1-1: supported test configurations

Г	Configuration	Description

Ī	1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
ſ	2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
ſ	Note:	The UE is only re	equired to be tested in one of the supported test configurations.

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.3.1-2 \sim 4 below.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6.1.3.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Value	Comment
Active cell		1, 2	PCell (Cell 1)	
Neighbour cell		1, 2	Cell 2	Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 and Cell 2	One TDD carrier frequency is used for the NR cells.
Gap type		1, 2	Per-UE gaps	
Measurement gap repitition periodicity	ms	1, 2	40	
Measurement gap length	ms	1, 2	6	
Measurement gap offset	ms	1, 2	39	
SMTC configuration		1, 2	SMTC.1	
CSI-RS parameters		1, 2	CSI-RS.3.2 TDD resource #0	Resource #1 is not used
A3-Offset	dB	1, 2	-11	
CP length		1, 2	Normal	
Hysteresis	dB	1, 2	0	
Time To Trigger	s	1, 2	0	
Filter coefficient		1, 2	0	L3 filtering is not used
DRX		1, 2	OFF	
Time offset between Cell 1 and Cell 2		1, 2	3 μs	Synchronous cells
T1	s	1, 2	5	
T2	s	1, 2	5	

Table A.7.6.1.3.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Cell 1		Cell 2		
			T1	T2	T1	T2	
TDD configuration		1, 2	TDDConf.3.1		TDDConf.3.1		
BW _{channel}	MHz	1, 2	100: N	100: N _{RB,c} = 66		100: N _{RB,c} = 66	
Data RBs allocated		1	24		24		
		2		l8	48		

Intial BWP configuration		1, 2	DLBWP.0.1	DLBWP.0.1
		•	ULBWP.0.1	ULBWP.0.1
Active DL BWP configuration		1, 2	DLBWP.1.2	DLBWP.1.1
Active UL BWP configuration		1, 2	ULBWP.1.2	ULBWP.1.1
RLM-RS		1, 2	CSI-RS	SSB
PDSCH RMC configuration		1	SR.3.2 TDD	N/A
		2	SR.3.3 TDD	
RMSI CORESET RMC configuration		1	CR.3.1 TDD	N/A
		2	CR.3.2 TDD	N/A
Dedicated CORESET RMC configuration		1	CCR.3.1 TDD	N/A
		2	CCR.3.7 TDD	N/A
TRS configuration		1, 2	TRS.2.1 TDD	N/A
PDSCH/PDCCH TCI states		1, 2	TCI.State.2	N/A
PDSCH/PDCCH subcarrier	kHz	1, 2	120	120
spacing				
OCNG Patterns		1, 2	OP.5	N/A
cellIndividualOffset	dB	1~2	N/A	16
SSB		1	SSB.3 FR2	SSB.7 FR2
		2	SSB.4 FR2	SSB.8 FR2
Propagation Condition		1, 2	AWGN	AWGN

Table A.7.6.1.3.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps without DRX

Parameter	Unit	Config	Ce	II 1	Cell 2	
			T1	T2	T1	T2
AoA setup		1, 2	Se	etup 3 defir	ned in A.3.1	5.3
			Ao	A1	Ad	oA2
Beam Assumption ^{Note 4}		1,2	Ro	Rough		ugh
Es	dBm/SCS	1	-89	-89	-Infinity	-89
		2	-86	-86	-Infinity	-86
$\hat{E}_{_{s}}/I_{_{ot\ BB\ Note\ 5}}$	dB	1, 2	-0.12	-0.12	-Infinity	-0.12
SSB_RP	dBm/SCS	1	-89	-89	-Infinity	-89
		<u>2</u>	-86	-86	-Infinity	-86
Io	dBm/95.04MHz	1	-64.41	-64.41	-Infinity	-64.41
-		2	-61.41	-61.41	-Infinity	-61.41
Time multiplexing of the downlink transmissions from each AoA		1	Defi	Defined in Figure A.7.6.1.3.1-1		

- Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.
- Note 2: Void
- Note 3: Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 5: Calculation of Es/Iot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

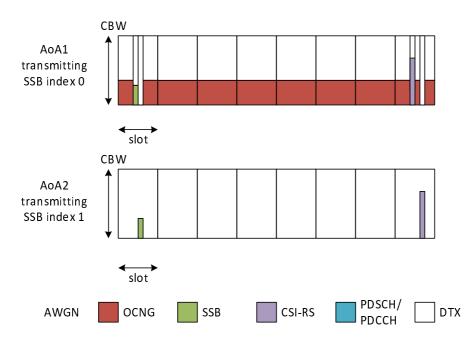


Figure A.7.6.1.3.1-1: Time multiplexed downlink transmissions (Config 1 example)

A.7.6.1.3.2 Test Requirements

In the test, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 3.2s for a UE supporting power class 1,
- 1.92s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.1.4 SA event triggered reporting test with per-UE gaps under DRX

A.7.6.1.4.1 Test purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the TDD intra-frequency cell search requirements in clause 9.2.5.1 and 9.2.5.2. Supported test configurations are shown in table A.7.6.1.4.1-1.

Table A.7.6.1.4.1-1: supported test configurations

Cor	nfiguration	Description
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations.

There are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on the same frequency as the PCell. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.6.1.4.1-2, A.7.6.1.4.1-3 and A.7.6.1.4.1-4 below.

There are two BWPs configured in Cell 1, BWP1 which contains the cell defining SSB, and BWP2 which does not contain any SSB of Cell 1. During the whole test, BWP2 is always scheduled as the active BWP for the UE.

In the measurement control information, a measurement object is configured for the frequency of the PCell, and it is indicated to the UE that event-triggered reporting with Event A3 is used.

The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of Cell 2.

Table A.7.6.1.4.1-2: General test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

Parameter	Unit Config		Va	lue	Comment
		_	Test 1	Test 2	
Active cell		1, 2	PCell (Cell 1)	•	
Neighbour cell		1, 2	Cell 2		Cell to be identified.
RF Channel Number		1, 2	1: Cell 1 and C	Cell 2	One TDD carrier frequency is used for the NR cells.
Gap type		1, 2	Per-UE gaps		
Measurement gap repitition periodicity	ms	1, 2	40		
Measurement gap length	ms	1, 2	6		
Measurement gap offset	ms	1, 2	39		
SMTC configuration		1, 2	SMTC.1		
CSI-RS parameters		1, 2	CSI-RS.3.2 TE	DD resource #0	Resource #1 is not used
A3-Offset	dB	1, 2	-6		
CP length		1, 2	Normal		
Hysteresis	dB	1, 2	0		
Time To Trigger	S	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	DRX.1	DRX.7	DRX related parameters are defined in Table A.7.6.1.2.1-5
Time offset between Cell 1 and Cell 2		1, 2	3 μs		Synchronous cells
T1	S	1, 2	5		
T2	S	1, 2	10	52	

Table A.7.6.1.4.1-3: NR Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Ce	Cell 1		ell 2
			T1	T2	T1	T2
TDD configuration		1, 2	TDDC	TDDConf.3.1		onf.3.1
BW _{channel}	MHz	1, 2	100: N _{RB,c} = 66 100		100: Ni	RB,c = 66

Data RBs allocated		1, 2	66	66
Intial BWP configuration		1, 2	DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Active DL BWP configuration		1, 2	DLBWP.1.2	DLBWP.1.1
Active UL BWP configuration		1, 2	ULBWP.1.2	ULBWP.1.1
RLM-RS		1, 2	SCSI-RS	SSB
PDSCH RMC		1	SR.3.2 TDD	N/A
configuration		2	SR.3.3 TDD	
RMSI CORESET RMC		1	CR.3.1 TDD	N/A
configuration		2	CR.3.2 TDD	N/A
Dedicated CORESET RMC		1	CCR.3.1 TDD	N/A
configuration		2	CCR.3.7 TDD	N/A
TRS configuration		1, 2	TRS.2.1 TDD	N/A
PDSCH/PDCCH TCI state		1, 2 1, 2	TCI.State.2	N/A
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	120	120
OCNG Patterns		1, 2	OP.1	OP.1
SSB		1	SSB.3 FR2	SSB.3 FR2
		2	SSB.4 FR2	SSB.4 FR2
Propagation Condition		1, 2	AWGN	AWGN

Table A.7.6.1.4.1-4: NR OTA Cell specific test parameters for intra-frequency event triggered reporting for SA with TDD PCell in FR2 with per-UE gaps with DRX

Parameter	Unit	Config	Ce	II 1	Ce	II 2
			T1	T2	T1	T2
AoA setup		1, 2	S	etup 1 defii	ned in A.3.1	5.1
Beam Assumption ^{Note 4}		1,2		Ro	ough	
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 5	dB	1, 2	3.77	-1.52	-Infinity	-1.52
N_{oc} Note 2	dBm/15 KHz	1, 2	-98			
N_{oc} Note 2	dBm/SCS	1	-89			
1 oc		2		-	·86	
SSB_RP	dBm/SCS	1	-85	-85	-Infinity	-85
		2	-82	-82	-Infinity	-82
\hat{E}_s/N_{oc}	dB	1, 2	4	4	-Infinity	4
Io	dBm/95.04MHz	1, 2	-54.53	-52.18	See Cell 2	2 columns

Note 1:	The resources for uplink transmission are assigned to the UE prior to the start of time period
	T2.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for
	N_{oc} to be fulfilled.
Note 3:	Es/lot, SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 5:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor Δ MB _P from TS 38.101-2 [19] Table 6.2.1.3-4.

Table A.7.6.1.4.1-5: Void Table A.7.6.1.4.1-6: Void

A.7.6.1.4.2 Test Requirements

In test 1, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 7.2s for a UE supporting power class 1,
- 4.32s for a UE supporting power class 2, 3 and 4

In test 2, the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

- 51.2s for a UE supporting power class 1,
- 30.72s for a UE supporting power class 2, 3 and 4

The UE is not required to read the neighbour cell SSB index in this test.

The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled.

The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2 Inter-frequency Measurements

A.7.6.2.1 SA event triggered reporting tests For FR2 without SSB time index detection when DRX is not used (PCell in FR2)

A.7.6.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.1.1-1, A.7.6.2.1.1-2, and A.7.6.2.1.1-3.

Measurement gap pattern configuration # 13 as defined in Table A.7.6.2.1.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.1.1-1.

Table A.7.6.2.1.1-1 SA event triggered reporting tests without SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void.	

Table A.7.6.2.1.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test configurati on	Value	Comment
NR RF Channel Number		Config 1	1, 2	Two FR2 NR carrier frequencies is used.
Active cell		Config 1	NR cell 1 (Pcell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR cell 2	NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39	
SMTC-SSB parameters		Config 1	SSB.3 FR2	As specified in clause A.3.10.2
offsetMO	dB	Config 1	16	Applied to NR Cell 2 measurement object
A3-Offset	dB	Config 1	-11	
Hysteresis	dB	Config 1	0	
CP length		Config 1	Normal	
TimeToTrigger	S	Config 1	0	
Filter coefficient		Config 1	0	L3 filtering is not used
DRX		Config 1	OFF	DRX is not used
Time offset between serving and neighbour cells		Config 1	3µs	Synchronous cells.
T1	S	Config 1	5	
T2	S	Config 1	5.2 for PC1; 3.5 for other PC	

Table A.7.6.2.1.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test	Cell 1		Cell 2		
		configuratio	T1 T2		T1	T2	
		n					
AoA setup		Config 1	Setup 3 as specified in clause A.3.15				
			AoA1		l l	AoA2	

	l Number						ough
Dunley made	NR RF Channel Number		Config 1		1		2
Duplex mode			Config 1	Т	DD	-	ΓDD
TDD configurati	on		Config 1		onf.3.1	TDDConf.3.1	
BW _{channel}	011	MHz	Config 1		RB,c = 66	100: N _{RB,c} = 66	
Data RBs alloca	ated		Config 1		66	66	
BWP BW		MHz	Config 1		RB,c = 66	100.1	NRB,c = 66
BWP	Initial DL		Coming 1	100.11	KB,0 — CC	100.1	1112,0 = 00
configuration	BWP			DLB\	WP.0.1		N/A
	Initial UL BWP		Config 1	ULBV	WP.0.1		N/A
	Dedicated DL BWP			DLB\	WP.1.1		N/A
	Dedicated UL BWP			ULBV	WP.1.1		N/A
OCNG Patterns A.3.2.1.1 (OP.1)		Config 1	0	P.1	(DP.1
PDSCH Reference measurement control	hannel		Config 1	SR.3	.1 TDD		-
CORESET Refe			Config 1	CR.3	.1 TDD		-
SMTC configuration A.3.11.1 and	A.3.11.2	kHz	Config 1	SMTC.1		SMTC.1	
spacing	PDSCH/PDCCH subcarrier spacing		Config 1	120		120	
TRS configuration			Config 1		2.1 TDD		N/A
PDSCH/PDCCI			Config 1	TCI.State.2			N/A
EPRE ratio of P	SS to SSS						
EPRE ratio of P	BCH DMRS						
EPRE ratio of P	BCH to PBCH						
EPRE ratio of P to SSS	DCCH DMRS						
EPRE ratio of P PDCCH DMRS	DCCH to		Config 1	0		0	
EPRE ratio of P to SSS							
EPRE ratio of P PDSCH	DSCH to						
EPRE ratio of C to SSS(Note 1)							
EPRE ratio of COUNTY OCNG DMRS (
Ês		dBm/S CS	Config 1	-87	-87	-Infinity	-87
SSB_RP Note 3		dBm/S CS Note5	Config 1	-87	-87	-Infinity	-87
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note 8		dB	Config 1	1.89	1.89	-Infinity	1.89
L- Note3		dBm/95	Config 1	-58.01	-58.01	-Infinity	-58.01
Io Note3		.04 MHz Note5					

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Void
Note 3:	SSB-RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	Void
Note 5:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 6:	As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 8:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for the
	associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for
	UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.6.2.1.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

The UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.2 SA event triggered reporting tests For FR2 without SSB time index detection when DRX is used (PCell in FR2)

A.7.6.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.2.1-1, A.7.6.2.2.1-2, and A.7.6.2.2.1-3.

In test 1&2 measurement gap pattern configuration # 13 as defined in Table A.7.6.2.2.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.2.1-1.

UE needs to be provided at least once every 500ms with new Timing Advance Command MAC control element to restart the Time alignment timer to keep UE uplink time alignment. Furthermore UE is allocated with PUSCH resource at every DRX cycle.

Table A.7.6.2.2.1-1: SA event triggered reporting tests without SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void.	

Table A.7.6.2.2.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Unit Test Value		Comment	
		configurati on	Test 1	Test 2	
NR RF Channel Number		Config 1	1	, 2	Two FR2 NR carrier frequencies is used.
Active cell		Config 1	NR cell 1 (Pcell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR cell 2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39		
SMTC-SSB parameters		Config 1	SSB.3 FR2		As specified in clause A.3.10.2
A3-Offset	dB	Config 1	-6		
Hysteresis	dB	Config 1	0		
CP length		Config 1	Normal		
TimeToTrigger	S	Config 1	0		
Filter coefficient		Config 1	0		L3 filtering is not used
DRX		Config 1	DRX.1	DRX.7	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1	3µs	•	Synchronous cells.
T1	s	Config 1	5		
T2	S	Config 1	8 for PC1; 5 for other PC	82 for PC1; 52 for other PC	

Table A.7.6.2.2.1-3: Cell specific test parameters for CA inter-frequency event triggered reporting without SSB time index detection

Para	meter	Unit	Test	Ce	Cell 1		Cell 2	
			configuratio	T1	T2	T1	T2	
			n					
AoA setup			Config 1	Setu	p 1 as specif	ied in clause	e A.3.15	
Beam Assump	tion ^{Note 7}		Config 1		Ro	ough		
NR RF Channe	el Number		Config 1	1 2			2	
TDD configura	tion		Config 1	TDDC	onf.3.1	TDD	Conf.3.1	
Duplex mode			Config 1	TI	OD	-	TDD	
BW _{channel}		MHz	Config 1	100: N _{RB,c} = 66 100: N _{RB,c}		N _{RB,c} = 66		
Data RBs alloc	ated		Config 1	66			66	
BWP BW	•	MHz	Config 1	100: N _{RB,c} = 66		100:	N _{RB,c} = 66	
BWP configuration	Initial DL BWP		Config 1	DLBV	DLBWP.0.1		N/A	

Г	1		1		T	
Initial UL BWP			ULBV	VP.0.1	1	N/A
Dedicated DL BWP			DLBV	VP.1.1	1	N/A
Dedicated UL BWP			ULBWP.1.1		1	N/A
OCNG Patterns defined in A.3.2.1.1		Config 1	OI	P.1	C)P.1
PDSCH Reference measurement channel		Config 1	SR.3.	1 TDD		-
CORESET Reference Channel		Config 1	CR.3.	1 TDD		-
SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1	SM	TC.1	SM	ITC.1
PDSCH/PDCCH subcarrier spacing	kHz	Config 1	1:	20	,	120
TRS configuration		Config 1	TRS.2	.1 TDD	1	V/A
PDSCH/PDCCH TCI state		Config 1		State.2		V/A
EPRE ratio of PSS to SSS						
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS						
EPRE ratio of PDCCH DMRS to SSS						
EPRE ratio of PDCCH to PDCCH DMRS		Config 1		0		0
EPRE ratio of PDSCH DMRS to SSS						
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG to OCNG DMRS (Note 1)						
$N_{oc}^{$	dBm/15 kHz Note5		-10)4.7	-1	04.7
$N_{oc}^{ m Note2}$	dBm/S CS Note4	Config 1	-9	5.7	-6	95.7
SSB_RP Note 3	dBm/S CS Note5	Config 1	-89.7	-89.7	-Infinity	-86.7
\hat{E}_s/I_{ot}	dB	Config 1	6	6	-Infinity	9
\hat{E}_s/N_{oc}	dB	Config 1	6	6	-Infinity	9
IoNote3	dBm/95	Config 1	-59.7	-59.7	-66.7	-57.2
	.04 MHz	·· ·				
	Note5					
Propagation Condition		Config 1	AW	/GN	A۱	WGN

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant
	over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be
	fulfilled.
Note 3:	SSB_RP and lo levels have been derived from other parameters for information purposes. They
	are not settable parameters themselves.
Note 4:	Void
Note 5:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
Note 6:	As observed with 0 dBi gain antenna at the centre of the quiet zone
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or
	test system implementation

A.7.6.2.2.2 Test Requirements

In test 1 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.3 SA event triggered reporting tests For FR2 with SSB time index detection when DRX is not used (PCell in FR2)

A.7.6.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.3.1-1, A.7.6.2.3.1-2, and A.7.6.2.3.1-3.

Measurement gap pattern configuration # 13 as defined in Table A.7.6.2.3.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.3.1-1.

Table A.7.6.2.3.1-1: SA event triggered reporting tests with SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void.	

Table A.7.6.2.3.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test configurati on	Value	Comment
NR RF Channel Number		Config 1	1, 2	Two FR2 NR carrier frequencies is used.
Active cell		Config 1	NR cell 1 (Pcell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1	NR cell 2	NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	13	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39	
SMTC-SSB parameters		Config 1	SSB.3 FR2	As specified in clause A.3.10.2
offsetMO	dB	Config 1	16	Applied to NR Cell 2 measurement object
A3-Offset	dB	Config 1	-11	
Hysteresis	dB	Config 1	0	
CP length		Config 1	Normal	
TimeToTrigger	s	Config 1	0	
Filter coefficient		Config 1	0	L3 filtering is not used
DRX		Config 1	OFF	DRX is not used
Time offset between		Config 1	3μs	Synchronous cells.
serving and neighbour				
cells				
T1	S	Config 1	5	
T2	s	Config 1	7 for PC1; 4.5 for other PC	

Table A.7.6.2.3.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Para	meter	Unit	Test	Cell 1		Cell 2	
			configuratio n	T1	T2	T1	T2
AoA setup			Config 1	Setu	ıp 3 as specit	fied in claus	e A.3.15
			 	Ad	oA1		AoA2
Beam Assump	tion ^{Note 7}		Config 1	Ro	ough	F	Rough
NR RF Channe	el Number		Config 1	1		2	
Duplex mode			Config 1	Т	DD	TDD	
TDD configura	tion		Config 1	TDDConf.3.1		TDDConf.3.1	
BW _{channel}		MHz	Config 1	100: N _{RB,c} = 66		100: N _{RB,c} = 66	
Data RBs alloc	ated		Config 1	(66	66	
BWP BW		MHz	Config 1	100: N	RB,c = 66	100: N _{RB,c} = 66	
BWP configuration	Initial DL BWP			DLBWP.0.1			N/A
	Initial UL BWP		Config 1	ULBWP.0.1		N/A	
	Dedicated DL BWP			DLB\	WP.1.1	N/A	

Dedicated UL			I				
BWP			ULBWP.1.1		1	N/A	
OCNG Patterns defined in A.3.2.1.1		Config 1	OP.1		OP.1		
PDSCH Reference measurement channel		Config 1	SR.3.	1 TDD	-		
CORESET Reference Channel		Config 1	CR.3.	1 TDD		-	
SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1	SMT	ΓC.1	SM	ITC.1	
PDSCH/PDCCH subcarrier spacing	kHz	Config 1	12	20		120	
TRS configuration		Config 1		.1 TDD	1	N/A	
PDSCH/PDCCH TCI state		Config 1	TCI.S	state.2	1	N/A	
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to PBCH DMRS							
EPRE ratio of PDCCH DMRS to SSS						0	
EPRE ratio of PDCCH to PDCCH DMRS		Config 1	(0			
EPRE ratio of PDSCH DMRS to SSS							
EPRE ratio of PDSCH to PDSCH							
EPRE ratio of OCNG DMRS to SSS(Note 1)							
EPRE ratio of OCNG to OCNG DMRS (Note 1)							
Ês	dBm/S CS	Config 1	-87	-87	-Infinity	-87	
SSB_RP Note 3	dBm/S CS Note5	Config 1	-87	-87	-Infinity	-87	
$\hat{E}_{_{\mathrm{s}}}/I_{_{\mathrm{ot}}}$ BB Note 8	dB	Config 1	1.89	1.89	-Infinity	1.89	
IO Note3	dBm/95 .04 MHz _{Note5}	Config 1	-58.01	-58.01	-Infinity	-58.01	
Propagation Condition		Config 1	AW	/GN	A۱	VGN	
Nata 4: OCNO aball bassasa		ان المحمد المحملات	H (l .			:44l	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Void
- Note 3: SSB-RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Void
- Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
- Note 8: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMBs from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.6.2.3.2 Test Requirements

The UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

The UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.4 SA event triggered reporting tests For FR2 with SSB time index detection when DRX is used (PCell in FR2)

A.7.6.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR2 on NR RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.4.1-1, A.7.6.2.4.1-2, and A.7.6.2.4.1-3.

In test 1&2 measurement gap pattern configuration # 13 as defined in Table A.7.6.2.4.1-2 is provided for UE that does not support per-FR gap and for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A3 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.4.1-1.

Table A.7.6.2.4.1-1: SA event triggered reporting tests with SSB index reading for FR2-FR2

Config	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note 1: Void.	

Table A.7.6.2.4.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
NR RF Channel Number		Config 1	1,	2	Two FR2 NR carrier frequencies is used.
Active cell		Config 1	NR cell 1 (Pce	II)	NR Cell 1 is on NR RF channel number 1.

Neighbour cell		Config 1	NR cell 2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1	13		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1	39		
SMTC-SSB parameters		Config 1	SSB.3 FR2		As specified in clause A.3.10.2
A3-Offset	dB	Config 1	-6		
Hysteresis	dB	Config 1	0		
CP length		Config 1	Normal		
TimeToTrigger	S	Config 1	0		
Filter coefficient		Config 1	0		L3 filtering is not used
DRX		Config 1	DRX.1	DRX.7	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1	3μs		Synchronous cells.
T1	S	Config 1	5		
T2	S	Config 1	11 for PC1; 6.5 for other PC	108 for PC1; 67 for other PC	

Table A.7.6.2.4.1-3: Cell specific test parameters for CA inter-frequency event triggered reporting with SSB time index detection

Para	meter	Unit	Test	Ce	II 1	(Cell 2	
			configuratio n	T1	T2	T1	T2	
AoA setup			Config 1	Setu	Setup 1 as specified in clause A.3.			
Beam Assump	tion ^{Note 7}		Config 1		Ro	ough		
NR RF Channe	el Number		Config 1		1		2	
Duplex mode			Config 1	ΤI	DD		TDD	
TDD configura	tion		Config 1		onf.3.1		Conf.3.1	
BW _{channel}		MHz	Config 1	100: N	_{RB,c} = 66	100:	$N_{RB,c} = 66$	
Data RBs alloc	cated		Config 1	6	6		66	
BWP BW		MHz	Config 1	100: N	RB,c = 66	100:	N _{RB,c} = 66	
BWP configuration	Initial DL BWP				VP.0.1		N/A	
	Initial UL BWP		Cantin 4	ULBV	VP.0.1		N/A	
	Dedicated DL BWP		Config 1 DLBWP.1.1		VP.1.1	N/A		
	Dedicated UL BWP			ULBV	VP.1.1	N/A		
OCNG Pattern A.3.2.1.1	s defined in		Config 1	OI	P.1		OP.1	
PDSCH Reference measurement			Config 1	SR.3.	1 TDD		-	
CORESET Re Channel	ference		Config 1	CR.3.	1 TDD		-	
SMTC configu in A.3.11.1 and			Config 1	SMTC.1		SMTC.1		
PDSCH/PDCCH subcarrier spacing		kHz	Config 1	120		120		
	TRS configuration		Config 1	TRS.2	.1 TDD		N/A	
PDSCH/PDCC		Config 1			TCI.State.2		N/A	
EPRE ratio of	PSS to SSS						·	
EPRE ratio of to SSS	PBCH DMRS		Config 1) 		0	

EPRE ratio of PBCH to PBCH						
DMRS						
EPRE ratio of PDCCH DMRS						
to SSS						
EPRE ratio of PDCCH to						
PDCCH DMRS						
EPRE ratio of PDSCH DMRS						
to SSS						
EPRE ratio of PDSCH to						
PDSCH						
EPRE ratio of OCNG DMRS						
to SSS(Note 1)						
EPRE ratio of OCNG to						
OCNG DMRS (Note 1)						
$N_{oc}^{ m Note2}$	dBm/15		-10	04.7	-10	04.7
	kHz					
	Note5					
$N_{oc}^{ m Note2}$	dBm/S	Config 1	-9	5.7	-9	95.7
	CS					
Nav. 0	Note4				<u> </u>	
SSB_RP Note 3	dBm/S	Config 1	-89.7	-89.7	-Infinity	-86.7
	CS					
	Note5	0 " 1			1.0.0	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	Config 1	6	6	-Infinity	9
\hat{E}_s/N_{oc}	dB	Config 1	6	6	-Infinity	9
Io ^{Note3}	ID (05	0 " 1			20.7	57. 0
10140165	dBm/95	Config 1	-59.7	-59.7	-66.7	-57.2
	.04					
	MHz					
Drang pation Condition	Note5	Confin 4	0.10	ICNI	0.1/	VON
Propagation Condition		Config 1		VGN		VGN
Note 1: OCNG shall be used	such that b	oth cells are fu	ily allocated a	and a consta	nt total transn	nitted power

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: Void
- Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.6.2.4.2 Test Requirements

In test 1 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 the UE shall send one Event A3 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.5 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is not used (PCell in FR1)

A.7.6.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.5.1-1, A.7.6.2.5.1-2, and A.7.6.2.5.1-3.

In test 1 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.5.1-2 is provided for a UE that does not support per-FR gap and in test 2 no gap pattern is configured as defined in Table A.7.6.2.5.1-2. If the UE supports per-FR gap, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.5.1-1.

Table A.7.6.2.5.1-1 SA event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell						
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,						
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	100 MHz bandwidth, TDD						
3	NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	duplex mode						
Note: The U	Note: The UE is only required to be tested in one of the supported test configurations							

Table A.7.6.2.5.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test	Value		Comment		
		configurati on	Test 1	Test 2			
NR RF Channel Number		Config 1,2,3	1, 2		One NR FR1 and one NR FR2 carrier frequency is used.		
Active cell		Config 1,2,3	NR cell 1 (Pcell)				NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell 2		NR cell 2 is on NR RF channel number 2.		
Gap Pattern Id		Config 1,2,3	0	Gap not configured	As specified in clause 9.1.2-1.		
Measurement gap offset		Config 1,2,3	39	N/A			
SMTC-SSB parameters		Config 1	SSB.1 FR1		As specified in clause A.3.10.1		
on NR RF Channel 1		Config 2	SSB.1 FR1		As specified in clause A.3.10.1		
		Config 3	SSB.2 FR1		As specified in clause A.3.10.1		
		Config 1	TRS.1.1 FDD				

001.00 ()	1	0 " 0			T
CSI-RS for tracking		Config 2	TRS.1.1 TDD		
parameters on NR RF Channel 1		Config 3	TRS.1.2 TDD		
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3 FR2		As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3	6		
Hysteresis	dB	Config 1,2,3	0		
a4-Threshold	dBm	Config 1,2,3	-105		
CP length		Config 1,2,3	Normal		
TimeToTrigger	S	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3µs		Synchronous cells.
T1	S	Config 1,2,3	5		
T2	S	Config 1,2,3	5.2 for PC1; 3.5 for other PC	3 for PC1; 2 for other PC	

Table A.7.6.2.5.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter		Unit	Test	Се	II 1	C	ell 2
			configuratio n	T1	T2	T1	T2
AoA setup			Config 1,2,3	N/A			s specified in e A.3.15
Beam Assump	tion ^{Note 7}		Config 1,2,3	N	/A	R	ough
NR RF Channe	el Number		Config 1,2,3	,	1		2
Duplex mode			Config 1	F	DD		TDD
			Config 2,3	TI	DD	1	TDD
TDD configura	tion		Config 1	Not Ap	plicable	TDD	Conf.3.1
			Config 2	TDDC	onf.1.1	TDD	Conf.3.1
			Config 3	TDDC	onf.2.1	TDD	Conf.3.1
BW _{channel}		MHz	Config 1	10: N _R	_{B,c} = 52	100: 1	$N_{RB,c} = 66$
			Config 2	10: N _R	в,c = 52	100: N _{RB,c} = 66	
			Config 3	40: N _{RB,c} = 106		100: N _{RB,c} = 66	
Data RBs alloc	ated		Config 1	52			66
			Config 2	52		66	
			Config 3	10	06		66
BWP BW		MHz	Config 1	10: N _{RB,c} = 52		100: N _{RB,c} = 66	
			Config 2	10: N _R	$_{\rm B,c} = 52$	100: 1	$N_{RB,c} = 66$
			Config 3	40: N _{RE}	s,c = 106	100: 1	$N_{RB,c} = 66$
BWP configuration	Initial DL BWP			DLBV	/P.0.1		N/A
	Initial UL BWP		Config 1 2 2	ULBWP.0.1 DLBWP.1.1		N/A N/A	
	Dedicated DL BWP		Config 1,2,3				
Dedicated UL BWP				ULBWP.1.1		N/A	
	OCNG Patterns defined in A.3.2.1.1 (OP.1)		Config 1,2,3	Ol	P.1)P.1
PDSCH Refere	ence		Config 1	SR.1.	1 FDD		-
measurement	channel		Config 2		1 TDD	<u> </u>	

RMSI CORESET Reference		Config 3 Config 1	SR2.1 TDD CR.1.1 FDD		
Channel		Config 2	CR.1.1 TDD		-
Shanner		Config 3	CR2.1 TDD		
Dedicated CORESET RMC configuration		Config 1	CCR.1.1 FDD		-
· ·		Config 2	CCR.1.1 TDD		
		Config 3	CCR.2.1 TDD		
SMTC configuration defined n A.3.11.1 and A.3.11.2		Config 1	SMTC.2	SM	TC.2
		Config 2,3	SMTC.1	SM	TC.1
PDSCH/PDCCH subcarrier	kHz	Config 1,2	15	1:	20
spacing		Config 3	30	1:	20
PRE ratio of PSS to SSS		Config 1,2,3	0	(0
PRE ratio of PBCH DMRS o SSS					
PRE ratio of PBCH to PBCH DMRS					
PRE ratio of PDCCH DMRS o SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS o SSS					
PRE ratio of PDSCH to					
PRE ratio of OCNG DMRS o SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
<u>-</u> s	dBm/S CS	Config 1,2,3		-Infinity	-87
SSB_RP Note 3	dBm/S CS Note5	Config 1,2		-Infinity	-87
Ê s /I ot BB Note 8	dB	Config 1,2,3	Link only, see clause	-Infinity	14.69
O ^{Note3}	dBm/95 .04 MHz Note5	Config 1,2,3	A.3.7A	-Infinity	-58.01
Propagation Condition		Config 1,2,3		AW	/GN

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Note 3: SSB_RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Void

Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone

Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 8: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.6.2.5.2 Test Requirements

In test 1, with per-UE, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

5120 for UE supporting power class 1, or

3200 for UE supporting other power class.

In test 2, without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

2560 for UE supporting power class 1, or

1600 for UE supporting other power class.

In test 1 and 2 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.6 SA event triggered reporting tests for FR2 without SSB time index detection when DRX is used (PCell in FR1)

A.7.6.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.6.1-1, A.7.6.2.6.1-2, and A.7.6.2.6.1-3.

In test 1&2 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.6.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 no gap pattern is configured as defined in Table A.7.6.2.6.1-2. If a UE supports per-FR gap it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.6.1-1.

Table A.7.6.2.6.1-1: SA event triggered reporting tests without SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	100 MHz bandwidth, TDD
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	duplex mode
Note: The	UE is only required to be tested in one of the supported test configur	rations

Table A.7.6.2.6.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test	Value			Comment	
		configurati on	Test 1	Test 2	Test 3	Test 4	
NR RF Channel Number		Config 1,2,3	1, 2		•	One NR FR1 and one NR FR2 carrier frequency is used.	
Active cell		Config 1,2,3	NR ce	II 1 (Pce	ell)		NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR ce	II 2			NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0		Gap n		As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39		N/A		
SMTC-SSB parameters		Config 1	SSB.1	FR1			As specified in clause A.3.10.1
on NR RF Channel 1		Config 2	SSB.1	FR1			As specified in clause A.3.10.1
		Config 3	SSB.2	FR1			As specified in clause A.3.10.1
CSI-RS for tracking		Config 1	TRS.1	.1 FDD			•
parameters on NR RF		Config 2		.1 TDD			
Channel 1		Config 3		.2 TDD			
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3				As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3	6				
Hysteresis	dB	Config 1,2,3	0				
a4-Threshold	dBm	Config 1,2,3	-105				
CP length		Config 1,2,3	Norma	al			
TimeToTrigger	s	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX .1	DRX .7	DRX .1	DRX .7	As specified in clause A.3.3
Time offset between serving and neighbour cells		Config 1	3ms	ı	ı	•	Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3µs				Synchronous cells.
T1	S	Config 1,2,3	5				
T2	S	Config 1,2,3	8 for PC1; 5 for othe r PC	82 for PC1; 52 for othe r PC	8 for PC1; 5 for othe r PC	82 for PC1; 52 for other PC	

Table A.7.6.2.6.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 without SSB time index detection

Parameter	Unit	Test	Cell 1 T1 T2		Cell 1 Cell 2		ell 2
		configuratio			T1	T2	
		n					
AoA setup		Config 1,2,3	1	۱A	Setup 1 a	s specified in	
						e A.3.15	
Beam AssumptionNote 7		Config 1,2,3	١	I/A	R	ough	
NR RF Channel Number		Config 1,2,3	1 2		2		
Duplex mode		Config 1	FDD			ΓDD	
		Config 2,3	Т	TDD		ΓDD	

TDD configure	tion		Config 1	Not Applicable	TDDConf 2.4
TDD configura	uon		Config 1 Config 2	Not Applicable TDDConf.1.1	TDDConf.3.1 TDDConf.3.1
			Config 3	TDDConf.2.1	TDDConf.3.1
BW _{channel}		MHz	Config 1	10: N _{RB,c} = 52	100: N _{RB,c} = 66
DVVchannel		IVIITZ	Config 2	10: N _{RB,c} = 52	100: N _{RB,c} = 66
			Config 3	40: $N_{RB,c} = 32$	100: N _{RB,c} = 66
Data RBs alloc	notod			$\frac{40.1N_{RB,c} = 100}{52}$	100. N _{RB,c} = 66
Data RBS allot	aled		Config 1		
			Config 2	52	66
DIA/D DIA/		N 41 1-	Config 3	106	66
BWP BW		MHz	Config 1	10: N _{RB,c} = 52	100: N _{RB,c} = 66
			Config 2	10: N _{RB,c} = 52	100: N _{RB,c} = 66
DWD	Lateral DI		Config 3	40: N _{RB,c} = 106	100: N _{RB,c} = 66
BWP configuration	Initial DL BWP			DLBWP.0.1	N/A
	Initial UL BWP		Config 1,2,3	ULBWP.0.1	N/A
	Dedicated DL BWP		Coming 1,2,5	DLBWP.1.1	N/A
	Dedicated UL BWP			ULBWP.1.1	N/A
OCNG Pattern A.3.2.1.1 (OP.			Config 1,2,3	OP.1	OP.1
PDSCH Refer			Config 1	SR.1.1 FDD	-
measurement					
			Config 2	SR.1.1 TDD	
DIANI CODEO	ET D (Config 3	SR2.1 TDD	
RMSI CORES	ET Reference		Config 1	CR.1.1 FDD	-
Channel			Config 2	CR.1.1 TDD	
D II / 100	DECET DATE		Config 3	CR2.1 TDD	
Dedicated CORESET RMC configuration			Config 1	CCR.1.1 FDD	-
			Config 2	CCR.1.1 TDD	
			Config 3	CCR.2.1 TDD	
SMTC configu in A.3.11.1 and			Config 1	SMTC.2	SMTC.2
			Config 2,3	SMTC.1	SMTC.1
PDSCH/PDCC	H subcarrier	kHz	Config 1,2	15	120
spacing			Config 3	30	120
EPRE ratio of	PSS to SSS				
EPRE ratio of					
	PBCH to PBCH		1		
DMRS			1		
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to			Config 1 2 2	0	_
PDCCH DMRS			Config 1,2,3	0	0
EPRE ratio of PDSCH DMRS to SSS			_		
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					

$N_{oc}^{ m Note2}$	dBm/15 kHz			-1	04.7
	Note5				
$N_{oc}^{ m Note2}$	dBm/S	Config 1,2		-9	95.7
·oc	CS	Config 3		-:	95.7
	Note4	_			
SSB_RP Note 3	dBm/S	Config 1,2		-Infinity	-86.7
	CS	Config 3		-Infinity	-86.7
	Note5				
\hat{E}_s/I_{ot}	dB	Config 1,2,3	NA Link only one clayes	-Infinity	9
\hat{E}_s/N_{oc}	dB	Config 1,2,3	Link only, see clause A.3.7A	-Infinity	9
Io ^{Note3}	dBm/9.	Config 1,2		-	-
	36MHz				
	dBm/38	Config 3		-	-
	.16MHz				
	dBm/95	Config 1,2,3		-66.7	-57.2
	.04				
	MHz				
	Note5				
Propagation Condition		Config 1,2,3		- Al	NGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled
- Note 3: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SSB_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.6.2.6.2 Test Requirements

In test 1 with per-UE gap and in test 3 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

7680 for UE supporting power class 1, or

4800 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

81920 for UE supporting power class 1, or

51200 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is not required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.7 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is not used (PCell in FR1)

A.7.6.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.7.1-1, A.7.6.2.7.1-2, and A.7.6.2.7.1-3.

In test 1 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.7.1-2 is provided for a UE that does not support per-FR gap and in test 2 measurement no gap pattern is configured as defined in Table A.7.6.2.7.1-2. If the UE supports per-FR gap, it is only required to pass test 2. Otherwise it is only required to pass test 1.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.7.1-1.

Table A.7.6.2.7.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell						
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,						
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	100 MHz bandwidth, TDD						
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	duplex mode						
Note: The U	Note: The UE is only required to be tested in one of the supported test configurations							

Table A.7.6.2.7.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
NR RF Channel Number		Config 1,2,3	1, 2		One NR FR1 and one NR FR2 carrier frequency is used.
Active cell		Config 1,2,3	NR cell 1 (Pce	ell)	NR Cell 1 is on NR RF channel number 1.
Neighbour cell		Config 1,2,3	NR cell 2		NR cell 2 is on NR RF channel number 2.
Gap Pattern Id		Config 1,2,3	0	Gap not configured	As specified in clause 9.1.2-1.
Measurement gap offset		Config 1,2,3	39	N/A	
SMTC-SSB parameters		Config 1	SSB.1 FR1		As specified in clause A.3.10.1
on NR RF Channel 1		Config 2	SSB.1 FR1		As specified in clause A.3.10.1
		Config 3	SSB.2 FR1		As specified in clause A.3.10.1
CSI-RS for tracking		Config 1	TRS.1.1 FDD		
parameters on NR RF		Config 2	TRS.1.1 TDD		
Channel 1		Config 3	TRS.1.2 TDD		
SMTC-SSB parameters on NR RF Channel 2		Config 1,2,3	SSB.3 FR2		As specified in clause A.3.10.2
offsetMO	dB	Config 1,2,3	6		
Hysteresis	dB	Config 1,2,3	0		
a4-Threshold	dBm	Config 1,2,3,4,5,6	-105		

CP length		Config 1,2,3	Normal		
TimeToTrigger	S	Config 1,2,3	0		
Filter coefficient		Config 1,2,3	0		L3 filtering is not used
DRX		Config 1,2,3	OFF		DRX is not used
Time offset between serving and neighbour cells		Config 1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		Config 2,3	3µs		Synchronous cells.
T1	s	Config 1,2,3	5		
T2	S	Config 1,2,3	7 for PC1; 4.5 for other PC	3.5 for PC1; 2.5 for other PC	

Table A.7.6.2.7.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Para	meter	Unit	Test		ell 1	_	ell 2	
			configuratio n	T1	T2	T1	T2	
AoA setup			Config 1,2,3	١	ĪΑ		s specified in e A.3.15	
Beam Assump	tion ^{Note 7}		Config 1,2,3	N	I/A		ough	
NR RF Channe			Config 1,2,3		1		2	
Duplex mode			Config 1	F	DD	-	ΓDD	
Dapiox mode			Config 2,3		DD		TDD	
TDD configura	tion		Config 1	Not Ap	plicable	TDD	Conf.3.1	
			Config 2	TDDC	onf.1.1	TDD	Conf.3.1	
			Config 3		onf.2.1	TDD	Conf.3.1	
BW _{channel}		MHz	Config 1		$_{B,c} = 52$		$N_{RB,c} = 66$	
			Config 2		RB,c = 52		$N_{RB,c} = 66$	
			Config 3		_{B,c} = 106	100: 1	N _{RB,c} = 66	
Data RBs allocated			Config 1		52		66	
			Config 2		52		66	
			Config 3	106		66		
BWP BW		MHz	Config 1		RB,c = 52		$N_{RB,c} = 66$	
			Config 2		$_{B,c} = 52$		$N_{RB,c} = 66$	
			Config 3	40: N _{RB,c} = 106		100: N _{RB,c} = 66		
BWP configuration	Initial DL BWP			DLBV	VP.0.1		N/A	
	Initial UL BWP		Config 4 2 2	ULBWP.0.1			N/A	
	Dedicated DL BWP		Config 1,2,3	DLBWP.1.1			N/A	
	Dedicated UL BWP			ULBWP.1.1			N/A	
OCNG Pattern A.3.2.1.1 (OP.			Config 1,2,3	OP.1			OP.1	
PDSCH Refere			Config 1	SR.1.	1 FDD		-	
measurement	channel		Config 2	SR.1.	1 TDD			
			Config 3	SR2.	1 TDD	7		
RMSI CORESI	ET Reference		Config 1	CR.1.	.1 FDD		-	
Channel	-		Config 2		.1 TDD	1		
			Config 3		1 TDD	1		
Dedicated COI configuration	RESET RMC		Config 1		.1 FDD		-	

		Config 2	CCR.1.1 TDD	İ	
		Corning 2	CCR.1.1 TDD		
		Config 3	CCR.2.1 TDD		
SMTC configuration defined in A.3.11.1 and A.3.11.2		Config 1	SMTC.2	SM	ITC.2
		Config 2,3	SMTC.1	SM	ITC.1
PDSCH/PDCCH subcarrier	kHz	Config 1,2	15		20
spacing		Config 3	30	1	20
EPRE ratio of PSS to SSS		Config 1,2,3	0		0
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS					
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS(Note 1)					
EPRE ratio of OCNG to OCNG DMRS (Note 1)					
Ês	dBm/S CS	Config 1,2, 3		-Infinity	-87
SSB_RP Note 3	dBm/S CS Note5	Config 1,2		-Infinity	-87
	Notes	Config 3		-Infinity	-87
\hat{E}_s/I_{ot} BB Note 8	dB	Config 1,2,3	Link only, see clause	-Infinity	14.69
IoNote3	dBm/95	Config 1,2,3	A.3.7A	Infinity	-58.01
	.04	35111g 1,2,0	71.0.771	y	00.01
	MHz				
	Note5				
Propagation Condition		Config 1,2,3			VGN
Note 1: OCNG shall be used	such that b	ooth cells are full	y allocated and a consta	nt total transı	mitted power

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Note 3: SSB_RP, Es/lot and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Void

Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone

Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 8: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_S from TS 38.101-2 [19] Table 6.2.1.3-4.

A.7.6.2.7.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

6720 for UE supporting power class 1, or

4160 for UE supporting other power class.

In test 2 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X ms from the beginning of time period T2, where X is

3360 for UE supporting power class 1, or

2080 for UE supporting other power class.

In test 1 and 2 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.2.8 SA event triggered reporting tests for FR2 with SSB time index detection when DRX is used (PCell in FR1)

A.7.6.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the SA inter-frequency NR cell search requirements in clause 9.3.4.

In this test, there are two cells: NR cell 1 as PCell in FR1 on NR RF channel 2 and NR cell 2 as neighbour cell in FR2 on NR RF channel 2. The test parameters and configurations are given in Tables A.7.6.2.8.1-1, A.7.6.2.8.1-2, and A.7.6.2.8.1-3.

In test 1&2 per-UE measurement gap pattern configuration # 0 as defined in Table A.7.6.2.8.1-2 is provided for a UE that does not support per-FR gap and in test 3&4 measurement no gap pattern is configured as defined in Table A.7.6.2.8.1-2.If a UE supports per-FR gap , it is only required to pass test 3&4. Otherwise it is only required to pass test 1&2.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event A4 is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Supported test configurations are shown in table A.7.6.2.8.1-1.

Table A.7.6.2.8.1-1: SA event triggered reporting tests with SSB index reading for FR1-FR2

Config	Description of serving cell	Description of target cell						
1	NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode	120 kHz SSB SCS,						
2	NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode	100 MHz bandwidth, TDD						
3	NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode	duplex mode						
Note: The U	Note: The UE is only required to be tested in one of the supported test configurations							

Table A.7.6.2.8.1-2: General test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Value	Comment

		Test	Test	Test	Test	Test	
		configurati	1	2	3	4	
		on					
NR RF Channel		Config 1,2,3	1, 2				One NR FR1 and one NR FR2
Number							carrier frequency is used.
Active cell		Config 1,2,3	NR ce	II 1 (Pce	ell)		NR Cell 1 is on NR RF channel
		-					number 1.
Neighbour cell		Config 1,2,3	NR ce	II 2			NR cell 2 is on NR RF channel
							number 2.
Gap Pattern Id		Config 1,2,3	0		Gap n		As specified in clause 9.1.2-1.
					config	ured	
Measurement gap		Config 1,2,3	39		N/A		
offset							
SMTC-SSB parameters		Config 1	SSB.1				As specified in clause A.3.10.1
on NR RF Channel 1		Config 2	SSB.1				As specified in clause A.3.10.1
		Config 3	SSB.2				As specified in clause A.3.10.1
CSI-RS for tracking		Config 1		.1 FDD			
parameters on NR RF		Config 2		.1 TDD			
Channel 1		Config 3		.2 TDD			
SMTC-SSB parameters		Config 1,2,3	SSB.3	FR2			As specified in clause A.3.10.2
on NR RF Channel 2							
offsetMO	dB	Config 1,2,3	6				
Hysteresis	dB	Config 1,2,3	0				
a4-Threshold	dBm	Config 1,2,3	-105				
CP length		Config 1,2,3	Norma	al			
TimeToTrigger	S	Config 1,2,3	0				
Filter coefficient		Config 1,2,3	0				L3 filtering is not used
DRX		Config 1,2,3	DRX	DRX	DRX	DRX	As specified in clause A.3.3
			.1	.7	.1	.7	
Time offset between		Config 1	3ms				Asynchronous cells.
serving and neighbour							The timing of Cell 2 is 3ms later
cells							than the timing of Cell 1.
		Config 2,3	3µs				Synchronous cells.
T1		Config 1 2 2	5				
	S	Config 1,2,3		100	11	100	
T2	S	Config 1,2,3	11	108	11	108	
			for PC1;	for PC1;	for PC1;	for PC1;	
			6.5	67	6.5	67	
			for	for	for	for	
			othe	othe	othe	other	
			r	r	r	PCT	
			PCT	PCT	PCT	BD	
			BD	BD	BD		
	l		100		טט	1	

Table A.7.6.2.8.1-3: Cell specific test parameters for SA inter-frequency event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	Cell 1		Cell 2					
		configuratio	T1	T2	T1	T2				
AoA setup		Config 1,2,3	NA		Setup 1 as specified in clause A.3.15					
Beam AssumptionNote 7		Config 1,2,3	N	N/A		Rough				
NR RF Channel Number		Config 1,2,3	,	1		1 2		2		
Duplex mode		Config 1	F	FDD		FDD		FDD		ΓDD
		Config 2,3	TDD		٦	ΓDD				
TDD configuration		Config 1	Not Applicable		TDD	Conf.3.1				
		Config 2	TDDC	onf.1.1	TDDConf.3.1					

			Config 3	TDDConf.2.1	TDDConf.3.1	
BWchannel		MHz	Config 1	10: N _{RB,c} = 52	100: N _{RB,c} = 66	
D T Chamilei			Config 2	10: N _{RB,c} = 52	100: N _{RB,c} = 66	
			Config 3	40: N _{RB,c} = 106	100: N _{RB,c} = 66	
Data RBs alloc	ated		Config 1	52	66	
2414 1120 400			Config 2	52	66	
			Config 3	106	66	
BWP BW		MHz	Config 1	10: N _{RB,c} = 52	100: N _{RB,c} = 66	
			Config 2	10: N _{RB,c} = 52	100: N _{RB,c} = 66	
			Config 3	40: N _{RB,c} = 106	100: N _{RB,c} = 66	
BWP configuration	Initial DL BWP			DLBWP.0.1	N/A	
	Initial UL BWP		Confin 4.2.2	ULBWP.0.1	N/A	
	Dedicated DL BWP		Config 1,2,3	DLBWP.1.1	N/A	
	Dedicated UL BWP			ULBWP.1.1	N/A	
OCNG Pattern A.3.2.1.1 (OP.			Config 1,2,3	OP.1	OP.1	
PDSCH Refere	ence		Config 1	SR.1.1 FDD	-	
measurement	channel		Config 2	SR.1.1 TDD		
			Config 3	SR2.1 TDD		
RMSI CORESI	ET Reference		Config 1	CR.1.1 FDD	-	
Channel			Config 2	CR.1.1 TDD		
			Config 3	CR2.1 TDD		
Dedicated COI configuration	RESET RMC		Config 1	CCR.1.1 FDD	-	
3			Config 2	CCR.1.1 TDD		
			Config 3	CCR.2.1 TDD		
SMTC configur in A.3.11.1 and			Config 1	SMTC.2	SMTC.2	
			Config 2,3	SMTC.1	SMTC.1	
PDSCH/PDCC	H subcarrier	kHz	Config 1,2	15	120	
spacing		<u> </u>	Config 3	30	120	
EPRE ratio of			-			
EPRE ratio of I to SSS						
DMRS	PBCH to PBCH					
to SSS	PDCCH DMRS					
EPRE ratio of I			Config 1,2,3	0	0	
	PDSCH DMRS					
EPRE ratio of PDSCH to PDSCH						
EPRE ratio of OCNG DMRS to SSS(Note 1)						
EPRE ratio of OCNG DMRS	OCNG to					
$N_{oc}^{ m Note2}$		dBm/15 kHz Note5		NA Link only, see clause A.3.7A	-104.7	

$N_{oc}^{ m Note2}$	dBm/S	Config 1,2	-!	95.7
TV _{oc} local	CS	Config 3	T	95.7
	Note4			
SSB_RP Note 3	dBm/S	Config 1,2	-Infinity	-86.7
	CS	Config 3	-Infinity	-86.7
	Note5	· ·	_	
\hat{E}_{s}/I_{ot}	dB	Config 1,2,3	-Infinity	9
\hat{E}_s/N_{oc}	dB	Config 1,2,3	-Infinity	9
Io ^{Note3}	dBm/9.	Config 1,2	-	-
	36MHz			
	dBm/38	Config 3	-	-
	.16MHz	_		
	dBm/95	Config 1,2,3	-66.7	-57.2
	.04			
	MHz			
	Note5			
Propagation Condition		Config 1,2,3	A۱	VGN

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 3: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SSB_RP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone
- Note 6: As observed with 0 dBi gain antenna at the centre of the quiet zone
- Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation.

A.7.6.2.8.2 Test Requirements

In test 1 with per-UE gap and in test 3 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X1 ms from the beginning of time period T2, where X1 is

10080 for UE supporting power class 1, or

6240 for UE supporting other power class.

In test 2 with per-UE gap and in test 4 without the gap, the UE shall send one Event A4 triggered measurement report, with a measurement reporting delay less than X2 ms from the beginning of time period T2, where X2 is

107520 for UE supporting power class 1, or

66560 for UE supporting other power class.

In test 1, 2, 3 and 4 UE is required to report SSB time index. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.7.6.3 L1-RSRP measurement for beam reporting

A.7.6.3.1 SSB based L1-RSRP measurement when DRX is not used

A.7.6.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.7.6.3.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.7.6.3.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config	Description
1		NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

A.7.6.3.1.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.1.2-1 and Table A.7.6.3.1.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.7.6.3.1.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
BW _{channel}	1~2	MHz	100: N _{RB,c} = 66
Data RBs allocated	1~2		66
PDSCH Reference measurement channel	1		SR.3.2 TDD
	2		SR.3.3 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD
	2		CR.3.2 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD
	2		CCR.3.7 TDD
SSB configuration	1		SSB.1 FR2
OOD configuration	2		SSB.2 FR2
OCNG Patterns	1~2		OP.1
Initial BWP Configuration	1~2		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3 ULBWP.1.3
SMTC configuration	1~2		SMTC.1
TRS Configuration	1~2		TRS.2.1 TDD

PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2
DRX configuration	1~2		Off
reportConfigType	1~2		periodic
reportQuantity	1~2		ssb-Index-RSRP
Number of reported RS	1~2		2
L1-RSRP reporting period	1~2	slot	320
T1	1~2	S	5
T2	1~2	S	2
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS ^{Note 1} EPRE ratio of OCNG to OCNG DMRS Note 1	1~2	dB	0
Propagation condition	1~2		AWGN

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.7.6.3.1.2-2: SSB specific test parameters

Doromotor	Confin	l lmi4	SS	B#0	SSI	B#1
Parameter	Config	Unit	T1	T2	T1	T2
Angle of arrival configuration			Set	Setup 1 according to A.3.15.1		
Beam Assumption ^{Note 4}	1-2			Ro	ugh	
$N_{oc}^{ m Note2}$	1~2	dBm/15kHz		-1	05	
M Note2	1	dBm/SSB SCS		-(96	
$N_{oc}^{ m Note2}$	2		-93			
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~2	dB	0	0	-Infinity	9
SSB_RP Note3	1	dBm/SSB SCS	-96	-96	-Infinity	-87
OOD_IXI	2		-93	-93	-Infinity	-84
I Noto2	1	dBm/95.04MHz	-63.97	-63.97	-66.98	-57.47
Io Note3	2		-63.97	-63.97	-66.98	-57.47
\hat{E}_s/N_{oc}	1~2	dB	0	0	-Infinity	9

Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for

 $N_{\!{oc}}$ to be fulfilled.

Note 3: SSB_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.6.3.1.3 Test Requirements

The UE shall send L1-RSRP report every 320 slots. No later than X ms plus 320 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 1680 for UE supporting power class 1
- 1200 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.6.3.2 SSB based L1-RSRP measurement when DRX is used

A.7.6.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.1, with the testing configurations for NR cells in Table A.7.6.3.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15

Table A.7.6.3.2.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

	Config	Description
1		NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2		NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

A.7.6.3.2.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.2.2-1 and Table A.7.6.3.2.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the SSBs and report periodically. The test consists of two successive time periods, with time duration of T1 and T2 respectively. The test has higher layer parameter *timeRestrictionForChannelMeasurements* configured.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSBs.

Table A.7.6.3.2.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1~2		freq1
Duplex mode	1~2		TDD
TDD Configuration	1~2		TDDConf.3.1
BWchannel	1~2	MHz	100: N _{RB,c} = 66
Data RBs allocated	1~2		66
PDSCH Reference	1		SR.3.2 TDD
measurement channel	2		SR.3.3 TDD
RMSI CORESET Reference	1		CR.3.1 TDD
Channel	2		CR.3.2 TDD

Dedicated CORESET	1		CCR.3.1 TDD
Reference Channel	2		CCR.3.7 TDD
000	1		SSB.1 FR2
SSB configuration	2		SSB.2 FR2
OCNG Patterns	1~2		OP.1
Leidel DWD Ocean Course Course	4.0		DLBWP.0.1
Initial BWP Configuration	1~2		ULBWP.0.1
Dadicated DMD configuration	4.0		DLBWP.1.3
Dedicated BWP configuration	1~2		ULBWP.1.3
SMTC configuration	1~2		SMTC.1
TRS Configuration	1~2		TRS.2.1 TDD
PDCCH/PDSCH TCI	1~2		TCI Ctoto 0
Configuration	1~2		TCI.State.2
DRX configuration	1~2		DRX.3
reportConfigType	1~2		periodic
reportQuantity	1~2		ssb-Index-RSRP
Number of reported RS	1~2		2
L1-RSRP reporting period	1~2	slot	320
T1	1~2	s	5
T2	1~2	s	3
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS			
EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH			
DMRS			
EPRE ratio of PDSCH DMRS to SSS	1~2	dB	0
EPRE ratio of PDSCH to PDSCH	. –		_
DMRS			
EPRE ratio of OCNG DMRS to			
SSS ^{Note 1}			
EPRE ratio of OCNG to OCNG DMRS Note 1			
Propagation condition	1~2		AWGN
Note 1: OCNC shall be used a	. –		

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.7.6.3.2.2-2: SSB specific test parameters

Parameter	Config	Unit	SS	SSB#0		SSB#1	
Farameter	Config	Unit	T1	T2	T1	T2	
Angle of arrival configuration			Set	Setup 1 according to A.3.15.1			
Beam Assumption ^{Note 4}	1-2			Ro	ugh		
$N_{oc}^{ m Note2}$	1~2	dBm/15kHz	-105				
λ/ Note2	1	dBm/SSB SCS	-96				
$N_{oc}^{ m Note2}$	2			-(93		
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	1~2	dB	0	0	-Infinity	9	
SSB_RP Note3	1	dBm/SSB SCS	-96	-96	-Infinity	-87	
OOD_IXI	2		-93	-93	-Infinity	-84	
I Noto?	1	dBm/95.04MHz	-63.97	-63.97	-66.98	-57.47	
lo ^{Note3}	2		-63.97	-63.97	-66.98	-57.47	

\hat{E}_s/N_{oc}		1~2	dB	0	0	-Infinity	9
Note 1:	Note 1: The resources for uplink transmission are assigned to the UE prior to the start of time period T2.						ne period
Note 2:	· - ·						
	N_{oc} to be fulfilled.						
Note 3:	_		ave been derived from oth rameters themselves.	er parame	ters for info	rmation pu	rposes.
Note 4:		71	of UE beam is given in B.2 /stem implementation	2.1.3, and o	does not lim	nit UE	

A.7.6.3.2.3 Test Requirements

The UE shall send L1-RSRP report every 320 slots. No later than X ms plus 320 slots from the beginning of time period T2, UE shall send L1-RSRP report including the results for both SSB#0 and SSB#1 while meeting the accuracy requirements defined in clause 10.1.20.1, where X is

- 2880 for UE supporting power class 1
- 1920 for UE supporting power class 2,3 or 4.

The reported L1-RSRP value shall include the Rx antenna gain in the range of -10 to +20 dB.

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.6.3.3 CSI-RS based L1-RSRP measurement when DRX is not used

A.7.6.3.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.7.6.3.3.1-1.

Table A.7.6.3.3.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

	Config	Description
1		NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode
Note:	The UE is only r	equired to be tested in one of the supported test configurations

A.7.6.3.3.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.3.2-1 and Table A.7.6.3.3.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 480ms from the beginning of the test, the DCI trigger comes in slot 1 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.7.6.3.3.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.7.6.3.3.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1		freq1
Duplex mode	1		TDD
TDD Configuration	1		TDDConf.3.1
BWchannel	1	MHz	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2
CSI-RS configuration	1		CSI-RS.3.3 TDD
OCNG Patterns	1		OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1		SMTC.1
TRS Configuration	1		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1		TCI.State.2
DRX configuration	1		Off
reportConfigType	1		aperiodic
reportQuantity	1		cri-RSRP
Number of reported RS	1		2
qcl-Info	1		SSB#0 for resource#0 SSB#1 for resource#1
reportSlotOffsetList	1		8
Propagation condition	1		AWGN
T1	1	S	5
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS DMRS			
EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1	1	dB	0

Note 1: OCNG shall be used such that the resources in Cell 1 are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Table A.7.6.3.3.2-1: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1	
Angle of arrival configuration	1		Setup 1 according to A.3.15.1		
Beam Assumption ^{Note 4}	1		Rough		

$N_{oc}^{ m Note1}$	1	dBm/15kHz	-105	
$N_{oc}^{ m Note1}$	1	dBm/SSB SCS	-95.97	
\hat{E}_{s}/I_{ot}	1	dB	0	9
CSI-RS RSRP Note2	1	dBm/SSB SCS	-95.97	-86.97
lo ^{Note2}	1	dBm/95.04MHz	-63.97	-57.47
\hat{E}_s/N_{oc}	1	dB	0	9

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 3: CSI-RS RSRP and lo levels have been derived from other parameters for information

purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation

A.7.6.3.3.3 Test Requirements

After 480ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1.

For absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1, the UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.6.3.3.3-1.

For relative accuracy of CSI-RS0 compared with CSI-RS1, the UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.7.6.3.3.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3
	CSI-RS0	CSI-RS _RP0 - δ + G _{min} \leq Reported RSRP(dBm) \leq CSI-RS _RP0 + δ + G _{max}
	CSI-RS1	CSI-RS _RP1 - δ + G _{min} \leq Reported RSRP(dBm) \leq CSI-RS _RP1 + δ + G _{max}
Note 1:		e equivalent power received by an antenna with 0dBi gain at the centre of the quiet the test for the CSI-RS n under consideration
Note 2:	δ is the RSRP absoused in the test	olute accuracy requirement from Table 10.1.20.2.1-1, selected according to the lo
Note 3:	G _{min} and G _{max} are t according to the UE	he minimum and maximum UE gain values from Table B.2.1.5.1-1, selected E power class

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.6.3.4 CSI-RS based L1-RSRP measurement when DRX is used

A.7.6.3.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of L1-RSRP measurement. This test will partly verify the L1-RSRP measurement requirements in clause 9.5.4.2, with the testing configurations for NR cells in Table A.7.6.3.4.1-1.

Table A.7.6.3.4.1-1: Applicable NR configurations for FR2 CSI-RS based L1-RSRP test

	Config	Description			
1		NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode			
Note:	The UE is only re	equired to be tested in one of the supported test configurations			

A.7.6.3.4.2 Test parameters

There is one cells in the test, the FR2 PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.6.3.4.2-1 and Table A.7.6.3.4.2-2 below.

In CSI measurement configuration, UE is indicated to perform L1-RSRP measurement on the CSI-RS and report aperiodically. The test consists of a single time period T1, during which the UE is triggered via DCI to report L1-RSRP on aperiodic CSI-RS resources. UE is also configured to measure L1-RSRP based on SSB. After 1440ms from the beginning of the test, the DCI trigger comes in slot 1 of a frame and UE provides the report back based on the reporting configuration as defined in Table A.7.6.3.4.2-1.

There is no measurement gap configured in the test. Before the test, UE is configured to perform RLM and BFD based on the SSBs.

Table A.7.6.3.4.2-1: General test parameters

Parameter	Config	Unit	Value
SSB GSCN	1		freq1
Duplex mode	1		TDD
TDD Configuration	1		TDDConf.3.1
BWchannel	1	MHz	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2
CSI-RS configuration	1		CSI-RS.3.3 TDD
OCNG Patterns	1		OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.1 ULBWP.1.1
SMTC configuration	1		SMTC.1
TRS Configuration	1		TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1		TCI.State.2
DRX configuration	1		DRX.3
reportConfigType	1		aperiodic
reportQuantity	1		cri-RSRP
Number of reported RS	1		2
qcl-Info	1		SSB#0 for resource#0 SSB#1 for resource#1
reportSlotOffsetList	1		8
Propagation condition	1		AWGN
T1	1	s	5
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS	1	dB	0

EPRE ratio of PDCCH to PDCCH DMRS			
EPRE ratio of PDSCH DMRS to SSS			
EPRE ratio of PDSCH to PDSCH			
DMRS			
EPRE ratio of OCNG DMRS to			
SSSNote 1			
EPRE ratio of OCNG to OCNG			
DMRS Note 1			
Note 1: OCNG shall be used	such that the	resources i	n Cell 1 are fully
allocated and a cons	ant total tran	smitted pow	er spectral density is
achieved for all OFD	M symbols.	· ·	

Table A.7.6.3.4.2-1: CSI-RS specific test parameters

Parameter	Config	Unit	CSI-RS#0	CSI-RS#1		
Angle of arrival configuration	1		Setup 1 accord	ling to A.3.15.1		
Beam Assumption ^{Note 4}	1		Rou	ıgh		
$N_{_{OC}}$ Note1	1	dBm/15kHz	-105			
$N_{oc}^{}$ Note1	1	dBm/SSB SCS	-95.97			
${ m \hat{E}}_{ m s}/{ m I}_{ m ot}$	1	dB	0	9		
CSI-RS RSRP Note2	1	dBm/SSB SCS	-95.97	-86.97		
lo Note2	1	dBm/95.04MHz	-63.97	-57.47		
\hat{E}_s/N_{oc}	1	dB	0	9		
		ells and noise sources no and time and shall be mo				

 N_{oc} to be fulfilled.

CSI-RS RSRP and lo levels have been derived from other parameters for information Note 3: purposes. They are not settable parameters themselves.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.6.3.4.3 **Test Requirements**

After 1440ms from the beginning of the test, the UE shall send L1-RSRP report at slot 8 from the reception of DCI triggering the L1-RSRP measurement. The L1-RSRP report shall include the results for both CSI-RS#0 and CSI-RS#1 while meeting the accuracy requirements defined in clause 10.1.20.1.

For absolute accuracy of CSI-RS0 and absolute accuracy of CSI-RS1, the UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.6.3.4.3-1.

For relative accuracy of CSI-RS0 compared with CSI-RS1, the UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.7.6.3.4.3-1: L1-RSRP absolute accuracy test requirement

	Test requirement Notes1,2,3			
CSI-RS0	CSI-RS _RP0 - δ + G _{min} \leq Reported RSRP(dBm) \leq CSI-RS _RP0 + δ + G _{max}			
CSI-RS1	CSI-RS _RP1 - δ + G _{min} ≤ Reported RSRP(dBm) ≤CSI-RS _RP1 + δ + G _{max}			

- Note 1: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the CSI-RS n under consideration
- Note 2: δ is the RSRP absolute accuracy requirement from Table 10.1.20.2.1-1, selected according to the lo used in the test
- Note 3: G_{min} and G_{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class

The rate of correct events observed during repeated tests shall be at least 90%.

A.7.7 Measurement Performance requirements

Unless explicitly stated otherwise:

- Reported measurements shall be within defined range of accuracy limits defined in Clause 10 for at least 90 % of the reported cases. If multiple measurement performance requirements are verified in the same test, the reported measurements for each requirement shall be within defined range of accuracy limits of the corresponding requirement defined in Clause 10 for at least 90% of the reported cases.
- Measurements are performed in RRC_CONNECTED state.
- The reference channels assume transmission of PDSCH with a maximum number of 5 HARQ transmissions unless otherwise specified.

A.7.7.1 SS-RSRP

A.7.7.1.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.3.1.1 and 10.1.3.1.2 for intra-frequency measurements.

A.7.7.1.1.2 Test parameters

In this set of test cases all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.1.1.2-1. Both absolute and relative accuracy of SS-RSRP intra-frequency measurements are tested by using the parameters in Table A.7.7.1.1.2-2 and A.7.7.1.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1. The test consists of two time phases T1 and T2.

Table A.7.7.1.1.2-1: SS-RSRP Intra frequency SS-RSRP supported test configurations

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.1.1.2-2: SS-RSRP Intra frequency general test parameters

Parameter	l lmi4	T1		T2	
Parameter	Unit Cell 1 Cell 2		Cell 1	Cell 2	
Cell ID		489	0	489	0
SSB ARFCN		freq1		freq1	
Duplex mode		TDD		TDD	
TDD configuration		TDDConf.3.1		TDDConf.3.1	
BW _{channel}	MHz	100: N _F	100: N _{RB,c} = 66		RB,c = 66

Downlink initial BWP configuration	Data RBs allocated		2	4	2	4
1						
Downlink dedicated BWP configuration	Downlink initial BWP configuration			-		-
Downlink dedicated BWP configuration						
Configuration 1 1 1 Uplink initial BWP configuration ULB WP.0 WP.0 1 ULB WP.0 1 ULB WP.0 1 Uplink dedicated BWP configuration ULB WP.1 WP.1 WP.1 1 ULB WP.1 1 WP.1 1 DRX cycle configuration Not applic able able able able able able able able	Downlink dedicated BWP					
Uplink initial BWP configuration	configuration			-		-
Uplink initial BWP configuration						
Uplink dedicated BWP configuration	Uplink initial BWP configuration		-	_	_	-
VP.1. - VP.1. - VP.1. - VP.1. - VP.1. - VP.1. 1 1 1 1 1 1 1 1 1			_		_	
DRX cycle configuration	Liplink dedicated DWD		ULB		ULB	
Not applic able Applic ab			WP.1.	-	WP.1.	-
DRX cycle configuration	Comiguration					
Able Able Able Able Able TRS.2 TRS.2 TRS.2 TRS.2 TRS.2 TDD						
TRS.2	DRX cycle configuration			-		-
TRS configuration						
TCI state	TPS configuration		_		_	
TCI state	1 K3 Corniguration			_		-
Aug. Aug.						
PDSCH Reference measurement channel	I CI state			-		-
channel ZD TDD TDD TDD TDD TDD CR.3. CR.3. CR.3. CR.3. CR.3. CR.3. CR.3. CR.3. CR.3. CR.3. CR.3. CR.3. TDD TDD </td <td>DD00HD-f</td> <td></td> <td>1</td> <td></td> <td></td> <td></td>	DD00HD-f		1			
RMSI CORESET Reference			2	-	2	-
RMSI CORESET Reference Channel	Channel					
Dedicated CORESET Reference channel						
Dedicated CORESET Reference channel			-	_	-	-
Dedicated CORESET Reference channel 3.1	Channel		TDD		TDD	
Dedicated CORESET Reference channel 3.1			CCB		CCB	
Channel TDD TDD TDD OCNG Patterns OP.3 OP.3 OP.3 OP.3 SSB configuration SSB.3 FR2 FR2 FR2 FR2 FR2 FR2 SMTC SMTC <t< td=""><td>Dedicated CORESET Reference</td><td></td><td></td><td></td><td></td><td></td></t<>	Dedicated CORESET Reference					
OCNG Patterns OP.3 OP.3 OP.3 OP.3 SSB.3 FR2 FR2 FR2 FR2 SMTC MTC			_	-	_	-
SSB configuration	Granici		100		100	
SSB configuration FR2 FR2 FR2 SMTC SMTC SMTC SMTC SMTC SMTC SMTC SMTC	OCNG Patterns					
SMTC configuration SMTC SMTC SMTC SMTC SMTC .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1 .1	SSB configuration					
1						
Time offset with Cell 1	SMTC configuration		_			
PDSCH/PDCCH subcarrier spacing EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Propagation conditions kHz 120 120 120 120 120 120 120 12	Time offset with Cell 1	us			-	
EPRE ratio of PSS to SSS EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS to SSS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Propagation conditions RHZ 120 120 120 120 120		•	400		400	
EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Propagation conditions AWG AWG AWG N N N		KHZ	120	120	120	120
EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Propagation conditions AWG AWG AWG N N N	EPRE ratio of PSS to SSS					
EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Propagation conditions AWG AWG AWG N N N AWG	_					
PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Propagation conditions AWG AWG AWG N N N						
EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Propagation conditions AWG AWG AWG N N N						
EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Propagation conditions AWG AWG N N N N N						
EPRE ratio of PDCCH to dB 0 0 0 PDCCH_DMRS dB 0 0 0 EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of OCNG DMRS to SSS ^{Note 1} EPRE ratio of OCNG to OCNG DMRS to AWG N AWG N AWG N AWG N	<u> </u>					
PDCCH_DMRS		1				
EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Propagation conditions AWG AWG N N N N N		dB	0	0	0	0
EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Propagation conditions AWG AWG N N AWG N N		1				
EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG DMRS to SSS ^{Note 1} EPRE ratio of OCNG to OCNG DMRS Note 1 Propagation conditions AWG AWG N N AWG N N	_	1				
PDSCH_DMRS EPRE ratio of OCNG DMRS to SSS ^{Note 1} EPRE ratio of OCNG to OCNG DMRS Note 1 Propagation conditions AWG AWG N AWG N		1				
SSSNote 1 EPRE ratio of OCNG to OCNG DMRS Note 1 Propagation conditions AWG AWG AWG N N N N]				
Propagation conditions EPRE ratio of OCNG to OCNG DMRS Note 1 AWG AWG AWG AWG AWG N N N N						
DMRS Note 1 Propagation conditions AWG AWG AWG AWG AWG N N N N		1				
Propagation conditions AWG AWG AWG N N N						
Propagation conditions N N N N	DMRS Note 1		۸۱۸/۵	۸۱۸/۵	۸۱۸/۵	۸۱۸۱۵
	Propagation conditions			_		
	Antenna configuration					

Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note 2:	Void
Note 3:	Void
Note 4:	Void
Note 5:	Void

Table A.7.7.1.1.2-3: SS-RSRP Intra frequency OTA related test parameters

Parameter	Unit	T1		Т	2	
Parameter	Offic	Cell 1	Cell 2	Cell 1	Cell 2	
Angle of arrival configuration		Setup 1 according to clause A.3.15.1				
Assumption for UE beams ^{Note 7}		Ro	ugh	Ro	ugh	
$N_{oc}^{}$ Note1	dBm/15kH z ^{Note4}	-9	1.6	N	/A	
$N_{oc}^{}$ Note1	dBm/SCS Note4	-8.	2.6	N	I/A	
\hat{E}_s/N_{oc}	dB	6.0	1.0	N/A	N/A	
Es	dBm/SCS Note4			(Table B.2.2-2 Rx Beam Peak +2.1dB)	(Table B.2.2-2 Rx Beam Peak +2.1dB)	
SSB_RP ^{Note2}	dBm/SCS	-76.6	-81.6	(Table (Table B.2.2-2 B.2.2-2 Rx Beam Rx Bea Peak Peak +2.1dB) +2.1dE		
$\hat{E}_{_{s}}/I_{_{ot}}$ BB Note6	dB	2.44	-5.98	-5.98	-5.98	
lo ^{Note2}	dBm/95.04 MHz ^{Note4}).05	(Table B.2.2-2 Rx Beam Peak +29.70d		
	used, interfere ed in the test is					
and shall be modelled as AWGN of appropriate power for N_{oc} to be						
fulfillo	1					

fulfilled.

SSB_RP, Es/lot and lo levels have been derived from other parameters Note 2: for information purposes. They are not settable parameters themselves.

Note 3:

Equivalent power received by an antenna with 0 dBi gain at the centre of Note 4: the quiet zone

Note 5:

Note 6: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor $\Delta \dot{M}B_P$ from TS 38.101-2 [19] Table 6.2.1.3-4.

Note 7: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.7.1.1.3 **Test Requirements**

The SS-RSRP measurement accuracy shall fulfil the absolute accuracy requirements in clauses 10.1.3.1.1 and relative accuracy requirements in clause 10.1.3.1.2. The following requirements are to be verified:

During T1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.7.7.1.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

During T2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in table A.7.7.1.1.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

During T1 and T2:

Relative accuracy of Cell 1 during T2 compared with Cell 1 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

Relative accuracy of Cell 2 during T2 compared with Cell 2 during T1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in Table 10.1.3.1.2-1.

Table A.7.7.1.1.3-1: SS-RSRP absolute accuracy test requirement

	Test requirement Notes1,2,3						
	Cell 1	SSB_RP1 -δ +G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP1 +δ +G _{max}					
	Cell 2	SSB_RP2 - δ +G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP2 + δ +G _{max}					
Note 1:		quivalent power received by an antenna with 0dBi gain at the centre of the quiet zone est for the cell n under consideration					
Note 2:	δ is the RSRP absoused in the test	olute accuracy requirement from Table 10.1.3.1.1-1, selected according to the lo					
Note 3:	G _{min} and G _{max} are t according to the UE	he minimum and maximum UE gain values from Table B.2.1.5.1-1, selected E power class					

A.7.7.1.2 SA inter-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.5.1.1 and 10.1.5.1.2 for inter-frequency measurements with the testing configurations for NR cells in Table A.7.7.1.2.1-1.

Table A.7.7.1.2.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Configuration	Description
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

A.7.7.1.2.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) and a FR2 neighbour cell (Cell 2) on a different frequency than the PCell. The test parameters and applicability for Cell 1 are defined in A.3.7.2. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.7.1.2.2-1 and Table A.7.7.1.2.2-2 below. Both absolute and relative accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.7.7.1.2.2-1 and Table A.7.7.1.2.2-1. The inter-frequency measurements are supported by a measurement gap.

Table A.7.7.1.2.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Unit		st 1 Test			
		Oint.	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN	1~2		freq1	freq2	freq1	freq2	
BW _{channel}	1~2		N _{RB,c} = 66		N _{RB,c} = 66		
Data RBs allocated	1		24		24		
	2		+	8	48		
Gap pattern ID	4.0		0 TDD		0 TDD		
Duplex mode	1~2						
TDD configuration	1~2		TDDC	ont.3.1	TDDC	ont.3.1	
PDSCH Reference	1		SR.3.2 TDD	_	SR.3.2 TDD	_	
measurement channel	2		SR.3.3 TDD	-	SR.3.3 TDD	-	
RMSI CORESET	1		CR.3.2 TDD		CR.3.2 TDD		
Reference Channel	2		CR.3.2 TDD	-	CR.3.2 TDD	-	
Dedicated CORESET	1		CCR.3.1 TDD		CCR.3.1 TDD		
Reference Channel	2		CCR.3.7 TDD	-	CCR.3.7 TDD	-	
SSB configuration	1		SSB.3		SSB.3		
-	2		SSB.	4 FR2	SSB.4	4 FR2	
PDSCH/PDCCH subcarrier spacing	1~2	kHz	12	120		120	
OCNG Patterns	1~2		OP.3		OP.3		
Initial BWP	1~2		DLBWP.0.1		DLBWP.0.1		
Configuration	11-2		ULBW		ULBW		
Dedicated BWP configuration	1~2		DLBW	/P.1.3 /P.1.3		DLBWP.1.3 ULBWP.1.3	
TRS Configuration	1~2			1 TDD	TRS.2.1 TDD		
PDCCH/PDSCH TCI	4 0		TOLO(-1- 0		TCI.State.2		
Configuration	1~2		TCI.State.2		TCI.State.2		
SMTC configuration	1~2		SMT	ΓC.1	SMTC.1		
Time offset between Cell 2 and Cell 1	1~2	μs	3	3	3		
EPRE ratio of PSS to SSS							
EPRE ratio of PBCH DMRS to SSS							
EPRE ratio of PBCH to							
PBCH DMRS EPRE ratio of PDCCH	_						
DMRS to SSS							
EPRE ratio of PDCCH to	RE ratio of PDCCH to		0		0		
PDCCH DMRS EPRE ratio of PDSCH	1~2	dB	0	U	0	U	
DMRS to SSS							
EPRE ratio of PDSCH to PDSCH DMRS							
EPRE ratio of OCNG	1						
DMRS to SSS ^{Note 1}	1						
EPRE ratio of OCNG to OCNG DMRS Note 1							
Propagation condition	1~2		AWGN	AWGN	AWGN	AWGN	
Antenna configuration	1~2	-	1x2	1x2	1x2	1x2	

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Table A.7.7.1.2.2-2: SS-RSRP inter frequency OTA related test parameters

Donomoton	Confin	I I m i t	Test 1		Tes	st 2
Parameter	Config	Unit	Cell 1			Cell 2
				ccording to		ccording to
Angle of arrival				.3.15.4.2	clause A	
configuration	1~2		AoA1	AoA2	AoA1	AoA2
			Spherical	Rx Beam	Spherical	Rx Beam
Assumption for			coverage	Peak	coverage	Peak
Assumption for UE beams ^{Note 7}	1~2		Ro	ugh		ugh
	1		-90.6	-90.6	(Table	(Table
N_{oc} Note1		dBm/15kH			B.2.3-2 Rx Beam	B.2.3-2 Rx Beam
1 voc	0	Z ^{Note4}	00.7	00.7	Peak ^{Note 8}	Peak ^{Note 8}
	2		-93.7	-93.7	+1.97dB)	-3.03dB)
					(Table	(Table
					B.2.3-2	B.2.3-2
	1		-81.6	-81.6	Rx Beam	Rx Beam
					Peak ^{Note 8}	Peak ^{Note 8}
N_{oc} Note1		dBm/SCS			+11.0dB)	+6.0dB)
1 oc	2	Note4			(Table	(Table
			-81.7 -81.7	-81.7	B.2.3-2	B.2.3-2
					Rx Beam	Rx Beam
					Peak ^{Note 8} +14.0dB)	Peak ^{Note 8} +9.0dB)
<u> </u>					,	,
\hat{E}_s/N_{oc}	1~2	dB	6.0	6.0	17.0	-1.0
				-75.6	(Table	(Table
	1				B.2.3-2	B.2. 3-2
			-75.6		Rx Beam	Rx Beam
			cs	Peak ^{Note 8}	Peak ^{Note 8}	
SSB_RPNote2		dBm/SCS			+28.0dB)	+5.0dB)
				-75.7	(Table B.2.3-2	(Table B.2. 3-2
	2		-75.7		Rx Beam	Rx Beam
	2		-/5./	-75.7	Peak ^{Note 8}	Peak ^{Note 8}
					+31.0dB)	+8.0dB)
(SSB_RPcell 1 -	1~2	dB	()	23	,
SSB_RP _{Cell 2})	1	-	5.26	5.96		
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}{}_{BB}}$ Note6	2	dB	4.61	5.91	9.53	-3.46
			1.01	0.01	(Table	(Table
					B.2.3-2	B.2.3-2
	1		-50.00	-50.00	Rx Beam	Rx Beam
					Peak ^{Note 8}	PeakNote 8
Io ^{Note2}		dBm/95.04			+52.68dB)	+33.13dB)
10140162		MHz Note4			(Table	(Table
					B.2.3-2	B.2.3-2
	2		-50.09	-50.09	Rx Beam	Rx Beam
					PeakNote 8	Peak ^{Note 8}
(10. 10.)	1.0	40	,		+55.69dB)	+36.14dB)
(lo _{freq 1} - lo _{freq 2})	1~2	dB	(<i>.</i>	19	.55

Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 2: SSB_RP, Es/lot, Io, (SSB_RP_{Cell 2} – SSB_RP_{Cell 1}) and (lo_{freq 2} – lo_{freq 1}) levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: Void

Note 4:	Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet
	zone
Note 5:	Void
Note 6:	Calculation of Es/Iot _{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 38.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor Δ MB _P or Δ MB _S from TS 38.101-2 [19] Table 6.2.1.3-4.
Note 7:	Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation
Note 8:	The value in Table B.2.3-2 is the Minimum SSB_RP for SCS _{SSB} = 120 kHz, selected according to the operating band of cell 2 and UE power class, without Δ MB _{P,n} adjustment.

A.7.7.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 1 and Cell 2 shall fulfil the absolute requirements in clause 10.1.5.1.1 and the relative requirements in clause 10.1.5.1.2.

Test 1:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.7.7.1.2.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.7.7.1.2.3-2.

Test 2:

Absolute accuracy of Cell 1 and absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.7.7.1.2.3-1.

Relative accuracy of Cell 2 compared with Cell 1. The UE is deemed to meet the requirement if the difference in reported SS-RSRP meets the requirements in A.7.7.1.2.3-2.

Table A.7.7.1.2.3-1: SS-RSRP absolute accuracy test requirement

		Test requirement Notes 1,2,3,4
	Cell 1	SSB_RP1 - δ +G _{min} +X ≤ Reported RSRP(dBm) ≤ SSB_RP1 + δ +G _{max}
	Cell 2	SSB_RP2 - δ +G _{min} ≤ Reported RSRP(dBm) ≤ SSB_RP2 + δ +G _{max}
Note 1:		uivalent power received by an antenna with 0dBi gain at the centre of the quiet zone est for the cell n under consideration
Note 2:	δ is the RSRP absoused in the test	olute accuracy requirement from Table 10.1.5.1.1-1, selected according to the lo
Note 3:	G _{min} and G _{max} are t according to the UE	he minimum and maximum UE gain values from Table B.2.1.5.1-1, selected E power class
Note 4:		coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) 19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating a negative value.

Table A.7.7.1.2.3-2: SS-RSRP relative accuracy test requirement

		Test requirement Notes 1, 2, 3, 4, 5, 6			
С	ell 2 – Cell 1	SSB_RP2 - SSB_RP1 -ō - D - G _{inter} ≤ Reported RSRP(dB) ≤ SSB_RP2 - SSB_RP1 + δ + G _{inter} -(X) + [3]			
Note 1: SSB_RPn is the ed		uivalent power received by an antenna with 0dBi gain at the centre of the quiet zone			
configured in the test for the cell n under consideration					
Note 2:	δ is the RSRP rela	tive accuracy requirement from Table 10.1.5.1.2-1			

Note 3:	Void
Note 4:	X is the Spherical coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage)
	from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating
	band. X is always a negative value.
Note 5:	D is the margin due to mis-alignment between fine beam and rough beam. D is the Rough Beam gain
	reduction in Rx beam peak direction from Table B.2.1.5.3-1, selected according to the UE power class.
	D is always a positive value.
Note 6:	Ginter is the margin due to different antenna gain caused by frequency separation. Ginter is from Table
	B.2.1.5.2-1, selected according to the UE power class, and is always a positive value.

A.7.7.1.3 SA inter-frequency measurement accuracy with FR1 serving cell and FR2 target cell

A.7.7.1.3.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 10.1.5.1.1 for inter-frequency measurements with the testing configurations in Table A.7.7.1.3.1-1.

Table A.7.7.1.3.1-1: Applicable NR configurations for FR2 inter-frequency SS-RSRP accuracy test

Config	Description of serving cell	Description of target cell
1	NR 15 kHz SSB SCS, 10 MHz bandwidth,	
	FDD duplex mode	
2	NR 15 kHz SSB SCS, 10 MHz bandwidth,	120 kHz SSB SCS, 100 MHz
	TDD duplex mode	bandwidth, TDD duplex mode
3	NR 30 kHz SSB SCS, 40 MHz bandwidth,	
	TDD duplex mode	

A.7.7.1.3.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1) in FR1 and Cell 2 in FR2. The test parameters for the Cell 1 and Cell 2 are given in Table A.7.7.1.3.2-1 and Table A.7.7.1.3.2-2 below. Absolute accuracy of RSRP inter-frequency measurements are tested by using the parameters in Table A.7.7.1.3.2-1 and Table A.7.7.1.3.2-2. The inter-frequency measurements are supported by a measurement gap.

Table A.7.7.1.3.2-1: SS-RSRP inter-frequency test parameters

Parameter	Config	Unit	Tes	Test 1 Test 2		st 2	
Farameter	Config	Ollit	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN	1~3		freq1	freq2	freq1	freq2	
	1		10:		10:		
	-		N _{RB,c} = 52		$N_{RB,c} = 52$		
BW _{channel}	2	MHz	10:	100:	10:	100:	
= · · orientici			$N_{RB,c} = 52$	$N_{RB,c} = 66$	$N_{RB,c} = 52$	$N_{RB,c} = 66$	
	3		40:		40:		
	_		$N_{RB,c} = 106$		$N_{RB,c} = 106$		
Data RBs allocated	1,2		52	24	52	66	
Data NB3 allocated	3		106	24	106		
	1		FDD		FDD		
Duplex mode	2		TDD	TDD	TDD	TDD	
	3		TDD		TDD		
	1		N/A		N/A		
	2		TDDConf.	TDDConf.	TDDConf.	TDDConf. 3.1	
TDD configuration	2		1.1		1.1		
	3		TDDConf.	3.1	TDDConf.		
	3		2.1		2.1		
	1		SR.1.1 FDD	-	SR.1.1 FDD	-	

PDSCH Reference	2		SR.1.1 TDD		SR.1.1 TDD	
	3					
measurement channel			SR.2.1 FDD		SR.2.1 FDD	
RMSI CORESET	2		CR.1.1 FDD	-	CR.1.1 FDD	-
Reference Channel			CR.1.1 TDD	-	CR.1.1 TDD	-
	3		CR.2.1 FDD	-	CR.2.1 FDD	-
Dedicated CORESET	2		CCR.1.1 FDD	-	CCR.1.1 FDD	-
Reference Channel			CCR.1.1 TDD	-	CCR.1.1 TDD	-
	3		CCR.2.1 TDD	-	CCR.2.1 TDD	-
	1		SSB.1		SSB.1	
		ļ	FR1	000.0	FR1	000.0
SSB configuration	2		SSB.1	SSB.3	SSB.1	SSB.3
3			FR1	FR2	FR1	FR2
	3		SSB.2		SSB.2	
	_		FR1		FR1	
OCNG Patterns	1~3		OP.1	OP.3	OP.1	OP.1
Initial BWP	1~3		DLBW		DLBW	
Configuration			ULBV		ULBW	
Dedicated BWP	1~3			/P.1.3	DLBW	-
configuration	. •		ULBW	/P.1.3	ULBWP.1.3	
TRS Configuration	1~3		TRS.2	.1 TDD	TRS.2.	1 TDD
PDCCH/PDSCH TCI	1~3		TCI.State.2		TCI.State.2	
Canting mating	1~3		TOI.State.2		TCI.State.2	
Configuration						
SMTC configuration	1~3		SMT	ΓC.1	SMT	TC.1
		Ша			SMT	
SMTC configuration Time offset between Cell 2 and Cell 1	1~3	μs		TC.1		
SMTC configuration Time offset between		μs			SMT	
SMTC configuration Time offset between Cell 2 and Cell 1		μs			SMT	
SMTC configuration Time offset between Cell 2 and Cell 1 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS		μs			SMT	
SMTC configuration Time offset between Cell 2 and Cell 1 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to		μs			SMT	
SMTC configuration Time offset between Cell 2 and Cell 1 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS		μs			SMT	
SMTC configuration Time offset between Cell 2 and Cell 1 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH		μs			SMT	
SMTC configuration Time offset between Cell 2 and Cell 1 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS		μs			SMT	
SMTC configuration Time offset between Cell 2 and Cell 1 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to	1~3	μs		3	SMT	3
SMTC configuration Time offset between Cell 2 and Cell 1 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS					SMT	
SMTC configuration Time offset between Cell 2 and Cell 1 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to	1~3			3	SMT	3
SMTC configuration Time offset between Cell 2 and Cell 1 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH	1~3			3	SMT	3
SMTC configuration Time offset between Cell 2 and Cell 1 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS	1~3			3	SMT	3
SMTC configuration Time offset between Cell 2 and Cell 1 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of PDSCH to PDSCH DMRS	1~3			3	SMT	3
SMTC configuration Time offset between Cell 2 and Cell 1 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS Note 1	1~3			3	SMT	3
SMTC configuration Time offset between Cell 2 and Cell 1 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS	1~3			3	SMT	3
SMTC configuration Time offset between Cell 2 and Cell 1 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG to OCNG DMRS	1~3	dB	0	0	SMT 3	0
SMTC configuration Time offset between Cell 2 and Cell 1 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS	1~3		O NA	3	SMT 3	3
SMTC configuration Time offset between Cell 2 and Cell 1 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG to OCNG DMRS Propagation condition	1~3	dB	0 NA Link only,	0 AWGN	SMT 3 0 NA Link only,	0 AWGN
SMTC configuration Time offset between Cell 2 and Cell 1 EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG DMRS to SSS EPRE ratio of OCNG to OCNG DMRS	1~3	dB	O NA	0	SMT 3	0

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total

transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void

Table A.7.7.1.3.2-2: SS-RSRP inter-frequency OTA related test parameters

Parameter	Config	Unit	Test 1		Test 2 NOTE 3	
Parameter	Config	Onit	Cell 1	Cell 2	Cell 1	Cell 2
Angle of arrival configuration according to clause A.3.15			NA	Setup 2b	NA	Setup 2b
Assumption for UE beams ^{Note 4}			N/A	Rough	N/A	Rough
N oc	1~3	dBm/15 kHz	NA	-90	NA	NA

N oc		1~3	dBm/SS B SCS	Link only, see	-80.97	Link only, see	NA	
\hat{E}_s/N_o	c	1~3	dB	clause A.3.7A	5	clause A.3.7A	NA	
Es		1~3	dBm/SC S				(Table B.2.3-2 Spherical coverage +1dB)	
SSB_RP ^I	Note1	1~3	dBm/SC S		-76.0		Table B.2.3-2 Spherical coverage +1dB)	
\hat{E}/I_{otbb}	$\mathbf{\hat{E}}/\mathbf{I}_{ ext{otBB}^{ ext{Note6}}}$		dB		4.35		-3.81	
Io ^{Note1}		1~3	dBm/ 95.04M Hz		-50.18		SSB_RP+ 28.98	
Note 1:	Es/lot, SSB_RP and I				•	ters for inform	nation	
N	purposes. They are no	ot settable	parameters	themselves				
Note 2: Note 3:	Void No additional noise is	addad by	the test suc	tom in Tost)			
Note 4:	Information about type	•	,			ot limit UF		
	implementation or tes							
Note 5:	Where used, interfere assumed to be consta							
	appropriate power for N_{oc} to be fulfilled.							
Note 6:	Calculation of Es/lotesthe associated Refser 1dB for UE multi-band	ns requiren	nent in clau	se 7.3.2 of T	S 38.101-2	[19], and an a	allowance of	

A.7.7.1.3.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 shall fulfil the Absolute requirement in clause 10.1.5.1.1.

Test 1:

Absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.7.7.1.3.3.

Test 2:

Absolute accuracy of Cell 2. The UE is deemed to meet the requirement if the reported SS-RSRP is in the range shown in Table A.7.7.1.3.3.

Table A.7.7.1.3.3: SS-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3,4		
	Cell 2	SSB_RP1 - δ +G _{min} +X ≤ Reported RSRP(dBm) ≤ SSB_RP1 + δ +G _{max}		
Note 1:	Note 1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the cell n under consideration			
Note 2:	δ is the RSRP absoused in the test	olute accuracy requirement from Table 10.1.5.1.1-1, selected according to the lo		

Note 3: G_{min} and G_{max} are the minimum and maximum UE gain values from Table B.2.1.5.1-1, selected according to the UE power class

Note 4: X is the Spherical coverage gain difference in dB, derived as (UE Refsens - UE Spherical coverage) from TS 38.101-2 [19] clauses 7.3.2 and 7.3.4, selected according to the UE power class and operating band. X is always a negative value.

A.7.7.2 SS-RSRQ

A.7.7.2.1 SA intra-frequency measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.8.1.1.

A.7.7.2.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.2.1.2-1. The absolute accuracy of SS-RSRQ intra-frequency measurement is test by using the parameters in Table A.7.7.2.1.2-2 and Table A.7.7.2.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell.

Table A.7.7.2.1.2-1: SS-RSRQ Intra frequency SS-RSRQ supported test configurations

Configuration	Description			
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			

Table A.7.7.2.1.2-2: SS-RSRQ Intra frequency test parameters

Do	· · · · · · · · · · · · · · · · · · ·	Unit	Tes	Test 1		Test 2	
Pa	rameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN			Fred	η1	Fr	eq1	
Duplex mode			TD	TDD TDD			
TDD configuration			TDDCo	nf.3.1	TDDC	onf.3.1	
BW _{channel}		MHz	100: N _{RE}	$_{3,c} = 66$	100: N	RB,c = 66	
Data RBs allocated	,		66			66	
	Initial DL BWP			DLBW	/P.0.1		
BWP	Dedicated DL BWP			DLBW	/P.1.1		
configuration	Initial UL BWP			ULBW	/P.0.1		
	Dedicated UL BWP			ULBW	JLBWP.1.1		
TRS configuration			TRS.2.1				
TKS Configuration			TDD		1 TDD		
TCI state	TCI state		TCI.State		TCI.Sta		
TOTSIALE			.0		te.0		
PDSCH Reference	measurement channel		SR.3.1		SR.3.1		
1 DOOTT ROTOTOTIO	medearement charmer		TDD		TDD		
RMSI CORESET R	eference Channel		CR.3.1	_	CR.3.1		
			TDD		TDD		
Control channel RM	1C		CCR.3.1	-	CCR.3.	_	
			TDD	05.4	1 TDD		
OCNG Patterns			OP.1	OP.1	OP.1	OP.1	
SMTC configuration	1			SMT			
SSB configuration			SSB.1	SSB.1	SSB.1	SSB.1	
			FR2	FR2	FR2 FR2		
PDSCH/PDCCH su		kHz				120	
SS-RSSI-Measurer		10			plicable	•	
EPRE ratio of PSS	to 555	dB	0	0	0	0	

EPRE ratio of PBCH_DMRS to SSS				
EPRE ratio of PBCH to PBCH_DMRS				
EPRE ratio of PDCCH_DMRS to SSS				
EPRE ratio of PDCCH to PDCCH_DMRS				
EPRE ratio of PDSCH_DMRS to SSS				
EPRE ratio of PDSCH to PDSCH_DMRS				
EPRE ratio of OCNG DMRS to SSSNote 1				
EPRE ratio of OCNG to OCNG DMRS Note 1				
Propagation condition	AW	GN	A۷	/GN
Antenna configuration	1x2	1x2	1x2	1x2

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void Note 5: Void

Table A.7.7.2.1.2-3: SS-RSRQ Intra frequency OTA related test parameters

	Unit	Tes	t 1	Test 2		
	Unit	Cell 1	Cell 2	Cell 1	Cell 2	
Angle of arrival configuration		Setup 1 a to clause			ccording to A.3.15.1	
Assumption for UE beams ^{Note 9}		to clause		Rough	A.J. 1J. 1	
$N_{oc}^{}$ Note1	dBm/15kHz ^N	-9	5	-	95	
N_{oc} Note1	dBm/SCS ^{Note}	-86		-86		
\hat{E}_s/N_{oc}	dB	3	-3	-3	3	
SSB_RP ^{Note2}	dBm/SCS Note4	-83	-83	-89	-89	
SS-RSRQ Note2	dB	-14.77	-14.77	-16.81	-16.81	
$\hat{\mathrm{E}}_{\mathrm{s}}/\mathrm{I}_{\mathrm{ot}}$	dB	-1.76	-1.76	-4.76	-4.76	
lo ^{Note2}	dBm/95.04 MHz ^{Note4}	-5	0	-	54	

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.
- Note 2: SS-RSRQ, SSB_RP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the guiet zone
- Note 6: Void
- Note 7: Void
- Note 8: Void
- Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.7.2.1.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ-2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal RSRQ+3.5dB to Nominal RSRQ-3.5dB according to the requirements in clause 10.1.8.1.1.Nominal RSRQ is the value shown in table A.7.7.2.1.2-3.

A.7.7.2.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.7.7.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 10.1.9.1.1 and 10.1.9.1.2 for inter-frequency measurement.

A.7.7.2.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.2.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-RSRQ inter-frequency measurement are tested by using test parameters in Table A.7.7.2.2.2-2 and Table A.7.7.2.2.2-3.. In all test cases, Cell 1 is the PCell and Cell 2 is target cell.

Table A.7.7.2.2.2-1: SS-RSRQ Inter frequency SS-RSRQ supported test configurations

Configuration	Description			
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			

Table A.7.7.2.2.2-2: SS-RSRQ Inter frequency general test parameters

Doro	meter	Unit	Tes	Test 1		Test 2	
Faia	illetei	Onit	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN			Freq1	freq2	freq1	Freq2	
SSB Configuration			SSB.1 FR2	SSB. 1 FR2	SSB.1 FR2	SSB.1 FR2	
Duplex mode			TD	D	Т	DD	
TDD configuration			TDDCo	nf.3.1	TDDC	Conf.3.1	
BW _{channel}		MHz	100: N _{RE}	$_{3,c} = 66$	100: N	RB,c = 66	
Data RBs allocated			66	6	(66	
	Initial DL BWP			DLE	3WP.0.1		
BWP configuration	Dedicated DL BWP			DLE	LBWP.1.1		
	Initial UL BWP			ULE	3WP.0.1		
	Dedicated UL BWP			ULE	ULBWP.1.1		
TRS configuration			TRS.2. 1 TDD	-	TRS.2. 1 TDD	-	
TCI state			TCI.Sta te.0	-	TCI.Sta te.0	-	
PDSCH Reference m	easurement channel		SR.3.1 TDD	-	SR.3.1 TDD -		
RMSI CORESET Ref	erence Channel		CR.3.1 TDD	-	CR.3.1 TDD	-	
OCNG Patterns			OP.1	OP.1	OP.1 OP.1		
SMTC configuration			SMTC. 1 FR2	SMT C.1 FR2	SMTC. 1 FR2	SMTC.1 FR2	

PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0	0	0
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSSNote 1					
EPRE ratio of OCNG to OCNG DMRS Note 1					
Propagation conditions		AWGN	AWG	AWGN	AWGN
		AWGN	N	AWGN	AWGN
Antenna configuration		1x2	1x2	1x2	1x2

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total

transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Table A.7.7.2.2.2-3: SS-RSRQ Inter frequency OTA related test parameters

Parameter	Unit	Test 1		Test 2	
Parameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2
AoA setup			1 in clause Setup 1 i A.3.15. A.3.		in clause .15.
Assumption for UE beams ^{Note 8}		Ro	ugh	Ro	ugh
Note1	dBm/15kHz ^N ote4	-94.03	-94.03	-94.03	-94.03
Note1 N oc	dBm/SCS ^{Note}	-85.0	-85.0	-85.0	-85.0
\hat{E}_s/N_{oc}	dB	-1.75	-1.75	-3	-1.75
SSB_RP ^{Note2}	dBm/SCS Note4	-86.75	-86.75	-88	-88
SS-RSRQ ^{Note2}	dB	-14.75	-14.75	-15.56	-15.56
Ê , /I ot	dB	-1.75	-1.75	-3	-3
lo ^{Note2}	dBm/95.04 MHz ^{Note4}	-53.8	-53.8	-54.25	-54.25

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_{N_{\rm col}}$ to be fulfilled.

Note 2: SS-RSRQ, SSB_RP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SS-RSRQ and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone

Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone

Note 6: Void Note 7: Void

Note 8: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.7.2.2.3 Test Requirements

The SS-RSRQ absolute measurement accuracy in test 1 shall be within the range Nominal SS-RSRQ+2.5dB to Nominal SS-RSRQ -2.5dB and the SS-RSRQ measurement accuracy in test 2 shall be within the range Nominal SS-RSRQ +3.5dB to Nominal SS-RSRQ -3.5dB according to the requirements in clause 10.1.10.1.1.

The SS-RSRQ relative measurement accuracy shall fulfil the requirements in clause 10.1.10.1.2.

A.7.7.3 SS-SINR

A.7.7.3.1 SA intra-frequency case measurement accuracy with FR2 serving cell and FR2 target cell

A.7.7.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.13.1.1.

A.7.7.3.1.2 Test Parameters

In this test case all cells are on the same carrier frequency. Supported test configurations are shown in Table A.7.7.3.1.2-1. The absolute accuracy of SS-SINR intra-frequency measurement is test by using the parameters in Table A.7.7.3.1.2-2 and Table A.7.7.3.1.2-3. In all test cases, Cell 1 is the PCell and Cell 2 the target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.3.1.2-1: SS-SINR Intra frequency SS-SINR supported test configurations

	Configuration	Description
1		120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.7.7.3.1.2-2: SS-SINR Intra frequency test parameters

Parameter	Unit	Te	Test 1		Test 2	
Parameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN		Fre	eq2	Fre	q2	
Duplex mode		TDD TDD				
TDD configuration		TDDC	TDDConf.3.1 TDDConf.3.			
BW _{channel}	MHz	100: N	RB,c = 66	100: N _F	RB,C = 66	
Data RBs allocated		6	66	6	6	
Downlink initial BWP configuration			DLBV	VP.0.1		
Downlink dedicated BWP configuration			DLBV	VP.1.1		
Uplink initial BWP configuration			ULBV	VP.0.1		
Uplink dedicated BWP configuration			ULBV	VP.1.1		
DRX cycle configuration	ms		Not applicable			
TRS configuration				.1 TDD		
TCI state			TCI.State.0			
PDSCH Reference measurement channel		SR.3.1		SR.3.1		
r DOCT Reference measurement channel		TDD		TDD		
RMSI CORESET Reference Channel		CR.3.1	_	CR.3.1		
		TDD		TDD		
Dedicated RMSI CORESET Reference		CCR.3	_	CCR.3.	_	
Channel		.1 TDD		1 TDD		
OCNG Patterns		OP.1	OP.1 OP.1 OP.1 OP.1			
SMTC configuration			SMTC.1			
SSB configuration		SSB.1	SSB.1	SSB.1	SSB.1	
ŭ		FR2	FR2	FR2	FR2	
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	

SS-RSSI-Measurement		Not Applicable			
EPRE ratio of PSS to SSS					
EPRE ratio of PBCH_DMRS to SSS					
EPRE ratio of PBCH to PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to SSS					
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0	0	0
EPRE ratio of PDSCH_DMRS to SSS					
EPRE ratio of PDSCH to PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSSNote 1					
EPRE ratio of OCNG to OCNG DMRS Note 1					
Propagation conditions		AWGN			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Table A.7.7.3.1.2-3: SS-SINR Intra frequency OTA related test parameters

Parameter	Unit	Te	Test 1		Test 3		
Parameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2		
		Set	up 1	Setup 1			
Angle of arrival configuration		accor	ding to	according to			
		clause	A.3.15.1	clause .	A.3.15.1		
Assumption for UE beams ^{Note 9}		Ro	ugh	Ro	ugh		
Note1	dBm/15kHz Note4	-105		-105 -105			
Note1	dBm/SCS Note3	-96		-96			
\hat{E}_s/N_{oc}	dB	4.54	4.54 2.66		-3		
SSB_RP ^{Note2}	dBm/SCS Note4	-91.46	-93.34	-99	-99		
SS-SINR Note2	dB	0	-3.2	-4.76	-4.76		
Ê ¸ /I ot	dB	0	-3.2	-4.76	-4.76		
Io ^{Note2}	dBm/95.04 MHz Note4	-59.2		-64			

Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for _N to be fulfilled.

Note 2: SS-SINR, SSB_RP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

Note 4: Equivalent power received by an antenna with 0 dBi gain at the centre of the quiet zone

Note 5: As observed with 0 dBi gain antenna at the centre of the quiet zone

Note 6: Void Note 7: Void Note 8: Void

Note 9: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.7.3.1.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR+3B to Nominal SS-SINR and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.10.13.1.

A.7.7.3.2 SA Inter-frequency measurement accuracy with FR2 serving cell and FR2 TDD target cell

A.7.7.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-SINR measurement accuracy is within the specified limits. This test will verify the requirements in Clause 10.1.15.1.1 and 10.1.15.1.2 for inter-frequency measurement.

A.7.7.3.2.2 Test Parameters

In this test case the two cells (i.e., Cell 1 and Cell 2) are on different carrier frequencies and measurement gaps are provided. Supported test configurations are shown in Table A.7.7.3.2.2-1. Both absolute accuracy and relative accuracy requirements of SS-SINR inter-frequency measurement are tested by using test parameters in Table A.7.7.3.2.2-2 and Table A.7.7.3.2.2-3. In all test cases, Cell 1 is the PCell and Cell 2 is target cell. The TCI status for Cell 1 is defined in Table A.3.16.2-1 and TRS configuration for Cell 1 is defined in Table A.3.17.2.1-1.

Table A.7.7.3.2.2-1: SS-SINR Inter frequency SS-SINR supported test configurations

Configuration	Description			
1	120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			

Table A.7.7.3.2.2-2: SS-SINR Inter frequency general test parameters

Parameter Unit		Test 1		Test 2		Test 3		
Parameter	Offic	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2	
SSB ARFCN		freq1	freq2	freq1	freq2	freq1	freq2	
Duplex mode		TI	DD	T	DD	TE	TDD	
TDD configuration		TDDC	onf.3.1	TDDC	onf.3.1	TDDC	onf.3.1	
BW _{channel}	MHz	100: N	RB,C = 66	100: N	RB,C = 66	100: N _F	RB,C = 66	
Data RBs allocated		6	66	6	6	6	6	
Downlink initial BWP configuration				DLBV	VP.0.1			
Downlink dedicated BWP configuration				DLBV	VP.1.1			
Uplink initial BWP configuration				ULBV	VP.0.1			
Uplink dedicated BWP configuration				ULBV	VP.1.1			
DRX cycle configuration	ms				plicable			
TRS configuration		TRS.2.1 TDD						
TCI state					tate.0			
		SR.3.1		SR.3.1		SR.3.1		
PDSCH Reference measurement channel		TDD	-	TDD	-	TDD	-	
		CR.3.1		CR.3.1		CR.3.1		
RMSI CORESET Reference Channel		TDD	-	TDD	-	TDD	-	
OCNG Patterns		OP.1	OP.1	OP.1	OP.1	OP.1	OP.1	
SMTC configuration		SMTC.	SMTC.	SMTC.	SMTC.	SMTC.	SMTC.	
		1 FR2	1 FR2	1 FR2	1 FR2	1 FR2	1 FR2	
SSB configuration		SSB.3	SSB.3	SSB.3	SSB.3	SSB.3	SSB.3	
		FR2	FR2	FR2	FR2	FR2	FR2	
PDSCH/PDCCH subcarrier spacing	kHz	120	120	120	120	120	120	
EPRE ratio of PSS to SSS	dB	0	0	0	0	0	0	

EPRE ratio of PBCH_DMRS to SSS EPRE ratio of PBCH to PBCH_DMRS EPRE ratio of PDCCH_DMRS to SSS EPRE ratio of PDCCH to PDCCH_DMRS EPRE ratio of PDSCH_DMRS to SSS EPRE ratio of PDSCH to PDSCH_DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG DMRS Note						
EPRE ratio of OCNG to OCNG DMRS Note						
Propagation conditions	AWGN	AWGN	AWGN	AWGN	AWGN	AWGN
Antenna configuration	1x2	1x2	1x2	1x2	1x2	1x2

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void Note 3: Void Note 4: Void

Table A.7.7.3.2.2-3: SS-SINR Inter frequency OTA related test parameters

Parameter	Unit	Tes	st 1	Tes	st 2	Test 3	
Parameter	Unit	Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
		Set	up 1	Setup 1		Setup 1	
Angle of arrival configuration	degrees	accord	ding to	according to		according to	
		A.3.	15.1	A.3.	15.1	A.3.	15.1
Assumption for UE beams ^{Note 10}		Ro	ugh	Ro	ugh	Ro	ugh
N oc Note1	dBm/15kHz Note4	-105	-105	-105	-105	-105	-105
Note1	dBm/SCS Note3	-96	-96	-96	-96	-96	-96
\hat{E}_s/N_{oc}	dB	-0.5	-0.5	11.0	11.0	-3.0	-3.0
SSB_RPNote2	dBm/SCS Note4	-96.5	-96.5	-85	-85	-99	-99
SS-SINR ^{Note2}	dB	-0.5	-0.5	11	11	-3.0	-3.0
Ê s /I ot	dB	-0.5	-0.5	11	11	-3.0	-3.0
lo ^{Note2}	dBm/95.04 MHz Note4	-69.3	-69.3	-55.4	-55.4	-65.24	-65.24

- Note 1: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{max} to be fulfilled.
- Note 2: SS-SINR, SSB_RP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 3: SS-SINR and SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone
- Note 5: As observed with 0dBi gain antenna at the centre of the quiet zone
- Note 6: Void Note 7: Void Note 8: Void Note 9: Void

Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.7.7.3.2.3 Test Requirements

The SS-SINR absolute measurement accuracy in test 1 shall be within the range Nominal SS-SINR +3dB to Nominal SS-SINR -3dB and the SS-SINR measurement accuracy in test 2 shall be within the range Nominal SS-SINR +3.5dB to Nominal SS-SINR -3.5dB according to the requirements in clause 10.1.15.1.1.

The SS-SINR relative measurement accuracy shall fulfil the requirements in clause 10.1.15.1.2.

A.7.7.4 L1-RSRP measurement for beam reporting

A.7.7.4.1 SSB based L1-RSRP measurement

A.7.7.4.1.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.5.2 and clause 10.1.20.1 for L1-RSRP measurements based on SSB with the testing configurations for NR cells in Table A.7.7.4.1.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.4.1.1-1: Applicable NR configurations for FR2 SSB based L1-RSRP test

Config Description				
	1	NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
	2	NR 240 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode		
Note:	The UE is only re	equired to be tested in one of the supported test configurations in each supported band		

A.7.7.4.1.2 Test parameters

In this set of test cases there are two cells in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.4.1.2-1 and Table A.7.7.4.1.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.7.7.4.1.2-1 and Table A.7.7.4.1.2-2.

Here is no measurement gap configured in the test. Before the test, UE is configured one SSB resource set with two SSB resources. UE is configured to perform RLM, BFD and L1-RSRP measurement based on the SSB resources 0 and 1.

Table A.7.7.4.1.2-1: FR2 SSB based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1~2		freq1	freq1
Duplex mode	1~2		TDD	TDD
TDD Configuration	1~2		TDDConf.3.1	TDDConf.3.1
BW _{channel}	1~2	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
Data RBs allocated	1~2		66	66
PDSCH Reference	1		SR.3.2 TDD	SR.3.2 TDD
measurement channel	2		SR.3.3 TDD	SR.3.3 TDD
RMSI CORESET Reference	1		CR.3.1 TDD	CR.3.1 TDD
Channel	2		CR.3.2 TDD	CR.3.2 TDD
Dedicated CORESET	1		CCR.3.1 TDD	CCR.3.1 TDD
Reference Channel	2		CCR.3.7 TDD	CCR.3.7 TDD
SSB configuration	1		SSB.1 FR2	SSB.1 FR2
33B Configuration	2		SSB.2 FR2	SSB.2 FR2
OCNG Patterns	1~2		OP.1	OP.1
Initial BWP Configuration	1~2		DLBWP.0.1	DLBWP.0.1
Illitial BVVF Collingulation	1~2		ULBWP.0.1	ULBWP.0.1
Dedicated BWP configuration	1~2		DLBWP.1.3	DLBWP.1.3
Dedicated BVVF configuration	1~2		ULBWP.1.3	ULBWP.1.3
TRS Configuration	1~2		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1~2		TCI.State.2	TCI.State.2

OMTO C C	4.0	l	OLATO 4	ON ATO A
SMTC configuration	1~2		SMTC.1	SMTC.1
reportConfigType	1~2		periodic	periodic
reportQuantity	1~2		ssb-Index-RSRP	ssb-Index-RSRP
Number of reported RS	1~2		2	2
L1-RSRP reporting period	1~2		slot320	slot320
Propagation condition	1~2		AWGN	AWGN
Antenna configuration	1~2		1x2	1x2
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH				
DMRS				
EPRE ratio of PDSCH DMRS to SSS	1~2	dB	0	0
EPRE ratio of PDSCH to PDSCH				
DMRS				
EPRE ratio of OCNG DMRS to				
SSSNote 1				
EPRE ratio of OCNG to OCNG				
DMRS Note 1				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for N_{oc} to be fulfilled.

Table A.7.7.4.1.2-2: FR2 SSB based L1-RSRP OTA related test parameters

Parameter	Config	Unit	Test 1		Test 2	NOTE 3	
Farameter Comit		Offic	SSB0	SSB1	SSB0	SSB1	
Angle of arrival configuration			Setup 1 ac	cording to	Setup 1 acc	ording to	
			A.3.15.1		A.3.15.1		
Assumption for UE beams ^{Note 4}			Rough		Rough		
N oc	1, 2	dBm/15 kHz			n.a.		
N oc	1	dBm/SS	-91		n.a.		
	2	B SCS	-88	-88		n.a.	
\hat{E}_{s}/I_{ot}	1~2	dB	10	-2	n.a.		
SSB_RPNote1	1	dBm/SC	-81	-93	As in Table B.2.4-2		
SSB_RPINGS	2	S	-78	-90	As in Table	B.2.4-2	
Io ^{Note1}	1~2	dBm/ 95.04M Hz	-51.57		SS-RSRP+28.98		
\hat{E}_s/N_{oc}	1~2	dB	10	-2	n.a.		

Note 1: SSB_RP and lo levels have been derived from other parameters for information purposes.

They are not settable parameters themselves.

Note 2: Void

Note 3: No additional noise is added by the test system in Test 2.

Note 4: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation.

A.7.7.4.1.3 Test Requirements

After 320ms from the beginning of the test, the L1-RSRP measurement accuracy for SSB#0 and SSB#1 of Cell 2 shall fulfil the requirements in clauses 10.1.20.1. The following requirements are to be verified:

For Test 1:

Absolute accuracy of SSB0. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.1.3-1.

Relative accuracy of SSB0 compared with SSB1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.1.2-1.

For Test 2:

Absolute accuracy of SSB resource reported by UE in L1-RSRP report (SSB0 or SSB1). The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.1.3-1.

Relative accuracy of SSB0 compared with SSB1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.1.2-1.

Table A.7.7.4.1.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes1,2,3			
	SSB0	SSB_RP0 - δ + G _{min} \leq Reported RSRP(dBm) \leq SSB_RP0 + δ + G _{max}			
	SSB1	$SSB_RP1 - \delta + G_{min} \leqslant Reported \ RSRP(dBm) \leqslant SSB_RP1 + \delta + G_{max}$			
Note 1:	Note 1: SSB_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone configured in the test for the SSB n under consideration				
Note 2:					
Note 3:					

A.7.7.4.2 CSI-RS based L1-RSRP measurement on resource set with repetition off

A.7.7.4.2.1 Test Purpose and Environment

The purpose of this test is to verify that the L1-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clauses 9.5.3 and clause 10.1.20.2 for L1-RSRP measurements based on CSI-RS with the testing configurations for NR cells in Table A.7.7.4.2.1-1.

The AoA setup for this test is Setup 1 as defined in clause A.3.15.

Table A.7.7.4.2.1-1: Applicable NR configurations for FR1 CSI-RS based L1-RSRP test

Config	Description			
1	NR 120 kHz CSI-RS SCS, 100 MHz bandwidth, TDD duplex mode			

A.7.7.4.2.2 Test parameters

In this set of test cases there are one cell in the test, PCell (Cell 1). The test parameters for the Cell 1 are given in Table A.7.7.4.2.2-1 and Table A.7.7.4.2.2-2 below. The absolute and relative accuracy of L1-RSRP measurements are tested by using the parameters in Table A.7.7.4.2.2-1 and Table A.7.7.4.2.2-2.

There is no measurement gap configured in the test. Before the test, UE is configured one CSI-RS resource set with two CSI-RS resources. UE is configured to perform RLM and BFD based on SSB 0 and 1. CSI-RS is not transmitted in the same OFDM symbols as SSB.

Table A.7.7.4.2.2-1: FR2 CSI-RS based L1-RSRP general test parameters

Parameter	Config	Unit	Test 1	Test 2
SSB GSCN	1		freq1	freq1
Duplex mode	1		TDD	TDD
TDD Configuration	1		TDDConf.3.1	TDDConf.3.1

BW _{channel}	1	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66
PDSCH Reference measurement channel	1		SR.3.1 TDD	SR.3.1 TDD
RMSI CORESET Reference Channel	1		CR.3.1 TDD	CR.3.1 TDD
Dedicated CORESET Reference Channel	1		CCR.3.1 TDD	CCR.3.1 TDD
SSB configuration	1		SSB.1 FR2	SSB.1 FR2
OCNG Patterns	1		OP.1	OP.1
Initial BWP Configuration	1		DLBWP.0.1 ULBWP.0.1	DLBWP.0.1 ULBWP.0.1
Dedicated BWP configuration	1		DLBWP.1.1 ULBWP.1.1	DLBWP.1.1 ULBWP.1.1
TRS Configuration	1		TRS.2.1 TDD	TRS.2.1 TDD
PDCCH/PDSCH TCI Configuration	1		TCI.State.2	TCI.State.2
SMTC configuration	1		SMTC.1	SMTC.1
CSI-RS	1		CSI-RS.3.2 TDD	CSI-RS.3.2 TDD
reportConfigType	1		periodic	periodic
reportQuantity	1		cri-RSRP	cri-RSRP
Number of reported RS	1		2	2
L1-RSRP reporting period	1		slot80	slot80
Propagation condition	1		AWGN	AWGN
Antenna configuration	1		1x2	1x2
EPRE ratio of PSS to SSS EPRE ratio of PBCH DMRS to SSS EPRE ratio of PBCH to PBCH DMRS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDSCH DMRS to SSS EPRE ratio of PDSCH to PDSCH DMRS EPRE ratio of OCNG DMRS to SSSNote 1 EPRE ratio of OCNG to OCNG	1	dB	0	0
DMRS Note 1				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power

for N_{oc} to be fulfilled.

Table A.7.7.4.2.2-2: FR2 CSI-RS based L1-RSRP OTA related test parameters

			Tes	st 1	Test 2 NOTE 3	
Parameter	Config	Unit	CSI-RS0	CSI-RS1	CSI-RS0	CSI- RS1
Angle of arrival configuration			Setup 1 ac	cording to	Setup 1 acc	cording to
			A.3.	15.1	A.3.1	5.1
Assumption for UE beams ^{Note 4}			Rough		Rough	
N_{oc}	1~2	dBm/15 kHz	-100		n.a.	
N_{oc}	1~2	dBm/SS B SCS	-91		n.a. n.a.	
Ê , /I ot	1~2	dB	10 -2		n.a	١.
CSI-RS-RSRPNote1	1~2	dBm/SC S	-81 -93		As in Table	∋ B.2.4-2
Io ^{Note1}	1~2	dBm/	-59	.86	SS-RSRF	P+28.98

			95.04M			
			Hz			
\hat{E}_{s}/N_{oc}		1~2	dB	-51.57	-2	n.a.
Note 1:	RSRP and lo levels ha	ave been c	derived from	other paran	neters for inf	formation purposes.
	They are not settable parameters themselves.					
Note 2:	RSRP minimum requi	rements ai	e specified	assuming in	dependent i	nterference and noise
	at each receiver anter	nna port.				
Note 3:	No additional noise is					
Note 4:	Information about type	es of UE be	eam is give	n in B.2.1.3,	and does no	ot limit UE
	implementation or test	t system in	nolementati	on		

A.7.7.4.2.3 Test Requirements

After 640ms from the beginning of the test, the L1-RSRP measurement accuracy for CSI-RS#0 and CSI-RS#1 of Cell 1 shall fulfil the requirements in clause 10.1.20.2. The following requirements are to be verified:

For Test 1:

Absolute accuracy of CSI-RS0. The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.2.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

For Test 2:

Absolute accuracy of CSI-RS resource reported by UE in L1-RSRP report (CSI-RS0 or CSI-RS1). The UE is deemed to meet the requirement if the reported L1-RSRP is in the range shown in Table A.7.7.4.2.3-1.

Relative accuracy of CSI-RS0 compared with CSI-RS1. The UE is deemed to meet the requirement if the difference in reported L1-RSRP meets the requirements in Table 10.1.20.2.2-1.

Table A.7.7.4.2.3-1: L1-RSRP absolute accuracy test requirement

		Test requirement Notes 1,2,3		
	CSI-RS0	CSI-RS _RP0 - δ + G _{min} ≤ Reported RSRP(dBm) ≤CSI-RS _RP0 + δ + G _{max}		
	CSI-RS1	CSI-RS _RP1 - δ + G _{min} \leq Reported RSRP(dBm) \leq CSI-RS _RP1 + δ + G _{max}		
Note 1: CSI-RS_RPn is the equivalent power received by an antenna with 0dBi gain at the centre of the quie zone configured in the test for the CSI-RS n under consideration				
Note 2:				
Note 3:				

A.8 E-UTRA standalone tests for NR RRM

Editor notes: All NR RRM tests under E-UTRA standalone operations are included in this Annex. All EN-DC related NR RRM tests are in A.4 and A.5.

A.8.1 Void

A.8.2 RRC_IDLE state mobility

A.8.2.1 Inter-RAT NR Cell re-selection

A.8.2.1.1 E-UTRA Cell reselection to higher priority NR target Cell in FR1

A.8.2.1.1.1 Test Purpose and Environment

This test is to verify the requirement for the E-UTRAN to NR inter-RAT cell reselection requirements specified in clause 4.2.2.5.6 in TS 36.133 [15].

The test scenario comprises of 1 E-UTRA cell and 1 NR cell as given in tables A.8.2.1.1.1-1, A.8.2.1.1.1-2, A.8.2.1.1.1-3 and A.8.2.1.1.1-4. The test consists of three successive time periods, with time duration of T1, T2, and T3 respectively. E-UTRA cell 1 is already identified by the UE prior to the start of the test. Cell 2 is of higher priority than cell 1.

Table A.8.2.1.1.1-1: Supported test configurations

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE i	s only required to be tested in one of the supported test configurations

Table A.8.2.1.1.1-2: General test parameters for E-UTRA cell re-selection FR1 NR cell test case

	Parameter		Test configuration	Value	Comment
Initial condition			1, 2, 3, 4, 5, 6	Cell2	The UE camps on cell 2 in the initial phase
	Neighbour cell		1, 2, 3, 4, 5, 6	Cell1	
T1 end condition	Active cell			Cell1	During T1 period the UE reselects to cell 1
	Neighbour cell			Cell2]
T3 end	Active cell		1, 2, 3, 4, 5, 6	Cell2	The UE shall perform reselection to cell 2
condition	Neighbour cell		1, 2, 3, 4, 5, 6	Cell1	during T3
RF Channe	el Number		1, 2, 3, 4, 5, 6	1, 2	E-UTRAN radio channel (1) and NR radio channel (2) are used for this test
Time offse	t between cells		1, 4	3 ms	Asynchronous cells
			2, 5	3 μs	Synchronous cells
			3, 6	3 μs	Synchronous cells
Access Ba	rring Information	-	1, 2, 3, 4, 5, 6	Not Sent	No additional delays in random access procedure.
DRX cycle	length	S	1, 2, 3, 4, 5, 6	1.28	The value shall be used for all cells in the test.
NR PRACH configuration index			1, 2, 3, 4, 5, 6	102	The detailed configuration is specified in TS 38.211 clause 6.3.3.2
T1	T1		1, 2, 3, 4, 5, 6	15	T1 needs to be defined so that cell re- selection reaction time is taken into account.

T2	S	1, 2, 3, 4, 5, 6	>7	During T2, cell 2 shall be powered off, and during the off time the physical cell identity shall be changed. The intention is to ensure that cell 2 has not been detected by the UE prior to the start of period T3.
ТЗ	s	1, 2, 3, 4, 5, 6	75	T3 needs to be defined so that cell re- selection reaction time is taken into account.

Table A.8.2.1.1.1-3: Cell specific test parameters for NR cell 2

Parameter	Unit	Test		Cell 2	
		configuration	T1	T2	Т3
TDD configuration		1, 4		N/A	
		2, 5		TDDConf.1.1	
		3, 6		TDDConf.2.1	
PDSCH Reference		1, 4		SR.1.1 FDD	
measurement channel		2, 5		SR.1.1 TDD	
		3, 6		SR.2.1 TDD	
RMSI CORESET		1, 4		CR.1.1 FDD	
Reference Channel		2, 5		CR.1.1 TDD	
		3, 6		CR.2.1 TDD	
RMC CORESET		1, 4	CCR.1.1 FDD		
Reference Channel		2, 5	CCR.1.1 TDD		
		3, 6		CCR.2.1 TDD	
OCNG Patterns		1, 2, 3, 4, 5, 6	OP.1		
SMTC configuration		1, 2, 3, 4, 5, 6		SMTC.1	
SSB configuration		1, 4	SSB.1 FR1		
3		2, 5	SSB.1 FR1		
		3, 6	SSB.2 FR1		
Initial DL BWP		1, 2, 3, 4, 5, 6	DLBWP.0.1		
configuration		., _, 0, ., 0, 0		222	
Initial UL BWP		1, 2, 3, 4, 5, 6		ULBWP.0.1	
configuration		., _, 0, ., 0, 0		0	
RLM-RS		1, 2, 3, 4, 5, 6		SSB	
Qrxlevmin	dBm/SCS	1, 2, 4, 5		-140	
		3, 6		-137	
Pcompensation	dB	1, 2, 3, 4, 5, 6		0	
Qhysts	dB	1, 2, 3, 4, 5, 6		0	
Qoffsets, n	dB	1, 2, 3, 4, 5, 6		0	
Cell_selection_and_		1, 2, 3, 4, 5, 6			
reselection_quality_m		1, 2, 0, 1, 0, 0		SS-RSRP	
easurement					
Ê , /I ot	dB	1, 4	-4	-infinity	12
		2, 5			
		3, 6			
7	dBm/SCS	1, 4		-98	
N_{oc} Note2	ab, 000	2, 5		-98	
		3, 6		-95	
3.7	dBm/15 kHz	1, 4		-98	
N_{oc} Note2	abili, to kitz	2, 5		00	
		3, 6			
\hat{E}_{s}/N_{oc}	dB	1, 4	-4	-infinity	12
≥ s / 11 oc	uБ	2, 5	- 	-manney	12
		3, 6			
SS-RSRP Note3	dBm/SCS	1, 4	102	-infinity	96
SO-KOKF "Soo	ubii/SCS		-102 -102		-86
		2, 5		-infinity	-86
		3, 6	-99	-infinity	-83

lo	dBm/9.36 MHz	1, 4	-68.60	-70.05	-57.78	
	dBm/9.36 MHz	2, 5	-68.60	-70.05	-57.78	
	dBm/38.16 MHz	3, 6	-62.50	-63.95	-51.69	
Treselection	S	1, 2, 3, 4, 5, 6	0	0	0	
SnonintrasearchP	dB	1, 2, 3, 4, 5, 6	50			
Thresh _{x, highP}	dB	1, 2, 3, 4, 5, 6	48			
Thresh _{serving, lowP}	dB	1, 2, 3, 4, 5, 6	44			
Thresh _{x, lowP}	dB	1, 2, 3, 4, 5, 6	50			
Propagation Condition		1, 2, 3, 4, 5, 6	AWGN			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant

over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: SS-RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Table A.8.2.1.1.1-4: Cell specific test parameters for E-UTRA cell 1

Parameter	Unit		Cell 1		
		T1	T2	T3	
E-UTRA RF Channel number			1		
BW _{channel}	MHz	10			
OCNG Patterns defined in TS 36.133 [15]		OP.2 TDD	for test configur	ation 1, 2, 3;	
clause A.3.2		OP.2 FDD	for test configur	ration 4, 5, 6	
PBCH_RA	dB				
PBCH_RB	dB				
PSS_RA	dB				
SSS_RA	dB				
PCFICH_RB	dB				
PHICH_RA	dB		_		
PHICH_RB	dB		0		
PDCCH_RA	dB				
PDCCH_RB	dB				
PDSCH_RA	dB				
PDSCH_RB	dB				
OCNG_RA ^{Note 1}	dB				
OCNG_RBNote 1	dB				
Qrxlevmin	dBm		-140		
$N_{oc}^{}$ Note 2	dBm/15 kHz		-98		
RSRP Note 3	dBm/15 KHz	-84	-84	-84	
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	14	14	14	
\hat{E}_s/N_{oc}	dB	14	14	14	
Treselection _{EUTRAN}	S		0		
SnonintrasearchP	dB		50		
Thresh _{x, highP}	dB		48		
Thresh _{serving, lowP}	dB		44		
Thresh _{x, lowP}	dB		50		
Propagation Condition			AWGN		

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

A.8.2.1.1.2 Test Requirements

The cell reselection delay to a higher priority NR cell is defined as the time from the beginning of time period T3, to the moment when the UE camps on cell 2, and starts to send preambles on the PRACH for sending the *RRCSetupRequest* message to perform a Registration procedure for mobility and periodic registration update on cell 2

The cell re-selection delay to a higher priority cell shall be less than 68 s.

The rate of correct cell reselections observed during repeated tests shall be at least 90%.

NOTE: The cell re-selection delay to a higher priority cell can be expressed as: $T_{higher_priority_search} + T_{evaluate, NR} + T_{SI-NR}$, and to a lower priority cell can be expressed as: $T_{evaluate, EUTRAN} + T_{SI-EUTRA}$,

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.

Note 3: RSRP levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Where:

Thigher_priority_search See clause 4.2.2 in TS 36.133 [15]

T_{evaluate, NR} See Table 4.2.2.5.6-1 in clause 4.2.2.5.6 in TS 36.133 [15]

T_{SI-NR} Maximum repetition period of relevant system info blocks that needs to be received by the UE to

camp on a cell; 1280 ms is assumed in this test case.

T_{evaluate, EUTRAN}See Table 4.2.2.5-1 in clause 4.2.2.5

T_{SI-EUTRA} Maximum repetition period of relevant system info blocks that needs to be received by the UE to

camp on a cell; 1280 ms is assumed in this test case.

This gives a total of 67.68 s, allow 68 s for the cell re-selection delay to a higher priority NR cell and 7.68 s for the cell re-selection delay to a lower priority cell in the test case, which we allow 8 s.

A.8.3 RRC_CONNECTED state mobility

A.8.3.1 Handover

A.8.3.1.1 E-UTRAN - NR handover in FR1

A.8.3.1.1.1 Test Purpose and Environment

This test shall verify the E-UTRAN to NR FR1 handover requirements as specified in clause 6.1.2.1 specified in clause 5.3.4 in TS 36.133 [15].

The test comprises of one E-UTRA carrier and one NR carrier. There are two cells and one cell on each carrier. Cell 1 is the E-UTRAN and Cell 2 is an inter-RAT NR neighbour cell. The test consists of three successive time periods, with time durations of T1, T2 and T3 respectively. At the start of time duration T1, the UE does not have any timing information of Cell 2. Starting T2, Cell 2 becomes detectable and the UE is expected to detect and send a measurement report. Gap pattern configuration with id #0 as specified in Table 8.1.2.1-1 of TS 36.133 [15] is configured before T2 begins to enable inter-RAT frequency monitoring.

A RRC message implying handover shall be sent to the UE during period T2 after the UE has reported Event B2. The start of T3 is the instant when the last TTI containing the RRC message implying handover is sent to the UE. The handover message shall contain Cell 2 as the target cell.

Supported test configurations are shown in table A.8.3.1.1-1. General test parameters are provided in Table A.8.3.1.1-2. Cell specific test parameters for Cell 1 and Cell 2 are provided in Tables A.8.3.1.1-3 and A.8.3.1.1-4 respectively.

Table A.8.3.1.1-1: Supported test configurations for E-UTRAN inter-RAT NR handover

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The UE is	s only required to be tested in one of the supported test configurations

Table A.8.3.1.1-2: General test parameters for E-UTRAN inter-RAT NR handover

Daramatar	Value	Commont

NR RF Channel Number			1	1 NR carrier frequency is used in the test
LTE RF Channel I	Number		2	1 E-UTRAN carrier frequency is used in the test
Initial conditions			Cell 1	E-UTRAN cell
initial conditions	Neighbouring cell		Cell 2	NR cell
Final condition	Active cell		Cell 2	1414 3011
NR measurement			SS-RSRP	
E-UTRAN measur			RSRP	
b2-Threshold1		dBm	-83	Absolute E-UTRAN RSRP
				threshold for event B2
b2-Threshold2NR		dBm	As specified in Table	Absolute NR SS-RSRP threshold
			A.8.3.1.1-4	for event B2
Hysteresis		dB	0	
TimeToTrigger		S	0	
Filter coefficient			0	L3 filtering is not used
DRX			OFF	Non-DRX test
Access Barring In	formation	-	Not sent	No additional delays in random
				access procedure
Time offset betwe	en cells		3 ms	Asynchronous cells
Gap pattern configuration Id			0	As specified in Table 8.1.2.1-1
				started before T2 starts [15]
T1		S	5	
T2		S	≤5	
T3		S	1	

Table A.8.3.1.1-3: Cell specific test parameters for E-UTRAN inter-RAT NR handover (Cell 1)

Parameter	Unit	Configuration	Cell 1		
			T1	T2	Т3
RF channel number		1, 2, 3, 4, 5, 6		2	•
Duplex mode		1, 2, 3		FDD	
·		4, 5, 6		TDD	
TDD special subframe configuration ^{Note1}		4, 5, 6		6	
TDD uplink-downlink configuration ^{Note1}		4, 5, 6		1	
BW _{channel}	MHz	1, 2, 3, 4, 5, 6		5 MHz: N _{RB,c} = 25 10 MHz: N _{RB,c} = 5	
			2	0 MHz: N _{RB,c} = 10	00
PRACH ConfigurationNote2		1, 2, 3		4	
		4, 5, 6		53	
PDSCH parameters:		1, 2, 3		5 MHz: R.7 FDD)
DL Reference Measurement				10 MHz: R.3 FDE)
Channel ^{Note3}				20 MHz: R.6 FDI)
		4, 5, 6		5 MHz: R.4 TDD)
				10 MHz: R.0 TDE	
				20 MHz: R.3 TDE	
PCFICH/PDCCH/PHICH		1, 2, 3		5 MHz: R.11 FD	-
parameters:				10 MHz: R.6 FD	_
DL Reference Measurement				20 MHz: R.10 FD	
Channel ^{Note3}		4, 5, 6		5 MHz: R.11 TDE	=
				10 MHz: R.6 TD	
OONO D. II. Noto?		4.00		20 MHz: R.10 TD	
OCNG Patterns ^{Note3}		1, 2, 3		MHz: OP.20 FD	
				0 MHz: OP.10 FC	
		4.5.0		0 MHz: OP.17 FC	
		4, 5, 6		5 MHz: OP.9 TDI	
	1		1	10 MHz: OP.1 TD	U

			2	0 MHz: OP.7 TD	D
PBCH_RA		1, 2, 3, 4, 5, 6			
PBCH_RB		, , , , ,			
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB	dB			0	
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA ^{Note4}					
OCNG_RB ^{Note4}					
N _{oc} Note5	dBm/15kHz	1, 2, 3, 4, 5, 6		-98	
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	7	7	7
Ê _s /I _{ot} ^{Note6}	dB	1, 2, 3, 4, 5, 6	7	7	7
RSRP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-91	-91	-91
SCH_RP ^{Note6}	dBm/15kHz	1, 2, 3, 4, 5, 6	-91	-91	-91
Io ^{Note6}	dBm/9MHz	1, 2, 3, 4, 5, 6	-62.43	-62.43	-62.43
Propagation Condition		1, 2, 3, 4, 5, 6		AWGN	
Antenna Configuration and Correlation Matrix Note7		1, 2, 3, 4, 5, 6		1x2 Low	

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: PRACH configurations are specified in table 5.7.1-2 and table 5.7.1-3 in TS 36.211 [23].
- Note 3: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 4: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 5: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 6: \hat{E}_s/I_{ot} , RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 7: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.3.1.1-4: Cell specific test parameters E-UTRAN inter-RAT NR handover (Cell 2)

Parameter	Unit	Configuration		Cell 2	
			T1	T2	T3
RF channel number		1, 2, 3, 4, 5, 6		1	
Duplex mode		1, 4		FDD	
		2, 3, 5, 6		TDD	
TDD Configuration		2, 5		TDDConf.1.1	
		3, 6		TDDConf.2.1	
BW _{channel}	MHz	1, 4	10:	$N_{RB,c} = 52 (F)$	DD)
		2, 5	10:	$N_{RB,c} = 52 (T)$	DD)
		3, 6	40:	$N_{RB,c} = 106 (T)$	DD)
PDSCH reference measurement channel		1, 4		SR.1.1 FDD	
		2, 5		SR.1.1 TDD	
		3, 6		SR.2.1 TDD	
CORSET reference channel		1, 4		CR.1.1 FDD	
		2, 5		CR.1.1 TDD	
		3, 6		CR.2.1 TDD	
PRACH configuration			FR1 P	RACH configu	ration 1
OCNG pattern ^{Note1}		1, 2, 3, 4, 5, 6		OP.1	
BWP	Initial DL BWP	1, 2, 3, 4, 5, 6		DLBWP.0.1	
	Dedicated DL BWP			DLBWP.1.1	

l l	Initial UL BWP	Ī		ULBWP.0.1	
	Dedicated UL			ULBWP.1.1	
	BWP			OLDWI .II.I	
SMTC configuration	2	1, 2, 3, 4, 5, 6		SMTC.1	
SSB configuration		1, 2, 4, 5		SSB.1 FR1	
302 comigaration		3, 6		SSB.2 FR1	
b2-Threshold2NR	dBm	1, 2, 4, 5		-106	
DE TINGONOIGENT	abiii	3, 6		-103	
EPRE ratio of PSS to SSS	dB	1, 2, 3, 4, 5, 6		0	
EPRE ratio of PBCH_DMRS to SSS		,, =, =, 1, =, =		-	
EPRE ratio of PBCH to					
PBCH_DMRS					
EPRE ratio of PDCCH_DMRS to					
SSS					
EPRE ratio of PDCCH to					
PDCCH_DMRS					
EPRE ratio of PDSCH_DMRS to					
SSS					
EPRE ratio of PDSCH to					
PDSCH_DMRS					
EPRE ratio of OCNG DMRS to SSS					
EPRE ratio of OCNG to OCNG					
DMRS					
N _{oc} Note2	dBm/15 KHz	1, 2, 3, 4, 5, 6		-98	
N _{oc} Note2	dBm/SCS	1, 2, 4, 5		-98	
		3, 6		-95	
Ês/Noc	dB	1, 2, 3, 4, 5, 6	-inifinity	0	0
Ês/lot ^{Note3}	dB	1, 2, 3, 4, 5, 6	-inifinity	0	0
SS-RSRP ^{Note3}	dBm/SCS	1, 2, 4, 5	-inifinity	-98	-98
		3, 6	-inifinity	-95	-95
Io ^{Note3}	dBm/9.36	1, 2, 4, 5	-70.05	-67.04	-67.04
	MHz				
	dBm/38.16	3, 6	-63.96	-60.94	-60.94
	MHz				
Propagation condition		1, 2, 3, 4, 5, 6		AWGN	
Antenna Configuration and		1, 2, 3, 4, 5, 6		1x2 Low	
Correlation Matrix					

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{oc} to be fulfilled.

Note 3: Ê_s/I_{ot}, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

A.8.3.1.1.2 Test Requirements

The UE shall start to transmit the PRACH to Cell 2 less than 112 ms from the beginning of time period T3.

The rate of correct handovers observed during repeated tests shall be at least 90%.

NOTE: The handover delay can be expressed as: RRC procedure delay + $T_{interrupt}$, where:

RRC procedure delay = 50 ms and is specified in TS36.133.

 $T_{interrupt} = 62$ ms in the test; $T_{interrupt}$ is defined in TS36.133 clause 5.3.4.3.

A.8.4 Measurement procedure

A.8.4.1 E-UTRA – NR Inter-RAT SFTD Measurement Delay

A.8.4.1.1 E-UTRA – NR Inter-RAT SFTD Measurement Delay in non-DRX

A.8.4.1.1.1 Test Purpose and Environment

The purpose of this test is to partly verify that measurement reporting delay for SFTD between E-UTRA PCell and inter-RAT NR neighbour cell in FR1 is within the requirements stated in clauses 8.1.2.4.25 and 8.1.2.4.26 of TS 36.133 [15] for E-UTRA FDD and TDD, respectively, when no measurement gaps are provided and no DRX is configured.

The tests consist of a single time period of duration T1. Two carriers are used in the tests: one E-UTRA carrier with the PCell (Cell 1), and one NR carrier with the NR neighbour cell (Cell 2).

Prior to the start of time duration T1, the UE is connected to Cell 1 and configured to carry out intra-frequency measurements only. The point in time at which the UE receives, at the UE antenna connector(s), a RRC message containing a measurement configuration for SFTD measurements on RF channel 1 defines the start of time duration T1. Following the start of T1 the UE shall detect Cell 2, determine the SFN and frame time difference of Cell 2 relative to Cell 1, and send a measurement report.

The supported test configurations are listed in Table A.8.4.1.1.1-1 below. Test parameters and cell-specific parameters for the NR cell are provided in Tables A.8.4.1.1.1-2 and A.8.4.1.1.1-3 below, respectively. Cell-specific parameters for the E-UTRA cell are provided in Table A.3.7.2.1-1 in clause A.3.7.2.1.

Table A.8.4.1.1.1-1: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only required to be tested in one of the supported test configurations

Table A.8.4.1.1.1-2: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test

Parameter	Unit	Test	Va	lue	Comment
		configuration	Test 1	Test 2	
E-UTRA RF Channel		Config	,	1	One E-UTRAN carrier frequencies
Number		1,2,3,4,5,6			is used.
NR RF Channel		Config	,	ı	One NR FR1 carrier frequencies is
Number		1,2,3,4,5,6			used.
Active cell		Config	Ce	11 4	Cell 1 is on E-UTRA RF channel
		1,2,3,4,5,6	Ö	II I	number 1.
Neighbour cell		Config	Cell 2		Cell 2 is on NR RF channel number
		1,2,3,4,5,6	Ce	11 2	1.
SSB configuration		Config 1,4	SSB.	1 FR1	As specified in clause A.3.10.1
		Config 2,5	SSB.	1 FR1	As specified in clause A.3.10.1
		Config 3,6	SSB.2 FR1		As specified in clause A.3.10.1
CP length		Config	Non		Applicable to both cells.
		1,2,3,4,5,6	Normal		
DRX		Config	OFF		DRX is not used
		1,2,3,4,5,6			

Frame time offset between serving and neighbour cells	ms	Config 1,2,3,4	3	7	Asynchronous cells. The timing of Cell 2 relative to the timing of Cell 1.
	μs	Config 5,6	;	3	Synchronous cells.
SFN offset between serving and neighbour cells		Config 1,2,3,4,5,6	0	1	SFN of Cell 2 relative to SFN of Cell 1.
T1	S	Config 1,2,3,4,5,6		1	

Table A.8.4.1.1.1-3: Cell specific test parameters for Cell 2 in inter-RAT SFTD measurement delay test

Parameter	Unit	Test configuration	Cell 2
NR RF Channel Number		Config 1,2,3,4,5,6	1
Duplex mode		Config 1,4	FDD
Duplex mode		Config 2,3,5,6	TDD
		Config 1,4	10: $N_{RB,c} = 52$
BW _{channel}	MHz	Config 2,5	10: $N_{RB,c} = 52$
		Config 3,6	40: N _{RB,c} = 106
TDD configuration		Config 2,5	TDDConf.1.1
1 DD configuration		Config 3,6	TDDConf.2.1
OCNG Pattern defined in A.3.2.1.1		Config 1,2,3,4,5,6	OP.1
SMTC configuration		Config 1,2,3,4,5,6	SMTC.1
PDSCH/PDCCH subcarrier	kHz	Config 1,2,4,5	15
spacing	KIIZ	Config 3,6	30
EPRE ratio of PSS to SSS	dB		
EPRE ratio of PBCH DMRS to SSS	dB		
EPRE ratio of PBCH to PBCH DMRS	dB	Config 1,2,3,4,5,6	0
EPRE ratio of OCNG DMRS to SSS Note 1	dB		
EPRE ratio of OCNG to OCNG DMRS Note 1	dB		
N _{oc} Note2	dBm/15kHz		-98
N _{oc} Note2	dBm/SCS	Config 1,2,4,5	-98
Noc	ubiii/SCS	Config 3,6	-95
SS-RSRP Note 3, 4	dBm/SCS	Config 1,2,4,5	-94
OO-NOICE	UDIII/OCO	Config 3,6	-91
\hat{E}_s/I_{ot}	dB	Config 1,2,3,4,5,6	4
Ês/Noc	dB	Config 1,2,3,4,5,6	4
lo Note 3	dBm/9.36MHz	Config 1,2,4,5	-64.59
10	dBm/38.16MHz	Config 3,6	-58.50
Propagation Condition		Config 1,2,3,4,5,6	AWGN

Note	 OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
Note	 Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
Note	3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note	4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.8.4.1.1.2 Test Requirements

Following the start of T1, the UE shall detect Cell 2 and determine the relative time difference between Cell 1 and Cell 2. At latest at $T_{RRC_procedure_delay} + T_{measure_SFTD1}$ after the beginning of time duration T1, the UE shall send a measurement report on SFTD between Cell 1 and Cell 2.

The observed rate of successful SFTD reports in repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2×TTI_{DCCH} longer than the measurement reporting delays above due to TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.1.2 E-UTRA – NR Inter-RAT SFTD Measurement Delay in DRX

A.8.4.1.2.1 Test Purpose and Environment

The purpose of this test is to partly verify that measurement reporting delay for SFTD between E-UTRA PCell and inter-RAT NR neighbour cell in FR1 is within the requirements stated in clauses 8.1.2.4.25 and 8.1.2.4.26 of TS 36.133 [15] for E-UTRA FDD and TDD, respectively, when no measurement gaps are provided and DRX is configured.

The tests consist of a single time period of duration T1. Two carriers are used in the tests: one E-UTRA carrier with the PCell (Cell 1), and one NR carrier with the NR neighbour cell (Cell 2).

Prior to the start of time duration T1, the UE is connected to Cell 1 and configured to carry out intra-frequency measurements only. The point in time at which the UE receives, at the UE antenna connector(s), a RRC message containing a measurement configuration for SFTD measurements on RF channel 1 defines the start of time duration T1. Following the start of T1 the UE shall detect Cell 2, determine the SFN and frame time difference of Cell 2 relative to Cell 1, and send a measurement report.

The supported test configurations are listed in Table A.8.4.1.2.1-1 below. Test parameters are provided in Tables A.8.4.1.2.1-2 below. Cell-specific parameters for the E-UTRA and NR cells are provided in Table A.3.7.2.1-1 in clause A.3.7.2.1, and Table A.8.4.1.1.1-3 in clause A.8.4.1.1.1, respectively.

Table A.8.4.1.2.1-1: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test in DRX

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: T	he UE is only required to be tested in one of the supported test configurations

Table A.8.4.1.2.1-2: Applicable E-UTRA and NR configurations for inter-RAT SFTD measurement delay test in DRX

Parameter	Unit Test		Va	lue	Comment
		configuration	Test 1	Test 2	
E-UTRA RF Channel Number		Config 1,2,3,4,5,6	1		One E-UTRAN carrier frequencies is used.
NR RF Channel Number		Config 1,2,3,4,5,6		1	One NR FR1 carrier frequencies is used.
Active cell		Config 1,2,3,4,5,6	Ce	ell 1	Cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		Config 1,2,3,4,5,6	Ce	ell 2	Cell 2 is on NR RF channel number 1.
		Config 1,4	SSB.	1 FR1	As specified in clause A.3.10.1
SSB configuration		Config 2,5	SSB.	1 FR1	As specified in clause A.3.10.1
		Config 3,6	SSB.2 FR1		As specified in clause A.3.10.1
CP length		Config 1,2,3,4,5,6	Noi	mal	Applicable to both cells.
DRX		Config 1,2,3,4,5,6	DR	X.4	DRX configuration as specified in clause A.3.3.4
Frame time offset between serving and neighbour cells	ms	Config 1,2,4,5	3	7	Asynchronous cells. The timing of Cell 2 relative to the timing of Cell 1.
	μs	Config 3,6	3		Synchronous cells.
SFN offset between serving and neighbour cells		Config 1,2,3,4,5,6	0	1	SFN of Cell 2 relative to SFN of Cell 1.
T1	S	Config 1,2,3,4,5,6	1		

A.8.4.1.2.2 Test Requirements

Following the start of T1, the UE shall detect Cell 2 and determine the relative time difference between Cell 1 and Cell 2. At latest at the earliest DRX activity time following upon $T_{RRC_procedure_delay} + T_{measure_SFTD1}$ from the beginning of time duration T1, the UE shall send a measurement report on SFTD between Cell 1 and Cell 2.

The observed rate of successful SFTD reports in repeated tests shall be at least 90%.

NOTE: The actual overall delays measured in the test may be up to 2×TTI_{DCCH} longer than the measurement reporting delays above due to TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2 E-UTRA – NR Inter-RAT Measurements

A.8.4.2.1 NR Inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is not used

A.8.4.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.1.1-1, A.8.4.2.1.1-2, A.8.4.2.1.1-3 and A.8.4.2.1.1-4.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.1.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.1.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.1.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description					
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note 1: The UE is only	Note 1: The UE is only required to be tested in one of the supported test configurations.					

Table A.8.4.2.1.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Va	lue	Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Number		1, 2, 3, 4, 5, 6	1		One E-UTRAcarrier frequency is used.
NR RF Chanel Number		1, 2, 3, 4, 5, 6	1		One FR1 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5, 6	E-UTRA cel	I 1 (PCell)	E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39	19	As specified in TS 36.331 [16].
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	Note 1		E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dBm	1, 2, 3, 4, 5, 6	Note 2		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0		
CP length		1, 2, 3, 4, 5, 6	Normal		
TimeToTrigger	S	1, 2, 3, 4, 5, 6	0		
Filter coefficient		1, 2, 3, 4, 5, 6	0		L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	OFF		DRX is not used

Time offset between serving and neighbour cells		1, 4	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
		2, 3, 5, 6	3µs		Synchronous cells.
T1	s	1, 2, 3, 4, 5, 6	5		
T2	s	1, 2, 3, 4, 5, 6	1	1	
		shold1 is defined			
Note 2: The value of b	2-Thres	shold2NR is defi	ned in Table A	\.8.4.2.1.1 - 4	

Table A.8.4.2.1.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell 1
			T1 T2
RF channel number		1, 2, 3, 4, 5, 6	1
Duplex mode		1, 2, 3	FDD
		4, 5, 6	TDD
TDD special subframe		4, 5, 6	6
configuration ^{Note1}			
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RB,c} = 25
			10 MHz: $N_{RB,c} = 50$
			20 MHz: N _{RB,c} = 100
PDSCH parameters:		1, 2, 3	5 MHz: R.7 FDD
DL Reference Measurement			10 MHz: R.3 FDD
Channel ^{Note2}			20 MHz: R.6 FDD
		4, 5, 6	5 MHz: R.4 TDD
			10 MHz: R.0 TDD
			20 MHz: R.3 TDD
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.11 FDD
parameters:			10 MHz: R.6 FDD
DL Reference Measurement			20 MHz: R.10 FDD
Channel ^{Note2}		4, 5, 6	5 MHz: R.11 TDD
			10 MHz: R.6 TDD
			20 MHz: R.10 TDD
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP.20 FDD
			10 MHz: OP.10 FDD
			20 MHz: OP.17 FDD
		4, 5, 6	5 MHz: OP.9 TDD
			10 MHz: OP.1 TDD
10.7		100150	20 MHz: OP.7 TDD
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	-79
PBCH_RA		1, 2, 3, 4, 5, 6	
PBCH_RB			
PSS_RA			
SSS_RA			
PCFICH_RB			
PHICH_RA	ᆜ		
PHICH_RB	dB		0
PDCCH_RA			
PDCCH_RB			
PDSCH_RA			
PDSCH_RB			
OCNG_RANote3			
OCNG_RBNote3			
N _{oc} Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-104

Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	17	17
Ês/lot ^{Note5}	dB	1, 2, 3, 4, 5, 6	17	17
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87
SCH_RPNote5	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87
Io ^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-59.13+10log (N _{RB,c} /50)	-59.13+10log (N _{RB,c} /50)
Propagation Condition Note6		1, 2, 3, 4, 5, 6	ETU7	70
Antenna Configuration and Correlation Matrix Note6		1, 2, 3, 4, 5, 6	1x2 Lo	DW WC

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 5: \hat{E}_s /I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes.
 - They are not settable parameters themselves.
- Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.1.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	C	ell 2
		configuration	T1	T2
NR RF Channel Number		1, 2, 3, 4, 5, 6		1
Duplex mode		1, 4	F	DD
•		2, 3, 5, 6	Т	DD
TDD configuration		2, 5	TDDO	Conf.1.1
		3, 6	TDDO	Conf.2.1
BW _{channel}	MHz	1, 2, 4, 5	10: N	RB,c = 52
		3, 6		в,с = 106
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	С	P.1
SMTC configuration defined in A.3.11.1		1, 4	SM	ITC.2
and A.3.11.2		2, 3, 5, 6	SM	ITC.1
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5		15
		3, 6		30
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5	-	101
		3, 6		.98
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				0
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note				
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				
N_{oc}	dBm/15kHz	1, 2, 3, 4, 5, 6	-	98
Note2	dBm/SCS	1, 2, 4, 5		98
		3, 6		95
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91
A /		3, 6	-Infinity	-88
\hat{E}_s/I_{ot}	dB	1, 2, 3, 4, 5, 6	-Infinity	7
\hat{E}_s/N_{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	7
Io ^{Note3}	dBm/9.36MHz	1, 2, 4, 5	-70.05	-62.26

		dBm/38.16MH	3, 6	-63.95	-56.16
		Z			
Propagat	tion Condition		1, 2, 3, 4, 5, 6	TDL-C 30	00ns 100Hz
Antenna	Configuration and Correlation		1, 2, 3, 4, 5, 6	1x2	2 Low
Matrix	_				
Note 1:	OCNG shall be used such that the density is achieved for all OFDM s		ted and a constan	t total transmitted	power spectral
Note 2:	Interference from other cells and r subcarriers and time and shall be	oise sources not			
Note 3:	SS-RSRP and lo levels have beer settable parameters themselves.	n derived from oth	er parameters for	information purpo	ses. They are not
Note 4:	SS-RSRP minimum requirements receiver antenna port.	are specified assu	uming independen	t interference and	noise at each

A.8.4.2.1.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 800 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.2 NR Inter-RAT event triggered reporting tests for FR1 without SSB time index detection when DRX is used

A.8.4.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.2.1-1, A.8.4.2.2.1-2, A.8.4.2.2.1-3 and A.8.4.2.2.1-4.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.2.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.2.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.2.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode

2		LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3		LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5		LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6		LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note 1:	The UE is only re	equired to be tested in one of the supported test configurations.

Table A.8.4.2.2.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Value				Comment
		configuratio n	Test 1			Test 4	
E-UTRA RF		1, 2, 3, 4, 5,	1				One E-UTRA carrier frequency is used.
Channel Number		6					
NR RF Channel Number		1, 2, 3, 4, 5, 6			1		One FR1 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5, 6	E-UTR	A cell 1 (PC	Cell)		E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5,	NR cell	2			NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39		19		As specified in TS 36.331 [16].
b2-Threshold1	dB m	1, 2, 3, 4, 5, 6	Note 1	Note 1			E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dB m	1, 2, 3, 4, 5, 6	Note 2				SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0				
CP length		1, 2, 3, 4, 5, 6	Normal				
TimeToTrigger	s	1, 2, 3, 4, 5, 6	0				
Filter coefficient		1, 2, 3, 4, 5, 6	0				L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	DRX. 9	DRX.12	DRX. 9	DRX.12	As specified in clause A.3.3
Time offset between serving and neighbour		1, 4	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
cells		2, 3, 5, 6	3µs				Synchronous cells.
T1	S	1, 2, 3, 4, 5, 6	5				
T2	s	1, 2, 3, 4, 5, 6	2	11	2	11	

Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.2.1-4

Table A.8.4.2.2.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell	1
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	1	

Duplex mode		1, 2, 3	FDD)	
Duplex mode		4, 5, 6	TDE		
TDD special subframe		4, 5, 6	6	<u> </u>	
configuration ^{Note1}		1, 0, 0			
TDD uplink-downlink		4, 5, 6	1		
configuration ^{Note1}		1, 0, 0	-		
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _R	B,c = 25	
			10 MHz: N _F		
			20 MHz: N _R	B,c = 100	
PDSCH parameters:		1, 2, 3	5 MHz: R.	7 FDD	
DL Reference Measurement			10 MHz: R	.3 FDD	
Channel ^{Note2}			20 MHz: R	.6 FDD	
		4, 5, 6	5 MHz: R.		
			10 MHz: R		
			20 MHz: R		
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.		
parameters:			10 MHz: R		
DL Reference Measurement			20 MHz: R.		
Channel ^{Note2}		4, 5, 6	5 MHz: R.		
			10 MHz: R		
OON O D Note?		4.0.0	20 MHz: R.		
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP		
			10 MHz: OP		
		4 5 6	20 MHz: OP 5 MHz: OP		
		4, 5, 6	10 MHz: OF	-	
b2-Threshold1	dBm	123456	20 MHz: OP.7 TDD -77		
PBCH_RA	<u> </u>	1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6			
PBCH_RB		, _, _, , , , ,			
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB	dB		0		
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG RA ^{Note3}					
OCNG_RBNote3					
N _{oc} Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-104	ļ	
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	17	17	
Ês/Iot ^{Note5}	dB	1, 2, 3, 4, 5, 6	17	17	
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87	
SCH_RPNote5	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87	
Io ^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-59.13+10log (N _{RB,c} /50)	-59.13+10log (N _{RB,c} /50)	
Propagation Condition Note6		1, 2, 3, 4, 5, 6	ETU7	,	
Antenna Configuration and		1, 2, 3, 4, 5, 6			
Correlation Matrix Note6		., 2, 3, 4, 3, 0	1,72 E		

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.

Note 5: \hat{E}_s/I_{ot} , RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.2.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Ce	ell 2
		configuration	T1	T2
NR RF Channel Number		1, 2, 3, 4, 5, 6		1
Duplex mode		1, 4	F	DD
•		2, 3, 5, 6	Т	DD
TDD configuration		2, 5	TDDC	onf.1.1
•		3, 6	TDDC	onf.2.1
BW _{channel}	MHz	1, 2, 4, 5	10: N _F	_{B,c} = 52
		3, 6	40: N _R i	в,c = 106
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	0	P.1
SMTC configuration defined in A.3.11.1		1, 4	SM	TC.2
and A.3.11.2		2, 3, 5, 6	SM	TC.1
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5	•	15
, ,		3, 6	(30
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5	-1	01
		3, 6	-	98
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				0
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note				
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				
Note2 N oc	dBm/15kHz	1, 2, 3, 4, 5, 6	-	98
Note2	dBm/SCS	1, 2, 4, 5	-	98
N oc		3, 6		95
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91
		3, 6	-Infinity	-88
\hat{E}_s/I_{ot}	dB	1, 2, 3, 4, 5, 6	-Infinity	7
\hat{E}_s/N_{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	7
Io ^{Note3}	dBm/9.36MHz	1, 2, 4, 5	-70.05	-62.26
	dBm/38.16MH	3, 6	-63.95	-56.16
	Z	2, 2		
Propagation Condition		1, 2, 3, 4, 5, 6	TDL-C 30	0ns 100Hz
Antenna Configuration and Correlation		1, 2, 3, 4, 5, 6		Low
Matrix		, , , , -, -		
Note 1: OCNG shall be used such that the	e cell is fully alloca	ted and a constant	total transmitted	power spectral
density is achieved for all OFDM s				•
Note 2: Interference from other cells and r		enecified in the test	is assumed to be	constant over

Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{N_{out}}$ to be fulfilled.

A.8.4.2.2.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered

Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1080 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 10240 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is not required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.3 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is not used

A.8.4.2.3.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.3.1-1, A.8.4.2.3.1-2, A.8.4.2.3.1-3 and A.8.4.2.3.1-4.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.3.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.3.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.3.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description					
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note 1: The UE is only required to be tested in one of the supported test configurations.						

Table A.8.4.2.3.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	t Test Value		'alue	Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Number		1, 2, 3, 4, 5, 6		1	One E-UTRA carrier frequency is used.
NR RF Channel Number		1, 2, 3, 4, 5,		1	One FR1 NR carrier frequency is used.
Active cell		1, 2, 3, 4, 5,	E-UTRA ce	ell 1 (PCell)	E-UTRA cell 1 is on E-UTRA RF channel number 1.
Neighbour cell		1, 2, 3, 4, 5,	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39	19	As specified in TS 36.331 [16].
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	Note 1		E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dBm	1, 2, 3, 4, 5, 6	Note 2		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0		
CP length		1, 2, 3, 4, 5, 6	Normal		
TimeToTrigger	S	1, 2, 3, 4, 5, 6	0		
Filter coefficient		1, 2, 3, 4, 5, 6	0		L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	OFF		DRX is not used
Time offset between serving and neighbour cells		1, 4	3ms		Asynchronous cells. The timing of Cell 2 is 3 ms later than the timing of Cell 1.
		2, 3, 5, 6	3µs		Synchronous cells.
T1	S	1, 2, 3, 4, 5, 6	5		
T2	S	1, 2, 3, 4, 5, 6	2	1	

Note 1: The value of b2-Threshold1 is defined in Table A.8.4.2.3.1-3

Note 2: The value of b2-Threshold2NR is defined in Table A.8.4.2.3.1-4

Table A.8.4.2.3.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell	1
			T1	T2
RF channel number		1, 2, 3, 4, 5, 6	1	
Duplex mode		1, 2, 3	FDD	
		4, 5, 6	TDD	
TDD special subframe configuration ^{Note1}		4, 5, 6	6	
TDD uplink-downlink configuration ^{Note1}		4, 5, 6	1	
BWchannel	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RE} 10 MHz: N _R	

			20 MHz: N _R	B c = 100	
PDSCH parameters:		1, 2, 3	5 MHz: R.		
DL Reference Measurement		., _, •	10 MHz: R		
Channel ^{Note2}			20 MHz: R	.6 FDD	
		4, 5, 6	5 MHz: R.		
		, -, -	10 MHz: R.0 TDD		
			20 MHz: R	.3 TDD	
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.	11 FDD	
parameters:		, ,	10 MHz: R	.6 FDD	
DL Reference Measurement			20 MHz: R.	10 FDD	
Channel ^{Note2}		4, 5, 6	5 MHz: R.	11 TDD	
			10 MHz: R	.6 TDD	
			20 MHz: R.	10 TDD	
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP	.20 FDD	
			10 MHz: OP	.10 FDD	
			20 MHz: OP		
		4, 5, 6	5 MHz: OP		
			10 MHz: OF		
			20 MHz: OP.7 TDD		
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	-77		
PBCH_RA		1, 2, 3, 4, 5, 6			
PBCH_RB					
PSS_RA					
SSS_RA					
PCFICH_RB					
PHICH_RA					
PHICH_RB	dB		0		
PDCCH_RA					
PDCCH_RB					
PDSCH_RA					
PDSCH_RB					
OCNG_RA ^{Note3}					
OCNG_RB ^{Note3}					
N _{oc} ^{Note4}	dBm/15kHz	1, 2, 3, 4, 5, 6	-104		
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	17	17	
Ê _s /I _{ot} ^{Note5}	dB	1, 2, 3, 4, 5, 6	17	17	
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87	
SCH_RP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87	
Io ^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-59.13+10log (N _{RB,c} /50)	-59.13+10log (N _{RB,c} /50)	
Propagation Condition Note6		1, 2, 3, 4, 5, 6	ETU70		
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 Lo		
Correlation Matrix Note6					

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.

Note 5: Ê_s/I_{ot}, RSRP, SCH_RP and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.3.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Co	ell 2
		configuration	T1	T2
NR RF Channel Number		1, 2, 3, 4, 5, 6	1	

Duplex mode		1, 4	F	DD
		2, 3, 5, 6	Т	DD
TDD configuration		2, 5		Conf.1.1
		3, 6	TDDC	Conf.2.1
BW _{channel}	MHz	1, 2, 4, 5	10: N	RB,c = 52
		3, 6	40: N _R	_{B,c} = 106
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	0	P.1
SMTC configuration defined in A.3.11.1		1, 4	SM	TC.2
and A.3.11.2		2, 3, 5, 6	SM	TC.1
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5		15
3		3, 6		30
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5		101
		3, 6		98
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6		
EPRE ratio of PBCH DMRS to SSS		, , _, , , , , ,		
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS			0	
EPRE ratio of PDSCH to PDSCH				-
EPRE ratio of OCNG DMRS to SSS (Note				
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				
Note2 N _{oc}	dBm/15kHz	1, 2, 3, 4, 5, 6	-	98
N _{oc} Note2	dBm/SCS	1, 2, 4, 5	-	98
IV oc		3, 6		95
SS-RSRP Note 3	dBm/SCS	1, 2, 4, 5	-Infinity	-91
		3, 6	-Infinity	-88
$\hat{E}_{s}/\mathrm{I}_{ot}$	dB	1, 2, 3, 4, 5, 6	-Infinity	7
\hat{E}_s/N_{oc}	dB	1, 2, 3, 4, 5, 6	-Infinity	7
Io ^{Note3}	dBm/9.36MHz	1, 2, 4, 5	-70.05	-62.26
	dBm/38.16MH	3, 6	-63.95	-56.16
	Z			
Propagation Condition		1, 2, 3, 4, 5, 6	TDL-C 30	00ns 100Hz
Antenna Configuration and Correlation		1, 2, 3, 4, 5, 6		2 Low
Matrix				
Note 1: OCNG shall be used such that the		ted and a constant	total transmitted	power spectral
density is achieved for all OFDM				•

- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $N_{N_{out}}$ to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.

A.8.4.2.3.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1040 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 920 ms from the beginning of time period T2. The UE shall not send event triggered

measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.4 NR Inter-RAT event triggered reporting tests for FR1 with SSB time index detection when DRX is used

A.8.4.2.4.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR1 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.4.1-1, A.8.4.2.4.1-2, A.8.4.2.4.1-3 and A.8.4.2.4.1-4.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.4.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.4.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.4.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR1

Configuration	Description					
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode					
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode					
6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode					
Note 1: The UE is	Note 1: The UE is only required to be tested in one of the supported test configurations.					

Table A.8.4.2.4.1-2: General test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	Value				Comment
		configuratio	Test	Test 2	Test	Test 4	
		n	1		3		
E-UTRA RF		1, 2, 3, 4, 5,	1				One E-UTRA carrier frequency is used.
Channel Number		6	· ·				
NR RF Channel		1, 2, 3, 4, 5,	1				One FR1 NR carrier frequency is used.
Number		6					
Active cell		1, 2, 3, 4, 5,	E-UTR/	E-UTRA cell 1 (PCell)			E-UTRA cell 1 is on E-UTRA RF
		6	,				channel number 1.
Neighbour cell		1, 2, 3, 4, 5,	NR cell 2				NR cell 2 is on NR RF channel number
_		6					1

Gap Pattern Id		1, 2, 3, 4, 5, 6					As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39 19				As specified in TS 36.331 [16].
b2-Threshold1	dB m	1, 2, 3, 4, 5, 6	Note 1				E-UTRA RSRP threshold for E-UTRA RSRP measurement on cell 1 for event B2 [16]
b2-Threshold2NR	dB m	1, 2, 3, 4, 5, 6	Note 2				SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B2 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0				
CP length		1, 2, 3, 4, 5, 6	Normal				
TimeToTrigger	S	1, 2, 3, 4, 5, 6	0				
Filter coefficient		1, 2, 3, 4, 5, 6	0				L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	DRX. 9	DRX.12	DRX. 9	DRX.12	As specified in clause A.3.3
Time offset between serving and neighbour		1, 4	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
cells		2, 3, 5, 6	3µs				Synchronous cells.
T1	S	1, 2, 3, 4, 5, 6	5				
T2	S	1, 2, 3, 4, 5, 6	2	13	2	13	
		Threshold1 is d Threshold2NR i				1-4	

Table A.8.4.2.4.1-3: E-UTRAN PCell specific test parameters for NR inter-RAT event triggered reporting in non-DRX with NR neigbour cell in FR1 without SSB time index detection

Parameter	Unit	Configuration	Cell 1		
			T1	T2	
RF channel number		1, 2, 3, 4, 5, 6	1		
Duplex mode		1, 2, 3	FDD		
		4, 5, 6	TDD		
TDD special subframe configuration Note1		4, 5, 6	6		
TDD uplink-downlink configuration Note1		4, 5, 6	1		
BW _{channel}	MHz	1, 2, 3, 4, 5, 6	5 MHz: N _{RB,c} =	25	
			10 MHz: N _{RB,c} =	= 50	
			20 MHz: N _{RB,c} =	100	
PDSCH parameters:		1, 2, 3	5 MHz: R.7 FI	DD	
DL Reference Measurement			10 MHz: R.3 F	DD	
Channel ^{Note2}			20 MHz: R.6 F	DD	
		4, 5, 6	5 MHz: R.4 TI	DD	
			10 MHz: R.0 T	DD	
			20 MHz: R.3 T	DD	
PCFICH/PDCCH/PHICH		1, 2, 3	5 MHz: R.11 F	DD	
parameters:			10 MHz: R.6 F	DD	
DL Reference Measurement			20 MHz: R.10 F	DD	
Channel ^{Note2}		4, 5, 6	5 MHz: R.11 T	DD	
			10 MHz: R.6 T	DD	
			20 MHz: R.10 T	DD	
OCNG Patterns ^{Note2}		1, 2, 3	5 MHz: OP.20 F	-DD	
			10 MHz: OP.10	FDD	

			20 MHz: OP	.17 FDD			
		4, 5, 6	5 MHz: OP	.9 TDD			
			10 MHz: OF	10 MHz: OP.1 TDD			
			20 MHz: OP.7 TDD				
b2-Threshold1	dBm	1, 2, 3, 4, 5, 6	-77				
PBCH_RA		1, 2, 3, 4, 5, 6					
PBCH_RB							
PSS_RA							
SSS_RA							
PCFICH_RB							
PHICH_RA							
PHICH_RB	dB		0				
PDCCH_RA							
PDCCH_RB							
PDSCH_RA							
PDSCH_RB							
OCNG_RA ^{Note3}							
OCNG_RB ^{Note3}							
N _{oc} Note4	dBm/15kHz	1, 2, 3, 4, 5, 6	-104	1			
Ê _s /N _{oc}	dB	1, 2, 3, 4, 5, 6	17	17			
Ê _s /I _{ot} Note5	dB	1, 2, 3, 4, 5, 6	17	17			
RSRP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87			
SCH_RP ^{Note5}	dBm/15kHz	1, 2, 3, 4, 5, 6	-87	-87			
Io ^{Note5}	dBm/9MHz	1, 2, 3, 4, 5, 6	-59.13+10log (N _{RB,c} /50)	-59.13+10log (N _{RB,c} /50)			
Propagation Condition Note6		1, 2, 3, 4, 5, 6	ETU70				
Antenna Configuration and		1, 2, 3, 4, 5, 6	1x2 Low				
Correlation Matrix Note6							

- Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].
- Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.
- Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for Noc to be fulfilled.
- Note 5: Ê_s/I_{ot}, RSRP, SCH_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 6: Propagation condition and correlation matrix are defined in clause B.2 in TS 36.101 [25].

Table A.8.4.2.4.1-4: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR1 without SSB time index detection

Parameter	Unit	Test	C	ell 2	
		configuration	T1	T2	
NR RF Channel Number		1, 2, 3, 4, 5, 6		1	
Duplex mode		1, 4	F	DD	
		2, 3, 5, 6	Т	DD	
TDD configuration		2, 5	TDDC	Conf.1.1	
		3, 6	TDDC	Conf.2.1	
BW _{channel}	MHz	1, 2, 4, 5	10: N	RB,c = 52	
		3, 6	40: N _R	в,с = 106	
OCNG Patterns defined in A.3.2.1.1 (OP.1)		1, 2, 3, 4, 5, 6	0	P.1	
SMTC configuration defined in A.3.11.1		1, 4	SM	TC.2	
and A.3.11.2		2, 3, 5, 6	SM	TC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2, 4, 5		15	
		3, 6		30	
b2-Threshold2NR	dBm/SCS	1, 2, 4, 5		101	
		3, 6	-	98	
EPRE ratio of PSS to SSS		1, 2, 3, 4, 5, 6		0	
EPRE ratio of PBCH DMRS to SSS			0		

dBm/15kHz	1, 2, 3, 4, 5, 6	-	98				
dBm/SCS	1, 2, 4, 5	-	98				
	3, 6	-	95				
dBm/SCS	1, 2, 4, 5	-Infinity	-91				
	3, 6	-Infinity	-88				
dB	1, 2, 3, 4, 5, 6	-Infinity	7				
dB	1, 2, 3, 4, 5, 6	-Infinity	7				
dBm/9.36MHz	1, 2, 4, 5	-70.05	-62.26				
dBm/38.16MH	3, 6	-63.95	-56.16				
Z							
	1, 2, 3, 4, 5, 6	TDL-C 30	0ns 100Hz				
	1, 2, 3, 4, 5, 6	1x2	Low				
Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral							
density is achieved for all OFDM symbols.							
ote 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over							
subcarriers and time and shall be modelled as AWGN of appropriate power for $_{N_{_{oc}}}$ to be fulfilled.							
e 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not							
	•		-				
	dBm/SCS dB dB dB dB dB/9.36MHz dBm/38.16MH z cell is fully alloca ymbols. oise sources not smodelled as AWG	dBm/SCS 1, 2, 4, 5 3, 6 dBm/SCS 1, 2, 4, 5 3, 6 dB 1, 2, 3, 4, 5, 6 dB 1, 2, 3, 4, 5, 6 dBm/9.36MHz 1, 2, 4, 5 dBm/38.16MH 3, 6 z 1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6 cell is fully allocated and a constant ymbols. oise sources not specified in the tesmodelled as AWGN of appropriate p	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				

A.8.4.2.4.2 Test Requirements

receiver antenna port.

Note 4:

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

SS-RSRP minimum requirements are specified assuming independent interference and noise at each

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 12160 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 1280 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than 12160 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.5 NR Inter-RAT event triggered reporting tests for FR2 without SSB time index detection when DRX is not used

A.8.4.2.5.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.5.1-1, A.8.4.2.5.1-2 and A.8.4.2.5.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.5.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.5.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have timing information of NR cell 2.

Table A.8.4.2.5.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR2 in non-DRX

Configuration	Configuration Description					
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
2 LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode						
Note 1: The UE is only re	lote 1: The UE is only required to be tested in one of the supported test configurations.					

Table A.8.4.2.5.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Number		1, 2		1	One E-UTRA carrier frequency is used.
NR RF Channel Number		1, 2		1	One FR2 NR carrier frequency is used.
Active cell		1, 2	E-UTRA ce	ell 1 (PCell)	E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2.
Neighbour cell		1, 2	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2	0	4	As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2	39	19	As specified in TS 36.331 [16].
b1-ThresholdNR	dBm	1, 2	Note 1		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]
Hysteresis	dB	1, 2	0		
CP length		1, 2	Normal		
TimeToTrigger	S	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	OFF		DRX is not used
Time offset between serving and neighbour cells		1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.

			2	3µs		Synchronous cells.
T1		S	1, 2	10		
T2		S	1, 2	6	3	
Note 1: The value of b1-ThresholdNR is defined in Table A.8.4.2.5.1-3						

Table A.8.4.2.5.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

Parameter	Unit	Test	Cell 2		
		configuration	T1	T2	
AoA setup defined in A.3.15.2.1		1, 2	Set	up 2a	
Assumption for UE beams ^{Note 5}		1, 2	Ro	ough	
NR RF Channel Number		1, 2		1	
Duplex mode		1, 2	T	DD	
TDD configuration		1, 2	TDD0	Conf.3.1	
BW _{channel}	MHz	1, 2	100: N	$I_{RB,c} = 24$	
OCNG patterns defined in A.3.2.1.3		1, 2	C	P.3	
SMTC configuration defined in A.3.11.1		1	SM	ITC.2	
and A.3.11.2		2	SM	ITC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	1	120	
b1-ThresholdNR UE power class 3	dBm/SCS	1, 2	-112		
EPRE ratio of PSS to SSS		1, 2			
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS				0	
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS (Note					
1)					
EPRE ratio of OCNG to OCNG DMRS					
(Note 1)				T	
Ês	dBm/SCS	1, 2	-Infinity	-80.6	
SSB-RP Note 3	dBm/SCS	1, 2	-Infinity	-80.6	
$\hat{E}_s/I_{_{\mathrm{ot}}}$ BB Note 6	dB	1, 2	-Infinity	8.3	
Io ^{Note3}	dBm/95.04MH z	1, 2	-Infinity	-56.0	
Propagation Condition		1, 2	AV	VGN	

Note 1: OCNG shall be used such that a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Voic

Note 3: SSB-RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 4: Void

Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

Note 6: Calculation of Es/lot_{BB} includes the effect of UE internal noise up to the value assumed for the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an allowance of 1dB for UE multi-band relaxation factor ΔMB_P from TS 38.101-2 [19] Table 6.2.1.3-4.

A.8.4.2.5.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is not required to report SSB time index.

Table A.8.4.2.5.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in non-DRX

Test case	Measurement reporting delay (ms)				
	Test 1: D1 ms	Test 2: D2 ms			
UE power class 3	3200	1600			

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.6 NR Inter-RAT event triggered reporting tests for FR2 without SSB time index detection when DRX is used

A.8.4.2.6.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.6.1-1, A.8.4.2.6.1-2 and A.8.4.2.6.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.6.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.6.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have timing information of NR cell 2.

Table A.8.4.2.6.1-1: NR inter-RAT event triggered reporting tests without SSB index reading for FR2 in DRX

Configuration Description						
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2	2 LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode					
Note 1: The UE	The UE is only required to be tested in one of the supported test configurations.					

Table A.8.4.2.6.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

Parameter	Unit	Test	Value				Comment
		configuratio	Test	Test 2	Test	Test 4	
		n	1		3		
E-UTRA RF		1, 2	1				One E-UTRA carrier frequency is used.
Channel Number							
NR RF Channel		1, 2	1				One FR2 NR carrier frequency is used.
Number							. ,

Active cell		1, 2, 3, 4, 5, 6	E-UTRA cell 1 (PCell)				E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2.
Neighbour cell		1, 2, 3, 4, 5, 6	NR cell	2			NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2, 3, 4, 5, 6	0		4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2, 3, 4, 5, 6	39		19		As specified in TS 36.331 [16].
b1-ThresholdNR	dB m	1, 2	Note 1				SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]
Hysteresis	dB	1, 2, 3, 4, 5, 6	0				
CP length		1, 2, 3, 4, 5, 6	Normal				
TimeToTrigger	S	1, 2, 3, 4, 5, 6	0				
Filter coefficient		1, 2, 3, 4, 5, 6	0				L3 filtering is not used
DRX		1, 2, 3, 4, 5, 6	DRX. 9	DRX.12	DRX. 9	DRX.12	As specified in clause A.3.3
Time offset between serving and neighbour		1	3ms				Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.
cells		2	3µs				Synchronous cells.
T1	S	1, 2, 3, 4, 5, 6	5				
T2	S	1, 2, 3, 4, 5, 6	6	83	6	83	
Note 1: The value	e of b1	-ThresholdNR is	defined i	n Table A.	8.4.2.6.1	-3	

Table A.8.4.2.6.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

Parameter	Unit	Test	С	ell 2
		configuration	T1	T2
AoA setup defined in A.3.15.1		1, 2	Se	tup 1
Assumption for UE beams ^{Note 5}		1, 2	R	ough
NR RF Channel Number		1, 2		1
Duplex mode		1, 2	Т	DD
TDD configuration		1, 2	TDD0	Conf.3.1
BW _{channel}	MHz	1, 2	100: N	$I_{RB,c} = 66$
OCNG patterns defined in A.3.2.1.1 (OP.1)		1, 2	C)P.1
SMTC configuration defined in A.3.11.1		1	SMTC.2	
and A.3.11.2		2	SMTC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	120	
b1-ThresholdNR UE power class 3	dBm/SCS	1, 2	-	106
EPRE ratio of PSS to SSS		1, 2		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				0
EPRE ratio of PDSCH DMRS to SSS				
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note	·			
1)				

EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				
Note2	dBm/15kHz	1, 2	-10	04.7
Note2	dBm/SCS	1, 2	-9	5.7
SS-RSRP Note 3	dBm/SCS	1, 2	-Infinity	-87.7
$\hat{\mathbf{E}}_{\mathrm{s}}/\mathbf{I}_{\mathrm{ot}}$	dB	1, 2	-Infinity	8
\hat{E}_s/N_{oc}	dB	1, 2	-Infinity	8
lo ^{Note3}	dBm/95.04MH	1, 2	-66.7	-58.0
	Z			
Propagation Condition		1, 2	AWGN	

- Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_{N_{\infty}}$ to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.8.4.2.6.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D3 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B1 triggered measurement report, with a measurement reporting delay less than D4 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is not required to report SSB time index.

Table A.8.4.2.6.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 without SSB time index detection in DRX

Test case	Measurement reporting delay (ms)						
	Test 1: D1 ms Test 2: D2 ms Test 3: D3 ms Test 4: D4 ms						
UE power class 3	4800	51200	4800	51200			

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.4.2.7 NR Inter-RAT event triggered reporting tests for FR2 with SSB time index detection when DRX is not used

A.8.4.2.7.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.7.1-1, A.8.4.2.7.1-2 and A.8.4.2.7.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In test 1 measurement gap pattern configuration # 0 as defined in Table A.8.4.2.7.1-2 is provided for UE that does not support per-FR gap and in test 2 measurement gap pattern configuration #4 as defined in Table A.8.4.2.7.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.7.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR2 in non-DRX

Cor	nfiguration	Description			
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note 1:	The UE is only required to be tested in one of the supported test configurations.				

Table A.8.4.2.7.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

Parameter	Unit	Test	Value		Comment
		configurati on	Test 1	Test 2	
E-UTRA RF Channel Numbers		1, 2	1		One E-UTRA carrier frequency is used.
NR RF Channel Numbers		1, 2		1	One FR2 NR carrier frequency is used.
Active cell		1, 2	E-UTRA cell 1 (PCell)		E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2.
Neighbour cell		1, 2	NR cell 2		NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2	0 4		As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].
Measurement gap offset		1, 2	39	19	As specified in TS 36.331 [16].
b1-ThresholdNR	dBm	1, 2	Note 1		SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]
Hysteresis	dB	1, 2	0		
CP length		1, 2	Normal		
TimeToTrigger	S	1, 2	0		
Filter coefficient		1, 2	0		L3 filtering is not used
DRX		1, 2	OFF		DRX is not used

Time offset between serving and neighbour cells		1	3ms		Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.		
		2	3µs		Synchronous cells.		
T1	S	1, 2	5				
T2	S	1, 2	5	3			
Note 1: The value of b1-ThresholdNR is defined in Table A.8.4.2.7.1-3							

Table A.8.4.2.7.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

Parameter	Unit	Test	C	ell 2	
		configuration	T1	T2	
AoA setup defined in A.3.15.1		1, 2	Se	tup 1	
Assumption for UE beams ^{Note 5}		1, 2	Ro	ough	
NR RF Channel Number		1, 2		1	
Duplex mode		1, 2	T	DD	
TDD configuration		1, 2	TDD0	Conf.3.1	
BW _{channel}	MHz	1, 2	100: N	$I_{RB,c} = 66$	
OCNG patterns defined in A.3.2.1.1		1, 2	C	P.1	
SMTC configuration defined in A.3.11.1		1	SM	ITC.2	
and A.3.11.2		2	SM	ITC.1	
PDSCH/PDCCH subcarrier spacing	kHz	1, 2	120		
b1-ThresholdNR UE power class 3	dBm/SCS	1, 2	-106		
EPRE ratio of PSS to SSS		1, 2			
EPRE ratio of PBCH DMRS to SSS					
EPRE ratio of PBCH to PBCH DMRS					
EPRE ratio of PDCCH DMRS to SSS					
EPRE ratio of PDCCH to PDCCH DMRS					
EPRE ratio of PDSCH DMRS to SSS				0	
EPRE ratio of PDSCH to PDSCH					
EPRE ratio of OCNG DMRS to SSS (Note					
1)					
EPRE ratio of OCNG to OCNG DMRS					
(Note 1)					
Note2 N oc	dBm/15kHz	1, 2	-104.7		
Note2	dBm/SCS	1, 2	-95.7		
SS-RSRP Note 3	dBm/SCS	1, 2	-Infinity -87.7		
\hat{E}_{s}/I_{ot}	dB	1, 2	-Infinity	8	
\hat{E}_s/N_{oc}	dB	1, 2	-Infinity	8	
Io ^{Note3}	dBm/95.04MH	1, 2	-66.7	-58.0	
	Z				
Propagation Condition		1, 2	AV	VGN	

- Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.8.4.2.7.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 1 and test 2, the UE is required to report SSB time index.

NOTE: The actual overall delays measured in the test may be up to $2xTTI_{DCCH}$ higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

Table A.8.4.2.7.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in non-DRX

Test case	Measurement reporting delay (ms)				
	Test 1: D1 ms Test 2: D2 ms				
UE power class 3	4160	2080			

A.8.4.2.8 NR Inter-RAT event triggered reporting tests for FR2 with SSB time index detection when DRX is used

A.8.4.2.8.1 Test Purpose and Environment

The purpose of this test is to verify that the UE makes correct reporting of an event. This test will partly verify the NR inter-RAT cell search requirements in clause 8.1.2.4.21 of TS 36.133 [15] for E-UTRAN FDD-NR measurements and clause 8.1.2.4.22 of TS 36.133 [15] for E-UTRAN TDD-NR measurements.

In this test, there are two cells: E-UTRA cell 1 as PCell on E-UTRA RF channel 1 and NR cell 2 as neighbour cell in FR2 on NR RF channel 1. The test parameters are given in Tables A.8.4.2.8.1-1, A.8.4.2.8.1-2 and A.8.4.2.8.1-3.

The cell specific test parameters for E-UTRA cell1 as PCell are defined in clause A.3.7.2.2.

In tests 1 and 2, measurement gap pattern configuration # 0 as defined in Table A.8.4.2.8.1-2 is provided for UE that does not support per-FR gap and in tests 3 and 4, measurement gap pattern configuration #4 as defined in Table A.8.4.2.8.1-2 is provided for UE that supports per-FR gap.

In the measurement control information, it is indicated to the UE that event-triggered reporting with Event B1 (Inter RAT neighbour becomes better than threshold) [16] is used. In the measurement configuration the UE shall be indicated to report the SSB index of the identified NR cell. The test consists of two successive time periods, with time duration of T1, and T2 respectively. During time duration T1, the UE shall not have any timing information of NR cell 2.

Table A.8.4.2.8.1-1: NR inter-RAT event triggered reporting tests with SSB index reading for FR2 in DRX

Cor	nfiguration	Description			
1		LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
2		LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode			
Note 1:	The UE is only required to be tested in one of the supported test configurations.				

Table A.8.4.2.8.1-2: General test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in DRX

Parameter	Parameter Unit Test Value		Va		Comment		
		configuratio n	Test 1	Test 2	Test 3	Test 4	
E-UTRA RF Channel Number		1, 2		1			One E-UTRA carrier frequency is used.
NR RF Channel Number		1, 2			1		One FR2 NR carrier frequency is used.
Active cell		1, 2	E-UTR	A cell 1 (PC	Cell)		E-UTRA cell 1 is on E-UTRA RF channel number 1 as defined in clause A.3.7.2.2.
Neighbour cell		1, 2	NR cell	2			NR cell 2 is on NR RF channel number 1.
Gap Pattern Id		1, 2				As specified in clause Table 8.1.2.1-1 of TS 36.133 [15].	
Measurement gap offset		1, 2	39 19			As specified in TS 36.331 [16].	
b1-ThresholdNR	dBm	1, 2	Note 1				SS-RSRP threshold for SS-RSRP measurement on cell 2 for event B1 [16]
Hysteresis	dB	1, 2	0				
CP length		1, 2	Normal				
TimeToTrigger	S	1, 2	0				
Filter coefficient		1, 2	0				L3 filtering is not used
DRX			DRX. 9	DRX.12	DRX. 9	DRX.12	As specified in clause A.3.3
Time offset between serving and neighbour		1	3ms			Asynchronous cells. The timing of Cell 2 is 3ms later than the timing of Cell 1.	
cells		2	3µs			Synchronous cells.	
T1	S	1, 2	5				
T2	S	1, 2	7	70	7	70	
Note 1: The value of b1-ThresholdNR is defined in Table A.8.4.2.8.1-3							

Table A.8.4.2.8.1-3: NR neighbour cell specific test parameters for NR inter-RAT event triggered reporting for FR2 with SSB time index detection

Parameter	Unit	Test	С	ell 2
		configuration	T1	T2
AoA setup defined in A.3.15.1		1, 2	Setup 1	
Assumption for UE beams ^{Note 5}		1, 2	Rough	
NR RF Channel Number		1, 2		1
Duplex mode		1, 2	7	DD
TDD configuration		1, 2	TDD	Conf.3.1
BW _{channel}	MHz	1, 2	100: N	$I_{RB,c} = 66$
OCNG patterns defined in A.3.2.1.1		1, 2	C	P.1
SMTC configuration defined in A.3.11.1		1	SM	ITC.2
and A.3.11.2		2	SM	ITC.1
PDSCH/PDCCH subcarrier spacing	kHz	1, 2		120
b1-ThresholdNR UE power class 3	dBm/SCS	1, 2	-	106
EPRE ratio of PSS to SSS		1, 2		
EPRE ratio of PBCH DMRS to SSS				
EPRE ratio of PBCH to PBCH DMRS				
EPRE ratio of PDCCH DMRS to SSS				
EPRE ratio of PDCCH to PDCCH DMRS				
EPRE ratio of PDSCH DMRS to SSS				0
EPRE ratio of PDSCH to PDSCH				
EPRE ratio of OCNG DMRS to SSS (Note				
1)				
EPRE ratio of OCNG to OCNG DMRS				
(Note 1)				
Note2	dBm/15kHz	1, 2	-104.7	
Note2	dBm/SCS	1, 2	-95.7	
SS-RSRP Note 3	dBm/SCS	1, 2	-Infinity	-87.7
\hat{E}_{s}/I_{ot}	dB	1, 2	-Infinity	8
\hat{E}_s/N_{oc}	dB	1, 2	-Infinity	8
Io ^{Note3}	dBm/95.04MH	1, 2	-66.7	-58.0
	Z			
Propagation Condition		1, 2	AWGN	

- Note 1: OCNG shall be used such that the cell is fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_N$ to be fulfilled.
- Note 3: SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: Information about types of UE beam is given in B.2.1.3, and does not limit UE implementation or test system implementation

A.8.4.2.8.2 Test Requirements

In test 1 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D1 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 2 with per-UE gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D2 ms from the beginning of time period T2. The UE shall not send event triggered

measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 3 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D3 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In test 4 with per-FR gap, the UE shall send one Event B2 triggered measurement report, with a measurement reporting delay less than D4 ms from the beginning of time period T2. The UE shall not send event triggered measurement reports, as long as the reporting criteria are not fulfilled. The rate of correct events observed during repeated tests shall be at least 90%.

In tests 1, 2, 3 and 4, the UE is required to report SSB time index.

Table A.8.4.2.8.2-1: Test requirements for NR inter-RAT event triggered reporting for FR2 with SSB time index detection in DRX

Test case	Measurement reporting delay (ms)							
	Test 1: D1 ms Test 2: D2 ms Test 3: D3 ms Test 4: D4 ms							
UE power class 3	6240	66560	6240	66560				

NOTE: The actual overall delays measured in the test may be up to 2xTTI_{DCCH} higher than the measurement reporting delays above because of TTI insertion uncertainty of the measurement report in DCCH.

A.8.5 Measurement performance

A.8.5.1 SFTD accuracy

A.8.5.1.1 SFTD accuracy

A.8.5.1.1.1 Test Purpose

The purpose of this set of tests is to verify that the SFTD measurement accuracy is within the specified limits. This test will verify the requirements as specified in clause 9.1.27 in TS 36.133 [15] for inter-RAT FR1 SFTD measurements.

A.8.5.1.1.2 Test Environment

Supported test configurations are shown in Table A.8.5.1.1.2-1. In this set of test cases there are two cells on different carriers. Cell 1 is E-UTRAN PCell and Cell 2 is inter-RAT NR FR1 target cell. The test parameters of cell 1 are given in clause A.8.5.1.1.2-2. The test parameters of cell 2 are given in Table A.8.5.1.1.2-3. The SFTD between PCell and target cell shall be set by the test equipment to one of the time differences in Table A.8.5.1.1.2-4.

Table A.8.5.1.1.2-1: Supported test configurations for SFTD accuracy

Configuration		Description		
1		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE FDD		
2		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE FDD		
3		NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE FDD		
4		NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode, LTE TDD		
5		NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode, LTE TDD		
6		NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode, LTE TDD		
Note:	Note: The UE is only required to be tested in one of the supported test configurations			

Table A.8.5.1.1.2-2: Test parameters for SFTD accuracy (Cell 1)

Parameter	Unit	Test 1				
E-UTRA RF Channel Number		1				
Duplex mode		FDD or TDD				
TDD special subframe configuration ^{Note1}		6				
TDD uplink-downlink configuration ^{Note1}		1				
BW _{channel}		5 MHz: N _{RB,c} = 25				
		10 MHz: N _{RB,c} = 50				
		20 MHz: N _{RB,c} = 100				
PDSCH parameters:		5 MHz: R.7 FDD				
DL Reference Measurement Channel ^{Note2}		10 MHz: R.3 FDD				
		20 MHz: R.6 FDD				
		5 MHz: R.4 TDD				
		10 MHz: R.0 TDD				
		20 MHz: R.3 TDD				
PCFICH/PDCCH/PHICH parameters:		5 MHz: R.11 FDD				
DL Reference Measurement Channel ^{Note2}		10 MHz: R.6 FDD				
		20 MHz: R.10 FDD				
		5 MHz: R.11 TDD				
		10 MHz: R.6 TDD				
OCNO Dette in a Note?		20 MHz: R.10 TDD				
OCNG Patterns ^{Note2}		5 MHz: OP.20 FDD				
		10 MHz: OP.10 FDD 20 MHz: OP.17 FDD				
		5 MHz: OP.17 FDD				
		10 MHz: OP.1 TDD				
		20 MHz: OP.7 TDD				
PBCH RA	dB	20 WH 12. OT .7 TDD				
PBCH_RB	dB					
PSS_RA	dB					
SSS_RA	dB					
PCFICH_RB	dB					
PHICH_RA	dB					
PHICH_RB	dB	0				
PDCCH_RA	dB					
PDCCH_RB	dB					
PDSCH_RA	dB					
PDSCH_RB	dB					
OCNG_RA ^{Note3}	dB					
OCNG_RB ^{Note3}	dB					
Noc ^{Note4}	dBm/15 kHz	-104				
Ês/Noc	dB	-3				
Ê _s /I _{ot}	dB	-3				
RSRP Note5	dBm/15 kHz	-107				
SCH_RP Note5	dBm/15 kHz	-107				
lo Note5	dBm/Ch BW	-74.45				
		+10log				
B 4 0 114		(N _{RB,c} /50)				
Propagation Condition		AWGN				
Antenna Configuration 1x2 Note 1: Special subframe and unlink-downlink configurations are specified in table 4.2-1 in TS 36 211 [23]						

Note 1: Special subframe and uplink-downlink configurations are specified in table 4.2-1 in TS 36.211 [23].

Note 5: Es/lot, RSRP, SCH_RP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 2: DL RMCs and OCNG patterns are specified in clauses A 3.1 and A 3.2 of TS 36.133 [15] respectively.

Note 3: OCNG shall be used such that all cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 4: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N₀c to be fulfilled.

Table A.8.5.1.1.2-3: Test parameters for SFTD accuracy (Cell 2)

	Parameter	Config	Unit	Test 1
SSB GSCN		1~6		freq1
		1,4		FDD
Duplex mod	de	2,5		TDD
		3,6		TDD
		1,4		N/A
TDD Config	uration	2,5	1	TDDConf.1.1
	122 comgaration		1	TDDConf.2.1
		3,6 1,4		10: N _{RB,c} = 52
BWchannel	BW _{channel}		MHz	10: N _{RB,c} = 52
			1	40: N _{RB,c} = 106
		3,6 1,4		SR.1.1 FDD
	ference measurement	2,5	1	SR.1.1 TDD
channel		3,6	1	SR.2.1 TDD
		1,4		CR.1.1 FDD
RMSI COR	ESET Reference Channel	2,5	1	CR.1.1 TDD
		3,6	1	CR.2.1 TDD
		1,4		CCR.1.1 FDD
RMC CORE	SET Reference Channel	2,5		CCR.1.1 TDD
		3,6		CCR.2.1 TDD
		1,4		SSB.1 FR1
SSB config	uration	2,5		SSB.1 FR1
		3,6		SSB.2 FR1
SMTC conf	iguration	1~6		SMTC.1
DL BWP co		1~6		DLBWP.1.1
UL BWP co		1~6		ULBWP.1.1
OCNG Patt	erns	1~6		OP.1
EPRE ratio	of PSS to SSS			
EPRE ratio	of PBCH DMRS to SSS			
EPRE ratio	of PBCH to PBCH DMRS			
EPRE ratio	EPRE ratio of PDCCH DMRS to SSS			
EPRE ratio	of PDCCH to PDCCH			
DMRS				
EPRE ratio	of PDSCH DMRS to SSS	1~6	dB	0
EPRE ratio	of PDSCH to PDSCH			
DMRS				
EPRE ratio	of OCNG DMRS to SSS ^{Note}			
1				
EPRE ratio	of OCNG to OCNG DMRS			
14016 1	ND EDD ED4 4			
	NR_FDD_FR1_A,	1~6	dBm/15kHz	-104
	NR_TDD_FR1_A NOTE 5			
	NR_FDD_FR1_B			
	NR_TDD_FR1_C			
N_{oc} Note2	NR_FDD_FR1_D,			
	NR_TDD_FR1_D			
	NR_FDD_FR1_E, NR TDD FR1 E			
	NR FDD FR1 G			
	NR_FDD_FR1_H			
$N_{oc\ Note2}$	NR FDD FR1 A,	1,2,4,5	dBm/SSB SCS	
	NR_FDD_FR1_A, NR_TDD_FR1_A NOTE 5			
	NR FDD FR1 B			-104
	NR_TDD_FR1_C			
	NR_FDD_FR1_D,			
	NR_TDD_FR1_D,			
	'*'_ DD_	1	1	

	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				
	NR_FDD_FR1_H				
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A NOTE 5				
	NR_FDD_FR1_B				
	NR_TDD_FR1_C				
	NR_FDD_FR1_D,	3,6		-101	
	NR_TDD_FR1_D	0,0			
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				
	NR_FDD_FR1_H				
Ê , /I ot		1~6	dB	-3	
\hat{E}_{s}/N_{oc}	T	1~6	dB	-3	
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A NOTE 5	1			
	NR_FDD_FR1_B	1			
	NR_TDD_FR1_C	4			
	NR_FDD_FR1_D,	1,2,4,5		-107	
	NR_TDD_FR1_D	1,=, 1,=			
	NR_FDD_FR1_E,		- dBm/SCS -		
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				
SS-RSRP Note3	NR_FDD_FR1_H				
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A NOTE 5	-			
	NR_FDD_FR1_B	-			
	NR_TDD_FR1_C	3,6			
	NR_FDD_FR1_D,			-104	
	NR_TDD_FR1_D				
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				
	NR_FDD_FR1_H NR_FDD_FR1_A,				
	NR_TDD_FR1_A NOTE 5				
	NR FDD FR1 B	1	dBm/9.36 MHz		
	NR TDD FR1 C	+			
	NR FDD FR1 D,	+			
	NR_TDD_FR1_D,	1,2,4,5	UDITI/9.30 IVITIZ	-74.28	
	NR_FDD_FR1_E,				
	NR_TDD_FR1_E				
	NR_FDD_FR1_G				
	NR_FDD_FR1_H				
lo Note3	NR_FDD_FR1_A,				
	NR_TDD_FR1_A NOTE 5	1			
	NR_FDD_FR1_B	1			
	NR_TDD_FR1_C	1			
	NR_FDD_FR1_D,	1	dBm/38.16		
	NR_TDD_FR1_D	3,6	MHz	-68.18	
	NR_FDD_FR1_E,	1			
	NR_TDD_FR1_E				
	NR_FDD_FR1_G	1			
	NR_FDD_FR1_H	1			
Propagation condition		1~6		AWGN	
Antenna co		1~6		1x2	
	DCNG shall be used such tha		fully allocated and		
	ransmitted power spectral de				

Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_{N_{oc}}$ to be fulfilled.
Note 3:	SS-RSRP and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
Note 5:	The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

Table A.8.5.1.1.2-4: Timing offsets for SFTD accuracy test

Condition	SFN offset between PCell and PSCell	Frame boundary offset between PCell and PSCell (Ts)
1	100	-122000
2	300	-60540
3	500	1000
4	700	62540
5	900	124000

A.8.5.1.1.3 Test Requirements

The SFTD reported by the UE consists of 2 elements, SFN offset and frame boundary offset between PCell and inter-RAT NR target cell. The reported SFTD accuracy shall fulfil the requirement in clause 9.1.27 in TS 36.133 [15].

A.8.5.2 E-UTRA – NR Inter-RAT Measurement Performance requirements

A.8.5.2.1 SS-RSRP

A.8.5.2.1.1 E-UTRAN – NR inter-RAT measurements with FR1 target cell

A.8.5.2.1.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.1 in TS 36.133 [15] for inter-RAT FR1 SS-RSRP measurements.

A.8.5.2.1.1.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.1.1.2-1. In this test case there are two cells on different carriers. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. Cell 2 is the inter-RAT NR FR1 target cell. The absolute accuracy requirements of SS-RSRP inter-RAT measurement is tested by using test parameters in Table A.8.5.2.1.1.2-2.

Table A.8.5.2.1.1.2-1: SS-RSRP Inter-RAT SS-RSRP supported test configurations

Config	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode

	6	LTE TDD, NR 30 kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note:	The UE is only re	equired to be tested in one of the supported test configurations

Table A.8.5.2.1.1.2-2: SS-RSRP inter-RAT test parameters

	Parame	eter	Unit	Tes			st 2
SSB ARFCN			Cell 2 Cell 2 freq1 freq1				
		Config 1,4		freq1 freq1 FDD		y qı	
Duplex mo	de	Config 2,3,5,6	1	TDD			
		Config 1,4		Not Applicable			
TDD config	uration	Config 2,5	1	TDDConf.1.1			
	, a. a. a.	Config 3,6	1	TDDConf.2.1			
Downlink in	nitial BWP cor						
	al BWP config	•			DLBWP.0.1 ULBWP.0.1		
-							
DRX Cycle	configuration	 	ms		пот Ар	plicable	
		Config 1,4					
	Reference nent channel	Config 2,5		-			-
		Config 3,6					
		Config 1,4					
RMSI COR Reference		Config 2,5		-			-
		Config 3,6					
		Config 1,4					
Dedicated Reference		Config 2,5		-			-
		Config 3,6					
OCNG Pat	terns			OP.1			
SS-RSSI-M	/leasurement			Not Applicable			
SMTC conf	figruation			SMTC.1			
000 "		Config 1,2,4,5			SSB.	1 FR1	
SSB config	juration	Config 3,6	1		SSB.	2 FR1	
PDSCH/PD	CCH	Config 1,2,4,5		15			
subcarrier		Config 3,6	kHz			30	
	of PSS to SSS	<u> </u>					
EPRE ratio	of PBCH DMRS]				
	of PBCH to PBC		4				
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS		dB	0	0	0	0	
EPRE ratio of PDSCH DMRS to SSS]					
	of PDSCH to PI		4				
EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)		-					
Note2	Config	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15k	2.4	C.F.	-1	17
N oc	1,2,3,4,5,6	NR_FDD_FR1_B	Hz	-94	.65	_11	16.5
	, , , , , , , , , , ,	NR_TDD_FR1_C	†			-116.5 -116	

		NR_FDD_FR1_D NR_TDD_FR1_D			-115.5
		NR_FDD_FR1_E NR_TDD_FR1_E			-115
		NR_FDD_FR1_G	ĺ		-114
		NR_FDD_FR1_H			-113.5
	Config 1,2,4	,5		-94.65	Same as Noc for 15kHz
		NR_FDD_FR1_A	i		
		NR_TDD_FR1_A			-114
		NR_FDD_FR1_B	ID (00		-113.5
Note2		NR_TDD_FR1_C	dBm/SC S		-113
	Config 3,6	NR_FDD_FR1_D	3	-91.65	-112.5
		NR_TDD_FR1_D	<u> </u>		-112.0
		NR_FDD_FR1_E			-112
		NR_TDD_FR1_E	-		444
		NR_FDD_FR1_G	1		-111
Ê , /I _{ot}	l	NR_FDD_FR1_H	dB	10	-110.5
\hat{E}_{s}/I_{ot} \hat{E}_{s}/N_{oc}			dB dB	10 10	-4 -4
E s / IV oc		NR_FDD_FR1_A	иь	10	-4
		NR_TDD_FR1_A			-121
	Config 1,2,4,5	NR_FDD_FR1_B	1		-120.5
		NR_TDD_FR1_C			-120
		NR_FDD_FR1_D		-84.65	-119.5
		NR_TDD_FR1_D	-		
		NR_FDD_FR1_E NR_TDD_FR1_E]		-119
00		NR_FDD_FR1_G			-118
SS- RSRP ^{Not}		NR_FDD_FR1_H	dBm/SC		-117.5
e3		NR_FDD_FR1_A	S	-81.65	
		NR_TDD_FR1_A NOTE 6			-118
		NR_FDD_FR1_B]		-117.5
		NR_TDD_FR1_C			-117
	Config 3,6	NR_FDD_FR1_D			-116.5
		NR_TDD_FR1_D	-		110.0
		NR_FDD_FR1_E			-116
		NR_TDD_FR1_E	}		
		NR_FDD_FR1_G NR_FDD_FR1_H	-		-115 -114.5
		NR_FDD_FR1_A			-114.0
		NR_TDD_FR1_A			-87.76
		NR_FDD_FR1_B			-87.26
	Confin	NR_TDD_FR1_C	4D /		-86.76
	Config 1,2,4,5	NR_FDD_FR1_D	dBm/ 9.36MHz	-56.28	
	1,4,4,5	NR_TDD_FR1_D	3.JUIVITZ		-86.26
Io ^{Note3}		NR_FDD_FR1_E NR_TDD_FR1_E			-85.76
		NR_FDD_FR1_G]		-84.76
		NR_FDD_FR1_H			-84.26
		NR_FDD_FR1_A			
		NR_TDD_FR1_A	dBm/		-84.76
	Config 3,6	NOTE 6	38.16MH	-50.19	04.00
		NR_FDD_FR1_B	Z		-84.26
		NR_TDD_FR1_C			-83.76
		NR_FDD_FR1_D	l		-83.26

	NR_TDD_FR1_D			-82.76 -81.76 -81.26
Propagat	ion condition	-	AW	/GN
Antenna	configuration	-	1:	x2
Note 1:	OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.			
Note 2:	Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for $_{N}$ to be fulfilled.			
Note 3:	3: SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.			
Note 4:	SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.			
Note 5:	NR operating band groups are as defined in clause 3.5.2.			
Note 6:	The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.			

A.8.5.2.1.1.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.1 in TS 36.133 [15].

A.8.5.2.1.2 E-UTRAN – NR inter-RAT measurements with FR2 target cell

A.8.5.2.1.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRP measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.1 in TS 36.133 [15] for inter-RAT FR2 SS-RSRP measurements.

A.8.5.2.1.2.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.1.2.2-1. In this test case there are two cells on different carriers. Absolute accuracy requirements of SS-RSRP inter-RAT measurement are tested by using test setup in Table A.8.5.2.1.2.2-2 and Table A.8.5.2.1.2.2-3. In all test cases, Cell 2 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.8.5.2.1.2.2-1: SS-RSRP Inter-RAT SS-RSRP supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.8.5.2.1.2.2-2: SS-RSRP Inter-RAT general test parameters

Parameter	Unit	Test 1	Test 2
raiailletei	Ollic	Cell 2	Cell 2
SSB ARFCN		Freq1	freq1
Duplex mode		TDD	TDD
TDD configuration		TDDConf.3.1	TDDConf.3.1
BW _{channel}	MHz	100: $N_{RB,c} = 66$	100: $N_{RB,c} = 66$
Downlink initial BWP configuration		DLBWP.0.1	
Uplink initial BWP configuration		ULBWP.0.1	
DRX cycle configuration	ms	Not applicable	
PDSCH Reference measurement channel		•	-
RMSI CORESET Reference Channel		-	-
OCNG Patterns		OP.1	OP.1

SMTC configuration		SMTC.1	SMTC.1
SSB configuraiton		SSB.3 FR2	SSB.3 FR2
PDSCH/PDCCH subcarrier spacing	kHz	120	120
EPRE ratio of PSS to SSS			
EPRE ratio of PBCH_DMRS to SSS			
EPRE ratio of PBCH to PBCH_DMRS			
EPRE ratio of PDCCH_DMRS to SSS			
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0
EPRE ratio of PDSCH_DMRS to SSS			
EPRE ratio of PDSCH to PDSCH_DMRS			
EPRE ratio of OCNG DMRS to SSSNote 1			

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total

transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void. Note 3: Void. Note 4: Void.

Table A.8.5.2.1.2.2-3: SS-RSRP Inter-RAT OTA related test parameters

Parameter	Unit	Test 1	Test 2
Parameter	Unit	Cell 2	Cell 2
		Setup 1	Setup 1
Angle of arrival configuration		according to	according to
		A.3.15.1	A.3.15.1
Assumption for UE beams ^{Note 10}		Rough	Rough
N _{oc} Note1	dBm/15kHz Note4	-105	N/A
N _{oc} Note1	dBm/SCS Note4	-96	N/A
			(Table B.2.3-2 Rx
	dBm/SCS		Beam Peak
Es	Note4		+1dB)
			(Note 7)
\hat{E}_s / N_{oc}	dB	11	N/A
			(Table B.2.3-2 Rx
Nus	dBm/SCS		Beam Peak
SSB_RP ^{Note2}	Note4	-85	+1dB)
			(Note 7)
$\hat{E}_{\rm s}/I_{ m ot}_{ m BB}$ Note 2, Note 9	dB	9.97	-3.81
			(Table B.2.3-2 Rx
L Nove	dBm/95.04		Beam Peak
Io ^{Note2}	MHz Note4	-55.65	+30dB)
			(Note 8)
Note 1: Where used interference fro			

Note 1: Where used, interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{ac} to be fulfilled.

Note 2: SSB_RP, Es/lot and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.

Note 3: Void

Note 4: Equivalent power received by an antenna with 0dBi gain at the centre of the quiet zone.

Note 5: Void Note 6: Void

Note 7:	SSB_RP is applied at 1dB above the minimum level specified in Table B.2.3-2 for beam
	peak.
Note 8:	Io is applied at 10log ₁₀ (792)dB+1dB above the minimum level specified in Table B.2.3-2
	for beam peak.
Note 9:	Calculation of Es/lot _{BB} includes the effect of UE internal noise up to the value assumed for
	the associated Refsens requirement in clause 7.3.2 of TS 36.101-2 [19], and an
	allowance of 1dB for UE multi-band relaxation factor ΔMB _P from TS 38.101-2 [19] Table
	6.2.1.3-4.
	i i

Note 10: Information about types of UE beam is given in B.2.1.3, and does not limit UE

implementation or test system implementation.

A.8.5.2.1.2.3 Test Requirements

The SS-RSRP measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.1 in TS 36.133 [15].

A.8.5.2.2 SS-RSRQ

A.8.5.2.2.1 E-UTRAN – NR inter-RAT measurements with FR1 target cell

A.8.5.2.2.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.2 in TS 36.133 [15] for inter-RAT FR1 SS-RSRQ measurements.

A.8.5.2.2.1.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.2.1.2-1. In this test case there are two cells on different carriers. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. Cell 2 is the inter-RAT NR FR1 target cell. The absolute accuracy requirements of SS-RSRP inter-RAT measurement is tested by using test parameters in Table A.8.5.2.2.1.2-2.

Table A.8.5.2.2.1.2-1: SS-RSRQ Inter-RAT SS-RSRQ supported test configurations

Confi	Description
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode
Note: The	E is only required to be tested in one of the supported test configurations

Table A.8.5.2.2.1.2-2: SS-RSRQ inter-RAT test parameters

Param	eter	Unit	Tes	st 1		st 2		st 3 ell 2
SSB ARFCN			fre			q1		eq1
	Config 1,4		FDD			- 1		
Duplex mode	Config 2,3,5,6		TDD					
	Config 1,4		Not Applicable TDDConf.1.1					
TDD configuration	Config 2,5	1						
_	Config 3,6	1		TDDConf.2.1				
Downlink initial BWP cor					DLBV	VP.0.1		
Uplink initial BWP config	juration				ULBV	VP.0.1		
DRX Cycle configuration	1	ms			Not Ap	plicable		
	Config 1,4							
PDSCH Reference measurement channel	Config 2,5			-		-		-
	Config 3,6							
	Config 1,4							
RMSI CORESET Reference Channel	Config 2,5		-	-		-		-
	Config 3,6							
	Config 1,4							
Dedicated CORESET Reference Channel	Config 2,5			-	-		-	
	Config 3,6							
OCNG Patterns			OP.1					
SS-RSSI-Measurement			Not Applicable					
SMTC configruation			SMTC.1					
	Config 1,2,4,5				SSB.	1 FR1		
SSB configuration	Config 3,6	1	SSB.2 FR1					
DDCCH/DDCCH	Config 1,2,4,5					15		
PDSCH/PDCCH subcarrier spacing	Config 3,6	kHz				30		
EPRE ratio of PSS to SSS	Coming 0,0				1	50 		
EPRE ratio of PBCH DMRS	S to SSS	1						
EPRE ratio of PBCH to PB	CH DMRS							
EPRE ratio of PDCCH DMRS to SSS EPRE ratio of PDCCH to PDCCH DMRS		- 40		0	0		0	0
EPRE ratio of PDSCH DMRS to SSS		dB	0	0	0	0	0	0
EPRE ratio of PDSCH to P	DSCH							
	EPRE ratio of OCNG DMRS to SSS(Note 1) EPRE ratio of OCNG to OCNG DMRS (Note 1)							
EPRE ratio of OCNG to OC								
Note2 Config	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15k	-80	-80.18 -106		06		116
1,2,4,5	NR_FDD_FR1_B	Hz			1			15.5
	NR_TDD_FR1_C						^	115

	1	ND EDD ED4 D	1		T	T
		NR_FDD_FR1_D				
		NR_TDD_FR1_D				-114.5
		NR_FDD_FR1_E				
		NR_TDD_FR1_E				-114
		NR_FDD_FR1_G				-113
		NR_FDD_FR1_H				-112.5
	Config 3,6			-86.27	-113	Same as Noc for Config 1,2,4,5
	Config 1,2,4	,5		-80.18	-106	Same as Noc for 15kHz
		NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6				-113
Nere		NR_FDD_FR1_B]			-112.5
Note2		NR_TDD_FR1_C	dBm/SC			-112
	Config 3,6	NR_FDD_FR1_D	S	-83.27	-110	
		NR_TDD_FR1_D				-111.5
		NR_FDD_FR1_E				
		NR_TDD_FR1_E				-111
		NR_FDD_FR1_G	ĺ			-110
		NR_FDD_FR1_H				-109.5
Ê , /I ot	11	<u>, </u>	dB	-1.75	-1.75	-1.75
\hat{E}_{s}/N_{oc}			dB	-1.75	-1.75	-1.75
s / oc		NR_FDD_FR1_A	ub.	1.70	1.10	1.70
		NR_TDD_FR1_A				-117.75
		NR_FDD_FR1_B]			-117.25
	0	NR_TDD_FR1_C				-116.75
	Config	NR_FDD_FR1_D		-81.93	-107.75	
	1,2,4,5	NR_TDD_FR1_D	dBm/SC			-116.25
		NR_FDD_FR1_E				
		NR_TDD_FR1_E				-115.75
		NR_FDD_FR1_G				-114.75
SS-		NR_FDD_FR1_H				-114.75
RSRP ^{Not}		NR_FDD_FR1_A	S		-111.75	-114.25
e3		NR_TDD_FR1_A	3			-114.75
		NR_FDD_FR1_B	1			-114.25
		NR_TDD_FR1_C	1			-113.75
	Config 3,6	NR_FDD_FR1_D	1	-85.02		110.70
	Coming 0,0	NR TDD FR1 D		00.02	111.70	-113.25
		NR_FDD_FR1_E	}			-113.23
		NR_TDD_FR1_E				110.75
			1			-112.75
		NR_FDD_FR1_G	{			-111.75
ļ		NR_FDD_FR1_H	1			-111.25
		NR_FDD_FR1_A				
		NR_TDD_FR1_A				
		NR_FDD_FR1_B	1			
	Nata 2	NR_TDD_FR1_C	ļ			
SS-RSRQ	NOTES	NR_FDD_FR1_D	dB	-14.77	-40.59	-14.76
		NR_TDD_FR1_D	1			
		NR_FDD_FR1_E				
		NR_TDD_FR1_E]			
		NR_FDD_FR1_G	† 			
		NR_FDD_FR1_H				
		NR_FDD_FR1_A				
Io ^{Note3}	Config 1,2,4,5	NR_TDD_FR1_A	dBm/ 9.36MHz	-50	-75.83	-85.83
	.,_,.,	NR_FDD_FR1_B				-85.33

		NR_TDD_FR1_C]			-84.83
		NR_FDD_FR1_D				-84.33
		NR_TDD_FR1_D	ļ			-04.55
		NR_FDD_FR1_E				-83.83
		NR_TDD_FR1_E				
		NR_FDD_FR1_G				-82.83
		NR_FDD_FR1_H				-82.33
		NR_FDD_FR1_A				
		NR_TDD_FR1_A				-79.73
		NOTE 6				
		NR_FDD_FR1_B	Į			-79.23
		NR_TDD_FR1_C	dBm/			-78.73
	Config 3,6	NR_FDD_FR1_D	38.16MH	-50	-76.73	-78.23
		NR_TDD_FR1_D	z			70.20
		NR_FDD_FR1_E				-77.73
		NR_TDD_FR1_E]			11.10
		NR_FDD_FR1_G	ļ			-76.73
		NR_FDD_FR1_H				-76.53
Propagation condition		-	AWGN			
Antenna configuration			-		1x2	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{∞} to be fulfilled.
- Note 3: SS-RSRQ, SS-RSRP, and lo levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-RSRQ minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification.

A.8.5.2.2.1.3 Test Requirements

The SS-RSRQ measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.2 in TS 36.133 [15].

A.8.5.2.2.2 E-UTRAN – NR inter-RAT measurements with FR2 target cell

A.8.5.2.2.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS-RSRQ measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.2 in TS 36.133 [15] for inter-RAT FR2 SS-RSRQ measurements.

A.8.5.2.2.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.2.2-1. In this test case there are two cells on different carriers. Absolute accuracy requirements of SS-RSRQ inter-RAT measurement are tested by using test setup in Table A.8.5.2.2.2-2 and Table A.8.5.2.2.2-3. In all test cases, Cell 2 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.8.5.2.2.2.2-1: SS-RSRQ Inter-RAT SS-RSRQ supported test configurations

Configuration	Description
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode

Table A.8.5.2.2.2-2: SS-RSRQ Inter-RAT general test parameters

Parameter	Unit	Test 1	Test 2	
Parameter	Onit	Cell 2	Cell 2	
SSB ARFCN		Freq1	freq1	
Duplex mode		TDD	TDD	
TDD configuration		TDDConf.3.1	TDDConf.3.1	
BW _{channel}	MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66	
Downlink initial BWP configuration		DLBV	/P.0.1	
Uplink initial BWP configuration		ULBV	/P.0.1	
DRX cycle configuration	ms	Not ap	olicable	
PDSCH Reference measurement channel		-	-	
RMSI CORESET Reference Channel		-	-	
OCNG Patterns		OP.1	OP.1	
SMTC configuration		SMTC.1	SMTC.1	
SSB configuration		SSB.3 FR2	SSB.3 FR2	
PDSCH/PDCCH subcarrier spacing	kHz	120	120	
EPRE ratio of PSS to SSS				
EPRE ratio of PBCH_DMRS to SSS				
EPRE ratio of PBCH to PBCH_DMRS				
EPRE ratio of PDCCH_DMRS to SSS				
EPRE ratio of PDCCH to PDCCH_DMRS	dB	0	0	
EPRE ratio of PDSCH_DMRS to SSS				
EPRE ratio of PDSCH to PDSCH_DMRS				
EPRE ratio of OCNG DMRS to SSS ^{Note 1}				

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void. Note 3: Void. Note 4: Void.

Table A.8.5.2.2.2-3: SS-RSRQ Inter-RAT OTA related test parameters

Parameter	Unit	Test 1	Test 2
Parameter	Onit	Cell 2	Cell 2
		Setup 1	Setup 1
Angle of arrival configuration		according to	according to
		A.3.15.1	A.3.15.1
Assumption for UE beams ^{Note 10}		Rough	Rough
N oc Note1	dBm/15kHz Note4	-104.7	(Table B.2.3-2 Rx Beam Peak -5dB)
			(Note 7)
$N_{oc}^{$	dBm/SCS Note4	-95.7	(Table B.2.3-2 Rx Beam Peak +4dB) (Note 7)
\hat{E}_s/N_{oc}	dB	-0.5	-1.75
SSB_RPNote2	dBm/SCS Note4	-96.2	(Table B.2.3-2 Rx Beam Peak +2.25dB) (Note 8)
SS-RSRQ ^{Note2}	dB	-3.27	-14.82
\hat{E}_{s}/I_{ot} Note2	dB	-0.5	-1.75

lo ^{Note2}		dBm/95.04 MHz ^{Note4}	-63.95	(Table B.2.3-2 Rx Beam Peak +35.22dB)
N. 4				(Note 9)
Note 1:	Interference from other cells and constant over subcarriers and time for $N_{\it oc}$ to be fulfilled.			
Note 2:	SSB_RP, SS-RSRQ, Es/lot and I information purposes. They are n			r parameters for
Note 3:	Void	•		
Note 4:	Equivalent power received by an	antenna with 0d	Bi gain at the centre	of the quiet zone.
Note 5:	Void			
Note 6:	Void			
Note 7:	N₀c for SCS 15kHz is applied at - Table B.2.3-2 for beam peak. N₀c level specified in Table B.2.3-2 fo	for SCS 120kHz		
Note 8:	SSB_RP is applied at 2.25dB above beam peak.	ove the minimum	n level specified in Ta	ble B.2.3-2 for
Note 9:	lo is applied at 10log ₁₀ (792)+6.22 for beam peak.	dB above the m	inimum level specifie	d in Table B.2.3-2
Note 10:		•	.2.1.3, and does not I	imit UE

A.8.5.2.2.3 Test Requirements

The SS-RSRQ measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.2 in TS 36.133 [15].

In this test case there are two cells on different carriers and measurement gaps are provided

A.8.5.2.3 SS-SINR

A.8.5.2.3.1 E-UTRAN – NR inter-RAT measurements with FR1 target cell

A.8.5.2.3.1.1 Test Purpose and Environment

The purpose of this test is to verify that the SS- SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.3 in TS 36.133 [15] for inter-RAT FR1 SS-SINR measurements.

A.8.5.2.3.1.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.3.1.2-1. In this test case there are two cells on different carriers. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1. Cell 2 is the inter-RAT NR FR1 target cell. The absolute accuracy requirements of SS-RSRP inter-RAT measurement is tested by using test parameters in Table A.8.5.2.3.1.2-2.

Table A.8.5.2.3.1.2-1: SS- SINR Inter-RAT SS- SINR supported test configurations

Config	Description						
1	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode						
2	LTE FDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode						
3	LTE FDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode						
4	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, FDD duplex mode						
5	LTE TDD, NR 15 kHz SSB SCS, 10 MHz bandwidth, TDD duplex mode						
6	LTE TDD, NR 30kHz SSB SCS, 40 MHz bandwidth, TDD duplex mode						
Note: The UE is onl	Note: The UE is only required to be tested in one of the supported test configurations						

Table A.8.5.2.3.1.2-2: SS-SINR inter-RAT test parameters

Paramo	eter	Unit		st 1		st 2 II 2		st 3 ell 2
SSB ARFCN	Config 1 4		fre		fre			eq1
Duplex mode	Config 1,4		FDD					
B uplox mode	Config 2,3,5,6		TDD					
	Config 1,4	<u> </u>				plicable		
TDD configuration	Config 2,5				TDDC	onf.1.1		
	Config 3,6				TDDC	onf.2.1		
Downlink initial BWP cor					DLB\	VP.0.1		
Uplink initial BWP config	uration				ULB\	VP.0.1		
DRX Cycle configuration	1	ms			Not Ap	plicable		
	Config 1,4							
PDSCH Reference measurement channel	Config 2,5			-		-	-	
	Config 3,6							
	Config 1,4							
RMSI CORESET Reference Channel	Config 2,5			-			-	
	Config 3,6							
	Config 1,4							
Dedicated CORESET Reference Channel	Config 2,5			-		-		-
	Config 3,6							
OCNG Patterns			OP.1					
SS-RSSI-Measurement			Not Applicable					
SMTC configruation			SMTC.1					
000 (1 11	Config 1,2,4,5		SSB.1 FR1					
SSB configuration	Config 3,6		SSB.2 FR1					
PDSCH/PDCCH	Config 1,2,4,5				,	15		
subcarrier spacing	Config 3,6	kHz	30					
EPRE ratio of PSS to SS	•					-		
EPRE ratio of PBCH DM	IRS to SSS]						
EPRE ratio of PBCH to I				1				
EPRE ratio of PDCCH D								
EPRE ratio of PDCCH to PDCCH DMRS EPRE ratio of PDSCH DMRS to SSS		dB	0	0	0	0	0	0
EPRE ratio of PDSCH to		1		1				
EPRE ratio of OCNG DMRS to SSS ^(Note 1)		†		1				
EPRE ratio of OCNG to OCNG DMRS (Note 1)								
Note2 Config 1,2,4,5	NR_FDD_FR1_A NR_TDD_FR1_A NOTE 6	dBm/15k Hz	-88		-108.5		-119.5	
1,2,7,0	NR_FDD_FR1_B	114					-1	19

	1	ND TOD TO	1		1	140-
		NR_TDD_FR1_C	-			-118.5
		NR_FDD_FR1_D				-118
		NR_TDD_FR1_D NR_FDD_FR1_E	-			
		NR_TDD_FR1_E				-117.5
		NR_FDD_FR1_G	<u> </u>			-116.5
		NR_FDD_FR1_H	Ī			-116
	Config 1,2,4	5		-88	-108.5	Same as Noc for
	Coming 1,2,4			-00	-100.5	15kHz
		NR_FDD_FR1_A				440.5
		NR_TDD_FR1_A				-116.5
		NR_FDD_FR1_B	1			-116
Note2		NR TDD FR1 C	dBm/SC			-115.5
21 oc	Config 3,6	NR_FDD_FR1_D	S	-85	-105.5	
		NR_TDD_FR1_D				-115
		NR_FDD_FR1_E				-114.5
		NR_TDD_FR1_E	<u> </u>			
		NR_FDD_FR1_G	}			-114.5 -113
Ê , /I ot	1	NR_FDD_FR1_H	dB	-1.75	20	-113
\hat{E}_{s}/N_{oc}			dB	-1.75	20	-4.0
		NR_FDD_FR1_A	. –			
		NR_TDD_FR1_A				-123.5
		NOTE 6	=	-89.75	-88.5	
		NR_FDD_FR1_B	dBm/SC			-123
	Config	NR_TDD_FR1_C NR_FDD_FR1_D				-122.5
	1,2,4,5	NR_FDD_FR1_D				-122
		NR_FDD_FR1_E				
		NR_TDD_FR1_E				-121.5
SS-		NR_FDD_FR1_G				-120.5
RSRP ^{Not}		NR_FDD_FR1_H				-120
e3		NR_FDD_FR1_A	S			100 F
		NR_TDD_FR1_A				-120.5
		NR_FDD_FR1_B	1			-120
		NR_TDD_FR1_C	1			-119.5
	Config 3,6	NR_FDD_FR1_D	1	-86.75	-85.5	-119
		NR_TDD_FR1_D	1			-119
		NR_FDD_FR1_E				-118.5
		NR_TDD_FR1_E NR_FDD_FR1_G				
		NR_FDD_FR1_H	1			-117.5 -117
	1	NR_FDD_FR1_A				117
		NR_TDD_FR1_A				
		NOTE 6				
		NR_FDD_FR1_B				
CC CIVIE N	lote3	NR_TDD_FR1_C	70	4 75	00	4.0
SS-SINR N	10.00	NR_FDD_FR1_D NR_TDD_FR1_D	dB	-1.75	20	-4.0
		NR FDD FR1 E				
		NR_TDD_FR1_E				
		NR_FDD_FR1_G]			
	T	NR_FDD_FR1_H				
		NR_FDD_FR1_A				00.00
Io ^{Note3}	Config	NR_TDD_FR1_A	dBm/	E7 00	60.5	-90.09
10.4000	1,2,4,5	NR_FDD_FR1_B	9.36MHz	-57.83	-60.5	-89.59
		NR_TDD_FR1_C	1			-89.09
	1		1		1	33.00

		NR_FDD_FR1_D NR_TDD_FR1_D				-88.59
		NR_FDD_FR1_E				-88.09
		NR_TDD_FR1_E	ļ			
		NR_FDD_FR1_G	Į			-87.09
		NR_FDD_FR1_H				-86.59
		NR_FDD_FR1_A				
		NR_TDD_FR1_A				-84
		NOTE 6				
		NR_FDD_FR1_B	Į			-83.5
		NR_TDD_FR1_C	dBm/			-83
	Config 3,6	NR_FDD_FR1_D	38.16MH	-51.73	-54.41	-82.5
		NR_TDD_FR1_D	z			-02.5
		NR_FDD_FR1_E				-82
		NR_TDD_FR1_E]			-02
		NR_FDD_FR1_G				-81
		NR_FDD_FR1_H				-80.5
Propagation	Propagation condition		-	AWGN		
Antenna co	Antenna configuration		-	_	1x2	

- Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.
- Note 2: Interference from other cells and noise sources not specified in the test is assumed to be constant over subcarriers and time and shall be modelled as AWGN of appropriate power for N_{max} to be fulfilled.
- Note 3: SS-SINR, SS-RSRP, and Io levels have been derived from other parameters for information purposes. They are not settable parameters themselves.
- Note 4: SS-SINR, SS-RSRP minimum requirements are specified assuming independent interference and noise at each receiver antenna port.
- Note 5: NR operating band groups are as defined in clause 3.5.2.
- Note 6: The test configuration excludes support for band n51 and it is not required to run this test on band n51 in this release of the specification

A.8.5.2.3.1.3 Test Requirements

The SS-SINR measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.3 in TS 36.133 [15].

A.8.5.2.3.2 E-UTRAN – NR inter-RAT measurements with FR2 target cell

A.8.5.2.3.2.1 Test Purpose and Environment

The purpose of this test is to verify that the SS- SINR measurement accuracy is within the specified limits. This test will verify the requirements in clause 9.11.3 in TS 36.133 [15] for inter-RAT FR2 SS-SINR measurements.

A.8.5.2.3.2.2 Test Parameters

Supported test configurations are shown in Table A.8.5.2.3.2.2-1. In this test case there are two cells on different carriers. Absolute accuracy requirements of SS-SINR inter-RAT measurement are tested by using test setup in Table A.8.5.2.3.2.2-2 and A.8.5.2.3.2.2-3. In all test cases, Cell 2 is target cell. Cell 1 is the E-UTRA cell which specific test parameters for this test case are specified in Table A.3.7.2.1-1.

Table A.8.5.2.3.2.2-1: SS-SINR Inter-RAT SS-SINR supported test configurations

Configuration	Description				
1	LTE FDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				
2	LTE TDD, NR 120 kHz SSB SCS, 100 MHz bandwidth, TDD duplex mode				

Table A.8.5.2.3.2.2-2: SS-SINR Inter-RAT general test parameters

Parameter	Unit	Test 1	Test 2	Test 3

	Cell 2	Cell 2	Cell 2
	Freq1	freq1	freq1
	TDD	TDD	TDD
	TDDConf.3.1	TDDConf.3.1	TDDConf.3.1
MHz	100: N _{RB,c} = 66	100: N _{RB,c} = 66	100: N _{RB,c} = 66
		DLBWP.0.1	
		ULBWP.0.1	
ms		Not applicable	
	-	-	-
	-	-	-
	OP.1	OP.1	OP.1
	SMTC.1	SMTC.1	SMTC.1
	SSB.3 FR2	SSB.3 FR2	SSB.3 FR2
kHz	120	120	120
dB	0	0	0
	ms kHz	Freq1 TDD TDDConf.3.1 MHz 100: N _{RB,c} = 66 ms	Freq1 freq1 TDD TDD TDD TDDConf.3.1 TDDConf.3.1 MHz 100: N _{RB,c} = 66 100: N _{RB,c} = 66 DLBWP.0.1 ULBWP.0.1 Not applicable OP.1 OP.1 SMTC.1 SMTC.1 SSB.3 FR2 SSB.3 FR2 kHz 120 120

Note 1: OCNG shall be used such that both cells are fully allocated and a constant total transmitted power spectral density is achieved for all OFDM symbols.

Note 2: Void. Note 3: Void. Note 4: Void.

Table A.8.5.2.3.2.2-3: SS-SINR Inter-RAT OTA related test parameters

Parameter	Unit	Test 1	Test 2	Test 3
Parameter	Unit	Cell 2	Cell 2	Cell 2
		Setup 1	Setup 1	Setup 1
Angle of arrival configuration		according to	according to	according to
No. 40		A.3.15.1	A.3.15.1	A.3.15.1
Assumption for UE beams ^{Note 10}		Rough	Rough	Rough
$N_{\it oc}^{\rm Note1}$	dBm/15kHz Note4	-104.7	-104.7	(Table B.2.3-2 Rx Beam Peak -5dB) (Note 7)
$N_{oc}^{-{ m Note1}}$	dBm/SCS Note4	-95.7	-95.7	(Table B.2.3-2 Rx Beam Peak +4dB)
\hat{E}_{s}/N_{oc}	dB	-0.5	11	(Note 7) -1.0
SSB_RP ^{Note2}	dBm/SCS Note4	-96.2	-84.7	(Table B.2.3-2 Rx Beam Peak +3dB) (Note 8)
SS-SINR ^{Note2}	dB	-0.5	11	-1.0
$\hat{\mathrm{E}}_{_{\mathrm{s}}}/\mathrm{I}_{_{\mathrm{ot}}}$ Note2	dB	-0.5	11	-1.0
Io ^{Note2}	dBm/95.04 MHz ^{Note4}	-63.95	-55.38	(Table B.2.3-2 Rx Beam Peak +35.54dB)

					(Note 9)	
Note 1:	Interference from other cells and					
	subcarriers and time and shall be	modelled as AV	VGN of appropriate p	ower for $N_{_{oc}}$ to be f	ulfilled.	
Note 2:	SSB_RP, SS-SINR, Es/lot and lo They are not settable parameters		en derived from other	parameters for inform	nation purposes.	
Note 3:	Void	memserves.				
Note 4:	Equivalent power received by an	antenna with 0 o	dBi gain at the centre	of the quiet zone.		
Note 5:	Void					
Note 6:	Void					
Note 7:	$N_{\rm oc}$ for SCS 15kHz is applied at - peak. $N_{\rm oc}$ for SCS 120kHz is appl peak.	ied at 4dB abov	e the minimum level s	specified in Table B.2	2.3-2 for beam	
Note 8:	SSB_RP is applied at 3dB above the minimum level specified in Table B.2.3-2 for beam peak.					
Note 9:	lo is applied at level 10log ₁₀ (792)+6.54dB above the minimum level specified in Table B.2.3-2 for beam peak.					
Note 10:	Information about types of UE beinplementation.	am is given in B	.2.1.3, and does not I	imit UE implementation	on or test system	

A.8.5.2.3.2.3 Test Requirements

The SS-SINR measurement accuracy for Cell 2 shall fulfil the requirement in clause 9.11.3 in TS 36.133 [15].

Annex B (normative):

Conditions for RRM requirements applicability for operating bands

B.1 Conditions for NR RRC_IDLE state mobility

B.1.1 Introduction

In Annex B.1, the following conditions are specified:

- UE conditions which shall apply for UE intra-frequency measurements procedures and requirements in clause 4,
- UE conditions which shall apply for UE inter-frequency measurements procedures and requirements in clause 4.

B.1.2 Conditions for measurements on NR intra-frequency cells for cell re-selection

This clause defines the following conditions for NR intra-frequency measurements performed based on SSBs for cell re-selection: SSB_RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.1.2-1 for FR1 NR cells.

The conditions are defined in Table B.1.2-2 for FR2 NR cells.

Table B.1.2-1: Conditions for intra-frequency cell re-selection in FR1

		Minimum	SSB Ês/lot	
Baramatar	NR operating band groups Note1	dBm /	SCS _{SSB}	
Parameter	NK operating band groups	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dB
	NR_FDD_FR1_A, NR_TDD_FR1_A	-124	-121	
	NR_FDD_FR1_B	-123.5	-120.5	
	NR_TDD_FR1_C	-123	-120	
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-122.5	-119.5	≥ -4
	NR_FDD_FR1_E, NR_TDD_FR1_E	-122	-119	
	NR_FDD_FR1_G	-121	-118	
	NR FDD FR1 H	-120.5	-117.5	

Table B.1.2-2: Conditions for intra-frequency cell re-selection in FR2

			Minimum SSB_RP Note 2, Note				ote 3	SSB Ês/lot
Parameter	Angle of arrival	NR operating bands		dBm / SCS _{SSB} SCS _{SSB} = 120 kHz UE Power class		SCS _{SSB} = 240 kHz	dB	
						UE Power class		
			1	2	3	4	1, 2, 3, 4	
		n257	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄	(Value for SCS _{SSB} = 120 kHz) +3dB	
Conditions		n258	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄		
Conditions		n260	- 122.3+Y ₁		-106.5	- 122.8+Y ₄		≥-4
		n261	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄		

	n257	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄		
Spherical	n258	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄	(Value for	≥-4
Coverage Note 1	n260	- 114.3+Z ₁		SCS _{SSB} = 120 kHz) +3dB	2-4		
	n261	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄		

- NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.
- NOTE 2: Values specified at the Reference point to give minimum SSB Es/lot, with no applied noise.
- NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΔMB_{P,n} and Spherical coverage values are increased by ΔMB_{S,n}, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.1.2-2:

- The value of Y for Power classes 1 and 4 is FFS, where Y₁ and Y₄ are the rough/fine beam gain differences in Rx beam peak direction for Power classes 1 and 4 respectively
- The value of Z for Power classes 1 and 4 is FFS, where Z₁ and Z₄ are the rough/fine beam gain differences in spherical coverage directions for Power classes 1 and 4 respectively

B.1.3 Conditions for measurements on NR inter-frequency cells for cell re-selection

This clause defines the following conditions for NR inter-frequency measurements performed based on SSBs for cell re-selection: SSB_RP and SSB Es/Iot, applicable for a corresponding operating band.

The conditions defined in Table B.1.2-1 for FR1 NR intra-frequency cell re-selection shall also apply for FR1 NR inter-frequency cells in this clause.

The conditions defined in Table B.1.2-2 for FR2 NR intra-frequency cell re-selection shall also apply for FR2 NR inter-frequency cells in this clause.

B.2 Conditions for UE measurements procedures and performance requirements in RRC_CONNECTED state

B.2.1 Introduction

B.2.1.1 General

In Annex B.2, the following conditions are specified:

- The conditions for RRC connection release with redirection to NR requirements in clause 6.2.3.2.1,
- The conditions for UE transmit timing adjustment in clause 7.1,
- UE conditions which shall apply for UE intra-frequency measurements procedures and requirements in clause 9, UE conditions which shall apply for UE inter-frequency measurements procedures and requirements in clause 9,
- UE conditions which shall apply for UE intra-frequency measurements performance requirements in clause 10,
- UE conditions which shall apply for UE inter-frequency measurements performance requirements in clause 10.

B.2.1.2 Derivation of Minimum SSB_RP values for FR1

[FFS]

B.2.1.3 Derivation of Minimum SSB_RP values for FR2

Editor's note:

- The Assumption for UE beams (fine or rough) in Annex A RRM test cases is defined based on power class 3, and unless otherwise stated also applies for other UE power classes

B.2.1.3.1 Minimum SSB_RP values for Rx Beam Peak angle of arrival

Minimum SSB_RP values in Tables B.2.2-2 and B.2.3-2 are based on reference sensitivity for the Operating band and for the UE power class, taking a baseline of UE power class 3 in Band n260 with 50 MHz channel bandwidth.

 $\label{eq:minimum} \begin{aligned} & Minimum \ SSB_RP = Reference \ sensitivity \ _{PC3, \ n260, \ 50MHz} + Y \ -10Log_{10}(PRB_{Refsens} \ x \ 12) - SNR_{Refsens} + SSB \ \hat{E}s/Iot + \\ & \Delta MB_{P,n} \end{aligned}$

where:

Reference sensitivity PC3, n260, 50MHz is the reference sensitivity value in dBm specified for power class 3 in Band n260 for 50 MHz Channel bandwidth in Table 7.3.2.3-1 of TS 38.101-2 [19];

Y is the gain difference between fine and rough beams, which is defined in Table B.2.1.3.1-1;

Table B.2.1.3.1-1: Gain difference Y between fine and rough beams, Rx beam peak direction

Value "Y" in dB, for each UE power class					
1	2	3	4		
FFS	9.0	7.0	FFS		

 $PRB_{Refsens}$ is N_{RB} associated with subcarrier spacing 120 kHz for 50MHz in TS 38.101-2 [19] Table 5.3.2-1, and is 32:

12 is the number of subcarriers in a PRB;

SNR_{Refsens} is the SNR used for simulation of Refsens and EIS spherical coverage, and is -1 dB;

SSB Ês/Iot is the minimum value required by the UE to perform measurements, and is -6 dB for intra-frequency measurements and -4 dB for inter-frequency measurements. The only contribution to Iot is the UE internal noise;

ΔMB_{P,n} is the UE multi-band relaxation factor value in dB specified in TS 38.101-2 [19] clause 6.2.1.

The calculated Minimum SSB_RP value for the baseline of UE power class 3 in Band n260 is $(-109.5 + \Delta MB_{P,n})$ dBm/120kHz for intra-frequency measurements and $(-107.5 + \Delta MB_{P,n})$ dBm/120kHz for inter-frequency measurements.

The following methodology to define the Minimum SSB_RP level for power class X (PC_X) and operating band Y (Band_Y) is used:

 $For \ Intra-frequency: \ Minimum \ SSB_RP \ (PC_X, \ Band_Y) = -109.5 \ dBm/120kHz + Refsens_{PC_X, \ Band_Y, \ 50MHz} - Refsens_{PC_X,$

 $For\ Inter-frequency:\ Minimum\ SSB_RP\ (PC_X,\ Band_Y) = -107.5\ dBm/120kHz + Refsens\ _{PC_X,\ Band_Y,\ 50MHz} - Refsens\ _{PC_X,\ Ban$

B.2.1.3.2 Minimum SSB_RP values for angle of arrival within Spherical coverage

Minimum SSB_RP values in Tables B.2.2-2 and B.2.3-2 are based on EIS spherical coverage for the Operating band and for the UE power class, taking a baseline of UE power class 3 in Band n260 with 50 MHz channel bandwidth.

Minimum SSB_RP = EIS spherical coverage $_{PC3, n260, 50MHz}$ +Z -10Log $_{10}$ (PRB $_{Refsens}$ x 12) - SNR $_{Refsens}$ + SSB \hat{E} s/Iot + $\Delta MB_{S,n}$,

where:

EIS spherical coverage $_{PC3, n260, 50MHz}$ is the EIS spherical coverage value in dBm specified for power class 3 in Band n260 for 50MHz Channel bandwidth in TS 38.101-2 [19] Table 7.3.4.3-1;

Z is the gain difference between fine and rough beams, and is defined in Table B.2.1.3.2-1;

Table B.2.1.3.2-1: Gain difference Z between fine and rough beams, Spherical coverage directions

Value "Z" in dB, for each UE power class					
1	2	3	4		
FFS	9.0	7.0	FFS		

PRB_{Refsens} is N_{RB} associated with subcarrier spacing 120 kHz for 50MHz in TS 38.101-2 [19] Table 5.3.2-1, and is 32:

12 is the number of subcarriers in a PRB;

SNR_{Refsens} is the SNR used for simulation of Refsens and EIS spherical coverage, and is -1 dB;

SSB Ês/Iot is the minimum value required by the UE to perform measurements, and is -6 dB for intra-frequency measurements and -4 dB for inter-frequency measurements. The only contribution to Iot is the UE internal noise;

ΔMB_{S,n} is the UE multi-band relaxation factor value in dB specified in TS 38.101-2 [19] clause 6.2.1.

The calculated Minimum SSB_RP value for the baseline of UE power class 3 in Band n260 is $(-96.9 + \Delta MB_{S,n})$ dBm/120kHz for intra-frequency measurements and is $(-94.9 + \Delta MB_{S,n})$ dBm/120kHz for inter-frequency measurements.

The following methodology to define the Minimum SSB_RP level for power class X (PC_X) and operating band Y (Band Y) is used:

For Intra-frequency: Minimum SSB_RP (PC_X, Band_Y) = -96.9 dBm/120kHz + EIS spherical coverage $_{PC_X, Band_Y, 50MHz}$ - EIS spherical coverage $_{PC_X, Band_Y, 50MHz}$

For Inter-frequency: Minimum SSB_RP (PC_X, Band_Y) = -94.9 dBm/120kHz + EIS spherical coverage $_{PC_X, Band_Y, 50MHz}$ - EIS spherical coverage $_{PC_X, Band_Y, 50MHz}$

B.2.1.4 Gain to SS-RSRP measurement point for FR1

In FR1 conducted requirements are specified at the UE antenna connector, which is also the SS-RSRP measurement point.

B.2.1.5 Gain to SS-RSRP measurement point for FR2

B.2.1.5.1 Gain to SS-RSRP measurement point for Rx Beam Peak angle of arrival

In clause 5.1.1 of TS 38.215 [4] SS-RSRP is defined to be measured based on the combined signal from antenna elements corresponding to a given receiver branch. The reference point for requirement parameters from the UE perspective is the input of the UE antenna array. The gain "G" relates the combined signal from antenna elements corresponding to a given receiver branch to the reference point for requirement parameters.

The gain "G" affects absolute signal level values reported by the UE.

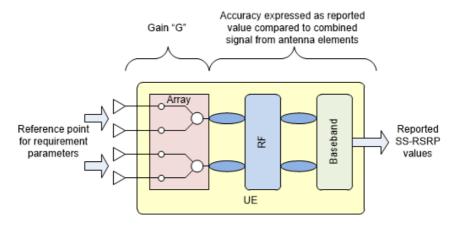


Figure B.2.1.5.1-1: Gain and Reference point for requirement parameters

The gain range for each power class is specified in Table B.2.1.5.1-1.

Table B.2.1.5.1-1: UE gain G, Rx beam peak direction

	UE Power class					
	1	2	3	4		
Minimum, dBi	FFS	FFS	-10	FFS		
Maximum, dBi	FFS	FFS	+20	FFS		

Gain range in spherical coverage directions may be lower than in Rx beam peak direction, according to the difference between the EIS spherical coverage value specified in TS 38.101-2 [19] clause 7.3.4 and the Reference sensitivity level specified in TS 38.101-2 [19] clause 7.3.2.

B.2.1.5.2 Gain to SS-RSRP measurement point for different frequency

In any specific direction, the UE gain G may be different depending on frequencies. The gain " G_{inter} " affects relative signal level values reported by the UE when measuring between different frequencies and is specified in Table B.2.1.5.2-1 for each power class.

Table B.2.1.5.2-1: UE gain difference between inter-frequencies Ginter

	UE Power class						
	1 2 3						
Maximum difference, dB	FFS	FFS	3	FFS			

B.2.1.5.3 Alignment of Rough beam to Rx beam Peak

The definition of Rx Beam Peak in TS 38.101-2 [19] clause 7.3.2 is based on Throughput at Reference sensitivity power level, and assumes use of Fine beams. In many RRM scenarios the UE can use Rough beams, but the largest Rough beam gain direction may not be aligned to the Fine beam Peak direction.

When the Rx Beam Peak is selected and defined based on Fine Beams, the rough beam gain in that direction may be lower than the largest rough beam gain in another direction within Spherical Coverage. The term "D" is the maximum allowed rough beam gain reduction, and is specified in Table B.2.1.5.3-1 for each power class.

Table B.2.1.5.3-1: Rough Beam gain reduction "D" in Rx Beam Peak direction

	UE Power class						
	1 2 3 4						
Maximum gain reduction, dB	FFS	FFS	5.5	FFS			

B.2.2 Conditions for NR intra-frequency measurements

This clause defines the following conditions for NR intra-frequency measurements and corresponding procedures performed based on SSBs: SSB_RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.2-1 for FR1 NR cells.

The conditions are defined in Table B.2.2-2 for FR2 NR cells.

Table B.2.2-1: Conditions for intra-frequency measurements in FR1

		Minimum	SSB_RP	SSB Ês/lot	
Parameter	NR operating band groups Note1	dBm/	SCS _{SSB}		
Parameter	NK operating band groups	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dB	
	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-127	-124		
	NR_FDD_FR1_B	-126.5	-123.5		
Conditions	NR_TDD_FR1_C	-126	-123	≥ -6	
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-125.5	-122.5	≥ -0	
	NR_FDD_FR1_E, NR_TDD_FR1_E	-125	-122		
	NR_FDD_FR1_G	-124	-121		
	NR_FDD_FR1_H	-123.5	-120.5		
NOTE 1:NR	operating band groups are defined in clause	e 3.5.2.	·		

Table B.2.2-2: Conditions for intra-frequency measurements in FR2

				SSB Ês/lot					
		NR operating		dBm / SCS _{SSB}					
Parameter	Angle of arrival			SCS _{SSB} =	: 120 kHz		SCS _{SSB} = 240 kHz	J.D.	
		bands		UE power class				dB	
			1	2	3	4	1, 2, 3, 4		
		n257	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄	(Value for SCSssB = 120 kHz) +3dB	≥-6	
	Rx Beam Peak	n258	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄			
		n260	- 125.3+Y ₁		-109.5	- 125.8+Y ₄			
Conditions		n261	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄			
Conditions		n257	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄			
	Spherical	n258	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄	(Value for SCSssb = 120	≥-6	
	COVERAGE Note 1	n260	- 117.3+Z ₁		-96.9	- 113.8+Z ₄	kHz) +3dB		
		n261	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄			

Note 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

Note 2: Values specified at the Reference point to give minimum SSB Ês/lot, with no applied noise.

Note 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΔMB_{P,n} and Spherical coverage values are increased by ΔMB_{S,n}, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.2-2:

⁻ The value of Y for power classes 1 and 4 is FFS, where Y₁ and Y₄ are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively

- The value of Z for power classes 1 and 4 is FFS, where Z₁ and Z₄ are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

B.2.3 Conditions for NR inter-frequency measurements

This clause defines the following conditions for NR inter-frequency measurements and corresponding procedures performed based on SSBs: SSB_RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.3-1 for FR1 NR cells.

The conditions are defined in Table B.2.3-2 for FR2 NR cells.

Table B.2.3-1: Conditions for inter-frequency measurements in FR1

		Minimum	SSB_RP	SSB Ês/lot
Parameter	NR operating band groups Note1	dBm /		
rarameter	NA operating band groups	SCS _{SSB} = 15	SCS _{SSB} = 30	dB
		kHz	kHz	
	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-125	-122	
	NR_FDD_FR1_B	-124.5	-121.5	
Conditions	NR_TDD_FR1_C	-124	-121	> -4
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-124.5	-120.5	≥ -4
	NR_FDD_FR1_E, NR_TDD_FR1_E	-123	-120	
	NR_FDD_FR1_G	-122	-119	
	NR_FDD_FR1_H	-121.5	-118.5	
NOTE 1:NR	operating band groups are defined in clause	3.5.2.	·	

Table B.2.3-2: Conditions for inter-frequency measurements in FR2

				SSB Ês/lot					
		ND		dBm / SCS _{SSB}					
Parameter	Angle of arrival	NR operating bands		SCS _{SSB} =	: 120 kHz		SCS _{SSB} = 240 kHz	40	
		bands		UE pow	er class		UE power class	dB	
			1	2	3	4	1, 2, 3, 4		
		n257	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄	(Value for SCS _{SSB} = 120 kHz) +3dB	≥-4	
	Rx Beam Peak	n258	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄			
		n260	- 123.3+Y ₁		-107.5	- 123.8+Y ₄			
Conditions		n261	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄			
Conditions		n257	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄			
	Spherical coverage	n258	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄	(Value for SCS _{SSB} = 120	≥-4	
	Note 1	n260	- 115.3+Z ₁		-94.9	- 111.8+Z ₄	kHz) +3dB	2-4	
		n261	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄			

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

NOTE 2: Values specified at the Reference point to give minimum SSB Ês/lot, with no applied noise.

NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΔMB_{P,n} and Spherical coverage values are increased by ΔMB_{S,n}, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.3-2:

- The value of Y for power classes 1 and 4 is FFS, where Y₁ and Y₄ are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively

- The value of Z for power classes 1 and 4 is FFS, where Z₁, and Z₄ are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

B.2.4 Conditions for NR L1-RSRP reporting

B.2.4.1 Conditions for SSB based L1-RSRP reporting

This clause defines the following conditions for NR L1-RSRP measurement reporting and corresponding procedures performed based on SSBs: SSB_RP and SSB £s/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.4.1-1 for FR1 NR cells.

The conditions are defined in Table B.2.4.1-2 for FR2 NR cells.

Table B.2.4.1-1: Conditions for SSB based L1-RSRP measurements in FR1

		Minimum	SSB_RP	SSB Ês/lot	
Parameter	NR operating band groups Note1	dBm /	SCS _{SSB}		
rarameter	ian operating band groups	SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	dB	
	NR_FDD_FR1_A, NR_TDD_FR1_A, NR_SDL_FR1_A	-124	-121		
	NR_FDD_FR1_B	-123.5	-120.5		
Conditions	NR_TDD_FR1_C	-123	-120	> 0	
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-122.5	-119.5	≥ -3	
	NR_FDD_FR1_E, NR_TDD_FR1_E	-122	-119		
	NR_FDD_FR1_G	-121	-118		
	NR_FDD_FR1_H	-120.5	-117.5	<u>i</u>	
NOTE 1:NR	operating band groups are defined in clause	3.5.2.	•		

Table B.2.4.1-2: Conditions for SSB based L1-RSRP measurements in FR2

				SSB Ês/lot				
		NR			dBm/S	CS _{SSB}		
Parameter	Angle of arrival	operating bands		SCS _{SSB} =	120 kHz		SCS _{SSB} = 240 kHz	dB
		Danus		UE pow	er class		UE power class	иь
			1	2	3	4	1, 2, 3, 4	
		n257	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄	(Value for SCSssb = 120 kHz) +3dB	≥-3
	Rx Beam Peak	n258	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄		
		n260	- 122.3+Y ₁		-106.5	- 122.8+Y ₄		
Conditions		n261	- 125.3+Y ₁	-110.8	-109.1	- 124.8+Y ₄		
Conditions		n257	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z₄		
	Spherical coverage Note 1	n258	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄	(Value for SCS _{SSB} = 120	≥-3
		n260	- 114.3+Z ₁		-93.9	- 110.8+Z ₄	kHz) +3dB	
		n261	- 117.3+Z ₁	-99.8	-98.2	- 115.8+Z ₄		

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

NOTE 2: Values specified at the Reference point to give minimum SSB £s/lot, with no applied noise.

NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by $\Delta MB_{P,n}$ and Spherical coverage values are increased by $\Delta MB_{S,n}$, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.4.1-2:

- The value of Y for power classes 1 and 4 is FFS, where Y_1 and Y_4 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively
- The value of Z for power classes 1 and 4 is FFS, where Z₁ and Z₄ are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

B.2.4.2 Conditions for CSI-RS based L1-RSRP reporting

This clause defines the following conditions for NR L1-RSRP measurement reporting and corresponding procedures performed based on CSI-RS: CSI-RS_RP and CSI-RS Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.4.2-1 for FR1 NR cells.

The conditions are defined in Table B.2.4.2-2 for FR2 NR cells.

Table B.2.4.2-1: Conditions for CSI-RS based L1-RSRP measurements in FR1

	NP operating		Minimum CSI-RS_RP		CSI-RS Ês/lot
Parameter	NR operating band groups ^{Note1}		dBm / SCS _{CSI-RS}		dB
	balla groups	SCS _{CSI-RS} = 15 kHz	SCS _{CSI-RS} = 30 kHz	SCS _{CSI-RS} = 60 kHz	uБ
	NR_FDD_FR1_A,				
	NR_TDD_FR1_A,	-124	-121	-118	
	NR_SDL_FR1_A				
	NR_FDD_FR1_B	-123.5	-120.5	-117.5	
	NR_TDD_FR1_C	-123	-120	-117	
Conditions	NR_FDD_FR1_D,	-122.5	-119.5	-116.5	≥ -3
	NR_TDD_FR1_D	-122.5	-119.5	-110.5	
	NR_FDD_FR1_E,	-122	-119	-116	
	NR_TDD_FR1_E	-122	-119	-116	
	NR_FDD_FR1_G	-121	-118	-115	
	NR_FDD_FR1_H	-120.5	-117.5	-114.5	
NOTE 4. NE		a ara dafinad in alauga	0.0		

NOTE 1: NR operating band groups are defined in clause 3.5.2.

Table B.2.4.2-2: Conditions for CSI-RS based L1-RSRP measurements in FR2

				CSI-RS Ês/lot				
Doromotor		NR			dBm / SC	Scsi-RS		
Parameter	Angle of arrival	operating		SCS _{CSI-RS}	= 60 kHz		SCS _{CSI-RS} = 120 kHz	40
		bands		UE pow	er class		UE power class	dB
			1	2	3	4	1, 2, 3, 4	
	Rx Beam Peak	n257	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄	(Value for SCScsl-Rs = 60 kHz) +3dB	
		n258	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄		≥-3
		n260	- 125.3+Y ₁		-109.5	- 125.8+Y ₄		
Conditions		n261	- 128.3+Y ₁	-113.8	-112.1	- 127.8+Y ₄		
Contactions		n257	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄		
	Spherical coverage Note 1	n258	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄	(Value for SCS _{CSI-RS} = 60 kHz) +3dB	≥-3
		n260	- 117.3+Z ₁		-96.9	- 113.8+Z ₄		
		n261	- 120.3+Z ₁	-102.8	-101.2	- 118.8+Z ₄		

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

NOTE 2: Values specified at the Reference point to give minimum CSI-RS Ês/lot, with no applied noise.

NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΔMB_{P,n} and Spherical coverage values are increased by ΔMB_{S,n}, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.4.2-2:

- The value of Y for power classes 1 and 4 is FFS, where Y₁ and Y₄ are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively
- The value of Z for power classes 1 and 4 is FFS, where Z₁ and Z₄ are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively

B.2.5 Conditions for RRC connection release with redirection to NR

This clause defines the following conditions for RRC connection release with redirection to NR: SSB_RP and SSB Ês/Iot, applicable for a corresponding operating band.

The conditions are defined in Table B.2.5-1 for FR1 NR cells.

The conditions are defined in Table B.2.5-2 for FR2 NR cells.

Table B.2.5-1: Conditions for for RRC connection release with redirection to NR in FR1

		Minimum	SSB_RP	SSB Ês/lot
Parameter	NR operating band groups Note1	dBm /	dB	
		SCS _{SSB} = 15 kHz	SCS _{SSB} = 30 kHz	иь
	NR_FDD_FR1_A, NR_TDD_FR1_A	-125	-122	
	NR_FDD_FR1_B	-124.5	-121.5	
	NR_TDD_FR1_C	-124	-121	
Conditions	NR_FDD_FR1_D, NR_TDD_FR1_D	-124.5	-120.5	≥ -4
	NR_FDD_FR1_E, NR_TDD_FR1_E	-123	-120	
	NR_FDD_FR1_G	-122	-119	
	NR_FDD_FR1_H	-121.5	-118.5	
NOTE 1: NF	depending band groups are defined in clause	3.5.2.		•

Table B.2.5-2: Conditions for RRC connection release with redirection to NR in FR2

				SSB Ês/lot					
		ND		dBm / SCS _{SSB}					
Parameter	Angle of arrival	NR operating bands		SCS _{SSB} =	= 120 kHz		SCS _{SSB} = 240 kHz	4D	
		Danus		UE pow	er class		UE power class	dB	
			1	2	3	4	1, 2, 3, 4		
		n257	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄	(Value for SCSssB = 120 kHz) +3dB	≥-4	
	Rx Beam Peak	n258	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄			
		n260	- 123.3+Y ₁		-107.5	- 123.8+Y ₄			
Conditions		n261	- 126.3+Y ₁	-111.8	-110.1	- 125.8+Y ₄			
Conditions		n257	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄			
	Spherical coverage	n258	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄	(Value for SCS _{SSB} = 120	≥-4	
	Note 1	n260	- 115.3+Z₁		-94.9	- 111.8+Z ₄	kHz) +3dB	2-4	
		n261	- 118.3+Z ₁	-100.8	-99.2	- 116.8+Z ₄			

NOTE 1: Values based on EIS spherical coverage as defined in clause 7.3.4 of TS 38.101-2 [19]. Side condition applies for directions in which EIS spherical coverage requirement is met.

NOTE 2: Values specified at the Reference point to give minimum SSB Ês/lot, with no applied noise.

NOTE 3: For UEs that support multiple FR2 bands, Rx Beam Peak values are increased by ΔMB_{P,n} and Spherical coverage values are increased by ΔMB_{S,n}, the UE multi-band relaxation factor in dB specified in clause 6.2.1 of TS 38.101-2 [19].

Editor's notes for Table B.2.5.2-2:

- The value of Y for power classes 1 and 4 is FFS, where Y_1 and Y_4 are the rough/fine beam gain differences in Rx beam peak direction for power classes 1 and 4 respectively
- The value of Z for power classes 1 and 4 is FFS, where Z₁ and Z₄ are the rough/fine beam gain differences in spherical coverage directions for power classes 1 and 4 respectively
- B.2.6 Void

B.2.6.1 Void

Table B.2.6.1-1: Void

Table B.2.6.1-2: Void

B.2.6.2 Void

B.3 RRM Requirements Exceptions

B.3.1 Introduction

Annex B.3 covers exceptions for side conditions based on receiver sensitivity for CA, DC, and SUL.

B.3.2 Receiver sensitivity relaxation for CA

B.3.2.1 Receiver sensitivity relaxation for UE supporting CA in FR1

For a UE supporting inter-band carrier aggregation configuration with uplink in NR band, if there is a relaxation of receiver sensitivity $\Delta R_{IB,c}>0$ dB as defined in clause 7.3A.3 of TS 38.101-1 [18], the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB,c}$ defined for the corresponding downlink NR bands.

For a UE supporting CA configuration in FR1, the requirement in this clause applies for both SC and CA operation.

B.3.2.2 Receiver sensitivity relaxation for UE configured with CA in FR1

B.3.2.2.1 Inter-band carrier aggregation

For a UE configured with inter-band carrier aggregation with active uplink in NR band, if there is a relaxation of receiver sensitivity $\Delta R_{IB,c}>0$ dB as defined in clause 7.3A.3 of TS 38.101-1 [18], the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB,c}$ defined for the corresponding downlink NR bands.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.2.1 should not be applied.

B.3.2.2.2 Reference sensitivity exceptions due to UL harmonic interference for CA

In this clause, requirements exceptions are described for the UE configured with a band in FR1 when it is impacted by UL harmonic interference from another band in FR1 of the same CA configuration.

A relevant side condition (SSB_RP and Io) in a requirement shall be increased by the amount Δ =L2-L1, where L1 is the reference sensitivity level specified in clause 7.3.2 of TS 38.101-1 [18], and L2 is the reference sensitivity level based on the requirements in clause 7.3A.4 of TS 38.101-1 [18], when the following conditions are fulfilled,

- corresponding downlink component carriers on different NR bands are configured with CA and active,
- the upling is configured in the NR low operating band and is active,

- the uplink configuration is as specified in clause 7.3A.4 of TS 38.101-1 [18], and
- the exception requirements specified in clause 7.3A.4 of TS 38.101-1 [18] apply.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.2.1 should not be applied.

B.3.2.2.3 Reference sensitivity exceptions due to intermodulation interference due to 2UL CA

In this clause, requirements exceptions are described for the UE with an inter-band carrier aggregation with uplink assigned to two NR bands.

A relevant side condition (SSB_RP and Io) in a requirement shall be increased by the amount Δ =L2-L1, where L1 is the reference sensitivity level specified in clause 7.3.2 of TS 38.101-1 [18], and L2 is the reference sensitivity level based on the requirements in clause 7.3A.5 of TS 38.101-1 [18], when the following conditions are fulfilled,

- corresponding downlink component carriers on different bands are configured with CA and active,
- uplinks are assigned to two NR bands,
- the exception requirements specified in clause 7.3A.5 of TS 38.101-1 [18] apply.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.2.1 should not be applied.

B.3.2.3 Receiver sensitivity relaxation for UE supporting CA in FR2

B.3.2.4 Receiver sensitivity relaxation for UE configured with CA in FR2

B.3.2.4.1 Intra-band contiguous carrier aggregation

For a UE configured with intra-band contiguous carrier aggregation in NR band in FR2, if there is a relaxation of receiver sensitivity $\Delta R_{IB}>0$ dB as defined in clause 7.3A.2.1 of TS 38.101-2 [19] depending on the aggregated channel bandwidth, the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB}$ defined for the corresponding downlink NR bands.

B.3.2.4.2 Intra-band non-contiguous carrier aggregation

For a UE configured with intra-band non-contiguous carrier aggregation in NR band in FR2, if there is a relaxation of receiver sensitivity $\Delta R_{IB}>0$ dB as defined in clause 7.3A.2.1 of TS 38.101-2 [19] depending on the aggregated channel bandwidth, the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta=\Delta R_{IB}$ defined for the corresponding downlink NR bands.

B.3.3 Receiver sensitivity relaxation for DC

B.3.3.1 Receiver sensitivity relaxation for EN-DC

Editor's note: TBD

B.3.3.2 Receiver sensitivity relaxation for NE-DC

Editor's note: TBD

B.3.4 Receiver sensitivity relaxation for SUL

B.3.4.1 Receiver sensitivity relaxation for UE supporting SUL in FR1

For a UE supporting a SUL configuration in FR1, if there is a relaxation of receiver sensitivity $\Delta R_{IB,c}>0$ dB as defined in clause 7.3C.3 of TS 38.101-1 [18], the relevant side conditions specifying received power levels (SSB_RP and Io) shall be increased by the amount $\Delta = \Delta R_{IB,c}$ defined for the corresponding downlink NR bands.

For a UE supporting a SUL configuration in FR1, the requirement in this clause applies for both SC and SUL operation.

B.3.4.2 Receiver sensitivity relaxation for UE configured with SUL in FR1

B.3.4.2.1 Reference sensitivity exceptions due to UL harmonic interference for SUL

In this clause, requirements exceptions are described for the UE with a band in FR1 when it is impacted by UL harmonic interference from another band in FR1 of the same SUL configuration.

A relevant side condition (SSB_RP and Io) in a requirement shall be increased by the amount Δ =L2-L1, where L1 is the reference sensitivity level specified in clause 7.3.2 of TS 38.101-1 [18], and L2 is the reference sensitivity level based on the requirements in clause 7.3C.2 of TS 38.101-1 [18], when the following conditions are fulfilled,

- a downlink component carrier is configured in NR band and is active,
- the upling is configured in the NR low operating band and is active,
- the uplink configuration is as specified in clause 7.3C.2 of TS 38.101-1 [18], and
- the exception requirements specified in clause 7.3C.2 of TS 38.101-1 [18] apply.

If the relaxation Δ specified in this clause applies, then the relaxation specified in clause B.3.4.1 should not be applied.

Annex C (informative): Change history

						Change history	
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2017-05	RAN4#83	R4-1706324				Specification skeleton	0.0.1
2017-09						Email approved	0.1.0
2017-09	RAN4-NR AH #3	R4-1709413				Capture TPs approved in the meeting	0.2.0
2017-10	RAN4#84 -Bis	R4-1711985				Capture TPs approved in the meeting	0.3.0
2017-12	RAN4#85	R4-1714546				Capture TPs approved in RAN4#85	0.4.0
2017-12	RAN#78	RP-172407				v1.0.0 submitted for plenary approval	1.0.0
2017-12	RAN#78					Approved by plenary – Rel-15 spec under change control	15.0.0
2018-03	RAN#79	RP-180264	0032		В	CR to TS38.133	15.1.0
2018-06	RAN#80	RP-181075	0037		В	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4 #86bis and RAN4 #87	15.2.0
2018-09	RAN#81	RP-181896	0043		В	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4-AH-1807 and RAN4 #88	15.3.0
2018-12	RAN#82	RP-182763	0057	3	В	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4-88bis and RAN4-89	15.4.0
2019-03	RAN#83	RP-190569	0064	1	В	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4#90	15.5.0
2019-06	RAN#84	RP-191240	0072	1	F	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4#90bis and RAN4#91	15.6.0
2019-09	RAN#85	RP-192022	0084		F	CR to TS 38.133: Implementation of endorsed draft CRs from RAN4#92 (Rel-15)	15.7.0
2019-12	RAN#86	RP-193039	0089		F	Correction to the starting point of the DRX cycle length interval	15.8.0
2019-12	RAN#86	RP-193042	0090		F	CR to 38.133 R15 Add the missing units to DRX cycle values	15.8.0
2019-12	RAN#86	RP-192997	0092	1	F	Specification of UE antenna gain range	15.8.0
2019-12	RAN#86	RP-192992	0094		F	Add RRM Test case setup for 1 AoA in Rx beam peak and 1 in non Rx beam peak	15.8.0
2019-12	RAN#86	RP-192997	0096		F	Update of Parameters, Test case A.7.7.1.1 FR2 Intra-frequency SS-RSRP accuracy	15.8.0
2019-12	RAN#86	RP-192997	0098		F	Update of Parameters, Test case A.5.7.1.1 FR2 Intra-frequency SS-RSRP accuracy	15.8.0
2019-12	RAN#86	RP-192997	0100		F	Update of Parameters, Test case A.7.7.1.2 FR2 Inter-frequency SS-RSRP accuracy	15.8.0
2019-12	RAN#86	RP-192997	0102		F	Update of Parameters, Test case A.5.7.1.2 FR2 Inter-frequency SS-RSRP accuracy	15.8.0
2019-12	RAN#86	RP-192992	0104		F	Correction to Random access test case in FR1 for PSCell in EN-DC	15.8.0
2019-12	RAN#86	RP-193040	0106		F	CR on handover 38.133	15.8.0
2019-12	RAN#86	RP-192994	0108		F	CR on the BWP switch test cases EN-DC FR1 (clause A.4.5.6)	15.8.0
2019-12	RAN#86	RP-192994	0109		F	CR on the BWP switch test cases EN-DC FR2 (clause A.5.5.6)	15.8.0
2019-12	RAN#86	RP-192994	0110		F	CR on the BWP switch test cases SA FR1 (clause A.6.5.6)	15.8.0
2019-12	RAN#86	RP-192994	0111		F	CR on the BWP switch test cases SA FR2 (clause A.7.5.6)	15.8.0
2019-12	RAN#86	RP-193042	0116		F	CR to TS38.133 on correction for BWP switching with SCS changing (Clause 8.2.1.2.7, 8.2.2.2.5 and 8.6.2)	15.8.0
2019-12	RAN#86	RP-193040	0120		F	CR on handover RRM requirement (clause 6.1.1.5) (R15)	15.8.0
2019-12	RAN#86	RP-192994	0122		F	CR on test cases for EN-DC FR2 inter-frequency measurement (clause A.5.6.2) (R15)	15.8.0
2019-12	RAN#86	RP-192994	0126		F	CR on test cases for Redirection from NR in FR2 to NR in FR2 (clause A.7.3.2.3) (R15)	15.8.0
2019-12	RAN#86	RP-192994	0128		F	CR on test cases for FR2 handover (clause A.7.3.1) (R15)	15.8.0
2019-12	RAN#86	RP-193042	0130		F	CR to 38.133 on TCI state switching (Clause 8.10) (R15)	15.8.0
2019-12	RAN#86	RP-192994	0136		F	CR on TC with monitoring PDCCH not in first 3 OFDM symbols R15	15.8.0
2019-12	RAN#86	RP-193042	0144		F	Editorial correction for SCell activation and deactivation delay	15.8.0
2019-12	RAN#86	RP-193040	0147		F	CR on inter-RAT measurement in TS38.133 (clause 9.4.2, 9.4.3)	15.8.0
2019-12	RAN#86	RP-193041	0155		F	CR on NR MTTD and MRTD definition for R15	15.8.0
2019-12	RAN#86	RP-193039	0158		F	CR for SCell activation delay in FR2	15.8.0
2019-12	RAN#86	RP-193040	0160		F	CR for scheduling restriction due to L1-RSRP measurement	15.8.0
2019-12	RAN#86	RP-192993	0166	1	F	CR on SSB setting for new gap and SMTC setting (Clause A.3.10)	15.8.0
2019-12	RAN#86	RP-192995	0168		F	CR on TS38.133 for EN-DC SS-SINR tests with PSCell in FR1 (Clause A.4.7.3)	15.8.0
2019-12	RAN#86	RP-192995	0170		F	CR on TS38.133 for SA SS-SINR tests with PCell in FR1 (Clause A.6.7.3)	15.8.0

2019-12 RANNESS RP-192986 0186 F endorsed CR on intra-frequency measurement and reporting for RN-DC FR2 RT 5.	15.8.0	CR on cell-reselection test cases for NR SA FR2 R15	F		0184	RP-192993	RAN#86	2019-12
2019-12 RAN#86 RP-192996 0189 F endorsed CR on intra-frequency measurement and reporting for NR SA FRZ R15 ST 1019-12 RAN#86 RP-192996 0192 F endorsed CR on RLM scheduling restrictions for EN-DC FRZ R15 2019-12 RAN#86 RP-192996 0192 F endorsed CR on RLM scheduling restrictions for NR SA FRZ R15 2019-12 RAN#86 RP-192990 0200 1 F Correction to PRACH configuration index in test cases 0219-12 RAN#86 RP-193030 0201 1 F Correction on the TCl state withing (clause 8.10) Correction on the TCl state withing (clause 8.10) RESTRICTION Correction on the TCl state withing (clause 8.10) RESTRICTION Correction on the TCl state withing (clause 8.10) RESTRICTION Correction on the TCl state withing (clause 8.10) RESTRICTION Correction on the TCl state withing (clause 8.10) RESTRICTION Correction on the TCl state withing (clause 8.10) RESTRICTION Correction on the TCl state withing (clause 8.10) RESTRICTION Correction on the TCl state withing (clause 8.10) RESTRICTION Correction on the TCl state withing (clause 8.10) RESTRICTION Correction on the TCl state withing (clause 9.10) RESTRICTION Correction on the TCl state withing (clause 9.10) RESTRICTION Correction on the TCl state withing (clause 9.10) RESTRICTION Correction on the TCl state withing (clause 9.10) RESTRICTION Correction to Clause 9.10 RESTRICTION Correction to Clause 9.10 RESTRICTION Correction to Clause 9.10 RESTRICTION Correction to Service withing (clause 9.10) RESTRICTION Correction to Service withing (clause 9.10) RESTRICTION Correction to Clause 9.10 RESTRICTION Correction to Clause 9.10 RESTRICTION RESTRICTION Correction to Clause 9.10 RESTRICTION	15.8.0		F		0186	RP-192995	RAN#86	2019-12
2019-12 RAN#86 RP-192996 0192 F endorsed CR on RLM Scheduling restrictions for RN-DC FRZ R15 2019-12 RAN#86 RP-192992 0200 1 F correction to PRACH configuration index in test cases 15 2019-12 RAN#86 RP-193039 0206 F correction on the TCI state switching (clause 8.10 N S AFR R2 R15 2019-12 RAN#86 RP-193039 0214 F Correction on the TCI state switching (clause 8.10 N S 17 PC R15 2019-12 RAN#86 RP-193039 0215 F Correction on the TCI state switching (clause 8.10 N S 17 PC R15 2019-12 RAN#86 RP-193039 0215 F CR for 38133 editorial for clause 8.5 in Rel-15 2019-12 RAN#86 RP-193039 0215 F CR for 38133 editorial for clause 8.5 in Rel-15 2019-12 RAN#86 RP-193040 0216 F CR for 38133 editorial for clause 9.3 in Rel-15 2019-12 RAN#86 RP-193040 0216 F CR for 38133 editorial for clause 9.3 in Rel-15 2019-12 RAN#86 RP-193040 0216 F CR for 38133 editorial for clause 9.3 in Rel-15 2019-12 RAN#86 RP-193040 0216 F CR for 38133 editorial for clause 9.3 in Rel-15 2019-12 RAN#86 RP-193040 0216 F CR for 38133 editorial for clause 9.3 in Rel-15 2019-12 RAN#86 RP-193040 0216 F CR for 38133 editorial for clause 9.3 in Rel-15 2019-12 RAN#86 RP-193040 0216 F CR for 38133 editorial for clause 9.3 in Rel-15 2019-12 RAN#86 RP-193040 0216 F CR for 38133 editorial for clause 9.3 in Rel-15 2019-12 RAN#86 RP-193040 0216 F CR for 38133 editorial for Clause 9.3 in Rel-15 2019-12 RAN#86 RP-193092 0234 F Editorial corrections to measurement accuracy tests 2019-12 RAN#86 RP-193092 0234 F Editorial corrections to SS-RNC and SS-SINR OTA tests with SA 2019-12 RAN#86 RP-193099 0234 F Editorial corrections to SS-RNC and SS-SINR OTA tests with SA 2019-12 RAN#86 RP-193099 0234 F Editorial corrections to town SS-SINR OTA tests with SA 2019-12 RAN#86 RP-193099 0265 F Corrections to town SS-RNC and SS-SINR OTA tests with SA 2019-12 RAN#86 RP-193099 0265 F COrrections to town SS-RNC and SS-SINR OTA tests with SA 2019-12 RAN#86 RP-193099 0265 F COrrections to town SS-RNC a	15.8.0	endorsed CR on intra-frequency measurement and reporting for	F		0188	RP-192996	RAN#86	2019-12
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2019-12 RAN#86 RP-192993 0319 F CR on power offset in TRS RMC (A.3.17) 2019-12 RAN#86 RP-192995 0321 F CR to introduce new PDCCH RMC (A.3.1.3.2) 2019-12 RAN#86 RP-192997 0323 F Maintenance CR for measurement accuracy (clause 10.1) 2019-12 RAN#86 RP-192996 0325 F FR1 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) 2019-12 RAN#86 RP-192996 0327 1 F FR2 CSI-RS RLM test OOS/IS non-DRX for EN-DC (clause A.4.5.1) 2019-12 RAN#86 RP-192996 0329 F FR1 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) 2019-12 RAN#86 RP-192997 0331 1 F FR2 CSI-RS RLM test OOS/IS non-DRX for SA (clause A.6.5.1) 2019-12 RAN#86 RP-192999 0333 1 F L1-RSRP delay test FR1 EN-DC (clause A.4.6.3) 2019-12 RAN#86 RP-192997 0335 F L1-RSRP delay test FR2 EN-DC (clause A.5.6.3) 2019-12 RAN#86 RP-1929997 0339 F L1	15.8.0			-				
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2019-12 RAN#86 RP-192992 0361 F CR 38.133 (A.7.5.7) TCs for PSCell addition and release delay 2019-12 RAN#86 RP-192995 0365 F CR to TS 38.133: New common clause with OTA related definitions for FR2 testing (Rel-15)	15.8.0	CR 38.133 (8.3.3) Correction of SCell deactivation delay	F		0359	RP-193039	RAN#86	2019-12
2019-12 RAN#86 RP-192995 0365 F CR to TS 38.133: New common clause with OTA related definitions for FR2 testing (Rel-15)	15.8.0							
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2019-12 RAN#86 RP-192995 0367 F CR to TS 38.133: Configuration of NR FR1 cell in NR FR1-FR2 tests (Rel-15)	15.8.0	CR to TS 38.133: Configuration of NR FR1 cell in NR FR1-FR2	F		0367	RP-192995	RAN#86	2019-12

2019-12	RAN#86	RP-192995	0369		F	CR to TS 38.133: Clarificatins to Antenna Configurations for FR2	15.8.0
						(Rel-15)	
2019-12	RAN#86	RP-192995	0371		F	CR to TS 38.133: Corrections to CORESET RMCs (Rel-15)	15.8.0
2019-12	RAN#86	RP-192995	0373		F	CR to TS 38.133: Corrections to FR2 test configurations (Rel-15)	15.8.0
2019-12	RAN#86	RP-193042	0375	1	F	Editorial updates (clause 9.4)	15.8.0
2019-12	RAN#86	RP-193039	0377	1	F	Correction in interruption requirements (clause 8.2)	15.8.0
2019-12	RAN#86			1	F		
		RP-193042	0379	ı		Editorial updates (Annex B)	15.8.0
2019-12	RAN#86	RP-193040	0381		F	CR on 38133 for MRTD and MTTD in intra-band EN-DC	15.8.0
2019-12	RAN#86	RP-192992	0384	1	F	CR for MAC-CE based TCI State switch for ENDC (Clause A.5.5.8)	15.8.0
2019-12	RAN#86	RP-192993	0385	1	В	CR for MAC-CE based TCI State switch for NR SA (Clause A.7.5.7)	15.8.0
2019-12	RAN#86	RP-192993	0386	1	В	CR for RRC based TCI State switch for NR SA (Clause A.7.5.7)	15.8.0
2019-12	RAN#86	RP-192993	0387	1	F	CR for RRC based TCI State switch for EN-DC (Clause A.5.5.8)	15.8.0
2019-12	RAN#86	RP-192992	0388	1	F	CR for FR1 handover test cases (Clause A.6.3.1.1, A.6.3.1.2,	15.8.0
						A.6.3.1.3)	
2019-12	RAN#86	RP-193041	0389	1	F	CR on MTTD for intra-band EN-DC	15.8.0
2019-12	RAN#86	RP-193040	0397		F	CR on corrections on NR intra frequency measurement reporting	15.8.0
						requirements (Clause 9.2.4)	
2020-03	RAN#87	RP-200400	0404	1	F	[CR] handover requirements 38.133 R15	15.9.0
				1			15.9.0
2020-03	RAN#87	RP-200400	0411	1	F	[CR] SCell activation delay 38.133 R15	
2020-03	RAN#87	RP-200400	0416	ļ	F	Corrections to RRM Test case A.7.1.1.2	15.9.0
2020-03	RAN#87	RP-200400	0418		F	Correction to Active UL BWP for SA intra-frequency event	15.9.0
						triggered reporting with per-UE gaps	
2020-03	RAN#87	RP-200400	0420	t	F	Correction to FR1-E-UTRA Inter-RAT cell re-selection test cases	15.9.0
2020-03	RAN#87	RP-200400	0420	-	F	Removal of Time offset between PCell and PSCell in SA RRM	15.9.0
2020-03	KAN#87	RP-200400	0422		F		15.9.0
			1	<u> </u>	<u> </u>	Test cases	
2020-03	RAN#87	RP-200400	0424		F	Correction to SRS periodicity and Offset for UL transit timing with DRx config	15.9.0
2020-03	RAN#87	RP-200400	0426		F	Update of Test Requirements, FR2 Intra-frequency SS-RSRP	15.9.0
						accuracy Test cases	
2020-03	RAN#87	RP-200400	0428		F	Update of Test requirements, FR2 Inter-frequency SS-RSRP	15.9.0
	D 4 1 1 1 1 0 =	DD 000101	0.100			accuracy Test cases	
2020-03	RAN#87	RP-200484	0438	2	F	CR on test cases for SA FR2 inter-frequency measurement R15 (section A.7.6.2)	15.9.0
2020-03	RAN#87	RP-200400	0444	1	F	Editorial corrections for 38.133 Perf Part R15	15.9.0
2020-03	RAN#87	RP-200400	0446		F	Editorial corrections for 38.133 Core Part R15	15.9.0
2020-03	RAN#87	RP-200400	0453		F	Editorial correction for active TCI state switching delay	15.9.0
2020-03	RAN#87	RP-200400	0461	1	F	Corrections for BWP switch delay R15	15.9.0
2020-03	RAN#87	RP-200400	0463		F	CR for reference correction on L1-RSRP measurement period (section 9.5.3)	15.9.0
2020 02	D 4 N # 0 7	DD 000400	0.405		-		45.00
2020-03	RAN#87	RP-200400	0465		F	CR for measurement restriction in FR2 across CCs (section 8.1.2.3, 8.1.3.3, 8.5.2.3, 8.5.3.3, 8.5.5.3, 8.5.6.3, 9.5.5.1, 9.5.5.2)	15.9.0
2020-03	RAN#87	RP-200400	0467		F	CR for SSB based candidate beam detection (section 8.5.5.2)	15.9.0
2020-03	RAN#87	RP-200400	0487		F	CR to TS 38.133: Corrections to FR1-FR2 event triggered test cases Annex A.5 (Rel-15)	15.9.0
2020-03	RAN#87	RP-200400	0489		F	CR to TS 38.133: Corrections to FR1-FR2 event triggered test cases Annex A.7 (Rel-15)	15.9.0
2020.02	D A NI#OZ	RP-200400	0404		-	CR to TS 38.133: Clarifications to AoA setup and AoA cell	1E 0 0
2020-03	RAN#87	KP-200400	0491		F	assignement Annex A.5 (Rel-15)	15.9.0
2020-03	RAN#87	RP-200400	0493		F	CR to TS 38.133: Clarifications to AoA setup Annex A.8 (Rel-15)	15.9.0
2020-03	RAN#87	RP-200400	0495	†	F	CR to TS 38.133: Addition of TC A.4.7.2.2 (Rel-15)	15.9.0
				 			
2020-03	RAN#87	RP-200400	0499		F	Editorial correction of EN-DC FR1 L1-RSRP measurement for	15.9.0
2020-03	RAN#87	RP-200400	0501		F	beam reporting Editorial correction of NR SA FR1 L1-RSRP measurement for	15.9.0
		-				beam reporting	
2020-03	RAN#87	RP-200400	0508		F	CR on removing one-shot timing adjustment requirements	15.9.0
				4			
2020-03	RAN#87	RP-200400	0515	1	F	Correction to BWP switching delay	15.9.0
2020-03	RAN#87	RP-200400	0517	1	F	Correction to inter-RAT measurement on LTE serving carrrier	15.9.0
2020-03	RAN#87	RP-200400	0519	1	F	Correction to configurations for TRS	15.9.0
2020-03	RAN#87	RP-200400	0521		F	Correction to FR1 SA inter-RAT measurement TCs	15.9.0
00		_55.00				NOTE The CR is not implemented because the changes in this CR were already implemented in the latest version	2.3.0
						of the specification.	
2020-03	RAN#87	RP-200400	0523		F		15.9.0
2020-03	RAN#87	RP-200400	0523		F	of the specification. Correction to interruption TCs NOTE The CR is not implemented because some parts of changes in the CR were already implemented in the latest version of the specification.	15.9.0
2020-03	RAN#87	RP-200400	0523		F	of the specification. Correction to interruption TCs NOTE The CR is not implemented because some parts of changes in the CR were already implemented in the	15.9.0

2020-03 RANBEY RP-200400 0531 F Correction to U.; reconfiguration delay 105 15.9.0				T			Ta	T 1
2020-09 RANNEY RP-200400 0541 F CR on cell respectation test cases for PRZ SA R15 15.9.0 2020-09 RANNEY RP-200400 0541 F CR on cell respectation test cases for PRZ SA R15 15.9.0 2020-09 RANNEY RP-200400 0563 F CR On cell respectation test cases for PRZ SA R15 15.9.0 2020-09 RANNEY RP-200400 0563 F CR SA R13 R17 Correction 15.9.0 2020-09 RANNEY RP-200400 0563 F RN editorial correction 15.9.0 2020-09 RANNEY RP-200400 0565 F RN editorial corrections to PSC elicitating delay 15.9.0 2020-09 RANNES RP-200400 0586 F PRACH configurations in FRI SSB based RLM tests 15.9.0 2020-09 RANNES RP-200400 0586 F PRACH configurations in FRI SSB based RLM tests 15.9.0 2020-09 RANNES RP-20087 0594 F CR 8.1 CR 8 Editorial corrections for 93.138 R15 Core Part 15.10.0 2020-06 RANNES RP-20087 0594 F CR 8 C	2020-03	RAN#87	RP-200400	0531		F	Correction to UL reconfiguration delay TCs	15.9.0
2020-03 RANNET RP-200400 0643 F CR to not eliroselection total cases for FRZ SA R15 15.9.0 2020-03 RANNET RP-200400 0653 F NR editorial correction to TDM-ed SSS R15 15.9.0 2020-03 RANNET RP-200400 0569 F RR editorial correction to PSCell change delay 15.9.0 2020-03 RANNET RP-200400 0579 F RR editorial correction to PSCell change delay 15.9.0 2020-03 RANNET RP-200400 0579 F RR editorial correction to PSCell change delay 15.9.0 2020-04 RANNET RP-200400 0588 F RR editorial corrections for St. 158 based ER LM tests 15.9.0 2020-05 RANNES RP-20087 0594 1 F CR Editorial corrections for St. 158 based ER LM tests 15.9.0 2020-06 RANNES RP-200887 0597 1 F CR Editorial corrections for St. 158 based ER LM tests 15.9.0 2020-06 RANNES RP-200887 0597 1 F CR Editorial corrections for St. 158 based ER LM tests 15.10.0 2020-06 RANNES RP-200887 0505 1 F CR Editorial corrections for St. 158 based ER LM tests 15.10.0 2020-06 RANNES RP-200887 0505 1 F CR Editorial corrections for St. 158 based ER LM tests 15.10.0 2020-06 RANNES RP-200887 0505 1 F CR Editorial corrections for St. 158 based ER LM tests 15.10.0 2020-06 RANNES RP-200887 0505 1 F CR Editorial corrections for St. 158 based ER LM tests 15.10.0 2020-06 RANNES RP-200887 0505 1 F CR Editorial correction for St. 158 based ER LM tests 15.10.0 2020-06 RANNES RP-200887 0505 1 F CR Editorial correction for St. 158 based ER LM tests 15.10.0 2020-06 RANNES RP-200887 0505 1 F CR Editorial correction for St. 158 based ER LM tests 15.10.0 2020-06 RANNES RP-200887 0555 F CR EA RATUS Editorial correction for St. 158 based ER LM tests 15.10.0 2020-06 RANNES RP-200887 0554 F LM tests 15.10.0 2020-06 RANNES RP-200887 0555 F LM tests 15.10.0 2020-06 RANNES RP-200887 0555 F LM tests 15.10.0 2020-06 RANNES RP-200887 0565 F LM	2020-03	RAN#87	RP-200400	0537		F	CR on SSB RLM test cases EN-DC R15	15.9.0
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2020-06	RAN#88	RP-200987	0834		F	CR to TCI state switch TC R15	15.10.0
2020-06	RAN#88	RP-200987	0866		F	Clarification on RLM	15.10.0
2020-09	RAN#89	RP-201512	8880		F	CR to Redirection from NR in FR1 to E-UTRAN	15.11.0
2020-09	RAN#89	RP-201512	0890		F	CR to timing advance adjustment accuracy in FR1	15.11.0
2020-09	RAN#89	RP-201512	0894		F	CR to SS-RSRQ Intra-Frequency and Inter-frequency FR1 measurement accuracy	15.11.0
2020-09	RAN#89	RP-201512	0896		F	Update to FR2 240kHz SSB Configurations	15.11.0
2020-09	RAN#89	RP-201512	0898		F	Update of FR2 Random Access Test cases	15.11.0
2020-09	RAN#89	RP-201512	0900		F	Update to FR2 event-triggered reporting RRM Test cases in A.5.6 and A.7.6	15.11.0
2020-09	RAN#89	RP-201512	0902		F	Update to FR2 SS-RSRP RRM Test cases in A.5.7 and A.7.7	15.11.0
2020-09	RAN#89	RP-201512	0904		F	CR to EN-DC timing advance adjustment accuracy in FR2	15.11.0
2020-09	RAN#89	RP-201512	0906		F	CR to configuration of CSI-RS for tracking	15.11.0
2020-09	RAN#89	RP-201512	0908	1	F	Update of RRC-based Active BWP Switch test cases	15.11.0
2020-09	RAN#89	RP-201512	0910	<u> </u>	F	Update to FR2 Annex B RRM side conditions	15.11.0
2020-09	RAN#89	RP-201512	0912		F	Add UE Beam assumption for RRM Test cases in A.5.5	15.11.0
2020-09	RAN#89	RP-201512	0921		F	Add UE Beam assumption for RRM Test cases in A.7.5 Rel-15	15.11.0
2020-09	RAN#89	RP-201512	0932		F	CR for TS38.133 Rel-15, Correction for RRM core requirements	15.11.0
2020-09	RAN#89	RP-201512	0934	1	F	CR for TS38.133 Rel-15, Correction for test cases of BWP	15.11.0
				,		switching	
2020-09	RAN#89	RP-201512	0945	1	F	CR on TS38.133 for handover test cases	15.11.0
2020-09	RAN#89	RP-201512	0947		F	CR on TS38.133 for introducing the PDSCH RMC configuration in cell re-selection test cases	15.11.0
2020-09	RAN#89	RP-201512	0955	1	F	CR on FR2 measurement capability for R15	15.11.0
2020-09	RAN#89	RP-201512	0962		F	CR on Inter-RAT RSTD measurements (section 9.4.4)	15.11.0
2020-09	RAN#89	RP-201512	0964	1	F	CR on active BWP switch in R15	15.11.0
2020-09	RAN#89	RP-201512	0985		F	CR for SCell activation delay in FR2 in R15	15.11.0
2020-09	RAN#89	RP-201512	0987	1	F	CR on TCI state switch delay in R15	15.11.0
2020-09	RAN#89	RP-201512	1002	1	F	Fine/rough beam assumption for idle mode and measurement procedure test case	15.11.0
2020-09	RAN#89	RP-201512	1022		F	Clarification of SNR values in RLM Test cases	15.11.0
2020-09	RAN#89	RP-201512	1024		F	CR to TS 38.133: Corrections to CSI-RS configurations in A.3.14 (Rel-15)	15.11.0
2020-09	RAN#89	RP-201512	1026		F	CR to TS 38.133: Corrections to event triggered test cases (Rel-15)	15.11.0
2020-09	RAN#89	RP-201512	1028		F	CR to TS 38.133: Corrections to inter-RAT test cases (Rel-15)	15.11.0
2020-09	RAN#89	RP-201512	1028		F	CR to TS 38.133: Corrections to AoA setup information in some	15.11.0
2020-09	IVAIN#03	101-201312	1030		'	test cases (Rel-15)	13.11.0
2020-09	RAN#89	RP-201512	1032	1	F	CR on maintaining handover tests in Rel-15	15.11.0
2020-09	RAN#89	RP-201512	1047	1	F	CR on reporting criteria for EN-DC in 38.133 R15	15.11.0
2020-09	RAN#89	RP-201512	1047	1	F	CR on test cases for Active TCI state switch delay R15	15.11.0
2020-09	RAN#89	RP-201512	1051	1	F	Addition of new default configurations for RMC scheduling	15.11.0
2020-09	RAN#89	RP-201512	1053	1	F	Correction to beam failure detection and link recovery test cases	15.11.0
2020-09	RAN#89	RP-201512	1055	1	F	Correction to BWP switching delay test cases	15.11.0
2020-09	RAN#89	RP-201512	1057	i i	F	Correction to FR1 intra-frequency measurement with gap test	15.11.0
2020-09	RAN#89	RP-201512	1059	1	F	Correction to inter-RAT HO test cases	15.11.0
2020-09		RP-201512 RP-201512		- '			
	RAN#89		1069	4	F	CR on correction to CSSF within gap R15	15.11.0
2020-09 2020-09	RAN#89	RP-201512	1071	1	F	CR on SCell activation requirements R15	15.11.0
	RAN#89	RP-201512	1073	1	F	CR on BWP switching delay requirements R15	15.11.0
2020-09	RAN#89	RP-201512	1074	1	F	CR on UL BWP configuration for RRM test cases R15	15.11.0
2020-09	RAN#89	RP-201512 RP-201512	1076	1	F	CR to add UE beam assumption for TC in A.5.6 R15 CR to 38.133: Correction to RRC basd BWP switch delay	15.11.0
2020-09	RAN#89		1096			requirements	15.11.0
2020-09	RAN#89	RP-201512	1098	1	F	CR to 38.133: Correction to interruption requirements for per-FR gap in FR2	15.11.0
2020-09	RAN#89	RP-201512	1110		F	[CR] Replacing x in references with correct numbers (Core R15 Cat F)	15.11.0
2020-09	RAN#89	RP-201512	1112		F	[CR] Replacing x in references with correct numbers (Perf R15 Cat F)	15.11.0
2020-12	RAN#90	RP-202487	1118	1	F	RB allocation and Noc level in RLM Test cases	15.12.0
2020-12	RAN#90	RP-202487	1120		F	Update FR2 event-triggered reporting Test cases in A.5.6, A.7.6	15.12.0
2020-12	RAN#90	RP-202487	1122		F	240kHz SSB SCS Configuration for FR2 SS-RSRP Test cases	15.12.0
2020-12	RAN#90	RP-202487	1124	1	F	Correct UE beam assumption for Test Cases in A.5.6	15.12.0
	RAN#90	RP-202487	1126	1	F	Aggregation level of CORESET for RMC scheduling	15.12.0
2020-12			1128		F	Clarify FR1 NSA SS-SINR measurement TCs	15.12.0
2020-12 2020-12	RAN#90	RP-202487	1120				15.12.0
2020-12	RAN#90				F	IFR1 Inter-frequency Event triggered Reporting tests in DRX	10.12.0
		RP-202487 RP-202487 RP-202487	1130		F	FR1 Inter-frequency Event triggered Reporting tests in DRX E-UTRAN	
2020-12 2020-12 2020-12	RAN#90 RAN#90 RAN#90	RP-202487 RP-202487	1130 1132	1		E-UTRAN	15.12.0
2020-12 2020-12	RAN#90 RAN#90	RP-202487	1130	1 1	F	E-UTRAN CR on CSI-RS BW condition for BFD/CBD R15	15.12.0
2020-12 2020-12 2020-12 2020-12 2020-12	RAN#90 RAN#90 RAN#90 RAN#90 RAN#90	RP-202487 RP-202487 RP-202486 RP-202486	1130 1132 1145 1147		F F	E-UTRAN CR on CSI-RS BW condition for BFD/CBD R15 CR on AP-CSI-RS based L1-RSRP measurement R15	15.12.0 15.12.0 15.12.0
2020-12 2020-12 2020-12 2020-12 2020-12 2020-12	RAN#90 RAN#90 RAN#90 RAN#90 RAN#90 RAN#90	RP-202487 RP-202487 RP-202486 RP-202486 RP-202487	1130 1132 1145 1147 1159		F F	E-UTRAN CR on CSI-RS BW condition for BFD/CBD R15 CR on AP-CSI-RS based L1-RSRP measurement R15 CR on TS38.133 for cell activation and deactivation test case	15.12.0 15.12.0 15.12.0 15.12.0
2020-12 2020-12 2020-12 2020-12 2020-12	RAN#90 RAN#90 RAN#90 RAN#90 RAN#90	RP-202487 RP-202487 RP-202486 RP-202486	1130 1132 1145 1147	1	F F F	E-UTRAN CR on CSI-RS BW condition for BFD/CBD R15 CR on AP-CSI-RS based L1-RSRP measurement R15	15.12.0 15.12.0

2020-12	RAN#90	RP-202486	1195		F	CR on carrier frequency range of PCell/PSCell for the maximum number of RLM-RS resources	15.12.0
2020-12	RAN#90	RP-202486	1201	1	F	CR on MO merge in R15	15.12.0
2020-12	RAN#90	RP-202487	1208	1	F	Correction on beamFailureInstanceMaxCount for test case of availability restriction during FR2 BFR in R15	15.12.0
2020-12	RAN#90	RP-202487	1215		F	Correction of RRM tests	15.12.0
2020-12	RAN#90	RP-202487	1224		F	Correction to types of requirements in annex A	15.12.0
2020-12	RAN#90	RP-202487	1226	1	F	Corrections to frequency range in interfrequency measurement procedures tests	15.12.0
2020-12	RAN#90	RP-202487	1229		F	Correction on TBD values in FR1+FR2 interfrequency RSRP accuracy tests	15.12.0
2020-12	RAN#90	RP-202486	1231		F	Addition of symbol definitions	15.12.0
2020-12	RAN#90	RP-202487	1235	1	F	Square bracket removal in 38.133 section A.1 to A.5	15.12.0
2020-12	RAN#90	RP-202487	1237	1	F	Square bracket removal in 38.133 section A.6 to A.8	15.12.0
2020-12	RAN#90	RP-202486	1251	1	F	CR to TS 38.133 on DCI based BWP switch requirements applicability	15.12.0
2020-12	RAN#90	RP-202487	1258	1	F	Correction to CSI-RS RMC configuration R15	15.12.0
2020-12	RAN#90	RP-202487	1260	1	F	Correction to cell reselection test cases R15	15.12.0
2020-12	RAN#90	RP-202487	1262	1	F	Correction to inter-RAT handover test cases R15	15.12.0
2020-12		RP-202487	1264	1	F	Correction to NR measurement under LTE SA test cases R15	15.12.0
2020-12	RAN#90	RP-202487	1266	1	F	Correction to inter-RAT SFTD measurement test cases R15	15.12.0
2020-12	RAN#90	RP-202487	1270	<u> </u>	F	CR on maintaining BFD/CBD measurements test cases R15	15.12.0
2020-12	RAN#90	RP-202486	1295	1	F	CR on RRC-based BWP switch requirements	15.12.0
2020-12	RAN#90	RP-202487	1297	1	F	CR on RRC-based active TCI state switch test case Rel-15	15.12.0
2020-12	RAN#90	RP-202486	1310	<u> </u>	F	[CR] Specify RRC processing delay in TCI state switching delay	15.12.0
2020-12	RAN#90	RP-202487	1312	1	F	[CR] NR Perf Maintenance R15 Cat F	15.12.0
2020-12	RAN#90	RP-202486	1316	1	F	CR on SCell activation requirements R15	15.12.0
2020-12	RAN#90	RP-202487	1318	- '	F	CR on FR2 unkown SCell activation test cases R15	15.12.0
2020-12	RAN#90	RP-202487	1320		F	CR on BWP in L1-RSRP delay and accuracy test cases R15	15.12.0
				1	F		
2020-12	RAN#90	RP-202486	1335			Introducing reference to the source of the Lmax and NRLM.	15.12.0
2020-12	RAN#90	RP-202487	1341	1	F	CR to TS 38.133: Corrections to inter-RAT FR1 test cases (Rel-15)	15.12.0
2020-12	RAN#90	RP-202487	1343	1	F	CR to TS 38.133: Corrections to inter-RAT FR2 test cases (Rel-15)	15.12.0
2020-12		RP-202487	1349	_	F	CR 38.133 Corrections to test cases for TCl state switching	15.12.0
2020-12	RAN#90	RP-202487	1363	1	F	Removal of annex B.2.6 on one shot timing adjustment in 38.133	15.12.0
2020-12	RAN#90	RP-202487	1365	1	F	Correction to NR FR1 DL active BWP switch of Cell with non-DRX in SA (A.6.5.6.2.1)	15.12.0
2020-12	RAN#90	RP-202486	1371	2	F	CR to 38.133 on Active BWP switch and Active TCI State Switching requirements - Rel15	15.12.0
2021-03	RAN#91	RP-210116	1404	1	F	CR on correcting SSB and RACH configuration in CSI-RS based beam failure detection and link recovery tests	15.13.0
2021-03	RAN#91	RP-210116	1416	1	F	[CR] RRM test case maintenance R15 Cat F	15.13.0
2021-03	RAN#91	RP-210116	1422	1	F	Update FR2 Reference channels and OCNG for FR2 RRM Test cases	15.13.0
2021-03	RAN#91	RP-210116	1425		F	CR to FR1 SA SS-SINR measurement TCs	15.13.0
2021-03	RAN#91	RP-210116	1428		F	CR on E-UTRA carrier for EN-DC event triggered reporting tests	15.13.0
2021-03	RAN#91	RP-210116	1431		F	Add missing FR2 Test case setups and Beam assumptions	15.13.0
2021-03	RAN#91	RP-210116	1494		F	Correction to cell reselection test case	15.13.0
2021-03	RAN#91	RP-210116	1503		F	Update of DRX configuration in FR1 Event-triggered Test cases	15.13.0
2021-03	RAN#91	RP-210116	1512		F	Correction on PRACH configuration for FR2 Non-Contention based Random Access in R15	15.13.0
2021-03	RAN#91	RP-210116	1515	1	F	Correction on PRACH configuration for Beam Failure Detection and Link Recovery Test in R15	15.13.0
2021-03	RAN#91	RP-210116	1518		F	Correction on PRACH RMC for FR1 CSI-RS based Non- Contention based Random Access for BFR in R15	15.13.0
2021-03	RAN#91	RP-210117	1537	2	F	CR on Scell activation delay maintenance (R15)	15.13.0
2021-03	RAN#91	RP-210116	1545		F	CR for test requirements correction of SA event triggered reporting tests for FR1 inter-frequency measurements with SSB time index	15.13.0
0004.00	DANIIIO	DD 04044=	4540	_	_	detection when DRX is used	45.40.0
2021-03	RAN#91	RP-210117	1548	1	F	CR on R15 remaining issues	15.13.0
2021-03	RAN#91	RP-210116	1563	1	F	Correction on the power of the first preamble for random access in EN-DC and SA in R15	15.13.0
2021-03	RAN#91	RP-210116	1566	2	F	Correction on the time for Scell activation and CSI-report in R15	15.13.0
2021-03	RAN#91	RP-210116	1569	1	F	Correction on the Noc level in TS38.133 in R15	15.13.0
		RP-210117	1605	1	F	CR on the filter for beam failure indications in 38.133	15.13.0
2021-03	RAN#91		14044	1	F	Correction to Aperiodic CSI-RS configurations R15	15.13.0
2021-03 2021-03	RAN#91	RP-210116	1614				45 40 0
2021-03 2021-03 2021-03	RAN#91 RAN#91	RP-210116	1617		F	Correction to radio link monitoring test cases R15	15.13.0
2021-03 2021-03 2021-03 2021-03	RAN#91 RAN#91 RAN#91	RP-210116 RP-210116	1617 1620	2	F	Correction to beam failure recovery test cases R15	15.13.0
2021-03 2021-03 2021-03 2021-03 2021-03	RAN#91 RAN#91 RAN#91 RAN#91	RP-210116 RP-210116 RP-210116	1617 1620 1623	1	F F	Correction to beam failure recovery test cases R15 Correction to L1-RSRP reporting delay test cases R15	15.13.0 15.13.0
2021-03 2021-03 2021-03 2021-03	RAN#91 RAN#91 RAN#91 RAN#91	RP-210116 RP-210116	1617 1620		F	Correction to beam failure recovery test cases R15 Correction to L1-RSRP reporting delay test cases R15 CR on maintaining Antenna configurations in TS38.133 R15	15.13.0
2021-03 2021-03 2021-03 2021-03 2021-03	RAN#91 RAN#91 RAN#91 RAN#91	RP-210116 RP-210116 RP-210116 RP-210122 RP-210122	1617 1620 1623	1	F F	Correction to beam failure recovery test cases R15 Correction to L1-RSRP reporting delay test cases R15	15.13.0 15.13.0
2021-03 2021-03 2021-03 2021-03 2021-03 2021-03	RAN#91 RAN#91 RAN#91 RAN#91	RP-210116 RP-210116 RP-210116 RP-210122	1617 1620 1623 1634	1 2	F F	Correction to beam failure recovery test cases R15 Correction to L1-RSRP reporting delay test cases R15 CR on maintaining Antenna configurations in TS38.133 R15	15.13.0 15.13.0 15.13.0
2021-03 2021-03 2021-03 2021-03 2021-03 2021-03 2021-03	RAN#91 RAN#91 RAN#91 RAN#91 RAN#91	RP-210116 RP-210116 RP-210116 RP-210122 RP-210122	1617 1620 1623 1634 1637	1 2 1	F F F	Correction to beam failure recovery test cases R15 Correction to L1-RSRP reporting delay test cases R15 CR on maintaining Antenna configurations in TS38.133 R15 CR on test requirements for measurement performance tests R15	15.13.0 15.13.0 15.13.0 15.13.0

2021-03	RAN#91	RP-210116	1749		F	CR on test cases for inter-RAT measurement r15	15.13.0
		111 210110				CR on SCell activation delay, cell idenfication requirements on	1011010
2021-03	RAN#91	RP-210117	1752	2	F	deactivated SCell and inter-RAT ECID requirements for NE-DC R15	15.13.0
2021-03	RAN#91	RP-210116	1755	1	F	CR on SCell activation TCs R15	15.13.0
2021-03	RAN#91	RP-210116	1779	2	F	Cat-F CR to addition of TRS Configurations in Rel-15 Test Cases	15.13.0
2021-06	RAN#92	RP-211080	1810	1	F	CR to Interruptions during measurements on deactivated NR SCC	15.14.0
		RP-211083	1813		F	CR to CSI-RS based L1-RSRP measurement on resource set with	
<u>2021-06</u> 2021-06	RAN#92 RAN#92	RP-211084	1816		F	repetition off TCs CR to the notation of SMTC in the general test parameters of Re-	<u>15.14.0</u> 15.14.0
	_					establishment TCs	
2021-06	RAN#92	RP-211084	1819		F	CR to BWP configuration for interruption test case.	15.14.0
2021-06	RAN#92	RP-211080	1825	1	F	Update of DRX configuration in Event-triggered Test cases	15.14.0
2021-06	RAN#92	RP-211081	1831	1	F	Update RRM Test cases where 66RBs gives insufficient dB range	15.14.0
2021-06	RAN#92	RP-211081	1834	1	F	Update Reference channels and OCNG for FR2 240kHz SSB SCS RRM Test cases	15.14.0
2021-06	RAN#92	RP-211081	1837	1	F	Cat-F CR to Cell Reselection Tests with Async Cells in Rel-15	15.14.0
2021-06	RAN#92	RP-211081	1842	1	F	Cat-F CR to FR2 CORESET and Search Space RMC in Rel-15	15.14.0
2021-06	RAN#92	RP-211085	1845		F	Cat-F CR to PDSCH RMC in Rel-15	15.14.0
2021-06	RAN#92	RP-211085	1848		F	Cat-F CR to TRS Configuration in Rel-15 Test Case	15.14.0
2021-06	RAN#92	RP-211081	1855	1	F	Maintenance CR for test cases - R15	15.14.0
2021-06	RAN#92	RP-211085	1862		F	CR on BFD and link recovery test cases	15.14.0
2021-06	RAN#92	RP-211080	1885	1	F	Maintenance on CSSF for EN-DC and deactivated SCell measurement R15	15.14.0
2021-06	RAN#92	RP-211080	1896	1	F	Core requirement maintenance on signal characteristics (R15)	15.14.0
2021-06	RAN#92	RP-211081	1928	1	F	Correction on the SS-RSRP difference value for SS-RSRP	15.14.0
2021-06	RAN#92	RP-211081	1931	1	F	measurement TC in R15 Correction on the CSI-reporting period for SCell activation delay in	15.14.0
2021-06	RAN#92	RP-211080	1938	1	F	R15 CR on scheduling restriction of UE during intra-frequency	15.14.0
2021-06	RAN#92	RP-211087	1981		F	measurements on FR2 in R15 CR to TS 38.133: Correction of TDD Configuration for several TCs	15.14.0
2021-06	RAN#92	RP-211081	1984	1	F	(Rel-15) CR to TS 38.133: Correction of OCNG pattern for several TCs	15.14.0
				'		(Rel-15)	
2021-06	RAN#92	RP-211087	1987		F	CR to TS 38.133: Correction of IRAT TCs (Rel-15)	15.14.0
2021-06	RAN#92	RP-211087	1990		F	CR to TS 38.133: Corrections to SS-RSRP/RSRQ/SINR accuracy	15.14.0
0004.00	DANI//OO	DD 044000	4000		_	TCs (Rel 15)	45.44.0
2021-06	RAN#92	RP-211080	1993	1	F	CR to TS 38.133: Several corrections to TCs (Rel 15)	15.14.0
2021-06	RAN#92	RP-211087	2031		F	CR on measurement on deactivated SCell and interruption to NR serving cells for measurements on deactivated NR Scell	15.14.0
2021-06	RAN#92	RP-211088	2056		F	Correction to CSI-RS reference configuration_R15	15.14.0
2021-06	RAN#92	RP-211089	2063		F	Correction to TRS reference configuration_R15	15.14.0
2021-06	RAN#92	RP-211081	2066	1	F	Correction to FR1 test cases using DLBWP.0.2_R15	15.14.0
2021-06	RAN#92	RP-211089	2070		F	Correction to reference configurations related to DLBWP.0.2_R15	15.14.0
2021-06	RAN#92	RP-211089	2072		F	Correction to interruption during measurement on deactivated SCell test cases_R15	15.14.0
2021-06	RAN#92	RP-211089	2074		F	Correction of test parameters for SA inter-frequency event triggered reporting TCs	15.14.0
2021-06	RAN#92	RP-211080	2103	1	F	CR on Rel-15 SCell activation, SMTC determination and UL timing 38133	15.14.0
2021-06	RAN#92	RP-211090	2109		F	CR on NR-DC PSCell addition and release delay in Rel15	15.14.0
2021-06	RAN#92	RP-211081	2112	1	F	Maintenance CR for RRM test cases in Rel15	15.14.0
2021-06	RAN#92	RP-211081	2137	1	F	Correction to AoA setup in FR2	15.14.0
2021-09	RAN#93	RP-211922	2197		F	Big CR to TS 38.133: NR_newRAT-Core maintenance (Rel-15)	15.15.0
2021-09	RAN#93	RP-211925	2200		F	Big CR to TS 38.133: NR_newRAT-Perf maintenance Part 1 (Rel-	15.15.0
2021-09	RAN#93	RP-211925	2203		F	Big CR to TS 38.133: NR_newRAT-Perf maintenance Part 2 (Rel-	15.15.0
2021-09	RAN#93	RP-211925	2206		F	Big CR to TS 38.133: NR_newRAT-Perf maintenance Part 3 (Rel-15)	15.15.0
2021-12	RAN#94	RP-212854	2237		F	Big CR to TS 38.133: NR_newRAT-Core maintenance (Rel-15)	15.16.0
2021-12	RAN#94	RP-212855	2240		F	Big CR to TS 38.133: NR_newRAT-Core maintenance (Rel-15)	15.16.0
2022-03	RAN#95	RP-2120337	2270		F	Big CR to TS 38.133: NR_newRAT-Core maintenance (Rel-15)	15.17.0
2022-03	RAN#95	RP-220337	2273	1	F	Big CR to TS 38.133: NR_newRAT-Core maintenance (Rel-15)	15.17.0
	RAN#96	RP-221660	2311	1	F	CR to maintain test case of PScell addition and release	15.18.0
2022-06	i .				_	delay (A4.5.7)_R15 Big CR for TS 38.133 Core Maintenance Part-1 (Rel-15)	15.18.0
	D V VITOC	DD 004055	0404		F	IRIO LE TOT IS 3X 133 L'OTA MAINTANANCA PART-1 (RAI-15)	i 15.18.0
2022-06	RAN#96	RP-221655	2404				
2022-06 2022-06	RAN#96	RP-221655	2407		F	Big CR for TS 38.133 Core Maintenance Part-2 (Rel-15)	15.18.0
2022-06 2022-06 2022-06	RAN#96 RAN#96	RP-221655 RP-221660	2407 2410			Big CR for TS 38.133 Core Maintenance Part-2 (Rel-15) Big CR for TS 38.133 Perf Maintenance Part-1 (Rel-15)	15.18.0 15.18.0
2022-06 2022-06	RAN#96	RP-221655	2407		F	Big CR for TS 38.133 Core Maintenance Part-2 (Rel-15)	15.18.0
2022-06 2022-06 2022-06	RAN#96 RAN#96	RP-221655 RP-221660	2407 2410		F	Big CR for TS 38.133 Core Maintenance Part-2 (Rel-15) Big CR for TS 38.133 Perf Maintenance Part-1 (Rel-15)	15.18.0 15.18.0

2022-12	RAN#98-e	RP-223293	2674	1	F	CR to CSI-RS, RLM and BWP switching in annex	15.20.0
2022-12	RAN#98-e	RP-223293	2677	1	F	Update on Scell activation and deactivation and Control Channel	15.20.0
						RMC for RLM FR2 (Rel-15)	
2022-12	RAN#98-e	RP-223292	2680		F	Update to L1-RSRP test scenarios (Rel-15)	15.20.0
2022-12	RAN#98-e	RP-223293	2693	1	F	R15 Cat-F CR testcase correction from R15 TS 38.133	15.20.0
2022-12	RAN#98-e	RP-223292	2700		F	CR on test case correction for timing advance	15.20.0
2022-12	RAN#98-e	RP-223293	2709	1	F	CR on TC for known PSCell addition in R15	15.20.0
2022-12	RAN#98-e	RP-223292	2712		F	CR on TC for inter-RAT NR Cell reselection in R15	15.20.0
2022-12	RAN#98-e	RP-223293	2747	2	F	Correction on Aperiodic CSI-RS RMCs and RLM in-sync test	15.20.0
						cases for R15	

History

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