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**5G;  
5GS;  
User Equipment (UE) conformance specification;  
Part 3: Protocol Test Suites  
(3GPP TS 38.523-3 version 15.1.0 Release 15)**



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# 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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The present document is part 3 of a multi-part deliverable covering the 5G System (5GS) User Equipment (UE) protocol conformance specification, as identified below:

- 3GPP TS 38.523-1 [8]: "5GS; User Equipment (UE) conformance specification; Part 1: Protocol".
- 3GPP TS 38.523-2 [9]: "5GS; User Equipment (UE) conformance specification; Part 2: Applicability of protocol test cases".
- **3GPP TS 38.523-3: "5GS; User Equipment (UE) conformance specification; Part 3: Protocol Test Suites"** (the present document).

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# 1 Scope

The present document specifies the protocol and signalling conformance testing in TTCN-3 for the 3GPP UE connecting to the 5G System (5GS) via its radio interface(s).

The following TTCN test specification and design considerations can be found in the present document:

- the test system architecture;
- the overall test suite structure;
- the test models and ASP definitions;
- the test methods and usage of communication ports definitions;
- the test configurations;
- the design principles and assumptions;
- TTCN styles and conventions;
- the partial PIXIT proforma;
- the test suites.

The Test Suites designed in the document are based on the test cases specified in prose in 3GPP TS 38.523-1 [8]. The applicability of the individual test cases is specified in 3GPP TS 38.523-2 [9].

The present document is valid for TTCN development for 5GS UE conformance test according to 3GPP Releases starting from Release 15 up to the Release indicated on the cover page of the present document.

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# 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 TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] ISO/IEC 9646-1: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts".
- [3] ISO/IEC 9646-7: "Information technology - Open systems interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statements".
- [4] ETSI ES 201 873: "Methods for Testing and Specification (MTS); The Testing and Test Control Notation version 3".
- [5] 3GPP TS 38.508-1: "5GS; User Equipment (UE) conformance specification; Part 1: Common test environment".
- [6] 3GPP TS 38.508-2: "5GS; User Equipment (UE) conformance specification; Part 2: Common Implementation Conformance Statement (ICS) proforma".
- [7] 3GPP TS 38.509: "5GS; Special conformance testing functions for User Equipment (UE)".
- [8] 3GPP TS 38.523-1: "5GS; User Equipment (UE) conformance specification; Part 1: Protocol".

- [9] 3GPP TS 38.523-2: "5GS; User Equipment (UE) conformance specification; Part 2: Applicability of protocol test cases".
- [10] 3GPP TS 36.508: "Common test environments for User Equipment (UE) conformance testing".
- [11] 3GPP TS 36.509: "Terminal logical test interface; Special conformance testing functions".
- [12] 3GPP TS 36.523-3: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Packet Core (EPC); User Equipment (UE) conformance specification; Part 3: Test suites".
- [13] 3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification".
- [14] 3GPP TS 38.322: "NR; Radio Link Control (RLC) protocol specification".
- [15] 3GPP TS 38.323: "NR; Packet Data Convergence Protocol (PDCP) specification".
- [16] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".
- [17] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA) Radio Resource Control (RRC); Protocol Specification".
- [18] 3GPP TS 24.301: "Non-Access-Stratum (NAS) Protocol for Evolved Packet System (EPS); Stage 3".
- [19] 3GPP TS 38.211: "NR; Physical channels and modulation".
- [20] 3GPP TS 38.212: "NR; Multiplexing and channel coding".
- [21] 3GPP TS 38.213: "NR; Physical layer procedures for control".
- [22] 3GPP TS 38.214: "NR; Physical layer procedures for data".
- [23] 3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical channels and modulation".

---

## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

In addition for the purposes of the present document, the following terms, definitions, symbols and abbreviations apply:

- such given in ISO/IEC 9646-1 [2] and ISO/IEC 9646-7 [3]

**NOTE:** Some terms and abbreviations defined in [2] and [3] are explicitly included below with small modification to reflect the terminology used in 3GPP.

**Implementation eXtra Information for Testing (IXIT):** A statement made by a supplier or implementer of an UEUT which contains or references all of the information (in addition to that given in the ICS) related to the UEUT and its testing environment, which will enable the test laboratory to run an appropriate test suite against the UEUT.

**IXIT proforma:** A document, in the form of a questionnaire, which when completed for an UEUT becomes an IXIT.

**Protocol Implementation Conformance Statement (PICS):** An ICS for an implementation or system claimed to conform to a given protocol specification.

**Protocol Implementation eXtra Information for Testing (PIXIT):** An IXIT related to testing for conformance to a given protocol specification.

## 3.2 Symbols

No specific symbols have been identified so far.

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

ASP	Abstract Service Primitive
ATS	Abstract Test Suite
DL	Downlink
EN-DC	E-UTRA-NR Dual Connectivity
EPC	Evolved Packet Core
ICS	Implementation Conformance Statement
IUT	Implementation Under Test
IXIT	Implementation eXtra Information for Testing
LSB	Least Significant Bit
MSB	Most Significant Bit
RAT	Radio Access Technology
SS	System Simulator
TC	Test Case
UL	Uplink
UT	Upper Tester

---

# 4 Test system architecture

## 4.1 General system architecture

The architecture specified in TS 36.523-3 [12] subclause 4.1.1 applies to the present document.

## 4.2 Component architecture

The architecture specified in TS 36.523-3 [12] subclause 4.1.2 applies to the present document, with NR RAT as another separate TTCN-3 parallel component.

# 5 Test models

## 5.1 EN-DC

### 5.1.1 Layer 3

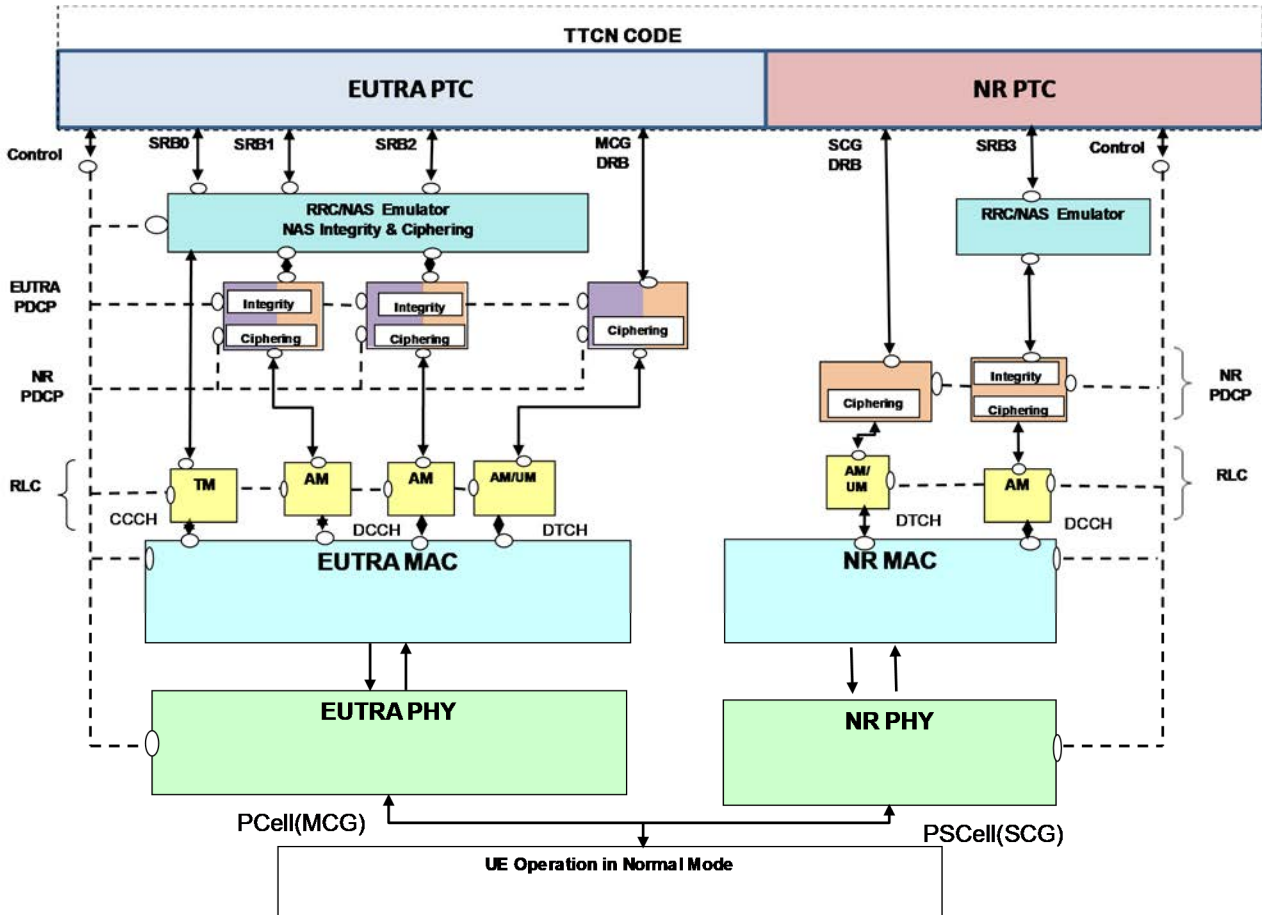


Figure 5.1.1-1: Test model for EN-DC Layer3 testing (MCG and SCG)

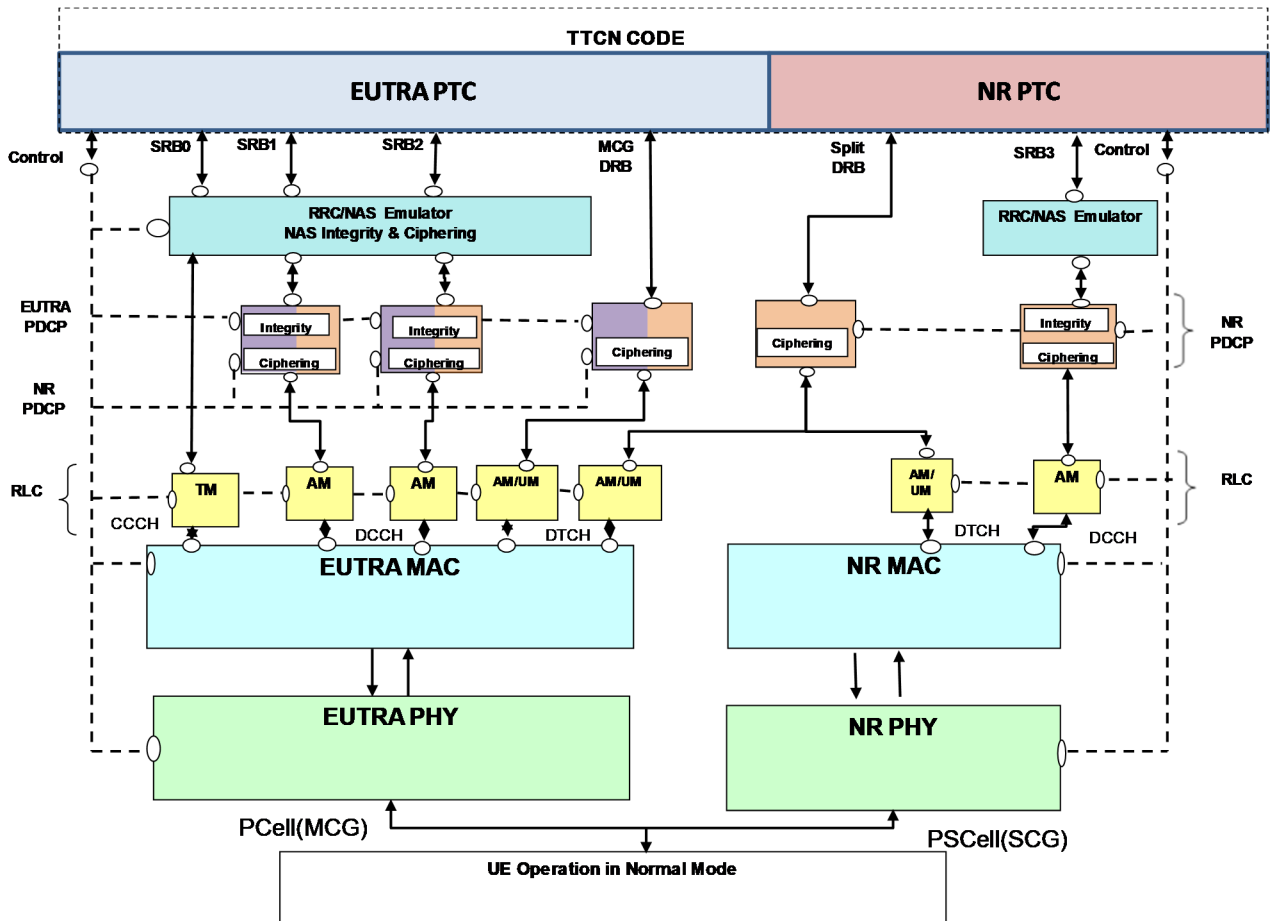


Figure 5.1.1-2: Test model for EN-DC Layer3 testing (MCG and SN terminated split DRB)

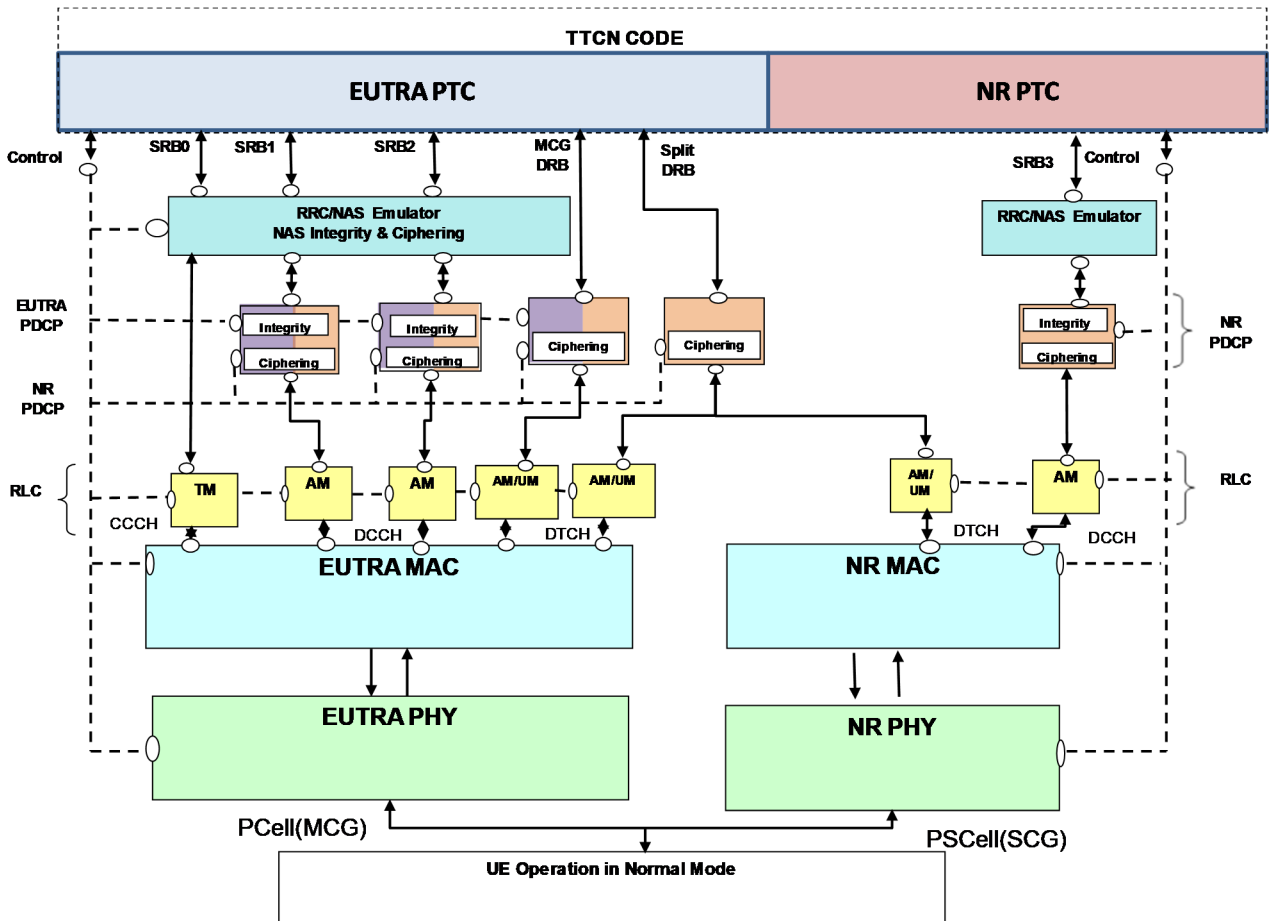


Figure 5.1.1-3: Test model for EN-DC Layer3 testing (MCG and MN terminated split DRB)

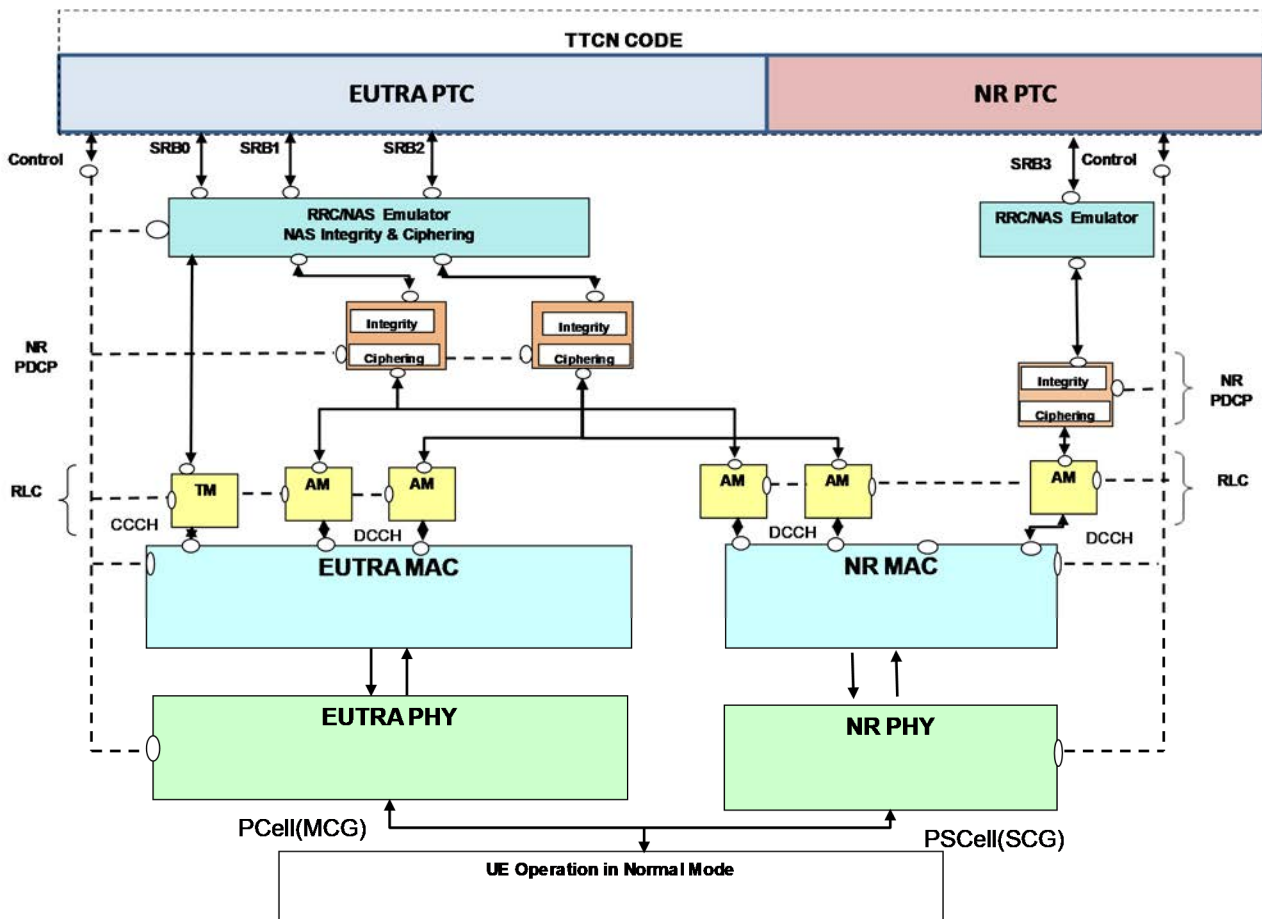


Figure 5.1.1-4: Test model for EN-DC Layer3 testing (*Split SRB(s), DRBs removed for clarity*)

The UE is configured in normal mode. On the UE side Ciphering and Integrity (PDCP and NAS) are enabled and ROHC is not configured.

On the SS Side L1, MAC and RLC (EUTRA/NR) and PDCP (EUTRA/NR) are configured in normal way and shall perform all their functions. SRB0, 1 & 2 are configured only in EUTRA. For SRB0 the DL and UL port is above RLC. For SRB1 and SRB2 the port is above/below the EUTRA RRC and NAS emulator, which is implemented as a parallel test component. For DRB, the port is above PDCP. PDCP Ciphering/Integrity is enabled. NAS integrity/Ciphering is enabled.

NOTE: PDCP (EUTRA/NR) is always configured in the EUTRA PTC for SRB1 & 2.

The EUTRA RRC/NAS emulator for SRB1 and SRB2 shall provide the Ciphering and Integrity functionality for the EPS NAS messages. In UL direction, SS shall report RRC messages, still containing (where appropriate) the secure and encoded NAS message, to the RRC port. In DL, RRC and NAS messages with same timing information shall be embedded in one PDU after integrity and ciphering for NAS messages.

SRB3 is connected directly to the SRB port in the NR PTC/dummy NR RRC/NAS emulator.

The NR PDCP can be configured in either the EUTRA or NR PTC for one or more SRBs or DRBs. If NR PDCP is configured, the bearer can be split. In this case the PDCP will be fully configured on the cell upon which the bearer is terminated and the other PTC will be configured with a proxy PDCP. Data shall be sent/received only on the PTC upon which the bearer is terminated. The SS shall route data to/from either cell, via the routing information provided.



5.1.2 Layer 2

5.1.2.1 PDCP

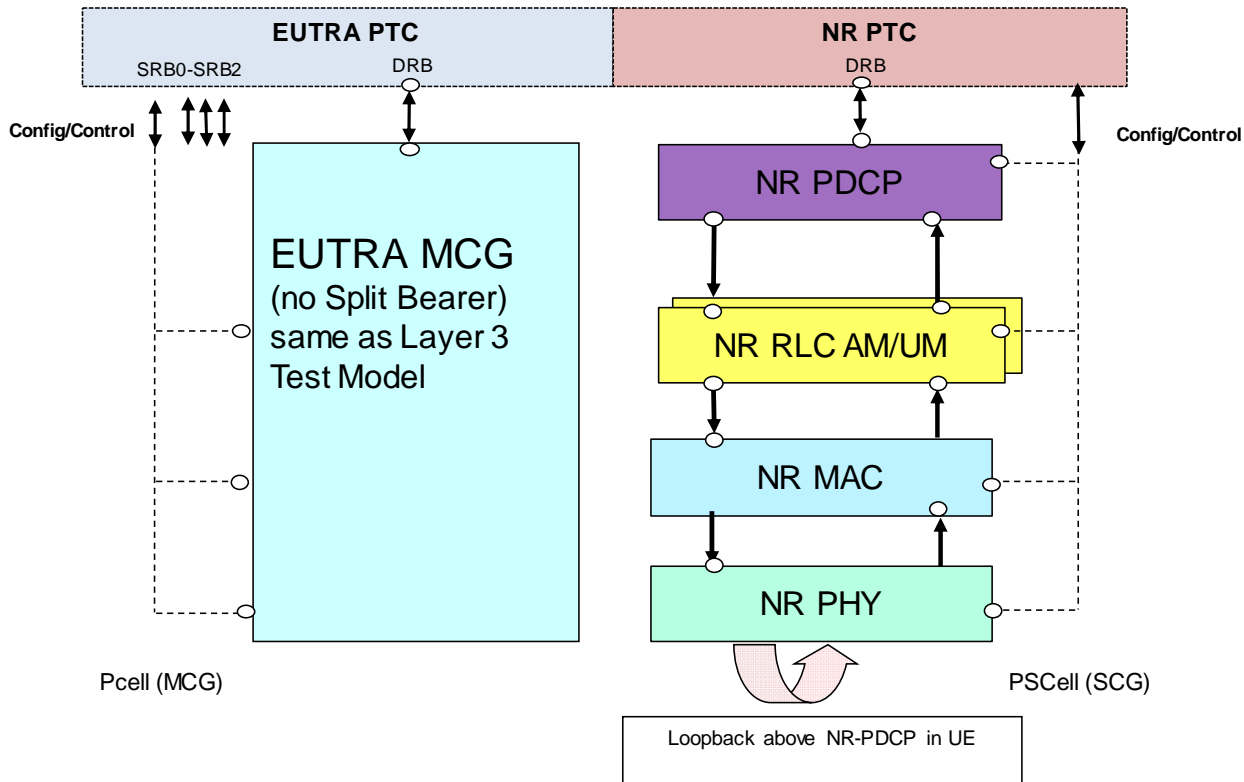


Figure 5.1.2.1-1: Test model for EN-DC PDCP testing (MN terminated MCG DRB and SN terminated SCG DRB)

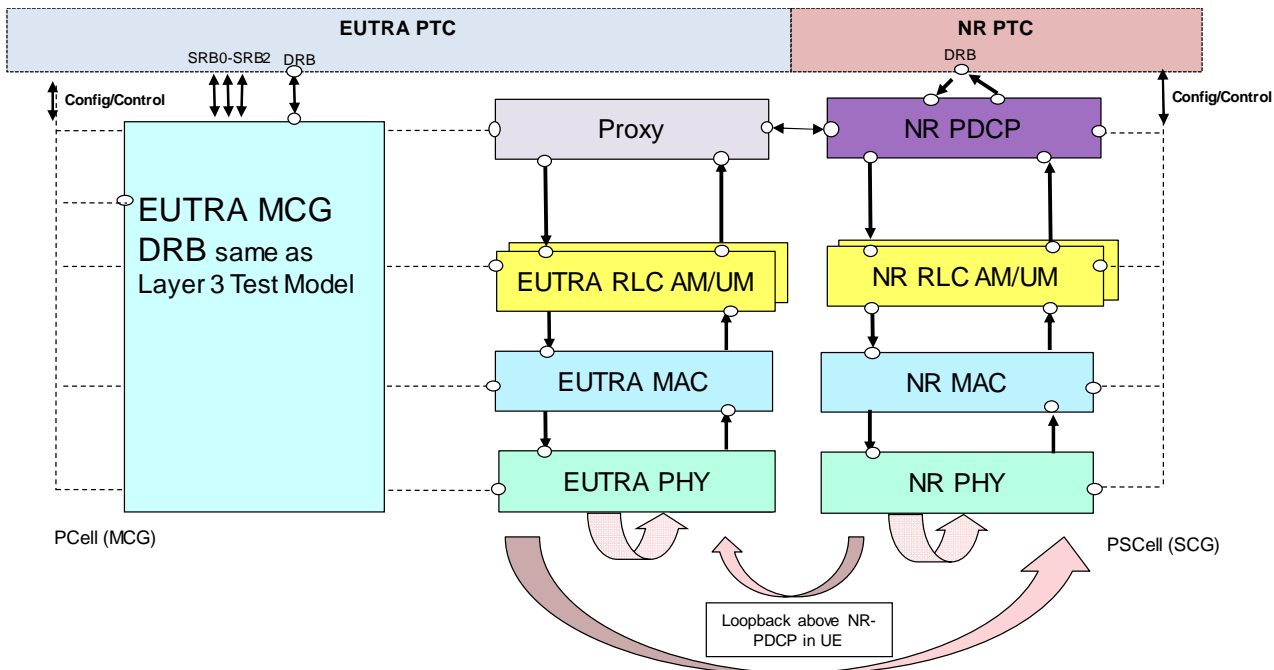


Figure 5.1.2.1-2: Test model for EN-DC PDCP testing (MN terminated MCG DRB and SN terminated split DRB)

The UE is configured in Test Loop Mode, to loop back the user domain data above PDCP layer. On UE side Ciphering is enabled as null algorithm and ROHC is not configured.

Test Loop Mode can be active on SN terminated SGC DRB as shown in Figure 5.1.2.1-1 or active on SN terminated split DRB as shown in Figure 5.1.2.1-2.

NOTE: Test loop Mode activation on MN terminated DRB with NR-PDCP is not considered in Figure 5.1.2.1-2.

On the SS NR, Layer 1, MAC and RLC is configured in the normal operation. The PDCP is configured in a special mode, where SS does not add any PDCP headers in DL and/or not remove any PDCP headers in UL directions respectively at DRB port on the NR PTC. The TTCN maintains sequence numbers and state variables for the PDCP layer.

On the SS Side the EUTRA MCG layer 1, MAC, RLC is configured test model in normal operation. They shall perform their functions. In case of split DRB, PDCP layer is configured as Proxy mode, TTCN shall configure EUTRA for EN-DC PDCP testing only when a Test Loop Mode is active on an SN terminated split DRB.

The SS shall route DL PDCP PDUs from TTCN to PCell and/or PSCell and SS shall indicate that the UL PDCP PDU is received from PCell or PSCell.

Duplication function:

- DL is FFS.
- UL SS shall include routing information for each UL PDCP PDU.

The UL Scheduling Grant and DL Scheduling assignments are configured from TTCN over system control port. SS reports PUCCH scheduling information reception over system indication port, if configured.

### 5.1.2.2 RLC

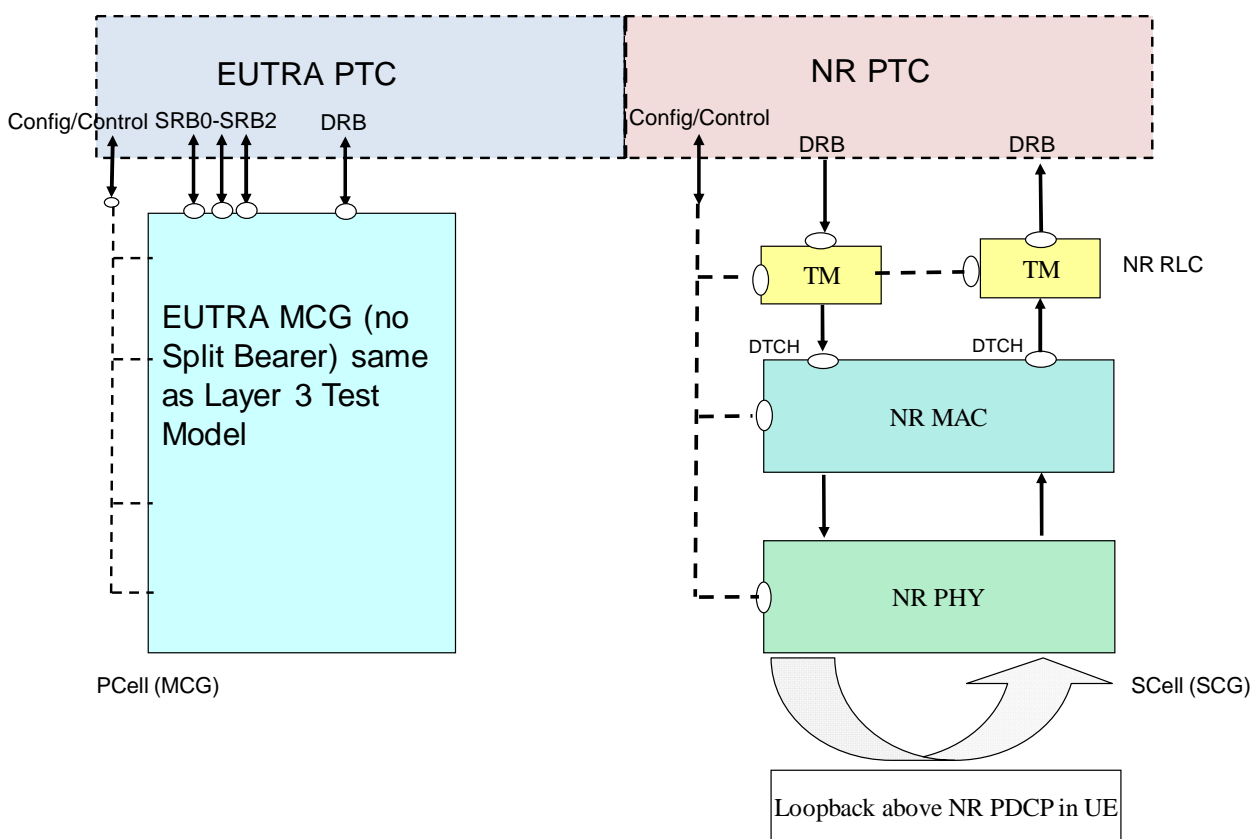


Figure 5.1.2.2-1: Test model for EN-DC RLC AM/UM testing

The PCell is an EUTRA Cell and PSCell is an NR cell on which testing happens. The UE is registered in EUTRA, using SRBs 0-2, and configured for EN-DC operation.

This model is suitable for testing both UM/AM mode of operation of DRBs on UE side.

The UE is configured in Test Loop Mode, to loop back the user domain data above PDCP layer. On UE side Ciphering is enabled (since mandatory) but with dummy ciphering algorithm, which is equivalent to not using ciphering. ROHC is not configured on UE Side.

On the SS Side, L1 and MAC are configured in the normal way. The RLC of the SCG DRBs is configured in transparent mode. Hence with this configuration PDUs out of SS RLC are same as the SDUs in it. There is no PDCP configured on SS NR PTC side. The ports are directly above RLC.

The PDUs, exchanged between TTCN and SS, shall be the final RLC PDUs consisting of RLC and PDCP headers. TTCN code shall take care in DL of building RLC headers and PDCP headers and in UL handle RLC and PDCP headers. TTCN code shall take care of maintaining sequence numbers and state variables for RLC and PDCP layers. If RLC on UE side is in AM mode, TTCN shall take care of generating polls in DL and responding with RLC control PDUs on reception of UL Poll.

### 5.1.2.3 MAC

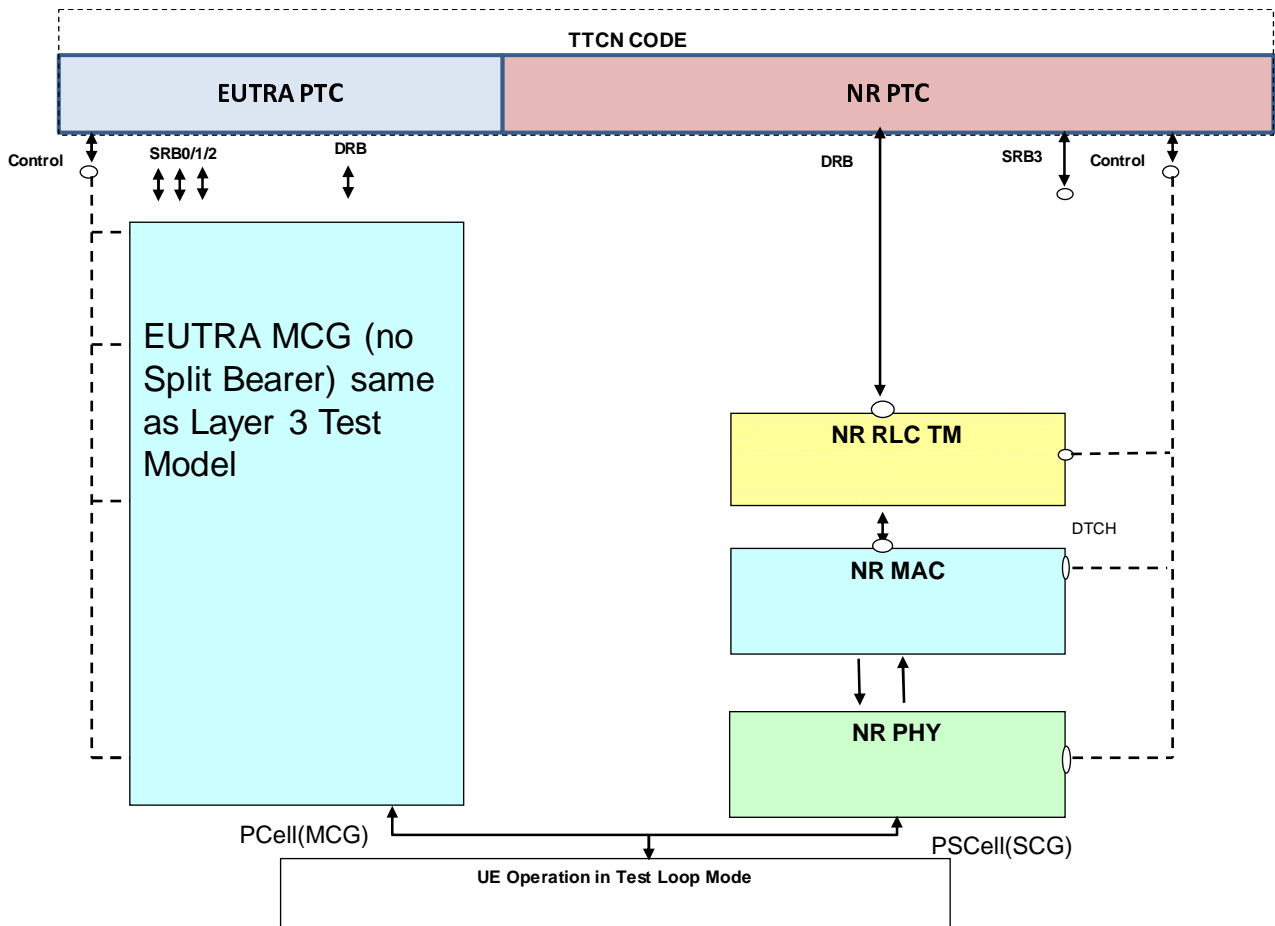


Figure 5.1.2.3-1: Test model for EN-DC MAC testing

The UE is configured in Test Loop Mode, to loop back the User Plane data above PDCP layer. On UE side Ciphering is enabled (since Mandatory) but with dummy ciphering algorithm, which is equivalent to not using ciphering. ROHC is not configured on UE Side.

On the SS Side the EUTRA MCG is configured as per the EN-DC Layer 3 test model in normal operation. The EN-DC MAC test model expects no split bearers to be configured.

On the SS NR, Layer 1 is configured in the normal way. NR MAC is configured in a special mode, where it does not add any MAC headers in DL and /or not remove any MAC headers in UL directions respectively at DRB port. In this case, the TTCN shall provide the final MAC PDU, including padding. Except for this, the NR MAC layer shall perform all its other functions. SRB3 if present is configured as in Layer 3 test model in normal operation.

On DRBs the NR RLC is configured in transparent mode. Hence with this configuration PDUs out of SS RLC are same as the SDUs in it. There is no NR PDCP configured on SS Side. The ports are directly above NR RLC.

There are two different test modes in which NR MAC header addition/removal can be configured:

1. DL/UL header-transparent mode: no header addition in DL and no header removal in UL.
2. DL only header-transparent mode: no header addition in DL; UL NR MAC is configured in normal mode to remove MAC header and de-multiplex the MAC SDUs according to the logical channel Ids.

If SS NR MAC is configured in DL/UL header-transparent mode, the PDUs, exchanged at the DRB port between TTCN and SS, shall be the final MAC PDUs consisting of MAC, RLC and PDCP headers. TTCN code shall take care in DL of building MAC header, RLC headers and PDCP headers and in UL handle MAC, RLC and PDCP headers. TTCN code shall take care of maintaining sequence numbers and state variables for RLC and PDCP layers. During testing of multiple DRBs at the UE side, it shall still be possible to configure only one DRB on SS side with configuration in the figure 5.1.2.3-1. Other DRBs will not be configured, to facilitate routing of UL MAC PDUs. Multiplexing/de-multiplexing of PDUs meant/from different DRBs shall be performed in TTCN. Since the MAC layer does not evaluate the MAC headers in UL it cannot distinguish between SRB and DRB data in UL. There shall be no SRB3 traffic while MAC is configured in this test mode. The SS MAC shall take care of automatic repetitions/retransmission in UL and DL, based on normal MAC HARQ behaviour.

If SS NR MAC is configured in DL only header-transparent mode, the UL PDUs exchanged at the DRB port between TTCN and SS, shall be final RLC PDUs consisting of RLC and PDCP headers. SS shall route these PDUs based on logical channel IDs. In DL, TTCN sends fully encoded MAC PDUs at the DRB port (consisting of MAC, RLC and PDCP headers). In this case TTCN needs to take care of maintaining sequence numbers and state variables for RLC and PDCP layers. Furthermore, in UL and DL the SS MAC layer shall be capable of dealing with SRB3 data (i.e. it shall handle DL RLC PDUs coming from SRB3 RLC layer or de-multiplex UL RLC PDUs to SRB3) as in normal mode. The SS MAC shall take care of automatic repetitions/retransmissions in UL and DL, based on normal MAC HARQ behaviour. TTCN shall ensure that no DL MAC SDUs in normal mode and DL MAC PDUs in test mode are mixed for the same TTI.

The UL Scheduling Grant and DL Scheduling assignments are configured from TTCN over system control port. SS reports PUCCH scheduling information reception over system indication port, if configured. In a similar way the reception of PRACH preambles is reported by SS over the same port.

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## 6 System interface

### 6.1 Upper tester interface

The Upper Tester (UT) interface is the same as specified in TS 36.523-3 [12] clause 5.

### 6.2 Abstract system primitives

#### 6.2.1 Introduction

The present subclause 6.2 specifies the abstract system primitives (ASPs) used on the system interface to configure and control the SS.

#### 6.2.2 General requirements and assumptions

The requirements and assumptions specified in TS 36.523-3 [12] subclause 6.1 apply to the present document.

#### 6.2.3 E-UTRAN ASP definitions

Please refer to TS 36.523-3 [12] subclause 6.2.

## 6.2.4 NR ASP definitions

See Annex D.

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# 7 Test methods and design considerations

## 7.1 Common aspects

### 7.1.1 Introduction

Subclause 7.1 specifies test methods and design considerations that are common to all 5GS deployment options.

### 7.1.2 Physical layer aspects

#### 7.1.2.1 Search spaces and DCI

##### 7.1.2.1.1 Parameters

For each search space there are several parameters specifying the location of this search space in the time and frequency domain.

##### 7.1.2.2.1.1 Search space configuration

<b>PDCCH monitoring periodicity</b>	
<b>Comment/description</b>	slot periodicity in time domain
<b>ASN.1 parameter</b>	SearchSpace.monitoringSlotPeriodicityAndOffset
<b>Core spec reference</b>	TS 38.213 [21] clause 10.1
<b>PDCCH monitoring offset</b>	
<b>Comment/description</b>	slot offset
<b>ASN.1 parameter</b>	SearchSpace.monitoringSlotPeriodicityAndOffset
<b>Core spec reference</b>	TS 38.213 [21] clause 10.1
<b>PDCCH monitoring pattern</b>	
<b>Comment/description</b>	first symbol(s) of the control resource set within a slot for PDCCH monitoring; in general a search space starts with first symbol of a slot; the duration is given by the L1 parameter 'CORESET-time-duration'
<b>ASN.1 parameter</b>	SearchSpace.monitoringSymbolsWithinSlot
<b>Core spec reference</b>	TS 38.213 [21] clause 10.1
<b>CORESET time duration</b>	
<b>Comment/description</b>	Duration of a search space in time domain: 1, 2 or 3 symbols
<b>ASN.1 parameter</b>	ControlResourceSet.duration
<b>Core spec reference</b>	TS 38.213 [21] clause 10.1
<b>CORESET frequency domain allocation</b>	
<b>Comment/description</b>	Bitmap specifying the frequency domain allocation of a search space NOTE: The allocations needs to fit into the BWP to which the CORESET belongs
<b>ASN.1 parameter</b>	ControlResourceSet.frequencyDomainResources
<b>Core spec reference</b>	TS 38.213 [21] clause 10.1, TS 38.211 [19] clause 7.3.2.2

##### 7.1.2.1.2 PDCCH search spaces

For each configured DL BWP, the TTCN may configure one or several search spaces.

For each search space, TTCN configures the SS with:

- the configuration of this search space as given to the UE, enabling the SS to determine the PDCCH transmission occasions (same as the UE PDCCH monitoring occasions) and associated CORESET,
- the CCE aggregation level  $L$  that the SS shall use for PDCCH transmission on this search space,
- the priority  $P$  of this search space that the SS shall consider in its PDCCH candidate selection algorithm.

- a value of 0 represents the highest priority, a value of 1 the second highest priority and so on.

NOTE: "Search space" is used in terms of TS 38.213 [21] clause 10.1 and a single search space configuration (ASN.1 type 'SearchSpace') may contain several search spaces.

#### 7.1.2.1.3 DCI formats

The SS shall support several DCI formats. For each 5GS option, the set of DCI formats to support may be different (see relevant option-specific subclauses).

The transmission of DCI formats may be explicitly requested from TTCN or semi-autonomously handled by the SS. In case of explicit request:

- If the associated timing information is explicit, the TTCN shall ensure that this timing information matches one of the configured PDCCH transmission occasions.
- If the associated timing information is now, the SS shall determine and use the next valid PDCCH transmission occasion.

#### 7.1.2.1.4 PDCCH candidate selection

The SS shall consider search space priorities as configured by TTCN to find appropriate PDCCH candidates for scheduling of DCI formats in case of:

##### a) Overlapping search spaces:

- Depending on system configuration and slot number candidates of the different search spaces may be located in same (or overlapping) CCEs.
  - Example: system information is automatically scheduled by the SS and UE-specific data transmission requires scheduling of PDCCH for the same slot and symbols
- => Candidates of the UE-specific search space may collide with actual PDCCH of a common search space (e.g. system information).

##### b) Within a search space if different search space types are mapped to the same search space configuration.

For every PDCCH assignment (in terms of TS 38.213 [21] clause 10.1) the SS shall apply the PDCCH candidate selection algorithm specified hereafter:

##### 1) For each search space the SS selects the PDCCH candidate with index $m(\text{search space}, L) = 0$

With (see TS 38.213 [21] subclause 10.1):

- candidate index  $m(\text{search space}, L) := 0 .. M(\text{search space}, L) - 1$ ;
- $M(\text{search space}, L)$ : number of PDCCH candidates per CCE aggregation level for the given search space;
- $L$ : CCE aggregation level

##### 2) If there is an overlapping of the selected candidates, the SS shall:

- keep the PDCCH candidate of the search space with higher priority  $P$ ,
- increment  $m$  for the search space with lower priority;

##### 3) The SS shall repeat 2) until there is no overlapping anymore.

In the following cases the SS shall raise an error:

- Collision of PDCCH candidates of search spaces with the same priority,
- When a DL transmission or a single UL grant is scheduled with specific TimingInfo and after applying the above rules there is no PDCCH candidate left anymore.

NOTE: For TimingInfo 'Now' there is no error as the SS can shift the transmission to the next PDCCH occasion

In case of continuous UL grant configuration, the SS shall not raise an error when a grant cannot be scheduled at a specific point in time but skip it, if the grant is configured to be at every occasion, or shift it to the next occasion otherwise.

## 7.1.2.2 Downlink resource allocation

### 7.1.2.2.1 Parameters

There are several parameters specifying the resource allocation on PDCCH (see subclause 7.1.2.2.1.1) and PDSCH for a DL transmission. The following sub-clauses summarise the parameters being most relevant for downlink resource allocation from the test model's point of view.

#### 7.1.2.2.1.1 Time domain resource allocation

For time domain resource allocation, either a default PDSCH time domain allocation according to TS 38.214 [22] clause 5.1.2.1.1 is applied or a table (pdsch-AllocationList) is configured via RRC signalling (pdsch-ConfigCommon.pdsch-TimeDomainAllocationList or pdsch-Config.pdsch-TimeDomainAllocationList, see TS 38.331 [16]). This table corresponds to L1 parameter "pdsch-AllocationList" and the entries are referred to by DCI.

pdsch-AllocationList has the following fields:

<b>PDSCH slot offset (<math>K_0</math>)</b>	
<b>Comment/description</b>	Slot offset of PDSCH transmission based on the corresponding PDCCH transmission (DCI) Assuming the same numerology for PDSCH and PDCCH: $K_0 = 0$ PDCCH and corresponding PDSCH transmission are in the same slot $K_0 > 0$ PDCCH and corresponding PDSCH transmission are in different slots
<b>ASN.1 parameter</b>	PDSCH-TimeDomainResourceAllocation.k0
<b>Core spec reference</b>	TS 38.214 [22] clause 5.1.2.1
<b>PDSCH mapping type</b>	
<b>Comment/description</b>	PDSCH mapping type A or B NOTE: In general - at least for early releases - type A is expected to be used by conformance testing (Type B seems to be intended for mini-slots)
<b>ASN.1 parameter</b>	PDSCH-TimeDomainResourceAllocation.mappingType
<b>Core spec reference</b>	TS 38.214 [22] clause 5.1.2.1
<b>Start and length indicator (SLIV)</b>	
<b>Comment/description</b>	The SLIV specifies the starting symbol (S) and the number of symbols (L) of the PDSCH resource assignment according to TS 38.214 [22] clause 5.1.2.1; valid start/length combinations depend on the PDSCH mapping type
<b>ASN.1 parameter</b>	PDSCH-TimeDomainResourceAllocation.startSymbolAndLength
<b>Core spec reference</b>	TS 38.214 [22] clause 5.1.2.1

#### 7.1.2.2.1.2 Frequency domain resource allocation configured at the UE via RRC signalling

<b>Resource allocation type</b>	
<b>Comment/description</b>	Specifies the format of the frequency domain resource assignment field of DCI format 1_1 (resource allocation type 0, resource allocation type 1 or both) NOTE: for DCI format 1_0 this parameter seems to be not relevant.
<b>ASN.1 parameter</b>	PDSCH-Config.resourceAllocation
<b>Core spec reference</b>	TS 38.212 [20] clause 7.3.1.2.2

#### 7.1.2.2.1.3 DCI parameters

<b>Frequency domain resource assignment</b>	
<b>Comment/description</b>	Resource allocation type 0: bitmap indicating resource block groups (RBGs) being allocated to the UE Resource allocation type 1: resource indication value (RIV) indicating start and length of a set of contiguously allocated resource blocks NOTE: for DCI format 1_0 only resource allocation type 1 is applicable (according to TS 38.214 [22] clause 5.1.2.2)
<b>Core spec reference</b>	TS 38.212 [20] clauses 7.3.1.2.1 and 7.3.1.2.2, TS 38.214 [22] clause 5.1.2.2
<b>Time domain resource assignment</b>	
<b>Comment/description</b>	Index addressing pre-configured time domain resource allocation (see clause 7.1.2.2.1.1)
<b>Core spec reference</b>	TS 38.212 [20] clauses 7.3.1.2.1 and 7.3.1.2.2

<b>VRB-to-PRB mapping</b>	
<b>Comment/description</b>	To distinguish non-interleaved and interleaved allocation of virtual resource blocks in case of resource allocation type 1
<b>Core spec reference</b>	TS 38.212 [20] clauses 7.3.1.2.1 and 7.3.1.2.2, TS 38.214 [22] clause 5.1.2.2
<b>Modulation and coding scheme (MCS)</b>	
<b>Comment/description</b>	Modulation and coding scheme according to TS 38.214 [22] clause 5.1.3: The DCI provides the MCS index ( $I_{MCS}$ ) which refers to the respective tables in clause 5.1.3.1 of TS 38.214 [22]
<b>Core spec reference</b>	TS 38.212 [20] clauses 7.3.1.2.1 and 7.3.1.2.2, TS 38.214 [22] clause 5.1.3
<b>Antenna port configuration</b>	
<b>Comment/description</b>	Configuration of antenna port(s) according to tables 7.3.1.2.2-1/2/3/4 of TS 38.212 [20] for DCI format 1_1: Specifies the number of CDM groups without data and the antenna ports being used for a transmission. The number of CDM groups affects the number of REs which cannot be used for PDSCH transmission according to step 1 of clause 5.1.3.2 in TS 38.214 [22]. The number of antenna ports being used for the DL transmission corresponds to the number of layers $v$ being used for the respective transport block transmission (1, 2, 3 or 4 layers per transport block). DCI format 1_0 does not have any field for antenna port configuration: TS 38.214 [22] clause 5.1.6.2 specifies that in general the UE shall assume 2 CDM groups i.e. there are no REs available for PDSCH transmission in any symbol where DMRS is sent. Regarding the number of layers $v=1$ is assumed for PDSCH transmissions scheduled with DCI format 1_0
<b>Core spec reference</b>	TS 38.212 [20] clauses 7.3.1.2.2, TS 38.214 [22] clause 5.1.3, TS 38.211 [19] clause 7.3.1.3/4

### 7.1.2.2.2 Timing

The timing information provided by the request ASP for a DL transmission specifies the slot in which the DCI on PDCCH is transmitted scheduling the corresponding PDSCH transmission. The exact timing of the PDSCH transmission is depending on the parameters for time domain resource allocation as described in the previous clause. If the timing information specifies a specific slot it is up to TTCN that an appropriate search space is configured for this slot. The SS shall not schedule the DL transmission otherwise and may raise an error.

In case of TimingInfo indicating “Now” or “Any slot” it is up to the SS to find the appropriate slot for scheduling of the DCI. The SS shall not use slots in which SS/PBCH blocks are scheduled.

NOTE: The restriction for slots containing SS/PBCH can be removed when there is clarification in core specs (e.g. TS 38.214 [22]) how “rate matching around” SS/PBCH blocks is reflected in the calculation of the transport block size (see clause 7.1.2.2.4).

In case of TimingInfo not being “Now” TTCN shall ensure that the data is scheduled at least 100ms in advance. Furthermore, it is up to the test case prose to avoid any overlapping of PDSCH and PDCCH transmissions in time domain and it is up to TTCN implementation to address an appropriate slot for which the TBS size determination is well-defined according to clause 7.1.2.2.4; the SS shall raise an error otherwise.

Figures 7.1.2.2.2-1 and 7.1.2.2.2-2 illustrate the timing for  $K_0 = 0$  and  $K_0 > 0$ .



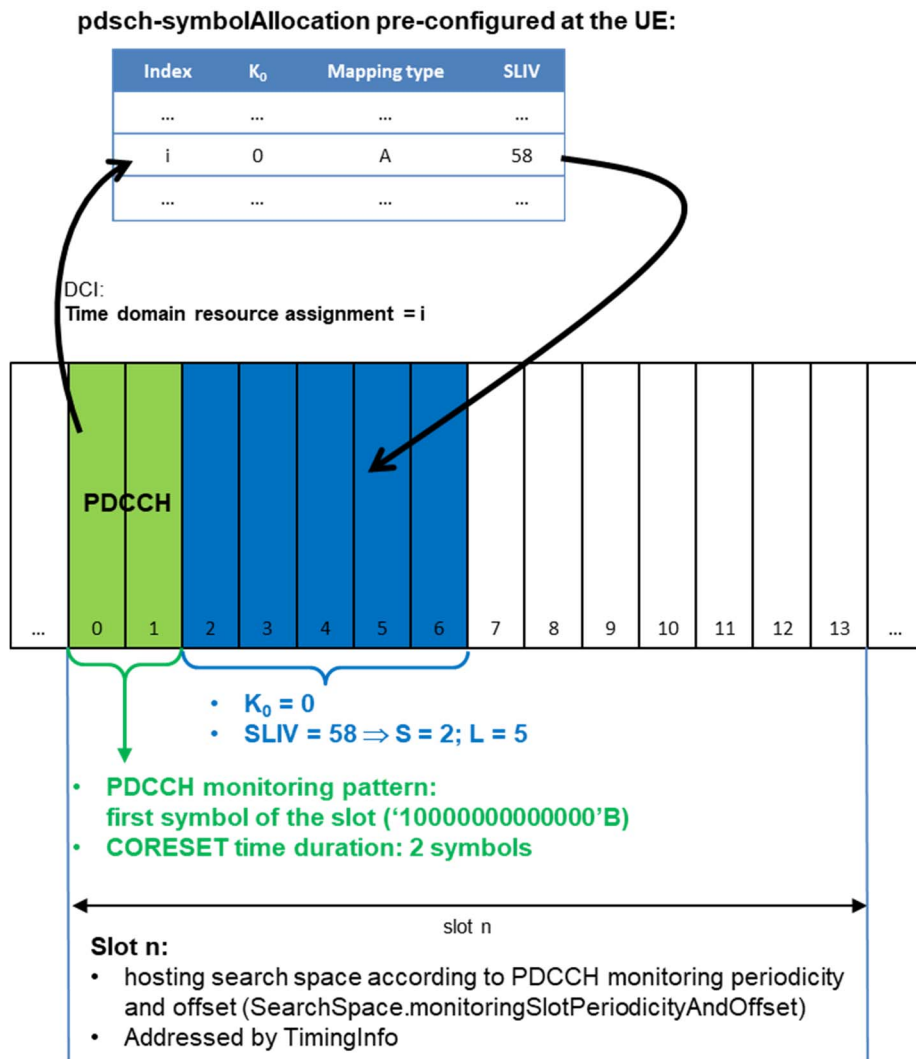
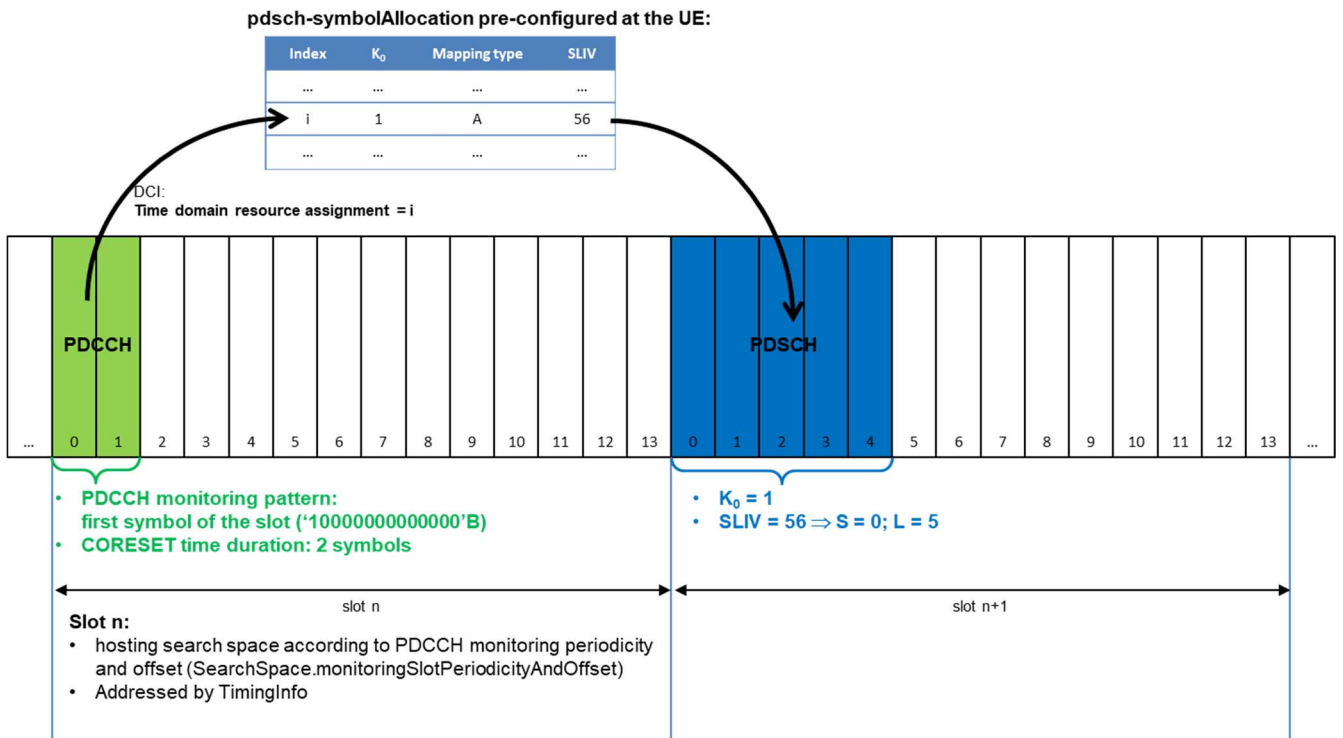


Figure 7.1.2.2-1: Example for time domain resource allocation for  $K_0 = 0$



**Figure 7.1.2.2-2: Example for time domain resource allocation for  $K_0 > 0$**

### 7.1.2.2.3 DL scheduling scheme

Different kinds of PDSCH transmissions need to be scheduled:

- System information (SI: SIB1 and other system information)
- Paging
- Random access response (RAR)
- DCCH/DTCH transmissions

The scheduling needs to be done so that there is no overlapping in frequency or time domain.

In general there are different ways to do the scheduling:

- a) Multiplexing in frequency domain of a single BWP
- b) Multiplexing in time domain of a single BWP (at slot or at symbol level)
- c) Use of different BWPs: e.g. initial BWP for SI, RAR, Paging + dedicated BWP for DCCH/DTCH
- d) Combinations of the above

In frequency domain the different kinds of PDSCH transmissions may use different resource allocation types (TS 38.214 [22] clause 5.1.2.2):

- Resource allocation (RA) type 0: Bitmap-based allocation of Resource Block Groups (RBGs): Applicable only for DCI format 1\_1  $\Rightarrow$  not applicable for scheduling of SI, Paging and RAR
- Resource allocation (RA) type 1, non-interleaved: continuous allocation of RBs with one-by-one mapping of virtual resource blocks (VRBs) to physical resource blocks (PRBs).
- Resource allocation (RA) type 1, interleaved: continuous allocation of RBs with interleaved VRB-to-PRB mapping according to TS 38.211 [19] clause 6.3.1.7.

#### 7.1.2.2.3.1 DL scheduling scheme: Frequency domain multiplexing, RA type1, non-interleaved

This scheduling scheme multiplexes the different kinds of PDSCH transmissions in the frequency domain of a single BWP by exclusively using resource allocation type 1 with non-interleaved VRB-to-PRB mapping. Assuming the resource blocks being numbered from 0 to  $N_{\text{BWP}}-1$  (with  $N_{\text{BWP}}$  being the size of the BWP) the following allocation is done:

**Table 7.1.2.2.3.1-1: Resource allocation for frequency domain multiplexing, RA type1, non-interleaved**

Kind of PDSCH transmission (Note 1)	Resource block allocation (Note 2)	
	RB <sub>start</sub>	L <sub>RBs,max</sub> (Note 2)
System information	0	5
Paging	5	1
Random access response (Note 3)	6	$N_{\text{BWP}}-6$
DCCH/DTCH transmissions (Note 3)	6	$N_{\text{BWP}}-6$
NOTE 1: In context of a generic 5G test model it is not relevant whether or not there is SI and Paging for a given deployment option (e.g. EN-DC).		
NOTE 2: $L_{\text{RBs}} \leq L_{\text{RBs,max}}$ with $L_{\text{RBs}}$ : number of resource blocks being eventually used for a particular transmission.		
NOTE 3: Random access response and DCCH/DTCH transmissions are mutual exclusive and therefore share the same allocation		

In general PDCCH and corresponding PDSCH transmissions are in the same slot ( $K_0 = 0$ ).

#### 7.1.2.2.4 Transport block size determination

TS 38.214 [22] clause 5.1.3.2 describes the transport block size (TBS) determination from the UE's point of view: the UE calculates the TBS depending on several parameters. From a test model's point of view appropriate values need to be found for the parameters to achieve a given TBS.

There are two modes specified for DL scheduling:

- automatic mode
- explicit mode

In explicit mode all parameters for the TBS determination are provided by TTCN, i.e. it is up to the TTCN implementation to find proper values. In automatic mode TTCN only provides RB<sub>start</sub> and L<sub>RBs,max</sub> and it is up to the SS to determine the values of L<sub>RBs</sub> and I<sub>MCS</sub> to achieve the TBS which is needed for a particular DL transmission.

The SS shall apply the rules as described in clause 7.1.2.2.4.2.

##### 7.1.2.2.4.1 Parameters affecting TBS determination

The following parameters need to be considered for TBS determination:

Table 7.1.2.2.4.1-1: Parameters affecting TBS determination

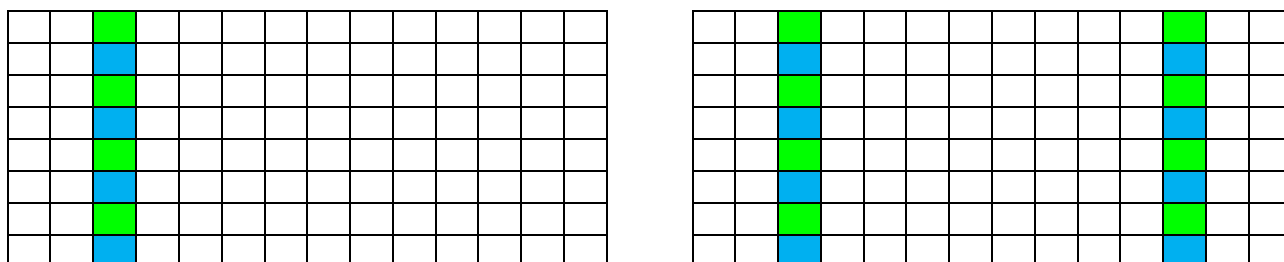
Parameter	Comment/Description	Reference
Number of RBs in frequency domain	Indicated by DCI	Clause 7.1.2.2.1.3
Number of symbols in time domain	Pre-configured at UE, selected by DCI; corresponds to "PDSCH duration" TS 38.211 [19] clause 7.4.1.1.2	Clause 7.1.2.2.1.1
MCS index $I_{mcs}$	Indicated by DCI: Modulation Order $Q_m$ , Target code Rate $R$	Clause 7.1.2.2.1.3; TS 38.214 [22] Table 5.1.3.1-1 and 5.1.3.1-2
Number of layers $\nu$	The number of layers being used for transmission of a transport block can be derived from the antenna port configuration provided by DCI format 1_1 taking into account the layer mapping according to TS 38.211 clause 7.3.1.3. For DCI format 1_1 in general $\nu = 1$ according to TS 38.508-1 [5] Table 4.3.6.1.2.2-1. For DCI format 1_0 $\nu = 1$ is assumed (in accordance to TS 38.214 [22] clause 5.1.6.2 specifying antenna port 1000 to be used for DMRS).	TS 38.214 [22] clause 5.1.1.1 and 5.1.6.2, TS 38.211 [19] clause 7.3.1.4, TS 38.212 [20] clause 7.3.1.2.2 and tables 7.3.1.2.2-1/2/3/4
PDSCH mcs-Table	Pre-configured at the UE via RRC signalling: PDSCH-Config.mcs-Table := {qam64, qam256}; indicates which MCS table to be applied when DL transmission is scheduled with C-RNTI	TS 38.214 [22] clause 5.1.3.1
Number of REs per PRB	Number of REs per PRB which are applicable for the PDSCH transmission	Table 7.1.2.2.4.1-2
Rate matching	TS 38.214 [22] clause 5.1.3.2 does not specify how rate matching needs to be considered for TBS determination ⇒ at least for early implementations slots containing SS/PBCH block transmission shall not be used for PDSCH transmissions and further rate matching is assumed not to be configured via RRC signalling	TS 38.214 [22] clause 5.1.4

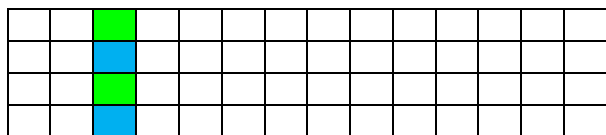
**Table 7.1.2.2.4.1-2: Parameters affecting number of REs allocated for PDSCH per PRB**

Parameter	Comment/Description	Reference
PDSCH mapping type	Type A or B	Clause 7.1.2.2.1.1; TS 38.211 [19] clause 7.4.1.1.2
dmrs-Type	DMRS Configuration type 1 or 2 as indicated to the UE by DMRS-DownlinkConfig.dmrs-Type	TS 38.211 [19] clause 7.4.1.1.2
dmrs-AdditionalPosition	Number of additional DMRS positions: For DCI format 1_1 as indicated to the UE by DMRS-DownlinkConfig.dmrs-AdditionalPosition 0, 1, 2 or 3 additional positions. For DCI format 1_0 according to TS 38.214 [22] clause 5.1.6.2 the UE shall assume dmrs-AdditionalPosition='pos2'	TS 38.211 [19] clause 7.4.1.1.2 and tables 7.4.1.1.2-3/4
maxLength	Number of OFDM symbols used for DMRS: For DCI format 1_1 as indicated to the UE by DMRS-DownlinkConfig.maxLength: Single or double symbol DM-RS. For DCI format 1_0 according to TS 38.214 [22] clause 5.1.6.2 single symbol DM-RS is applied.	TS 38.211 [19] clause 7.4.1.1.2 and table 7.4.1.1.2-5
number of CDM groups without data	The maximum number of CDM groups without data depends on the DMRS Configuration type (dmrs-Type): type 1: up to 2 CDM groups (TS 38.211 [19] Table 7.4.1.1.2-1) type 2: up to 3 CDM groups (TS 38.211 [19] Table 7.4.1.1.2-2)  For DCI format 1_1 the number of CDM groups without data for a single transmission is determined by the antenna port configuration provided in the DCI (TS 38.212 [20] tables 7.3.1.2.2-1/2/3/4)  For DCI format 1_0 according to TS 38.214 [22] clause 5.1.6.2 for mapping type A the UE shall assume that the number of DM-RS CDM groups without data is 2 (what results in PDSCH not being present in any symbol carrying DM-RS)	TS 38.211 [19] clause 7.4.1.1.2, TS 38.212 [20] clause 7.3.1.2.2 and tables 7.3.1.2.2-1/2/3/4, TS 38.214 [22] clause 5.1.3.2 and 5.1.6.2
xOverhead	Number of REs used for additional overhead as indicated to the UE by PDSCH-ServingCellConfig.xOverhead: 0, 6, 12, 18 REs	TS 38.214 [22] clause 5.1.3.2
PDSCH duration	Number of symbols allocated for the PDSCH transmission	Clause 7.1.2.2.1.1

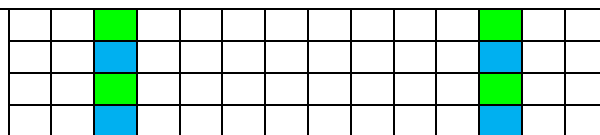
Table 7.1.2.2.4.1-3 gives examples for the position of DMRS within a resource block depending on different parameters, with DMRS CDM group 0 shown in blue and DMRS CDM group 1 (if any) shown in green. For DCI format 1\_0 and PDSCH mapping type A the UE assumes both CDM groups to be used; for DCI format 1\_1 the number of DMRS CDM groups without data depends on the antenna port configuration of the DCI: In case of dmrs-Type=1, maxLength=1 and only one code word TS 38.212 [20] table 7.3.1.2.2-1 is applied and '0000'B (as specified in TS 38.508-1 [5] table 4.3.6.1.2.2-1) corresponds one DRMS CDM group at port 1000 which results in the REs shown in blue.

**Table 7.1.2.2.4.1-3: Examples for the position of DMRS in an RB with PDSCH mapping type A, DMRS configuration type 1, maxLength=1, dmrs-AdditionalPosition=2**

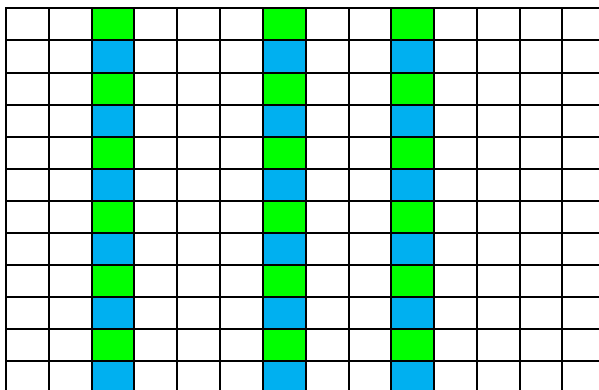




**DL-DMRS-add-pos = 0:**  
 $k = 4n + 2k' + \Delta; k' = 0, 1; \Delta = 0, 1$   
 $l_0 = 2$



**DL-DMRS-add-pos = 1, PDSCH duration = 13, 14:**  
 $k = 4n + 2k' + \Delta; k' = 0, 1; \Delta = 0, 1$   
 $l_0 = 2, l_1 = 11$



**DL-DMRS-add-pos = 2, PDSCH duration = 10, 11, 12:**  
 $k = 4n + 2k' + \Delta; k' = 0, 1; \Delta = 0, 1$   
 $l_0 = 2, l_1 = 6, l_2 = 9$

For PDSCH mapping type A and single-symbol DMRS according to TS 38.211 [19] Table 7.4.1.1.2-3 the number  $N_{\text{Symbols with DMRS}}$  of symbols with DMRS per resource block is as shown in table 7.1.2.2.4.1-4.

**Table 7.1.2.2.4.1-4: Number of symbols with DMRS per resource block**

PDSCH duration	dmrs-AdditionalPosition			
	0	1	2	3
2	1	1	1	1
3				
4				
5		2	2	2
6				
7				
8				
9	3	3	3	
10				
11			4	
12				
13	4			
14				

Assuming DMRS configuration type 1, maxLength=1, Xoh-PDSCH=0 and no rate matching, depending on the number of CDM groups without data, this results in the number of REs for DMRS per PRB including the overhead of the DMRS CDM groups without data as shown in Table 7.1.2.2.4.1-5.

**Table 7.1.2.2.4.1-5: Number of REs for DMRS per PRB including the overhead of the DMRS CDM groups without data for DMRS configuration type 1, maxLength=1, Xoh-PDSCH=0, no rate matching**

	dmrs-AdditionalPosition	PDSCH duration	Number of REs for DMRS	
DCI format 1_1 indicating one DMRS CDM group without data according to TS 38.212 [20] Table 7.3.1.2.2-1	0 (NOTE 1)	any	6	6 * N <sub>Symbols with DMRS</sub>
	1 (NOTE 1)	< 8	6	
		≥ 8	12	
DCI format 1_0	2 (NOTE 2)	< 8	12	12 * N <sub>Symbols with DMRS</sub>
		8, 9	24	
		> 9	36	
NOTE 1: TS 38.508-1 [5] table 4.6.3-36 specifies pos0 or pos1				
NOTE 2: pos2 for DCI format 1_0 according to TS 38.214 clause 5.1.6.2				

#### 7.1.2.2.4.2 Determination of TBS and corresponding I<sub>MCS</sub> and L<sub>RBs</sub> in automatic mode

In automatic mode, for each PDSCH transmission, the SS shall autonomously select a TBS and a L<sub>RBs</sub> / I<sub>MCS</sub> pair for this TBS.

For a given PDSCH transmission, the SS shall first select an initial TBS fulfilling the following conditions:

- First maximize the transmission of data available in its DL buffer,
- Then minimize the amount of padding.

Using the selected TBS, the SS shall apply the following rules:

- 1) When the TBS can be achieved with more than one L<sub>RBs</sub> / I<sub>MCS</sub> pairs the SS shall choose the L<sub>RBs</sub> / I<sub>MCS</sub> pair with minimum L<sub>RBs</sub> (L<sub>RBs,min</sub>) i.e. with maximum values of Q<sub>m</sub> and R taking into account limitations of Q<sub>m</sub> e.g. for the scheduling of system information as according to TS 38.214 [22] clause 5.1.3.1.
- 2) When there is more than one pair with the same (minimum) L<sub>RBs</sub> but different I<sub>MCS</sub>, the smaller I<sub>MCS</sub> value shall be chosen (what in fact results in smaller Q<sub>m</sub>).
- 3) If L<sub>RBs</sub> for the TBS is greater than L<sub>RBs,max</sub> the SS shall try the next greater TBS and use it if L<sub>RBs</sub> ≤ L<sub>RBs,max</sub> for this TBS. If the SS cannot find a TBS with L<sub>RBs</sub> ≤ L<sub>RBs,max</sub>, the SS shall raise an error.
- 4) If there is no L<sub>RBs</sub> / I<sub>MCS</sub> pair for the TBS the SS shall try the next greater TBS and shall raise an error if it cannot find any.

Annex B.1 provides tables for determination of I<sub>MCS</sub> and L<sub>RBs</sub> for different parameters and scenarios based on the following assumptions (unless stated otherwise for a specific table):

- Number of layers v = 1
- PDSCH mapping type A
- dmrs-Type: type1
- maxLength: single symbol DM-RS
- xOverhead = 0

### 7.1.2.3 Uplink grant

#### 7.1.2.3.1 General principles and grant allocation types

Uplink grants assignments for NR follow similar principles as for LTE (TS 36.523-3 [12] clause 7.2).

##### 7.1.2.3.1.1 PUCCH synchronisation in connected mode

To prevent the UE from doing RACH procedure for purpose of PUCCH synchronisation the SS gets configured to maintain PUCCH synchronisation at UE by periodically sending a MAC PDU containing the MAC control element 'Timing Advance Command'. The period as configured by TTCN is set to 80 % of the 'timeAlignmentTimer' value configured at UE.

As in general the PUCCH synchronisation is not time critical, the SS shall choose the next possible occasion for sending of the Timing Advance Command from expiry of the period onward (i.e. the SS shall not raise an error when sending of the Timing Advance Command is not possible at the calculated end of the period).

#### 7.1.2.3.1.2 Grant allocation types

In general PUCCH synchronisation is configured at the SS for the different grant allocation types when the UE is in connected mode.

##### 7.1.2.3.1.2.1 Grant allocation by RACH procedure

The UE gets assigned an uplink grant by the Random Access Response message being configured at the SS.

##### 7.1.2.3.1.2.2 Grant allocation type 1: Uplink grant triggered by SR

The SS gets configured to automatically assign an uplink grant when requested by the UE with a Scheduling Request (SR). The size of this UL grant is configured by TTCN, i.e. there is no requirement for SS implementation to determine the grant size but the configured value shall be used regardless of how much data the UE wants to send. The SS shall assign the UL grant within less than 10ms after it has received the scheduling requests.

##### 7.1.2.3.1.2.3 Grant allocation type 2: Periodic uplink grant

The SS gets configured to assign uplink grants periodically irrespective of any Scheduling Request sent by the UE. The configuration specifies:

- the uplink grant size
- the periodicity: once, several times, continuous
- the period in number of slots (e.g. every slot, every second slot, etc.)

The first uplink grant transmitted is as specified in the explicit timing information. If timing information is "now" the SS selects the first suitable subframe for UL transmission.

The SS shall not assign any additional uplink grant due to a Scheduling Request sent by the UE.

##### 7.1.2.3.1.2.4 Grant allocation type 3: Single uplink grant

Special case of Grant allocation type 2: Uplink grant is assigned only once.

##### 7.1.2.3.1.2.5 Grant allocation type 4: Periodic uplink grant triggered by SR

Combination of Grant allocation type 1 and 2: Periodic uplink grant according to clause 7.1.2.3.1.2.3 is triggered by a Scheduling Request sent by the UE.

#### 7.1.2.3.2 Determination of explicit uplink grants

##### 7.1.2.3.2.1 Parameters

Similar as for the downlink the UE gets preconfigured with parameters for time and frequency domain and a particular UL transmission is addressed by DCI:

1. Time domain resource allocation:  
Similar parameters are defined for UL as for DL (see clause 7.1.2.2.1.1, TS 38.214 [22] clause 6.1.2.1).
2. Frequency domain resource allocation:  
Similar as for the DL there is resource allocation type 0 and 1 for the UL (see clause 7.1.2.2.1.2, TS 38.214 [22] clause 6.1.2.2).  
Uplink resource allocation type 1 is assumed to be used for signalling conformance testing.
3. DCI parameters:  
Similar parameters are defined for UL as for DL (see clause 7.1.2.2.1.3, TS 38.212 [20] clauses 7.3.1.1.1 and 7.3.1.1.2, TS 38.214 [22] clause 6.1).

In detail for a particular uplink grant the parameters listed in tables 7.1.2.3.2.1-1 and 7.1.2.3.2.1-2 need to be considered.



Table 7.1.2.3.2.1-1: Parameters affecting TBS determination

Parameter	Comment/Description	Reference
Number of RBs in frequency domain	Indicated by DCI	
Number of symbols in time domain	Pre-configured at UE, selected by DCI; corresponds to "Duration in symbols" TS 38.211 [19] clause 6.4.1.1.3	
MCS index $I_{MCS}$	Indicated by DCI: Modulation Order $Q_m$ , Target code Rate $R$	TS 38.214 [22] clause 6.1.4.1; TS 38.214 [22] Table 5.1.3.1-1, 5.1.3.1-2, 6.1.4.1-1
Number of layers $u$	The number of layers being used for transmission of a transport block can be derived from the precoding information and the antenna port configuration provided by DCI format 0_1. For DCI format 0_1 in general $u = 1$ according to TS 38.508-1 [5] Table 4.3.6.1.1.2-1. For DCI format 0_0 $u = 1$ is assumed.	TS 38.214 [22] clause 6.1.1.1, TS 38.211 [19] clause 6.3.1.5 TS 38.212 [20] clause 7.3.1.1.2 and tables Table 7.3.1.1.2-2..5
PUSCH Parameters mcs-Table, mcs-TableTransformPrecoder, transformPrecoder	Pre-configured at the UE via RRC signalling: PUSCH-Config.mcs-Table := {qam64, qam256}; PUSCH-Config.mcs-TableTransformPrecoder := {qam64, qam256}; PUSCH-Config.transformPrecoder := {enabled, disabled}; indicates which MCS table to be applied	TS 38.214 [22] clause 6.1.4.1
Support of pi/2 BPSK modulation	In case of transformPrecoder==enabled and mcs-TableTransformPrecoder==qam64 the first two entries of TS 38.214 [22] Table 6.1.4.1-1 depend on whether or not the UE supports pi/2 BPSK modulation.	TS 38.214 [22] clause 6.1.4.1
Number of REs per PRB	Number of REs per PRB which are applicable for the PUSCH transmission	Table 7.1.2.3.2.1-2

**Table 7.1.2.3.2.1-2: Parameters affecting number of REs allocated for PUSCH per PRB**

Parameter	Comment/Description	Reference
PUSCH mapping type	Type A or B	TS 38.211 [19] clause 6.4.1.1.3
dmrs-Type	DMRS Configuration type 1 or 2 as indicated to the UE by DMRS-UplinkConfig.dmr-Type	TS 38.211 [19] clause 6.4.1.1.3
dmrs-AdditionalPosition	Number of additional DMRS positions: For DCI format 0_1 as indicated to the UE by DMRS-UplinkConfig.dmr-AdditionalPosition: 0, 1, 2 or 3 additional positions. For DCI format 0_0 according to TS 38.214 [22] clause 6.2.2 the UE shall assume dmrs-AdditionalPosition='pos2' when frequency hopping is disabled and dmrs-AdditionalPosition='pos1' when frequency hopping is enabled.	TS 38.211 [19] clause 6.4.1.1.3 and tables 6.4.1.1.3-3/4, TS 38.214 [22] clause 6.2.2
maxLength	Number of OFDM symbols used for DMRS: For DCI format 0_1 as indicated to the UE by DMRS-UplinkConfig.maxLength: Single or double symbol DM-RS. For DCI format 0_0 according to TS 38.214 [22] clause 6.2.2 single symbol DM-RS is applied.	TS 38.211 [19] clause 6.4.1.1.3 and table 6.4.1.1.3-5, TS 38.214 [22] clause 6.2.2
number of CDM groups without data	The maximum number of CDM groups without data depends on the DMRS Configuration type (dmrs-Type): type 1: up to 2 CDM groups (TS 38.211 [19] Table 6.4.1.1.3-1) type 2: up to 3 CDM groups (TS 38.211 [19] Table 6.4.1.1.3-2) For DCI format 0_1 the number of CDM groups without data for a single transmission is determined by the antenna port configuration provided in the DCI (TS 38.212 [20] tables 7.3.1.1.2-6..23) For DCI format 1_0 according to TS 38.214 [22] clause 6.2.2 for PUSCH duration > 2 the UE shall assume that the number of DM-RS CDM groups without data is 2 (what results in PDSCH not being present in any symbol carrying DM-RS)	TS 38.211 [19] clause 6.4.1.1.3, TS 38.212 [20] clause 7.3.1.1.2 and tables 7.3.1.1.2-6..23, TS 38.214 [22] clause 6.1.4.2 and 6.2.2
xOverhead	Number of REs used for additional overhead as indicated to the UE by PUSCH-ServingCellConfig.xOverhead: 0, 6, 12, 18 REs	TS 38.214 [22] clause 6.1.4.2
PUSCH duration	Number of symbols allocated for the PUSCH transmission by DCI	

The number of REs for DMRS and PDSCH per PRB is determined in the same way for UL as for DL (TS 38.211 [19] clause 7.4.1.1.2) ⇒ The same values are applicable for UL and DL (see Table 7.1.2.2.4.1-4).

#### 7.1.2.3.2.2 Determination of $I_{MCS}$ and $L_{RBs}$ for given TBS

Uplink grant assignments are fully controlled by TTCN. Annex B.2 provides tables as guideline for choosing values of  $I_{MCS}$  and  $L_{RBs}$  for a given TBS based on the following assumptions (unless stated otherwise for a specific table):

- Number of layers  $v = 1$
- PUSCH mapping type B (as according to PUSCH-TimeDomainResourceAllocationList and PUSCH-Config in TS 38.101-1 [5])
- dmrs-Type: type1
- maxLength: single symbol DM-RS
- xOverhead = 0

### 7.1.3 System information

TTCN provides the MIB message to the SS as a structured ASN.1 type using a control ASP (NR\_SYSTEM\_CTRL\_REQ). The SS shall:

- set the *systemFrameNumber* in the MIB to the 6 MSBs of the current SFN. A dummy value is provided by TTCN. The SS shall convey the 4 LSBs of the current SFN in the PBCH transport block. The SS shall fulfil  $\text{current SFN mod } 80 = 0$ .
- encode the MIB ASN.1 message as specified in Table 8.1-1.
- transmit the encoded MIB message periodically as specified in TS 38.331 [16]. For each transmission, the SS shall update *systemFrameNumber* value as specified above.

### 7.1.4 Cell(s) handling

#### 7.1.4.1 Multi-cells environment

In the present version of the document, simultaneous configuration and handling of a maximum of 1 E-UTRA cell and 1 NR cell is supported.

#### 7.1.4.2 Cell power change

The same principles and rules are applied as according to clause 7.4.2 of TS 36.523-3 [12].

### 7.1.5 Timing aspects

#### 7.1.5.1 SS time

The SS shall provide one system time common across all RATs and cells being configured in a test case. The timing of each configured cell is specified as an offset to this common system time.

#### 7.1.5.2 Cell(s) timing

The timing of E-UTRA cells is specified in TS 36.523-3 [12] subclause 7.4.3.1.

The DL timing of each NR cell is specified in Table 7.1.5.2-1.

Table 7.1.5.2-1: DL timing parameters of simulated NR cells

NR cell Id	H-SFN-offset (note1)	SFN-offset (note2)	Tcell (note3)	Tc-offset (note4)
NR Cell 1	0	0	0	0
NR Cell 2	0	124	0	0
NR Cell 3	0	257	0	0
NR Cell 4	0	1000	0	0
NR Cell 6	0	657	0	0
NR Cell 10	0	129	0	0
NR Cell 11	0	957	0	0
NR Cell 12	0	1015	0	0
NR Cell 13	0	890	0	0
NR Cell 14	0	680	0	0
NR Cell 23	0	383	0	0
NR Cell 28	0	890	0	0
NR Cell 29	0	680	0	0
NR Cell 30	0	1015	0	0
NR Cell 31	0	52	0	0

NOTE1: H-SFN-offset corresponds to the offset applied on H-SFN as defined for E-UTRA. It shall be set to 0 for an NR cell.

NOTE2: SFN-offset corresponds to the offset applied on system frame number (0 .. 1023).

NOTE3: Tcell corresponds to the timing offset in  $T_s$ .  $T_s = 1/(15000 * 2048)$  as for E-UTRA.

NOTE4: Tc-offset corresponds to the timing offset in  $T_c$ .  $\kappa = T_s/T_c = 64$  with  $T_c = 1/(480000 * 4096)$ . See TS 38.211 [19] subclause 4.1 and TS 36.211 [23] subclause 4).

The UL timing of each NR cell is configured as an offset (timing advance) to its DL timing. By default, the timing advance is initialised to 0 (unless specifically specified otherwise in the test case prose).

## 7.2 EN-DC

### 7.2.1 Introduction

Subclause 7.2 specifies test methods and design considerations that are specific to EN-DC.

### 7.2.2 Physical layer aspects

#### 7.2.2.1 Search spaces and DCI

For EN-DC test cases, TTCN provides the DCI configuration only for the following PDCCH search spaces on the active DL BWP:

- Type1-PDCCH common search space: used for the Random Access procedure on the NR cell, and
- UE specific search space (UL and DL): used for data exchange in RRC\_CONNECTED state on the NR cell.
  - For the default NR cell operation, TTCN configures DCI formats 0\_0 and 1\_0 in the SS.

### 7.2.3 System information

For EN-DC only MIB is configured and broadcast. SIB1 (RMSI) and Other SI are not configured.

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## 8 Other SS requirements with TTCN-3 impact

### 8.1 Codec requirements

The SS shall comply with the requirements specified in TS 36.523-3 [12] subclause 8.1. In addition, the SS shall also comply with the codec requirements specified in Table 8.1-1.

**Table 8.1-1: Codec requirements**

Type definitions	Codec requirements	Encoding rule in TTCN-3
NR ASN.1 types used for RRC signalling	shall comply to TS 38.331 [16] subclause 8.3	UNALIGNED_PER_OctetAligned

## 8.2 External function definitions

The SS shall implement the external functions specified in TS 36.523-3 [12] subclause 8.2.

# 9 IXIT proforma

## 9.1 Introduction

The partial IXIT proforma contained in the present document is provided for completion, when the related Abstract Test Suite(s) is(are) to be used against the Implementation Under Test (IUT).

The completed partial IXIT will normally be used in conjunction with the completed ICS, as it adds precision to the information provided by the ICS.

## 9.2 E-UTRA and EPC PIXIT

The PIXITs specified in TS 36.523-3 [12] subclause 9.1 apply. Additional PIXITs are also specified in Table 9.2-1.

**Table 9.2-1: EUTRA\_NR PIXIT**

Parameter Name	Parameter Type	Default Value	Supported Values	Description
px_ENDC_BandCombination	ENDC_BandCombination_Type	DC_1A_n28A		Band combination for EN-DC test case

## 9.3 NR and 5GC PIXIT

**Table 9.3-1: NR PIXIT**

Parameter Name	Parameter Type	Default Value	Supported Values	Description
px_NR_CipheringAlgorithm	CipheringAlgorithm	nea2		Ciphering Algorithm (see Note 1)
px_NR_IntegrityProtAlgorithm	IntegrityProtAlgorithm	nia2		Integrity Algorithm (see Note 1)

NOTE 1: Unless specified otherwise in the test case prose, the null algorithm shall not be used for verification.

# 10 Postambles

## 10.1 Introduction

The purpose of the present clause 10 is to specify the postambles used to bring the UE to a well-defined state regardless of the UE state at the termination of main test body or of the SS conditions and values of the system information inherited from the test.

## 10.2 EN-DC

The postambles specified in TS 36.523-3 [12] subclause 10.3 are also applicable to EN-DC test cases.

## Annex A (normative): Test Suites

This annex references the approved Test Suites, which accompany the present document. The Test Suites have been produced using the Testing and Test Control Notation version 3 (TTCN-3) according to ES 201 873 [4].

### A.1 Baseline of specifications

Table A.1-1 lists the core specifications and test specifications, which the delivered Test Suites are based upon.

**Table A.1-1: References of the test and Core specifications**

Type	Specification	Release	Version
<b>Core specifications</b>	TS 38.321 [13]	Note 1	Note 2
	TS 38.322 [14]	Note 1	Note 2
	TS 38.323 [15]	Note 1	Note 2
	TS 36.331 [17]	Note 1	Note 2
	TS 38.331 [16]	Note 1	Note 2
	TS 24.301 [18]	Note 1	Note 2
<b>Test specifications</b>	TS 36.508 [10]	Note 1	Note 2
	TS 36.509 [11]	Note 1	Note 2
	TS 38.508-1 [5]	Note 1	Note 2
	TS 38.508-2 [6]	Note 1	Note 2
	TS 38.509 [7]	Note 1	Note 2
	TS 38.523-1 [8]	Note 1	Note 2
	TS 38.523-2 [9]	Note 1	Note 2
NOTE 1: Latest release available, up to the release number of the present document.			
NOTE 2: Latest version available, up to the version number of the present document.			

### A.2 5GS Test Suites

There is no approved Test Suite in the present version of the present document.

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## Annex B: NR TBS tables

### B.1 Downlink TBS (normative)

The tables in this clause are depending on the following parameters (see subclause 7.1.2.2.4.1):

- MCS index tables 5.1.3.1-1, 5.1.3.1-2 according to TS 38.214 [22]
- dmrs-AdditionalPosition as configured at the UE via RRC signalling for DCI format 1\_1 or according to TS 38.214 [22] clause 5.1.6.2 for DCI format 1\_0
- number of CDM groups as indicated by DCI format 1\_1 or 2 CDM groups for DCI format 1\_0
- maximum modulation order according to TS 38.211 [19] table 6.3.1.2-1 which is applicable for the transmission: 6 for MCS index table 1 or 8 for MCS index table 2 (unless stated otherwise)
- number of layers: 1 (unless stated otherwise)
- PDSCH duration: number of symbols

NOTE: The tables in this clause are limited to the maximum of 24 RBs.

## B.1.1 Downlink TBS using MCS index table 5.1.3.1-1

### B.1.1.1 Downlink TBS using MCS index table 5.1.3.1-1, dmrs-AdditionalPosition = 0, number of CDM groups = 1

**Table B.1.1.1-1: Downlink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 0, number of CDM groups = 1, PDSCH duration = 14**

TBS	LRBs	IMCS	TBS	LRBs	IMCS	TBS	LRBs	IMCS	TBS	LRBs	IMCS
32	1	0	848	1	27	3496	4	28	8192	10	27
40	1	1	888	1	28	3624	5	24	8456	12	24
56	1	2	928	4	11	3752	5	25	8712	10	28
72	1	3	984	2	19	3824	8	19	8968	12	25
88	1	4	1032	2	20	3840	9	18	9224	11	27
104	3	0	1064	4	12	3904	6	23	9480	11	28
112	1	5	1128	2	21	3968	5	26	9736	13	25
136	1	6	1160	5	11	4032	12	14	9992	12	27
144	4	0	1192	4	13	4096	5	27	10248	13	26
152	2	3	1224	2	22	4224	6	24	10504	12	28
160	1	7	1256	6	9	4352	5	28	10760	13	27
176	1	8	1288	3	18	4480	6	25	11016	18	22
184	2	4	1320	2	23	4608	7	23	11272	13	28
208	1	9	1352	4	14	4736	6	26	11528	14	27
224	1	11	1416	2	24	4864	7	24	11784	18	23
240	4	2	1480	7	9	4992	6	27	12040	14	28
256	7	0	1544	2	25	5120	6	28	12296	22	21
272	1	12	1608	2	26	5248	7	25	12552	15	27
288	3	4	1672	2	27	5376	16	14	12808	16	26
304	1	13	1736	2	28	5504	7	26	13064	15	28
320	2	7	1800	6	13	5632	8	24	13320	16	27
336	1	14	1864	3	22	5760	7	27	13576	17	26
352	3	5	1928	4	19	5888	9	23	13832	16	28
368	1	15	2024	3	23	6016	7	28	14088	17	27
384	5	3	2088	4	20	6144	11	21	14344	18	26
408	1	16	2152	3	24	6272	9	24	14600	17	28
432	1	18	2216	12	8	6400	8	26	14856	18	27
456	2	11	2280	3	25	6528	10	23	15112	19	26
480	1	19	2408	3	26	6656	8	27	15624	18	28
504	14	0	2472	3	27	6784	9	25	15880	19	27
528	1	20	2536	6	18	6912	8	28	16136	23	24
552	3	8	2600	3	28	7040	10	24	16392	19	28
576	1	21	2664	4	23	7168	9	26	16896	21	26
608	1	22	2728	8	14	7296	12	22	17424	20	28
640	3	9	2792	5	21	7424	9	27	17928	21	28
672	1	23	2856	4	24	7552	10	25	18432	22	27
704	1	24	2976	4	25	7680	11	24	18960	22	28
736	4	8	3104	5	22	7808	9	28	19968	23	28
768	1	25	3240	4	26	7936	10	26	21000	24	28
808	1	26	3368	4	27	8064	17	19			



**Table B.1.1.1-2: Downlink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 0, number of CDM groups = 1, PDSCH duration = 13**

TBS	L <sub>RBs</sub>	I <sub>MCS</sub>	TBS	L <sub>RBs</sub>	I <sub>MCS</sub>	TBS	L <sub>RBs</sub>	I <sub>MCS</sub>	TBS	L <sub>RBs</sub>	I <sub>MCS</sub>
32	1	0	808	1	27	3368	4	28	8192	10	28
40	1	1	848	1	28	3496	5	24	8456	11	26
56	1	2	888	3	13	3624	5	25	8712	11	27
64	2	0	928	2	19	3752	9	18	8968	18	20
72	1	3	984	3	14	3824	6	23	9224	11	28
88	1	4	1032	2	20	3840	5	26	9480	12	27
104	1	5	1064	6	8	3968	5	27	9736	18	21
112	2	2	1128	2	21	4032	6	24	9992	12	28
128	1	6	1160	3	16	4096	5	28	10248	15	24
136	3	1	1192	2	22	4224	11	16	10504	13	27
144	2	3	1224	3	18	4352	6	25	10760	13	28
152	1	7	1256	2	23	4480	9	20	11016	19	22
168	3	2	1288	5	12	4608	6	26	11272	14	27
176	1	8	1320	4	14	4736	6	27	11528	14	28
192	1	9	1352	2	24	4864	9	21	11784	20	22
208	6	0	1416	3	19	4992	6	28	12040	15	27
224	1	11	1480	2	25	5120	16	14	12296	16	26
240	7	0	1544	2	26	5248	9	22	12552	15	28
256	1	12	1608	2	27	5376	7	26	12808	16	27
272	3	4	1672	2	28	5504	11	20	13064	17	26
288	1	13	1736	6	13	5632	7	27	13320	16	28
304	2	7	1800	3	22	5760	7	28	13576	17	27
320	1	14	1864	4	19	5888	10	22	13832	18	26
336	3	5	1928	3	23	6016	12	20	14088	17	28
352	2	8	2024	4	20	6144	8	26	14344	18	27
368	1	15	2088	3	24	6272	10	23	14600	19	26
384	1	16	2152	3	25	6400	8	27	14856	18	28
408	1	18	2216	10	11	6528	9	25	15112	19	27
432	12	0	2280	3	26	6656	8	28	15368	20	26
456	1	19	2408	3	27	6784	10	24	15624	23	24
504	1	20	2472	5	20	6912	9	26	15880	19	28
528	3	8	2536	3	28	7040	12	22	16136	21	26
552	1	21	2600	8	14	7168	9	27	16392	23	25
576	2	13	2664	12	11	7296	16	19	16896	20	28
608	1	22	2728	4	24	7424	9	28	17424	21	28
640	1	23	2792	11	12	7552	12	23	18432	22	28
672	1	24	2856	7	18	7680	10	26	18960	23	28
704	4	8	2976	4	25	7808	19	18	19968	24	28
736	1	25	3104	4	26	7936	10	27			
768	1	26	3240	4	27	8064	12	24			

**Table B.1.1.1-3: Downlink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 0, number of CDM groups = 1, PDSCH duration = 12**

TBS	L <sub>RBs</sub>	I <sub>MCS</sub>	TBS	L <sub>RBs</sub>	I <sub>MCS</sub>	TBS	L <sub>RBs</sub>	I <sub>MCS</sub>	TBS	L <sub>RBs</sub>	I <sub>MCS</sub>
32	1	0	736	1	27	2976	4	27	7680	10	28
40	1	1	768	1	28	3104	4	28	7808	17	20
48	1	2	808	3	13	3240	6	22	7936	12	25
64	1	3	848	2	19	3368	5	25	8064	11	27
80	1	4	888	3	14	3496	6	23	8192	18	20
96	1	5	928	2	20	3624	5	26	8456	11	28
104	2	2	984	6	8	3752	5	27	8712	12	27
120	1	6	1032	2	21	3840	5	28	8968	18	21
128	2	3	1064	3	16	3904	11	16	9224	12	28
136	1	7	1128	2	22	3968	6	25	9480	13	27
152	3	2	1160	2	23	4032	7	23	9736	18	22
160	1	8	1192	4	14	4096	9	20	9992	13	28
168	4	1	1224	6	11	4224	6	26	10248	14	27
176	1	9	1256	2	24	4352	6	27	10504	15	26
192	6	0	1288	7	9	4480	9	21	10760	14	28
208	1	11	1320	5	13	4608	6	28	11016	15	27
224	7	0	1352	2	25	4736	16	14	11272	16	26
240	1	12	1416	2	26	4864	7	26	11528	15	28
256	3	4	1480	2	27	4992	8	24	11784	16	27
272	1	13	1544	2	28	5120	7	27	12040	17	26
288	2	7	1608	3	22	5248	8	25	12296	16	28
304	1	14	1672	4	19	5376	7	28	12552	17	27
320	2	8	1736	12	7	5504	11	21	12808	18	26
336	1	15	1800	3	23	5632	8	26	13064	17	28
352	1	16	1864	4	20	5760	10	23	13320	18	27
368	2	9	1928	3	24	5888	8	27	13832	18	28
384	1	18	2024	3	25	6016	9	25	14088	19	27
408	2	11	2088	5	19	6144	8	28	14344	23	24
432	1	19	2152	3	26	6272	9	26	14600	19	28
456	1	20	2216	3	27	6400	11	23	14856	21	26
480	2	12	2280	3	28	6528	22	14	15368	20	28
504	1	21	2408	4	23	6656	9	27	15624	22	26
528	2	13	2472	5	21	6784	11	24	15880	24	25
552	1	22	2536	4	24	6912	9	28	16136	21	28
576	1	23	2600	11	12	7040	10	26	16896	22	28
608	2	14	2664	4	25	7168	19	18	17424	23	28
640	1	24	2728	5	22	7296	10	27	18432	24	28
672	1	25	2792	12	12	7424	12	24			
704	1	26	2856	4	26	7552	13	23			

### B.1.1.2 Downlink TBS using MCS index table 5.1.3.1-1, dmrs-AdditionalPosition = 1, number of CDM groups = 1

**Table B.1.1.2-1: Downlink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 1, number of CDM groups = 1, PDSCH duration = 14**

TBS	LRBs	IMCS	TBS	LRBs	IMCS	TBS	LRBs	IMCS	TBS	LRBs	IMCS
32	1	0	848	1	27	3496	4	28	8192	10	27
40	1	1	888	1	28	3624	5	24	8456	12	24
56	1	2	928	4	11	3752	5	25	8712	10	28
72	1	3	984	2	19	3824	8	19	8968	12	25
88	1	4	1032	2	20	3840	9	18	9224	11	27
104	3	0	1064	4	12	3904	6	23	9480	11	28
112	1	5	1128	2	21	3968	5	26	9736	13	25
136	1	6	1160	5	11	4032	12	14	9992	12	27
144	4	0	1192	4	13	4096	5	27	10248	13	26
152	2	3	1224	2	22	4224	6	24	10504	12	28
160	1	7	1256	6	9	4352	5	28	10760	13	27
176	1	8	1288	3	18	4480	6	25	11016	18	22
184	2	4	1320	2	23	4608	7	23	11272	13	28
208	1	9	1352	4	14	4736	6	26	11528	14	27
224	1	11	1416	2	24	4864	7	24	11784	18	23
240	4	2	1480	7	9	4992	6	27	12040	14	28
256	7	0	1544	2	25	5120	6	28	12296	22	21
272	1	12	1608	2	26	5248	7	25	12552	15	27
288	3	4	1672	2	27	5376	16	14	12808	16	26
304	1	13	1736	2	28	5504	7	26	13064	15	28
320	2	7	1800	6	13	5632	8	24	13320	16	27
336	1	14	1864	3	22	5760	7	27	13576	17	26
352	3	5	1928	4	19	5888	9	23	13832	16	28
368	1	15	2024	3	23	6016	7	28	14088	17	27
384	5	3	2088	4	20	6144	11	21	14344	18	26
408	1	16	2152	3	24	6272	9	24	14600	17	28
432	1	18	2216	12	8	6400	8	26	14856	18	27
456	2	11	2280	3	25	6528	10	23	15112	19	26
480	1	19	2408	3	26	6656	8	27	15624	18	28
504	14	0	2472	3	27	6784	9	25	15880	19	27
528	1	20	2536	6	18	6912	8	28	16136	23	24
552	3	8	2600	3	28	7040	10	24	16392	19	28
576	1	21	2664	4	23	7168	9	26	16896	21	26
608	1	22	2728	8	14	7296	12	22	17424	20	28
640	3	9	2792	5	21	7424	9	27	17928	21	28
672	1	23	2856	4	24	7552	10	25	18432	22	27
704	1	24	2976	4	25	7680	11	24	18960	22	28
736	4	8	3104	5	22	7808	9	28	19968	23	28
768	1	25	3240	4	26	7936	10	26	21000	24	28
808	1	26	3368	4	27	8064	17	19			

**Table B.1.1.2-2: Downlink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 1, number of CDM groups = 1, PDSCH duration = 13**

TBS	L <sub>RBs</sub>	I <sub>MCS</sub>	TBS	L <sub>RBs</sub>	I <sub>MCS</sub>	TBS	L <sub>RBs</sub>	I <sub>MCS</sub>	TBS	L <sub>RBs</sub>	I <sub>MCS</sub>
32	1	0	736	1	26	3104	4	27	7808	12	24
40	1	1	768	1	27	3240	4	28	7936	10	28
48	1	2	808	1	28	3368	6	22	8064	11	26
64	1	3	848	3	13	3496	5	25	8192	12	25
80	1	4	888	2	19	3624	6	23	8456	11	27
88	2	1	928	3	14	3752	5	26	8712	11	28
96	3	0	984	2	20	3824	11	15	8968	13	25
104	1	5	1032	2	21	3840	5	27	9224	12	27
120	1	6	1064	5	11	3904	6	24	9480	12	28
128	3	1	1128	2	22	3968	5	28	9736	14	25
136	2	3	1160	6	9	4032	11	16	9992	13	27
144	1	7	1192	3	18	4096	6	25	10248	14	26
160	3	2	1224	2	23	4224	7	23	10504	13	28
168	1	8	1256	4	14	4352	6	26	10760	14	27
176	4	1	1288	6	11	4480	7	24	11016	15	26
184	1	9	1320	2	24	4608	6	27	11272	14	28
208	1	11	1352	7	9	4736	6	28	11528	15	27
224	4	2	1416	2	25	4864	7	25	11784	16	26
240	1	12	1480	2	26	4992	9	22	12040	15	28
256	2	6	1544	2	27	5120	7	26	12296	16	27
272	1	13	1608	2	28	5248	8	24	12552	17	26
288	2	7	1672	6	13	5376	7	27	12808	16	28
304	1	14	1736	3	22	5504	8	25	13064	17	27
320	3	5	1800	4	19	5632	7	28	13320	18	26
336	2	8	1864	3	23	5760	12	20	13576	17	28
352	1	15	1928	4	20	5888	8	26	13832	18	27
368	1	16	2024	3	24	6016	10	23	14088	19	26
384	2	9	2088	3	25	6144	8	27	14344	18	28
408	1	18	2152	10	11	6272	9	25	14600	19	27
432	1	19	2216	3	26	6400	8	28	14856	23	24
456	3	7	2280	3	27	6528	10	24	15112	19	28
480	1	20	2408	3	28	6656	9	26	15368	20	27
504	2	12	2472	8	14	6784	13	21	15624	24	24
528	1	21	2536	12	11	6912	9	27	15880	20	28
552	2	13	2600	4	24	7040	18	18	16136	21	27
576	1	22	2664	11	12	7168	9	28	16392	24	25
608	1	23	2728	16	8	7296	10	26	16896	21	28
640	2	14	2792	4	25	7424	17	19	17424	22	28
672	1	24	2856	6	20	7552	11	25	18432	23	28
704	1	25	2976	4	26	7680	10	27	18960	24	28

**Table B.1.1.2-3: Downlink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 1, number of CDM groups = 1, PDSCH duration = 12**

TBS	L <sub>RBs</sub>	I <sub>MCS</sub>	TBS	L <sub>RBs</sub>	I <sub>MCS</sub>	TBS	L <sub>RBs</sub>	I <sub>MCS</sub>	TBS	L <sub>RBs</sub>	I <sub>MCS</sub>
24	1	0	672	1	26	2856	6	21	7552	12	25
40	1	1	704	1	27	2976	4	28	7680	11	27
48	1	2	736	1	28	3104	6	22	7808	14	23
56	2	0	768	3	13	3240	5	25	7936	20	19
64	1	3	808	2	19	3368	5	26	8064	11	28
72	1	4	848	3	14	3496	5	27	8192	13	25
80	2	1	888	2	20	3624	6	24	8456	12	27
88	3	0	928	6	8	3752	5	28	8712	12	28
96	1	5	984	2	21	3824	6	25	8968	14	25
112	1	6	1032	2	22	3840	7	23	9224	13	27
120	3	1	1064	6	9	3904	9	20	9480	13	28
128	1	7	1128	2	23	3968	10	19	9736	14	27
144	3	2	1160	4	14	4032	6	26	9992	15	26
152	1	8	1192	2	24	4096	7	24	10248	14	28
160	4	1	1224	7	9	4224	6	27	10504	15	27
168	1	9	1256	5	13	4352	6	28	10760	16	26
184	6	0	1288	2	25	4480	7	25	11016	15	28
192	1	11	1320	3	20	4608	9	22	11272	16	27
208	5	1	1352	2	26	4736	7	26	11528	17	26
224	1	12	1416	2	27	4864	7	27	11784	16	28
240	3	4	1480	2	28	4992	9	23	12040	17	27
256	1	13	1544	3	22	5120	7	28	12296	22	23
272	2	7	1608	4	19	5248	11	21	12552	17	28
288	1	14	1672	3	23	5376	8	26	12808	19	26
304	2	8	1736	5	16	5504	10	23	13064	18	28
320	1	15	1800	3	24	5632	8	27	13320	19	27
336	1	16	1864	12	8	5760	9	25	13576	20	26
352	2	9	1928	3	25	5888	8	28	13832	19	28
368	1	18	2024	3	26	6016	9	26	14088	20	27
384	2	11	2088	3	27	6144	11	23	14344	24	24
408	1	19	2152	6	18	6272	9	27	14600	20	28
432	1	20	2216	3	28	6400	16	19	14856	21	27
456	2	12	2280	8	14	6528	9	28	15368	21	28
480	1	21	2408	4	24	6656	12	23	15624	23	26
504	2	13	2472	11	12	6784	10	26	16136	22	28
528	1	22	2536	4	25	6912	11	25	16896	23	28
552	1	23	2600	5	22	7040	10	27	17424	24	28
576	2	14	2664	6	20	7168	12	24			
608	1	24	2728	4	26	7296	10	28			
640	1	25	2792	4	27	7424	11	26			

**B.1.1.3 Downlink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 2, number of CDM groups = 2,  
modulation order <= 2**

**Table B.1.1.3-1: Downlink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 2, number of CDM groups = 2,  
modulation order <= 2, PDSCH duration = 14**

TBS	LRBs	IMCS	TBS	LRBs	IMCS	TBS	LRBs	IMCS	TBS	LRBs	IMCS
24	1	0	288	3	5	888	5	9	2152	14	8
40	1	1	304	2	8	928	6	8	2216	19	6
48	1	2	320	4	4	984	7	7	2280	13	9
56	2	0	336	11	0	1032	13	4	2408	15	8
64	1	3	352	2	9	1064	6	9	2472	14	9
72	1	4	368	9	1	1128	7	8	2536	22	6
80	2	1	384	4	5	1160	10	6	2600	19	7
88	3	0	408	3	7	1192	12	5	2664	15	9
96	1	5	432	14	0	1224	7	9	2728	20	7
112	1	6	456	4	6	1256	8	8	2792	16	9
120	3	1	480	3	8	1288	11	6	2856	21	7
128	1	7	504	5	5	1352	10	7	2976	17	9
144	3	2	528	3	9	1416	8	9	3104	20	8
152	1	8	552	4	7	1480	15	5	3240	18	9
160	4	1	576	5	6	1544	11	7	3368	19	9
168	1	9	608	6	5	1608	9	9	3496	20	9
184	6	0	640	4	8	1672	12	7	3624	23	8
192	2	5	672	5	7	1736	11	8	3752	21	9
208	5	1	704	4	9	1800	10	9	3840	22	9
224	2	6	736	9	4	1864	12	8	4032	23	9
240	3	4	768	15	2	1928	11	9	4224	24	9
256	4	3	808	5	8	2024	13	8			
272	2	7	848	13	3	2088	12	9			

**Table B.1.1.3-2: Downlink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 2, number of CDM groups = 2,  
modulation order <= 2, PDSCH duration = 13**

TBS	LRBs	IMCS	TBS	LRBs	IMCS	TBS	LRBs	IMCS	TBS	LRBs	IMCS
24	1	0	288	2	8	888	7	7	2024	14	8
32	1	1	304	11	0	928	20	2	2088	13	9
40	1	2	320	2	9	984	6	9	2152	15	8
56	1	3	336	9	1	1032	14	4	2216	14	9
72	1	4	352	4	5	1064	10	6	2280	16	8
80	3	0	368	3	7	1128	7	9	2408	15	9
88	1	5	408	7	3	1160	11	6	2472	20	7
104	1	6	432	3	8	1192	20	3	2536	16	9
112	2	3	456	5	5	1224	17	4	2600	21	7
120	1	7	480	3	9	1256	10	7	2664	19	8
128	3	2	504	4	7	1288	8	9	2728	17	9
136	1	8	528	5	6	1320	18	4	2856	18	9
144	2	4	552	12	2	1352	11	7	2976	21	8
152	1	9	576	4	8	1416	10	8	3104	19	9
168	6	0	608	10	3	1480	9	9	3240	20	9
176	2	5	640	4	9	1544	17	5	3368	21	9
192	7	0	672	9	4	1608	10	9	3496	22	9
208	2	6	704	5	8	1672	23	4	3752	23	9
224	3	4	736	6	7	1736	12	8	3824	24	9
240	2	7	768	13	3	1800	11	9			
256	7	1	808	5	9	1864	13	8			
272	3	5	848	6	8	1928	12	9			

**Table B.1.1.3-3: Downlink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 2, number of CDM groups = 2,  
modulation order <= 2, PDSCH duration = 12**

TBS	LRBs	IMCS	TBS	LRBs	IMCS	TBS	LRBs	IMCS	TBS	LRBs	IMCS
24	1	0	256	2	8	768	6	8	1800	14	8
32	1	1	272	5	3	808	7	7	1864	13	9
40	1	2	288	2	9	848	9	6	1928	15	8
48	1	3	304	9	1	888	6	9	2024	14	9
64	1	4	320	4	5	928	14	4	2088	19	7
72	1	5	336	3	7	984	10	6	2152	15	9
80	2	2	352	14	0	1032	7	9	2216	20	7
88	1	6	368	7	3	1064	11	6	2280	16	9
96	3	1	384	3	8	1128	10	7	2408	19	8
104	1	7	408	5	5	1160	8	9	2472	17	9
120	1	8	432	3	9	1192	15	5	2536	20	8
128	2	4	456	4	7	1224	11	7	2600	18	9
136	1	9	480	5	6	1256	19	4	2664	21	8
144	6	0	504	4	8	1288	9	9	2728	19	9
152	2	5	528	8	4	1320	14	6	2792	22	8
160	4	2	552	5	7	1352	12	7	2856	20	9
176	7	0	576	4	9	1416	11	8	2976	21	9
184	2	6	608	9	4	1480	10	9	3104	24	8
192	3	4	640	5	8	1544	12	8	3240	22	9
208	4	3	672	6	7	1608	11	9	3368	23	9
224	2	7	704	13	3	1672	13	8	3496	24	9
240	3	5	736	5	9	1736	12	9			

### B.1.1.4 Downlink TBS using MCS index table 5.1.3.1-1, dmrs-AdditionalPosition = 2, number of CDM groups = 2

**Table B.1.1.4-1: Downlink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 2, number of CDM groups = 2, PDSCH duration = 14**

TBS	LRBs	IMCS	TBS	LRBs	IMCS	TBS	LRBs	IMCS	TBS	LRBs	IMCS
24	1	0	672	1	26	2856	6	21	7552	12	25
40	1	1	704	1	27	2976	4	28	7680	11	27
48	1	2	736	1	28	3104	6	22	7808	14	23
56	2	0	768	3	13	3240	5	25	7936	20	19
64	1	3	808	2	19	3368	5	26	8064	11	28
72	1	4	848	3	14	3496	5	27	8192	13	25
80	2	1	888	2	20	3624	6	24	8456	12	27
88	3	0	928	6	8	3752	5	28	8712	12	28
96	1	5	984	2	21	3824	6	25	8968	14	25
112	1	6	1032	2	22	3840	7	23	9224	13	27
120	3	1	1064	6	9	3904	9	20	9480	13	28
128	1	7	1128	2	23	3968	10	19	9736	14	27
144	3	2	1160	4	14	4032	6	26	9992	15	26
152	1	8	1192	2	24	4096	7	24	10248	14	28
160	4	1	1224	7	9	4224	6	27	10504	15	27
168	1	9	1256	5	13	4352	6	28	10760	16	26
184	6	0	1288	2	25	4480	7	25	11016	15	28
192	1	11	1320	3	20	4608	9	22	11272	16	27
208	5	1	1352	2	26	4736	7	26	11528	17	26
224	1	12	1416	2	27	4864	7	27	11784	16	28
240	3	4	1480	2	28	4992	9	23	12040	17	27
256	1	13	1544	3	22	5120	7	28	12296	22	23
272	2	7	1608	4	19	5248	11	21	12552	17	28
288	1	14	1672	3	23	5376	8	26	12808	19	26
304	2	8	1736	5	16	5504	10	23	13064	18	28
320	1	15	1800	3	24	5632	8	27	13320	19	27
336	1	16	1864	12	8	5760	9	25	13576	20	26
352	2	9	1928	3	25	5888	8	28	13832	19	28
368	1	18	2024	3	26	6016	9	26	14088	20	27
384	2	11	2088	3	27	6144	11	23	14344	24	24
408	1	19	2152	6	18	6272	9	27	14600	20	28
432	1	20	2216	3	28	6400	16	19	14856	21	27
456	2	12	2280	8	14	6528	9	28	15368	21	28
480	1	21	2408	4	24	6656	12	23	15624	23	26
504	2	13	2472	11	12	6784	10	26	16136	22	28
528	1	22	2536	4	25	6912	11	25	16896	23	28
552	1	23	2600	5	22	7040	10	27	17424	24	28
576	2	14	2664	6	20	7168	12	24			
608	1	24	2728	4	26	7296	10	28			
640	1	25	2792	4	27	7424	11	26			



**Table B.1.1.4-2: Downlink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 2, number of CDM groups = 2, PDSCH duration = 13**

TBS	L <sub>RBs</sub>	MCS	TBS	L <sub>RBs</sub>	MCS	TBS	L <sub>RBs</sub>	MCS	TBS	L <sub>RBs</sub>	MCS
24	1	0	672	1	28	2728	5	24	7040	11	27
32	1	1	704	3	13	2792	6	22	7168	18	20
40	1	2	736	2	19	2856	11	14	7296	11	28
56	1	3	768	13	3	2976	5	25	7424	16	22
72	1	4	808	2	20	3104	5	26	7552	13	25
80	3	0	848	6	8	3240	5	27	7680	12	27
88	1	5	888	2	21	3368	5	28	7808	18	21
104	1	6	928	3	16	3496	6	25	7936	12	28
112	2	3	984	2	22	3624	7	23	8064	14	25
120	1	7	1032	2	23	3752	6	26	8192	13	27
128	3	2	1064	6	11	3824	7	24	8456	14	26
136	1	8	1128	2	24	3840	6	27	8712	13	28
144	2	4	1160	2	25	3904	9	21	8968	14	27
152	1	9	1192	3	20	3968	6	28	9224	14	28
168	6	0	1224	2	26	4032	7	25	9480	15	27
176	1	11	1256	4	16	4096	16	14	9736	16	26
192	7	0	1288	2	27	4224	7	26	9992	15	28
208	1	12	1320	3	21	4352	8	24	10248	16	27
224	1	13	1352	2	28	4480	7	27	10504	17	26
240	2	7	1416	3	22	4608	7	28	10760	16	28
256	1	14	1480	4	19	4736	11	21	11016	18	26
272	3	5	1544	3	23	4864	8	26	11272	17	28
288	1	15	1608	4	20	4992	10	23	11528	18	27
304	1	16	1672	3	24	5120	8	27	12040	18	28
320	1	18	1736	3	25	5248	8	28	12296	20	26
336	9	1	1800	10	11	5376	10	24	12552	19	28
352	2	11	1864	3	26	5504	9	26	12808	20	27
368	1	19	1928	3	27	5632	12	22	13064	24	24
408	1	20	2024	3	28	5760	9	27	13320	20	28
432	1	21	2088	8	14	5888	11	24	13576	22	26
456	2	13	2152	4	24	6016	9	28	13832	24	25
480	1	22	2216	6	19	6144	10	26	14088	21	28
504	1	23	2280	7	18	6272	11	25	14600	22	28
528	2	14	2408	4	25	6400	10	27	15368	23	28
552	1	24	2472	4	26	6528	12	24	15880	24	28
576	1	25	2536	4	27	6656	10	28			
608	1	26	2600	6	21	6784	11	26			
640	1	27	2664	4	28	6912	12	25			

**Table B.1.1.4-3: Downlink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 2, number of CDM groups = 2, PDSCH duration = 12**

TBS	L <sub>RBs</sub>	MCS	TBS	L <sub>RBs</sub>	MCS	TBS	L <sub>RBs</sub>	MCS	TBS	L <sub>RBs</sub>	MCS
24	1	0	552	1	26	2408	4	28	6272	11	27
32	1	1	576	1	27	2472	5	24	6400	14	23
40	1	2	608	1	28	2536	6	22	6528	11	28
48	1	3	640	3	13	2600	5	25	6656	12	26
64	1	4	672	2	19	2664	9	18	6784	13	25
72	1	5	704	3	14	2728	6	23	6912	12	27
80	2	2	736	2	20	2792	5	26	7040	18	21
88	1	6	768	6	8	2856	5	27	7168	12	28
96	3	1	808	2	21	2976	5	28	7296	14	25
104	1	7	848	2	22	3104	6	25	7424	13	27
120	1	8	888	3	18	3240	7	23	7552	18	22
128	2	4	928	2	23	3368	6	26	7680	14	26
136	1	9	984	2	24	3496	6	27	7808	13	28
144	6	0	1032	4	15	3624	6	28	7936	19	22
152	1	11	1064	2	25	3752	16	14	8064	14	27
160	4	2	1128	2	26	3824	9	22	8192	15	26
176	1	12	1160	2	27	3840	7	26	8456	14	28
184	2	6	1192	2	28	3904	8	24	8712	15	27
192	3	4	1224	11	7	3968	17	14	8968	15	28
208	1	13	1256	6	13	4032	7	27	9224	16	27
224	2	7	1288	3	22	4096	8	25	9480	16	28
240	1	14	1320	4	19	4224	7	28	9736	17	27
256	1	15	1352	12	7	4352	8	26	9992	18	26
272	1	16	1416	3	23	4480	10	23	10248	17	28
288	1	18	1480	3	24	4608	8	27	10504	19	26
304	9	1	1544	12	8	4736	8	28	10760	18	28
320	1	19	1608	3	25	4864	10	24	11016	19	27
336	3	7	1672	3	26	4992	9	26	11272	19	28
352	1	20	1736	3	27	5120	9	27	11528	20	27
368	2	12	1800	3	28	5248	16	19	11784	24	24
384	1	21	1864	4	23	5376	9	28	12040	20	28
408	2	13	1928	12	11	5504	10	26	12552	21	28
432	1	22	2024	4	24	5632	19	18	12808	23	26
456	1	23	2088	4	25	5760	10	27	13064	22	28
480	2	14	2152	6	20	5888	12	24	13320	23	27
504	1	24	2216	4	26	6016	10	28	13832	23	28
528	1	25	2280	4	27	6144	19	19	14344	24	28

## B.1.2 Downlink TBS using MCS index table 5.1.3.1-2

### B.1.2.1 Downlink TBS using MCS index table 5.1.3.1-2, dmrs-AdditionalPosition = 0, number of CDM groups = 1

**Table B.1.2.1-1: Downlink TBS using MCS index table 5.1.3.1-2,  
dmrs-AdditionalPosition = 0, number of CDM groups = 1, PDSCH duration = 14**

TBS	LRBs	IMCS	TBS	LRBs	IMCS	TBS	LRBs	IMCS	TBS	LRBs	IMCS
32	1	0	1192	4	7	4352	4	25	11272	10	26
56	1	1	1224	2	15	4480	4	26	11528	10	27
72	2	0	1256	21	1	4608	4	27	11784	11	25
88	1	2	1288	3	11	4736	6	19	12040	13	22
104	3	0	1320	2	16	4864	5	23	12296	11	26
112	2	1	1352	4	8	4992	6	20	12552	13	23
136	1	3	1416	2	17	5120	5	24	12808	11	27
144	4	0	1480	8	4	5248	7	18	13064	15	21
176	1	4	1544	2	18	5376	5	25	13320	12	26
184	2	2	1608	2	19	5504	5	26	13576	14	23
224	1	5	1672	2	20	5632	8	17	13832	12	27
240	4	1	1736	2	21	5760	5	27	14088	13	25
256	7	0	1800	6	7	5888	9	16	14344	14	24
272	1	6	1864	2	22	6016	7	21	14600	13	26
288	3	2	1928	4	12	6144	6	24	14856	18	20
304	1	7	2024	2	23	6272	9	17	15112	13	27
336	1	8	2088	2	24	6400	6	25	15368	15	24
352	6	1	2152	2	25	6528	10	16	15624	14	26
368	1	9	2216	2	26	6656	6	26	15880	19	20
408	1	10	2280	3	18	6784	7	23	16136	14	27
432	1	11	2408	2	27	6912	6	27	16392	16	24
456	2	5	2472	3	20	7040	10	17	16896	15	26
480	1	12	2536	6	11	7168	7	24	17424	15	27
504	14	0	2600	3	21	7296	8	22	17928	16	26
528	1	13	2664	4	16	7424	9	20	18432	16	27
552	3	4	2728	8	8	7552	7	25	18960	17	26
576	1	14	2792	3	22	7680	11	17	19464	17	27
608	1	15	2856	4	17	7808	7	26	19968	18	26
640	11	1	2976	3	23	7936	10	19	20496	19	25
672	1	16	3104	3	24	8064	7	27	21000	18	27
704	1	17	3240	3	25	8192	8	24	21504	20	25
736	4	4	3368	3	26	8456	12	17	22032	19	27
768	1	18	3496	3	27	8712	8	25	22536	20	26
808	1	19	3624	5	17	8968	8	26	23040	20	27
848	1	20	3752	4	22	9224	8	27	23568	21	26
888	1	21	3824	8	12	9480	11	21	24072	21	27
928	1	22	3840	4	23	9736	9	25	24576	22	26
984	1	23	3904	6	16	9992	9	26	25608	22	27
1032	1	24	3968	5	19	10248	10	24	26120	24	25
1064	4	6	4032	12	8	10504	9	27	26632	23	27
1128	1	25	4096	4	24	10760	10	25	27656	24	27
1160	1	27	4224	6	17	11016	12	22			

**Table B.1.2.1-2: Downlink TBS using MCS index table 5.1.3.1-2,  
dmrs-AdditionalPosition = 0, number of CDM groups = 1, PDSCH duration = 13**

TBS	L <sub>RBs</sub>	I <sub>MCS</sub>	TBS	L <sub>RBs</sub>	I <sub>MCS</sub>	TBS	L <sub>RBs</sub>	I <sub>MCS</sub>	TBS	L <sub>RBs</sub>	I <sub>MCS</sub>
32	1	0	1160	3	10	4224	4	26	11016	10	27
56	1	1	1192	2	15	4352	5	22	11272	11	25
64	2	0	1224	3	11	4480	4	27	11528	13	22
88	1	2	1256	2	16	4608	5	23	11784	11	26
104	3	0	1288	5	6	4736	6	20	12040	13	23
112	2	1	1320	4	8	4864	5	24	12296	11	27
128	1	3	1352	2	17	4992	6	21	12552	12	25
136	4	0	1416	3	12	5120	5	25	12808	12	26
168	3	1	1480	2	18	5248	6	22	13064	14	23
176	1	4	1544	2	19	5376	5	26	13320	12	27
208	6	0	1608	2	20	5504	5	27	13576	13	25
224	1	5	1672	2	21	5632	6	23	13832	13	26
240	7	0	1736	6	7	5760	7	21	14088	15	23
256	1	6	1800	2	22	5888	6	24	14344	13	27
272	3	2	1864	2	23	6016	12	13	14600	14	25
288	1	7	1928	3	16	6144	6	25	14856	15	24
320	1	8	2024	2	24	6272	10	16	15112	14	26
336	6	1	2088	2	25	6400	6	26	15368	20	19
352	2	4	2152	2	26	6528	7	23	15624	14	27
368	1	9	2216	2	27	6656	6	27	15880	16	24
384	1	10	2280	3	19	6784	10	17	16136	15	26
408	1	11	2408	3	20	6912	7	24	16392	16	25
432	12	0	2472	5	13	7040	8	22	16896	15	27
456	1	12	2536	3	21	7168	9	20	17424	16	26
504	1	13	2600	8	8	7296	7	25	17928	16	27
528	3	4	2664	3	22	7424	8	23	18432	17	26
552	1	14	2728	4	17	7552	7	26	18960	17	27
576	2	7	2792	3	23	7680	10	19	19464	18	26
608	1	15	2856	7	11	7808	7	27	19968	18	27
640	1	16	2976	3	24	7936	9	22	20496	19	26
672	1	17	3104	3	25	8064	12	17	21000	19	27
704	4	4	3240	3	26	8192	8	25	21504	20	26
736	1	18	3368	3	27	8456	8	26	22032	20	27
768	1	19	3496	5	17	8712	10	22	22536	21	26
808	1	20	3624	4	22	8968	8	27	23040	22	25
848	1	21	3752	4	23	9224	9	25	23568	21	27
888	1	22	3824	6	16	9480	12	20	24072	23	25
928	1	23	3840	5	19	9736	9	26	24576	22	27
984	1	24	3904	4	24	9992	9	27	25104	24	25
1032	1	25	3968	5	20	10248	10	25	25608	23	27
1064	6	4	4032	6	17	10504	12	22	26632	24	27
1128	1	26	4096	4	25	10760	10	26			

**Table B.1.2.1-3: Downlink TBS using MCS index table 5.1.3.1-2,  
dmrs-AdditionalPosition = 0, number of CDM groups = 1, PDSCH duration = 12**

TBS	L <sub>RBs</sub>	MCS	TBS	L <sub>RBs</sub>	MCS	TBS	L <sub>RBs</sub>	MCS	TBS	L <sub>RBs</sub>	MCS
32	1	0	984	1	25	3904	4	26	9736	12	22
48	1	1	1032	1	27	3968	6	18	9992	10	26
64	2	0	1064	3	10	4032	5	22	10248	10	27
80	1	2	1128	2	15	4096	4	27	10504	11	25
96	3	0	1160	2	16	4224	5	23	10760	11	26
104	2	1	1192	4	8	4352	6	20	11016	15	20
120	1	3	1224	6	5	4480	5	24	11272	11	27
128	4	0	1256	2	17	4608	6	21	11528	12	25
152	3	1	1320	5	7	4736	5	25	11784	12	26
160	1	4	1352	2	18	4864	5	26	12040	14	23
192	6	0	1416	2	19	4992	8	17	12296	12	27
208	1	5	1480	2	20	5120	5	27	12552	14	24
224	7	0	1544	2	21	5248	8	18	12808	13	26
240	1	6	1608	3	15	5376	6	24	13064	16	22
256	3	2	1672	2	22	5504	11	14	13320	13	27
272	1	7	1736	2	23	5632	7	22	13576	15	24
288	9	0	1800	3	16	5760	6	25	13832	14	26
304	1	8	1864	2	24	5888	6	26	14088	19	20
320	2	4	1928	2	25	6016	7	23	14344	14	27
336	1	9	2024	2	26	6144	6	27	14600	16	24
352	1	10	2088	2	27	6272	7	24	14856	15	26
368	3	3	2152	3	19	6400	11	16	15368	15	27
384	1	11	2216	3	20	6528	8	22	15624	22	19
408	2	5	2280	3	21	6656	7	25	15880	16	26
432	1	12	2408	4	16	6784	11	17	16136	17	25
456	1	13	2472	3	22	6912	7	26	16392	16	27
480	2	6	2536	4	17	7040	10	19	16896	17	26
504	1	14	2600	3	23	7168	7	27	17424	17	27
528	2	7	2664	4	18	7296	9	22	17928	18	26
552	1	15	2728	3	24	7424	12	17	18432	18	27
576	1	16	2792	12	6	7552	8	25	18960	19	26
608	2	8	2856	3	25	7680	9	23	19464	19	27
640	1	17	2976	3	26	7808	17	13	19968	20	26
672	1	18	3104	3	27	7936	8	26	20496	20	27
704	1	19	3240	4	22	8064	10	22	21000	22	25
736	1	20	3368	5	18	8192	8	27	21504	21	27
768	1	21	3496	4	23	8456	9	25	22032	23	25
808	1	22	3624	4	24	8712	12	20	22536	22	27
848	2	12	3752	5	20	8968	9	26	23040	24	25
888	1	23	3824	4	25	9224	9	27	23568	23	27
928	1	24	3840	5	21	9480	10	25	24576	24	27

### B.1.2.2 Downlink TBS using MCS index table 5.1.3.1-2, dmrs-AdditionalPosition = 1, number of CDM groups = 1

**Table B.1.2.2-1: Downlink TBS using MCS index table 5.1.3.1-2,  
dmrs-AdditionalPosition = 1, number of CDM groups = 1, PDSCH duration = 14**

TBS	LRBs	IMCS	TBS	LRBs	IMCS	TBS	LRBs	IMCS	TBS	LRBs	IMCS
32	1	0	1192	4	7	4352	4	25	11272	10	26
56	1	1	1224	2	15	4480	4	26	11528	10	27
72	2	0	1256	21	1	4608	4	27	11784	11	25
88	1	2	1288	3	11	4736	6	19	12040	13	22
104	3	0	1320	2	16	4864	5	23	12296	11	26
112	2	1	1352	4	8	4992	6	20	12552	13	23
136	1	3	1416	2	17	5120	5	24	12808	11	27
144	4	0	1480	8	4	5248	7	18	13064	15	21
176	1	4	1544	2	18	5376	5	25	13320	12	26
184	2	2	1608	2	19	5504	5	26	13576	14	23
224	1	5	1672	2	20	5632	8	17	13832	12	27
240	4	1	1736	2	21	5760	5	27	14088	13	25
256	7	0	1800	6	7	5888	9	16	14344	14	24
272	1	6	1864	2	22	6016	7	21	14600	13	26
288	3	2	1928	4	12	6144	6	24	14856	18	20
304	1	7	2024	2	23	6272	9	17	15112	13	27
336	1	8	2088	2	24	6400	6	25	15368	15	24
352	6	1	2152	2	25	6528	10	16	15624	14	26
368	1	9	2216	2	26	6656	6	26	15880	19	20
408	1	10	2280	3	18	6784	7	23	16136	14	27
432	1	11	2408	2	27	6912	6	27	16392	16	24
456	2	5	2472	3	20	7040	10	17	16896	15	26
480	1	12	2536	6	11	7168	7	24	17424	15	27
504	14	0	2600	3	21	7296	8	22	17928	16	26
528	1	13	2664	4	16	7424	9	20	18432	16	27
552	3	4	2728	8	8	7552	7	25	18960	17	26
576	1	14	2792	3	22	7680	11	17	19464	17	27
608	1	15	2856	4	17	7808	7	26	19968	18	26
640	11	1	2976	3	23	7936	10	19	20496	19	25
672	1	16	3104	3	24	8064	7	27	21000	18	27
704	1	17	3240	3	25	8192	8	24	21504	20	25
736	4	4	3368	3	26	8456	12	17	22032	19	27
768	1	18	3496	3	27	8712	8	25	22536	20	26
808	1	19	3624	5	17	8968	8	26	23040	20	27
848	1	20	3752	4	22	9224	8	27	23568	21	26
888	1	21	3824	8	12	9480	11	21	24072	21	27
928	1	22	3840	4	23	9736	9	25	24576	22	26
984	1	23	3904	6	16	9992	9	26	25608	22	27
1032	1	24	3968	5	19	10248	10	24	26120	24	25
1064	4	6	4032	12	8	10504	9	27	26632	23	27
1128	1	25	4096	4	24	10760	10	25	27656	24	27
1160	1	27	4224	6	17	11016	12	22			

**Table B.1.2.2-2: Downlink TBS using MCS index table 5.1.3.1-2, dmrs-AdditionalPosition = 1, number of CDM groups = 1, PDSCH duration = 13**

TBS	L <sub>RBs</sub>	MCS	TBS	L <sub>RBs</sub>	MCS	TBS	L <sub>RBs</sub>	MCS	TBS	L <sub>RBs</sub>	MCS
32	1	0	1160	9	3	4224	4	27	11016	11	25
48	1	1	1192	3	11	4352	6	19	11272	11	26
64	2	0	1224	2	16	4480	5	23	11528	13	23
80	1	2	1256	4	8	4608	6	20	11784	11	27
96	3	0	1288	6	5	4736	5	24	12040	12	25
104	2	1	1320	2	17	4864	7	18	12296	12	26
120	1	3	1352	8	4	4992	5	25	12552	14	23
128	4	0	1416	2	18	5120	5	26	12808	12	27
160	3	1	1480	2	19	5248	5	27	13064	17	20
168	1	4	1544	2	20	5376	6	23	13320	13	26
208	1	5	1608	2	21	5504	8	18	13576	16	22
224	4	1	1672	6	7	5632	6	24	13832	13	27
240	1	6	1736	2	22	5760	12	13	14088	15	24
256	2	3	1800	2	23	5888	6	25	14344	14	26
272	1	7	1864	3	16	6016	10	16	14600	19	20
304	1	8	1928	2	24	6144	6	26	14856	14	27
320	6	1	2024	2	25	6272	7	23	15112	16	24
336	2	4	2088	2	26	6400	6	27	15368	15	26
352	1	9	2152	2	27	6528	10	17	15624	24	17
368	1	10	2216	3	19	6656	7	24	15880	15	27
384	3	3	2280	3	20	6784	8	22	16136	17	24
408	1	11	2408	3	21	6912	7	25	16392	16	26
432	1	12	2472	8	8	7040	18	11	16896	16	27
480	1	13	2536	3	22	7168	7	26	17424	17	26
504	2	6	2600	4	17	7296	10	19	17928	17	27
528	1	14	2664	11	6	7424	7	27	18432	18	26
552	2	7	2728	3	23	7552	8	24	18960	18	27
576	1	15	2792	4	18	7680	10	20	19464	19	26
608	1	16	2856	3	24	7808	12	17	19968	20	25
640	2	8	2976	3	25	7936	8	25	20496	19	27
672	1	17	3104	3	26	8064	9	23	21000	21	25
704	1	18	3240	3	27	8192	8	26	21504	20	27
736	1	19	3368	6	15	8456	8	27	22032	22	25
768	1	20	3496	4	22	8712	11	21	22536	21	27
808	1	21	3624	4	23	8968	9	25	23040	23	25
848	1	22	3752	5	19	9224	9	26	23568	22	27
888	2	12	3824	4	24	9480	9	27	24072	24	25
928	1	23	3840	5	20	9736	11	23	24576	23	27
984	1	24	3904	6	17	9992	10	25	25608	24	27
1032	1	25	3968	4	25	10248	10	26			
1064	1	27	4032	11	10	10504	11	24			
1128	2	15	4096	4	26	10760	10	27			

**Table B.1.2.2-3: Downlink TBS using MCS index table 5.1.3.1-2,  
dmrs-AdditionalPosition = 1, number of CDM groups = 1, PDSCH duration = 12**

TBS	L <sub>RBs</sub>	I <sub>MCS</sub>	TBS	L <sub>RBs</sub>	I <sub>MCS</sub>	TBS	L <sub>RBs</sub>	I <sub>MCS</sub>	TBS	L <sub>RBs</sub>	I <sub>MCS</sub>
24	1	0	984	1	26	3904	4	27	9736	10	27
48	1	1	1032	2	15	3968	10	12	9992	11	25
56	2	0	1064	9	3	4032	6	19	10248	14	21
72	1	2	1128	2	16	4096	5	23	10504	11	26
88	3	0	1160	4	8	4224	6	20	10760	11	27
96	2	1	1192	2	17	4352	5	24	11016	12	25
112	1	3	1256	5	7	4480	5	25	11272	12	26
120	4	0	1288	2	18	4608	6	22	11528	14	23
144	3	1	1320	3	13	4736	5	26	11784	12	27
152	1	4	1352	2	19	4864	5	27	12040	14	24
184	6	0	1416	2	20	4992	9	16	12296	13	26
192	1	5	1480	2	21	5120	6	24	12552	16	22
224	1	6	1544	3	15	5248	11	14	12808	13	27
240	3	2	1608	2	22	5376	7	22	13064	15	24
256	1	7	1672	2	23	5504	6	25	13320	14	26
272	9	0	1736	2	24	5632	6	26	13576	14	27
288	1	8	1800	3	17	5760	7	23	13832	16	24
304	2	4	1864	2	25	5888	6	27	14088	15	26
320	1	9	1928	2	26	6016	7	24	14344	24	17
336	1	10	2024	2	27	6144	8	22	14600	15	27
352	3	3	2088	3	20	6272	9	20	14856	18	23
368	1	11	2152	6	11	6400	7	25	15112	16	26
384	2	5	2216	3	21	6528	7	26	15368	21	21
408	1	12	2280	8	8	6656	12	16	15624	16	27
432	1	13	2408	3	22	6784	7	27	16136	17	26
456	2	6	2472	3	23	6912	8	24	16392	17	27
480	1	14	2536	4	18	7040	10	20	16896	18	26
504	2	7	2600	3	24	7168	12	17	17424	18	27
528	1	15	2664	6	13	7296	8	25	17928	19	26
552	1	16	2728	3	25	7424	9	23	18432	19	27
576	2	8	2792	4	20	7552	8	26	18960	20	26
608	1	17	2856	3	26	7680	11	20	19464	20	27
640	1	18	2976	3	27	7808	8	27	19968	21	26
672	1	19	3104	4	22	7936	20	12	20496	21	27
704	1	20	3240	5	18	8064	11	21	21000	22	26
736	1	21	3368	4	23	8192	9	25	21504	22	27
768	3	7	3496	4	24	8456	9	26	22032	24	25
808	1	22	3624	6	17	8712	9	27	22536	23	27
848	1	23	3752	4	25	8968	11	23	23568	24	27
888	1	24	3824	4	26	9224	10	25			
928	1	25	3840	5	22	9480	10	26			

## B.2 Uplink TBS (informative)

The tables in this clause are depending on the following parameters (see clause 7.1.2.3.2):

- MCS index tables 5.1.3.1-1, 5.1.3.1-2, 6.1.4.1-1 according to TS 38.214 [22]
- dmrs-AdditionalPosition as configured at the UE via RRC signalling for DCI format 0\_1 or according to TS 38.214 [22] clause 6.2.2 for DCI format 0\_0
- number of CDM groups as indicated by DCI format 0\_1 or 2 CDM groups for DCI format 0\_0
- number of layers: 1 (unless stated otherwise)
- PDSCH duration: number of symbols

NOTE: The tables in this clause are limited to the maximum of 24 RBs.



## B.2.1 Uplink TBS using MCS index table 5.1.3.1-1

### B.2.1.1 Uplink TBS using MCS index table 5.1.3.1-1, dmrs-AdditionalPosition = 0, number of CDM groups = 1

**Table B.2.1.1-1: Uplink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 0, number of CDM groups = 1, PUSCH duration = 14**

TBS	pairs of {L <sub>RBs</sub> l <sub>MCS</sub> }
32	{1 0}
40	{1 1}
56	{1 2}
72	{1 3} {2 0}
88	{1 4} {2 1}
104	{3 0}
112	{1 5} {2 2}
136	{1 6} {3 1}
144	{4 0}
152	{2 3}
160	{1 7}
176	{1 8} {3 2} {5 0}
184	{2 4} {4 1}
208	{1 9} {1 10}
224	{1 11} {2 5} {3 3} {6 0}
240	{4 2} {5 1}
256	{7 0}
272	{1 12} {2 6}
288	{3 4} {5 2} {6 1} {8 0}
304	{1 13} {4 3}
320	{2 7}
336	{1 14} {7 1} {9 0}
352	{3 5} {6 2}
368	{1 15} {2 8} {4 4} {10 0}
384	{5 3} {8 1}
408	{1 16} {1 17} {2 9} {2 10} {3 6} {7 2} {11 0}
432	{1 18} {9 1} {12 0}
456	{2 11} {4 5} {6 3}
480	{1 19} {3 7} {5 4} {8 2} {10 1} {13 0}
504	{14 0}
528	{1 20} {2 12} {7 3} {9 2} {11 1}
552	{3 8} {4 6} {15 0}
576	{1 21} {5 5} {6 4} {12 1}
608	{1 22} {2 13} {8 3} {10 2} {16 0}
640	{3 9} {3 10} {4 7} {11 2} {13 1} {17 0}
672	{1 23} {2 14} {7 4} {14 1} {18 0}
704	{1 24} {3 11} {5 6} {6 5} {9 3} {12 2} {19 0}
736	{4 8} {15 1} {20 0}
768	{1 25} {2 15} {8 4} {10 3} {13 2} {16 1} {21 0}
808	{1 26} {2 16} {2 17} {3 12} {5 7} {7 5} {17 1} {22 0}
848	{1 27} {2 18} {4 9} {4 10} {6 6} {9 4} {11 3} {14 2} {23 0}
888	{1 28} {3 13} {15 2} {18 1} {24 0}
928	{4 11} {5 8} {8 5} {12 3} {19 1}
984	{2 19} {6 7} {7 6} {10 4} {16 2} {20 1}
1032	{2 20} {3 14} {5 9} {5 10} {9 5} {11 4} {13 3} {17 2} {21 1}
1064	{4 12} {14 3} {18 2} {22 1}
1128	{2 21} {3 15} {6 8} {7 7} {8 6} {12 4} {19 2} {23 1}
1160	{5 11} {10 5} {15 3} {24 1}
1192	{4 13} {20 2}
1224	{2 22} {3 16} {3 17} {9 6} {13 4} {16 3}
1256	{6 9} {6 10} {21 2}
1288	{3 18} {7 8} {8 7} {11 5} {22 2}
1320	{2 23} {5 12} {14 4} {17 3}
1352	{4 14} {23 2}
1416	{2 24} {3 19} {6 11} {10 6} {12 5} {15 4} {18 3} {24 2}
1480	{7 9} {7 10} {8 8} {9 7} {19 3}
1544	{2 25} {4 15} {5 13} {11 6} {13 5} {16 4} {20 3}
1608	{2 26} {3 20} {4 16} {4 17} {6 12} {7 11} {10 7} {17 4} {21 3}
1672	{2 27} {8 9} {8 10} {9 8} {12 6} {14 5}
1736	{2 28} {3 21} {4 18} {5 14} {15 5} {18 4} {22 3}
1800	{6 13} {11 7} {13 6} {19 4} {23 3}
1864	{3 22} {7 12} {8 11} {9 9} {9 10} {10 8} {16 5} {24 3}
1928	{4 19} {5 15} {12 7} {14 6} {20 4}
2024	{3 23} {5 16} {5 17} {6 14} {11 8} {17 5} {21 4}

2088	{4 20} {7 13} {9 11} {10 9} {10 10} {13 7} {15 6} {18 5} {22 4}
2152	{3 24} {5 18} {8 12} {23 4}
2216	{12 8} {16 6} {19 5}
2280	{3 25} {4 21} {6 15} {10 11} {11 9} {11 10} {14 7} {24 4}
2408	{3 26} {5 19} {6 16} {6 17} {7 14} {8 13} {9 12} {13 8} {15 7} {17 6} {20 5} {21 5}
2472	{3 27} {4 22} {12 9} {12 10} {18 6}
2536	{6 18} {11 11} {22 5}
2600	{3 28} {5 20} {14 8} {16 7} {19 6}
2664	{4 23} {7 15} {9 13} {10 12} {23 5}
2728	{8 14} {13 9} {13 10} {15 8} {17 7} {20 6}
2792	{5 21} {7 16} {7 17} {12 11} {24 5}
2856	{4 24} {6 19} {21 6}
2976	{4 25} {7 18} {8 15} {10 13} {11 12} {13 11} {14 9} {14 10} {16 8} {18 7}
3104	{5 22} {6 20} {9 14} {15 9} {15 10} {17 8} {19 7} {22 6}
3240	{4 26} {8 16} {8 17} {12 12} {14 11} {20 7} {23 6}
3368	{4 27} {5 23} {6 21} {7 19} {9 15} {10 14} {11 13} {16 9} {16 10} {18 8} {21 7} {24 6}
3496	{4 28} {8 18} {13 12} {15 11} {17 9} {19 8}
3624	{5 24} {7 20} {9 16} {9 17} {12 13} {17 10} {22 7}
3752	{5 25} {6 22} {10 15} {11 14} {14 12} {16 11} {18 9} {18 10} {20 8} {23 7}
3824	{8 19}
3840	{9 18} {13 13} {21 8} {24 7}
3904	{6 23} {7 21} {17 11} {19 9} {19 10}
3968	{5 26} {10 16} {10 17} {15 12}
4032	{12 14} {22 8}
4096	{5 27} {8 20} {11 15} {14 13} {18 11} {20 9} {20 10}
4224	{6 24} {7 22} {9 19} {10 18} {16 12} {23 8}
4352	{5 28} {11 16} {11 17} {13 14} {19 11} {21 9} {21 10} {24 8}
4480	{6 25} {8 21} {12 15} {15 13} {17 12} {22 9} {22 10}
4608	{7 23} {9 20} {11 18} {20 11}
4736	{6 26} {10 19} {12 16} {12 17} {14 14} {16 13} {18 12} {23 9} {23 10}
4864	{7 24} {8 22} {13 15} {21 11}
4992	{6 27} {9 21} {15 14} {17 13} {19 12} {22 11} {24 9} {24 10}
5120	{6 28} {10 20} {11 19} {12 18} {13 17}
5248	{7 25} {8 23} {13 16} {14 15} {20 12} {23 11}
5376	{16 14} {18 13}
5504	{7 26} {9 22} {13 18} {21 12} {24 11}
5632	{8 24} {10 21} {11 20} {12 19} {14 16} {14 17} {15 15} {19 13}
5760	{7 27} {17 14} {22 12}
5888	{9 23} {14 18} {20 13}
6016	{7 28} {8 25} {10 22} {15 16} {15 17} {16 15} {18 14} {23 12}
6144	{11 21} {12 20} {13 19}
6272	{9 24} {21 13} {24 12}
6400	{8 26} {15 18} {16 16} {16 17} {17 15} {19 14}
6528	{10 23} {14 19} {22 13}
6656	{8 27} {11 22} {13 20} {20 14}
6784	{9 25} {12 21} {16 18} {17 16} {17 17} {18 15} {23 13}
6912	{8 28}
7040	{10 24} {15 19} {21 14}
7168	{9 26} {11 23} {14 20} {17 18} {18 16} {18 17} {19 15} {24 13}
7296	{12 22} {13 21}
7424	{9 27} {20 15} {22 14}
7552	{10 25} {16 19} {19 16} {19 17}
7680	{11 24} {18 18} {23 14}
7808	{9 28} {12 23} {14 21} {15 20} {21 15}
7936	{10 26} {13 22} {20 16} {20 17}
8064	{17 19} {19 18} {24 14}
8192	{10 27} {11 25} {16 20} {22 15}
8456	{12 24} {13 23} {14 22} {15 21} {18 19} {20 18} {21 16} {21 17}
8712	{10 28} {11 26} {17 20} {22 16} {22 17} {23 15}
8968	{12 25} {16 21} {19 19} {21 18} {24 15}
9224	{11 27} {13 24} {14 23} {15 22} {18 20} {23 16} {23 17}
9480	{11 28} {12 26} {17 21} {20 19} {22 18} {24 16} {24 17}
9736	{13 25} {14 24} {15 23} {16 22} {19 20} {23 18}
9992	{12 27} {18 21} {21 19}
10248	{13 26} {17 22} {20 20} {24 18}

10504	{12 28} {14 25} {15 24} {16 23} {22 19}
10760	{13 27} {19 21} {21 20} {23 19}
11016	{18 22}
11272	{13 28} {14 26} {15 25} {16 24} {17 23} {20 21} {22 20} {24 19}
11528	{14 27} {19 22}
11784	{18 23} {21 21} {23 20}
12040	{14 28} {15 26} {16 25} {17 24} {20 22}
12296	{22 21} {24 20}
12552	{15 27} {19 23}
12808	{16 26} {17 25} {18 24} {21 22} {23 21}
13064	{15 28} {20 23}
13320	{16 27} {19 24} {22 22}
13576	{17 26} {18 25} {24 21}
13832	{16 28} {21 23}
14088	{17 27} {20 24} {23 22}
14344	{18 26} {19 25} {22 23}
14600	{17 28} {24 22}
14856	{18 27} {21 24}
15112	{19 26} {20 25} {23 23}
15624	{18 28} {22 24}
15880	{19 27} {20 26} {21 25} {24 23}
16136	{23 24}
16392	{19 28} {20 27} {22 25}
16896	{21 26} {24 24}
17424	{20 28} {21 27} {22 26} {23 25}
17928	{21 28} {24 25}
18432	{22 27} {23 26}
18960	{22 28} {23 27} {24 26}
19968	{23 28} {24 27}
21000	{24 28}

B.2.1.2 Uplink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 1, number of CDM groups = 1

**Table B.2.1.2-1: Uplink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 1, number of CDM groups = 1, PUSCH duration = 14**

TBS	pairs of {L <sub>RBs</sub> l <sub>MCS</sub> }
32	{1 0}
40	{1 1}
56	{1 2}
72	{1 3} {2 0}
88	{1 4} {2 1}
104	{3 0}
112	{1 5} {2 2}
136	{1 6} {3 1}
144	{4 0}
152	{2 3}
160	{1 7}
176	{1 8} {3 2} {5 0}
184	{2 4} {4 1}
208	{1 9} {1 10}
224	{1 11} {2 5} {3 3} {6 0}
240	{4 2} {5 1}
256	{7 0}
272	{1 12} {2 6}
288	{3 4} {5 2} {6 1} {8 0}
304	{1 13} {4 3}
320	{2 7}
336	{1 14} {7 1} {9 0}
352	{3 5} {6 2}
368	{1 15} {2 8} {4 4} {10 0}
384	{5 3} {8 1}
408	{1 16} {1 17} {2 9} {2 10} {3 6} {7 2} {11 0}
432	{1 18} {9 1} {12 0}
456	{2 11} {4 5} {6 3}
480	{1 19} {3 7} {5 4} {8 2} {10 1} {13 0}
504	{14 0}
528	{1 20} {2 12} {7 3} {9 2} {11 1}
552	{3 8} {4 6} {15 0}
576	{1 21} {5 5} {6 4} {12 1}
608	{1 22} {2 13} {8 3} {10 2} {16 0}
640	{3 9} {3 10} {4 7} {11 2} {13 1} {17 0}
672	{1 23} {2 14} {7 4} {14 1} {18 0}
704	{1 24} {3 11} {5 6} {6 5} {9 3} {12 2} {19 0}
736	{4 8} {15 1} {20 0}
768	{1 25} {2 15} {8 4} {10 3} {13 2} {16 1} {21 0}
808	{1 26} {2 16} {2 17} {3 12} {5 7} {7 5} {17 1} {22 0}
848	{1 27} {2 18} {4 9} {4 10} {6 6} {9 4} {11 3} {14 2} {23 0}
888	{1 28} {3 13} {15 2} {18 1} {24 0}
928	{4 11} {5 8} {8 5} {12 3} {19 1}
984	{2 19} {6 7} {7 6} {10 4} {16 2} {20 1}
1032	{2 20} {3 14} {5 9} {5 10} {9 5} {11 4} {13 3} {17 2} {21 1}
1064	{4 12} {14 3} {18 2} {22 1}
1128	{2 21} {3 15} {6 8} {7 7} {8 6} {12 4} {19 2} {23 1}
1160	{5 11} {10 5} {15 3} {24 1}
1192	{4 13} {20 2}
1224	{2 22} {3 16} {3 17} {9 6} {13 4} {16 3}
1256	{6 9} {6 10} {21 2}
1288	{3 18} {7 8} {8 7} {11 5} {22 2}
1320	{2 23} {5 12} {14 4} {17 3}
1352	{4 14} {23 2}
1416	{2 24} {3 19} {6 11} {10 6} {12 5} {15 4} {18 3} {24 2}
1480	{7 9} {7 10} {8 8} {9 7} {19 3}
1544	{2 25} {4 15} {5 13} {11 6} {13 5} {16 4} {20 3}
1608	{2 26} {3 20} {4 16} {4 17} {6 12} {7 11} {10 7} {17 4} {21 3}
1672	{2 27} {8 9} {8 10} {9 8} {12 6} {14 5}
1736	{2 28} {3 21} {4 18} {5 14} {15 5} {18 4} {22 3}
1800	{6 13} {11 7} {13 6} {19 4} {23 3}
1864	{3 22} {7 12} {8 11} {9 9} {9 10} {10 8} {16 5} {24 3}
1928	{4 19} {5 15} {12 7} {14 6} {20 4}
2024	{3 23} {5 16} {5 17} {6 14} {11 8} {17 5} {21 4}

2088	{4 20} {7 13} {9 11} {10 9} {10 10} {13 7} {15 6} {18 5} {22 4}
2152	{3 24} {5 18} {8 12} {23 4}
2216	{12 8} {16 6} {19 5}
2280	{3 25} {4 21} {6 15} {10 11} {11 9} {11 10} {14 7} {24 4}
2408	{3 26} {5 19} {6 16} {6 17} {7 14} {8 13} {9 12} {13 8} {15 7} {17 6} {20 5} {21 5}
2472	{3 27} {4 22} {12 9} {12 10} {18 6}
2536	{6 18} {11 11} {22 5}
2600	{3 28} {5 20} {14 8} {16 7} {19 6}
2664	{4 23} {7 15} {9 13} {10 12} {23 5}
2728	{8 14} {13 9} {13 10} {15 8} {17 7} {20 6}
2792	{5 21} {7 16} {7 17} {12 11} {24 5}
2856	{4 24} {6 19} {21 6}
2976	{4 25} {7 18} {8 15} {10 13} {11 12} {13 11} {14 9} {14 10} {16 8} {18 7}
3104	{5 22} {6 20} {9 14} {15 9} {15 10} {17 8} {19 7} {22 6}
3240	{4 26} {8 16} {8 17} {12 12} {14 11} {20 7} {23 6}
3368	{4 27} {5 23} {6 21} {7 19} {9 15} {10 14} {11 13} {16 9} {16 10} {18 8} {21 7} {24 6}
3496	{4 28} {8 18} {13 12} {15 11} {17 9} {19 8}
3624	{5 24} {7 20} {9 16} {9 17} {12 13} {17 10} {22 7}
3752	{5 25} {6 22} {10 15} {11 14} {14 12} {16 11} {18 9} {18 10} {20 8} {23 7}
3824	{8 19}
3840	{9 18} {13 13} {21 8} {24 7}
3904	{6 23} {7 21} {17 11} {19 9} {19 10}
3968	{5 26} {10 16} {10 17} {15 12}
4032	{12 14} {22 8}
4096	{5 27} {8 20} {11 15} {14 13} {18 11} {20 9} {20 10}
4224	{6 24} {7 22} {9 19} {10 18} {16 12} {23 8}
4352	{5 28} {11 16} {11 17} {13 14} {19 11} {21 9} {21 10} {24 8}
4480	{6 25} {8 21} {12 15} {15 13} {17 12} {22 9} {22 10}
4608	{7 23} {9 20} {11 18} {20 11}
4736	{6 26} {10 19} {12 16} {12 17} {14 14} {16 13} {18 12} {23 9} {23 10}
4864	{7 24} {8 22} {13 15} {21 11}
4992	{6 27} {9 21} {15 14} {17 13} {19 12} {22 11} {24 9} {24 10}
5120	{6 28} {10 20} {11 19} {12 18} {13 17}
5248	{7 25} {8 23} {13 16} {14 15} {20 12} {23 11}
5376	{16 14} {18 13}
5504	{7 26} {9 22} {13 18} {21 12} {24 11}
5632	{8 24} {10 21} {11 20} {12 19} {14 16} {14 17} {15 15} {19 13}
5760	{7 27} {17 14} {22 12}
5888	{9 23} {14 18} {20 13}
6016	{7 28} {8 25} {10 22} {15 16} {15 17} {16 15} {18 14} {23 12}
6144	{11 21} {12 20} {13 19}
6272	{9 24} {21 13} {24 12}
6400	{8 26} {15 18} {16 16} {16 17} {17 15} {19 14}
6528	{10 23} {14 19} {22 13}
6656	{8 27} {11 22} {13 20} {20 14}
6784	{9 25} {12 21} {16 18} {17 16} {17 17} {18 15} {23 13}
6912	{8 28}
7040	{10 24} {15 19} {21 14}
7168	{9 26} {11 23} {14 20} {17 18} {18 16} {18 17} {19 15} {24 13}
7296	{12 22} {13 21}
7424	{9 27} {20 15} {22 14}
7552	{10 25} {16 19} {19 16} {19 17}
7680	{11 24} {18 18} {23 14}
7808	{9 28} {12 23} {14 21} {15 20} {21 15}
7936	{10 26} {13 22} {20 16} {20 17}
8064	{17 19} {19 18} {24 14}
8192	{10 27} {11 25} {16 20} {22 15}
8456	{12 24} {13 23} {14 22} {15 21} {18 19} {20 18} {21 16} {21 17}
8712	{10 28} {11 26} {17 20} {22 16} {22 17} {23 15}
8968	{12 25} {16 21} {19 19} {21 18} {24 15}
9224	{11 27} {13 24} {14 23} {15 22} {18 20} {23 16} {23 17}
9480	{11 28} {12 26} {17 21} {20 19} {22 18} {24 16} {24 17}
9736	{13 25} {14 24} {15 23} {16 22} {19 20} {23 18}
9992	{12 27} {18 21} {21 19}
10248	{13 26} {17 22} {20 20} {24 18}

10504	{12 28} {14 25} {15 24} {16 23} {22 19}
10760	{13 27} {19 21} {21 20} {23 19}
11016	{18 22}
11272	{13 28} {14 26} {15 25} {16 24} {17 23} {20 21} {22 20} {24 19}
11528	{14 27} {19 22}
11784	{18 23} {21 21} {23 20}
12040	{14 28} {15 26} {16 25} {17 24} {20 22}
12296	{22 21} {24 20}
12552	{15 27} {19 23}
12808	{16 26} {17 25} {18 24} {21 22} {23 21}
13064	{15 28} {20 23}
13320	{16 27} {19 24} {22 22}
13576	{17 26} {18 25} {24 21}
13832	{16 28} {21 23}
14088	{17 27} {20 24} {23 22}
14344	{18 26} {19 25} {22 23}
14600	{17 28} {24 22}
14856	{18 27} {21 24}
15112	{19 26} {20 25} {23 23}
15624	{18 28} {22 24}
15880	{19 27} {20 26} {21 25} {24 23}
16136	{23 24}
16392	{19 28} {20 27} {22 25}
16896	{21 26} {24 24}
17424	{20 28} {21 27} {22 26} {23 25}
17928	{21 28} {24 25}
18432	{22 27} {23 26}
18960	{22 28} {23 27} {24 26}
19968	{23 28} {24 27}
21000	{24 28}



**B.2.1.3 Uplink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 1, number of CDM groups = 2**

**Table B.2.1.3-1: Uplink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 1, number of CDM groups = 2, PUSCH duration = 14**

TBS	pairs of {L <sub>RBs</sub> l <sub>MCS</sub> }
32	{1 0}
40	{1 1}
48	{1 2}
64	{1 3} {2 0}
80	{1 4}
88	{2 1}
96	{3 0}
104	{1 5} {2 2}
120	{1 6}
128	{3 1} {4 0}
136	{2 3}
144	{1 7}
160	{3 2}
168	{1 8} {2 4} {5 0}
176	{4 1}
184	{1 9} {1 10}
208	{1 11} {2 5} {3 3} {6 0}
224	{4 2} {5 1}
240	{1 12} {7 0}
256	{2 6} {3 4}
272	{1 13} {5 2} {6 1} {8 0}
288	{2 7} {4 3}
304	{1 14} {7 1} {9 0}
320	{3 5} {6 2}
336	{2 8} {10 0}
352	{1 15} {4 4} {5 3} {8 1}
368	{1 16} {1 17} {11 0}
384	{2 9} {2 10} {3 6} {7 2}
408	{1 18} {9 1} {12 0}
432	{1 19} {2 11} {4 5} {5 4} {6 3} {8 2} {13 0}
456	{3 7} {10 1}
480	{1 20} {11 1} {14 0}
504	{2 12} {3 8} {4 6} {7 3} {9 2} {15 0}
528	{1 21} {5 5} {6 4} {12 1}
552	{2 13} {10 2} {16 0}
576	{1 22} {3 9} {3 10} {8 3} {13 1} {17 0}
608	{1 23} {4 7} {7 4} {11 2} {18 0}
640	{2 14} {3 11} {5 6} {6 5} {9 3} {14 1} {19 0}
672	{1 24} {4 8} {12 2} {15 1} {20 0}
704	{1 25} {2 15} {8 4} {10 3} {13 2} {16 1} {21 0}
736	{1 26} {2 16} {2 17} {3 12} {5 7} {22 0}
768	{1 27} {4 9} {4 10} {6 6} {7 5} {14 2} {17 1}
808	{1 28} {2 18} {9 4} {11 3} {15 2} {18 1} {23 0} {24 0}
848	{3 13} {4 11} {5 8} {8 5} {12 3} {19 1}
888	{2 19} {6 7} {7 6} {10 4} {16 2} {20 1}
928	{3 14} {13 3} {17 2} {21 1}
984	{2 20} {4 12} {5 9} {5 10} {9 5} {11 4} {14 3} {18 2} {22 1}
1032	{2 21} {3 15} {6 8} {7 7} {8 6} {12 4} {19 2} {23 1}
1064	{5 11} {10 5} {15 3} {24 1}
1128	{2 22} {3 16} {3 17} {4 13} {13 4} {16 3} {20 2}
1160	{6 9} {6 10} {9 6} {21 2}
1192	{3 18} {7 8} {8 7} {11 5} {22 2}
1224	{2 23} {5 12} {14 4} {17 3}
1256	{4 14} {10 6} {23 2}
1288	{6 11} {12 5} {18 3}
1320	{2 24} {3 19} {15 4} {24 2}
1352	{7 9} {7 10} {8 8} {9 7} {19 3}
1416	{2 25} {4 15} {5 13} {11 6} {13 5} {16 4} {20 3}
1480	{2 26} {3 20} {4 16} {4 17} {6 12} {10 7} {17 4} {21 3}
1544	{2 27} {7 11} {8 9} {8 10} {9 8} {12 6} {14 5}
1608	{2 28} {3 21} {4 18} {5 14} {15 5} {18 4} {22 3}
1672	{6 13} {11 7} {13 6} {19 4} {23 3}
1736	{3 22} {5 15} {7 12} {8 11} {9 9} {9 10} {10 8} {16 5} {20 4} {24 3}
1800	{4 19} {12 7} {14 6}

1864	{3 23} {5 16} {5 17} {6 14} {11 8} {17 5} {21 4}
1928	{4 20} {7 13} {9 11} {10 9} {10 10} {13 7} {15 6} {18 5} {22 4}
2024	{3 24} {5 18} {8 12} {12 8} {16 6} {19 5} {23 4}
2088	{3 25} {4 21} {6 15} {11 9} {11 10} {14 7} {24 4}
2152	{10 11} {17 6} {20 5}
2216	{3 26} {5 19} {6 16} {6 17} {7 14} {8 13} {9 12} {13 8} {15 7} {21 5}
2280	{3 27} {4 22} {12 9} {12 10} {18 6}
2408	{3 28} {4 23} {5 20} {6 18} {7 15} {11 11} {14 8} {16 7} {19 6} {22 5}
2472	{8 14} {9 13} {10 12} {13 9} {13 10} {23 5}
2536	{12 11} {15 8} {17 7} {20 6} {24 5}
2600	{4 24} {5 21} {6 19} {7 16} {7 17}
2664	{11 12} {14 9} {14 10} {18 7} {21 6}
2728	{16 8}
2792	{4 25} {5 22} {7 18} {8 15} {9 14} {10 13} {13 11} {19 7} {22 6}
2856	{6 20} {15 9} {15 10} {17 8}
2976	{4 26} {8 16} {8 17} {12 12} {14 11} {20 7} {23 6}
3104	{4 27} {5 23} {6 21} {7 19} {9 15} {10 14} {11 13} {16 9} {16 10} {18 8} {21 7} {24 6}
3240	{4 28} {5 24} {8 18} {13 12} {15 11} {17 9} {17 10} {19 8} {22 7}
3368	{6 22} {7 20} {9 16} {9 17} {12 13} {20 8}
3496	{5 25} {8 19} {10 15} {11 14} {14 12} {16 11} {18 9} {18 10} {23 7}
3624	{6 23} {7 21} {9 18} {13 13} {17 11} {19 9} {19 10} {21 8} {24 7}
3752	{5 26} {10 16} {10 17} {12 14} {15 12} {22 8}
3824	{11 15} {20 9}
3840	{5 27} {8 20} {14 13} {18 11} {20 10} {23 8}
3904	{6 24} {7 22} {9 19} {10 18} {16 12}
3968	{5 28} {21 9} {21 10}
4032	{11 16} {11 17} {13 14} {19 11} {24 8}
4096	{6 25} {8 21} {12 15} {15 13} {17 12}
4224	{7 23} {9 20} {20 11} {22 9} {22 10}
4352	{6 26} {10 19} {11 18} {12 17} {14 14} {16 13} {18 12} {23 9} {23 10}
4480	{7 24} {8 22} {12 16} {13 15} {21 11}
4608	{6 27} {9 21} {15 14} {17 13} {19 12} {22 11} {24 9} {24 10}
4736	{6 28} {10 20} {11 19} {12 18} {13 16} {13 17}
4864	{7 25} {8 23} {14 15} {20 12} {23 11}
4992	{9 22} {16 14} {18 13}
5120	{7 26} {10 21} {13 18} {14 16} {14 17} {15 15} {21 12} {24 11}
5248	{8 24} {11 20} {12 19} {17 14} {19 13}
5376	{7 27} {9 23} {22 12}
5504	{8 25} {14 18} {15 16} {15 17} {16 15} {20 13}
5632	{7 28} {10 22} {11 21} {13 19} {18 14} {23 12}
5760	{12 20} {21 13}
5888	{8 26} {9 24} {15 18} {16 16} {16 17} {17 15} {19 14} {24 12}
6016	{10 23} {22 13}
6144	{8 27} {11 22} {13 20} {14 19} {20 14}
6272	{9 25} {12 21} {16 18} {17 16} {17 17} {18 15} {23 13}
6400	{8 28}
6528	{10 24} {15 19} {19 15} {21 14} {24 13}
6656	{9 26} {11 23} {12 22} {14 20} {17 18} {18 16} {18 17}
6784	{13 21} {22 14}
6912	{9 27} {10 25} {16 19} {20 15}
7040	{18 18} {19 16} {19 17}
7168	{9 28} {11 24} {15 20} {23 14}
7296	{10 26} {12 23} {13 22} {14 21} {21 15}
7424	{17 19} {19 18} {20 16} {20 17} {24 14}
7552	{11 25} {22 15}
7680	{10 27} {16 20} {21 17}
7808	{12 24} {13 23} {14 22} {15 21} {18 19} {20 18} {21 16}
7936	{10 28} {23 15}
8064	{11 26} {17 20} {22 16} {22 17}
8192	{12 25} {16 21} {19 19} {21 18} {24 15}
8456	{11 27} {13 24} {14 23} {15 22} {23 16} {23 17}
8712	{11 28} {12 26} {17 21} {18 20} {20 19} {22 18}
8968	{13 25} {15 23} {16 22} {19 20} {23 18} {24 16} {24 17}
9224	{12 27} {14 24} {18 21} {21 19}
9480	{12 28} {13 26} {17 22} {20 20} {22 19} {24 18}

9736	{14 25} {15 24} {16 23} {19 21}
9992	{13 27} {18 22} {21 20} {23 19}
10248	{14 26} {17 23}
10504	{13 28} {15 25} {16 24} {20 21} {22 20} {24 19}
10760	{14 27} {19 22}
11016	{15 26} {16 25} {17 24} {18 23} {21 21} {23 20}
11272	{14 28} {20 22}
11528	{15 27} {19 23} {22 21} {24 20}
11784	{16 26} {17 25} {18 24} {21 22}
12040	{15 28} {20 23} {23 21}
12296	{16 27} {19 24} {22 22}
12552	{17 26} {18 25} {24 21}
12808	{16 28} {21 23} {23 22}
13064	{17 27} {19 25} {20 24}
13320	{18 26} {22 23}
13576	{17 28} {21 24} {24 22}
13832	{18 27} {20 25} {23 23}
14088	{19 26}
14344	{18 28} {22 24}
14600	{19 27} {20 26} {21 25} {24 23}
14856	{23 24}
15112	{19 28}
15368	{20 27} {21 26} {22 25}
15624	{24 24}
15880	{20 28} {23 25}
16136	{21 27} {22 26}
16392	{24 25}
16896	{21 28} {22 27} {23 26}
17424	{22 28} {23 27} {24 26}
18432	{23 28} {24 27}
18960	{24 28}

B.2.1.4 Uplink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 2, number of CDM groups = 2

**Table B.2.1.4-1: Uplink TBS using MCS index table 5.1.3.1-1,  
dmrs-AdditionalPosition = 2, number of CDM groups = 2, PUSCH duration = 14**

TBS	pairs of {L <sub>RBs</sub> l <sub>MCS</sub> }
24	{1 0}
40	{1 1}
48	{1 2}
56	{2 0}
64	{1 3}
72	{1 4}
80	{2 1}
88	{3 0}
96	{1 5} {2 2}
112	{1 6}
120	{3 1} {4 0}
128	{1 7} {2 3}
144	{3 2}
152	{1 8} {2 4} {5 0}
160	{4 1}
168	{1 9} {1 10}
184	{6 0}
192	{1 11} {2 5} {3 3} {4 2}
208	{5 1}
224	{1 12} {2 6} {7 0}
240	{3 4} {6 1} {8 0}
256	{1 13} {4 3} {5 2}
272	{2 7} {9 0}
288	{1 14} {3 5} {7 1}
304	{2 8} {6 2} {10 0}
320	{1 15} {4 4} {5 3} {8 1}
336	{1 16} {1 17} {11 0}
352	{2 9} {2 10} {3 6} {7 2}
368	{1 18} {9 1} {12 0}
384	{2 11} {4 5} {6 3}
408	{1 19} {3 7} {5 4} {8 2} {10 1} {13 0}
432	{1 20} {14 0}
456	{2 12} {4 6} {7 3} {9 2} {11 1}
480	{1 21} {3 8} {6 4} {12 1} {15 0}
504	{2 13} {5 5} {10 2} {16 0}
528	{1 22} {3 9} {3 10} {8 3} {13 1} {17 0}
552	{1 23} {4 7} {7 4} {11 2} {18 0}
576	{2 14} {5 6} {9 3} {14 1}
608	{1 24} {3 11} {6 5} {12 2} {15 1} {19 0}
640	{1 25} {2 15} {4 8} {8 4} {10 3} {13 2} {16 1} {20 0}
672	{1 26} {2 16} {2 17} {3 12} {5 7} {21 0}
704	{1 27} {4 9} {4 10} {6 6} {7 5} {11 3} {14 2} {17 1} {22 0} {23 0}
736	{1 28} {2 18} {9 4} {18 1} {24 0}
768	{3 13} {15 2} {19 1}
808	{2 19} {4 11} {5 8} {6 7} {7 6} {8 5} {10 4} {12 3} {16 2} {20 1}
848	{3 14} {13 3} {17 2} {21 1}
888	{2 20} {4 12} {5 9} {5 10} {9 5} {11 4} {18 2} {22 1}
928	{6 8} {8 6} {14 3} {23 1}
984	{2 21} {3 15} {5 11} {7 7} {10 5} {12 4} {15 3} {19 2} {24 1}
1032	{2 22} {3 16} {3 17} {4 13} {13 4} {16 3} {20 2}
1064	{6 9} {6 10} {9 6} {21 2}
1128	{2 23} {3 18} {5 12} {7 8} {8 7} {11 5} {14 4} {17 3} {22 2}
1160	{4 14} {10 6} {18 3} {23 2}
1192	{2 24} {3 19} {6 11} {12 5} {15 4} {24 2}
1224	{7 9} {7 10} {9 7} {19 3}
1256	{5 13} {8 8}
1288	{2 25} {4 15} {11 6} {13 5} {16 4} {20 3}
1320	{3 20}
1352	{2 26} {4 16} {4 17} {6 12} {10 7} {17 4} {21 3}
1416	{2 27} {7 11} {8 9} {8 10} {9 8} {12 6} {14 5} {22 3}
1480	{2 28} {3 21} {4 18} {5 14} {15 5} {18 4}
1544	{3 22} {6 13} {11 7} {13 6} {19 4} {23 3}
1608	{4 19} {5 15} {7 12} {8 11} {9 9} {9 10} {10 8} {16 5} {20 4} {24 3}
1672	{3 23} {12 7} {14 6} {17 5} {21 4}

1736	{5 16} {5 17} {6 14} {11 8} {15 6}
1800	{3 24} {4 20} {5 18} {7 13} {8 12} {9 11} {10 9} {10 10} {13 7} {18 5} {22 4}
1864	{12 8} {16 6} {19 5} {23 4}
1928	{3 25} {4 21} {6 15} {11 9} {11 10} {14 7} {24 4}
2024	{3 26} {5 19} {7 14} {8 13} {9 12} {10 11} {13 8} {17 6} {20 5}
2088	{3 27} {4 22} {6 16} {6 17} {12 9} {12 10} {15 7} {18 6} {21 5}
2152	{6 18} {11 11} {14 8} {16 7} {22 5}
2216	{3 28} {4 23} {5 20} {7 15} {10 12} {19 6}
2280	{8 14} {9 13} {13 9} {13 10} {23 5}
2408	{4 24} {5 21} {6 19} {7 16} {7 17} {12 11} {15 8} {17 7} {20 6} {21 6} {24 5}
2472	{11 12} {14 9} {14 10} {16 8} {18 7}
2536	{4 25} {7 18} {8 15} {10 13} {13 11} {22 6}
2600	{5 22} {9 14} {19 7}
2664	{6 20} {12 12} {15 9} {15 10} {17 8} {23 6}
2728	{4 26} {8 16} {8 17} {14 11} {20 7}
2792	{4 27} {5 23} {7 19} {11 13} {16 9} {16 10} {18 8} {24 6}
2856	{6 21} {9 15} {10 14} {21 7}
2976	{4 28} {5 24} {8 18} {13 12} {15 11} {17 9} {17 10} {19 8} {22 7}
3104	{6 22} {7 20} {9 16} {9 17} {12 13} {14 12} {16 11} {20 8} {23 7}
3240	{5 25} {8 19} {9 18} {10 15} {11 14} {18 9} {18 10} {21 8} {24 7}
3368	{5 26} {6 23} {7 21} {10 17} {13 13} {15 12} {17 11} {19 9} {19 10}
3496	{5 27} {8 20} {10 16} {11 15} {12 14} {18 11} {20 9} {20 10} {22 8}
3624	{6 24} {7 22} {9 19} {10 18} {14 13} {16 12} {23 8}
3752	{5 28} {11 16} {11 17} {13 14} {19 11} {21 9} {21 10} {24 8}
3824	{6 25} {8 21} {12 15} {15 13} {17 12}
3840	{7 23} {22 9} {22 10}
3904	{9 20} {20 11}
3968	{10 19} {11 18} {14 14}
4032	{6 26} {12 16} {12 17} {16 13} {18 12} {23 9} {23 10}
4096	{7 24} {8 22} {13 15} {21 11}
4224	{6 27} {9 21} {15 14} {17 13} {19 12} {22 11} {24 9} {24 10}
4352	{6 28} {10 20} {11 19} {12 18} {13 16} {13 17}
4480	{7 25} {8 23} {14 15} {16 14} {18 13} {20 12} {23 11}
4608	{9 22} {13 18} {24 11}
4736	{7 26} {8 24} {10 21} {11 20} {12 19} {14 16} {14 17} {15 15} {19 13} {21 12}
4864	{7 27} {17 14} {22 12}
4992	{9 23} {14 18} {20 13}
5120	{7 28} {8 25} {10 22} {13 19} {15 16} {15 17} {16 15} {18 14} {23 12}
5248	{11 21} {12 20} {21 13}
5376	{8 26} {9 24} {15 18} {16 16} {16 17} {17 15} {19 14} {24 12}
5504	{10 23} {22 13}
5632	{8 27} {11 22} {12 21} {13 20} {14 19} {18 15} {20 14}
5760	{9 25} {16 18} {17 16} {17 17} {23 13}
5888	{8 28} {10 24}
6016	{9 26} {15 19} {18 17} {19 15} {21 14} {24 13}
6144	{11 23} {12 22} {13 21} {14 20} {17 18} {18 16}
6272	{9 27} {10 25} {20 15} {22 14}
6400	{16 19} {18 18} {19 16} {19 17}
6528	{9 28} {11 24} {15 20} {23 14}
6656	{12 23} {13 22} {14 21} {21 15}
6784	{10 26} {17 19} {19 18} {20 16} {20 17} {24 14}
6912	{11 25} {22 15}
7040	{10 27} {16 20} {21 16} {21 17}
7168	{12 24} {13 23} {14 22} {15 21} {18 19} {20 18}
7296	{10 28} {23 15}
7424	{11 26} {17 20} {22 16} {22 17}
7552	{12 25} {16 21} {19 19} {21 18} {24 15}
7680	{11 27} {13 24} {15 22}
7808	{14 23} {18 20} {23 16} {23 17}
7936	{20 19} {22 18}
8064	{11 28} {12 26} {17 21} {24 16} {24 17}
8192	{13 25} {15 23} {16 22} {19 20} {23 18}
8456	{12 27} {14 24} {18 21} {21 19}
8712	{12 28} {13 26} {17 22} {20 20} {22 19} {24 18}
8968	{14 25} {15 24} {16 23} {19 21}

9224	{13 27} {18 22} {21 20} {23 19}
9480	{13 28} {14 26} {15 25} {16 24} {17 23} {20 21} {24 19}
9736	{14 27} {19 22} {22 20}
9992	{15 26} {18 23} {21 21} {23 20}
10248	{14 28} {16 25} {17 24} {20 22}
10504	{15 27} {19 23} {22 21} {24 20}
10760	{16 26} {17 25} {18 24} {21 22}
11016	{15 28} {20 23} {23 21}
11272	{16 27} {19 24} {22 22}
11528	{17 26} {18 25} {24 21}
11784	{16 28} {21 23} {23 22}
12040	{17 27} {18 26} {19 25} {20 24}
12296	{22 23} {24 22}
12552	{17 28} {18 27} {21 24}
12808	{19 26} {20 25} {23 23}
13064	{18 28} {22 24}
13320	{19 27} {21 25} {24 23}
13576	{20 26}
13832	{19 28} {23 24}
14088	{20 27} {21 26} {22 25}
14344	{24 24}
14600	{20 28} {23 25}
14856	{21 27} {22 26}
15368	{21 28} {22 27} {24 25}
15624	{23 26}
16136	{22 28} {23 27} {24 26}
16896	{23 28} {24 27}
17424	{24 28}



## B.2.2 Uplink TBS using MCS index table 5.1.3.1-2

### B.2.2.1 Uplink TBS using MCS index table 5.1.3.1-2, dmrs-AdditionalPosition = 0, number of CDM groups = 1

**Table B.2.2.1-1: Uplink TBS using MCS index table 5.1.3.1-2,  
dmrs-AdditionalPosition = 0, number of CDM groups = 1, PUSCH duration = 14**

TBS	pairs of {LRBs IMCS}
32	{1 0}
56	{1 1}
72	{2 0}
88	{1 2}
104	{3 0}
112	{2 1}
136	{1 3}
144	{4 0}
176	{1 4} {3 1} {5 0}
184	{2 2}
224	{1 5} {6 0}
240	{4 1}
256	{7 0}
272	{1 6} {2 3}
288	{3 2} {5 1} {8 0}
304	{1 7}
336	{1 8} {9 0}
352	{6 1}
368	{1 9} {2 4} {4 2} {10 0}
408	{1 10} {3 3} {7 1} {11 0}
432	{1 11} {12 0}
456	{2 5}
480	{1 12} {5 2} {8 1} {13 0}
504	{14 0}
528	{1 13} {2 6} {9 1}
552	{3 4} {4 3} {15 0}
576	{1 14} {6 2}
608	{1 15} {2 7} {10 1} {16 0}
640	{11 1} {17 0}
672	{1 16} {2 8} {7 2} {18 0}
704	{1 17} {3 5} {5 3} {12 1} {19 0}
736	{4 4} {20 0}
768	{1 18} {2 9} {8 2} {13 1} {21 0}
808	{1 19} {2 10} {3 6} {22 0}
848	{1 20} {2 11} {6 3} {9 2} {14 1} {23 0}
888	{1 21} {3 7} {15 1} {24 0}
928	{1 22} {4 5} {5 4}
984	{1 23} {2 12} {7 3} {10 2} {16 1}
1032	{1 24} {2 13} {3 8} {11 2} {17 1}
1064	{4 6} {18 1}
1128	{1 25} {1 26} {2 14} {3 9} {6 4} {8 3} {12 2} {19 1}
1160	{1 27} {5 5}
1192	{4 7} {20 1}
1224	{2 15} {3 10} {9 3} {13 2}
1256	{21 1}
1288	{3 11} {7 4} {22 1}
1320	{2 16} {5 6} {14 2}
1352	{4 8} {23 1}
1416	{2 17} {3 12} {6 5} {10 3} {15 2} {24 1}
1480	{8 4}
1544	{2 18} {4 9} {5 7} {11 3} {16 2}
1608	{2 19} {3 13} {4 10} {6 6} {7 5} {17 2}
1672	{2 20} {9 4} {12 3}
1736	{2 21} {3 14} {4 11} {5 8} {18 2}
1800	{6 7} {13 3} {19 2}
1864	{2 22} {3 15} {7 6} {8 5} {10 4}
1928	{4 12} {5 9} {14 3} {20 2}
2024	{2 23} {3 16} {5 10} {6 8} {11 4} {21 2}
2088	{2 24} {4 13} {7 7} {9 5} {15 3} {22 2}
2152	{2 25} {3 17} {5 11} {8 6} {23 2}
2216	{2 26} {12 4} {16 3}
2280	{3 18} {4 14} {6 9} {10 5} {24 2}
2408	{2 27} {3 19} {5 12} {6 10} {7 8} {8 7} {9 6} {13 4} {17 3}
2472	{3 20} {4 15} {18 3}

2536	{6 11} {11 5}
2600	{3 21} {5 13} {14 4} {19 3}
2664	{4 16} {7 9} {9 7} {10 6}
2728	{8 8} {15 4} {20 3}
2792	{3 22} {5 14} {7 10} {12 5}
2856	{4 17} {6 12} {21 3}
2976	{3 23} {4 18} {7 11} {8 9} {10 7} {11 6} {13 5} {16 4}
3104	{3 24} {5 15} {6 13} {9 8} {17 4} {22 3}
3240	{3 25} {4 19} {8 10} {12 6} {14 5} {23 3}
3368	{3 26} {4 20} {5 16} {6 14} {7 12} {9 9} {10 8} {11 7} {18 4} {24 3}
3496	{3 27} {4 21} {8 11} {13 6} {15 5} {19 4}
3624	{5 17} {7 13} {9 10} {12 7}
3752	{4 22} {5 18} {6 15} {10 9} {11 8} {14 6} {16 5} {20 4}
3824	{8 12}
3840	{4 23} {9 11} {13 7} {21 4}
3904	{6 16} {7 14} {17 5}
3968	{5 19} {10 10} {15 6}
4032	{12 8} {22 4}
4096	{4 24} {5 20} {8 13} {11 9} {14 7} {18 5}
4224	{6 17} {7 15} {9 12} {10 11} {16 6} {23 4}
4352	{4 25} {5 21} {11 10} {13 8} {19 5} {24 4}
4480	{4 26} {6 18} {8 14} {12 9} {15 7} {17 6}
4608	{4 27} {5 22} {7 16} {9 13} {11 11} {20 5}
4736	{6 19} {10 12} {12 10} {14 8} {16 7} {18 6}
4864	{5 23} {7 17} {8 15} {13 9} {21 5}
4992	{6 20} {9 14} {15 8} {17 7} {19 6} {22 5}
5120	{5 24} {6 21} {10 13} {11 12} {12 11}
5248	{7 18} {8 16} {13 10} {14 9} {20 6} {23 5}
5376	{5 25} {16 8} {18 7}
5504	{5 26} {6 22} {7 19} {9 15} {13 11} {21 6} {24 5}
5632	{8 17} {10 14} {11 13} {12 12} {14 10} {15 9} {19 7}
5760	{5 27} {6 23} {7 20} {17 8} {22 6}
5888	{9 16} {14 11} {20 7}
6016	{7 21} {8 18} {10 15} {15 10} {16 9} {18 8} {23 6}
6144	{6 24} {11 14} {12 13} {13 12}
6272	{9 17} {21 7} {24 6}
6400	{6 25} {7 22} {8 19} {15 11} {16 10} {17 9} {19 8}
6528	{10 16} {14 12} {22 7}
6656	{6 26} {8 20} {11 15} {13 13} {20 8}
6784	{7 23} {9 18} {12 14} {16 11} {17 10} {18 9} {23 7}
6912	{6 27} {8 21}
7040	{10 17} {15 12} {21 8}
7168	{7 24} {9 19} {11 16} {14 13} {17 11} {18 10} {19 9} {24 7}
7296	{8 22} {12 15} {13 14}
7424	{9 20} {20 9} {22 8}
7552	{7 25} {10 18} {16 12} {19 10}
7680	{11 17} {18 11} {23 8}
7808	{7 26} {8 23} {9 21} {12 16} {14 14} {15 13} {21 9}
7936	{10 19} {13 15} {20 10}
8064	{7 27} {17 12} {19 11} {24 8}
8192	{8 24} {9 22} {10 20} {11 18} {16 13} {22 9}
8456	{12 17} {13 16} {14 15} {15 14} {18 12} {20 11} {21 10}
8712	{8 25} {9 23} {10 21} {11 19} {17 13} {22 10} {23 9}
8968	{8 26} {12 18} {16 14} {19 12} {21 11} {24 9}
9224	{8 27} {9 24} {10 22} {11 20} {13 17} {14 16} {15 15} {18 13} {23 10}
9480	{11 21} {12 19} {17 14} {20 12} {22 11} {24 10}
9736	{9 25} {10 23} {13 18} {14 17} {15 16} {16 15} {19 13} {23 11}
9992	{9 26} {11 22} {12 20} {18 14} {21 12}
10248	{10 24} {13 19} {17 15} {20 13} {24 11}
10504	{9 27} {12 21} {14 18} {15 17} {16 16} {22 12}
10760	{10 25} {11 23} {13 20} {19 14} {21 13} {23 12}
11016	{12 22} {18 15}
11272	{10 26} {11 24} {13 21} {14 19} {15 18} {16 17} {17 16} {20 14} {22 13} {24 12}
11528	{10 27} {12 23} {14 20} {19 15}
11784	{11 25} {18 16} {21 14} {23 13}

12040	{13 22} {14 21} {15 19} {16 18} {17 17} {20 15}
12296	{11 26} {12 24} {22 14} {24 13}
12552	{13 23} {15 20} {19 16}
12808	{11 27} {12 25} {14 22} {16 19} {17 18} {18 17} {21 15} {23 14}
13064	{15 21} {20 16}
13320	{12 26} {13 24} {16 20} {19 17} {22 15}
13576	{14 23} {17 19} {18 18} {24 14}
13832	{12 27} {15 22} {16 21} {21 16}
14088	{13 25} {17 20} {20 17} {23 15}
14344	{14 24} {18 19} {19 18} {22 16}
14600	{13 26} {15 23} {16 22} {17 21} {24 15}
14856	{18 20} {21 17}
15112	{13 27} {14 25} {19 19} {20 18} {23 16}
15368	{15 24}
15624	{14 26} {16 23} {17 22} {18 21} {22 17}
15880	{19 20} {20 19} {21 18} {24 16}
16136	{14 27} {15 25} {23 17}
16392	{16 24} {17 23} {18 22} {19 21} {20 20} {22 18}
16896	{15 26} {21 19} {24 17}
17424	{15 27} {16 25} {17 24} {18 23} {19 22} {20 21} {21 20} {22 19} {23 18}
17928	{16 26} {21 21} {24 18}
18432	{16 27} {17 25} {18 24} {19 23} {20 22} {22 20} {23 19}
18960	{17 26} {22 21} {23 20} {24 19}
19464	{17 27} {18 25} {19 24} {20 23} {21 22}
19968	{18 26} {22 22} {23 21} {24 20}
20496	{19 25} {20 24} {21 23}
21000	{18 27} {19 26} {23 22} {24 21}
21504	{20 25} {21 24} {22 23}
22032	{19 27} {24 22}
22536	{20 26} {21 25} {22 24} {23 23}
23040	{20 27} {24 23}
23568	{21 26} {22 25} {23 24}
24072	{21 27}
24576	{22 26} {23 25} {24 24}
25608	{22 27} {23 26}
26120	{24 25}
26632	{23 27} {24 26}
27656	{24 27}

**B.2.2.2 Uplink TBS using MCS index table 5.1.3.1-2,  
dmrs-AdditionalPosition = 1, number of CDM groups = 1**

**Table B.2.2.2-1: Uplink TBS using MCS index table 5.1.3.1-2,  
dmrs-AdditionalPosition = 1, number of CDM groups = 1, PUSCH duration = 14**

TBS	pairs of {L <sub>RBs</sub> l <sub>MCS</sub> }
32	{1 0}
56	{1 1}
72	{2 0}
88	{1 2}
104	{3 0}
112	{2 1}
136	{1 3}
144	{4 0}
176	{1 4} {3 1} {5 0}
184	{2 2}
224	{1 5} {6 0}
240	{4 1}
256	{7 0}
272	{1 6} {2 3}
288	{3 2} {5 1} {8 0}
304	{1 7}
336	{1 8} {9 0}
352	{6 1}
368	{1 9} {2 4} {4 2} {10 0}
408	{1 10} {3 3} {7 1} {11 0}
432	{1 11} {12 0}
456	{2 5}
480	{1 12} {5 2} {8 1} {13 0}
504	{14 0}
528	{1 13} {2 6} {9 1}
552	{3 4} {4 3} {15 0}
576	{1 14} {6 2}
608	{1 15} {2 7} {10 1} {16 0}
640	{11 1} {17 0}
672	{1 16} {2 8} {7 2} {18 0}
704	{1 17} {3 5} {5 3} {12 1} {19 0}
736	{4 4} {20 0}
768	{1 18} {2 9} {8 2} {13 1} {21 0}
808	{1 19} {2 10} {3 6} {22 0}
848	{1 20} {2 11} {6 3} {9 2} {14 1} {23 0}
888	{1 21} {3 7} {15 1} {24 0}
928	{1 22} {4 5} {5 4}
984	{1 23} {2 12} {7 3} {10 2} {16 1}
1032	{1 24} {2 13} {3 8} {11 2} {17 1}
1064	{4 6} {18 1}
1128	{1 25} {1 26} {2 14} {3 9} {6 4} {8 3} {12 2} {19 1}
1160	{1 27} {5 5}
1192	{4 7} {20 1}
1224	{2 15} {3 10} {9 3} {13 2}
1256	{21 1}
1288	{3 11} {7 4} {22 1}
1320	{2 16} {5 6} {14 2}
1352	{4 8} {23 1}
1416	{2 17} {3 12} {6 5} {10 3} {15 2} {24 1}
1480	{8 4}
1544	{2 18} {4 9} {5 7} {11 3} {16 2}
1608	{2 19} {3 13} {4 10} {6 6} {7 5} {17 2}
1672	{2 20} {9 4} {12 3}
1736	{2 21} {3 14} {4 11} {5 8} {18 2}
1800	{6 7} {13 3} {19 2}
1864	{2 22} {3 15} {7 6} {8 5} {10 4}
1928	{4 12} {5 9} {14 3} {20 2}
2024	{2 23} {3 16} {5 10} {6 8} {11 4} {21 2}
2088	{2 24} {4 13} {7 7} {9 5} {15 3} {22 2}
2152	{2 25} {3 17} {5 11} {8 6} {23 2}
2216	{2 26} {12 4} {16 3}
2280	{3 18} {4 14} {6 9} {10 5} {24 2}
2408	{2 27} {3 19} {5 12} {6 10} {7 8} {8 7} {9 6} {13 4} {17 3}
2472	{3 20} {4 15} {18 3}

2536	{6 11} {11 5}
2600	{3 21} {5 13} {14 4} {19 3}
2664	{4 16} {7 9} {9 7} {10 6}
2728	{8 8} {15 4} {20 3}
2792	{3 22} {5 14} {7 10} {12 5}
2856	{4 17} {6 12} {21 3}
2976	{3 23} {4 18} {7 11} {8 9} {10 7} {11 6} {13 5} {16 4}
3104	{3 24} {5 15} {6 13} {9 8} {17 4} {22 3}
3240	{3 25} {4 19} {8 10} {12 6} {14 5} {23 3}
3368	{3 26} {4 20} {5 16} {6 14} {7 12} {9 9} {10 8} {11 7} {18 4} {24 3}
3496	{3 27} {4 21} {8 11} {13 6} {15 5} {19 4}
3624	{5 17} {7 13} {9 10} {12 7}
3752	{4 22} {5 18} {6 15} {10 9} {11 8} {14 6} {16 5} {20 4}
3824	{8 12}
3840	{4 23} {9 11} {13 7} {21 4}
3904	{6 16} {7 14} {17 5}
3968	{5 19} {10 10} {15 6}
4032	{12 8} {22 4}
4096	{4 24} {5 20} {8 13} {11 9} {14 7} {18 5}
4224	{6 17} {7 15} {9 12} {10 11} {16 6} {23 4}
4352	{4 25} {5 21} {11 10} {13 8} {19 5} {24 4}
4480	{4 26} {6 18} {8 14} {12 9} {15 7} {17 6}
4608	{4 27} {5 22} {7 16} {9 13} {11 11} {20 5}
4736	{6 19} {10 12} {12 10} {14 8} {16 7} {18 6}
4864	{5 23} {7 17} {8 15} {13 9} {21 5}
4992	{6 20} {9 14} {15 8} {17 7} {19 6} {22 5}
5120	{5 24} {6 21} {10 13} {11 12} {12 11}
5248	{7 18} {8 16} {13 10} {14 9} {20 6} {23 5}
5376	{5 25} {16 8} {18 7}
5504	{5 26} {6 22} {7 19} {9 15} {13 11} {21 6} {24 5}
5632	{8 17} {10 14} {11 13} {12 12} {14 10} {15 9} {19 7}
5760	{5 27} {6 23} {7 20} {17 8} {22 6}
5888	{9 16} {14 11} {20 7}
6016	{7 21} {8 18} {10 15} {15 10} {16 9} {18 8} {23 6}
6144	{6 24} {11 14} {12 13} {13 12}
6272	{9 17} {21 7} {24 6}
6400	{6 25} {7 22} {8 19} {15 11} {16 10} {17 9} {19 8}
6528	{10 16} {14 12} {22 7}
6656	{6 26} {8 20} {11 15} {13 13} {20 8}
6784	{7 23} {9 18} {12 14} {16 11} {17 10} {18 9} {23 7}
6912	{6 27} {8 21}
7040	{10 17} {15 12} {21 8}
7168	{7 24} {9 19} {11 16} {14 13} {17 11} {18 10} {19 9} {24 7}
7296	{8 22} {12 15} {13 14}
7424	{9 20} {20 9} {22 8}
7552	{7 25} {10 18} {16 12} {19 10}
7680	{11 17} {18 11} {23 8}
7808	{7 26} {8 23} {9 21} {12 16} {14 14} {15 13} {21 9}
7936	{10 19} {13 15} {20 10}
8064	{7 27} {17 12} {19 11} {24 8}
8192	{8 24} {9 22} {10 20} {11 18} {16 13} {22 9}
8456	{12 17} {13 16} {14 15} {15 14} {18 12} {20 11} {21 10}
8712	{8 25} {9 23} {10 21} {11 19} {17 13} {22 10} {23 9}
8968	{8 26} {12 18} {16 14} {19 12} {21 11} {24 9}
9224	{8 27} {9 24} {10 22} {11 20} {13 17} {14 16} {15 15} {18 13} {23 10}
9480	{11 21} {12 19} {17 14} {20 12} {22 11} {24 10}
9736	{9 25} {10 23} {13 18} {14 17} {15 16} {16 15} {19 13} {23 11}
9992	{9 26} {11 22} {12 20} {18 14} {21 12}
10248	{10 24} {13 19} {17 15} {20 13} {24 11}
10504	{9 27} {12 21} {14 18} {15 17} {16 16} {22 12}
10760	{10 25} {11 23} {13 20} {19 14} {21 13} {23 12}
11016	{12 22} {18 15}
11272	{10 26} {11 24} {13 21} {14 19} {15 18} {16 17} {17 16} {20 14} {22 13} {24 12}
11528	{10 27} {12 23} {14 20} {19 15}
11784	{11 25} {18 16} {21 14} {23 13}

12040	{13 22} {14 21} {15 19} {16 18} {17 17} {20 15}
12296	{11 26} {12 24} {22 14} {24 13}
12552	{13 23} {15 20} {19 16}
12808	{11 27} {12 25} {14 22} {16 19} {17 18} {18 17} {21 15} {23 14}
13064	{15 21} {20 16}
13320	{12 26} {13 24} {16 20} {19 17} {22 15}
13576	{14 23} {17 19} {18 18} {24 14}
13832	{12 27} {15 22} {16 21} {21 16}
14088	{13 25} {17 20} {20 17} {23 15}
14344	{14 24} {18 19} {19 18} {22 16}
14600	{13 26} {15 23} {16 22} {17 21} {24 15}
14856	{18 20} {21 17}
15112	{13 27} {14 25} {19 19} {20 18} {23 16}
15368	{15 24}
15624	{14 26} {16 23} {17 22} {18 21} {22 17}
15880	{19 20} {20 19} {21 18} {24 16}
16136	{14 27} {15 25} {23 17}
16392	{16 24} {17 23} {18 22} {19 21} {20 20} {22 18}
16896	{15 26} {21 19} {24 17}
17424	{15 27} {16 25} {17 24} {18 23} {19 22} {20 21} {21 20} {22 19} {23 18}
17928	{16 26} {21 21} {24 18}
18432	{16 27} {17 25} {18 24} {19 23} {20 22} {22 20} {23 19}
18960	{17 26} {22 21} {23 20} {24 19}
19464	{17 27} {18 25} {19 24} {20 23} {21 22}
19968	{18 26} {22 22} {23 21} {24 20}
20496	{19 25} {20 24} {21 23}
21000	{18 27} {19 26} {23 22} {24 21}
21504	{20 25} {21 24} {22 23}
22032	{19 27} {24 22}
22536	{20 26} {21 25} {22 24} {23 23}
23040	{20 27} {24 23}
23568	{21 26} {22 25} {23 24}
24072	{21 27}
24576	{22 26} {23 25} {24 24}
25608	{22 27} {23 26}
26120	{24 25}
26632	{23 27} {24 26}
27656	{24 27}



**B.2.2.3 Uplink TBS using MCS index table 5.1.3.1-2,  
dmrs-AdditionalPosition = 0, number of CDM groups = 2**

**Table B.2.2.3-1: Uplink TBS using MCS index table 5.1.3.1-2,  
dmrs-AdditionalPosition = 0, number of CDM groups = 2, PUSCH duration = 14**

TBS	pairs of {LRBs IMCS}
32	{1 0}
56	{1 1}
72	{2 0}
88	{1 2}
104	{3 0}
112	{2 1}
136	{1 3}
144	{4 0}
176	{1 4} {3 1} {5 0}
184	{2 2}
224	{1 5} {6 0}
240	{4 1}
256	{7 0}
272	{1 6} {2 3}
288	{3 2} {5 1} {8 0}
304	{1 7}
336	{1 8} {9 0}
352	{6 1}
368	{1 9} {2 4} {4 2} {10 0}
408	{1 10} {3 3} {7 1} {11 0}
432	{1 11} {12 0}
456	{2 5}
480	{1 12} {5 2} {8 1} {13 0}
504	{14 0}
528	{1 13} {2 6} {9 1}
552	{3 4} {4 3} {15 0}
576	{1 14} {6 2}
608	{1 15} {2 7} {10 1} {16 0}
640	{11 1} {17 0}
672	{1 16} {2 8} {7 2} {18 0}
704	{1 17} {3 5} {5 3} {12 1} {19 0}
736	{4 4} {20 0}
768	{1 18} {2 9} {8 2} {13 1} {21 0}
808	{1 19} {2 10} {3 6} {22 0}
848	{1 20} {2 11} {6 3} {9 2} {14 1} {23 0}
888	{1 21} {3 7} {15 1} {24 0}
928	{1 22} {4 5} {5 4}
984	{1 23} {2 12} {7 3} {10 2} {16 1}
1032	{1 24} {2 13} {3 8} {11 2} {17 1}
1064	{4 6} {18 1}
1128	{1 25} {1 26} {2 14} {3 9} {6 4} {8 3} {12 2} {19 1}
1160	{1 27} {5 5}
1192	{4 7} {20 1}
1224	{2 15} {3 10} {9 3} {13 2}
1256	{21 1}
1288	{3 11} {7 4} {22 1}
1320	{2 16} {5 6} {14 2}
1352	{4 8} {23 1}
1416	{2 17} {3 12} {6 5} {10 3} {15 2} {24 1}
1480	{8 4}
1544	{2 18} {4 9} {5 7} {11 3} {16 2}
1608	{2 19} {3 13} {4 10} {6 6} {7 5} {17 2}
1672	{2 20} {9 4} {12 3}
1736	{2 21} {3 14} {4 11} {5 8} {18 2}
1800	{6 7} {13 3} {19 2}
1864	{2 22} {3 15} {7 6} {8 5} {10 4}
1928	{4 12} {5 9} {14 3} {20 2}
2024	{2 23} {3 16} {5 10} {6 8} {11 4} {21 2}
2088	{2 24} {4 13} {7 7} {9 5} {15 3} {22 2}
2152	{2 25} {3 17} {5 11} {8 6} {23 2}
2216	{2 26} {12 4} {16 3}
2280	{3 18} {4 14} {6 9} {10 5} {24 2}
2408	{2 27} {3 19} {5 12} {6 10} {7 8} {8 7} {9 6} {13 4} {17 3}
2472	{3 20} {4 15} {18 3}

2536	{6 11} {11 5}
2600	{3 21} {5 13} {14 4} {19 3}
2664	{4 16} {7 9} {9 7} {10 6}
2728	{8 8} {15 4} {20 3}
2792	{3 22} {5 14} {7 10} {12 5}
2856	{4 17} {6 12} {21 3}
2976	{3 23} {4 18} {7 11} {8 9} {10 7} {11 6} {13 5} {16 4}
3104	{3 24} {5 15} {6 13} {9 8} {17 4} {22 3}
3240	{3 25} {4 19} {8 10} {12 6} {14 5} {23 3}
3368	{3 26} {4 20} {5 16} {6 14} {7 12} {9 9} {10 8} {11 7} {18 4} {24 3}
3496	{3 27} {4 21} {8 11} {13 6} {15 5} {19 4}
3624	{5 17} {7 13} {9 10} {12 7}
3752	{4 22} {5 18} {6 15} {10 9} {11 8} {14 6} {16 5} {20 4}
3824	{8 12}
3840	{4 23} {9 11} {13 7} {21 4}
3904	{6 16} {7 14} {17 5}
3968	{5 19} {10 10} {15 6}
4032	{12 8} {22 4}
4096	{4 24} {5 20} {8 13} {11 9} {14 7} {18 5}
4224	{6 17} {7 15} {9 12} {10 11} {16 6} {23 4}
4352	{4 25} {5 21} {11 10} {13 8} {19 5} {24 4}
4480	{4 26} {6 18} {8 14} {12 9} {15 7} {17 6}
4608	{4 27} {5 22} {7 16} {9 13} {11 11} {20 5}
4736	{6 19} {10 12} {12 10} {14 8} {16 7} {18 6}
4864	{5 23} {7 17} {8 15} {13 9} {21 5}
4992	{6 20} {9 14} {15 8} {17 7} {19 6} {22 5}
5120	{5 24} {6 21} {10 13} {11 12} {12 11}
5248	{7 18} {8 16} {13 10} {14 9} {20 6} {23 5}
5376	{5 25} {16 8} {18 7}
5504	{5 26} {6 22} {7 19} {9 15} {13 11} {21 6} {24 5}
5632	{8 17} {10 14} {11 13} {12 12} {14 10} {15 9} {19 7}
5760	{5 27} {6 23} {7 20} {17 8} {22 6}
5888	{9 16} {14 11} {20 7}
6016	{7 21} {8 18} {10 15} {15 10} {16 9} {18 8} {23 6}
6144	{6 24} {11 14} {12 13} {13 12}
6272	{9 17} {21 7} {24 6}
6400	{6 25} {7 22} {8 19} {15 11} {16 10} {17 9} {19 8}
6528	{10 16} {14 12} {22 7}
6656	{6 26} {8 20} {11 15} {13 13} {20 8}
6784	{7 23} {9 18} {12 14} {16 11} {17 10} {18 9} {23 7}
6912	{6 27} {8 21}
7040	{10 17} {15 12} {21 8}
7168	{7 24} {9 19} {11 16} {14 13} {17 11} {18 10} {19 9} {24 7}
7296	{8 22} {12 15} {13 14}
7424	{9 20} {20 9} {22 8}
7552	{7 25} {10 18} {16 12} {19 10}
7680	{11 17} {18 11} {23 8}
7808	{7 26} {8 23} {9 21} {12 16} {14 14} {15 13} {21 9}
7936	{10 19} {13 15} {20 10}
8064	{7 27} {17 12} {19 11} {24 8}
8192	{8 24} {9 22} {10 20} {11 18} {16 13} {22 9}
8456	{12 17} {13 16} {14 15} {15 14} {18 12} {20 11} {21 10}
8712	{8 25} {9 23} {10 21} {11 19} {17 13} {22 10} {23 9}
8968	{8 26} {12 18} {16 14} {19 12} {21 11} {24 9}
9224	{8 27} {9 24} {10 22} {11 20} {13 17} {14 16} {15 15} {18 13} {23 10}
9480	{11 21} {12 19} {17 14} {20 12} {22 11} {24 10}
9736	{9 25} {10 23} {13 18} {14 17} {15 16} {16 15} {19 13} {23 11}
9992	{9 26} {11 22} {12 20} {18 14} {21 12}
10248	{10 24} {13 19} {17 15} {20 13} {24 11}
10504	{9 27} {12 21} {14 18} {15 17} {16 16} {22 12}
10760	{10 25} {11 23} {13 20} {19 14} {21 13} {23 12}
11016	{12 22} {18 15}
11272	{10 26} {11 24} {13 21} {14 19} {15 18} {16 17} {17 16} {20 14} {22 13} {24 12}
11528	{10 27} {12 23} {14 20} {19 15}
11784	{11 25} {18 16} {21 14} {23 13}

12040	{13 22} {14 21} {15 19} {16 18} {17 17} {20 15}
12296	{11 26} {12 24} {22 14} {24 13}
12552	{13 23} {15 20} {19 16}
12808	{11 27} {12 25} {14 22} {16 19} {17 18} {18 17} {21 15} {23 14}
13064	{15 21} {20 16}
13320	{12 26} {13 24} {16 20} {19 17} {22 15}
13576	{14 23} {17 19} {18 18} {24 14}
13832	{12 27} {15 22} {16 21} {21 16}
14088	{13 25} {17 20} {20 17} {23 15}
14344	{14 24} {18 19} {19 18} {22 16}
14600	{13 26} {15 23} {16 22} {17 21} {24 15}
14856	{18 20} {21 17}
15112	{13 27} {14 25} {19 19} {20 18} {23 16}
15368	{15 24}
15624	{14 26} {16 23} {17 22} {18 21} {22 17}
15880	{19 20} {20 19} {21 18} {24 16}
16136	{14 27} {15 25} {23 17}
16392	{16 24} {17 23} {18 22} {19 21} {20 20} {22 18}
16896	{15 26} {21 19} {24 17}
17424	{15 27} {16 25} {17 24} {18 23} {19 22} {20 21} {21 20} {22 19} {23 18}
17928	{16 26} {21 21} {24 18}
18432	{16 27} {17 25} {18 24} {19 23} {20 22} {22 20} {23 19}
18960	{17 26} {22 21} {23 20} {24 19}
19464	{17 27} {18 25} {19 24} {20 23} {21 22}
19968	{18 26} {22 22} {23 21} {24 20}
20496	{19 25} {20 24} {21 23}
21000	{18 27} {19 26} {23 22} {24 21}
21504	{20 25} {21 24} {22 23}
22032	{19 27} {24 22}
22536	{20 26} {21 25} {22 24} {23 23}
23040	{20 27} {24 23}
23568	{21 26} {22 25} {23 24}
24072	{21 27}
24576	{22 26} {23 25} {24 24}
25608	{22 27} {23 26}
26120	{24 25}
26632	{23 27} {24 26}
27656	{24 27}

**B.2.2.4 Uplink TBS using MCS index table 5.1.3.1-2,  
dmrs-AdditionalPosition = 1, number of CDM groups = 2**

**Table B.2.2.4-1: Uplink TBS using MCS index table 5.1.3.1-2,  
dmrs-AdditionalPosition = 1, number of CDM groups = 2, PUSCH duration = 14**

TBS	pairs of {L <sub>RBs</sub> l <sub>MCS</sub> }
32	{1 0}
48	{1 1}
64	{2 0}
80	{1 2}
96	{3 0}
104	{2 1}
120	{1 3}
128	{4 0}
160	{3 1}
168	{1 4} {2 2} {5 0}
208	{1 5} {6 0}
224	{4 1}
240	{1 6} {7 0}
256	{2 3} {3 2}
272	{1 7} {5 1} {8 0}
304	{1 8} {9 0}
320	{6 1}
336	{2 4} {10 0}
352	{1 9} {4 2}
368	{1 10} {11 0}
384	{3 3} {7 1}
408	{1 11} {12 0}
432	{1 12} {2 5} {5 2} {8 1} {13 0}
480	{1 13} {14 0}
504	{2 6} {3 4} {4 3} {9 1} {15 0}
528	{1 14} {6 2}
552	{2 7} {10 1} {16 0}
576	{1 15} {17 0}
608	{1 16} {7 2} {11 1} {18 0}
640	{2 8} {3 5} {5 3} {19 0}
672	{1 17} {4 4} {12 1} {20 0}
704	{1 18} {2 9} {8 2} {13 1} {21 0}
736	{1 19} {2 10} {3 6} {22 0}
768	{1 20} {6 3} {14 1}
808	{1 21} {2 11} {9 2} {15 1} {23 0} {24 0}
848	{1 22} {3 7} {4 5} {5 4}
888	{2 12} {7 3} {10 2} {16 1}
928	{1 23} {3 8} {17 1}
984	{1 24} {2 13} {4 6} {11 2} {18 1}
1032	{1 25} {1 26} {2 14} {3 9} {6 4} {8 3} {12 2} {19 1}
1064	{1 27} {5 5}
1128	{2 15} {3 10} {4 7} {13 2} {20 1}
1160	{9 3} {21 1}
1192	{3 11} {7 4} {22 1}
1224	{2 16} {5 6} {14 2}
1256	{4 8} {10 3} {23 1}
1288	{6 5}
1320	{2 17} {3 12} {15 2} {24 1}
1352	{8 4}
1416	{2 18} {4 9} {5 7} {11 3} {16 2}
1480	{2 19} {3 13} {4 10} {6 6} {17 2}
1544	{2 20} {7 5} {9 4} {12 3}
1608	{2 21} {3 14} {4 11} {5 8} {18 2}
1672	{6 7} {13 3} {19 2}
1736	{2 22} {3 15} {5 9} {7 6} {8 5} {10 4} {20 2}
1800	{2 23} {4 12} {14 3}
1864	{3 16} {5 10} {6 8} {11 4} {21 2}
1928	{2 24} {4 13} {7 7} {9 5} {15 3} {22 2}
2024	{2 25} {3 17} {5 11} {8 6} {12 4} {16 3} {23 2}
2088	{2 26} {3 18} {4 14} {6 9} {24 2}
2152	{2 27} {10 5} {17 3}
2216	{3 19} {5 12} {6 10} {7 8} {8 7} {9 6} {13 4}
2280	{3 20} {4 15} {18 3}
2408	{3 21} {4 16} {5 13} {6 11} {7 9} {11 5} {14 4} {19 3}

2472	{8 8} {9 7} {10 6}
2536	{3 22} {12 5} {15 4} {20 3}
2600	{4 17} {5 14} {6 12} {7 10}
2664	{11 6} {21 3}
2728	{3 23} {16 4}
2792	{4 18} {5 15} {7 11} {8 9} {9 8} {10 7} {13 5} {22 3}
2856	{3 24} {6 13} {17 4}
2976	{3 25} {4 19} {8 10} {12 6} {14 5} {23 3}
3104	{3 26} {4 20} {5 16} {6 14} {7 12} {9 9} {10 8} {11 7} {18 4} {24 3}
3240	{3 27} {4 21} {5 17} {8 11} {13 6} {15 5} {19 4}
3368	{6 15} {7 13} {9 10} {12 7} {20 4}
3496	{4 22} {5 18} {8 12} {10 9} {11 8} {14 6} {16 5}
3624	{4 23} {6 16} {7 14} {9 11} {13 7} {17 5} {21 4}
3752	{5 19} {10 10} {12 8} {15 6} {22 4}
3824	{4 24} {11 9}
3840	{5 20} {8 13} {14 7} {18 5} {23 4}
3904	{6 17} {7 15} {9 12} {10 11} {16 6}
3968	{4 25} {5 21}
4032	{11 10} {13 8} {19 5} {24 4}
4096	{4 26} {6 18} {8 14} {12 9} {15 7} {17 6}
4224	{4 27} {5 22} {7 16} {9 13} {20 5}
4352	{6 19} {10 12} {11 11} {14 8} {16 7} {18 6}
4480	{5 23} {7 17} {8 15} {12 10} {13 9} {21 5}
4608	{6 20} {9 14} {15 8} {17 7} {19 6} {22 5}
4736	{5 24} {6 21} {10 13} {11 12} {12 11} {13 10}
4864	{7 18} {8 16} {14 9} {20 6} {23 5}
4992	{5 25} {9 15} {16 8} {18 7}
5120	{5 26} {6 22} {7 19} {10 14} {13 11} {14 10} {15 9} {21 6} {24 5}
5248	{5 27} {8 17} {11 13} {12 12} {17 8} {19 7}
5376	{6 23} {7 20} {9 16} {22 6}
5504	{8 18} {14 11} {15 10} {16 9} {20 7}
5632	{6 24} {7 21} {10 15} {11 14} {13 12} {18 8} {23 6}
5760	{12 13} {21 7}
5888	{6 25} {7 22} {8 19} {9 17} {15 11} {16 10} {17 9} {19 8} {24 6}
6016	{10 16} {22 7}
6144	{6 26} {8 20} {11 15} {13 13} {14 12} {20 8}
6272	{7 23} {9 18} {12 14} {16 11} {17 10} {18 9} {23 7}
6400	{6 27} {8 21}
6528	{10 17} {15 12} {19 9} {21 8} {24 7}
6656	{7 24} {9 19} {11 16} {12 15} {14 13} {17 11} {18 10}
6784	{8 22} {13 14} {22 8}
6912	{7 25} {9 20} {10 18} {16 12} {20 9}
7040	{18 11} {19 10}
7168	{7 26} {8 23} {9 21} {11 17} {15 13} {23 8}
7296	{10 19} {12 16} {13 15} {14 14} {21 9}
7424	{7 27} {17 12} {19 11} {20 10} {24 8}
7552	{8 24} {9 22} {11 18} {22 9}
7680	{10 20} {16 13}
7808	{12 17} {13 16} {14 15} {15 14} {18 12} {20 11} {21 10}
7936	{8 25} {10 21} {23 9}
8064	{9 23} {11 19} {17 13} {22 10}
8192	{8 26} {12 18} {16 14} {19 12} {21 11} {24 9}
8456	{8 27} {9 24} {10 22} {11 20} {13 17} {14 16} {15 15} {23 10}
8712	{11 21} {12 19} {17 14} {18 13} {20 12} {22 11}
8968	{9 25} {10 23} {13 18} {15 16} {16 15} {19 13} {23 11} {24 10}
9224	{9 26} {11 22} {12 20} {14 17} {18 14} {21 12}
9480	{9 27} {10 24} {12 21} {13 19} {17 15} {20 13} {22 12} {24 11}
9736	{11 23} {14 18} {15 17} {16 16} {19 14}
9992	{10 25} {13 20} {18 15} {21 13} {23 12}
10248	{10 26} {12 22} {14 19} {17 16}
10504	{11 24} {13 21} {15 18} {16 17} {20 14} {22 13} {24 12}
10760	{10 27} {12 23} {14 20} {19 15}
11016	{11 25} {13 22} {15 19} {16 18} {17 17} {18 16} {21 14} {23 13}
11272	{11 26} {12 24} {14 21} {20 15}
11528	{13 23} {15 20} {19 16} {22 14} {24 13}

11784	{11 27} {14 22} {16 19} {17 18} {18 17} {21 15}
12040	{12 25} {15 21} {20 16} {23 14}
12296	{12 26} {13 24} {16 20} {19 17} {22 15}
12552	{14 23} {17 19} {18 18} {24 14}
12808	{12 27} {13 25} {15 22} {16 21} {21 16} {23 15}
13064	{17 20} {19 18} {20 17}
13320	{13 26} {14 24} {15 23} {18 19} {22 16}
13576	{16 22} {17 21} {21 17} {24 15}
13832	{13 27} {14 25} {18 20} {20 18} {23 16}
14088	{15 24} {19 19}
14344	{14 26} {16 23} {17 22} {18 21} {22 17}
14600	{19 20} {20 19} {21 18} {24 16}
14856	{14 27} {15 25} {23 17}
15112	{16 24} {17 23} {19 21}
15368	{15 26} {18 22} {20 20} {21 19} {22 18}
15624	{24 17}
15880	{15 27} {16 25} {20 21} {23 18}
16136	{17 24} {18 23} {19 22} {21 20} {22 19}
16392	{16 26} {24 18}
16896	{16 27} {17 25} {18 24} {19 23} {20 22} {21 21} {22 20} {23 19}
17424	{17 26} {22 21} {23 20} {24 19}
17928	{17 27} {18 25} {19 24} {20 23} {21 22}
18432	{18 26} {22 22} {23 21} {24 20}
18960	{18 27} {19 25} {20 24} {21 23} {24 21}
19464	{19 26} {22 23} {23 22}
19968	{20 25} {21 24}
20496	{19 27} {20 26} {23 23} {24 22}
21000	{21 25} {22 24}
21504	{20 27} {21 26} {23 24} {24 23}
22032	{22 25}
22536	{21 27} {22 26} {24 24}
23040	{23 25}
23568	{22 27} {23 26}
24072	{24 25}
24576	{23 27} {24 26}
25608	{24 27}



## B.2.3 Uplink TBS using MCS index table 6.1.4.1-1

### B.2.3.1 Uplink TBS using MCS index table 6.1.4.1-1, dmrs-AdditionalPosition = 0, number of CDM groups = 2, PUSCH-tp-pi2BPSK = disabled

**Table B.2.3.1-1: Uplink TBS using MCS index table 6.1.4.1-1,  
dmrs-AdditionalPosition = 0, number of CDM groups = 2,  
PUSCH-tp-pi2BPSK = disabled, PUSCH duration = 14**

TBS	pairs of {L <sub>RBs</sub> l <sub>MCS</sub> }
24	{1 0}
32	{2 0}
40	{1 1}
48	{3 0}
56	{1 2}
72	{1 3} {4 0}
88	{1 4} {2 1} {5 0}
104	{6 0}
112	{1 5} {2 2}
120	{7 0}
136	{1 6} {3 1}
144	{8 0}
152	{2 3}
160	{1 7} {9 0}
176	{1 8} {3 2} {10 0}
184	{2 4} {4 1}
208	{1 9} {1 10} {11 0}
224	{1 11} {2 5} {3 3} {12 0}
240	{4 2} {5 1} {13 0}
256	{14 0}
272	{1 12} {2 6} {15 0}
288	{3 4} {5 2} {6 1} {16 0}
304	{1 13} {4 3} {17 0}
320	{2 7}
336	{1 14} {7 1} {18 0}
352	{3 5} {6 2} {19 0}
368	{1 15} {2 8} {4 4} {20 0}
384	{5 3} {8 1} {21 0}
408	{1 16} {2 9} {2 10} {3 6} {7 2} {22 0}
432	{1 17} {9 1} {23 0} {24 0}
456	{2 11} {4 5} {6 3}
480	{1 18} {3 7} {5 4} {8 2} {10 1}
528	{1 19} {2 12} {7 3} {9 2} {11 1}
552	{3 8} {4 6}
576	{1 20} {5 5} {6 4} {12 1}
608	{1 21} {2 13} {8 3} {10 2}
640	{3 9} {3 10} {4 7} {11 2} {13 1}
672	{1 22} {2 14} {7 4} {14 1}
704	{1 23} {3 11} {5 6} {6 5} {9 3} {12 2}
736	{4 8} {15 1}
768	{1 24} {2 15} {8 4} {10 3} {13 2} {16 1}
808	{1 25} {2 16} {3 12} {5 7} {7 5} {17 1}
848	{1 26} {2 17} {4 9} {4 10} {6 6} {9 4} {11 3} {14 2}
888	{1 27} {3 13} {15 2} {18 1}
928	{4 11} {5 8} {8 5} {12 3} {19 1}
984	{2 18} {6 7} {7 6} {10 4} {16 2} {20 1}
1032	{2 19} {3 14} {5 9} {5 10} {9 5} {11 4} {13 3} {17 2} {21 1}
1064	{4 12} {14 3} {18 2} {22 1}
1128	{2 20} {3 15} {6 8} {7 7} {8 6} {12 4} {19 2} {23 1}
1160	{5 11} {10 5} {15 3} {24 1}
1192	{4 13} {20 2}
1224	{2 21} {3 16} {9 6} {13 4} {16 3}
1256	{6 9} {6 10} {21 2}
1288	{3 17} {7 8} {8 7} {11 5} {22 2}
1320	{2 22} {5 12} {14 4} {17 3}
1352	{4 14} {23 2}
1416	{2 23} {3 18} {6 11} {10 6} {12 5} {15 4} {18 3} {24 2}
1480	{7 9} {7 10} {8 8} {9 7} {19 3}
1544	{2 24} {4 15} {5 13} {11 6} {13 5} {16 4} {20 3}
1608	{2 25} {3 19} {4 16} {6 12} {7 11} {10 7} {17 4} {21 3}
1672	{2 26} {8 9} {8 10} {9 8} {12 6} {14 5}
1736	{2 27} {3 20} {4 17} {5 14} {15 5} {18 4} {22 3}
1800	{6 13} {11 7} {13 6} {19 4} {23 3}
1864	{3 21} {7 12} {8 11} {9 9} {9 10} {10 8} {16 5} {24 3}

1928	{4 18} {5 15} {12 7} {14 6} {20 4}
2024	{3 22} {5 16} {6 14} {11 8} {17 5} {21 4}
2088	{4 19} {7 13} {9 11} {10 9} {10 10} {13 7} {15 6} {18 5} {22 4}
2152	{3 23} {5 17} {8 12} {23 4}
2216	{12 8} {16 6} {19 5}
2280	{3 24} {4 20} {6 15} {10 11} {11 9} {11 10} {14 7} {24 4}
2408	{3 25} {5 18} {6 16} {7 14} {8 13} {9 12} {13 8} {15 7} {17 6} {20 5} {21 5}
2472	{3 26} {4 21} {12 9} {12 10} {18 6}
2536	{6 17} {11 11} {22 5}
2600	{3 27} {5 19} {14 8} {16 7} {19 6}
2664	{4 22} {7 15} {9 13} {10 12} {23 5}
2728	{8 14} {13 9} {13 10} {15 8} {17 7} {20 6}
2792	{5 20} {7 16} {12 11} {24 5}
2856	{4 23} {6 18} {21 6}
2976	{4 24} {7 17} {8 15} {10 13} {11 12} {13 11} {14 9} {14 10} {16 8} {18 7}
3104	{5 21} {6 19} {9 14} {15 9} {15 10} {17 8} {19 7} {22 6}
3240	{4 25} {8 16} {12 12} {14 11} {20 7} {23 6}
3368	{4 26} {5 22} {6 20} {7 18} {9 15} {10 14} {11 13} {16 9} {16 10} {18 8} {21 7} {24 6}
3496	{4 27} {8 17} {13 12} {15 11} {17 9} {19 8}
3624	{5 23} {7 19} {9 16} {12 13} {17 10} {22 7}
3752	{5 24} {6 21} {10 15} {11 14} {14 12} {16 11} {18 9} {18 10} {20 8} {23 7}
3824	{8 18}
3840	{9 17} {13 13} {21 8} {24 7}
3904	{6 22} {7 20} {17 11} {19 9} {19 10}
3968	{5 25} {10 16} {15 12}
4032	{12 14} {22 8}
4096	{5 26} {8 19} {11 15} {14 13} {18 11} {20 9} {20 10}
4224	{6 23} {7 21} {9 18} {10 17} {16 12} {23 8}
4352	{5 27} {11 16} {13 14} {19 11} {21 9} {21 10} {24 8}
4480	{6 24} {8 20} {12 15} {15 13} {17 12} {22 9} {22 10}
4608	{7 22} {9 19} {11 17} {20 11}
4736	{6 25} {10 18} {12 16} {14 14} {16 13} {18 12} {23 9} {23 10}
4864	{7 23} {8 21} {13 15} {21 11}
4992	{6 26} {9 20} {15 14} {17 13} {19 12} {22 11} {24 9} {24 10}
5120	{6 27} {10 19} {11 18} {12 17}
5248	{7 24} {8 22} {13 16} {14 15} {20 12} {23 11}
5376	{16 14} {18 13}
5504	{7 25} {9 21} {13 17} {21 12} {24 11}
5632	{8 23} {10 20} {11 19} {12 18} {14 16} {15 15} {19 13}
5760	{7 26} {17 14} {22 12}
5888	{9 22} {14 17} {20 13}
6016	{7 27} {8 24} {10 21} {15 16} {16 15} {18 14} {23 12}
6144	{11 20} {12 19} {13 18}
6272	{9 23} {21 13} {24 12}
6400	{8 25} {15 17} {16 16} {17 15} {19 14}
6528	{10 22} {14 18} {22 13}
6656	{8 26} {11 21} {13 19} {20 14}
6784	{9 24} {12 20} {16 17} {17 16} {18 15} {23 13}
6912	{8 27}
7040	{10 23} {15 18} {21 14}
7168	{9 25} {11 22} {14 19} {17 17} {18 16} {19 15} {24 13}
7296	{12 21} {13 20}
7424	{9 26} {20 15} {22 14}
7552	{10 24} {16 18} {19 16}
7680	{11 23} {18 17} {23 14}
7808	{9 27} {12 22} {14 20} {15 19} {21 15}
7936	{10 25} {13 21} {20 16}
8064	{17 18} {19 17} {24 14}
8192	{10 26} {11 24} {16 19} {22 15}
8456	{12 23} {13 22} {14 21} {15 20} {18 18} {20 17} {21 16}
8712	{10 27} {11 25} {17 19} {22 16} {23 15}
8968	{12 24} {16 20} {19 18} {21 17} {24 15}
9224	{11 26} {13 23} {14 22} {15 21} {18 19} {23 16}
9480	{11 27} {12 25} {17 20} {20 18} {22 17} {24 16}
9736	{13 24} {14 23} {15 22} {16 21} {19 19} {23 17}

9992	{12 26} {18 20} {21 18}
10248	{13 25} {17 21} {20 19} {24 17}
10504	{12 27} {14 24} {15 23} {16 22} {22 18}
10760	{13 26} {19 20} {21 19} {23 18}
11016	{18 21}
11272	{13 27} {14 25} {15 24} {16 23} {17 22} {20 20} {22 19} {24 18}
11528	{14 26} {19 21}
11784	{18 22} {21 20} {23 19}
12040	{14 27} {15 25} {16 24} {17 23} {20 21}
12296	{22 20} {24 19}
12552	{15 26} {19 22}
12808	{16 25} {17 24} {18 23} {21 21} {23 20}
13064	{15 27} {20 22}
13320	{16 26} {19 23} {22 21}
13576	{17 25} {18 24} {24 20}
13832	{16 27} {21 22}
14088	{17 26} {20 23} {23 21}
14344	{18 25} {19 24} {22 22}
14600	{17 27} {24 21}
14856	{18 26} {21 23}
15112	{19 25} {20 24} {23 22}
15624	{18 27} {22 23}
15880	{19 26} {20 25} {21 24} {24 22}
16136	{23 23}
16392	{19 27} {20 26} {22 24}
16896	{21 25} {24 23}
17424	{20 27} {21 26} {22 25} {23 24}
17928	{21 27} {24 24}
18432	{22 26} {23 25}
18960	{22 27} {23 26} {24 25}
19968	{23 27} {24 26}
21000	{24 27}

B.2.3.2 Uplink TBS using MCS index table 6.1.4.1-1,  
dmrs-AdditionalPosition = 1, number of CDM groups = 2,  
PUSCH-tp-pi2BPSK = disabled

**Table B.2.3.2-1: Uplink TBS using MCS index table 6.1.4.1-1,  
dmrs-AdditionalPosition = 1, number of CDM groups = 2,  
PUSCH-tp-pi2BPSK = disabled, PUSCH duration = 14**

TBS	pairs of {L <sub>RBs</sub> l <sub>MCS</sub> }
24	{1 0}
32	{2 0}
40	{1 1}
48	{1 2} {3 0}
64	{1 3} {4 0}
80	{1 4} {5 0}
88	{2 1}
96	{6 0}
104	{1 5} {2 2}
112	{7 0}
120	{1 6}
128	{3 1} {8 0}
136	{2 3}
144	{1 7} {9 0}
160	{3 2}
168	{1 8} {2 4} {10 0}
176	{4 1}
184	{1 9} {1 10} {11 0}
208	{1 11} {2 5} {3 3} {12 0}
224	{4 2} {5 1} {13 0}
240	{1 12} {14 0}
256	{2 6} {3 4} {15 0}
272	{1 13} {5 2} {6 1} {16 0}
288	{2 7} {4 3} {17 0}
304	{1 14} {7 1} {18 0}
320	{3 5} {6 2} {19 0}
336	{2 8} {20 0}
352	{1 15} {4 4} {5 3} {8 1} {21 0}
368	{1 16} {22 0}
384	{2 9} {2 10} {3 6} {7 2} {23 0}
408	{1 17} {9 1} {24 0}
432	{1 18} {2 11} {4 5} {5 4} {6 3} {8 2}
456	{3 7} {10 1}
480	{1 19} {11 1}
504	{2 12} {3 8} {4 6} {7 3} {9 2}
528	{1 20} {5 5} {6 4} {12 1}
552	{2 13} {10 2}
576	{1 21} {3 9} {3 10} {8 3} {13 1}
608	{1 22} {4 7} {7 4} {11 2}
640	{2 14} {3 11} {5 6} {6 5} {9 3} {14 1}
672	{1 23} {4 8} {12 2} {15 1}
704	{1 24} {2 15} {8 4} {10 3} {13 2} {16 1}
736	{1 25} {2 16} {3 12} {5 7}
768	{1 26} {4 9} {4 10} {6 6} {7 5} {14 2} {17 1}
808	{1 27} {2 17} {9 4} {11 3} {15 2} {18 1}
848	{3 13} {4 11} {5 8} {8 5} {12 3} {19 1}
888	{2 18} {6 7} {7 6} {10 4} {16 2} {20 1}
928	{3 14} {13 3} {17 2} {21 1}
984	{2 19} {4 12} {5 9} {5 10} {9 5} {11 4} {14 3} {18 2} {22 1}
1032	{2 20} {3 15} {6 8} {7 7} {8 6} {12 4} {19 2} {23 1}
1064	{5 11} {10 5} {15 3} {24 1}
1128	{2 21} {3 16} {4 13} {13 4} {16 3} {20 2}
1160	{6 9} {6 10} {9 6} {21 2}
1192	{3 17} {7 8} {8 7} {11 5} {22 2}
1224	{2 22} {5 12} {14 4} {17 3}
1256	{4 14} {10 6} {23 2}
1288	{6 11} {12 5} {18 3}
1320	{2 23} {3 18} {15 4} {24 2}
1352	{7 9} {7 10} {8 8} {9 7} {19 3}
1416	{2 24} {4 15} {5 13} {11 6} {13 5} {16 4} {20 3}
1480	{2 25} {3 19} {4 16} {6 12} {10 7} {17 4} {21 3}
1544	{2 26} {7 11} {8 9} {8 10} {9 8} {12 6} {14 5}
1608	{2 27} {3 20} {4 17} {5 14} {15 5} {18 4} {22 3}
1672	{6 13} {11 7} {13 6} {19 4} {23 3}

1736	{3 21} {5 15} {7 12} {8 11} {9 9} {9 10} {10 8} {16 5} {20 4} {24 3}
1800	{4 18} {12 7} {14 6}
1864	{3 22} {5 16} {6 14} {11 8} {17 5} {21 4}
1928	{4 19} {7 13} {9 11} {10 9} {10 10} {13 7} {15 6} {18 5} {22 4}
2024	{3 23} {5 17} {8 12} {12 8} {16 6} {19 5} {23 4}
2088	{3 24} {4 20} {6 15} {11 9} {11 10} {14 7} {24 4}
2152	{10 11} {17 6} {20 5}
2216	{3 25} {5 18} {6 16} {7 14} {8 13} {9 12} {13 8} {15 7} {21 5}
2280	{3 26} {4 21} {12 9} {12 10} {18 6}
2408	{3 27} {4 22} {5 19} {6 17} {7 15} {11 11} {14 8} {16 7} {19 6} {22 5}
2472	{8 14} {9 13} {10 12} {13 9} {13 10} {23 5}
2536	{12 11} {15 8} {17 7} {20 6} {24 5}
2600	{4 23} {5 20} {6 18} {7 16}
2664	{11 12} {14 9} {14 10} {18 7} {21 6}
2728	{16 8}
2792	{4 24} {5 21} {7 17} {8 15} {9 14} {10 13} {13 11} {19 7} {22 6}
2856	{6 19} {15 9} {15 10} {17 8}
2976	{4 25} {8 16} {12 12} {14 11} {20 7} {23 6}
3104	{4 26} {5 22} {6 20} {7 18} {9 15} {10 14} {11 13} {16 9} {16 10} {18 8} {21 7} {24 6}
3240	{4 27} {5 23} {8 17} {13 12} {15 11} {17 9} {17 10} {19 8} {22 7}
3368	{6 21} {7 19} {9 16} {12 13} {20 8}
3496	{5 24} {8 18} {10 15} {11 14} {14 12} {16 11} {18 9} {18 10} {23 7}
3624	{6 22} {7 20} {9 17} {13 13} {17 11} {19 9} {19 10} {21 8} {24 7}
3752	{5 25} {10 16} {12 14} {15 12} {22 8}
3824	{11 15} {20 9}
3840	{5 26} {8 19} {14 13} {18 11} {20 10} {23 8}
3904	{6 23} {7 21} {9 18} {10 17} {16 12}
3968	{5 27} {21 9} {21 10}
4032	{11 16} {13 14} {19 11} {24 8}
4096	{6 24} {8 20} {12 15} {15 13} {17 12}
4224	{7 22} {9 19} {20 11} {22 9} {22 10}
4352	{6 25} {10 18} {11 17} {14 14} {16 13} {18 12} {23 9} {23 10}
4480	{7 23} {8 21} {12 16} {13 15} {21 11}
4608	{6 26} {9 20} {15 14} {17 13} {19 12} {22 11} {24 9} {24 10}
4736	{6 27} {10 19} {11 18} {12 17} {13 16}
4864	{7 24} {8 22} {14 15} {20 12} {23 11}
4992	{9 21} {16 14} {18 13}
5120	{7 25} {10 20} {13 17} {14 16} {15 15} {21 12} {24 11}
5248	{8 23} {11 19} {12 18} {17 14} {19 13}
5376	{7 26} {9 22} {22 12}
5504	{8 24} {14 17} {15 16} {16 15} {20 13}
5632	{7 27} {10 21} {11 20} {13 18} {18 14} {23 12}
5760	{12 19} {21 13}
5888	{8 25} {9 23} {15 17} {16 16} {17 15} {19 14} {24 12}
6016	{10 22} {22 13}
6144	{8 26} {11 21} {13 19} {14 18} {20 14}
6272	{9 24} {12 20} {16 17} {17 16} {18 15} {23 13}
6400	{8 27}
6528	{10 23} {15 18} {19 15} {21 14} {24 13}
6656	{9 25} {11 22} {12 21} {14 19} {17 17} {18 16}
6784	{13 20} {22 14}
6912	{9 26} {10 24} {16 18} {20 15}
7040	{18 17} {19 16}
7168	{9 27} {11 23} {15 19} {23 14}
7296	{10 25} {12 22} {13 21} {14 20} {21 15}
7424	{17 18} {19 17} {20 16} {24 14}
7552	{11 24} {22 15}
7680	{10 26} {16 19}
7808	{12 23} {13 22} {14 21} {15 20} {18 18} {20 17} {21 16}
7936	{10 27} {23 15}
8064	{11 25} {17 19} {22 16}
8192	{12 24} {16 20} {19 18} {21 17} {24 15}
8456	{11 26} {13 23} {14 22} {15 21} {23 16}
8712	{11 27} {12 25} {17 20} {18 19} {20 18} {22 17}
8968	{13 24} {15 22} {16 21} {19 19} {23 17} {24 16}

9224	{12 26} {14 23} {18 20} {21 18}
9480	{12 27} {13 25} {17 21} {20 19} {22 18} {24 17}
9736	{14 24} {15 23} {16 22} {19 20}
9992	{13 26} {18 21} {21 19} {23 18}
10248	{14 25} {17 22}
10504	{13 27} {15 24} {16 23} {20 20} {22 19} {24 18}
10760	{14 26} {19 21}
11016	{15 25} {16 24} {17 23} {18 22} {21 20} {23 19}
11272	{14 27} {20 21}
11528	{15 26} {19 22} {22 20} {24 19}
11784	{16 25} {17 24} {18 23} {21 21}
12040	{15 27} {20 22} {23 20}
12296	{16 26} {19 23} {22 21}
12552	{17 25} {18 24} {24 20}
12808	{16 27} {21 22} {23 21}
13064	{17 26} {19 24} {20 23}
13320	{18 25} {22 22}
13576	{17 27} {21 23} {24 21}
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14088	{19 25}
14344	{18 27} {22 23}
14600	{19 26} {20 25} {21 24} {24 22}
14856	{23 23}
15112	{19 27}
15368	{20 26} {21 25} {22 24}
15624	{24 23}
15880	{20 27} {23 24}
16136	{21 26} {22 25}
16392	{24 24}
16896	{21 27} {22 26} {23 25}
17424	{22 27} {23 26} {24 25}
18432	{23 27} {24 26}
18960	{24 27}



B.2.3.3 Uplink TBS using MCS index table 6.1.4.1-1,  
dmrs-AdditionalPosition = 2, number of CDM groups = 2,  
PUSCH-tp-pi2BPSK = disabled

**Table B.2.3.3-1: Uplink TBS using MCS index table 6.1.4.1-1,  
dmrs-AdditionalPosition = 2, number of CDM groups = 2,  
PUSCH-tp-pi2BPSK = disabled, PUSCH duration = 14**

TBS	pairs of {L <sub>RBs</sub> l <sub>MCS</sub> }
24	{1 0} {2 0}
40	{1 1} {3 0}
48	{1 2}
56	{4 0}
64	{1 3}
72	{1 4} {5 0}
80	{2 1}
88	{6 0}
96	{1 5} {2 2}
104	{7 0}
112	{1 6}
120	{3 1} {8 0}
128	{1 7} {2 3}
136	{9 0}
144	{3 2}
152	{1 8} {2 4} {10 0}
160	{4 1}
168	{1 9} {1 10} {11 0}
184	{12 0}
192	{1 11} {2 5} {3 3} {4 2}
208	{5 1} {13 0}
224	{1 12} {2 6} {14 0}
240	{3 4} {6 1} {15 0} {16 0}
256	{1 13} {4 3} {5 2} {17 0}
272	{2 7} {18 0}
288	{1 14} {3 5} {7 1} {19 0}
304	{2 8} {6 2} {20 0}
320	{1 15} {4 4} {5 3} {8 1} {21 0}
336	{1 16} {22 0}
352	{2 9} {2 10} {3 6} {7 2} {23 0}
368	{1 17} {9 1} {24 0}
384	{2 11} {4 5} {6 3}
408	{1 18} {3 7} {5 4} {8 2} {10 1}
432	{1 19}
456	{2 12} {4 6} {7 3} {9 2} {11 1}
480	{1 20} {3 8} {6 4} {12 1}
504	{2 13} {5 5} {10 2}
528	{1 21} {3 9} {3 10} {8 3} {13 1}
552	{1 22} {4 7} {7 4} {11 2}
576	{2 14} {5 6} {9 3} {14 1}
608	{1 23} {3 11} {6 5} {12 2} {15 1}
640	{1 24} {2 15} {4 8} {8 4} {10 3} {13 2} {16 1}
672	{1 25} {2 16} {3 12} {5 7}
704	{1 26} {4 9} {4 10} {6 6} {7 5} {11 3} {14 2} {17 1}
736	{1 27} {2 17} {9 4} {18 1}
768	{3 13} {15 2} {19 1}
808	{2 18} {4 11} {5 8} {6 7} {7 6} {8 5} {10 4} {12 3} {16 2} {20 1}
848	{3 14} {13 3} {17 2} {21 1}
888	{2 19} {4 12} {5 9} {5 10} {9 5} {11 4} {18 2} {22 1}
928	{6 8} {8 6} {14 3} {23 1}
984	{2 20} {3 15} {5 11} {7 7} {10 5} {12 4} {15 3} {19 2} {24 1}
1032	{2 21} {3 16} {4 13} {13 4} {16 3} {20 2}
1064	{6 9} {6 10} {9 6} {21 2}
1128	{2 22} {3 17} {5 12} {7 8} {8 7} {11 5} {14 4} {17 3} {22 2}
1160	{4 14} {10 6} {18 3} {23 2}
1192	{2 23} {3 18} {6 11} {12 5} {15 4} {24 2}
1224	{7 9} {7 10} {9 7} {19 3}
1256	{5 13} {8 8}
1288	{2 24} {4 15} {11 6} {13 5} {16 4} {20 3}
1320	{3 19}
1352	{2 25} {4 16} {6 12} {10 7} {17 4} {21 3}
1416	{2 26} {7 11} {8 9} {8 10} {9 8} {12 6} {14 5} {22 3}
1480	{2 27} {3 20} {4 17} {5 14} {15 5} {18 4}
1544	{3 21} {6 13} {11 7} {13 6} {19 4} {23 3}

1608	{4 18} {5 15} {7 12} {8 11} {9 9} {9 10} {10 8} {16 5} {20 4} {24 3}
1672	{3 22} {12 7} {14 6} {17 5} {21 4}
1736	{5 16} {6 14} {11 8} {15 6}
1800	{3 23} {4 19} {5 17} {7 13} {8 12} {9 11} {10 9} {10 10} {13 7} {18 5} {22 4}
1864	{12 8} {16 6} {19 5} {23 4}
1928	{3 24} {4 20} {6 15} {11 9} {11 10} {14 7} {24 4}
2024	{3 25} {5 18} {7 14} {8 13} {9 12} {10 11} {13 8} {17 6} {20 5}
2088	{3 26} {4 21} {6 16} {12 9} {12 10} {15 7} {18 6} {21 5}
2152	{6 17} {11 11} {14 8} {16 7} {22 5}
2216	{3 27} {4 22} {5 19} {7 15} {10 12} {19 6}
2280	{8 14} {9 13} {13 9} {13 10} {23 5}
2408	{4 23} {5 20} {6 18} {7 16} {12 11} {15 8} {17 7} {20 6} {21 6} {24 5}
2472	{11 12} {14 9} {14 10} {16 8} {18 7}
2536	{4 24} {7 17} {8 15} {10 13} {13 11} {22 6}
2600	{5 21} {9 14} {19 7}
2664	{6 19} {12 12} {15 9} {15 10} {17 8} {23 6}
2728	{4 25} {8 16} {14 11} {20 7}
2792	{4 26} {5 22} {7 18} {11 13} {16 9} {16 10} {18 8} {24 6}
2856	{6 20} {9 15} {10 14} {21 7}
2976	{4 27} {5 23} {8 17} {13 12} {15 11} {17 9} {17 10} {19 8} {22 7}
3104	{6 21} {7 19} {9 16} {12 13} {14 12} {16 11} {20 8} {23 7}
3240	{5 24} {8 18} {9 17} {10 15} {11 14} {18 9} {18 10} {21 8} {24 7}
3368	{5 25} {6 22} {7 20} {13 13} {15 12} {17 11} {19 9} {19 10}
3496	{5 26} {8 19} {10 16} {11 15} {12 14} {18 11} {20 9} {20 10} {22 8}
3624	{6 23} {7 21} {9 18} {10 17} {14 13} {16 12} {23 8}
3752	{5 27} {11 16} {13 14} {19 11} {21 9} {21 10} {24 8}
3824	{6 24} {8 20} {12 15} {15 13} {17 12}
3840	{7 22} {22 9} {22 10}
3904	{9 19} {20 11}
3968	{10 18} {11 17} {14 14}
4032	{6 25} {12 16} {16 13} {18 12} {23 9} {23 10}
4096	{7 23} {8 21} {13 15} {21 11}
4224	{6 26} {9 20} {15 14} {17 13} {19 12} {22 11} {24 9} {24 10}
4352	{6 27} {10 19} {11 18} {12 17} {13 16}
4480	{7 24} {8 22} {14 15} {16 14} {18 13} {20 12} {23 11}
4608	{9 21} {13 17} {24 11}
4736	{7 25} {8 23} {10 20} {11 19} {12 18} {14 16} {15 15} {19 13} {21 12}
4864	{7 26} {17 14} {22 12}
4992	{9 22} {14 17} {20 13}
5120	{7 27} {8 24} {10 21} {13 18} {15 16} {16 15} {18 14} {23 12}
5248	{11 20} {12 19} {21 13}
5376	{8 25} {9 23} {15 17} {16 16} {17 15} {19 14} {24 12}
5504	{10 22} {22 13}
5632	{8 26} {11 21} {12 20} {13 19} {14 18} {18 15} {20 14}
5760	{9 24} {16 17} {17 16} {23 13}
5888	{8 27} {10 23}
6016	{9 25} {15 18} {19 15} {21 14} {24 13}
6144	{11 22} {12 21} {13 20} {14 19} {17 17} {18 16}
6272	{9 26} {10 24} {20 15} {22 14}
6400	{16 18} {18 17} {19 16}
6528	{9 27} {11 23} {15 19} {23 14}
6656	{12 22} {13 21} {14 20} {21 15}
6784	{10 25} {17 18} {19 17} {20 16} {24 14}
6912	{11 24} {22 15}
7040	{10 26} {16 19} {21 16}
7168	{12 23} {13 22} {14 21} {15 20} {18 18} {20 17}
7296	{10 27} {23 15}
7424	{11 25} {17 19} {22 16}
7552	{12 24} {16 20} {19 18} {21 17} {24 15}
7680	{11 26} {13 23} {15 21}
7808	{14 22} {18 19} {23 16}
7936	{20 18} {22 17}
8064	{11 27} {12 25} {17 20} {24 16}
8192	{13 24} {15 22} {16 21} {19 19} {23 17}
8456	{12 26} {14 23} {18 20} {21 18}

8712	{12 27} {13 25} {17 21} {20 19} {22 18} {24 17}
8968	{14 24} {15 23} {16 22} {19 20}
9224	{13 26} {18 21} {21 19} {23 18}
9480	{13 27} {14 25} {15 24} {16 23} {17 22} {20 20} {24 18}
9736	{14 26} {19 21} {22 19}
9992	{15 25} {18 22} {21 20} {23 19}
10248	{14 27} {16 24} {17 23} {20 21}
10504	{15 26} {19 22} {22 20} {24 19}
10760	{16 25} {17 24} {18 23} {21 21}
11016	{15 27} {20 22} {23 20}
11272	{16 26} {19 23} {22 21}
11528	{17 25} {18 24} {24 20}
11784	{16 27} {21 22} {23 21}
12040	{17 26} {18 25} {19 24} {20 23}
12296	{22 22} {24 21}
12552	{17 27} {18 26} {21 23}
12808	{19 25} {20 24} {23 22}
13064	{18 27} {22 23}
13320	{19 26} {21 24} {24 22}
13576	{20 25}
13832	{19 27} {23 23}
14088	{20 26} {21 25} {22 24}
14344	{24 23}
14600	{20 27} {23 24}
14856	{21 26} {22 25}
15368	{21 27} {22 26} {24 24}
15624	{23 25}
16136	{22 27} {23 26} {24 25}
16896	{23 27} {24 26}
17424	{24 27}

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## Annex C (informative): Style guide and design principles

### C.1 Style guide

The style guide specified in TS 36.523-3 [12] Annex B applies to the present document.

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### C.2 Design principles

The design principles specified in TS 36.523-3 [12] Annex B apply to the present document.

## Annex D (normative): TTCN-3 definitions

### D.0 Introduction

The present Annex D specifies the TTCN-3 type definitions used at the system interface to configure and control the SS.

In case of discrepancy between the content of the present Annex D and the equivalent TTCN-3 definitions / semantic requirements found in the TTCN modules provided as attachments to the present specification, the latter shall take precedence.

NOTE: This annex is automatically generated from the TTCN-3 modules provided as attachment to the present specification and containing the listed TTCN-3 type definitions,

### D.1 NR\_ASP\_TypeDefs

Type definitions for configuration of the system simulator;

Common design principles:

Semantics of OMIT: unless specified otherwise, for all TTCN-3 type definitions used in ASPs omit means "keep as it is" =>

- on initial configuration in general all fields shall be provided
- no default values for fields are foreseen
- if necessary non-existence of information shall be explicitly configured (e.g. with a union of "no configuration" and "configuration parameters")
- fields within structures imported from the core spec are excepted from this rule
- if a sub-structure is explicitly excluded from this rule all fields and sub-fields shall be fully specified for each (re-)configuration

#### D.1.1 ASN1\_Container

Definitions containing ASN.1 types for backward compatibility

##### NR\_ASN1\_UL\_AM\_RLC\_Type

TTCN-3 Union Type	
<b>Name</b>	NR_ASN1_UL_AM_RLC_Type
<b>Comment</b>	
R15	UL_AM_RLC

##### NR\_ASN1\_DL\_AM\_RLC\_Type

TTCN-3 Union Type	
<b>Name</b>	NR_ASN1_DL_AM_RLC_Type
<b>Comment</b>	
R15	DL_AM_RLC

##### NR\_ASN1\_UL\_UM\_RLC\_Type

TTCN-3 Union Type	
<b>Name</b>	NR_ASN1_UL_UM_RLC_Type
<b>Comment</b>	
R15	UL_UM_RLC

## NR\_ASN1\_DL\_UM\_RLC\_Type

TTCN-3 Union Type		
Name	NR_ASN1_DL_UM_RLC_Type	
Comment		
R15	DL_UM_RLC	

## NR\_ASN1\_PDSCH\_Config\_Type

TTCN-3 Union Type		
Name	NR_ASN1_PDSCH_Config_Type	
Comment		
R15	PDSCH_Config	

## NR\_ASN1\_PDSCH\_ConfigCommon\_Type

TTCN-3 Union Type		
Name	NR_ASN1_PDSCH_ConfigCommon_Type	
Comment		
R15	PDSCH_ConfigCommon	

## NR\_ASN1\_SPS\_Config\_Type

TTCN-3 Union Type		
Name	NR_ASN1_SPS_Config_Type	
Comment		
R15	SPS_Config	

## NR\_ASN1\_CSI\_ResourceConfig\_Type

TTCN-3 Union Type		
Name	NR_ASN1_CSI_ResourceConfig_Type	
Comment		
R15	CSI_ResourceConfig	

## NR\_ASN1\_TDD\_UL\_DL\_ConfigCommon\_Type

TTCN-3 Union Type		
Name	NR_ASN1_TDD_UL_DL_ConfigCommon_Type	
Comment		
R15	TDD_UL_DL_ConfigCommon	

## NR\_ASN1\_TDD\_UL\_DL\_SlotConfig\_Type

TTCN-3 Union Type		
Name	NR_ASN1_TDD_UL_DL_SlotConfig_Type	
Comment		
R15	TDD_UL_DL_SlotConfig	

## NR\_ASN1\_FrequencyInfoDL\_Type

TTCN-3 Union Type		
Name	NR_ASN1_FrequencyInfoDL_Type	
Comment		
R15	FrequencyInfoDL	

**NR\_ASN1\_FrequencyInfoUL\_Type**

TTCN-3 Union Type		
Name	NR_ASN1_FrequencyInfoUL_Type	
Comment		
R15	FrequencyInfoUL	

**NR\_ASN1\_BWP\_UplinkCommon\_Type**

TTCN-3 Union Type		
Name	NR_ASN1_BWP_UplinkCommon_Type	
Comment		
R15	BWP_UplinkCommon	

**NR\_ASN1\_BWP\_UplinkDedicated\_Type**

TTCN-3 Union Type		
Name	NR_ASN1_BWP_UplinkDedicated_Type	
Comment		
R15	BWP_UplinkDedicated	

**NR\_ASN1\_RACH\_ConfigDedicated\_Type**

TTCN-3 Union Type		
Name	NR_ASN1_RACH_ConfigDedicated_Type	
Comment		
R15	RACH_ConfigDedicated	

**NR\_ASN1\_PDSCH\_ServingCellConfig\_Type**

TTCN-3 Union Type		
Name	NR_ASN1_PDSCH_ServingCellConfig_Type	
Comment		
R15	PDSCH_ServingCellConfig	

**NR\_ASN1\_PUSCH\_ServingCellConfig\_Type**

TTCN-3 Union Type		
Name	NR_ASN1_PUSCH_ServingCellConfig_Type	
Comment		
R15	PUSCH_ServingCellConfig	

**NR\_ASN1\_SearchSpace\_Type**

TTCN-3 Union Type		
Name	NR_ASN1_SearchSpace_Type	
Comment		
R15	SearchSpace	

**NR\_ASN1\_ControlResourceSet\_Type**

TTCN-3 Union Type		
Name	NR_ASN1_ControlResourceSet_Type	
Comment		
R15	ControlResourceSet	



## NR\_ASN1\_BWP\_Type

TTCN-3 Union Type	
Name	NR_ASN1_BWP_Type
Comment	
R15	BWP

## NR\_ASN1\_DRX\_Config\_Type

TTCN-3 Union Type	
Name	NR_ASN1_DRX_Config_Type
Comment	
R15	DRX_Config

## NR\_ASN1\_MeasGapConfig\_Type

TTCN-3 Union Type	
Name	NR_ASN1_MeasGapConfig_Type
Comment	
R15	MeasGapConfig

## NR\_ASN1\_MAC\_CellGroupConfig\_Type

TTCN-3 Union Type	
Name	NR_ASN1_MAC_CellGroupConfig_Type
Comment	
R15	MAC_CellGroupConfig

## NR\_ASN1\_PhysicalCellGroupConfig\_Type

TTCN-3 Union Type	
Name	NR_ASN1_PhysicalCellGroupConfig_Type
Comment	
R15	PhysicalCellGroupConfig

## NR\_ASN1\_RateMatchPattern\_Type

TTCN-3 Union Type	
Name	NR_ASN1_RateMatchPattern_Type
Comment	
R15	RateMatchPattern

## NR\_ASN1\_RateMatchPatternLTE\_CRS\_Type

TTCN-3 Union Type	
Name	NR_ASN1_RateMatchPatternLTE_CRS_Type
Comment	
R15	RateMatchPatternLTE_CRS

## D.1.2 System\_Configuration

Formal ASP Definitions for system configuration

## NR\_SystemRequest\_Type

TTCN-3 Union Type		
Name	NR_SystemRequest_Type	
Comment		
Cell	<a href="#">NR_CellConfigRequest_Type</a>	configure/release a cell
CellAttenuation List	<a href="#">NR_CellAttenuationList_Type</a>	power attenuation for one or several cells; all cells included in the list shall be changed at the same time; all cells in the list shall reach the new cell power within a maximum of 100ms (10 frames) as according to TS 38.523-3 clause 7.1.4.2 NOTE: In the common ASP part the CellId shall be set - to the cell the timing information refers to if activation time shall be applied - to nr_Cell_NonSpecific when there is no activation time
RadioBearerList	<a href="#">NR_RadioBearerList_Type</a>	configure/release one or several SRBs and/or DRBs at an SpCell NOTE: RBs are not configured in an SCell
EnquireTiming	<a href="#">Null_Type</a>	get current timing information for the given cell
AS_Security	<a href="#">NR_AS_Security_Type</a>	StartRestart/Release of AS security
SystemIndCtrl	<a href="#">NR_System IndicationControl_Type</a>	to configure SS to generate system indications
PdcpCount	<a href="#">NR_PDCP_CountReq_Type</a>	to set or enquire PDCP COUNT for one or more RBs
DciTrigger	<a href="#">NR_DCI_Trigger_Type</a>	to trigger a specific DCI to be transmitted on PDCCH (e.g. PDCCH order)
MacCommand Trigger	<a href="#">NR_MAC_ControlElementDL_Type</a>	to trigger a specific MAC control element to be transmitted to the UE
L1_TestMode	<a href="#">NR_L1_TestMode_Type</a>	to Set L1/MAC in special Test modes e.g. DL CRC etc. per default (at initial configuration) no test mode is activated

## NR\_SystemConfirm\_Type

TTCN-3 Union Type		
Name	NR_SystemConfirm_Type	
Comment	confirmations for system configuration; in general to be sent after the configuration has been done	
Cell	<a href="#">Null_Type</a>	(no further parameters from SS)
CellAttenuation List	<a href="#">Null_Type</a>	(no further parameters from SS) NOTE 1: the confirmation shall be sent when all cells have changed power levels NOTE 2: for the CellId in the common ASP part the same rules are applied as for the SYSTEM REQ
RadioBearerList	<a href="#">Null_Type</a>	(no further parameters from SS)
EnquireTiming	<a href="#">Null_Type</a>	the cell's timing information is contained in the TimingInfo of the ASP's common part
AS_Security	<a href="#">Null_Type</a>	(no further parameters from SS)
SystemIndCtrl	<a href="#">Null_Type</a>	(no further parameters from SS)
RlcIndCtrl	<a href="#">Null_Type</a>	(no further parameters from SS)
PdcpCount	<a href="#">NR_PDCP_CountCnf_Type</a>	as response to 'Get' a list is returned containing COUNT information for the requested RBs
DciTrigger	<a href="#">Null_Type</a>	(no further parameters from SS)
MacCommand Trigger	<a href="#">Null_Type</a>	(no further parameters from SS)
L1_TestMode	<a href="#">Null_Type</a>	confirmation for L1 test mode

### NR\_SystemIndication\_Type

TTCN-3 Union Type		
Name	NR_SystemIndication_Type	
Comment		
Error	charstring	indicates an error situation in SS; is not explicitly handled in TTCN but causes an INCONC due to default behaviour; an additional error code can be signalled in the common part of the ASP; SS shall raise an error when in TS 38.523-3 or in any other ASP definitions
RlcDiscardInd	<a href="#">NR_RlcDiscardInd_Type</a>	indicates discarded PDUs
MAC	<a href="#">NR_MAC_ControlElementUL_Type</a>	indicates MAC control element being receive from the UE
RachPreamble	<a href="#">NR_RachPreamble_Type</a>	RACH preamble being sent by the UE
SchedReq	<a href="#">Null_Type</a>	indication for scheduling request sent by the UE
UL_HARQ	<a href="#">HARQ_Type</a>	to report the UL HARQ as received on PUCCH or PUSCH for corresponding DL transmission
HarqError	<a href="#">NR_HarqError_Type</a>	indicates detection of HARQ error: 1. HARQ CRC error for UL data 2. HARQ NACK from the UE unless SS is configured to report HARQ ACK/NACK

## D.1.3 Cell\_Configuration

Specific Info for Cell Configuration Primitive

### D.1.3.1 Cell\_Configuration\_Common

#### NR\_ASP\_TypeDefs: Constant Definitions

TTCN-3 Basic Types			
tsc_NR_CellAttenuation_Off	<a href="#">NR_Attenuation_Type</a>	{Off:=true}	

#### Cell\_Configuration\_Common: Basic Type Definitions

TTCN-3 Basic Types		
NR_InitialAttenuation_Type	<a href="#">NR_Attenuation_Type</a> ( <a href="#">tsc_NR_CellAttenuation_Off</a> )	Attenuation restricted to 'Off'

#### NR\_CellConfigRequest\_Type

TTCN-3 Union Type		
Name	NR_CellConfigRequest_Type	
Comment		
AddOrReconfigure	<a href="#">NR_CellConfigInfo_Type</a>	for cell configuration: CellId : identifier of the cell to be configured RoutingInfo : 'None' TimingInfo : 'Now' for initial configuration; specific TimingInfo may be used for reconfiguration ControllInfo : CnfFlag:=true; FollowOnFlag:=false (in general)
Release	<a href="#">Null_Type</a>	to remove a cell completely - CellId : identifier of the cell to be released; nr_Cell_NonSpecific, in case all cells shall be released RoutingInfo : 'None' TimingInfo : 'Now' ControllInfo : CnfFlag:=true; FollowOnFlag:=false (in general)

## NR\_CellConfigInfo\_Type

TTCN-3 Record Type			
Name	NR_CellConfigInfo_Type		
Comment	common information for initial cell configuration or reconfiguration; in case of reconfiguration omit means 'keep configuration as it is'		
StaticResource Config	<a href="#">NR_SS_StaticCellResource Config_Type</a>	opt	mandatory for the initial configuration; to be omitted afterwards
CellConfigCommon	<a href="#">NR_CellConfigCommon_Type</a>	opt	common configuration parameters which are not specific to physical layer (or any other layer)
PhysicalLayer	<a href="#">NR_CellConfigPhysicalLayer_Type</a>	opt	Physical layer configuration: physical channels, signals and BWPs for UL and DL; DCI
BcchConfig	<a href="#">NR_BcchConfig_Type</a>	opt	configuration of BCCH/BCH; SS is triggered to configure RLC/MAC accordingly; BCCH data on the PDSCH is distinguished by the SI-RNTI PBCH: MIB; PDSCH: scheduling and resource allocation; SIBs
PcchConfig	<a href="#">NR_PcchConfig_Type</a>	opt	configuration of PCCH/PCH; SS is triggered to configure RLC/MAC accordingly; PCCH data on the PDSCH is distinguished by the P-RNTI (needed even to modify SI => shall be configured for CELL_BROADCASTING)
RachProcedure Config	<a href="#">NR_RachProcedureConfig_Type</a>	opt	to configure the SS's behaviour for the RACH procedure; may be omitted at initial configuration e.g. in case that the cell shall not have an uplink; NOTE: there is no way to explicitly remove the RACH procedure configuration after it has been configured for a cell
CcchDcchDtch Config	<a href="#">NR_CcchDcchDtchConfig_Type</a>	opt	Parameters related to CCCH/DCCH/DTCH in UL and DL
ServingCellConfig	<a href="#">NR_ServingCellConfig_Type</a>	opt	To be configured at initial configuration of a cell: for non-CA scenarios it shall be either 'SpCell' or 'None' ('None' applies for pure neighbouring cells)

## NR\_SS\_StaticCellResourceConfig\_Type

TTCN-3 Record Type			
Name	NR_SS_StaticCellResourceConfig_Type		
Comment	capabilities of a cell according to the initial condition of a test case, to allow resource management at SS implementation; !!!! NR-PROSE: NR-equivalent of 36.508 clauses 6.3.3 and 6.3.4 to be added to 38.508 !!!!		
CellCapability	<a href="#">NR_CellCapability_Type</a>		common cell capability
CarrierAggregation	<a href="#">NR_CellInitialCAConfig_Type</a>		Initial configuration of a cell in context of carrier aggregation

## NR\_CellCapability\_Type

TTCN-3 Enumerated Type	
Name	NR_CellCapability_Type
Comment	capabilities of a cell acc. to the initial condition of a test case !!!! NR-TBD: reference to 38.508 !!!!
broadcastOnlyCell	no detection of RACH preambles required; cell is only broadcasting
minimumUplinkCell	detection of RACH preambles required but not any further RX capability
fullCell	full TX and RX capabilities

## NR\_CellInitialCAConfig\_Type

TTCN-3 Enumerated Type	
Name	NR_CellInitialCAConfig_Type
Comment	static information about the cell's initial role for carrier aggregation, not being changed during a test case; may be used for resource management at the SS; !!!! NR-TBD: reference to 38.508 !!!!
SpCell	Cell can be used as SpCell during a test case (primary cell of a master or secondary cell group; TS 37.340 clause 3.1); normal case i.e. applicable even when SpCell is the only cell of the cell group
Scell_Active	Carrier Aggregation: Cell is added as SCell to a cell group and may get activated during a test case
Scell_Inactive	Carrier Aggregation: Cell is added as SCell to a cell group but will never get activated during the test case
None	e.g. when a cell is not used for connected mode during a test case (pure neighbouring cell)

## NR\_CellConfigCommon\_Type

TTCN-3 Record Type			
Name	NR_CellConfigCommon_Type		
Comment	common configuration parameters which are not specific to physical layer (or any other layer)		
C_RNTI	<a href="#">RNTI_Value_Type</a>	opt	(pre-)configured C-RNTI used by physical layer and by MAC layer; affects scrambling of PDSCH/PUSCH and CRC of PDCCH(s); shall be used implicitly in RACH procedure (i.e. as CE in RAR)
CellTimingInfo	<a href="#">CellTimingInfo_Type</a>	opt	
InitialCellPower	<a href="#">NR_InitialCellPower_Type</a>	opt	reference cell power for the RS of each antenna in DL NOTE 1: the power of the RS of an antenna may be reduced by antenna specific configuration NOTE 2: in general the power may be adjusted on a per resource element basis => all physical channel/signal power settings shall be adjusted relatively to the RS; if there are more than one TX antennas each one may have its own attenuation; independently from those relative power settings the cell power can easily be adjusted by just changing the reference power

## NR\_Attenuation\_Type

TTCN-3 Union Type		
Name	NR_Attenuation_Type	
Comment	attenuation of the reference power	
Value	integer (0..149)	cell power reference power reduced by the given attenuation (value is in dB); corresponds to AbsoluteCellPower_Type
Off	<a href="#">Null_Type</a>	!!!! NR-FFS: to be checked for NR; reference to 38.508 to be added !!!!

## NR\_InitialCellPower\_Type

TTCN-3 Record Type			
Name	NR_InitialCellPower_Type		
Comment			
MaxReferencePower	<a href="#">NR_AbsoluteCellPower_Type</a>		maximum value of cell reference power (RS EPRE in dBm/15kHz as per TS 36.508, clause 4.3.4.1); !!!! NR-FFS: to be checked for NR; reference to 38.508 to be added !!!! a cell is initialised with this reference power; its value is the upper bound of the cell power during the test case
Attenuation	<a href="#">NR_InitialAttenuation_Type</a>		initial attenuation

## D.1.3.2 PhysicalLayer

## NR\_CellConfigPhysicalLayer\_Type

TTCN-3 Record Type			
Name	NR_CellConfigPhysicalLayer_Type		
Comment	Common configuration of physical channels, signals and BWPs		
Common	<a href="#">NR_CellConfigPhysicalLayerCommon_Type</a>	opt	Configuration common for UL and DL
Downlink	<a href="#">NR_CellConfigPhysicalLayerDownlink_Type</a>	opt	DL configuration
Uplink	<a href="#">NR_CellConfigPhysicalLayerUplink_Type</a>	opt	UL configuration; may be omitted at initial configuration e.g. in case that the cell shall not have an uplink; NOTE: there is no way to explicitly remove the uplink configuration after it has been configured for a cell

## D.1.3.2.1 PhysicalLayer\_Common

## NR\_CellConfigPhysicalLayerCommon\_Type

TTCN-3 Record Type			
Name	NR_CellConfigPhysicalLayerCommon_Type		
Comment	Configuration common for UL and DL		
PhysicalCellId	PhysCellId	opt	Physical-layer cell identity according to 38.211 clause 7.4.2.1; EN-DC: corresponds to ServingCellConfigCommon.physCellId
DuplexMode	<a href="#">NR_DuplexMode_Type</a>	opt	FDD or TDD; FDD/TDD specific parameters !!!! NR-NOTE: called "RAT" in EUTRA but "DuplexMode" seems to be more precise !!!!

## NR\_DuplexMode\_Type

TTCN-3 Union Type			
Name	NR_DuplexMode_Type		
Comment	FDD/TDD and maybe other types of duplex mode; in general FDD/TDD mode is determined from the frequency band		
FDD	<a href="#">NR_FDD_Info_Type</a>		
TDD	<a href="#">NR_TDD_Info_Type</a>		

## NR\_FDD\_Info\_Type

TTCN-3 Record Type	
Name	NR_FDD_Info_Type
Comment	FDD (paired spectrum) specific parameters: no further parameters defined for FDD !!!! NR-NOTE: in contrast to EUTRA an empty record is used (rather than Null_Type) as it can be expanded without type change !!!!

## NR\_TDD\_UL\_DL\_ConfigCommon\_Type

TTCN-3 Record Type			
Name	NR_TDD_UL_DL_ConfigCommon_Type		
Comment	Common TDD UL/DL configuration		
Set1	<a href="#">NR_ASN1_TDD_UL_DL_ConfigCommon_Type</a>		cell-specific TDD UL/DL configuration (L1 parameter tdd-UL-DL-ConfigurationCommon in TS 38.213); corresponds to ServingCellConfigCommon.tdd-UL-DL-ConfigurationCommon1
Set2	<a href="#">NR_ASN1_TDD_UL_DL_ConfigCommon_Type</a>	opt	cell-specific TDD UL/DL configuration (L1 parameter tdd-UL-DL-ConfigurationCommon2 in TS 38.213); corresponds to ServingCellConfigCommon.tdd-UL-DL-ConfigurationCommon2; omit means that there is no set2

## NR\_TDD\_UL\_DL\_SlotConfigList\_Type

TTCN-3 Record of Type	
<b>Name</b>	<b>NR_TDD_UL_DL_SlotConfigList_Type</b>
<b>Comment</b>	corresponds to ServingCellConfig.tdd-UL-DL-ConfigurationDedicated
record of <a href="#">NR ASN1 TDD_UL_DL_SlotConfig_Type</a>	

## NR\_TDD\_Config\_Type

TTCN-3 Record Type			
<b>Name</b>	<b>NR_TDD_Config_Type</b>		
<b>Comment</b>	Common and dedicated TDD configuration		
Common	<a href="#">NR_TDD_UL_DL_ConfigCommon_Type</a>	opt	Common TDD configuration corresponding to L1 parameters tdd-UL-DL-ConfigurationCommon, tdd-UL-DL-ConfigurationCommon2; shall be present for TDD at initial configuration
Dedicated	<a href="#">NR_TDD_UL_DL_SlotConfigList_Type</a>	opt	Dedicated TDD configuration for single slots over-ruling the flexible slots of the common configuration; corresponds to L1 parameter UL-DL-configuration-dedicated; shall be present for TDD at initial configuration: the list is empty when there is no dedicated slot configuration; (omit means "keep as it is"); NOTE: The dedicated configuration can only exist together with common configuration as a single slot configuration is related to the periodicity given by the common configuration (see TDD-UL-DL-SlotConfig field description for slotIndex in TS 38.331)

## NR\_TDD\_Info\_Type

TTCN-3 Union Type		
<b>Name</b>	<b>NR_TDD_Info_Type</b>	
<b>Comment</b>	cell specific parameters for TDD (unpaired spectrum)	
Config	<a href="#">NR_TDD_Config_Type</a>	specific TDD configuration with sets of symbols for UL and DL and possibly flexible symbols which are not specified as UL or DL (corresponding to L1 parameters tdd-UL-DL-ConfigurationCommon, tdd-UL-DL-ConfigurationCommon2, UL-DL-configuration-dedicated according to TS 38.213 clause 11.1)
FullFlexible	<a href="#">Null_Type</a>	No TDD configuration is provided to the UE: all slots and symbols are considered as flexible according to TS 38.213 clause 11.1

## D.1.3.2.2 PhysicalLayer\_Downlink

## PhysicalLayer\_Downlink: Basic Type Definitions

TTCN-3 Basic Types		
<b>NR_EPRES_Ratio_Type</b>	integer	Energy per resource element relative to given reference signal or abstract reference cell power (dBm)

### NR\_CellConfigPhysicalLayerDownlink\_Type

TTCN-3 Record Type			
Name	<b>NR_CellConfigPhysicalLayerDownlink_Type</b>		
Comment	physical layer configuration at the SS for the downlink of a cell !!!! NR-NOTE: there is no AntennaGroup (NR_DownlinkAntennaGroupConfig_Type); specific antenna group configuration may be described in part 3 if needed !!!!		
FrequencyInfoDL	<a href="#">NR_ASN1_FrequencyInfoDL_Type</a>	opt	carries information about location of SSB and reference resource block (point A) in frequency domain and about associated frequency bands (list of FreqBandIndicatorNR)
SSPBchBlock	<a href="#">NR_SSB_Config_Type</a>	opt	Configuration of SS/PBCH-block transmission
PdschCellLevelConfig	<a href="#">NR_PDSCH_CellLevelConfig_Type</a>	opt	Cell-level configuration of PDSCH being applicable independent from the BWP a PDSCH is associated to
BWPs	<a href="#">NR_DownlinkBWPs_Type</a>	opt	Configuration of DL BWPs and their associated physical channels and signals

#### D.1.3.2.2.1 SS\_PBCH\_Block

SS/PBCH block configuration according to TS 38.213 clause 4.1:

SS/PBCH block consists of synchronisation Signals (PSS and SSS) and PBCH (see e.g. TS 38.300 figure 5.2.4-1); a demodulation reference signal (DM-RS) is frequency multiplexed on the PBCH symbols (TS 38.300 clause 5.2.4, TS 38.211 clause 7.4.1.4) and

the DM-RS sequence corresponds to the three LSBs of the SS/PBCH index (TS 38.213 clause 4.1 and TS 38.211 clause 7.4.1.4.1);

the SS/PBCH index needs to be maintained by the SS (as the system frame number);

the physical layer cell id is carried by PSS and SSS according to TS 38.211 clause 7.4.2

#### SS\_PBCH\_Block: Basic Type Definitions

TTCN-3 Basic Types		
NR_SSB_Periodicity_Type	ServingCellConfigCommon.ssb_periodicityServingCell	

#### NR\_SS\_BlockPattern\_Type

TTCN-3 Enumerated Type	
Name	<b>NR_SS_BlockPattern_Type</b>
Comment	TS 38.101-1 Table 5.4.3.3-1 specifies for a given operating band and SS Block subcarrier spacing which case of TS 38.213 clause 4.1 to be applied => first symbol indexes for candidate SS/PBCH blocks and the size of the bitmap are determined accordingly
caseA	15 kHz subcarrier spacing: 4 bits (<= 3GHz) or 8 bits (> 3GHz); first symbol indexes: {2,8} + 14*n
caseB	30 kHz subcarrier spacing: 4 bits (<= 3GHz) or 8 bits (> 3GHz); first symbol indexes: {4,8,16,20} + 28*n
caseC	30 kHz subcarrier spacing: 4 bits (<= 3GHz) or 8 bits (> 3GHz); first symbol indexes: {2,8} + 14*n
caseD	120 kHz subcarrier spacing: 64 bits (> 6GHz); first symbol indexes: {4,8,16,20} + 28*n
caseE	240 kHz subcarrier spacing: 64 bits (> 6GHz); first symbol indexes: {8,12,16,20,32,36,40,44} + 56*n



## NR\_SSB\_PositionsInBurst\_Type

TTCN-3 Record Type			
Name	NR_SSB_PositionsInBurst_Type		
Comment	To describe the the symbols to be used for transmission of SSB		
BlockPattern	<a href="#">NR_SS_BlockPattern_Type</a>		case A..E according to 38.213 clause 4.1
Bitmap	ServingCellConfigCommon.ssb_PositionsInBurst		"SSB-transmitted" parameter as used by the UE to rate-match around SSBs acc. 38.214 cl. 5.1; it is assumed that this can be used to fully describe all possible occurrences of SSBs in time domain in terms of SS configuration; (NOTE: similar information is provided in SIB1.ssb-PositionsInBurst ("SSB-transmitted-SIB1")); 4, 8 or 64 bits

## NR\_SSB\_EPRES\_Type

TTCN-3 Record Type			
Name	NR_SSB_EPRES_Type		
Comment	EPRE for PBCH and related signals		
Pbch	<a href="#">NR_EPRES_Ratio_Type</a>	opt	transmit power for resource elements (REs) being occupied by SS/PBCH block according to TS 38.213 clause 4.1 the UE shall assume that SSS and PBCH DM-RS have same EPRE
Pss	<a href="#">NR_EPRES_Ratio_Type</a>	opt	Primary synchronization signal; 38.211 clause 7.4.2.2
Sss	<a href="#">NR_EPRES_Ratio_Type</a>	opt	Secondary synchronization signal; 38.211 clause 7.4.2.3
Dmrs	<a href="#">NR_EPRES_Ratio_Type</a>	opt	DM-RS associated to PBCH (Demodulation reference signals for PBCH; 38.211 clause 7.4.1.4)

## NR\_SSB\_Config\_Type

TTCN-3 Record Type			
Name	NR_SSB_Config_Type		
Comment	Synchronization signals and PBCH; TS 38.211 clause 7.4.3, TS 38.300 clause 5.2.4; NOTE: SSB location in frequency domain is specified by NR_CellConfigPhysicalLayerDownlink_Type.FrequencyInfoDL.absoluteFrequencySSB		
SubCarrierSpacing	SubcarrierSpacing	opt	sub-carrier spacing for SS/PBCH block (as specified by ServingCellConfigCommon.subcarrierSpacing in case of non-initial access): According to comments for ServingCellConfigCommon.subcarrierSpacing "Only the values 15 or 30 kHz (<6GHz), 120 or 240 kHz (>6GHz) are applicable"; this corresponds to tables 13-1 .. 13.10 in TS 38.213 where only 15 or 30 kHz and 120 or 240 kHz are considered for SS/PBCH block sub-carrier spacing; and it corresponds to 38.211 clause 7.4.3.1 defining SS/PBCH block type A as numerology=0,1 and type B as numerology=3,4 (i.e. there is no numerology=2 for SS/PBCH block) NOTE 1: in contrast to SS/PBCH block sub-carrier spacing the sub-carrier spacing for SIB1, Msg.2/4 for initial access and broadcast SI-messages is restricted to 15kHz or 30kHz for carrier frequency <= 6 GHz and 60kHz or 120kHz for carrier frequency > 6 GHz (see comments for MIB.subCarrierSpacingCommon and TS 38.213 tables 13-1 .. 13.10) NOTE 2: As long as there is no sub-carrier spacing of 60kHz (numerology=2) for the SS/PBCH block acc. to TS 38.211 Table 4.2-1 there is no extended cyclic prefix either (even though Table 4.2-1 is mainly for BWP there is no indication for any extended cyclic prefix for SS/PBCH block) => there is no need to specify the cyclic prefix for SS/PBCH block configuration (normal cyclic prefix is assumed for all cases)
SubcarrierOffset	integer	opt	k_SSB as defined in TS 38.211 clause 7.4.3.1; needs to be consistent with absoluteFrequencySSB and absoluteFrequencyPointA as provided by FrequencyInfoDL to the UE and the SS
Periodicity	<a href="#">NR_SSB_Periodicity_Type</a>	opt	in multiples of half frames (5ms)
PositionsInBurst	<a href="#">NR_SSB_PositionsInBurst_Type</a>	opt	to specify a bitmap for the SS/PBCH block candidates which are eventually used for transmission of SS/PBCH blocks in a half frame; the number of bits depends on the numerology of the SS/PBCH block and the carrier frequency; (38.213 clause 4.1)
RelativeTxPower	<a href="#">NR_SSB_EPRES_Type</a>	opt	transmit power for PBCH and SS/PBCH signals NOTE: Parameter SS-PBCHBlockPower is provided to the UE in SIB1.ss-PBCH-BlockPower, ServingCellConfigCommon.ss-PBCH-BlockPower) as referenceSignalPower; The UE uses referenceSignalPower to determine the transmission power of the PRACH (TS 38.213 clause 7.4) => For signalling tests there seems to be no need to provide this parameter to the SS (nevertheless the value provided to the UE shall not conflict with the power settings for the SSB at the SS)

## D.1.3.2.2.2 Cell\_Level\_Configuration\_PDSCH

## Cell\_Level\_Configuration\_PDSCH: Basic Type Definitions

TTCN-3 Basic Types		
NR_PDSCH_DMRS_TypeA_Position_Type	MIB.dmrs_TypeA_Position	same as ServingCellConfigCommon.dmrs_TypeA_Position

## NR\_PDSCH\_CellLevelConfig\_Type

TTCN-3 Record Type			
<b>Name</b>	<b>NR_PDSCH_CellLevelConfig_Type</b>		
<b>Comment</b>	cell-level parameters for PDSCH: in contrast to BWP specific parameters the cell-level parameters apply to any PDSCH independent from the BWP a PDSCH is associated to		
DMRS_TypeA_Position	<a href="#">NR_PDSCH_DMRS_TypeA_Position_Type</a>	opt	The UE gets provided L1 parameter "dmrs-TypeA-Position" by MIB.dmrs-TypeA-Position or ServingCellConfigCommon.dmrs-TypeA-Position; DL-DMRS-typeA-pos defines position of the first DM-RS symbol in the sequence of DM-RS symbols according to TS 38.211 clause 7.4.1.1.
RateMatchPattern	<a href="#">NR_CellLevelRateMatchPattern_Type</a>	opt	rate match pattern according to TS 38.214 clause 5.1.4
ServingCellConfig	<a href="#">NR_ASN1_PDSCH_ServingCellConfig_Type</a>	opt	PDSCH related parameters not being BWP-specific; corresponds to ServingCellConfig.pdsch-ServingCellConfig

## NR\_RateMatchPatternList\_Type

TTCN-3 Record of Type	
<b>Name</b>	<b>NR_RateMatchPatternList_Type</b>
<b>Comment</b>	
record of <a href="#">NR_ASN1_RateMatchPattern_Type</a>	

## NR\_RateMatchPatternLteCrsList\_Type

TTCN-3 Record of Type	
<b>Name</b>	<b>NR_RateMatchPatternLteCrsList_Type</b>
<b>Comment</b>	
record of <a href="#">NR_ASN1_RateMatchPatternLTE_CRS_Type</a>	

## NR\_CellLevelRateMatchPattern\_Type

TTCN-3 Record Type			
<b>Name</b>	<b>NR_CellLevelRateMatchPattern_Type</b>		
<b>Comment</b>	configuration of rate match pattern on cell level (see TS 38.214 clause 5.1.4)		
PatternList	<a href="#">NR_RateMatchPatternList_Type</a>	opt	up to 4 cell-level RateMatchPattern according to TS 38.214 clause 5.1.4 (L1 RateMatchPattern); corresponds to ServingCellConfigCommon.rateMatchPatternToAddModList/rateMatchPatternToReleaseList; empty list per default (i.e. at initial configuration)
PatternListLteCrs	<a href="#">NR_RateMatchPatternLteCrsList_Type</a>	opt	0 or 1 LTE CRS pattern to rate match around (see TS 38.214 clause 5.1.4.2) corresponds to ServingCellConfigCommon.lte-CRS-ToMatchAround; empty list per default (i.e. at initial configuration)

## D.1.3.2.2.3 Downlink\_BWP

## NR\_DownlinkBWP\_Type

TTCN-3 Record Type			
Name	NR_DownlinkBWP_Type		
Comment	Configuration of single BWP at the SS		
Id	BWP_Id	opt	Initial BWP: 0 Dedicated BWP: 1..4
BWP	<a href="#">NR ASN1 BWP Type</a>	opt	Frequency domain location and bandwidth, subcarrier spacing, cyclic prefix
Pdcch	<a href="#">NR BWP PDCCH Configuration Type</a>	opt	
Pdsch	<a href="#">NR BWP PDSCH Configuration Type</a>	opt	
Sps	<a href="#">NR ASN1 SPS Config Type</a>	opt	BWP-DownlinkDedicated.SPS-Config
CSI_RS_Config	<a href="#">NR CSI_RS Config Type</a>	opt	Configuration of CSI Reference Signals

## NR\_DownlinkBWP\_List\_Type

TTCN-3 Record of Type	
Name	NR_DownlinkBWP_List_Type
Comment	configuration of BWPs: each entry shall have a distinct Id with ID=0 for the initial BWP; NOTE 1: In case of the initial BWP the BWP parameters (frequency location and bandwidth) correspond to the RMSI CORESET as given by MIB.pdcch-ConfigSIB1 (L1 parameter 'RMSI-PDCCH-Config'; TS 38.213 tables 13.x). NOTE 2: Even though in general the BWP-Id corresponds to the index of the element within the array of BWPs, the SS shall not take this as assumption
record of <a href="#">NR_DownlinkBWP_Type</a>	

## NR\_DownlinkBWPs\_Type

TTCN-3 Record Type			
Name	NR_DownlinkBWPs_Type		
Comment	configuration of downlink BWPs		
ActiveBWP	BWP_Id	opt	Id of the currently active BWP (this does not need to be the same as the index) According to TS 38.211 clause 4.4.5: "A UE can be configured with up to four carrier bandwidth parts in the downlink with a single downlink carrier bandwidth part being active at a given time. The UE is not expected to receive PDSCH, PDCCH, CSI-RS, or TRS outside an active bandwidth part."
BwpArray	<a href="#">NR_DownlinkBWP_List Type</a>	opt	array of band width parts: initial BWP + up to 4 dedicated BWPs

## D.1.3.2.2.3.1 PDSCH\_Configuration

Configuration of PDSCH and its related reference signals:

- DM-RS (Demodulation reference signal); TS 38.211 clause 7.4.1.1
- PT-RS (Phase-tracking reference signals for PDSCH); TS 38.211 clause 7.4.1.2

**NR\_BWP\_PDSCH\_Configuration\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_BWP_PDSCH_Configuration_Type</b>		
<b>Comment</b>	PDSCH configuration at the SS for specific BWP		
ConfigCommon	<a href="#">NR_ASN1_PDSCH_Config_Common_Type</a>	opt	
ConfigDedicated	<a href="#">NR_ASN1_PDSCH_Config_Type</a>	opt	
RelativeTxPower	<a href="#">NR_PDSCH_EPRES_Type</a>	opt	

**NR\_PDSCH\_EPRES\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_PDSCH_EPRES_Type</b>		
<b>Comment</b>	EPRE for PDSCH and related signals		
PdschToCell	<a href="#">NR_EPRE_Ratio_Type</a>	opt	transmit power relative to given cell power for resource elements (REs) being occupied by PDSCH
PdschToDmrs	<a href="#">NR_EPRE_Ratio_Type</a>	opt	DM-RS associated to PDSCH: relative transmit power according to TS 38.214 clause 4.1
PdschToPtrs	<a href="#">NR_EPRE_Ratio_Type</a>	opt	PT-RS associated to PDSCH: relative transmit power according to TS 38.214 clause 4.1 NOTE: PT-RS need only to be considered when being present (TS 38.211 clause 7.4.1.2.2 according to TS 38.214 clause 4.1), i.e. the SS shall ignore the PT-RS's EPRE if no PT-RS is present

## D.1.3.2.2.3.2 PDCCH\_Configuration

Configuration of PDSCH and its related reference signals:

- DM-RS (Demodulation reference signal); TS 38.211 clause 7.4.1.3

**NR\_BWP\_PDCCH\_Configuration\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_BWP_PDCCH_Configuration_Type</b>		
<b>Comment</b>	PDCCH configuration at the SS for specific BWP; NOTE: There are no fields for PDCCH-Config's "downlinkPreemption", "slotFormatIndicator", "tpc-PUSCH" and "tpc-PUCCH": This information is related to triggering DCI formats 2_X an shall be configured there (NR_DCI_Trigger_Type) according to test case requirements		
SearchSpaceArray	<a href="#">NR_BWP_SearchSpaceList_Type</a>	opt	
CoresetArray	<a href="#">NR_BWP_CoresetList_Type</a>	opt	
RelativeTxPower	<a href="#">NR_PDCCH_EPRES_Type</a>	opt	

**NR\_BWP\_CoresetList\_Type**

TTCN-3 Record of Type	
<b>Name</b>	<b>NR_BWP_CoresetList_Type</b>
<b>Comment</b>	list of CORESETs defined for a single BWP; according to TS 38.213 clause 10.1 "The control resource set configured for Type0-PDCCH common search space has control resource set index 0" NOTE: even though in general (array) index and controlResourceSetId are the same it is not clear what is meant by TS 38.213
record of <a href="#">NR_ASN1_ControlResourceSet_Type</a>	

### NR\_BWP\_SearchSpaceList\_Type

TTCN-3 Record of Type	
<b>Name</b>	<b>NR_BWP_SearchSpaceList_Type</b>
<b>Comment</b>	list of search spaces defined for a single BWP; according to TS 38.213 clause 10.1 "The Type0-PDCCH common search space has search space index 0" NOTE: even though in general (array) index and searchSpaceId are the same it is not clear what is meant by TS 38.213
record of <a href="#">NR_BWP_SearchSpaceConfig_Type</a>	

### NR\_PDCCH\_EPRES\_Type

TTCN-3 Record Type			
<b>Name</b>	<b>NR_PDCCH_EPRES_Type</b>		
<b>Comment</b>	EPRE for PDCCH and related signals		
PdchToCell	<a href="#">NR EPRE Ratio_Type</a>	opt	transmit power relative to given cell power for resource elements (REs) being occupied by PDCCH
PdchToDmrs	<a href="#">NR EPRE Ratio_Type</a>	opt	DM-RS associated to PDCCH; further DMRS parameters are given by ASN.1 PDCCH-Config as signalled to the UE or by additional parameters of the initial BWP configuration

D.1.3.2.2.3.2.1 Search\_Space\_Configuration

**Search\_Space\_Configuration: Basic Type Definitions**

TTCN-3 Basic Types		
<p><b>NR_SearchSpaceCandidatePriority_Type</b></p>	<p><a href="#">UInt_Type</a></p>	<p>Priorities to be considered by the SS in order to choose the candidate of a search space not colliding with the candidate of some other search space;                      a value of 0 represents the highest priority, a value of 1 the second highest priority and so on.</p> <p>The SS shall consider search space priorities to find appropriate candidates for scheduling of DCIs in case of</p> <p>a) Overlapping search spaces:                      Depending on system configuration and slot number candidates of the different search spaces may be located in same (or overlapping) CCEs.                      Example: system information is automatically scheduled by the SS and UE specific data transmission requires scheduling of PDCCH for the same slot and symbols                      =&gt; candidates of the UE specific search space may collide with actual PDCCH of the common search space (system information).</p> <p>b) Within a search space if different search space types are mapped to the same search space configuration</p> <p>Rules to select appropriate search space candidates:</p> <p>1. For each search space the SS selects the candidate with index <math>m(\text{search space}, L) = 0</math> With</p> <ul style="list-style-type: none"> <li>- candidate index <math>m(\text{search space}, L) := 0 .. M(\text{search space}, L) - 1</math>;</li> <li>- <math>M(\text{search space}, L)</math>: number of PDCCH candidates per CCE aggregation level for the given search space</li> <li>- L: CCE aggregation level (see TS 38.213 clause 10.1)</li> </ul> <p>2. If there is an overlapping of the selected candidates, the SS</p> <ul style="list-style-type: none"> <li>- keeps the candidate of the search space with higher priority</li> <li>- increments m for the search space with lower priority;</li> </ul> <p>this is done until there is no overlapping anymore.</p> <p>In the following cases the SS shall raise an error:</p> <p>A) Collision of PDCCH candidates of search spaces with the same priority                      B) When an DL transmission or a single UL grant is scheduled with specific TimingInfo and after applying the above rules there is no search space candidate left anymore</p> <p>NOTE: For TimingInfo 'Now' there is no error as the transmission can be shifted to the next PDCCH occasion.</p> <p>In case of continuous UL grant configuration the SS shall not raise an error when a grant cannot be scheduled at a specific point in time but skip it (periodicity=1) or shift it to the next occasion (periodicity&gt;1).</p>



### NR\_SearchSpaceType\_Type

TTCN-3 Enumerated Type	
Name	NR_SearchSpaceType_Type
Comment	types of search spaces according to TS 38.213 clause 10.1; NOTE 1: In principle there could be more than one instance for the same kind of search space; if this is ever needed, this enumerated shall be enhanced by introduction of a second entry for a particular type. NOTE 2: For the USS UL and DL are distinguished as they may need different priority in terms of scheduling of DCIs
cssType0	Type0-PDCCH common search space for scheduling of SIB1 (SI-RNTI); the SS shall scramble the DCI format's CRC with SI-RNTI; aggregation level and number of candidates correspond to TS 38.213 Table 10.1-1; For stand-alone options parameters of search space and associated CORESET need to be according to L1 parameter 'RMSI-PDCCH-Config' (corresponding to MIB.pdcch-ConfigSIB1) and TS 38.213 clause 13
cssType0A	Type0A-PDCCH common search space for scheduling of other system information (SI-RNTI); the SS shall scramble the DCI format's CRC with SI-RNTI
cssType1	Type1-PDCCH common search space for scheduling of Msg2/4 of RACH procedure (RA-RNTI, TC-RNTI, C-RNTI); the SS shall scramble the DCI format's CRC with - RA-RNTI for Msg2 of the RACH procedure - TC-RNTI (temporary C-RNTI) as configured for Msg4 of the RACH procedure (NR_TempC_RNTI_Type in NR_RAR_Payload_Type) - C-RNTI as stored for the cell (NR_ActiveCellConfig_Type) in all other cases
cssType2	Type2-PDCCH common search space for scheduling of Paging messages (P-RNTI); the SS shall scramble the DCI format's CRC with P-RNTI
cssType3	Type3-PDCCH common search space for other purpose DCIs (INT-RNTI, SFI-RNTI, TPC-PUSCH-RNTI, TPC-PUCCH-RNTI, TPC-SRS-RNTI, C-RNTI, CS-RNTI(s)); the SS shall scramble the DCI format's CRC with the RNTI-value as according to the ASP triggering the DCI to be sent
ussDL	UE-specific search space (C-RNTI, CS-RNTI(s)); the SS shall scramble the DCI format's CRC with the C-RNTI value as stored for the cell (NR_CellConfigCommon_Type)
ussUL	UE-specific search space: as USS_DL but in general with lower priority to give DL assignments precedence over periodic UL grants

### NR\_SearchSpaceTypeAndPriority\_Type

TTCN-3 Record Type	
Name	NR_SearchSpaceTypeAndPriority_Type
Comment	
Type	<a href="#">NR_SearchSpaceType_Type</a>
CandidatePriority	<a href="#">NR_SearchSpaceCandidatePriority_Type</a> priority to be considered when candidates of a different or the same search space overlap the same CCEs

### NR\_SearchSpaceTypeAndPriorityList\_Type

TTCN-3 Record of Type	
Name	NR_SearchSpaceTypeAndPriorityList_Type
Comment	
	record of <a href="#">NR_SearchSpaceTypeAndPriority_Type</a>

**NR\_PDCCH\_CCE\_AggregationLevel\_Type**

TTCN-3 Enumerated Type	
<b>Name</b>	<b>NR_PDCCH_CCE_AggregationLevel_Type</b>
<b>Comment</b>	Aggregation level for a search space
AggregationLevel1	
AggregationLevel2	
AggregationLevel4	
AggregationLevel8	
AggregationLevel16	

**NR\_BWP\_SearchSpaceConfig\_Type**

TTCN-3 Record Type		
<b>Name</b>	<b>NR_BWP_SearchSpaceConfig_Type</b>	
<b>Comment</b>	configuration of a single search space at the SS: The position of a particular search space candidate in frequency and time domain depends on configuration of the search space and its associated CORESET (see TS 38.213 clause 10.1): - Common or UE-specific search space - aggregation level L - number of candidates per aggregation level - PDCCH monitoring periodicity and offset - frequency domain resources - number of symbols (time domain) in addition in case of UE-specific search space: - C-RNTI (as configured for the active cell) - carrier indicator field value (in case of cross carrier scheduling)  all fields are mandatory as modification of a single field may cause inconsistencies	
TypeAndPriorityList	<a href="#">NR_SearchSpaceTypeAndPriorityList_Type</a>	list of search space types (according to TS 38.213 clause 10.1) to be mapped to the given search space configuration. NOTE 1: In general the lists of search space types for different search spaces shall be mutual exclusive; NOTE 2: TS 38.213 clause 10.1 could be read as if the different types of search spaces use distinct instances of search spaces; nevertheless RRC type definitions allow use of different types in one and the same search space
AggregationLevel	<a href="#">NR_PDCCH_CCE_AggregationLevel_Type</a>	aggregation level to be applied for an actual PDCCH of the given search space
SearchSpaceConfigAtUE	<a href="#">NR_ASN1_SearchSpace_Type</a>	search space configuration as sent to the UE; contains searchSpaceId and controlResourceSetId referring to the associated CORESET; furthermore the SS may need e.g. the number of candidates to detect error situations in context of candidate selection

D.1.3.2.2.3.2.2 Search\_Space\_DCI\_Assignment

**NR\_BWP\_Id\_List\_Type**

TTCN-3 Record of Type	
<b>Name</b>	<b>NR_BWP_Id_List_Type</b>
<b>Comment</b>	
record of BWP_Id	

## NR\_AssignedBWPs\_Type

TTCN-3 Record Type			
Name	NR_AssignedBWPs_Type		
Comment	definition of a set of BWPs being assigned e.g. to system information scheduling or RACH procedures NOTE 1: there is no error when e.g. "ActiveBWP" is set and the currently active BWP is contained in DedicatedBWPs too NOTE 2: it is up to use of this type in TTCN to ensure that a specific BWP assignment makes sense, in most cases multiple BWPs may not be applicable		
ActiveBWP	<a href="#">Null_Type</a>	opt	SS shall assign the currently active BWP
InitialBWP	<a href="#">Null_Type</a>	opt	SS shall assign the initial BWP
DedicatedBWPs	<a href="#">NR_BWP_Id_List_Type</a>		SS shall assign all BWPs as listed (on top of active or initial BWP if set); an empty list indicates that no (additional) BWPs are assigned

## NR\_SearchSpaceDIDciAssignment\_Type

TTCN-3 Record Type			
Name	NR_SearchSpaceDIDciAssignment_Type		
Comment	configuration of DCI for a specific search space; in general the configuration belongs to a transport channel configuration (e.g. BCH, PCH, DL-SCH): the DCI is applied for DL transmission on the respective channel and can be explicitly initiated by TTCN (e.g. PCH, DL-SCH) or automatically by the SS (e.g. BCH or Msg2/Msg4 scheduling of RACH procedure); all fields are mandatory for the first configuration of an instance for modifications "omit" means "keep as it is"		
AssignedBWPs	<a href="#">NR_AssignedBWPs_Type</a>	opt	BWP where given DCI shall be scheduled in given search space; NOTE 1: When there is no BWP according to configuration of AssignedBWPs, there is no DL assignment; this can be used e.g. to prevent automatic scheduling of system information; NOTE 2: In principle a DL assignment can happen simultaneously in more than one BWP e.g. if system information shall be scheduled in active and initial BWP; but as long as there is no use case for simultaneous DL assignments, configuration of AssignedBWPs shall be restricted to a maximum of one BWP
SearchSpaceType	<a href="#">NR_SearchSpaceType_Type</a>	opt	search space to be used for sending of given DCI; when at the scheduled point in time of a DL transmission there is no such search space configured at the given BWP, the SS may raise an error
DciInfo	<a href="#">NR_DciDInfo_Type</a>	opt	DCI to be used

## NR\_SearchSpaceUIDciAssignment\_Type

TTCN-3 Record Type			
Name	NR_SearchSpaceUIDciAssignment_Type		
Comment	configuration of DCI for UL grants in the UL USS; in general the configuration belongs to a transport channel configuration (e.g. UL-SCH); all fields are mandatory for the first configuration of an instance for modifications "omit" means "keep as it is"		
AssignedBWPs	<a href="#">NR_AssignedBWPs_Type</a>	opt	BWP where given DCI shall be scheduled in given search space; AssignedBWPs shall specify exactly one BWP (ActiveBWP in general); the SS may raise an error otherwise
SearchSpaceType	<a href="#">NR_SearchSpaceType_Type</a>	opt	search space to be used for sending of given DCI; when at the scheduled point in time of a UL grant transmission there is no such search space configured at the given BWP, the SS may raise an error
DciInfo	<a href="#">NR_DciUInfo_Type</a>	opt	DCI to be used

D.1.3.2.2.3.3 CSI\_Reference\_Signals

**NR\_CSI\_ResourceConfigList\_Type**

TTCN-3 Record of Type	
Name	NR_CSI_ResourceConfigList_Type
Comment	
record of <a href="#">NR_ASN1_CSI_ResourceConfig_Type</a>	

**NR\_CSI\_RS\_ConfigInfo\_Type**

TTCN-3 Record Type			
Name	NR_CSI_RS_ConfigInfo_Type		
Comment	Channel-state information reference signal (CSI) according to TS 38.211 clause 7.4.1.5; UE procedure for reporting channel state information as according to TS 38.214 clause 5.2		
ResourceConfigList	<a href="#">NR_CSI_ResourceConfigList_Type</a>	opt	list of CSI resource configurations as signalled to the UE; CSI-ResourceConfig contains configuration of either nzp-CSI-RS-ResourceSets or csi-IM-ResourceSets with L1 parameters for the CSI reference signals according to TS 38.211 clause 7.4.1.5 (e.g. ScramblingID, CDM-Type, etc.)
RelativeTxPower	<a href="#">NR_EPRES_Ratio_Type</a>	opt	transmit power for resource elements (REs) being used for CSI-RS

**NR\_CSI\_RS\_Config\_Type**

TTCN-3 Union Type		
Name	NR_CSI_RS_Config_Type	
Comment		
ConfigInfo	<a href="#">NR_CSI_RS_ConfigInfo_Type</a>	configuration of CSI Reference Signals
None	<a href="#">Null_Type</a>	no CSI Reference Signals

D.1.3.2.3 PhysicalLayer\_Uplink

Uplink physical layer configuration: UL channels and BWPs

**NR\_CellConfigPhysicalLayerUplink\_Type**

TTCN-3 Record Type			
Name	NR_CellConfigPhysicalLayerUplink_Type		
Comment	physical layer configuration at the SS for the uplink of a cell		
Uplink	<a href="#">NR_Uplink_Type</a>	opt	
Supplementary Uplink	<a href="#">NR_Uplink_Type</a>	opt	
TimingAdvance	<a href="#">NR_SS_TimingAdvanceConfig_Type</a>	opt	
PUSCH_ServicingCellConfig	<a href="#">NR_ASN1_PUSCH_ServicingCellConfig_Type</a>	opt	

**NR\_Uplink\_Type**

TTCN-3 Union Type		
Name	NR_Uplink_Type	
Comment		
Config	<a href="#">NR_UplinkConfig_Type</a>	
None	<a href="#">Null_Type</a>	in case the uplink or supplementary uplink is not used/needed

**NR\_SS\_TimingAdvanceConfig\_Type**

TTCN-3 Union Type		
Name	<b>NR_SS_TimingAdvanceConfig_Type</b>	
Comment		
InitialValue	<a href="#">NR_RACH_TimingAdvance_Type</a>	initial 12 bit value corresponding to Timing Advance Command field of the Random Access Response (TS 38.321 clause 6.2.3): value of 0..3846 according to TS 38.213 clause 4.2; 0 in normal cases)
Relative	<a href="#">NR_TimingAdvanceIndex_Type</a>	timing advance command to adjust changes of timing advance acc. to TS 38.213 clause 4.2; (range acc. 6 bit value: -31..32)

D.1.3.2.3.1 Uplink\_BWP

**NR\_UplinkBWP\_Type**

TTCN-3 Record Type			
Name	<b>NR_UplinkBWP_Type</b>		
Comment	Configuration of single BWP at the SS; NOTE: for rel-15 this is the same as the ASN.1 type "BWP-Uplink" but nevertheless the TTCN type may be useful for future extensions		
Id	BWP_Id	opt	Initial BWP: 0 Dedicated BWP: 1..4
Common	<a href="#">NR_ASN1_BWP_UplinkCommon_Type</a>	opt	contains common configuration for RACH, PUSCH, PUCCH configuration at the UE: - Initial BWP: -> ServingCellConfigCommon.uplinkConfigCommon.initialUplinkBWP  ServingCellConfigCommon.supplementaryUplinkConfig.initialUplinkBWP -> SIB1.uplinkConfigCommon.initialUplinkBWP  SIB1.supplementaryUplink.uplinkConfigCommon.initialUplinkBWP - Dedicated BWP: -> ServingCellConfig.uplinkConfig.uplinkBWP-ToAddModList[-].bwp-Common ServingCellConfig.supplementaryUplink.uplinkBWP-ToAddModList[-].bwp-Common
Dedicated	<a href="#">NR_ASN1_BWP_UplinkDedicated_Type</a>	opt	contains dedicated configuration for PUCCH, PUCCH, ConfiguredGrant, SRS, BeamFailureRecovery configuration at the UE: - Initial BWP: -> ServingCellConfig.uplinkConfig.initialUplinkBWP ServingCellConfig.supplementaryUplink.initialUplinkBWP - Dedicated BWP: -> ServingCellConfig.uplinkConfig.uplinkBWP-ToAddModList[-].bwp-Dedicated ServingCellConfig.supplementaryUplink.uplinkBWP-ToAddModList[-].bwp-Dedicated

**NR\_UplinkBWP\_List\_Type**

TTCN-3 Record of Type	
Name	<b>NR_UplinkBWP_List_Type</b>
Comment	configuration of BWPs: each entry shall have a distinct Id with ID=0 for the initial BWP NOTE: Even though in general the BWP-Id corresponds to the index of the element within the array of BWPs, the SS shall not take this as assumption
record of <a href="#">NR_UplinkBWP_Type</a>	

**NR\_ActiveUplinkBWP\_Id\_Type**

TTCN-3 Union Type		
Name	<b>NR_ActiveUplinkBWP_Id_Type</b>	
Comment		
Explicit	BWP_Id	in case that BWP-Id of active UL-BWP (and/or active UL-BWP of supplementary UL) is different than BWP-Id of active DL-BWP
SameIdAsDL	<a href="#">Null_Type</a>	same BWP-Id as of the active DL-BWP

**NR\_UplinkBWPs\_Type**

TTCN-3 Record Type			
Name	<b>NR_UplinkBWPs_Type</b>		
Comment	configuration of uplink BWPs		
ActiveBWP	<a href="#">NR_ActiveUplinkBWP_Id_Type</a>	opt	Id of the currently active BWP (this does not need to be the same as the index)
BwpArray	<a href="#">NR_UplinkBWP_List_Type</a>	opt	array of band width parts: initial BWP + up to 4 dedicated BWPs

**NR\_UplinkConfig\_Type**

TTCN-3 Record Type			
Name	<b>NR_UplinkConfig_Type</b>		
Comment	configuration of a single uplink (uplink or supplementary uplink)		
FrequencyInfo UL	<a href="#">NR_ASN1_FrequencyInfoUL_Type</a>	opt	carries information about location of reference resource block (point A) in frequency domain and about associated frequency bands (list of FreqBandIndicatorNR) !!!! NR-NOTE: there is no configuration parameters anymore as for EUTRA's UplinkStaticCellInfo_Type.Earfcn and UplinkStaticCellInfo_Type.Bandwidth !!!!
BWPs	<a href="#">NR_UplinkBWPs_Type</a>	opt	
RACH_ConfigDedicated	<a href="#">NR_ASN1_RACH_ConfigDedicated_Type</a>	opt	configuration at the UE: -> SpCellConfig.reconfigurationWithSync.rach-ConfigDedicated.uplink/supplementaryUplink

**D.1.3.2.4 DCI\_Configuration**

Definitions for resource assignment and DCI according to TS 38.212 clause 7.3 and TS 38.214 clause 5.1.2 and 6.1.2

**D.1.3.2.4.1 Common\_Fields**

Common type definitions for DCI fields being used for UL and DL assignments (format 0\_X and 1\_X);  
NOTE: in general fields of DCIs are defined as union in the first place to allow backward compatible enhancements, e.g. when a dynamic SS behaviour needs to replace the static value assignment

**NR\_DciCommon\_CarrierIndicator\_Type**

TTCN-3 Union Type		
Name	<b>NR_DciCommon_CarrierIndicator_Type</b>	
Comment	Carrier indicator field (CIF) of DCI formats 0_1 and 1_1 according to TS 38.212 and TS 38.213 clause 10.1	
None	<a href="#">Null_Type</a>	no cell index to be indicated in Carrier indicator field
CellIndex	<a href="#">B3_Type</a>	3 bits cell index to be indicated in Carrier indicator field; applicable when the UE is configured with higher layer parameter CrossCarrierSchedulingConfig

## NR\_DciCommon\_BWPIndicator\_Type

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DciCommon_BWPIndicator_Type</b>	
<b>Comment</b>	Bandwidth part indicator according to TS 38.212 Table 7.3.1.1.2-1; used to address RRC-configured BandwidthPart-Config; NOTE: in general the BWP configuration at the SS is static i.e. dedicated BWPs may be preconfigured in a test case preamble => a) BWP configuration at the SS is not always the same as at the UE and SS cannot determine the number of BWPs being configured at the UE from its BWP configuration. b) The number and order of BWPs may differ at SS and UE. c) The index used in the DCI's BWP indicator is not identical with the BWP-Id as the BWP indicator is the index in the UE's BWP array => in general the SS cannot determine the size and value of the DCI's BWP indicator but this need to be done in TTCN	
Index	bitstring	0, 1 or 2 bits

## NR\_DciCommon\_TpcCommand\_Type

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DciCommon_TpcCommand_Type</b>	
<b>Comment</b>	TPC Command Field according to TS 38.213 Table 7.1.1-1 and Table 7.2.1-1	
Value	<a href="#">B2_Type</a>	2 bits; default value: '01'B (0 dB; accumulated TPC)

## NR\_DciCommon\_UL\_SUL\_Indicator\_Type

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DciCommon_UL_SUL_Indicator_Type</b>	
<b>Comment</b>	TS 38.212 clause 7.3.1.1.1/2: UL/SUL indicator	
None	<a href="#">Null_Type</a>	to be used when no SUL is configured
Value	<a href="#">B1_Type</a>	UL/SUL indicator according to TS 38.212 Table 7.3.1.1.1-1

## NR\_DciCommon\_VrbPrbMapping\_Type

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DciCommon_VrbPrbMapping_Type</b>	
<b>Comment</b>	to specify how VRB-to-PRB mapping shall be controlled by DCI if applicable (see TS 38.212 Table 7.3.1.1.2-33 and where it is referred	
None	<a href="#">Null_Type</a>	0 bit, applicable for format_1_0 when only resource allocation type 0 is configured
Index	<a href="#">B1_Type</a>	1 bit, index in TS 38.212 Table 7.3.1.1.2-33 indicating non-interleaved or interleaved VRB-to-PRB mapping according to TS 38.211 clause 6.3.1.7

## NR\_DciCommon\_TimeDomainResourceAssignment\_Type

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DciCommon_TimeDomainResourceAssignment_Type</b>	
<b>Comment</b>	Common type definition for UL/DL Resource allocation in time domain according to TS 38.214 clause 5.1.2.1 and 6.1.2.1	
Index	bitstring	index of entry in SEQUENCE OF PUSCH/PDSCH-TimeDomainResourceAllocation provided e.g. by PUSCH/PDSCH-Config; number of bits in a particular DCI depends on the size of the SEQUENCE OF PUSCH/PDSCH-TimeDomainResourceAllocation (e.g. Time domain resource assignment is an empty bitstring ("B) when only one time-domain configuration is provided to the UE) NOTE: PDSCH/PUSCH-Config overrules list in PDSCH/PUSCH-ConfigCommon

**NR\_DciFormat\_X\_1\_SrsRequest\_Type**

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DciFormat_X_1_SrsRequest_Type</b>	
<b>Comment</b>	TS 38.212 clause 7.3.1.2: SRS request	
SingleUL	<a href="#">B2_Type</a>	2 bits: Index of the SRS resource set to be used according to TS 38.212 Table 7.3.1.1.2-24
UL_SUL	<a href="#">B3_Type</a>	3 bits: Index of the SRS resource set to be used according to TS 38.212 Table 7.3.1.1.2-24 plus first bit to distinguish UL/SUL

**NR\_DciFormat\_X\_1\_DmrsSequenceInit\_Type**

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DciFormat_X_1_DmrsSequenceInit_Type</b>	
<b>Comment</b>	TS 38.212 clause 7.3.1.2 (format 0_1) and clause 7.3.2.2 (format 1_1): DMRS sequence initialization	
None	<a href="#">Null_Type</a>	0 bit for format 0_1 and if PUSCH-tp==Enabled
Value	<a href="#">B1_Type</a>	1 bit else

D.1.3.2.4.2 Resource\_Allocation

Type definitions for resource allocation which do not correspond directly to DCI fields but are used to configure how the SS maintains resource allocation for a given DCI

**Resource\_Allocation: Basic Type Definitions**

TTCN-3 Basic Types		
<b>NR_ImcsValue_Type</b>	integer (0..31)	Modulation and coding scheme index coding
<b>NR_RedundancyVersion_Type</b>	integer (0..3)	Redundancy Version (RV): 2 bits

**NR\_ResourceAllocationType\_Type**

TTCN-3 Enumerated Type	
<b>Name</b>	<b>NR_ResourceAllocationType_Type</b>
<b>Comment</b>	to specify the format of the resource allocation type being used for frequency domain resource assignment in DCI; NOTE 1: For DCI Format 0_0 and 1_0 only resourceAllocationType1 is applicable (TS 38.214 clause 5.1.2.2 and 6.1.2.2) NOTE 2: The SS needs to be determined based on RRC configuration whether MSB of the frequency domain resource assignment needs to be used as discriminator for type 0/1 (see TS 38.212 clause 7.3.1.1.2 and clause 7.3.1.2.2 and PUSCH/PDSCH-Config.resourceAllocation) NOTE 3: The SS shall raise an error if the DCI configuration conflicts with the configuration given by PUSCH/PDSCH-Config.resourceAllocation
resourceAllocationType0	resource allocation type 0 according to TS 38.214 clause 5.1.2.2.1 and 6.1.2.2.1: bitmap indicating the Resource Block Groups (RBGs) that are allocated; not applicable for DCI Format 0_0 and 1_0
resourceAllocationType1	resource allocation type 1 according to TS 38.214 clause 5.1.2.2.2 and 6.1.2.2.2: resource indication value (RIV) corresponding to a starting virtual resource block and a length in terms of contiguously allocated resource blocks



## NR\_ModulationSchemePDSCH\_Type

TTCN-3 Enumerated Type	
<b>Name</b>	<b>NR_ModulationSchemePDSCH_Type</b>
<b>Comment</b>	Supported modulation schemes for PDSCH according to 38.211 Table 7.3.1.2-1
qpsk	
qam16	
qam64	
qam256	

## NR\_FreqDomainSchedulExplicit\_Type

TTCN-3 Record Type		
<b>Name</b>	<b>NR_FreqDomainSchedulExplicit_Type</b>	
<b>Comment</b>	type used for explicit DL scheduling; Nprb is the exact number of RBs whereas in NR_FreqDomainSchedulCommon_Type MaxRbCnt is the upper bound	
FirstRbIndex	integer	index of the first resource block in frequency domain
Nprb	integer	number of resource blocks to be assigned

## NR\_FreqDomainSchedulCommonDL\_Type

TTCN-3 Record Type		
<b>Name</b>	<b>NR_FreqDomainSchedulCommonDL_Type</b>	
<b>Comment</b>	common type to specify restrictions for frequency domain scheduling by a start index and a maximum range of RBs (similar to EUTRA, but for NR in general the frequency domain scheduling is not related to the whole frequency band but to a given band width part (BWP))	
FirstRbIndex	integer	index of the first (virtual) resource block in frequency domain
MaxRbCnt	integer	maximum number of resource-blocks to be used for a transport block; SS shall not assigned more than the given resource blocks; FirstRbIndex + MaxRbCnt shall not exceed the total number of available resource blocks in frequency domain; the SS shall raise an error otherwise

## NR\_FreqDomainResourceAssignmentDL\_Type

TTCN-3 Union Type		
<b>Name</b>	<b>NR_FreqDomainResourceAssignmentDL_Type</b>	
<b>Comment</b>		
Automatic	<a href="#">NR_FreqDomainSchedulCommonDL_Type</a>	The SS shall automatically do the resource assignment needed for a DL transmission based on TBS evaluation guideline given in Annex B.1 of 38.523-3
Explicit	<a href="#">NR_FreqDomainSchedulExplicit_Type</a>	Frequency domain resource assignment is given explicitly by TTCN; the SS needs to calculate the RIV (resource allocation type 1) or generate the bitmap (resource allocation type 0). In case of resource allocation type 0 the allocation shall also be in consecutive RBGs. NOTE: So far there is no requirement for signalling tests to use non-consecutive RBGs ((neither for LTE nor for NR)

## NR\_RedundancyVersionList\_Type

TTCN-3 Record of Type	
<b>Name</b>	<b>NR_RedundancyVersionList_Type</b>
<b>Comment</b>	There shall be as many entries in the list as re-transmissions are allowed; if there are not enough elements specified SS shall raise an error; In 4G at least in UL the array length corresponds to maxHARQ-Tx (i.e. up to 28 re-transmissions according to RRC ASN.1)
	record of <a href="#">NR_RedundancyVersion_Type</a>

## NR\_TransportBlockSchedulingDL\_Automatic\_Type

TTCN-3 Record Type			
Name	NR_TransportBlockSchedulingDL_Automatic_Type		
Comment			
TransportBlock 1	<a href="#">NR_ModulationSchemePD SCH_Type</a>		
TransportBlock 2	<a href="#">NR_ModulationSchemePD SCH_Type</a>	opt	MCS for 2nd transport block (if any); 'omit' means that there is no 2nd transport block; Presence corresponds to PDSCH-Config.maxNrofCodeWordsScheduledByDCI (L1 parameter Number-MCS-HARQ-DL-DCI)
RedundancyVersionList	<a href="#">NR_RedundancyVersionList_Type</a>		list of Redundancy versions to be used for DL transmission and possible retransmissions; in automatic mode the same list of redundancy versions is used for both transport blocks; if there are not enough elements to achieve successful DL transmission, SS shall raise an error

## RetransmissionTiming\_Type

TTCN-3 Union Type		
Name	RetransmissionTiming_Type	
Comment	to specify the timing of potential retransmissions related to the initial transmission. Rules in case of necessary UL or DL retransmissions: - When a transmission is scheduled with TimingInfo=Now, then any retransmission of a previous transmission takes precedence over the new transmission - Re-transmissions take precedence over periodic UL grants - The SS shall raise an error indication when - a retransmission collides with another UL or DL transmission which is scheduled by TTCN with specific TimingInfo for the same slot as the retransmission - a new DL transmission would take over an ongoing DL transmission - the retransmission is not possible at the given time for any other reason (e.g. due to slot format)	
SlotOffset	integer	the kth retransmission shall be $k * \text{SlotOffset}$ slots after the initial transmission: e.g. slots per subframe = N and initial transmission at subframeX and slotX => 1. retransmission at subframeX + (slotX + SlotOffset) / N and (slotX + SlotOffset) mod N 2. retransmission at subframeX + (slotX + 2*SlotOffset) / N and (slotX + 2*SlotOffset) mod N and so on
SubframeOffset	integer	the kth retransmission shall be $k * \text{SubframeOffset}$ subframes after the initial transmission in the same slot of subframe as for the initial transmission: e.g. initial transmission at subframeX and slotX 1. retransmission at subframeX + SubframeOffset and slotX 2. retransmission at subframeX + 2*SubframeOffset and slotX and so on
AnyTime	<a href="#">Null_Type</a>	the SS shall autonomously determine the next possible occasion for the retransmission

## TransmissionTimingOffset\_Type

TTCN-3 Union Type		
Name	TransmissionTimingOffset_Type	
Comment	Timing information for retransmissions	
None	<a href="#">Null_Type</a>	initial transmission: no timing offset but timing info as according to common part of the ASP
Retransmission	<a href="#">RetransmissionTiming_Type</a>	retransmission with timing offset relative to initial transmission

### NR\_TransportBlockSingleTransmission\_Type

TTCN-3 Record Type		
<b>Name</b>	<b>NR_TransportBlockSingleTransmission_Type</b>	
<b>Comment</b>	TS 38.212 clause 7.3.1.2.1 and 7.3.1.2.2: parameters for transmission (or re-transmission) of a single transport block; used for explicit mode of DL transmission and for UL grants	
TimingOffset	<a href="#">TransmissionTimingOffset_Type</a>	in general "None" in case of a new transmissin (i.e. no timing offset) and "Retransmission" for any retransmission
ImcsValue	<a href="#">NR_ImcsValue_Type</a>	Imcs value to be mapped to the Modulation and coding scheme field of DCI format 1_0 or 1_1
RedundancyVersion	<a href="#">NR_RedundancyVersion_Type</a>	Redundancy version for a single transmission or re-transmission
ToggleNDI	boolean	"true" for transmission of a new transport block, "false" for a re-transmission; the NDI (New data indicator) itself is maintained by the SS and therefore not provided as configuration parameter

### NR\_TransportBlockRetransmissionList\_Type

TTCN-3 Record of Type	
<b>Name</b>	<b>NR_TransportBlockRetransmissionList_Type</b>
<b>Comment</b>	list of (initial) transmission and potential retransmissions; used for explicit mode of DL transmission and for UL grants; in general the Imcs is the same for all (re-)transmissions and the NDI is not toggled for the retransmissions
record of <a href="#">NR_TransportBlockSingleTransmission_Type</a>	

### NR\_TransportBlockSchedulingDL\_Explicit\_Type

TTCN-3 Record Type		
<b>Name</b>	<b>NR_TransportBlockSchedulingDL_Explicit_Type</b>	
<b>Comment</b>		
TransportBlock 1	<a href="#">NR_TransportBlockRetransmissionList_Type</a>	list of transmission and retransmissions for transport block 1
TransportBlock 2	<a href="#">NR_TransportBlockRetransmissionList_Type</a>	opt 'omit' means that there is no 2nd transport block; Presence corresponds to PDSCH-Config.maxNrofCodeWordsScheduledByDCI

### NR\_TransportBlockSchedulingDL\_Type

TTCN-3 Union Type	
<b>Name</b>	<b>NR_TransportBlockSchedulingDL_Type</b>
<b>Comment</b>	
Automatic	<a href="#">NR_TransportBlockSchedulingDL_Automatic_Type</a>
Explicit	<a href="#">NR_TransportBlockSchedulingDL_Explicit_Type</a>

### NR\_HarqProcessConfig\_Type

TTCN-3 Union Type		
<b>Name</b>	<b>NR_HarqProcessConfig_Type</b>	
<b>Comment</b>	HARQ processes to be used automatically for UL grants or DL assignments	
None	<a href="#">Null_Type</a>	when there is no HARQ for the given DCI
AnyProcess	<a href="#">Null_Type</a>	The SS may choose any process for scheduling of the UL/DL data transfer
SpecificSubset	<a href="#">NR_HarqProcessList_Type</a>	only the HARQ processes of this list shall be used automatically, other processes are excluded from automatic assignments; nevertheless for DL any HARQ processes may be addressed explicitly by NR_DRB_DataPerSlot_DL_Type.HarqProcess

## D.1.3.2.4.3 PDSCH\_Scheduling

## NR\_DciDlInfo\_Type

TTCN-3 Record Type			
Name	NR_DciDlInfo_Type		
Comment	scheduling for CCCH/DCCH/DTCH mapped to DL-SCH mapped to PDSCH; for all parameters: mandatory for initial configuration of an instance, omit means "keep as it is" afterwards; definition is applicable for DCI format 1_0 (C-RNTI, RA-RNTI, TC-RNTI) and DCI format 1_1 !!!! NR-SA-FFS: DCI format 1_0 with CRC scrambled by SI-RNTI, P-RNTI !!!!		
ResourceAssignment	<a href="#">NR_DciFormat_1_X_ResourceAssignment_Type</a>	opt	resource assignment; to control setting of the following fields in DCI formats 1_0 and 1_1 (TS 38.212 clause 7.3.1.2.1 and 7.3.1.2.2): Frequency domain resource assignment Time domain resource assignment Modulation and coding scheme New data indicator Redundancy version HARQ process number
VrbPrbMapping	<a href="#">NR_DciCommon_VrbPrbMapping_Type</a>	opt	VRB-to-PRB mapping
TpcCommandPucch	<a href="#">NR_DciCommon_TpcCommand_Type</a>	opt	TPC command for scheduled PUCCH; to be set to 1 per default (0 dB; accumulated TPC)
PucchResourceIndicator	<a href="#">NR_DciFormat_1_X_PucchResourceIndicator_Type</a>	opt	PUCCH resource indicator
PdschHarqTimingIndicator	<a href="#">NR_DciFormat_1_X_PdschHarqTimingIndicator_Type</a>	opt	PDSCH-to-HARQ_feedback timing indicator
Format	<a href="#">NR_DciFormat_1_X_SpecificInfo_Type</a>	opt	DCI format and DCI format specific parameters

## NR\_DciFormat\_1\_X\_ResourceAssignment\_Type

TTCN-3 Record Type			
Name	NR_DciFormat_1_X_ResourceAssignment_Type		
Comment	Common definition to be used for resource scheduling in DL		
ResourceAllocationType	<a href="#">NR_ResourceAllocationType_Type</a>	opt	resource allocation type to be used for the frequency domain resource assignment
FreqDomain	<a href="#">NR_FreqDomainResourceAssignmentDL_Type</a>	opt	
TimeDomain	<a href="#">NR_DciCommon_TimeDomainResourceAssignment_Type</a>	opt	
TransportBlockScheduling	<a href="#">NR_TransportBlockSchedulingDL_Type</a>	opt	information about MCS and RV for one or two transport blocks
HarqProcessConfig	<a href="#">NR_HarqProcessConfig_Type</a>	opt	configures which HARQ processes the SS may use; corresponds to "HARQ process number" in TS 38.212 clause 7.3.1.2.1 and 7.3.1.2.2

## NR\_DciFormat\_1\_X\_SpecificInfo\_Type

TTCN-3 Union Type		
Name	NR_DciFormat_1_X_SpecificInfo_Type	
Comment		
Format_1_0	<a href="#">NR_DciFormat_1_0_SpecificInfo_Type</a>	
Format_1_1	<a href="#">NR_DciFormat_1_1_SpecificInfo_Type</a>	

## NR\_DciFormat\_1\_0\_SpecificInfo\_Type

TTCN-3 Record Type			
<b>Name</b>	<b>NR_DciFormat_1_0_SpecificInfo_Type</b>		
<b>Comment</b>	TS 38.212 clause 7.3.2.1: scheduling of PDSCH in one DL cell; default parameters according to TS 38.508-1 clause 4.3.6.1.2.1		
DAI	<a href="#">NR_DciFormat_1_0_DAI_Type</a>	opt	downlink assignment index

## NR\_DciFormat\_1\_1\_SpecificInfo\_Type

TTCN-3 Record Type			
<b>Name</b>	<b>NR_DciFormat_1_1_SpecificInfo_Type</b>		
<b>Comment</b>	TS 38.212 clause 7.3.2.2: scheduling of PDSCH in one cell; default parameters according to TS 38.508-1 clause 4.3.6.1.2.2 For all fields: 'omit' means that the information shall not be contained in the DCI on PDCCH		
CarrierIndicator	<a href="#">NR_DciCommon_CarrierIndicator_Type</a>	opt	Carrier indicator - CIF value for Cross Carrier Scheduling; 'None' otherwise
BWPIndicator	<a href="#">NR_DciCommon_BWPIndicator_Type</a>	opt	Bandwidth part indicator
PrbBundlingSizeIndicator	<a href="#">NR_DciFormat_1_1_PrbbundlingSizeIndicator_Type</a>	opt	PRB bundling size indicator
RateMatchingIndicator	<a href="#">NR_DciFormat_1_1_RateMatchingIndicator_Type</a>	opt	Rate matching indicator
ZP_CSI_RS_Trigger	<a href="#">NR_DciFormat_1_1_ZP_CSI_RS_Trigger_Type</a>	opt	ZP CSI-RS trigger
DAI	<a href="#">NR_DciFormat_1_1_DAI_Type</a>	opt	downlink assignment index
AntennaPorts	<a href="#">NR_DciFormat_1_1_AntennaPorts_Type</a>	opt	Antenna port(s)
TCI	<a href="#">NR_DciFormat_1_1_TCI_Type</a>	opt	Transmission configuration indication
SrsRequest	<a href="#">NR_DciFormat_X_1_SrsRequest_Type</a>	opt	SRS request
CBGTI	<a href="#">NR_DciFormat_1_1_CBGTI_Type</a>	opt	CBG transmission information (CBGTI)
CBGFI	<a href="#">NR_DciFormat_1_1_CBGFI_Type</a>	opt	CBG flushing out information (CBGFI)
DmrsSequenceInit	<a href="#">NR_DciFormat_X_1_DmrsSequenceInit_Type</a>	opt	DMRS sequence initialization

## NR\_DciFormat\_1\_X\_PucchResourceIndicator\_Type

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DciFormat_1_X_PucchResourceIndicator_Type</b>	
<b>Comment</b>	TS 38.212 clause 7.3.2.1/2: PUCCH resource indicator	
Value	<a href="#">B3_Type</a>	3 bits as defined in TS 38.213 clause 9.2.3 or reserved bits; corresponds to L1 parameter PUCCH-ResourceSet (-> index to list of PUCCH-ResourceSet configured by PUCCH-Config)

## NR\_DciFormat\_1\_X\_PdschHarqTimingIndicator\_Type

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DciFormat_1_X_PdschHarqTimingIndicator_Type</b>	
<b>Comment</b>	TS 38.212 clause 7.3.2.1/2: PDSCH-to-HARQ feedback timing indicator (TS 38.213 clause 9.2.3)	
Value	bitstring	Format 1_0: 3 bits, addresses one of {1, 2, 3, 4, 5, 6, 7, 8} according to TS 38.213 clause 9.2.3; Format 1_1: 0..3 bits, addresses entry in table provided by PUCCH-Config.dl-DataToUL-ACK

## NR\_DciFormat\_1\_0\_DAI\_Type

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DciFormat_1_0_DAI_Type</b>	
<b>Comment</b>	TS 38.212 clause 7.3.2.1: DAI (downlink assignment indicator)	
Index	<a href="#">B2_Type</a>	2 bits according to TS 38.213 clause 9.1.3 or reserved bits

## NR\_DciFormat\_1\_1\_PrbBundlingSizeIndicator\_Type

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DciFormat_1_1_PrbBundlingSizeIndicator_Type</b>	
<b>Comment</b>	TS 38.212 clause 7.3.2.2: PRB bundling size indicator	
None	<a href="#">Null_Type</a>	no PRB bundling
Dynamic	<a href="#">B1_Type</a>	L1 parameter prb-BundlingType is set to 'dynamic' (corresponding to PDSCH-Config.prb-BundlingType); indicates which set of PRG values to be used (see 38.214 clause 5.1.2.3)

## NR\_DciFormat\_1\_1\_RateMatchingIndicator\_Type

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DciFormat_1_1_RateMatchingIndicator_Type</b>	
<b>Comment</b>	TS 38.212 clause 7.3.2.2: Rate matching indicator; L1 parameter RateMatchPattern corresponding to list of RateMatchPattern configured by PDSCH-Config	
Index	bitstring	0, 1, or 2 bits: Index in list of RateMatchPattern as configured by PDSCH-Config at the UE

## NR\_DciFormat\_1\_1\_ZP\_CSI\_RS\_Trigger\_Type

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DciFormat_1_1_ZP_CSI_RS_Trigger_Type</b>	
<b>Comment</b>	TS 38.212 clause 7.3.2.2: ZP CSI-RS trigger; L1 parameter ZP-CSI-RS-Resource corresponding to list of ZP-CSI-RS-Resource configured by PDSCH-Config	
Index	bitstring	0, 1, or 2 bits: Index in list of ZP-CSI-RS-Resource as configured by PDSCH-Config at the UE

## NR\_DciFormat\_1\_1\_DAI\_Type

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DciFormat_1_1_DAI_Type</b>	
<b>Comment</b>	TS 38.212 clause 7.3.2.2: DAI (downlink assignment indicator) depending on L1 parameter pdsch-HARQ-ACK-codebook and the number of serving cells (corresponding to PhysicalCellGroupConfig.pdsch-HARQ-ACK-Codebook)	
None	<a href="#">Null_Type</a>	no DAI
SingleServingCell	<a href="#">B2_Type</a>	HARQ-ACK-codebook=dynamic and only one serving cell
MultipleServingCells	<a href="#">B4_Type</a>	HARQ-ACK-codebook=dynamic and more than one serving cell

## NR\_DciFormat\_1\_1\_AntennaPorts\_Type

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DciFormat_1_1_AntennaPorts_Type</b>	
<b>Comment</b>	TS 38.212 clause 7.3.1.2: Antenna ports as defined by Tables TS 38.212 7.3.1.2.2-1..4	
Index	bitstring	bitstring presentation of index to Tables 7.3.1.2.2-1..4

## NR\_DciFormat\_1\_1\_TCI\_Type

TTCN-3 Union Type		
Name	NR_DciFormat_1_1_TCI_Type	
Comment	TS 38.212 clause 7.3.1.2: Transmission configuration indication (TCI)	
None	<a href="#">Null_Type</a>	if L1 parameter TCI-PresentInDCI (corresponding to ControlResourceSet.tci-PresentInDCI) does not indicate 'enabled'
Value	<a href="#">B3_Type</a>	if TCI-PresentInDCI=='enabled': TCI according to TS 38.213 clause 5.1.5/6

## NR\_DciFormat\_1\_1\_CBGTI\_Type

TTCN-3 Union Type		
Name	NR_DciFormat_1_1_CBGTI_Type	
Comment	TS 38.212 clause 7.3.1.2: CBG transmission information (CBGTI)	
Bitmap	bitstring	0, 2, 4, 6, or 8 bits according to PDSCH-CodeBlockGroupTransmission.maxCodeBlockGroupsPerTransportBlock and TS 38.214 clause 5.1.7.2

## NR\_DciFormat\_1\_1\_CBGFI\_Type

TTCN-3 Union Type		
Name	NR_DciFormat_1_1_CBGFI_Type	
Comment	TS 38.212 clause 7.3.1.2: CBG flushing out information (CBGFI)	
None	<a href="#">Null_Type</a>	no CBGFI
Flag	<a href="#">B1_Type</a>	CBGFI flag, if codeBlockGroupTransmission is configured in PDSCH-ServingCellConfig with codeBlockGroupFlushIndicator set to true

## D.1.3.2.4.4 PUSCH\_Scheduling

## NR\_DciUlInfo\_Type

TTCN-3 Record Type			
Name	NR_DciUlInfo_Type		
Comment	scheduling for CCCH/DCCH/DTCH mapped to UL-SCH mapped to PUSCH; for all parameters: mandatory for initial configuration of an instance, omit means "keep as it is" afterwards		
ResourceAssignment	<a href="#">NR_DciFormat_0_X_ResourceAssignment_Type</a>	opt	resource assignment; to control setting of the following fields in DCI formats 0_0 and 0_1 (TS 38.212 clause 7.3.1.1.1 and 7.3.1.1.2): Frequency domain resource assignment Time domain resource assignment Modulation and coding scheme New data indicator Redundancy version HARQ process number
PuschHoppingCtrl	<a href="#">NR_DciFormat_0_X_PuschHoppingCtrl_Type</a>	opt	control of frequency hopping in DCI formats 0_0 and 0_1 (TS 38.212 clause 7.3.1.1.1 and 7.3.1.1.2)
TpcCommandPusch	<a href="#">NR_DciCommon_TpcCommand_Type</a>	opt	TPC command for scheduled PUSCH; to be set to 1 per default (0 dB; accumulated TPC)
UL_SUL_Indicator	<a href="#">NR_DciCommon_UL_SUL_Indicator_Type</a>	opt	to control use of supplementary UL by DCI
Format	<a href="#">NR_DciFormat_0_X_SpecificInfo_Type</a>	opt	DCI format and DCI format specific parameters

### NR\_DciFormat\_0\_X\_ResourceAssignment\_Type

TTCN-3 Record Type			
Name	<b>NR_DciFormat_0_X_ResourceAssignment_Type</b>		
Comment	Common definition to be used for resource scheduling in UL		
ResourceAllocationType	<a href="#">NR_ResourceAllocationType_Type</a>	opt	resource allocation type to be used for the frequency domain resource assignment
FreqDomain	<a href="#">NR_FreqDomainSchedulingType_Type</a>	opt	explicit resource assignment: first RB, number of RBs; corresponds to "Frequency domain resource assignment" in TS 38.212 clause 7.3.1.1.1 and 7.3.1.1.2
TimeDomain	<a href="#">NR_DciCommon_TimeDomainResourceAssignment_Type</a>	opt	corresponds to "Time domain resource assignment" in TS 38.212 clause 7.3.1.1.1 and 7.3.1.1.2
TransportBlockScheduling	<a href="#">NR_TransportBlockRetransmissionList_Type</a>	opt	information about MCS and RV for transport block transmission and possible re-transmissions; corresponds to "Modulation and coding scheme", "New data indicator" and "Redundancy version" in TS 38.212 clause 7.3.1.1.1 and 7.3.1.1.2
HarqProcessConfig	<a href="#">NR_HarqProcessConfig_Type</a>	opt	HARQ process to be used for the scheduled UL data transfer corresponds to "HARQ process number" in TS 38.212 clause 7.3.1.1.1 and 7.3.1.1.2; NOTE: for 5G there is no synchronous HARQ anymore but HARQ is asynchronous even for UL (TS 38.300 clause 5.3.5.4; TS 38.212 clause 7.3.1: 4-bit HARQ process number included in all DCI Formats for UL)

### NR\_DciFormat\_0\_X\_SpecificInfo\_Type

TTCN-3 Union Type		
Name	<b>NR_DciFormat_0_X_SpecificInfo_Type</b>	
Comment		
Format_0_0	<a href="#">NR_DciFormat_0_0_SpecificInfo_Type</a>	
Format_0_1	<a href="#">NR_DciFormat_0_1_SpecificInfo_Type</a>	

### NR\_DciFormat\_0\_0\_SpecificInfo\_Type

TTCN-3 Record Type	
Name	<b>NR_DciFormat_0_0_SpecificInfo_Type</b>
Comment	TS 38.212 clause 7.3.1.1: scheduling of PUSCH in one cell; default parameters according to TS 38.508-1 clause 4.3.6.1.1.1



## NR\_DciFormat\_0\_1\_SpecificInfo\_Type

TTCN-3 Record Type			
Name	NR_DciFormat_0_1_SpecificInfo_Type		
Comment	TS 38.212 clause 7.3.1.2: scheduling of PUSCH in one cell; default parameters according to TS 38.508-1 clause 4.3.6.1.1.2; for all parameters: mandatory for initial configuration of an instance, omit means "keep as it is" afterwards		
CarrierIndicator	<a href="#">NR_DciCommon_CarrierIndicator_Type</a>	opt	Carrier indicator - CIF value for Cross Carrier Scheduling; 'None' otherwise
BWPIndicator	<a href="#">NR_DciCommon_BWPIndicator_Type</a>	opt	Bandwidth part indicator
FirstDAI	<a href="#">NR_DciFormat_0_1_FirstDAI_Type</a>	opt	1st downlink assignment index
SecondDAI	<a href="#">NR_DciFormat_0_1_SecondDAI_Type</a>	opt	2nd downlink assignment index
SrsResourceIndicator	<a href="#">NR_DciFormat_0_1_SrsResourceIndicator_Type</a>	opt	SRS resource indicator
PrecodingInfo	<a href="#">NR_DciFormat_0_1_PrecodingInfo_Type</a>	opt	Precoding information and number of layers
AntennaPorts	<a href="#">NR_DciFormat_0_1_AntennaPorts_Type</a>	opt	Antenna ports
SrsRequest	<a href="#">NR_DciFormat_X_1_SrsRequest_Type</a>	opt	SRS request
CsiRequest	<a href="#">NR_DciFormat_0_1_CsiRequest_Type</a>	opt	CSI request
CBGTI	<a href="#">NR_DciFormat_0_1_CBGTI_Type</a>	opt	CBG transmission information (CBGTI)
PtrsDmrsAssociation	<a href="#">NR_DciFormat_0_1_PtrsDmrsAssociation_Type</a>	opt	PTRS-DMRS association
BetaOffsetIndicator	<a href="#">NR_DciFormat_0_1_BetaOffsetIndicator_Type</a>	opt	beta_offset indicator
DmrsSequenceInit	<a href="#">NR_DciFormat_X_1_DmrsSequenceInit_Type</a>	opt	DMRS sequence initialization

## NR\_DciFormat\_0\_X\_PuschHoppingCtrl\_Type

TTCN-3 Union Type		
Name	NR_DciFormat_0_X_PuschHoppingCtrl_Type	
Comment	TS 38.212 7.3.1.1.1 (format 0_0) and 7.3.1.1.2 (format 0_1)	
None	<a href="#">Null_Type</a>	0 bit if only resource allocation type 0 is configured
Flag	<a href="#">B1_Type</a>	1 bit if only resource allocation type 1 is configured (or type 0 and type 1) '1'B to indicate frequency hopping according to TS 38.214 clause 6.3

## NR\_DciFormat\_0\_1\_FirstDAI\_Type

TTCN-3 Union Type		
Name	NR_DciFormat_0_1_FirstDAI_Type	
Comment	TS 38.212 clause 7.3.1.1.2: First DAI (downlink assignment indicator) depending on L1 parameter pdsch-HARQ-ACK-codebook (corresponding to PhysicalCellGroupConfig.pdsch-HARQ-ACK-Codebook)	
SemiStaticCodebook	<a href="#">B1_Type</a>	1 bit according to TS 38.213 clause 9.1.2.2 for Type-1 HARQ-ACK (pdsch-HARQ-ACK-codebook=semi-static)
DynamicCodebook	<a href="#">B2_Type</a>	2 bits according to TS 38.213 Table 9.1.3-2 for Type-2 HARQ-ACK (pdsch-HARQ-ACK-codebook=dynamic)

## NR\_DciFormat\_0\_1\_SecondDAI\_Type

TTCN-3 Union Type		
Name	<b>NR_DciFormat_0_1_SecondDAI_Type</b>	
Comment	TS 38.212 clause 7.3.1.1.2: Second DAI (downlink assignment indicator) depending on L1 parameter pdsch-HARQ-ACK-codebook (corresponding to PhysicalCellGroupConfig.pdsch-HARQ-ACK-Codebook)	
None	<a href="#">Null_Type</a>	no 2nd DAI
DynamicCodebook	<a href="#">B2_Type</a>	2 bits according to TS 38.213 Table 9.1.3-2 for Type-2 HARQ-ACK (pdsch-HARQ-ACK-codebook=dynamic)

## NR\_DciFormat\_0\_1\_SrsResourceIndicator\_Type

TTCN-3 Union Type		
Name	<b>NR_DciFormat_0_1_SrsResourceIndicator_Type</b>	
Comment	TS 38.212 clause 7.3.1.1.2: SRS resource indicator depending on L1 parameter usage (corresponding to SRS-ResourceSet.usage)	
NonCodeBook	bitstring	usage==NonCodeBook: bitstring of index according to TS 38.212 Tables 7.3.1.1.2-28/29/30/31
CodeBook	bitstring	usage==CodeBook: bitstring of index according to TS 38.212 Table 7.3.1.1.2-32

## NR\_DciFormat\_0\_1\_PrecodingInfo\_Type

TTCN-3 Union Type		
Name	<b>NR_DciFormat_0_1_PrecodingInfo_Type</b>	
Comment	TS 38.212 clause 7.3.1.1.2: Precoding information and number of layers depending on L1 parameter txConfig (corresponding to PUSCH-Config.txConfig)	
NonCodeBook	<a href="#">Null_Type</a>	txConfig==NonCodeBook: 0 bits
CodeBook	bitstring	txConfig==CodeBook: bitstring according to TS 38.212 Tables 7.3.1.1.2-2..5; empty string for one antenna port only

## NR\_DciFormat\_0\_1\_AntennaPorts\_Type

TTCN-3 Union Type		
Name	<b>NR_DciFormat_0_1_AntennaPorts_Type</b>	
Comment	TS 38.212 clause 7.3.1.1.2: Antenna ports depending (mainly) on - PUSCH-Config.transformPrecoder, - DMRS-UplinkConfig.dmr-Type, - DMRS-UplinkConfig.maxLength	
Index	bitstring	bitstring presentation of index to Tables 7.3.1.1.2-6..23

## NR\_DciFormat\_0\_1\_CsiRrequest\_Type

TTCN-3 Union Type		
Name	<b>NR_DciFormat_0_1_CsiRrequest_Type</b>	
Comment	TS 38.212 clause 7.3.1.1.2: CSI request	
Index	bitstring	0, 1, 2, 3, 4, 5, or 6 bits determined by L1 parameter reportTriggerSize (CSI-MeasConfig.reportTriggerSize; TS 38.214 clause 5.2.1.5.1)

**NR\_DciFormat\_0\_1\_CBGTI\_Type**

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DciFormat_0_1_CBGTI_Type</b>	
<b>Comment</b>	TS 38.212 clause 7.3.1.1.2: CBG transmission information (CBGTI)	
Index	bitstring	0, 2, 4, 6, or 8 bits determined by L1 parameter maxCodeBlockGroupsPerTransportBlock corresponding to PUSCH-ServingCellConfig.codeBlockGroupTransmission.maxCodeBlockGroupsPerTransportBlock

**NR\_DciFormat\_0\_1\_PtrsDmrsAssociation\_Type**

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DciFormat_0_1_PtrsDmrsAssociation_Type</b>	
<b>Comment</b>	TS 38.212 clause 7.3.1.1.2: PTRS-DMRS association	
None	<a href="#">Null_Type</a>	0 bit if UL-PTRS-present=OFF and PUSCH-tp=Disabled, or if PUSCH-tp=Enabled
Value	<a href="#">B2_Type</a>	2 bits according to TS 38.212 Table 7.3.1.1.2-25 and 7.3.1.1.2-26

**NR\_DciFormat\_0\_1\_BetaOffsetIndicator\_Type**

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DciFormat_0_1_BetaOffsetIndicator_Type</b>	
<b>Comment</b>	TS 38.212 clause 7.3.1.1.2: beta_offset indicator	
None	<a href="#">Null_Type</a>	0 bit if uci-on-PUSCH != dynamic (ConfiguredGrantConfig.uci-OnPUSCH)
Value	<a href="#">B2_Type</a>	2 bits according to TS 38.213 Table 9.3-3

**D.1.3.3 MAC\_Layer**

Configuration for MAC procedures according to TS 38.321 clause 5 and related physical layer configuration

**D.1.3.3.1 MAC\_Layer\_Common****MAC\_Layer\_Common: Basic Type Definitions**

TTCN-3 Basic Types		
<b>NR_TimingAdvanceIndex_Type</b>	integer (0..63)	acc. to TS 38.321, clause 6.1.3.4 "Timing Advance Command MAC CE" and TS 38.213 clause 4.2 "Transmission timing adjustments"
<b>NR_TimingAdvance_Period_Type</b>	integer (400, 600, 1020, 1530, 2040, 4090, 8190)	the values correspond to 80 % of TimeAlignmentTimer (acc. to TS 38.523-3, clause 6.3.2): ms500, ms750, ms1280, ms1920, ms2560, ms5120, ms10240 rounded to nearest multiple of 10

**NR\_UplinkTimeAlignment\_AutoSynch\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_UplinkTimeAlignment_AutoSynch_Type</b>		
<b>Comment</b>	Parameters for automatic synchronisation of UL time alignment; The SS shall periodically transmit TA MAC control elements according to 38.321 clause 6.1.3.4 with - TAG-Id=0 for the SpCell - TAG-Id as configured for an SCell the transmission shall be continuously until being stopped		
TimingAdvance	<a href="#">NR_TimingAdvanceIndex_Type</a>		amount of timing adjustment that MAC entity has to apply
TA_Period	<a href="#">NR_TimingAdvance_Period_Type</a>		time period after which TA MAC control elements need to be automatically transmitted

**NR\_UplinkTimeAlignment\_Synch\_Type**

TTCN-3 Union Type			
<b>Name</b>	<b>NR_UplinkTimeAlignment_Synch_Type</b>		
<b>Comment</b>	Configuration of Time Alignment of the UL		
None	<a href="#">Null_Type</a>		no PUCCH Synchronisation applied
Auto	<a href="#">NR_UplinkTimeAlignment_AutoSynch_Type</a>		SS automatically maintains PUCCH synchronization at UE

## D.1.3.3.2 Random\_Access\_Procedure

**NR\_RachProcedureConfig\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_RachProcedureConfig_Type</b>		
<b>Comment</b>	parameters to control the random access procedure; TS 38.321, clause 5.1; NOTE: RACH-ConfigCommon and RACH-ConfigDedicated are contained in NR_UplinkBWP_Type already (RACH-ConfigCommon as part of BWP-UplinkCommon)		
RachProcedureList	<a href="#">NR_RachProcedureList_Type</a>	opt	in normal cases there is one element which is used for any RA procedure

**NR\_RachProcedureList\_Type**

TTCN-3 Record of Type	
<b>Name</b>	<b>NR_RachProcedureList_Type</b>
<b>Comment</b>	to simulate RACH procedure with one or more than one attempt by the UE: There is one element in the list per PRACH Preamble attempt
record of <a href="#">NR_RachProcedure_Type</a>	

## NR\_RachProcedure\_Type

TTCN-3 Record Type			
Name	NR_RachProcedure_Type		
Comment			
RandomAccess Response	<a href="#">NR_RandomAccessResponseConfig_Type</a>	opt	configures how the SS shall react on a PRACH Preamble attempt, in general: - RAR with RAPID matching the RAPID of the UE's PRACH Preamble - RAR with RAPID not matching the RAPID of the UE's PRACH Preamble - BackoffIndicator - no response at all
ContentionResolution	<a href="#">NR_ContentionResolutionControl_Type</a>	opt	Random Access Procedure may be 1. Contention free (Non-contention based) => no contention resolution 2. Contention based (see TS 38.321 clause 5.1.5): 2a) C-RNTI based: Msg3 contains MAC C-RNTI control element and in general contention resolution is done by assignment of an UL grant for this C-RNTI 2b) UE Contention Resolution Identity based: Msg3 contains RRC message to setup or restore RRC connection => contention resolution is done by sending of Msg4 with UE Contention Resolution Identity MAC CE

## D.1.3.3.2.1 Random\_Access\_Response

## Random\_Access\_Response: Basic Type Definitions

TTCN-3 Basic Types		
NR_RACH_TimingAdvance_Type	integer (0..3846)	12 bit value corresponding to Timing Advance Command field of the Random Access Response (TS 38.321 clause 6.2.3): 0..3846 according to TS 38.213 clause 4.2)
NR_RAR_BackoffIndicator_Type	integer (0..15)	MAC subPDU for Backoff Indicator only according to TS 38.321 clause 6.1.5

## NR\_RAR\_UplinkGrant\_Type

TTCN-3 Record Type			
Name	NR_RAR_UplinkGrant_Type		
Comment	TS 38.213 Table 8.2-1; 25 bits according to TS 38.321 Figure 6.2.3-1 !!!! NR-NOTE: in TS 38.213 Table 8.2-1 there are 3 reserved bits at the end of the table what does not fit to TS 38.321 Figure 6.2.3-1 !!!!		
HoppingFlag	<a href="#">B1_Type</a>		Hopping flag
Msg3FrequencyResourceAllocation	<a href="#">B12_Type</a>		Msg3 PUSCH frequency resource allocation
Msg3TimeResourceAllocation	<a href="#">B4_Type</a>		Msg3 PUSCH time resource allocation
MCS	<a href="#">B4_Type</a>		Modulation and Coding Scheme: first sixteen indices of the applicable MCS index table for PUSCH (TS 38.214 Table 6.1.4.1-1)
TPC_Command	<a href="#">B3_Type</a>		TPC command for Msg3 PUSCH
CQI_Req	<a href="#">B1_Type</a>		CQI request

**NR\_TempC\_RNTI\_Type**

TTCN-3 Union Type		
Name	<b>NR_TempC_RNTI_Type</b>	
Comment		
SameAsC_RNTI	<a href="#">Null_Type</a>	in the RA response SS shall use the same C-RNTI as configured in NR_CellConfigCommon_Type; this is useful for initial random access
Explicit	<a href="#">RNTI_Value_Type</a>	in the RA response SS shall use different value as configured in NR_CellConfigCommon_Type; this can be used when the UE already is in RRC_CONNECTED to have a temporary C-RNTI different from the one used by the UE; NOTE: when the UE is not in RRC_CONNECTED there shall be no explicit temp. C-RNTI since then the UE would assume this value as C-RNTI

**NR\_RAR\_Payload\_Type**

TTCN-3 Record Type		
Name	<b>NR_RAR_Payload_Type</b>	
Comment	MAC payload for Random Access Response according to TS 38.321 clause 6.2.3	
TimingAdvance	<a href="#">NR_RACH_TimingAdvance_Type</a>	timing advance: TS 38.321 clause 6.2.3 and TS 38.213 clause 4.2 NOTE: timing advance has impact not only on the RA procedure; SS in general needs to adjust its timing accordingly
UplinkGrant	<a href="#">NR_RAR_UplinkGrant_Type</a>	initial UL grant
TempC_RNTI	<a href="#">NR_TempC_RNTI_Type</a>	NOTE: In general for initial Random Access Procedure TempC_RNTI shall be 'SameAsC_RNTI' For Random Access Procedure in RRC_CONNECTED state the NW assigns a temporary C-RNTI which is replaced by the one stored at the UE; => TempC_RNTI may be 'SameAsC_RNTI' (in this case temp. C-RNTI and C-RNTI are equal what is not likely in a real network), or there is an explicit temp. C-RNTI what is used during RA procedure only (as in a real network)

**NR\_RAR\_RapldOnly\_Type**

TTCN-3 Record Type		
Name	<b>NR_RAR_RapldOnly_Type</b>	
Comment	MAC subPDU for RAPID only (acknowledgment for SI request) according to TS 38.321 clause 6.1.5	
Rapld	<a href="#">RAR_RapldCtrl_Type</a>	

**NR\_RAR\_RapldAndPayload\_Type**

TTCN-3 Record Type		
Name	<b>NR_RAR_RapldAndPayload_Type</b>	
Comment	MAC subPDU for RAPID and RAR payload according to TS 38.321 clause 6.1.5	
Rapld	<a href="#">RAR_RapldCtrl_Type</a>	
Payload	<a href="#">NR_RAR_Payload_Type</a>	

## NR\_RAR\_SubPdu\_Type

TTCN-3 Union Type	
<b>Name</b>	<b>NR_RAR_SubPdu_Type</b>
<b>Comment</b>	Random Access Response sub-PDU according to TS 38.321 clause 6.1.5
BackoffIndicator	<a href="#">NR_RAR_BackoffIndicator_Type</a>
RapIdOnly	<a href="#">NR_RAR_RapIdOnly_Type</a>
RapIdAndPayload	<a href="#">NR_RAR_RapIdAndPayload_Type</a>

## NR\_RAR\_SubPduList\_Type

TTCN-3 Record of Type	
<b>Name</b>	<b>NR_RAR_SubPduList_Type</b>
<b>Comment</b>	list of MAC subPDUs; if a Backoff Indicator is included it has to be the first element (TS 38.321 clause 6.1.5)
	record of <a href="#">NR_RAR_SubPdu_Type</a>

## NR\_RAR\_MacPdu\_Type

TTCN-3 Record Type			
<b>Name</b>	<b>NR_RAR_MacPdu_Type</b>		
<b>Comment</b>			
SubPduList	<a href="#">NR_RAR_SubPduList_Type</a>	opt	list of Backoff Indicator (optional) and random access responses; empty list if no RAR shall be sent at all (omit means "keep as it is" as usual)
CrcError	boolean	opt	if set, MAC PDU shall transmitted with CRC bits (0-3) being toggled

## NR\_RandomAccessResponseConfig\_Type

TTCN-3 Record Type			
<b>Name</b>	<b>NR_RandomAccessResponseConfig_Type</b>		
<b>Comment</b>	configuration for Random Access Response mapped to DL-SCH mapped to PDSCH		
SearchSpaceAndDci	<a href="#">NR_SearchSpaceDciAssignment_Type</a>	opt	in general a RACH procedure is expected at the BWP currently being configured as active BWP at the SS; Type1-PDCCH common search space is used for scheduling of the Random Access Response (Msg2)
MacPdu	<a href="#">NR_RAR_MacPdu_Type</a>	opt	MAC PDU to be sent automatically by the SS when there has been a RACH preamble

## D.1.3.3.2.2 Contention\_Resolution

## NR\_ContentionResolutionCtrl\_Type

TTCN-3 Union Type		
<b>Name</b>	<b>NR_ContentionResolutionCtrl_Type</b>	
<b>Comment</b>		
None	<a href="#">Null_Type</a>	no contention resolution: e.g. in case of contention free random access procedure or for special cases of contention based random access procedure
CRNTI_Based	<a href="#">NR_SearchSpaceUIDciAssignment_Type</a>	contention resolution based on C-RNTI on PDCCH: The SS assigns UL grant on PDCCH; in general the UL grant is scheduled in the Type1-PDCCH common search space of the BWP currently being configured as active BWP at the SS => in general UL grant shall be configured as "Format_0_0"
Msg4_Based	<a href="#">NR_RachProcedureMsg4_Type</a>	contention resolution based on UE Contention Resolution Identity on DL-SCH

**NR\_RachProcedureMsg4\_Type**

TTCN-3 Record Type		
<b>Name</b>	<b>NR_RachProcedureMsg4_Type</b>	
<b>Comment</b>	Msg4 of the RACH procedure in case of contention resolution based on UE Contention Resolution Identity	
ContentionResolutionId	<a href="#">NR_ContentionResolutionId_Type</a>	Contention Resolution Id contained in MAC PDU of Msg4
RrcPdu	<a href="#">NR_RachProcedureMsg4RrcMsg_Type</a>	RRC message to be contained in Msg4 of the RACH procedure
CrcError	boolean	if set, MAC PDU shall transmitted with CRC bits (0-3) being toggled

**NR\_ContentionResolutionId\_Type**

TTCN-3 Union Type		
<b>Name</b>	<b>NR_ContentionResolutionId_Type</b>	
<b>Comment</b>		
XorMask	<a href="#">B48_Type</a>	When SS receives Contention Resolution ID from the UE, SS shall XOR it with the given mask and use this as Contention Resolution ID; this allows to get an unmatching Contention Resolution ID; in normal cases mask shall be set to tsc_ContentionResolutionId_Unchanged (i.e. the Contention Resolution ID remains unchanged)
None	<a href="#">Null_Type</a>	MAC Contention Resolution Control Element is not contained in the MAC PDU sent out as response for Msg3

**NR\_RachProcedureMsg4RrcMsg\_Type**

TTCN-3 Union Type		
<b>Name</b>	<b>NR_RachProcedureMsg4RrcMsg_Type</b>	
<b>Comment</b>		
RrcCchMsg	octetstring	encoded RRC message for CCCH; LCID=000000 for CCCH
RrcDcchMsg	octetstring	encoded RRC message for DCCH; the SS shall <ul style="list-style-type: none"> <li>- apply integrity protection,</li> <li>- add a PDCP header accordingly,</li> <li>- add an AM RLC header,</li> <li>- use LCID=000001 corresponding to SRB1 as logical channel id</li> </ul>
None	<a href="#">Null_Type</a>	Msg4 does not contain any RRC message, e.g. when RRC message is sent stand-alone in separate DL transmission

**D.1.3.4 System\_Information\_Control**

Primitive to configuration scheduling of system information on BCCH/BCH

**System\_Information\_Control: Basic Type Definitions**

TTCN-3 Basic Types		
<b>NR_BcchToPbchConfig_Type</b>	<a href="#">Null_Type</a>	place holder for BCCH mapped to BCH mapped to PBCH: MIB using fixed periodicity (80ms) and repetitions (80ms) according to TS 38.331 clause 5.2.1; the position of SS/PBCH blocks in frequency and time domain is specified in TS 38.211 clause 7.4.3 and TS 38.213 clause 4.1 the SS configuration for SS/PBCH blocks is defined by NR_SSB_Config_Type as part of physical layer configuration of a cell
<b>NR_SiWindowLength_Type</b>	integer	!!!! NR-SA-TBD: to be replaced by appropriate ASN.1 type definition !!!!



## NR\_Sib1Schedul\_Type

TTCN-3 Record Type			
Name	NR_Sib1Schedul_Type		
Comment	Scheduling of SIB1 (RMSI - Remaining Minimum SI, according to TS 38.300 clause 7.3): fixed scheduling in time domain according to TS 38.331 clause 5.2.1 (periodicity: XXms; repetitions every XXms !!!! NR_SA_TBD: periodicity, repetitions !!!!)		
SearchSpaceAndDci	<a href="#">NR_SearchSpaceDIDciAssignment_Type</a>	opt	in general SIB scheduling is assigned to the initial BWP's Type0-PDCCH common search space; in principle SIB scheduling can be configured to happen simultaneously in more than one BWP (e.g. initial BWP and active BWP); SIB1 scheduling may be stopped by not assigning any BWP (AssignedBWPs being empty)

## NR\_SingleSiSchedul\_Type

TTCN-3 Record Type			
Name	NR_SingleSiSchedul_Type		
Comment	Scheduling for a single SI in its SI-window within a BWP (or even within several BWPs)		
SearchSpaceAndDci	<a href="#">NR_SearchSpaceDIDciAssignment_Type</a>	opt	in general SIB scheduling is assigned to the initial BWP's Type0A-PDCCH common search space; nevertheless in principle scheduling can be configured to happen simultaneously in more than one BWP (e.g. initial BWP and active BWP)
TimeDomainOffset	integer	opt	!!!! NR-SA-TBD: to be specified which kind of offset to be applied (e.g. slots, subframes etc.); !!!! NOTE: timing is partly defined by search space configuration already !!!!

## NR\_OtherSiSchedul\_Type

TTCN-3 Record Type			
Name	NR_OtherSiSchedul_Type		
Comment	Scheduling of other SI ("other SI" according to TS 38.300 clause 7.3): specifies for a specific SI the scheduling and repetitions within its SI window		
Periodicity	integer	opt	!!!! NR-SA-TBD: to be checked; type to be replaced according to ASN.1 !!!!
Window	record of <a href="#">NR_SingleSiSchedul_Type</a>	opt	!!!! NR-SA-TBD: to be checked; taken over from EUTRA as initial draft; appropriate comments to be added (see EUTRA) !!!!

## NR\_AllOtherSiSchedul\_Type

TTCN-3 Record Type			
Name	NR_AllOtherSiSchedul_Type		
Comment	Scheduling of (all) other SI (i.e. SIB2 and above according to TS 38.300 clause 7.3)		
WindowLength	<a href="#">NR_SiWindowLength_Type</a>	opt	to calculate start of each SI window according to TS 38.331 clause !!!! NR-SA-TBD: core spec reference to be added !!!!
SiList	<a href="#">NR_OtherSiSchedul_Type</a>	opt	list of scheduling info for the SIs containing one or more SIBs
SegmentedSiList	<a href="#">NR_OtherSiSchedul_Type</a>	opt	!!!! NR-SA-TBD: check whether this is needed; appropriate comments to be added if so !!!!

## NR\_BcchToPdschConfig\_Type

TTCN-3 Record Type			
Name	NR_BcchToPdschConfig_Type		
Comment	configuration for BCCH mapped to DL-SCH mapped to PDSCH		
Sib1Schedul	<a href="#">NR_Sib1Schedul_Type</a>	opt	SIB1 scheduling
SiSchedul	<a href="#">NR_AllOtherSiSchedul_Type</a>	opt	scheduling of other SI

**BCCH\_DL\_SCH\_Message**

TTCN-3 Record Type	
<b>Name</b>	<b>BCCH_DL_SCH_Message</b>
<b>Comment</b>	!!!! NR-SA-TBD: to be removed when there is an ASN.1 type definition !!!!

**NR\_SI\_List\_Type**

TTCN-3 Record of Type	
<b>Name</b>	<b>NR_SI_List_Type</b>
<b>Comment</b>	list of system information messages
record of <a href="#">BCCH_DL_SCH_Message</a>	

**NR\_SegmentedSI\_List\_Type**

TTCN-3 Record of Type	
<b>Name</b>	<b>NR_SegmentedSI_List_Type</b>
<b>Comment</b>	Each element is a list of segments; used for segmented SIBs !!!! NR-SA-TBD: to be added which ones (SIB11/12 for EUTRA) !!!!
record of <a href="#">NR_SI_List_Type</a>	

**NR\_BcchInfo\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_BcchInfo_Type</b>		
<b>Comment</b>	Configuration of system information message contents to be scheduled at the SS		
MIB	<a href="#">BCCH_BCH_Message</a>	opt	TS 38.331, clause 6.2.1 BCCH-BCH-Message and clause 6.2.2 MIB; NOTE: the system frame number included in MIB needs to be handled and maintained by the system simulator; that means that the system frame number being setup by TTCN shall be ignored and overwritten by the SS
SIB1	<a href="#">BCCH_DL_SCH_Message</a>	opt	TS 38.331, clause 6.2.1 BCCH-DL-SCH-Message and clause 6.2.2 SIB1
SIs	<a href="#">NR_SI_List_Type</a>	opt	list of SIs corresponding to SiList of NR_AllOtherSiSchedul_Type (i.e. element i of NR_AllOtherSiSchedul_Type's SiList specifies the scheduling for SIs[i])
SegmentedSIs	<a href="#">NR_SegmentedSI_List_Type</a>	opt	list of SIs containing segmented SIBs; corresponds to SegmentedSiList in AllSiSchedul_Type !!!! NR-SA-TBD: check whether this is needed !!!!

**NR\_BcchConfig\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_BcchConfig_Type</b>		
<b>Comment</b>	Configuration of system information scheduling and content at the SS		
Pbch	<a href="#">NR_BcchToPbchConfig_Type</a>	opt	
Pdsch	<a href="#">NR_BcchToPdschConfig_Type</a>	opt	
BcchInfo	<a href="#">NR_BcchInfo_Type</a>	opt	

**D.1.3.5 Paging\_Control**

Primitive to configuration PCCH/PCH

## NR\_PcchConfig\_Type

TTCN-3 Record Type			
<b>Name</b>	<b>NR_PcchConfig_Type</b>		
<b>Comment</b>	configuration for PCCH mapped to PCH mapped to PDSCH		
SearchSpaceAndDci	<a href="#">NR_SearchSpaceDciAssignment_Type</a>	opt	in general Paging happens at the BWP currently being configured as active BWP at the SS and Type2-PDCCH common search space is used for scheduling; NOTE: there is no use case to schedule Paging simultaneously in multiple BWPs

## D.1.3.6 CCCH\_DCCH\_DTCH\_Configuration

## NR\_CcchDcchDtchConfigDL\_Type

TTCN-3 Record Type			
<b>Name</b>	<b>NR_CcchDcchDtchConfigDL_Type</b>		
<b>Comment</b>	configuration for CCCH/DCCH/DTCH mapped to DL-SCH mapped to DL-SCH mapped to PDSCH; !!!! NR-NOTE 1: in contrast to EUTRA the configuration of HARQ processes to be used is done as part of DCI configuration !!!! !!!! NR-NOTE 2: it seems that this type provides configuration for DCCH and DTCH only; nevertheless for now the name kept !!!!		
SearchSpaceAndDci	<a href="#">NR_SearchSpaceDciAssignment_Type</a>	opt	in general DCCH/DTCH transmissions happen at the BWP currently being the active BWP at the SS and the UE specific search space is used for scheduling; DCI configuration for Msg2 of the RACH procedure is done as part of the RACH procedure configuration (NR_RandomAccessResponseConfig_Type)

## NR\_CcchDcchDtchConfigUL\_Type

TTCN-3 Record Type			
<b>Name</b>	<b>NR_CcchDcchDtchConfigUL_Type</b>		
<b>Comment</b>	scheduling for CCCH/DCCH/DTCH mapped to UL-SCH mapped to PUSCH !!!! NR-NOTE: it seems that this type provides configuration for DCCH and DTCH only; nevertheless for now the name kept !!!!		
SearchSpaceAndDci	<a href="#">NR_SearchSpaceUciAssignment_Type</a>	opt	in general DCCH/DTCH transmissions happen at the BWP currently being the active BWP at the SS and the UE specific search space is used for scheduling
PUCCH_Synch	<a href="#">NR_UplinkTimeAlignment_Synch_Type</a>	opt	parameters for automatic control of timing advance
GrantConfig	<a href="#">UL_GrantConfig_Type</a>	opt	configuration how UL grant allocation is done (as response to scheduling request, periodically, etc.

## NR\_DrxCtrl\_Type

TTCN-3 Union Type		
<b>Name</b>	<b>NR_DrxCtrl_Type</b>	
<b>Comment</b>	DRX configuration for connected mode (TS 38.321, clause 5.7)	
None	<a href="#">Null_Type</a>	DRX not configured
Config	<a href="#">NR_ASN1_DRX_Config_Type</a>	DRX is configured as signalled to the UE

**NR\_MeasGapCtrl\_Type**

TTCN-3 Union Type		
<b>Name</b>	<b>NR_MeasGapCtrl_Type</b>	
<b>Comment</b>	support of measurement gap configuration	
None	<a href="#">Null_Type</a>	no measurement gap configuration
Config	<a href="#">NR_ASN1_MeasGapConfig_Type</a>	measurement gap configuration acc. to TS 38.331, clause 5.5.2.9; NOTE: the release branch of MeasGapConfig in general is not used for configuration of the SS

**NR\_CcchDcchDtchConfig\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_CcchDcchDtchConfig_Type</b>		
<b>Comment</b>			
DL	<a href="#">NR_CcchDcchDtchConfigDL_Type</a>	opt	Scheduling, parameters related to CCCH, DCCH and DTCH in DL
UL	<a href="#">NR_CcchDcchDtchConfigUL_Type</a>	opt	Scheduling, parameters related to CCCH, DCCH and DTCH in UL
DrxCtrl	<a href="#">NR_DrxCtrl_Type</a>	opt	DRX configuration as sent to the UE (or 'None' when the UE does not support connected mode DRX)
MeasGapCtrl	<a href="#">NR_MeasGapCtrl_Type</a>	opt	to tell the SS when no assignments/grants shall be assigned to the UE

**D.1.3.7 Cell\_Group\_Configuration**

Configuration of cell group(s) in terms of dual connectivity and carrier aggregation

**Cell\_Group\_Configuration: Basic Type Definitions**

TTCN-3 Basic Types		
<b>NR_ServingCellIndex_Type</b>	integer	corresponds to ASN.1 (v15.1.0) definitions SCellIndex (1..31) and ServCellIndex (0..maxNrofServingCells-1): According to ASN.1 "The value range is shared across the Cell Groups" and "the PCell of the Master Cell Group uses ID = 0"

**NR\_ServingCellConfig\_Type**

TTCN-3 Union Type		
<b>Name</b>	<b>NR_ServingCellConfig_Type</b>	
<b>Comment</b>	serving cell capabilities of a cell	
SpCell	<a href="#">NR_SpCellConfig_Type</a>	parameters specific for an SpCell and cell group configuration
SCell	<a href="#">NR_SCellConfig_Type</a>	parameters specific for an SCell
None	<a href="#">Null_Type</a>	there is no serving cell at all (e.g. neighbouring cell only)

### NR\_SCellConfig\_Type

TTCN-3 Record Type			
Name	<b>NR_SCellConfig_Type</b>		
Comment	cell parameters specific for an SCell; NOTE: the corresponding SpCell can be derived from the SpCell's SCellList; further parameters may be added according to test requirements for CA test cases		
ServingCellIndex	<a href="#">NR_ServingCellIndex_Type</a>	opt	
TAG_Id	TAG_Id	opt	Id of the Timing Advance Group the SCell belongs to (according to TS 38.321 clause 6.1.3.4 the SpCell has the TAG Identity 0); the SS shall use the given TAG_Id e.g. for automatic time alignment in UL (see NR_UplinkTimeAlignment_AutoSynch_Type)

### NR\_SpCellConfig\_Type

TTCN-3 Record Type			
Name	<b>NR_SpCellConfig_Type</b>		
Comment	cell parameters specific for an SpCell (PCell of the MCG or the PSCell of the SCG) and additional parameters of the cell group; further parameters may be added according to test requirements for CA test cases		
ServingCellIndex	<a href="#">NR_ServingCellIndex_Type</a>	opt	
CellGroupConfig	<a href="#">NR_SpCell_CellGroupConfig_Type</a>	opt	parameters of the cell group of which the cell is SpCell (PCell or PSCell); assigned to SpCell as in many test cases the cell group consists of the SpCell only and on the other hand every cell group has to have at least an SpCell

### NR\_SpCell\_CellGroupConfig\_Type

TTCN-3 Record Type			
Name	<b>NR_SpCell_CellGroupConfig_Type</b>		
Comment	Configuration of an NR cell group; NOTE 1: The type of cell group (MCG, SCG) may be derived from the CellGroupId (CellGroupId==0 => MCG, CellGroupId>0 => SCG) NOTE 2: Further cell group specific MAC and PHY parameters may be added corresponding to ASN.1 MAC-CellGroupConfig or may need to be added (but e.g. the DRX configuration is assigned to NR_CcchDcchDtchConfig_Type already i.e. there is no need to configure it here)		
CellGroupId	CellGroupId	opt	0 for MCG (i.e. EUTRA in EN-DC), 1 for SCG (NR in EN-DC); see comments to ASN.1 definition of CellGroupId (v15.1.0)
SCellList	<a href="#">NR_CellIdList_Type</a>	opt	list of SCells belonging to the SpCell's cell group; shall be initialised as empty list
MAC_CellGroupConfig	<a href="#">NR_ASN1_MAC_CellGroupConfig_Type</a>	opt	Cell group specific MAC parameters as sent to the UE in CellGroupConfig.MAC-CellGroupConfig
PhysicalCellGroupConfig	<a href="#">NR_ASN1_PhysicalCellGroupConfig_Type</a>	opt	Cell group specific physical layer parameters as sent to the UE in CellGroupConfig.PhysicalCellGroupConfig

## D.1.4 Cell\_Power\_Attenuation

### NR\_CellAttenuationConfig\_Type

TTCN-3 Record Type			
Name	<b>NR_CellAttenuationConfig_Type</b>		
Comment			
CellId	<a href="#">NR_CellId_Type</a>		
Attenuation	<a href="#">NR_Attenuation_Type</a>		
TimingInfo	<a href="#">TimingInfo_Type</a>	opt	

### NR\_CellAttenuationList\_Type

TTCN-3 Record of Type	
Name	NR_CellAttenuationList_Type
Comment	record of <a href="#">NR_CellAttenuationConfig_Type</a>

## D.1.5 Radio\_Bearer\_Configuration

Radio Bearer Configuration: SRBs/DRBs

NOTE: Type definitions for PDCP configuration are in NR\_PDCP\_TypeDefs

### NR\_RlcBearerConfigInfo\_Type

TTCN-3 Record Type			
Name	NR_RlcBearerConfigInfo_Type		
Comment	RLC bearer as defined in TS 37.340: RLC and MAC logical channel configuration of a radio bearer in one cell group		
Rlc	<a href="#">NR_RLC_Configuration_Type</a>	opt	mandatory for initial configuration; omit means "keep as it is"
LogicalChannelId	<a href="#">NR_LogicalChannelId_Type</a>	opt	DRBs: DTCH-LogicalChannelIdentity as for rb-MappingInfo in DRB-ToAddModifyList; SRBs: for SRBs specified configurations acc. to TS 36.331, clause 9.1.2 shall be applied: SRB1: ul-LogicalChannel-Identity = dl-LogicalChannel-Identity = 1 SRB2: ul-LogicalChannel-Identity = dl-LogicalChannel-Identity = 2 for SRB0 being mapped to CCCH the LCID is '0000'B acc. to TS 36.321, clause 6.2.1; mandatory for initial configuration; omit means "keep as it is"
Mac	<a href="#">NR_MAC_Configuration_Type</a>	opt	
DiscardULData	boolean	opt	if omitted: initial configuration: data is handed over to TTCN as usual re-configuration: "keep as it is" if set: true - SS shall discard any data in UL for this radio bearer false - (re)configuration back to normal mode NOTE: typically applicable for UM DRBs only

### NR\_RlcBearerConfig\_Type

TTCN-3 Union Type		
Name	NR_RlcBearerConfig_Type	
Comment	configuration of RLC bearer below NR-PDCP	
Config	<a href="#">NR_RlcBearerConfigInfo_Type</a>	"normal" configuration: there is an RLC bearer configured for the cell which is linked to the PDCP being configured at the cell (the PDCP can be either 'RBTerminating' or 'Proxy')
None	<a href="#">Null_Type</a>	No RLC bearer is configured at NR below the NR-PDCP: NR_PDCP_Configuration_Type shall be 'RBTerminating' with LinkToOtherCellGroup indicating cell with RLC bearer to be used

### NR\_RadioBearerConfigInfo\_Type

TTCN-3 Record Type			
Name	NR_RadioBearerConfigInfo_Type		
Comment			
Pdcp	<a href="#">NR_PDCP_Configuration_Type</a>	opt	for SRB0: "Pdcp.None:=true" mandatory for initial configuration; omit means "keep as it is"
RlcBearer	<a href="#">NR_RlcBearerConfig_Type</a>	opt	mandatory for initial configuration; omit means "keep as it is"

**NR\_RadioBearerConfig\_Type**

TTCN-3 Union Type		
Name	<b>NR_RadioBearerConfig_Type</b>	
Comment		
AddOrReconfigure	<a href="#">NR_RadioBearerConfigInfo_Type</a>	add / re-configure RB - CellId : identifier of the cell being configured RoutingInfo : 'None' TimingInfo : 'Now' in common ControlInfo : CnfFlag:=true; FollowOnFlag:=false (in general)
Release	<a href="#">Null_Type</a>	release RB - CellId : identifier of the cell being configured RoutingInfo : 'None' TimingInfo : 'Now' in common ControlInfo : CnfFlag:=true; FollowOnFlag:=false (in general)

**NR\_RadioBearer\_Type**

TTCN-3 Record Type			
Name	<b>NR_RadioBearer_Type</b>		
Comment			
Id	<a href="#">NR_RadioBearerId_Type</a>		either for SRB or DRB
Config	<a href="#">NR_RadioBearerConfig_Type</a>		

**NR\_RadioBearerList\_Type**

TTCN-3 Record of Type	
Name	<b>NR_RadioBearerList_Type</b>
Comment	array of SRBs and/or DRBs
record of <a href="#">NR_RadioBearer_Type</a>	

**D.1.5.1 RLC\_Configuration**

RLC configuration: radio bearer specific

**RLC\_Configuration: Basic Type Definitions**

TTCN-3 Basic Types		
NR_SS_RLC_TM_Type	<a href="#">Null_Type</a>	TM to configure SRB0; no parameters to be defined

**NR\_RLC\_NotACK\_NextRLC\_PDU\_Type**

TTCN-3 Enumerated Type	
Name	<b>NR_RLC_NotACK_NextRLC_PDU_Type</b>
Comment	
Start	cause SS RLC layer not to ACK the next received RLC PDU; this is done regardless of whether the poll bit is set or not; Example [from UMTS]: when the UE gets new security information in a SECURITY MODE COMMAND the response (SECURITY MODE COMPLETE) sent by the UE is not acknowledged at the RLC level; this causes the UE to continue using the "old" security information

**NR\_RLC\_TransparentMode**

TTCN-3 Union Type		
Name	<b>NR_RLC_TransparentMode</b>	
Comment		
Umd	SN_FieldLengthUM	SN-FieldLengthUM ::= ENUMERATED {size6, size12} TS 38.331
Amd	SN_FieldLengthAM	SN-FieldLengthAM ::= ENUMERATED {size12, size18} TS 38.331

**NR\_RLC\_TestModelInfo\_Type**

TTCN-3 Union Type		
Name	<b>NR_RLC_TestModelInfo_Type</b>	
Comment		
NotACK_NextRLC_PDU	<a href="#">NR_RLC_NotACK_NextRLC_PDU_Type</a>	valid only when the RLC is configured in AM
TransparentMode	<a href="#">NR_RLC_TransparentMode</a>	

**NR\_RLC\_TestModeConfig\_Type**

TTCN-3 Union Type		
Name	<b>NR_RLC_TestModeConfig_Type</b>	
Comment		
None	<a href="#">Null_Type</a>	
Info	<a href="#">NR_RLC_TestModelInfo_Type</a>	

**NR\_SS\_RLC\_AM\_Type**

TTCN-3 Record Type			
Name	<b>NR_SS_RLC_AM_Type</b>		
Comment			
Tx	<a href="#">NR_ASN1_UL_AM_RLC_Type</a>	opt	the UE's UL setting to be used in SS's tx direction
Rx	<a href="#">NR_ASN1_DL_AM_RLC_Type</a>	opt	the UE's DL setting to be used in SS's rx direction

**NR\_SS\_RLC\_UM\_Type**

TTCN-3 Record Type			
Name	<b>NR_SS_RLC_UM_Type</b>		
Comment			
Tx	<a href="#">NR_ASN1_UL_UM_RLC_Type</a>	opt	the UE's UL setting to be used in SS's tx direction
Rx	<a href="#">NR_ASN1_DL_UM_RLC_Type</a>	opt	the UE's DL setting to be used in SS's rx direction

**NR\_RLC\_RbConfig\_Type**

TTCN-3 Union Type		
Name	<b>NR_RLC_RbConfig_Type</b>	
Comment	!!!! NR-NOTE: in EUTRA UM_OnlyUL is not used at all and UM_OnlyDL is used for MBMS only => not defined for NR (yet) !!!!	
AM	<a href="#">NR_SS_RLC_AM_Type</a>	
UM	<a href="#">NR_SS_RLC_UM_Type</a>	
TM	<a href="#">NR_SS_RLC_TM_Type</a>	normally SRB0 only; may be used for test purposes also



**NR\_RLC\_Configuration\_Type**

TTCN-3 Record Type			
Name	<b>NR_RLC_Configuration_Type</b>		
Comment			
Rb	<a href="#">NR_RLC_RbConfig_Type</a>	opt	mandatory for initial configuration; omit means "keep as it is"
TestMode	<a href="#">NR_RLC_TestModeConfig_Type</a>	opt	mandatory for initial configuration; omit means "keep as it is"

**D.1.5.2 MAC\_Configuration**

MAC configuration: radio bearer specific configuration

**MAC\_Configuration: Basic Type Definitions**

TTCN-3 Basic Types		
NR_LogicalChannelId_Type	<a href="#">UInt_Type</a>	

**NR\_MAC\_Test\_DLLogChID\_Type**

TTCN-3 Union Type		
Name	<b>NR_MAC_Test_DLLogChID_Type</b>	
Comment		
LogChId	<a href="#">NR_LogicalChannelId_Type</a>	Specifies to over write the logical channel ID in MAC header in all the DL messages sent on the configured logical channel
ConfigLchId	<a href="#">Null_Type</a>	Specifies that the normal mode of correct logical channel ID to be used in DL MAC header. This will be the default mode, when SS is initially configured.

**NR\_MAC\_Test\_SCH\_NoHeaderManipulation\_Type**

TTCN-3 Enumerated Type	
Name	<b>NR_MAC_Test_SCH_NoHeaderManipulation_Type</b>
Comment	
NormalMode	MAC header is fully controlled by the SS
DL_SCH_Only	TTCN can submit a final MAC PDU including header and payloads; SS does not do anything with this MAC PDU i.e. no header is added for the DL SCH transport channel. It is possible that data belonging to multiple DRBs is sent in one MAC PDU and from one special RB configured. NOTE: SRBs shall work as in normal mode and data can be sent/received on SRBs but sending on SRBs shall be in different TTIs than sending data PDUs.
DL_UL_SCH	In UL and DL the SS' MAC layer is transparent i.e. SS does not add or remove any MAC header

**NR\_MAC\_TestModelInfo\_Type**

TTCN-3 Record Type			
Name	<b>NR_MAC_TestModelInfo_Type</b>		
Comment	Parameters/Configuration for MAC tests		
DiffLogChId	<a href="#">NR_MAC_Test_DLLogChID_Type</a>		to be used in test cases 7.1.1.1 and 7.1.1.2 for using a different logical channel ID in MAC-header on DL-SCH channel
No_HeaderManipulation	<a href="#">NR_MAC_Test_SCH_NoHeaderManipulation_Type</a>		to configure mode for no header manipulation in SS MAC layer for DL/UL SCH

**NR\_MAC\_TestModeConfig\_Type**

TTCN-3 Union Type		
<b>Name</b>	<b>NR_MAC_TestModeConfig_Type</b>	
<b>Comment</b>		
None	<a href="#">Null_Type</a>	
Info	<a href="#">NR_MAC_TestModeInfo_Type</a>	

**NR\_MAC\_LogicalChannelConfig\_Type**

TTCN-3 Record Type		
<b>Name</b>	<b>NR_MAC_LogicalChannelConfig_Type</b>	
<b>Comment</b>		
Priority	integer	logical channel priority for the DL as described in TS 38.321, clause 5.4.3.1 for the UL
PrioritizedBitRate	<a href="#">NR_PrioritizedBitRate_Type</a>	PBR as described for the UL; probably not needed at SS

**NR\_MAC\_Configuration\_Type**

TTCN-3 Record Type		
<b>Name</b>	<b>NR_MAC_Configuration_Type</b>	
<b>Comment</b>		
LogicalChannel	<a href="#">NR_MAC_LogicalChannelConfig_Type</a>	opt mandatory for initial configuration; omit means "keep as it is"
TestMode	<a href="#">NR_MAC_TestModeConfig_Type</a>	opt mandatory for initial configuration; omit means "keep as it is"; for none MAC tests "TestMode.None:=true"

**D.1.6 AS\_Security**

Primitive for control of AS security

**NR\_PdcpsQN\_Type**

TTCN-3 Record Type		
<b>Name</b>	<b>NR_PdcpsQN_Type</b>	
<b>Comment</b>		
Format	<a href="#">NR_PdcpsCountFormat_Type</a>	12 bit or 18 bit SQN
Value	integer	SQN value (12 bit or 18 bit SQN) NOTE: in TTCN the test case writer is responsible to deal with potential overflows (e.g. there shall be a "mod 32", "mod 128" or "mod 4096" according to the format)

**NR\_PDCP\_ActTime\_Type**

TTCN-3 Union Type		
<b>Name</b>	<b>NR_PDCP_ActTime_Type</b>	
<b>Comment</b>	The sequence number in UL and DL for SRB1 should be one more than the present SQN, as Ciphering starts in UL and DL soon after SMC and SMComp; For other SRB/DRB it should be the present SQN.	
None	<a href="#">Null_Type</a>	No Activation time; to be used if Ciphering is not applied
SQN	<a href="#">NR_PdcpsQN_Type</a>	PDCP sequence number

## NR\_SecurityActTime\_Type

TTCN-3 Record Type			
Name	NR_SecurityActTime_Type		
Comment			
RadioBearerId	<a href="#">NR_RadioBearerId_Type</a>		
UL	<a href="#">NR_PDCP_ActTime_Type</a>		
DL	<a href="#">NR_PDCP_ActTime_Type</a>		

## NR\_SecurityActTimeList\_Type

TTCN-3 Record of Type			
Name	NR_SecurityActTimeList_Type		
Comment			
record of <a href="#">NR_SecurityActTime_Type</a>			

## NR\_AS\_IntegrityInfo\_Type

TTCN-3 Record Type			
Name	NR_AS_IntegrityInfo_Type		
Comment	<p>for initial configuration activation time is not needed for integrity protection as all messages in DL after security activation are integrity protected;  this means this ASP is invoked before transmission of Security mode command;  if there is a integrity violation in UL SS shall set the IndicationStatus in the common ASP part to flag the integrity error  (IndicationStatus.Error.Integrity.Pdcp := true);  integrity to be provided for each SRB as per core spec</p>		
Algorithm	IntegrityProtAlgorithm		IntegrityProtAlgorithm being defined in RRC ASN.1
KRRcInt	<a href="#">B128_Key_Type</a>		
KUPint	<a href="#">B128_Key_Type</a>	opt	Not used when UE connected to EPS (i.e. set to omit for EPS)
ActTimeList	<a href="#">NR_SecurityActTimeList_Type</a>	opt	omit for initial configuration (i.e. all SRBs to be integrity protected immediately); in HO scenarios activation time may be needed e.g. for SRB1

## NR\_AS\_CipheringInfo\_Type

TTCN-3 Record Type			
Name	NR_AS_CipheringInfo_Type		
Comment			
Algorithm	CipheringAlgorithm		CipheringAlgorithm_Type being defined in RRC ASN.1
KRRcEnc	<a href="#">B128_Key_Type</a>		
KUPenc	<a href="#">B128_Key_Type</a>		KUPenc is mandatory; and SS uses it when DRB are configured
ActTimeList	<a href="#">NR_SecurityActTimeList_Type</a>		

## NR\_AS\_SecStartRestart\_Type

TTCN-3 Record Type			
Name	NR_AS_SecStartRestart_Type		
Comment			
Integrity	<a href="#">NR_AS_IntegrityInfo_Type</a>	opt	optional to allow separated activation of integrity and ciphering; omit: keep as it is
Ciphering	<a href="#">NR_AS_CipheringInfo_Type</a>	opt	optional to allow separated activation of integrity and ciphering; omit: keep as it is

### NR\_AS\_Security\_Type

TTCN-3 Union Type		
Name	NR_AS_Security_Type	
Comment	Security mode command procedure (TS 38.331, clause 5.3.4): !!!! NR-FFS: both SMC and SMComp are integrity protected !!!! !!!! NR-FFS: (nevertheless SS shall be able to cope with unprotected SM reject); !!!! !!!! NR-FFS: ciphering is started just after SMComp (acc. to TS 38.331, clause 5.3.4.3 and 5.3.1.1) !!!!	
StartRestart	<a href="#">NR_AS_SecStartRestart_Type</a>	information to start/restart AS security protection in the PDCP
Release	<a href="#">Null_Type</a>	to release AS security protection in the PDCP

## D.1.7 System\_Indication\_Control

Primitive for control of system indications for special purposes

### NR\_System\_IndicationControl\_Type

TTCN-3 Record Type			
Name	NR_System_IndicationControl_Type		
Comment	Initially all indications apart from "Error" are disabled in SS (i.e. it shall not be necessary in 'normal' test cases to use this primitive but only if a specific indication is needed); omit means indication mode is not changed		
RLC_Discard	<a href="#">IndicationAndControlMode_Type</a>	opt	To enable/disable reporting of discarded RLC PDUs
MAC_BSR	<a href="#">IndicationAndControlMode_Type</a>	opt	To enable/disable reporting of short/long BSR
MAC_PHR	<a href="#">IndicationAndControlMode_Type</a>	opt	To enable/disable reporting of short/long PHR
RachPreamble	<a href="#">IndicationAndControlMode_Type</a>	opt	To enable/disable reporting of PRACH preamble
SchedReq	<a href="#">IndicationAndControlMode_Type</a>	opt	To enable/disable reporting of Scheduling Request
UL_HARQ	<a href="#">IndicationAndControlMode_Type</a>	opt	To enable/disable reporting of reception of HARQ ACK/NACK
HarqError	<a href="#">IndicationAndControlMode_Type</a>	opt	To enable/disable reporting of HARQ errors

## D.1.8 PDCP\_Count

Primitives to enquire PDCP COUNT

### NR\_PdcpCountFormat\_Type

TTCN-3 Enumerated Type	
Name	NR_PdcpCountFormat_Type
Comment	
PdcpCount_Srb	20 bit HFN; 12 bit SQF
PdcpCount_DrbSQN 12	20 bit HFN; 12 bit SQF
PdcpCount_DrbSQN 18	14 bit HFN; 18 bit SQF

### NR\_PdcpCount\_Type

TTCN-3 Record Type		
Name	NR_PdcpCount_Type	
Comment		
Format	<a href="#">NR_PdcpCountFormat_Type</a>	
Value	<a href="#">PdcpCountValue_Type</a>	

**NR\_PdcpCountInfo\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_PdcpCountInfo_Type</b>		
<b>Comment</b>			
RadioBearerId	<a href="#">NR_RadioBearerId_Type</a>		
UL	<a href="#">NR_PdcpCount_Type</a>	opt	omit: keep as it is
DL	<a href="#">NR_PdcpCount_Type</a>	opt	omit: keep as it is

**NR\_PdcpCountInfoList\_Type**

TTCN-3 Record of Type	
<b>Name</b>	<b>NR_PdcpCountInfoList_Type</b>
<b>Comment</b>	
record of <a href="#">NR_PdcpCountInfo_Type</a>	

**NR\_PdcpCountGetReq\_Type**

TTCN-3 Union Type		
<b>Name</b>	<b>NR_PdcpCountGetReq_Type</b>	
<b>Comment</b>		
AllRBs	<a href="#">Null_Type</a>	return COUNT values for all RBs being configured
SingleRB	<a href="#">NR_RadioBearerId_Type</a>	

**NR\_PDCP\_CountReq\_Type**

TTCN-3 Union Type		
<b>Name</b>	<b>NR_PDCP_CountReq_Type</b>	
<b>Comment</b>		
Get	<a href="#">NR_PdcpCountGetReq_Type</a>	Request PDCP count for one or all RBs being configured at the PDCP
Set	<a href="#">NR_PdcpCountInfoList_Type</a>	Set PDCP count for one or all RBs being configured at the PDCP; list for RBs which's COUNT shall be manipulated

**NR\_PDCP\_CountCnf\_Type**

TTCN-3 Union Type		
<b>Name</b>	<b>NR_PDCP_CountCnf_Type</b>	
<b>Comment</b>		
Get	<a href="#">NR_PdcpCountInfoList_Type</a>	RBs in ascending order; SRBs first
Set	<a href="#">Null_Type</a>	

**D.1.9 L1\_Test\_Mode**

Primitive for control of L1 Test Modes

**NR\_L1\_TestMode\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_L1_TestMode_Type</b>		
<b>Comment</b>			
DL_SCH_CRC	<a href="#">DL_SCH_CRC_Type</a>		Manipulation of CRC bit generation for DL-SCH
UL_RetransmissionMode	<a href="#">NR_UL_Retransmission_TestMode_Type</a>		either normal mode with UL retransmission only in case of HARQ error or test mode forcing adaptive retransmissions in UL

## NR\_MAC\_Test\_DL\_SCH\_CRC\_Mode\_Type

TTCN-3 Enumerated Type	
Name	NR_MAC_Test_DL_SCH_CRC_Mode_Type
Comment	
Normal	default mode, the CRC generation is correct
Erroneous	SS shall generate CRC error by toggling CRC bits; the CRC error shall be applied for all PDUs of the given RNTI and their retransmission until SS is configured back to 'normal' operation
Error1AndNormal	the SS generates wrong CRC for first transmission and correct CRC on first retransmission. Later SS operates in normal mode. The retransmission is automatically triggered by reception of HARQ NACK

## DL\_SCH\_CRC\_Type

TTCN-3 Union Type		
Name	DL_SCH_CRC_Type	
Comment	NOTE: CRC error mode for RA_RNTI is not addressed as it will be configured in RACHProcedureConfig	
C_RNTI	<a href="#">NR_MAC_Test_DL_SCH_CRC_Mode_Type</a>	to configure mode for CRC bit for all MAC PDUs for which C-RNTI is used in PDCCH transmission
SI_RNTI	<a href="#">NR_MAC_Test_DL_SCH_CRC_Mode_Type</a>	to configure mode for CRC bit for all MAC PDUs for which SI-RNTI is used in PDCCH transmission
SPS_RNTI	<a href="#">NR_MAC_Test_DL_SCH_CRC_Mode_Type</a>	to configure mode for CRC bit for all MAC PDUs for which SPS-RNTI is used in PDCCH transmission

## NR\_UL\_Retransmission\_TestMode\_Type

TTCN-3 Union Type		
Name	NR_UL_Retransmission_TestMode_Type	
Comment		
NormalMode	<a href="#">Null_Type</a>	UL retransmissions shall be autonomously requested by the SS when the SS detects a HARQ error; the adaptive retransmissions are configured according to configuration of the UL transmissions provided for the DCI format
ForceRetransmissions	<a href="#">Null_Type</a>	the SS shall schedule grants for adaptive re-transmissions independent of the HARQ result for the UL transmission; the SS shall force adaptive retransmissions as configured for the DCI format

## D.1.10 DCI\_Trigger

Primitive to trigger SS to send specific DCI (e.g. PDCCH order)

## NR\_DCI\_Trigger\_Type

TTCN-3 Union Type		
Name	NR_DCI_Trigger_Type	
Comment		
PdcchOrder	<a href="#">NR_PDCCH_Order_Type</a>	
DciFormat_2_0	<a href="#">NR_DciFormat_2_0_Type</a>	
DciFormat_2_1	<a href="#">NR_DciFormat_2_1_Type</a>	
DciFormat_2_2	<a href="#">NR_DciFormat_2_2_Type</a>	
DciFormat_2_3	<a href="#">NR_DciFormat_2_3_Type</a>	

## NR\_PDCCH\_Order\_Type

TTCN-3 Record Type			
Name	NR_PDCCH_Order_Type		
Comment	PDCCH order according to TS 38.212 clause 7.3.1.2.1 to initiate RA procedure (TS 38.321, clause 5.1.1): DCI format 1_0 with CRC scrambled by C-RNTI and the "Frequency domain resource assignment" field are of all ones		
RA_PreambleIndex	<a href="#">B6_Type</a>		ra-PreambleIndex according to TS 38.321 clause 5.1.2
UL_SUL_Indicator	<a href="#">NR_DciCommon_UL_SUL_Indicator_Type</a>		indicates which UL carrier in the cell to transmit the PRACH if the UE is configured with SUL in the cell and RA_PreambleIndex != '000000'B; "None" otherwise
SSB_Index	<a href="#">B6_Type</a>		indicates the SS/PBCH that shall be used to determine the RACH occasion for the PRACH transmission if RA_PreambleIndex != '000000'B; '000000'B (reserved) otherwise
PrachMaskIndex	<a href="#">B4_Type</a>		indicates the RACH occasion associated with the SS/PBCH indicated by "SS/PBCH index" for the PRACH transmission, according to TS 38.321 clause 5.1.1; '0000'B (reserved) otherwise

## NR\_DciFormat\_2\_0\_Type

TTCN-3 Record Type	
Name	NR_DciFormat_2_0_Type
Comment	TS 38.212 clause 7.3.3.1: for notifying the slot format; default parameters according to TS 38.508-1 clause 4.3.6.1.3.1; place-holder to be replaced when there are test cases dealing with DCI format 2_0; NOTE: SS also may need SlotFormatIndicator configuration as signalled to the UE in PDCCH-Config.slotFormatIndicator

## NR\_DciFormat\_2\_1\_Type

TTCN-3 Record Type	
Name	NR_DciFormat_2_1_Type
Comment	TS 38.212 clause 7.3.3.2: notifying the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE; default parameters according to TS 38.508-1 clause 4.3.6.1.3.2; place-holder to be replaced when there are test cases dealing with DCI format 2_1; NOTE: SS also may need DownlinkPreemption configuration as signalled to the UE in PDCCH-Config.downlinkPreemption

## NR\_DciFormat\_2\_2\_Type

TTCN-3 Record Type	
Name	NR_DciFormat_2_2_Type
Comment	TS 38.212 clause 7.3.3.3: for the transmission of TPC commands for PUCCH and PUSCH; default parameters according to TS 38.508-1 clause 4.3.6.1.3.3; place-holder to be replaced when there are test cases dealing with DCI format 2_2; NOTE: SS may need additional configuration as signalled to the UE in PDCCH-Config.tpc-PUSCH and PDCCH-Config.tpc-PUCCH

### NR\_DciFormat\_2\_3\_Type

TTCN-3 Record Type	
<b>Name</b>	<b>NR_DciFormat_2_3_Type</b>
<b>Comment</b>	TS 38.212 clause 7.3.3.4: for the transmission of a group of TPC commands for SRS transmissions by one or more UEs; default parameters according to TS 38.508-1 clause 4.3.6.1.3.4; place-holder to be replaced when there are test cases dealing with DCI format 2_3; NOTE: SS may need additional configuration as signalled to the UE in PDCCH-Config.tpc-PUSCH and PDCCH-Config.tpc-PUCCH

## D.1.11 System\_Indications

Primitives for System indications

### NR\_HarqProcessInfo\_Type

TTCN-3 Record Type	
<b>Name</b>	<b>NR_HarqProcessInfo_Type</b>
<b>Comment</b>	
Id	<a href="#">NR_HarqProcessId_Type</a>

### NR\_HarqError\_Type

TTCN-3 Union Type	
<b>Name</b>	<b>NR_HarqError_Type</b>
<b>Comment</b>	
UL	<a href="#">NR_HarqProcessInfo_Type</a> indicates HARQ error detected at the SS side (error at UL transmission)
DL	<a href="#">NR_HarqProcessInfo_Type</a> indicates HARQ NACK sent by the UE (error at DL transmission)

### NR\_RachPreamble\_Type

TTCN-3 Record Type	
<b>Name</b>	<b>NR_RachPreamble_Type</b>
<b>Comment</b>	
RAPID	integer indicates the RAPID of the preamble (integer (0..63))

### NR\_RlcDiscardInd\_Type

TTCN-3 Record Type	
<b>Name</b>	<b>NR_RlcDiscardInd_Type</b>
<b>Comment</b>	SS shall send this indication if it discards a received RLC AMD PDU as specified in TS 38.322 cl. 5.2.3.2.2
SequenceNumber	integer sequence number of the PDU being discarded



## D.1.12 System\_Interface

### NR\_SYSTEM\_CTRL\_REQ

TTCN-3 Record Type			
Name	NR_SYSTEM_CTRL_REQ		
Comment			
Common	<a href="#">NR_ReqAspCommonPart_Type</a>		TimingInfo depends on respective primitive:
Request	<a href="#">NR_SystemRequest_Type</a>		<ul style="list-style-type: none"> <li>- Cell TimingInfo: 'now' (in general)</li> <li>- CellAttenuationList TimingInfo: 'now' (in general, but activation time may be used also)</li> <li>- RadioBearerList TimingInfo: 'now' in general; activation time may be used in special case for release and/or reconfiguration of one or several RBs; the following rules shall be considered:                             <ul style="list-style-type: none"> <li>- release/Reconfiguration of an RB shall not be scheduled earlier than 5ms after a previous data transmission on this RB</li> <li>- subsequent release and reconfiguration(s) shall be scheduled with an interval of at least 5ms</li> <li>- a subsequent data transmission on an RB shall not be scheduled earlier than 5ms after the last reconfiguration of the RB the configuration shall be performed exactly at the given time</li> </ul> </li> <li>- EnquireTiming TimingInfo: 'now'</li> <li>- AS_Security TimingInfo: 'now'; NOTE: "activation time" may be specified in the primitive based on PDCP SQN</li> <li>- Sps TimingInfo: activation time for SPS assignment transmission</li> <li>- Paging TimingInfo: Calculated paging occasion</li> <li>- L1MacIndCtrl TimingInfo: 'now' (in general)</li> <li>- Pdcpcnt TimingInfo: 'now' (in general) activation time may be used in case of CA inter cell handover to set the Pdcpcnt</li> <li>- L1_TestMode TimingInfo: depends on the test mode; activation time is used e.g. for manipulation of the CRC</li> <li>- PdcchOrder TimingInfo: 'now' (in general)</li> </ul>

### NR\_SYSTEM\_CTRL\_CNF

TTCN-3 Record Type			
Name	NR_SYSTEM_CTRL_CNF		
Comment			
Common	<a href="#">NR_CnfAspCommonPart_Type</a>		TimingInfo is ignored by TTCN (apart from EnquireTiming) => SS may set TimingInfo to "None"
Confirm	<a href="#">NR_SystemConfirm_Type</a>		

## NR\_SYSTEM\_IND

TTCN-3 Record Type			
Name	NR_SYSTEM_IND		
Comment			
Common	<a href="#">NR_IndAspCommonPart_Type</a>		The SS shall provide TimingInfo depending on the respective indication:
Indication	<a href="#">NR_SystemIndication_Type</a>		<ul style="list-style-type: none"> <li>- Error TimingInfo: related to the error (if available)</li> <li>- RlcDiscardInd TimingInfo: slot in which the RLC PDU has been received</li> <li>- MAC TimingInfo: slot in which the MAC PDU has been received containing the MAC CE being indicated</li> <li>- RachPreamble TimingInfo: start of the RACH preamble</li> <li>- SchedReq TimingInfo: slot containing the SR</li> <li>- UL_HARQ TimingInfo: slot containing the UL HARQ</li> <li>- HarqError TimingInfo: slot containing the UL HARQ</li> </ul>

## NR\_SYSTEM\_PORT

TTCN-3 Port Type			
Name	NR_SYSTEM_PORT		
Comment	NR PTC: Port for system configuration		
out	<a href="#">NR_SYSTEM_CTRL_REQ</a>		
in	<a href="#">NR_SYSTEM_CTRL_CNF</a>		

## NR\_SYSIND\_PORT

TTCN-3 Port Type			
Name	NR_SYSIND_PORT		
Comment	NR PTC: Port for system indications		
in	<a href="#">NR_SYSTEM_IND</a>		

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## D.2 NR\_ASP\_DrbDefs

ASP interface for DRBs

### D.2.1 PDU\_TypeDefs

#### D.2.1.1 MAC\_PDU

## NR\_MAC\_PDU\_DL\_Type

TTCN-3 Record Type			
Name	NR_MAC_PDU_DL_Type		
Comment			
CE_SubPDUList	<a href="#">NR_MAC_CE_SubPDU_DL_List_Type</a>	opt	list of subPDUs with MAC CE
SDU_SubPDUList	<a href="#">NR_MAC_SDU_SubPDU_List_Type</a>	opt	list of subPDUs with MAC SDU
Padding_SubPDU	<a href="#">NR_MAC_Padding_SubPDU_Type</a>	opt	subPDU with padding

## NR\_MAC\_PDU\_UL\_Type

TTCN-3 Record Type			
Name	NR_MAC_PDU_UL_Type		
Comment			
SDU_SubPDU List	<a href="#">NR_MAC_SDU_SubPDU_List_Type</a>	opt	list of subPDUs with MAC SDU
CE_SubPDUList	<a href="#">NR_MAC_CE_SubPDU_UL_List_Type</a>	opt	list of subPDUs with MAC CE
Padding_SubPDU	<a href="#">NR_MAC_Padding_SubPDU_Type</a>	opt	subPDU with padding

## NR\_MAC\_PDU\_Type

TTCN-3 Union Type			
Name	NR_MAC_PDU_Type		
Comment			
DL	<a href="#">NR_MAC_PDU_DL_Type</a>		
UL	<a href="#">NR_MAC_PDU_UL_Type</a>		

## NR\_MAC\_PDUList\_Type

TTCN-3 Record of Type	
Name	NR_MAC_PDUList_Type
Comment	
record of <a href="#">NR_MAC_PDU_Type</a>	

## D.2.1.1.1 MAC\_PDU\_SubPDU

MAC subPDU (TS 38.321 clause 6.1.2)

## MAC\_PDU\_SubPDU: Basic Type Definitions

TTCN-3 Basic Types		
B8_16_Type	bitstring length(8..16)	NOTE: length restriction can only be a range but not two distinct lengths
NR_MAC_SDU_Type	octetstring	

## NR\_MAC\_PDU\_SubHeader\_Type

TTCN-3 Record Type			
Name	NR_MAC_PDU_SubHeader_Type		
Comment	MAC PDU SubHeader (TS 38.321 clause 6.1.2)		
Reserved	<a href="#">B1_Type</a>		Reserved bit
Format	<a href="#">B1_Type</a>		F: The Format field indicates the size of the Length field according to TS 38.321 clause 6.2.1: value 0 => 8 bits, value 1 => 16 bits. In case of MAC subheader for fixed sized MAC CE or padding (R/LCID MAC subheader) this field is reserved (i.e. treated as another R field)
LCID	<a href="#">B6_Type</a>		LCID: Logical Channel ID field according to TS 38.321 Tables 6.2.1-1 and 6.2.1-2
Length	<a href="#">B8_16_Type</a>	opt	Either omit (fixed-sized MAC CE) or 8 bits (F=0) or 16 bits (F=1)

**NR\_MAC\_CE\_SubPDU\_DL\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_MAC_CE_SubPDU_DL_Type</b>		
<b>Comment</b>	MAC DL subPPU with MAC subheader only (in case of MAC CE with fixed size of zero bits) or MAC subheader + MAC CE		
SubHeader	<a href="#">NR_MAC_PDU_SubHeader_Type</a>		
ControlElement	<a href="#">NR_MAC_ControlElementDL_Type</a>	opt	omit if MAC CE has fixed size of zero bits

**NR\_MAC\_CE\_SubPDU\_DL\_List\_Type**

TTCN-3 Set of Type	
<b>Name</b>	<b>NR_MAC_CE_SubPDU_DL_List_Type</b>
<b>Comment</b>	
set of <a href="#">NR_MAC_CE_SubPDU_DL_Type</a>	

**NR\_MAC\_CE\_SubPDU\_UL\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_MAC_CE_SubPDU_UL_Type</b>		
<b>Comment</b>	MAC UL subPPU with MAC subheader only (in case of MAC CE with fixed size of zero bits) or MAC subheader + MAC CE		
SubHeader	<a href="#">NR_MAC_PDU_SubHeader_Type</a>		
ControlElement	<a href="#">NR_MAC_ControlElementUL_Type</a>	opt	omit if MAC CE has fixed size of zero bits

**NR\_MAC\_CE\_SubPDU\_UL\_List\_Type**

TTCN-3 Set of Type	
<b>Name</b>	<b>NR_MAC_CE_SubPDU_UL_List_Type</b>
<b>Comment</b>	
set of <a href="#">NR_MAC_CE_SubPDU_UL_Type</a>	

**NR\_MAC\_SDU\_SubPDU\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_MAC_SDU_SubPDU_Type</b>		
<b>Comment</b>	MAC subPPU with MAC subheader + MAC SDU		
SubHeader	<a href="#">NR_MAC_PDU_SubHeader_Type</a>		
SDU	<a href="#">NR_MAC_SDU_Type</a>		

**NR\_MAC\_SDU\_SubPDU\_List\_Type**

TTCN-3 Set of Type	
<b>Name</b>	<b>NR_MAC_SDU_SubPDU_List_Type</b>
<b>Comment</b>	
set of <a href="#">NR_MAC_SDU_SubPDU_Type</a>	

## NR\_MAC\_Padding\_SubPDU\_Type

TTCN-3 Record Type		
Name	NR_MAC_Padding_SubPDU_Type	
Comment	MAC subPPU with MAC subheader + Padding	
SubHeader	<a href="#">NR_MAC_PDU_SubHeader_Type</a>	
Padding	octetstring	0 or more octets padding

## D.2.1.1.2 MAC\_ControlElements

MAC Control Elements (CEs) (TS 38.321 clause 6.1.3)

## NR\_MAC\_ControlElementDL\_Type

TTCN-3 Union Type		
Name	NR_MAC_ControlElementDL_Type	
Comment		
ContentionResolutionID	<a href="#">NR_MAC_CE_ContentionResolutionID_Type</a>	TS 38.321 clause 6.1.3.3
TimingAdvance	<a href="#">NR_MAC_CE_TimingAdvance_Type</a>	TS 38.321 clause 6.1.3.4
SCellActDeact	<a href="#">NR_MAC_CE_SCellActDeact_Type</a>	TS 38.321 clause 6.1.3.10
DuplicationActDeact	<a href="#">NR_MAC_CE_DuplicationActDeact_Type</a>	TS 38.321 clause 6.1.3.11
SP_ResourceSetActDeact	<a href="#">NR_MAC_CE_SP_ResourceSetActDeact_Type</a>	TS 38.321 clause 6.1.3.12
CSI_TriggerStateSubselection	<a href="#">NR_MAC_CE_CSI_TriggerStateSubselection_Type</a>	TS 38.321 clause 6.1.3.13
TCI_StatesActDeact	<a href="#">NR_MAC_CE_TCI_StatesActDeact_Type</a>	TS 38.321 clause 6.1.3.14
TCI_StateIndication	<a href="#">NR_MAC_CE_TCI_StateIndication_Type</a>	TS 38.321 clause 6.1.3.15
SP_CSI_ReportingActDeact	<a href="#">NR_MAC_CE_SP_CSI_ReportingActDeact_Type</a>	TS 38.321 clause 6.1.3.16
SP_SRS_ActDeact	<a href="#">NR_MAC_CE_SP_SRS_ActDeact_Type</a>	TS 38.321 clause 6.1.3.17
PUCCH_SpatialRelationActDeact	<a href="#">NR_MAC_CE_PUCCH_SpatialRelationActDeact_Type</a>	TS 38.321 clause 6.1.3.18
SP_ZP_ResourceSetActDeact	<a href="#">NR_MAC_CE_SP_ZP_ResourceSetActDeact_Type</a>	TS 38.321 clause 6.1.3.19
RecommendedBitrate	<a href="#">NR_MAC_CE_RecommendedBitrate_Type</a>	TS 38.321 clause 6.1.3.20

## NR\_MAC\_ControlElementUL\_Type

TTCN-3 Union Type		
Name	NR_MAC_ControlElementUL_Type	
Comment		
ShortBSR	<a href="#">NR_MAC_CE_ShortBSR_Type</a>	TS 38.321 clause 6.1.3.1
LongBSR	<a href="#">NR_MAC_CE_LongBSR_Type</a>	TS 38.321 clause 6.1.3.1
C_RNTI	<a href="#">RNTI_B16_Type</a>	TS 38.321 clause 6.1.3.2
SingleEntryPHR	<a href="#">NR_MAC_CE_SingleEntryPHR_Type</a>	TS 38.321 clause 6.1.3.8
MultiEntryPHR	<a href="#">NR_MAC_CE_MultiEntryPHR_Type</a>	TS 38.321 clause 6.1.3.9
RecommendedBitrate	<a href="#">NR_MAC_CE_RecommendedBitrate_Type</a>	TS 38.321 clause 6.1.3.20

## D.2.1.1.2.1 MAC\_ControlElement\_Common

## NR\_MAC\_CE\_SCellFlags\_Type

TTCN-3 Record Type			
<b>Name</b>	<b>NR_MAC_CE_SCellFlags_Type</b>		
<b>Comment</b>	bitmap to indicate presence of SCell with SCellIndex according to TS 38.331 either SCellIndex7_1 is present only or all octets are present		
SCellIndex7_1	<a href="#">B8_Type</a>		leftmost bit corresponds to SCellIndex7, 2nd bit from the right corresponds to SCellIndex1, rightmost bit is reserved
SCellIndex15_8	<a href="#">B8_Type</a>	opt	leftmost bit corresponds to SCellIndex15, rightmost bit corresponds to SCellIndex8
SCellIndex23_16	<a href="#">B8_Type</a>	opt	leftmost bit corresponds to SCellIndex23, rightmost bit corresponds to SCellIndex16
SCellIndex31_24	<a href="#">B8_Type</a>	opt	leftmost bit corresponds to SCellIndex31, rightmost bit corresponds to SCellIndex24

## NR\_MAC\_CE\_AD\_ServCellId\_Bwpld\_Type

TTCN-3 Record Type			
<b>Name</b>	<b>NR_MAC_CE_AD_ServCellId_Bwpld_Type</b>		
<b>Comment</b>	Common definition for first octet of CEs defined in TS 38.321 clause 6.1.3.12 .. TS 38.321 clause 6.1.3.19		
AD	<a href="#">B1_Type</a>		A/D field for NR_MAC_CE_SP_ResourceSetActDeact_Type and NR_MAC_CE_SP_SRS_ActDeact_Type reserved (set to 0) otherwise
ServCellId	<a href="#">B5_Type</a>		identity of the Serving Cell for which the MAC CE applies
Bwpld	<a href="#">B2_Type</a>		BWP-Id (as specified in TS 38.331) of the uplink/downlink bandwidth part for which the MAC CE applies

## D.2.1.1.2.2 MAC\_ControlElement\_BSR

TS 38.321 clause 6.1.3.1 (Buffer Status Report MAC CEs)

## MAC\_ControlElement\_BSR: Basic Type Definitions

TTCN-3 Basic Types		
NR_MAC_LongBSR_BufferSize_Type	<a href="#">O1_Type</a>	

## NR\_MAC\_CE\_ShortBSR\_Type

TTCN-3 Record Type			
<b>Name</b>	<b>NR_MAC_CE_ShortBSR_Type</b>		
<b>Comment</b>	Short BSR and Short Truncated BSR MAC CE according to TS 38.321 Figure 6.1.3.1-1		
LCG	<a href="#">B3_Type</a>		
BufferSize	<a href="#">B5_Type</a>		

## NR\_MAC\_LongBSR\_BufferSizeList\_Type

TTCN-3 Record of Type	
<b>Name</b>	<b>NR_MAC_LongBSR_BufferSizeList_Type</b>
<b>Comment</b>	record length (1..8) of <a href="#">NR_MAC_LongBSR_BufferSize_Type</a>

## NR\_MAC\_CE\_LongBSR\_Type

TTCN-3 Record Type			
Name	NR_MAC_CE_LongBSR_Type		
Comment	Long BSR and Long Truncated BSR MAC CE according to TS 38.321 Figure 6.1.3.1-2		
LCG_Presence	<a href="#">B8_Type</a>		'1' indicates that the Buffer Size field for a logical channel group i is reported, with i = 7 for the leftmost bit and i = 0 for the rightmost
BufferSizeList	<a href="#">NR_MAC_LongBSR_BufferSizeList_Type</a>		According to TS 38.321 clause 6.1.3.1 the Buffer Size fields are included in ascending order based on the LCGi

## D.2.1.1.2.3 MAC\_ControlElement\_ContentionResolutionId

TS 38.321 clause 6.1.3.3 (UE Contention Resolution Identity MAC CE)

## MAC\_ControlElement\_ContentionResolutionId: Basic Type Definitions

TTCN-3 Basic Types		
NR_MAC_CE_ContentionResolutionId_Type	<a href="#">B48_Type</a>	TS 38.321 Figure 6.1.3.3-1; fix size of 48 bits

## D.2.1.1.2.4 MAC\_ControlElement\_TimingAdvance

TS 38.321 clause 6.1.3.4 (Timing Advance Command MAC CE)

## NR\_MAC\_CE\_TimingAdvance\_Type

TTCN-3 Record Type			
Name	NR_MAC_CE_TimingAdvance_Type		
Comment	TS 38.321 Figure 6.1.3.4-1		
TAG_ID	<a href="#">B2_Type</a>		TAG Identity of the addressed TAG
TimingAdvanceCommand	<a href="#">B6_Type</a>		index value TA (0..63) used to control the amount of timing adjustment that MAC entity has to apply (as specified in TS 38.213)

## D.2.1.1.2.5 MAC\_ControlElement\_PHR

TS 38.321 clause 6.1.3.8 (Single Entry PHR) and 6.1.3.9 (Multiple Entry PHR)

## MAC\_ControlElement\_PHR: Basic Type Definitions

TTCN-3 Basic Types		
NR_MAC_CE_SingleEntryPHR_Type	<a href="#">NR_MAC_CE_PH_Record_Type</a>	TS 38.321 Figure 6.1.3.8-1

## NR\_MAC\_CE\_PH\_Record\_Type

TTCN-3 Record Type			
Name	NR_MAC_CE_PH_Record_Type		
Comment			
P_Bit	<a href="#">B1_Type</a>		P bit: 1 indicates the UE applies power backoff due to power management; reserved (R = '0'B) for Single Entry PHR MAC CE
V_Bit	<a href="#">B1_Type</a>		V bit: Indicates when the PH value is based on a real transmission or a reference format; reserved (R = '0'B) for Single Entry PHR MAC CE
Value	<a href="#">B6_Type</a>		The power headroom level. Ph Type 2 (if configured) for Pcell and Type 1 for Pcell and Scell
Reserved	<a href="#">B2_Type</a>	opt	2 reserved bits; present if V=1
PCMaxc	<a href="#">B6_Type</a>	opt	present if V=1

**NR\_MAC\_CE\_MultiEntryPHR\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_MAC_CE_MultiEntryPHR_Type</b>		
<b>Comment</b>	TS 38.321 Figure 6.1.3.9-1 and Figure 6.1.3.9-2		
PHFieldPresentForSCell	<a href="#">NR_MAC_CE_SCellFlags_Type</a>		to indicate presence of PH field for particular SCell
PH_Record	record of <a href="#">NR_MAC_CE_PH_Record_Type</a>		list of PH_Records for PCell and SCells as described in TS 38.321 clause 6.1.3.9

D.2.1.1.2.6 MAC\_ControlElement\_SCellActivationDeactivation

TS 38.321 clause 6.1.3.10 (SCell Activation/Deactivation MAC CEs)

**MAC\_ControlElement\_SCellActivationDeactivation: Basic Type Definitions**

TTCN-3 Basic Types		
<b>NR_MAC_CE_SCellActDeact_Type</b>	<a href="#">NR_MAC_CE_SCellFlags_Type</a>	TS 38.321 Figure 6.1.3.10-1 and Figure 6.1.3.10-2

D.2.1.1.2.7 MAC\_ControlElement\_DuplicationActivationDeactivation

TS 38.321 clause 6.1.3.11 (Duplication Activation/Deactivation MAC CE)

**MAC\_ControlElement\_DuplicationActivationDeactivation: Basic Type Definitions**

TTCN-3 Basic Types		
<b>NR_MAC_CE_DuplicationActDeact_Type</b>	<a href="#">B8_Type</a>	TS 38.321 Figure 6.1.3.11-1

D.2.1.1.2.8 MAC\_ControlElement\_SP\_ResourceSetActivationDeactivation

TS 38.321 clause 6.1.3.12 (SP CSI-RS / CSI-IM Resource Set Activation/Deactivation MAC CE)

**NR\_MAC\_CE\_SP\_ResourceSetActDeact\_Octet2\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_MAC_CE_SP_ResourceSetActDeact_Octet2_Type</b>		
<b>Comment</b>			
Reserved	<a href="#">B1_Type</a>		
IM	<a href="#">B1_Type</a>		indicates whether or not octet 3 is present
CSI_RS_ResourceSetId	<a href="#">B6_Type</a>		

**NR\_MAC\_CE\_SP\_ResourceSetActDeact\_Octet3\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_MAC_CE_SP_ResourceSetActDeact_Octet3_Type</b>		
<b>Comment</b>			
Reserved	<a href="#">B2_Type</a>		
CSI_IM_ResourceSetId	<a href="#">B6_Type</a>		



**NR\_MAC\_CE\_SP\_ResourceSetActDeact\_TciStateld\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_MAC_CE_SP_ResourceSetActDeact_TciStateld_Type</b>		
<b>Comment</b>			
Reserved	<a href="#">B2_Type</a>		
Id	<a href="#">B6_Type</a>		

**NR\_MAC\_CE\_SP\_ResourceSetActDeact\_TciStateldList\_Type**

TTCN-3 Record of Type			
<b>Name</b>	<b>NR_MAC_CE_SP_ResourceSetActDeact_TciStateldList_Type</b>		
<b>Comment</b>			
record of <a href="#">NR_MAC_CE_SP_ResourceSetActDeact_TciStateld_Type</a> eld_Type			

**NR\_MAC\_CE\_SP\_ResourceSetActDeact\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_MAC_CE_SP_ResourceSetActDeact_Type</b>		
<b>Comment</b>	TS 38.321 Figure 6.1.3.12-1		
Octet1	<a href="#">NR_MAC_CE_AD_ServCellId_Bwpld_Type</a>		
Octet2	<a href="#">NR_MAC_CE_SP_ResourceSetActDeact_Octet2_Type</a>		
Octet3	<a href="#">NR_MAC_CE_SP_ResourceSetActDeact_Octet3_Type</a>	opt	present if IM=1 in octet 2
IdList	<a href="#">NR_MAC_CE_SP_ResourceSetActDeact_TciStateldList_Type</a>		

**D.2.1.1.2.9 MAC\_ControlElement\_CSI\_TriggerStateSubselection**

TS 38.321 clause 6.1.3.13 (Aperiodic CSI Trigger State Subselection MAC CE)

**NR\_MAC\_CE\_CSI\_TriggerStateSubselection\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_MAC_CE_CSI_TriggerStateSubselection_Type</b>		
<b>Comment</b>	TS 38.321 Figure 6.1.3.13-1		
Octet1	<a href="#">NR_MAC_CE_AD_ServCellId_Bwpld_Type</a>		A/D field: reserved
Selection	<a href="#">B8_List_Type</a>		

**D.2.1.1.2.10 MAC\_ControlElement\_TCI\_StatesActivationDeactivation**

TS 38.321 clause 6.1.3.14 (TCI States Activation/Deactivation for UE-specific PDSCH MAC CE)

**NR\_MAC\_CE\_TCI\_StatesActDeact\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_MAC_CE_TCI_StatesActDeact_Type</b>		
<b>Comment</b>	TS 38.321 Figure 6.1.3.14-1		
Octet1	<a href="#">NR_MAC_CE_AD_ServCellId_Bwpld_Type</a>		A/D field: reserved
Status	<a href="#">B8_List_Type</a>		

**D.2.1.1.2.11 MAC\_ControlElement\_TCI\_StateIndication**

TS 38.321 clause 6.1.3.15 (TCI State Indication for UE-specific PDCCH MAC CE)

## NR\_MAC\_CE\_TCI\_StateIndication\_Octet2\_Type

TTCN-3 Record Type			
Name	NR_MAC_CE_TCI_StateIndication_Octet2_Type		
Comment			
CoresetId	<a href="#">B2_Type</a>		
TciStateId	<a href="#">B6_Type</a>		

## NR\_MAC\_CE\_TCI\_StateIndication\_Type

TTCN-3 Record Type			
Name	NR_MAC_CE_TCI_StateIndication_Type		
Comment	TS 38.321 Figure 6.1.3.15-1		
Octet1	<a href="#">NR_MAC_CE_AD_ServCell Id_Bwpld_Type</a>		A/D field: reserved
Octet2	<a href="#">NR_MAC_CE_TCI_StateIn dication_Octet2_Type</a>		

## D.2.1.1.2.12 MAC\_ControlElement\_SP\_CSI\_ReportingActivationDeactivation

TS 38.321 clause 6.1.3.16 (SP CSI reporting on PUCCH Activation/Deactivation MAC CE)

## NR\_MAC\_CE\_SP\_CSI\_ReportingActDeact\_Type

TTCN-3 Record Type			
Name	NR_MAC_CE_SP_CSI_ReportingActDeact_Type		
Comment	TS 38.321 Figure 6.1.3.16-1		
Octet1	<a href="#">NR_MAC_CE_AD_ServCell Id_Bwpld_Type</a>		A/D field: reserved
ConfigState	<a href="#">B8_Type</a>		

## D.2.1.1.2.13 MAC\_ControlElement\_SP\_SRS\_ActivationDeactivation

## NR\_MAC\_CE\_SP\_SRS\_ActDeact\_Octet2\_Type

TTCN-3 Record Type			
Name	NR_MAC_CE_SP_SRS_ActDeact_Octet2_Type		
Comment	TS 38.321 clause 6.1.3.17 (SP SRS Activation/Deactivation MAC CE)		
Reserved	<a href="#">B2_Type</a>		
C	<a href="#">B1_Type</a>		
SUL	<a href="#">B1_Type</a>		
SRS_Resource setId	<a href="#">B4_Type</a>		

## NR\_MAC\_CE\_SP\_SRS\_ActDeact\_ResourceId\_Type

TTCN-3 Record Type			
Name	NR_MAC_CE_SP_SRS_ActDeact_ResourceId_Type		
Comment			
F	<a href="#">B1_Type</a>		
Id	<a href="#">B7_Type</a>		

## NR\_MAC\_CE\_SP\_SRS\_ActDeact\_ResourceIdList\_Type

TTCN-3 Record of Type			
Name	NR_MAC_CE_SP_SRS_ActDeact_ResourceIdList_Type		
Comment			
record of <a href="#">NR_MAC_CE_SP_SRS_ActDeact_ResourceId_Type</a>			

## NR\_MAC\_CE\_SP\_SRS\_ActDeact\_ResourceInfo\_Type

TTCN-3 Record Type			
Name	NR_MAC_CE_SP_SRS_ActDeact_ResourceInfo_Type		
Comment			
Reserved	<a href="#">B1_Type</a>		
ServingCellId	<a href="#">B5_Type</a>		
BwpId	<a href="#">B2_Type</a>		

## NR\_MAC\_CE\_SP\_SRS\_ActDeact\_ResourceInfoList\_Type

TTCN-3 Record of Type			
Name	NR_MAC_CE_SP_SRS_ActDeact_ResourceInfoList_Type		
Comment			
record of <a href="#">NR_MAC_CE_SP_SRS_ActDeact_ResourceInfo_Type</a>			

## NR\_MAC\_CE\_SP\_SRS\_ActDeact\_Type

TTCN-3 Record Type			
Name	NR_MAC_CE_SP_SRS_ActDeact_Type		
Comment	TS 38.321 Figure 6.1.3.17-1		
Octet1	<a href="#">NR_MAC_CE_AD_ServCellId_BwpId_Type</a>		
Octet2	<a href="#">NR_MAC_CE_SP_SRS_ActDeact_Octet2_Type</a>		
ResourceIdList	<a href="#">NR_MAC_CE_SP_SRS_ActDeact_ResourceIdList_Type</a>		
ResourceInfoList	<a href="#">NR_MAC_CE_SP_SRS_ActDeact_ResourceInfoList_Type</a>		empty list when C=0

## D.2.1.1.2.14 MAC\_ControlElement\_PUCCH\_SpatialRelationActivationDeactivation

TS 38.321 clause 6.1.3.18 (PUCCH spatial relation Activation/Deactivation MAC CE)

## NR\_MAC\_CE\_PUCCH\_SpatialRelationActDeact\_Octet2\_Type

TTCN-3 Record Type			
Name	NR_MAC_CE_PUCCH_SpatialRelationActDeact_Octet2_Type		
Comment			
Reserved	<a href="#">B1_Type</a>		
ResourceId	<a href="#">B7_Type</a>		

## NR\_MAC\_CE\_PUCCH\_SpatialRelationActDeact\_Type

TTCN-3 Record Type			
Name	NR_MAC_CE_PUCCH_SpatialRelationActDeact_Type		
Comment	TS 38.321 Figure 6.1.3.18-1		
Octet1	<a href="#">NR_MAC_CE_AD_ServCellId_BwpId_Type</a>		A/D field: reserved
Octet2	<a href="#">NR_MAC_CE_PUCCH_SpatialRelationActDeact_Octet2_Type</a>		
ActivationStatus	<a href="#">B8_Type</a>		

## D.2.1.1.2.15 MAC\_ControlElement\_ZP\_ResourceSetActivationDeactivation

TS 38.321 clause 6.1.3.19 (SP ZP CSI-RS Resource Set Activation/Deactivation MAC CE)

## NR\_MAC\_CE\_SP\_ZP\_ResourceSetActDeact\_Octet2\_Type

TTCN-3 Record Type			
Name	NR_MAC_CE_SP_ZP_ResourceSetActDeact_Octet2_Type		
Comment			
Reserved	<a href="#">B4_Type</a>		
Id	<a href="#">B4_Type</a>		

## NR\_MAC\_CE\_SP\_ZP\_ResourceSetActDeact\_Type

TTCN-3 Record Type			
Name	NR_MAC_CE_SP_ZP_ResourceSetActDeact_Type		
Comment	TS 38.321 Figure 6.1.3.19-1		
Octet1	<a href="#">NR_MAC_CE_AD_ServCellId_Bwpld_Type</a>		
Octet2	<a href="#">NR_MAC_CE_SP_ZP_ResourceSetActDeact_Octet2_Type</a>		

## D.2.1.1.2.16 MAC\_ControlElement\_RecommendedBitrate

TS 38.321 clause 6.1.3.20 (Recommended bit rate MAC CE)

## NR\_MAC\_CE\_RecommendedBitrate\_Type

TTCN-3 Record Type			
Name	NR_MAC_CE_RecommendedBitrate_Type		
Comment	TS 38.321 Figure 6.1.3.20-1		
LCID	<a href="#">B6_Type</a>		
UL_DL	<a href="#">B1_Type</a>		
Bitrate	<a href="#">B6_Type</a>		
Reserved	<a href="#">B3_Type</a>		

## D.2.1.2 RLC\_PDU

## RLC\_PDU: Basic Type Definitions

TTCN-3 Basic Types		
NR_RLC_SDU_Type	octetstring	

## NR\_RLC\_PDU\_Type

TTCN-3 Union Type		
Name	NR_RLC_PDU_Type	
Comment		
TMD	<a href="#">NR_RLC_TMD_PDU_Type</a>	
UMD	<a href="#">NR_RLC_UMD_PDU_Type</a>	
AMD	<a href="#">NR_RLC_AMD_PDU_Type</a>	
Status	<a href="#">NR_RLC_AM_StatusPDU_Type</a>	

## NR\_RLC\_PDUList\_Type

TTCN-3 Record of Type	
Name	NR_RLC_PDUList_Type
Comment	record of <a href="#">NR_RLC_PDU_Type</a>

## NR\_RLC\_SDUList\_Type

TTCN-3 Record of Type	
Name	NR_RLC_SDUList_Type
Comment	
record of <a href="#">NR_RLC_SDU_Type</a>	

## D.2.1.2.1 Common

RLC PDU definition: common AM/UM field definitions

## Common: Basic Type Definitions

TTCN-3 Basic Types		
NR_RLC_SegmentationInfo_Type	<a href="#">B2_Type</a>	Segmentation Info (SI) field (TS 38.322, clause 6.2.3.4) 00 - Data field contains all bytes of an RLC SDU 01 - Data field contains the first segment of an RLC SDU 10 - Data field contains the last segment of an RLC SDU 11 - Data field contains neither the first nor last segment of an RLC SDU
NR_RLC_SegmentOffset_Type	<a href="#">B16_Type</a>	Segment Offset (SO) field (TS 38.322, 6.2.3.5)

## D.2.1.2.2 TM\_Data

RLC PDU definition: UM (TS 38.322, clause 6.2.2.2)

## TM\_Data: Basic Type Definitions

TTCN-3 Basic Types		
NR_RLC_TMD_PDU_Type	octetstring	TS 38.322, clause 6.2.2.2

## D.2.1.2.3 UM\_Data

RLC PDU definition: UM (TS 38.322, clause 6.2.2.3)

## UM\_Data: Basic Type Definitions

TTCN-3 Basic Types		
NR_RLC_UMD_Data_Type	octetstring	TS 38.322, clause 6.2.2.3

## NR\_RLC\_UMD\_HeaderNoSN\_Type

TTCN-3 Record Type			
Name	NR_RLC_UMD_HeaderNoSN_Type		
Comment	TS 38.322, clause 6.2.2.3 (Figure 6.2.2.3-1; one octet)		
SegmentationInfo	<a href="#">NR_RLC_SegmentationInfo_Type</a>		
Reserved	<a href="#">B6_Type</a>		

**NR\_RLC\_UMD\_PduNoSN\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_RLC_UMD_PduNoSN_Type</b>		
<b>Comment</b>	TS 38.322, clause 6.2.2.3 (Figure 6.2.2.3-1); one octet		
Header	<a href="#">NR_RLC_UMD_HeaderNoSN_Type</a>		
Data	<a href="#">NR_RLC_UMD_Data_Type</a>		

**NR\_RLC\_UMD\_HeaderSN6Bit\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_RLC_UMD_HeaderSN6Bit_Type</b>		
<b>Comment</b>	TS 38.322, clause 6.2.2.3 (6.2.2.3-2, 6.2.2.3-4); one octet		
SegmentationInfo	<a href="#">NR_RLC_SegmentationInfo_Type</a>		2 bits SI
SequenceNumber	<a href="#">B6_Type</a>		6 bits SN
SegmentOffset	<a href="#">NR_RLC_SegmentOffset_Type</a>	opt	16 bits SO; included in case of segmentation but not for the first segment (TS 38.322 clause 6.2.2.3)

**NR\_RLC\_UMD\_PduSN6Bit\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_RLC_UMD_PduSN6Bit_Type</b>		
<b>Comment</b>	TS 38.322, clause 6.2.2.3 (6.2.2.3-2, 6.2.2.3-4); one octet		
Header	<a href="#">NR_RLC_UMD_HeaderSN6Bit_Type</a>		
Data	<a href="#">NR_RLC_UMD_Data_Type</a>		

**NR\_RLC\_UMD\_HeaderSN12Bit\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_RLC_UMD_HeaderSN12Bit_Type</b>		
<b>Comment</b>	TS 38.322, clause 6.2.2.3 (Figure 6.2.2.3-3, 6.2.2.3-5); two octets		
SegmentationInfo	<a href="#">NR_RLC_SegmentationInfo_Type</a>		2 bits SI
Reserved	<a href="#">B2_Type</a>		2 bits reserved
SequenceNumber	<a href="#">B12_Type</a>		12 bits SN
SegmentOffset	<a href="#">NR_RLC_SegmentOffset_Type</a>	opt	16 bits SO; included in case of segmentation but not for the first segment (TS 38.322 clause 6.2.2.3)

**NR\_RLC\_UMD\_PduSN12Bit\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_RLC_UMD_PduSN12Bit_Type</b>		
<b>Comment</b>	TS 38.322, clause 6.2.2.3 (Figure 6.2.2.3-3, 6.2.2.3-5); two octets		
Header	<a href="#">NR_RLC_UMD_HeaderSN12Bit_Type</a>		
Data	<a href="#">NR_RLC_UMD_Data_Type</a>		

## NR\_RLC\_UMD\_PDU\_Type

TTCN-3 Union Type	
Name	NR_RLC_UMD_PDU_Type
Comment	
NoSN	<a href="#">NR_RLC_UMD_PduNoSN_Type</a>
SN6Bit	<a href="#">NR_RLC_UMD_PduSN6Bit_Type</a>
SN12Bit	<a href="#">NR_RLC_UMD_PduSN12Bit_Type</a>

## D.2.1.2.4 AM\_Data

RLC PDU definition: AM (TS 38.322, clause 6.2.2.4)

## AM\_Data: Basic Type Definitions

TTCN-3 Basic Types		
NR_RLC_AMD_Data_Type	octetstring	TS 38.322, clause 6.2.2.4

## NR\_RLC\_AMD\_HeaderSN12Bit\_Type

TTCN-3 Record Type			
Name	NR_RLC_AMD_HeaderSN12Bit_Type		
Comment	TS 38.322, clause 6.2.2.4 (Figure 6.2.2.4-1, 6.2.2.4-3)		
D_C	<a href="#">B1_Type</a>		1 bit, '1'B for Data PDU
Poll	<a href="#">B1_Type</a>		1 bit, '0'B - Status report not requested '1'B - Status report is requested
SegmentationInfo	<a href="#">NR_RLC_SegmentationInfo_Type</a>		2 bits SI
SequenceNumber	<a href="#">B12_Type</a>		12 bits SN
SegmentOffset	<a href="#">NR_RLC_SegmentOffset_Type</a>	opt	16 bits SO; included in case of segmentation but not for the first segment (TS 38.322 clause 6.2.2.4)

## NR\_RLC\_AMD\_PduSN12Bit\_Type

TTCN-3 Record Type			
Name	NR_RLC_AMD_PduSN12Bit_Type		
Comment	TS 38.322, clause 6.2.2.4 (Figure 6.2.2.4-1, 6.2.2.4-3)		
Header	<a href="#">NR_RLC_AMD_HeaderSN12Bit_Type</a>		
Data	<a href="#">NR_RLC_AMD_Data_Type</a>		

## NR\_RLC\_AMD\_HeaderSN18Bit\_Type

TTCN-3 Record Type			
Name	NR_RLC_AMD_HeaderSN18Bit_Type		
Comment	TS 38.322, clause 6.2.2.4 (Figure 6.2.2.4-2, 6.2.2.4-4)		
D_C	<a href="#">B1_Type</a>		1 bit, '1'B for Data PDU
Poll	<a href="#">B1_Type</a>		1 bit, 0 - Status report not requested 1 - Status report is requested
SegmentationInfo	<a href="#">NR_RLC_SegmentationInfo_Type</a>		2 bits SI
Reserved	<a href="#">B2_Type</a>		2 bits reserved
SequenceNumber	<a href="#">B18_Type</a>		18 bits SN
SegmentOffset	<a href="#">NR_RLC_SegmentOffset_Type</a>	opt	16 bits SO; included in case of segmentation but not for the first segment (TS 38.322 clause 6.2.2.4)

## NR\_RLC\_AMD\_PduSN18Bit\_Type

TTCN-3 Record Type	
<b>Name</b>	<b>NR_RLC_AMD_PduSN18Bit_Type</b>
<b>Comment</b>	TS 38.322, clause 6.2.2.4 Figure 6.2.2.4-2, 6.2.2.4-4)
Header	<a href="#">NR_RLC_AMD_HeaderSN18Bit_Type</a>
Data	<a href="#">NR_RLC_AMD_Data_Type</a>

## NR\_RLC\_AMD\_PDU\_Type

TTCN-3 Union Type	
<b>Name</b>	<b>NR_RLC_AMD_PDU_Type</b>
<b>Comment</b>	TS 38.322, clause 6.2.2.4
SN12Bit	<a href="#">NR_RLC_AMD_PduSN12Bit_Type</a>
SN18Bit	<a href="#">NR_RLC_AMD_PduSN18Bit_Type</a>

## D.2.1.2.5 AM\_Status

AM Status PDU (TS 36.322, clause 6.2.1.6)

## AM\_Status: Basic Type Definitions

TTCN-3 Basic Types		
<b>NR_RLC_Status_ExtensionBit1_Type</b>	<a href="#">B1_Type</a>	TS 38.322, clause 6.2.3.11 Extension bit 1 (E1) field: '0'B A set of NACK_SN, E1, E2 and E3 does not follow. '1'B A set of NACK_SN, E1, E2 and E3 follows.
<b>NR_RLC_Status_ExtensionBit2_Type</b>	<a href="#">B1_Type</a>	TS 38.322, clause 6.2.3.13 Extension bit 2 (E2) field: '0'B A set of SOstart and SOend does not follow for this NACK_SN. '1'B A set of SOstart and SOend follows for this NACK_SN.
<b>NR_RLC_Status_ExtensionBit3_Type</b>	<a href="#">B1_Type</a>	TS 38.322, clause 6.2.3.16 Extension bit 3 (E3) field: '0'B A set of NACK_SN, E1, E2 and E3 follows. '1'B NACK range field follows for this NACK_SN.



## NR\_RLC\_Status\_NackSN12Bit\_Type

TTCN-3 Record Type			
Name	NR_RLC_Status_NackSN12Bit_Type		
Comment	TS 38.322, clause 6.2.2.5 (Figure 6.2.2.5-1)		
SequenceNumberNACK	<a href="#">B12_Type</a>		12 bits SN
E1	<a href="#">NR_RLC_Status_ExtensionBit1_Type</a>		1 bit E1 field; set if further NACK set follows
E2	<a href="#">NR_RLC_Status_ExtensionBit2_Type</a>		1 bit E2 field
E3	<a href="#">NR_RLC_Status_ExtensionBit3_Type</a>		1 bit E3 field
Reserved	<a href="#">B1_Type</a>		1 bit reserved
SOstart	<a href="#">NR_RLC_SegmentOffset_Type</a>	opt	segment offset (start), present only if E2 is set to '1'B
SOstop	<a href="#">NR_RLC_SegmentOffset_Type</a>	opt	segment offset (stop), present only if E2 is set to '1'B
NACKrange	<a href="#">B8_Type</a>	opt	NACK range, present only if E3 is set to '1'B

## NR\_RLC\_Status\_NackListSN12Bit\_Type

TTCN-3 Record of Type	
Name	NR_RLC_Status_NackListSN12Bit_Type
Comment	record of <a href="#">NR_RLC_Status_NackSN12Bit_Type</a>

## NR\_RLC\_StatusPduSN12Bit\_Type

TTCN-3 Record Type			
Name	NR_RLC_StatusPduSN12Bit_Type		
Comment	TS 38.322, clause 6.2.2.5 (Figure 6.2.2.5-1)		
D_C	<a href="#">B1_Type</a>		1 bit, '0'B for Control PDU
CPT	<a href="#">B3_Type</a>		3 bits, TS 38.322, clause 6.2.3.9 Control PDU Type (CPT) field: '000'B STATUS PDU ELSE reserved
SequenceNumberNACK	<a href="#">B12_Type</a>		12 bits SN
E1	<a href="#">NR_RLC_Status_ExtensionBit1_Type</a>		1 bit E1 field
Reserved	<a href="#">B7_Type</a>		7 bits reserved
NackList	<a href="#">NR_RLC_Status_NackListSN12Bit_Type</a>	opt	zero or more sets of a NACK_SN, E1, E2 and E3 and possibly a pair of SOstart/SOend or NACK range field for each NACK_SN

## NR\_RLC\_Status\_NackSN18Bit\_Type

TTCN-3 Record Type			
Name	NR_RLC_Status_NackSN18Bit_Type		
Comment	TS 38.322, clause 6.2.2.5 (Figure 6.2.2.5-1)		
SequenceNumberNACK	<a href="#">B18_Type</a>		18 bits SN
E1	<a href="#">NR_RLC_Status_ExtensionBit1_Type</a>		1 bit E1 field; set if further NACK set follows
E2	<a href="#">NR_RLC_Status_ExtensionBit2_Type</a>		1 bit E2 field
E3	<a href="#">NR_RLC_Status_ExtensionBit3_Type</a>		1 bit E3 field
Reserved	<a href="#">B3_Type</a>		3 bits reserved
SOstart	<a href="#">NR_RLC_SegmentOffset_Type</a>	opt	segment offset (start), present only if E2 is set to '1'B
SOstop	<a href="#">NR_RLC_SegmentOffset_Type</a>	opt	segment offset (stop), present only if E2 is set to '1'B
NACKrange	<a href="#">B8_Type</a>	opt	NACK range, present only if E3 is set to '1'B

## NR\_RLC\_Status\_NackListSN18Bit\_Type

TTCN-3 Record of Type	
Name	NR_RLC_Status_NackListSN18Bit_Type
Comment	record of <a href="#">NR_RLC_Status_NackSN18Bit_Type</a>

## NR\_RLC\_StatusPduSN18Bit\_Type

TTCN-3 Record Type			
Name	NR_RLC_StatusPduSN18Bit_Type		
Comment	TS 38.322, clause 6.2.2.5 (Figure 6.2.2.5-1)		
D_C	<a href="#">B1_Type</a>		1 bit, '0'B for Control PDU
CPT	<a href="#">B3_Type</a>		3 bits, TS 38.322, clause 6.2.3.9 Control PDU Type (CPT) field: '000'B STATUS PDU ELSE reserved
SequenceNumberNACK	<a href="#">B18_Type</a>		18 bits SN
E1	<a href="#">NR_RLC_Status_ExtensionBit1_Type</a>		1 bit E1 field
Reserved	<a href="#">B1_Type</a>		1 bit reserved
NackList	<a href="#">NR_RLC_Status_NackListSN18Bit_Type</a>	opt	zero or more sets of a NACK_SN, E1, E2 and E3 and possibly a pair of SOstart/SOend or NACK range field for each NACK_SN

## NR\_RLC\_AM\_StatusPDU\_Type

TTCN-3 Union Type		
Name	NR_RLC_AM_StatusPDU_Type	
Comment	TS 38.322, clause 6.2.254	
SN12Bit	<a href="#">NR_RLC_StatusPduSN12Bit_Type</a>	
SN18Bit	<a href="#">NR_RLC_StatusPduSN18Bit_Type</a>	

## D.2.1.3 SDAP

## SDAP: Basic Type Definitions

TTCN-3 Basic Types		
NR_SDAP_SDU_Type	octetstring	

**NR\_SDAP\_SDUList\_Type**

TTCN-3 Record of Type	
<b>Name</b>	<b>NR_SDAP_SDUList_Type</b>
<b>Comment</b>	record of <a href="#">NR_SDAP_SDU_Type</a>

**NR\_SDAP\_DataPduHeader**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_SDAP_DataPduHeader</b>		
<b>Comment</b>	TS 37.324 Figure 6.2.2.2-1		
RQI	<a href="#">B1_Type</a>		TS 37.324 clause 6.3.4: The RQI bit indicates whether NAS and/or AS mapping rules need to be updated 1 bit: '0'B No action '1'B To inform NAS; and to update AS mapping rule, if needed
QFI	<a href="#">B7_Type</a>		TS 37.324 clause 6.3.5: The QFI field indicates the ID of the QoS flow to which the SDAP SDU belongs

**NR\_SDAP\_PDU\_Type**

TTCN-3 Record Type			
<b>Name</b>	<b>NR_SDAP_PDU_Type</b>		
<b>Comment</b>	TS 37.324 clause 6.2.2 Data PDU		
Header	<a href="#">NR_SDAP_DataPduHeader</a>	opt	present for Data PDU with SDAP header (clause 6.2.2.2), omitted for Data PDU without SDAP header (clause 6.2.2.1)
Data	<a href="#">NR_SDAP_SDU_Type</a>		

**NR\_SDAP\_PDUList\_Type**

TTCN-3 Record of Type	
<b>Name</b>	<b>NR_SDAP_PDUList_Type</b>
<b>Comment</b>	record of <a href="#">NR_SDAP_PDU_Type</a>

## D.2.2 DRB\_Primitive\_Definitions

Primitive definitions to send/receive data PDUs over DRB's

## D.2.2.1 DRB\_Common

## NR\_L2DataList\_Type

TTCN-3 Union Type		
Name	NR_L2DataList_Type	
Comment	MAC: acc. to rel-15 protocols there is exactly one MAC PDU per TB but in case of spatial multiplexing there can be one or more TB per HARQ process; any MAC PDU is completely included in one slot (TTI) RLC: one or more RLC PDUs per slot (TTI) (e.g. RLC Data + Status PDU on a logical channel; more than one RLC Data PDU in one MAC PDU is valid too) any RLC PDU is completely included in one slot (TTI) PDCP: one or more PDUs per slot (TTI); one PDCP PDU may be included in more than one slot (TTI)	
MacPdu	<a href="#">NR_MAC_PDUList_Type</a>	SS configuration: RLC TM mode, MAC no header removal (PDCP is not configured)
RlcPdu	<a href="#">NR_RLC_PDUList_Type</a>	SS configuration: RLC TM mode, MAC header removal (PDCP is not configured)
RlcSdu	<a href="#">NR_RLC_SDUList_Type</a>	SS configuration: RLC UM mode with no PDCP
PdcpPdu	<a href="#">NR_PDCP_PDUList_Type</a>	SS configuration: RLC AM/UM mode, no handling of PDCP header
PdcpSdu	<a href="#">NR_PDCP_SDUList_Type</a>	SS configuration: RLC AM/UM mode, PDCP normal mode (automatic handling of PDCP header)
SdapPdu	<a href="#">NR_SDAP_PDUList_Type</a>	SS configuration: RLC AM/UM mode, PDCP normal mode (automatic handling of PDCP header), no handling of SDAP header
SdapSdu	<a href="#">NR_SDAP_SDUList_Type</a>	SS configuration: RLC AM/UM mode, PDCP normal mode (automatic handling of PDCP header), automatic handling of SDAP header

## NR\_HarqProcessAssignment\_Type

TTCN-3 Union Type		
Name	NR_HarqProcessAssignment_Type	
Comment	in DL the HARQ process id may be specified by the test case or automatically assigned by SS	
Id	<a href="#">NR_HarqProcessId_Type</a>	HARQ process as specified by the test case NOTE1: the scope of this type is only for data being sent in one slot (TTI); if data needs more than one slot (TTI) the HarqProcessId is undefined for the 2nd TTI onward what shall be handled as an error at the SS; SS may send a SYSTEM_IND indicating an error in this case; NOTE2: The initial value of the NDI shall be the same for all HARQ processes and cells
Automatic	<a href="#">Null_Type</a>	HARQ process id automatically assigned by SS

## D.2.2.2 Downlink

## NR\_DRB\_DataPerSlot\_DL\_Type

TTCN-3 Record Type			
Name	NR_DRB_DataPerSlot_DL_Type		
Comment	common definition for one or several PDUs/SDUs; in NR the DL data is sent in the slot given by the slot offset NOTE 1: For MAC and RLC PDUs a single PDU is always sent in one slot; SS shall raise an error indication (using SYSTEM_IND) when that is not possible NOTE 2: For PDCP the data may be spread over more than one slot (segmented by the RLC); the TTCN implementation is responsible to calculate appropriate offsets accordingly; the exact timing depends on (and is exactly specified by) configuration of the DL scheduling; SS shall raise an error when there is any conflict		
SlotOffset	integer		NR: Slot offset relative to the absolute timing information given in the common part of the ASP; NOTE: if a PDCP PDU or SDU takes more than one slot, SlotOffset specifies the first slot (TTI)
HarqProcess	<a href="#">NR_HarqProcessAssignment_Type</a>	opt	HARQ process to be used: specific value or automatically assigned by SS; in automatic mode SS chooses HARQ process out of the set configured by CcchDcchDtchConfigDL_Type.HarqProcessConfig NOTE: for PDCP SDUs or PDUs automatic mode shall be used; otherwise SS shall raise an error
PduSduList	<a href="#">NR_L2DataList_Type</a>		list of PDUs/SDUs to be sent in one slot (TTI)

## NR\_DRB\_DataPerSlotList\_DL\_Type

TTCN-3 Record of Type			
Name	NR_DRB_DataPerSlotList_DL_Type		
Comment	list of user plane data to be sent in slots given by the SlotOffset in the single elements of the list; Timing: the start time for the whole sequence is given by the timing info of the ASP (common information); the timing for the respective data pdus is given by the SlotOffset relative to the common timing info; design consideration: repetitions of this sequence are not foreseen (in which case the slot offset could not be related to the timing info of the ASP)		
record of <a href="#">NR_DRB_DataPerSlot_DL_Type</a>			

## NR\_L2Data\_Request\_Type

TTCN-3 Record Type			
Name	NR_L2Data_Request_Type		
Comment	NOTE: formal type definition to allow later enhancements		
SlotDataList	<a href="#">NR_DRB_DataPerSlotList_DL_Type</a>		

### D.2.2.3 Uplink

#### NR\_DRB\_DataPerSlot\_UL\_Type

TTCN-3 Record Type		
<b>Name</b>	<b>NR_DRB_DataPerSlot_UL_Type</b>	
<b>Comment</b>	common definition for one or several PDUs/SDUs being received in one slot or to receive one PDCP PDU or SDU being spread over more than one slot (TTI); NOTE: There is a fix relation between HARQ process id and slot in UL => it is not necessary to include HARQ process id for UL data	
PduSduList	<a href="#">NR_L2DataList_Type</a>	list of PDUs/SDUs being received in one TTI; elements of the list appear in the same order as the PDUs/SDUs in the MAC PDU; for PDCP when a PDU or SDU takes more than one TTI the list only contains this PDU or SDU
NoOfTTIs	integer	in case of PDCP: number of TTIs the SDU or PDU has taken NOTE 1: for the time being the NoOfTTIs is not checked by TTCN-3 and may be set to 1 by SS; NOTE 2: the timing info in common part of the ASP refers to the last TTI NOTE 3: when NoOfTTIs > 1 => PduSduList shall only contain one PDCP PDU or SDU in case of MAC or RLC PDUs: NoOfTTIs shall always be 1

#### NR\_L2Data\_Indication\_Type

TTCN-3 Record Type		
<b>Name</b>	<b>NR_L2Data_Indication_Type</b>	
<b>Comment</b>	NOTE: formal type definition to allow later enhancements; L2Data_Indication_Type defines data being received in a single slot i.e. PDUs of subsequent TTIs are indicated in separated ASPs	
SlotData	<a href="#">NR_DRB_DataPerSlot_UL_Type</a>	

## D.2.3 System\_Interface

## NR\_DRB\_COMMON\_REQ

TTCN-3 Record Type			
Name	NR_DRB_COMMON_REQ		
Comment	common ASP to send PDUs to DRBs		
Common	<a href="#">NR_ReqAspCommonPart_Type</a>		<p>CellId : identifier of the cell            RoutingInfo : DRB id            TimingInfo : starting point when to start sending sequence of data PDUs            e.g.            SFN = X, subframe number = x; slot number = slot_i            depending on numerology            U_Plane.SubframeDataList[i].SlotOffset := offset_i;            =&gt; U_Plane.SubframeDataList[0].PduSduList shall be sent out at (X, x, i)            U_Plane.SubframeDataList[i].PduSduList shall be sent out offset_i slots after U_Plane.SubframeDataList[0].PduSduList (depending on the numerology)            ControllInfo : CnfFlag:=false; FollowOnFlag:=false</p>
U_Plane	<a href="#">NR_L2Data_Request_Type</a>		
SuppressPdcch ForC_RNTI	<a href="#">Null_Type</a>	opt	<p>By default all DRB_COMMON_REQ scheduled DL PDU's are associated with an appropriate explicit configured or SS selected DL assignment allocation on PDCCH.            For SuppressPdcch:=true in the sub frame in which DL PDU's are transmitted, there is no associated DL assignment allocation for configured C-RNTI. This will be used for SPS assignment based transmission or in any error scenarios;            NOTE: this flag has no impact on PDCCH messages required for SPS activation</p>

## NR\_DRB\_COMMON\_IND

TTCN-3 Record Type			
Name	NR_DRB_COMMON_IND		
Comment	common ASP to receive PDUs from DRBs		
Common	<a href="#">NR_IndAspCommonPart_Type</a>		<p>CellId : identifier of the cell            RoutingInfo : DRB id            TimingInfo : time when message has been received            NOTE 1:            For MAC and RLC PDUs per definition L2Data_Indication_Type correspond to exactly one slot            =&gt; TimingInfo refers to this slot            NOTE 2:            For PDCP a single PDU or SDU may take more than one TTI            =&gt; TimingInfo refers to the end of the PDU/SDU and the length is given by NoOfTTIs in L2Data_Indication_Type (the end of the PDU/SDU is the last RLC PDU being received; in case of retransmissions this is not necessarily the RLC PDU with the last SN)</p>
U_Plane	<a href="#">NR_L2Data_Indication_Type</a>		

## NR\_DRB\_PORT

TTCN-3 Port Type			
Name	NR_DRB_PORT		
Comment			
out	<a href="#">NR_DRB_COMMON_REQ</a>		
in	<a href="#">NR_DRB_COMMON_IND</a>		

## D.3 NR\_ASP\_SrbDefs

### D.3.1 SRB\_DATA\_ASPs

ASP Definitions to send/receive peer-to-peer messages on SRBs

#### SRB\_DATA\_ASPs: Basic Type Definitions

TTCN-3 Basic Types		
NR_NAS_MSG_RequestList_Type	<a href="#">Dummy_Type</a>	place holder for ENDC
NR_NAS_MSG_IndicationList_Type	<a href="#">Dummy_Type</a>	place holder for ENDC

#### NR\_C\_Plane\_Request\_Type

TTCN-3 Record Type			
Name	<b>NR_C_Plane_Request_Type</b>		
Comment	RRC and/or NAS PDU to be send to the UE; Note: it may be necessary to allow more than one NAS PDU (-> "record of")		
Rrc	<a href="#">NR_RRC_MSG_Request_Type</a>	opt	omit: NAS message shall be present; NAS message shall be sent in DLInformationTransfer present: if NAS message is present also, (piggybacked) NAS PDU shall be security protected (if necessary) and inserted in RRC PDU's DedicatedInfoNAS
Nas	<a href="#">NR_NAS_MSG_RequestList_Type</a>	opt	omit: RRC message shall be present; RRC message does not contain (piggybacked) NAS PDU present: if RRC message is omitted => NAS message shall be sent embedded in DLInformationTransfer if RRC message is present => NAS message is piggybacked in RRC message in case of RRC message is sent on CCCH, NAS message shall be omitted

#### NR\_C\_Plane\_Indication\_Type

TTCN-3 Record Type			
Name	<b>NR_C_Plane_Indication_Type</b>		
Comment	RRC and/or NAS PDU to be received from the UE; Note: it may be necessary to allow more than one NAS PDU (-> "record of")		
Rrc	<a href="#">NR_RRC_MSG_Indication_Type</a>	opt	omit: NAS message shall be present; NAS message is received in ULInformationTransfer present: if NAS message is present also, DedicatedInfoNAS contains unstructured and ciphered NAS message and the NAS message is the deciphered message in structured format
Nas	<a href="#">NR_NAS_MSG_IndicationList_Type</a>	opt	omit: RRC message shall be present; RRC message does not contain (piggybacked) NAS PDU present: if RRC message is omitted => NAS message has been received in ULInformationTransfer if RRC message is present => NAS message has been piggybacked in RRC message NOTE: even though currently (DEC 08 ASN.1) there is no RRC PDU in UL containing more than one DedicatedInfoNAS we provide a list to allow extendability



## NR\_SRB\_COMMON\_REQ

TTCN-3 Record Type	
<b>Name</b>	<b>NR_SRB_COMMON_REQ</b>
<b>Comment</b>	common ASP to send PDUs to SRB0, SRB1 or SRB2
Common	<p><a href="#">NR_ReqAspCommonPart_Type</a></p> <p>CellId identifier of the cell  RoutingInfo SRB0, SRB1, SRB2, SRB3  TimingInfo Now in normal cases;  For latency tests TimingInfo can be set to the SFN/subframe in which the RRC messages shall be sent out (in this case and if the RRC PDU is too long to be sent in one TTI the TimingInfo corresponds to the first TTI)  ControllInfo  CnfFlag:=false;  FollowOnFlag true: Indicates that the message(s) to be sent on the same TTI will follow  NOTE 1: When FollowOnFlag is true, TimingInfo shall always be "Now". Otherwise SS shall produce an error  NOTE 2: the follow on flag applies only for messages of the same SRB  false: Indicates that no more message(s) will follow</p>
Signalling	<a href="#">NR_C Plane Request Type</a>

## NR\_SRB\_COMMON\_IND

TTCN-3 Record Type	
<b>Name</b>	<b>NR_SRB_COMMON_IND</b>
<b>Comment</b>	common ASP to receive PDUs from SRB0, SRB1 or SRB2
Common	<p><a href="#">NR_IndAspCommonPart_Type</a></p> <p>CellId identifier of the cell  RoutingInfo SRB0, SRB1, SRB2, SRB3  TimingInfo time when message has been received (as received from the SS by the NAS emulator)</p>
Signalling	<a href="#">NR_C Plane Indication Type</a>

## D.3.2 Port\_Definitions

## NR\_SRB\_PORT

TTCN-3 Port Type	
<b>Name</b>	<b>NR_SRB_PORT</b>
<b>Comment</b>	NR PTC: Port for Sending/Receiving data on SRBs
out	<a href="#">NR_SRB_COMMON_REQ</a>
in	<a href="#">NR_SRB_COMMON_IND</a>

## NASEMU\_NR\_SRB\_PORT

TTCN-3 Port Type	
<b>Name</b>	<b>NASEMU_NR_SRB_PORT</b>
<b>Comment</b>	NASEMU PTC: Port for Sending/Receiving data on SRBs (interface to NR PTC)
out	<a href="#">NR_SRB_COMMON_IND</a>
in	<a href="#">NR_SRB_COMMON_REQ</a>

## D.4 NR\_CommonDefs

### DL\_CCCH\_Message

TTCN-3 Record Type	
Name	DL_CCCH_Message
Comment	

### UL\_CCCH\_Message

TTCN-3 Record Type	
Name	UL_CCCH_Message
Comment	

## D.4.1 Common\_Types

### Common\_Types: Basic Type Definitions

TTCN-3 Basic Types		
NR_HarqProcessId_Type	integer	HARQ process id; NOTE: there seems to be no need for any value restriction
NR_AbsoluteCellPower_Type	integer (-150..0)	absolute cell power (dBm)

### NR\_RRC\_MSG\_Request\_Type

TTCN-3 Union Type		
Name	NR_RRC_MSG_Request_Type	
Comment	DL RRC PDU on CCCH or DCCH	
Cch	<a href="#">DL_CCCH_Message</a>	
Dcch	DL_DCCH_Message	

### NR\_RRC\_MSG\_Indication\_Type

TTCN-3 Union Type		
Name	NR_RRC_MSG_Indication_Type	
Comment	UL RRC PDU on CCCH or DCCH	
Cch	<a href="#">UL_CCCH_Message</a>	
Dcch	UL_DCCH_Message	

### NR\_HarqProcessList\_Type

TTCN-3 Record of Type	
Name	NR_HarqProcessList_Type
Comment	list of HARQ processes: each element shall be unique; NOTE: there seems to be no need for any length restriction
record of <a href="#">NR_HarqProcessId_Type</a>	

## D.4.2 RRC\_Nested\_Types

### RRC\_Nested\_Types: Basic Type Definitions

TTCN-3 Basic Types		
NR_PrioritizedBitRate_Type	LogicalChannelConfig.ul_SpecificParameters.prioritisedBitRate	

## D.4.3 ASP\_CommonPart

Definition of ASP common parts for REQ-, CNF- and IND-ASPs

### D.4.3.1 ASP\_CommonPart\_Definitions

#### D.4.3.1.1 Routing\_Info

!!!! NR-NOTE: tsc\_MaxRB as defined in EUTRA should not be needed as being used only to limit RadioBearerList\_Type, SecurityActTimeList\_Type and PdcpcountInfoList\_Type and there seems to be no reason for any upper limit for these types !!!!

#### NR\_RadioBearerId\_Type

TTCN-3 Union Type	
Name	NR_RadioBearerId_Type
Comment	
Srb	<a href="#">SRB_Identity_Type</a>
Drb	DRB_Identity

#### NR\_RoutingInfo\_Type

TTCN-3 Union Type	
Name	NR_RoutingInfo_Type
Comment	
None	<a href="#">Null_Type</a>
RadioBearerId	<a href="#">NR_RadioBearerId_Type</a>

### D.4.3.2 REQ\_ASP\_CommonPart

#### NR\_ReqAspCommonPart\_Type

TTCN-3 Record Type	
Name	NR_ReqAspCommonPart_Type
Comment	
CellId	<a href="#">NR_CellId_Type</a>
RoutingInfo	<a href="#">NR_RoutingInfo_Type</a>
RlcBearerRouting	<a href="#">DC_RlcBearerRouting_Type</a>
TimingInfo	<a href="#">TimingInfo_Type</a>
ControllInfo	<a href="#">ReqAspControllInfo_Type</a>

### D.4.3.3 CNF\_ASP\_CommonPart

#### NR\_CnfAspCommonPart\_Type

TTCN-3 Record Type	
Name	NR_CnfAspCommonPart_Type
Comment	
CellId	<a href="#">NR_CellId_Type</a>
RoutingInfo	<a href="#">NR_RoutingInfo_Type</a>
TimingInfo	<a href="#">TimingInfo_Type</a>
Result	<a href="#">ConfirmationResult_Type</a>

## D.4.3.4 IND\_ASP\_CommonPart

### NR\_IndAspCommonPart\_Type

TTCN-3 Record Type			
Name	NR_IndAspCommonPart_Type		
Comment			
CellId	<a href="#">NR_CellId_Type</a>		
RoutingInfo	<a href="#">NR_RoutingInfo_Type</a>		
RlcBearerRouting	<a href="#">DC_RlcBearerRouting_Type</a>		
TimingInfo	<a href="#">TimingInfo_Type</a>		
Status	<a href="#">IndicationStatus_Type</a>		

## D.5 NR\_PDCP\_TypeDefs

### D.5.1 NR\_PDCP\_Config\_Parameters

Parameters defined in or related to NR ASN.1 type PDCP-Config

#### NR\_PDCP\_SN\_Size\_Type

TTCN-3 Enumerated Type	
Name	NR_PDCP_SN_Size_Type
Comment	PDCP Sequence Number
PDCP_SNLength12	TS 38.323 clause 6.2.2.1 and clause 6.2.2.2
PDCP_SNLength18	TS 38.323 clause 6.2.2.3

#### NR\_PDCP\_DRB\_HeaderCompression\_Type

TTCN-3 Union Type	
Name	NR_PDCP_DRB_HeaderCompression_Type
Comment	place holder for header compression
None	<a href="#">Null_Type</a>

#### NR\_PDCP\_DRB\_Config\_Parameters\_Type

TTCN-3 Record Type			
Name	NR_PDCP_DRB_Config_Parameters_Type		
Comment	parameters corresponding to NR ASN.1 PDCP-Config.drb; the following parameter are not included and may be added if needed: - integer DiscardTimer (timer value in milliseconds) - boolean StatusReportRequired - boolean OutOfOrderDelivery		
SN_SizeUL	<a href="#">NR_PDCP_SN_Size_Type</a>		PDCP-Config.drb.pdcp-SN-SizeUL
SN_SizeDL	<a href="#">NR_PDCP_SN_Size_Type</a>		PDCP-Config.drb.pdcp-SN-SizeDL
HeaderCompression	<a href="#">NR_PDCP_DRB_HeaderCompression_Type</a>		PDCP-Config.drb.headerCompression
IntegrityProtectionEnabled	boolean		PDCP-Config.drb.integrityProtection

#### NR\_PDCP\_RB\_Config\_Parameters\_Type

TTCN-3 Union Type		
Name	NR_PDCP_RB_Config_Parameters_Type	
Comment		
Srb	<a href="#">Null_Type</a>	no SRB specific parameters in NR ASN.1 PDCP-Config
Drb	<a href="#">NR_PDCP_DRB_Config_Parameters_Type</a>	DRB specific parameters corresponding to NR ASN.1 PDCP-Config.drb

## NR\_PDCP\_Config\_Parameters\_Type

TTCN-3 Record Type	
<b>Name</b>	<b>NR_PDCP_Config_Parameters_Type</b>
<b>Comment</b>	parameters corresponding to NR ASN.1 PDCP-Config: the following parameter are not included and may be added if needed: - integer TReorderingTimer (timer value in milliseconds)
Rb	<a href="#">NR_PDCP_RB_Config_Parameters_Type</a>

## D.5.2 NR\_PDCP\_Configuration

## NR\_PDCP\_RbConfig\_Type

TTCN-3 Union Type	
<b>Name</b>	<b>NR_PDCP_RbConfig_Type</b>
<b>Comment</b>	
Params	<a href="#">NR_PDCP_Config_Parameters_Type</a> PDCP configuration parameters corresponding to UE configuration
TransparentMode	<a href="#">Null_Type</a> PDCP configuration for transparent (test) mode: used for PDCP tests (TS 38.523-3, cl. 5.1.2.1): the SS does not apply ciphering, not apply integrity protection and does not maintain PDCP sequence numbers and state variables; ROHC is not applied by the SS. Note: a reconfiguration of a RB from transparent mode to 'normal' mode is not foreseen (i.e. there is no mechanism to restore Ciphering, PDCP sequence numbers and state variables at the SS)

## NR\_PDCP\_RBTerminating\_Type

TTCN-3 Record Type	
<b>Name</b>	<b>NR_PDCP_RBTerminating_Type</b>
<b>Comment</b>	RB terminating PDCP configuration: the PDCP may be linked - to a local RLC bearer: RLC bearer is configured for the same cell - to the RLC bearer of some other cell group: LinkToOtherCellGroup is not "None" - the both (in case of split bearer): RLC bearer is configured for the same cell and LinkToOtherCellGroup is not "None"
RbConfig	<a href="#">NR_PDCP_RbConfig_Type</a> opt mandatory for initial configuration; omit means "keep as it is"
LinkToOtherCellGroup	<a href="#">DC_RlcBearerRouting_Type</a> opt mandatory for initial configuration; omit means "keep as it is" None: no link to other cell group (normal case, non-split bearer) RAT/cellId: PDCP is linked to RLC bearer of another cell group (same or other RAT): split bearer or PDCP and RLC bearer being configured at different cells NOTE: applicable also for PDCP split bearer test cases when PDCP is in transparent mode => test case body may be implemented at one PTC

## NR\_PDCP\_Proxy\_Type

TTCN-3 Record Type	
<b>Name</b>	<b>NR_PDCP_Proxy_Type</b>
<b>Comment</b>	proxy to route PDCP data between terminating PDCP entity and RLC bearer of another cell (group)
LinkToOtherNode	<a href="#">DC_RlcBearerRouting_Type</a> RAT/cellId to address the radio bearer terminating node (PDCP) (None is not applicable)

## NR\_PDCP\_Configuration\_Type

TTCN-3 Union Type		
Name	NR_PDCP_Configuration_Type	
Comment		
None	<a href="#">Null_Type</a>	for SRB0 no PDCP is configured; furthermore the PDCP may not be configured e.g. for DRBs tested in RLC or MAC test cases
RBTerminating	<a href="#">NR_PDCP_RBTerminating_Type</a>	PDCP entity at the terminating node: handling of PDCP protocol for the given bearer (normal or split bearer)
Proxy	<a href="#">NR_PDCP_Proxy_Type</a>	proxy to be configured above RLC instead of a normal PDCP entity when the RLC bearer is not in the same cell (group) as the terminating PDCP entity

## D.5.3 NR\_PDCP\_DrbDefs

## NR\_PDCP\_DrbDefs: Basic Type Definitions

TTCN-3 Basic Types		
NR_PDCP_SDU_Type	octetstring	
NR_PDCP_CtrlPduType_Type	<a href="#">B3_Type</a>	PDU type according to TS 38.323 clause 6.3.8: 000 PDCP status report 001 Interspersed ROHC feedback 010-111 Reserved

## NR\_PDCP\_SDUList\_Type

TTCN-3 Record of Type	
Name	NR_PDCP_SDUList_Type
Comment	
record of <a href="#">NR_PDCP_SDU_Type</a>	

## NR\_PDCP\_DataPduSN12Bits\_Type

TTCN-3 Record Type			
Name	NR_PDCP_DataPduSN12Bits_Type		
Comment	Data PDU for DRBs with 12 bits PDCP SN (TS 38.323, clause 6.2.2.2)		
D_C	<a href="#">B1_Type</a>		1 bit, '1'B for Data PDU
Reserved	<a href="#">B3_Type</a>		3 bits reserved
SequenceNumber	<a href="#">B12_Type</a>		12 bits sequence number
SDU	<a href="#">NR_PDCP_SDU_Type</a>		content (octetstring)
MAC_I	<a href="#">B32_Type</a>	opt	message authentication code according to TS 38.323, clause 6.3.4; MAC-I field is present only when the DRB is configured with integrity protection; in this case it is up to TTCN to provide the valid MAC_I in DL and to check it in UL

## NR\_PDCP\_DataPduSN18Bits\_Type

TTCN-3 Record Type			
Name	NR_PDCP_DataPduSN18Bits_Type		
Comment	Data PDU for DRBs with 18 bits PDCP SN (TS 38.323, clause 6.2.2.3)		
D_C	<a href="#">B1_Type</a>		1 bit, '1'B for Data PDU
Reserved	<a href="#">B5_Type</a>		5 bits reserved
SequenceNumber	<a href="#">B18_Type</a>		18 bits sequence number
SDU	<a href="#">NR_PDCP_SDU_Type</a>		content (octetstring)
MAC_I	<a href="#">B32_Type</a>	opt	message authentication code according to TS 38.323, clause 6.3.4; MAC-I field is present only when the DRB is configured with integrity protection; in this case it is up to TTCN to provide the valid MAC_I in DL and to check it in UL

## NR\_PDCP\_CtrlPduStatus\_Type

TTCN-3 Record Type			
Name	NR_PDCP_CtrlPduStatus_Type		
Comment	Control PDU for PDCP status report (TS 38.323, clause 6.2.3.1)		
D_C	<a href="#">B1_Type</a>		1 bit, '0'B for Ctrl PDU
PDU_Type	<a href="#">NR_PDCP_CtrlPduType_Type</a>		3 bits, '000'B for PDCP status report
Reserved	<a href="#">B4_Type</a>		4 bits reserved
FirstMissingCo unt	<a href="#">B32_Type</a>		32 bits, TS 38.323, clause 6.3.9 FMC
Bitmap	octetstring	opt	Bitmap according to TS 38.323, clause 6.3.10

## NR\_PDCP\_CtrlPduRohcFeedback\_Type

TTCN-3 Record Type			
Name	NR_PDCP_CtrlPduRohcFeedback_Type		
Comment	Control PDU for Interspersed ROHC feedback (TS 38.323, clause 6.2.3.2)		
D_C	<a href="#">B1_Type</a>		1 bit, '0'B for Ctrl PDU
PDU_Type	<a href="#">NR_PDCP_CtrlPduType_Type</a>		3 bits, '001'B for Interspersed ROHC feedback
Reserved	<a href="#">B4_Type</a>		4 bits reserved
RohcFeedback	octetstring		ROHC packet that is not associated with a PDCP SDU

## NR\_PDCP\_PDU\_Type

TTCN-3 Union Type			
Name	NR_PDCP_PDU_Type		
Comment			
DataPduSN12 Bits	<a href="#">NR_PDCP_DataPduSN12Bits_Type</a>		
DataPduSN18 Bits	<a href="#">NR_PDCP_DataPduSN18Bits_Type</a>		
CtrlPduStatus	<a href="#">NR_PDCP_CtrlPduStatus_Type</a>		
CtrlPduRohcFe edback	<a href="#">NR_PDCP_CtrlPduRohcFeedbac k_Type</a>		

## NR\_PDCP\_PDUList\_Type

TTCN-3 Record of Type	
Name	NR_PDCP_PDUList_Type
Comment	
record of <a href="#">NR_PDCP_PDU_Type</a>	

## D.7 CommonDefs

### CommonDefs: Constant Definitions

TTCN-3 Basic Types			
<b>tsc_UInt16Max</b>	integer	65535	

### CommonDefs: Basic Type Definitions

TTCN-3 Basic Types		
<b>B1_Type</b>	bitstring length(1)	
<b>B2_Type</b>	bitstring length(2)	
<b>B3_Type</b>	bitstring length(3)	
<b>B4_Type</b>	bitstring length(4)	
<b>B5_Type</b>	bitstring length(5)	
<b>B6_Type</b>	bitstring length(6)	
<b>B7_Type</b>	bitstring length(7)	
<b>B8_Type</b>	bitstring length(8)	
<b>B12_Type</b>	bitstring length(12)	
<b>B16_Type</b>	bitstring length(16)	
<b>B18_Type</b>	bitstring length(18)	
<b>B32_Type</b>	bitstring length(32)	
<b>B48_Type</b>	bitstring length(48)	
<b>B128_Type</b>	bitstring length(128)	
<b>B128_Key_Type</b>	<a href="#">B128_Type</a>	128 bit security key
<b>O1_Type</b>	octetstring length(1)	
<b>Null_Type</b>	boolean (true)	dummy type for 'typeless' fields in unions
<b>Dummy_Type</b>	boolean (true)	dummy type for temporary purposes only
<b>UInt_Type</b>	integer (0 .. infinity)	
<b>UInt16_Type</b>	integer (0 .. <a href="#">tsc_UInt16Max</a> )	
<b>PdcpCountValue_Type</b>	<a href="#">B32_Type</a>	
<b>RNTI_Value_Type</b>	<a href="#">UInt16_Type</a>	corresponds to NR ASN.1: RNTI-Value ::= INTEGER (0..65535)
<b>RNTI_B16_Type</b>	<a href="#">B16_Type</a>	

### B8\_List\_Type

TTCN-3 Record of Type	
<b>Name</b>	<b>B8_List_Type</b>
<b>Comment</b>	
record of <a href="#">B8_Type</a>	

### IndicationAndControlMode\_Type

TTCN-3 Enumerated Type	
<b>Name</b>	<b>IndicationAndControlMode_Type</b>
<b>Comment</b>	
enable	
disable	



## NR\_CellId\_Type

TTCN-3 Enumerated Type	
Name	NR_CellId_Type
Comment	
nr_Cell_NonSpecific	
nr_Cell1	
nr_Cell2	
nr_Cell3	
nr_Cell4	
nr_Cell6	
nr_Cell10	
nr_Cell11	
nr_Cell12	
nr_Cell13	
nr_Cell14	
nr_Cell23	
nr_Cell28	
nr_Cell29	
nr_Cell30	
nr_Cell31	

## NR\_CellIdList\_Type

TTCN-3 Record of Type	
Name	NR_CellIdList_Type
Comment	NOTE: there seems to be no need for any length restriction
record of <a href="#">NR_CellId_Type</a>	

**EUTRA\_CellId\_Type**

TTCN-3 Enumerated Type	
Name	EUTRA_CellId_Type
Comment	
eutra_Cell_NonSpecific	
eutra_Cell1	
eutra_Cell2	
eutra_Cell3	
eutra_Cell4	
eutra_Cell6	
eutra_Cell10	
eutra_Cell11	
eutra_Cell12	
eutra_Cell13	
eutra_Cell14	
eutra_Cell23	
eutra_Cell28	
eutra_Cell29	
eutra_Cell30	
eutra_Cell31	
eutra_CellA	
eutra_CellB	
eutra_CellC	
eutra_CellD	
eutra_CellE	
eutra_CellG	
eutra_CellH	
eutra_CellI	
eutra_CellJ	
eutra_CellK	
eutra_CellL	
eutra_CellM	

## D.8 CommonAspDefs

### D.8.1 Cell\_Configuration\_Common

**CellTimingInfo\_Type**

TTCN-3 Record Type			
Name	CellTimingInfo_Type		
Comment	Cell Timing		
TcOffset	integer (0..63)	opt	For NR according to TS 38.211 clause 4.1 $T_s/T_c = 64$ with $T_c = 1/(480000 * 4096)$ and $T_s = 1/(15000 * 2048)$ as for EUTRA; => for NR to specify granularity per $T_c$ ; for EUTRA to be set to 0 (and/or to be ignored by the SS)
Tcell	integer (0..307199)		frame duration $T_f = 307200 * T_s = 10ms$ ; System Time Unit $T_s = 1/(15000 * 2048)$
SfnOffset	integer (0..1023)		
HsfnOffset	integer (0..1023)		

## D.8.2 MAC\_Layer

### ULGrant\_Period\_Type

TTCN-3 Union Type		
Name	ULGrant_Period_Type	
Comment		
OnlyOnce	<a href="#">Null_Type</a>	grant is sent out only once; no period
Duration	integer (1..infinity)	duration of the grant period in number of sub-frames (1 ms) for EUTRA and number of slots for NR

### TransmissionRepetition\_Type

TTCN-3 Union Type		
Name	TransmissionRepetition_Type	
Comment		
Continuous	<a href="#">Null_Type</a>	
NumOfCycles	integer (1..infinity)	

### PeriodicGrant\_Type

TTCN-3 Record Type		
Name	PeriodicGrant_Type	
Comment		
Period	<a href="#">ULGrant_Period_Type</a>	time period after which UL Grant need to be automatically transmitted or 'OnlyOnce'
NoOfRepetitions	<a href="#">TransmissionRepetition_Type</a>	number of UL Grant repetitions to be automatically transmitted or continuous repetition

### UL\_GrantConfig\_Type

TTCN-3 Union Type		
Name	UL_GrantConfig_Type	
Comment		
OnSR_Reception	<a href="#">Null_Type</a>	SS transmits UL Grant as configured by DciInfoUL_Type at every reception of SR; to be used in non L2 Test
Periodic	<a href="#">PeriodicGrant_Type</a>	SS transmits UL Grant as configured by DciInfoUL_Type periodically; to be used in L2 tests; MAC tests testing Grants might set the period as infinite and num grant as 1
PeriodicOnSR_Reception	<a href="#">PeriodicGrant_Type</a>	SS transmits UL Grant as configured by DciInfoUL_Type periodically; the periodic grant transmission is started/restarted on reception of a SR from UE to be used in non L2 Test to enable large UL data transmission for lower category UEs (Cat<=1)
None	<a href="#">Null_Type</a>	disable any grant transmission

## RAR\_RapidCtrl\_Type

TTCN-3 Union Type		
Name	RAR_RapidCtrl_Type	
Comment		
Automatic	<a href="#">Null_Type</a>	SS shall automatically use same RAPID as received from the UE
Unmatched	<a href="#">Null_Type</a>	SS shall use RAPID being different from preamble sent by the UE; SS shall calculate this RAPID acc. to $RAPID := (RAPID + 3..63) \bmod 64$ if single RAR is transmitted in a MAC PDU then only 3 is added if multiple RAR's are transmitted in MAC PDU, then for first unmatched RAR 3 is added, second unmatched 4 is added, third unmatched 5 is added and so on

## D.8.3 System\_Indications

## HARQ\_Type

TTCN-3 Enumerated Type	
Name	HARQ_Type
Comment	ack represents HARQ ACK; nack represents HARQ NACK
ack	
nack	

## D.8.4 ASP\_CommonPart

Definition of ASP common parts for REQ-, CNF- and IND-ASPs

## D.8.4.1 ASP\_CommonPart\_Definitions

## D.8.4.1.1 Routing\_Info

## CommonAspDefs: Constant Definitions

TTCN-3 Basic Types			
tsc_SRB0	integer	0	
tsc_SRB1	integer	1	
tsc_SRB2	integer	2	
tsc_SRB3	integer	3	

## Routing\_Info: Basic Type Definitions

TTCN-3 Basic Types		
SRB_Identity_Type	integer ( <a href="#">tsc_SRB0</a> , <a href="#">tsc_SRB1</a> , <a href="#">tsc_SRB2</a> , <a href="#">tsc_SRB3</a> )	

## DC\_RlcBearerRouting\_Type

TTCN-3 Union Type		
Name	DC_RlcBearerRouting_Type	
Comment	data routing e.g. in case of split bearer (split DRB or split SRB); applicable for multi-RAT Dual Connectivity (MR-DC) as well as single-RAT Dual Connectivity	
EUTRA	<a href="#">EUTRA_CellId_Type</a>	
NR	<a href="#">NR_CellId_Type</a>	
None	<a href="#">Null_Type</a>	normal case: PDCP and RLC are configured at the same cell

## D.8.4.1.2 Timing\_Info

## Timing\_Info: Basic Type Definitions

TTCN-3 Basic Types		
SystemFrameNumber_Type	integer (0..1023)	
SubFrameNumber_Type	integer (0..9)	
HyperSystemFrameNumberInfo_Type	<a href="#">SystemFrameNumberInfo_Type</a>	

## SubFrameInfo\_Type

TTCN-3 Union Type		
Name	<b>SubFrameInfo_Type</b>	
Comment		
Number	<a href="#">SubFrameNumber_Type</a>	
Any	<a href="#">Null_Type</a>	no specific sub-frame (valid for REQ ASPs only)

## SystemFrameNumberInfo\_Type

TTCN-3 Union Type		
Name	<b>SystemFrameNumberInfo_Type</b>	
Comment		
Number	<a href="#">SystemFrameNumber_Type</a>	
Any	<a href="#">Null_Type</a>	no specific frame number (valid for REQ ASPs only)

## SlotOffset\_Type

TTCN-3 Union Type		
Name	<b>SlotOffset_Type</b>	
Comment	slots per subframe according to TS 38.211 Table 4.3.2-1	
Numerology0	<a href="#">Null_Type</a>	mu=0; only one slot per subframe
Numerology1	integer (0..1)	mu=1; 2 slots per subframe
Numerology2	integer (0..3)	mu=2; 4 slots per subframe
Numerology3	integer (0..7)	mu=3; 8 slots per subframe
Numerology4	integer (0..15)	mu=4; 16 slots per subframe

## SlotTimingInfo\_Type

TTCN-3 Union Type		
Name	<b>SlotTimingInfo_Type</b>	
Comment	EUTRA, NBIOT: REQ ASPs: TTCN shall set the SlotTimingInfo to "FirstSlot" for EUTRA, NBIOT addressing the whole subframe IND ASPs: TTCN shall ignore the SlotTimingInfo sent by the SS for EUTRA, NBIOT NR: REQ ASPs: Any:=true only if the slot number is not relevant, in which case the SS may choose the next available slot of the given subframe IND ASPs: Any:=true only if there is no slot information available for the particular kind of indication	
SlotOffset	<a href="#">SlotOffset_Type</a>	to address a particular slot in a subframe
FirstSlot	<a href="#">Null_Type</a>	to address the first slot independent from the numerology (REQ ASPs only) or for REQ ASPs in EUTRA and NBIOT
Any	<a href="#">Null_Type</a>	for IND ASPs in EUTRA and NBIOT or if slot number is not relevant or not available

**SubFrameTiming\_Type**

TTCN-3 Record Type			
Name	SubFrameTiming_Type		
Comment			
SFN	<a href="#">SystemFrameNumberInfo_Type</a>		
Subframe	<a href="#">SubFrameInfo_Type</a>		
HSFN	<a href="#">HyperSystemFrameNumberInfo_Type</a>		
Slot	<a href="#">SlotTimingInfo_Type</a>		

**TimingInfo\_Type**

TTCN-3 Union Type			
Name	TimingInfo_Type		
Comment			
SubFrame	<a href="#">SubFrameTiming_Type</a>		
Now	<a href="#">Null_Type</a>		to be used in REQ ASPs when there is no 'activation time'
None	<a href="#">Null_Type</a>		only to be used in SYSTEM_CTRL_CNF or NR_SYSTEM_CTRL_CNF but not for EnquireTiming

**D.8.4.2 REQ\_ASP\_CommonPart**

**ReqAspControllInfo\_Type**

TTCN-3 Record Type			
Name	ReqAspControllInfo_Type		
Comment			
CnfFlag	boolean		true => SS shall send CNF: when the REQ is with no timing information (no activation time), SS shall send the confirmation when the configuration is done, i.e. when the test case may continue. Example: when there is a configuration followed by a send event it shall not be necessary to have a wait timer in between but the CNF triggers the send event. If there are other triggers e.g. like the UE sending a message, CnfFlag shall be set to false by the test case to avoid racing conditions with the CNF and the signalling message. When there is an activation time SS shall send the CNF after the configuration has been scheduled; that means SS shall not wait until the activation time has been expired.
FollowOnFlag	boolean		false => no further (related) information true: further related information will be sent to SS (semantics depending on respective ASP)

**D.8.4.3 CNF\_ASP\_CommonPart**

**ConfirmationResult\_Type**

TTCN-3 Union Type			
Name	ConfirmationResult_Type		
Comment			
Success	<a href="#">Null_Type</a>		
Error	integer		may contain SS specific error code; this will not be evaluated by TTCN

## D.8.4.4 IND\_ASP\_CommonPart

## IntegrityErrorIndication\_Type

TTCN-3 Record Type			
Name	IntegrityErrorIndication_Type		
Comment			
Nas	boolean		NAS Integrity: set to true when received MAC does not match calculated MAC
Pdcp	boolean		PDCP Integrity: set to true when received MAC does not match calculated MAC

## ErrorIndication\_Type

TTCN-3 Record Type			
Name	ErrorIndication_Type		
Comment			
Integrity	<a href="#">IntegrityErrorIndication_Type</a>		Integrity error: received MAC does not match calculated MAC
System	integer		any other error: may be SS specific error code; this will not be evaluated by TTCN; e.g. an error shall be raised when the UE requests retransmission of an RLC PDU

## IndicationStatus\_Type

TTCN-3 Union Type			
Name	IndicationStatus_Type		
Comment			
Ok	<a href="#">Null_Type</a>		
Error	<a href="#">ErrorIndication_Type</a>		

## D.9 References to TTCN-3

References to TTCN-3		
NR_ASP_TypeDefs	NR_Defs/NR_ASP_TypeDefs.ttcn	Rev 22011
NR_ASP_DrbDefs	NR_Defs/NR_ASP_DrbDefs.ttcn	Rev 21979
NR_ASP_SrbDefs	NR_Defs/NR_ASP_SrbDefs.ttcn	Rev 21118
NR_CommonDefs	NR_Defs/NR_CommonDefs.ttcn	Rev 21911
NR_PDCP_TypeDefs	Common4G5G/NR_PDCP_TypeDefs.ttcn	Rev 21633
Common4G5G	Common4G5G/Common4G5G.ttcn	Rev 22070
CommonDefs	Common/CommonDefs.ttcn	Rev 21864
CommonAspDefs	Common/CommonAspDefs.ttcn	Rev 21981

## Annex E (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2017-08	R5#76	R5-174121	-	-	-	Introduction of TS 38.523-3.	0.0.1
2018-03	R5#78	R5-180678	-	-	-	Initial Test Model aspects	0.1.0
2018-04	R5#2-5G-NR	R5-182072	-	-	-	EN-DC: Addition of Test Model aspects	0.2.0
2018-05	R5#79	R5-183237	-	-	-	EN-DC: Test Model updates	1.0.0
2018-06	RAN#80	RP-181212	-	-	-	put under revision control as v15.0.0 with small editorial changes	15.0.0
2018-09	RAN#81	R5-184333	000 2	-	F	Updates to Annex B	15.1.0
2018-09	RAN#81	R5-184696	000 3	-	F	EN-DC Test Model: Addition of further aspects	15.1.0
2018-09	RAN#81	R5-185172	000 1	2	F	EN-DC: Test Model updates	15.1.0
2018-09	RAN#81	<a href="#">R5s180525</a> RP-181987	000 5	-	F	Add updated ASP definitions to 38.523-3 (prose), Annex D	15.1.0



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# History

<b>Document history</b>		
V15.0.0	July 2018	Publication
V15.1.0	October 2018	Publication