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Evolved Universal Terrestrial Radio Access (E-UTRA);
Radio Resource Control (RRC);
Protocol specification
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Contents

1 Scope .................................................................................................................................................. 34
2 References .......................................................................................................................................... 34
3 Definitions, symbols and abbreviations .......................................................................................... 36
3.1 Definitions ...................................................................................................................................... 36
3.2 Abbreviations ................................................................................................................................ 36
4 General ................................................................................................................................................. 38
4.1 Introduction ..................................................................................................................................... 38
4.2 Architecture .................................................................................................................................... 39
4.2.1 UE states and state transitions including inter RAT ................................................................. 39
4.2.2 Signalling radio bearers ............................................................................................................ 39
4.3 Services .......................................................................................................................................... 39
4.3.1 Services provided to upper layers ............................................................................................ 39
4.3.2 Services expected from lower layers ....................................................................................... 39
4.4 Functions ....................................................................................................................................... 39
5 Procedures ............................................................................................................................................ 40
5.1 General ............................................................................................................................................. 40
5.1.1 Introduction ............................................................................................................................... 40
5.1.2 General requirements .............................................................................................................. 40
5.2 System information ....................................................................................................................... 41
5.2.1 Introduction ............................................................................................................................... 41
5.2.1.1 General ............................................................................................................................... 41
5.2.1.2a Scheduling for NB-IoT ...................................................................................................... 41
5.2.1.3 System information validity and notification of changes ...................................................... 42
5.2.1.4 Indication of ETWS notification ......................................................................................... 42
5.2.1.5 Indication of CMAS notification ......................................................................................... 42
5.2.1.6 Notification of EAB parameters change ............................................................................. 42
5.2.1.7 Access Barring parameters change in NB-IoT ................................................................. 42
5.2.2 System information acquisition ............................................................................................... 43
5.2.2.1 General ............................................................................................................................... 43
5.2.2.2 Initiation ............................................................................................................................. 43
5.2.2.3 System information required by the UE ............................................................................ 43
5.2.2.4 System information acquisition by the UE ........................................................................ 43
5.2.2.5 Essential system information required ................................................................................ 43
5.2.2.6 Actions upon reception of the MasterInformationBlock message ..................................... 43
5.2.2.7 Actions upon reception of the SystemInformationBlockType1 message ......................... 44
5.2.2.8 Actions upon reception of SystemInformation messages .................................................. 44
5.2.2.9 Actions upon reception of SystemInformationBlockType2 ............................................... 44
5.2.2.10 Actions upon reception of SystemInformationBlockType3 ............................................. 44
5.2.2.11 Actions upon reception of SystemInformationBlockType4 .............................................. 44
5.2.2.12 Actions upon reception of SystemInformationBlockType5 .............................................. 44
5.2.2.13 Actions upon reception of SystemInformationBlockType6 .............................................. 44
5.2.2.14 Actions upon reception of SystemInformationBlockType7 .............................................. 44
5.2.2.15 Actions upon reception of SystemInformationBlockType8 .............................................. 44
5.2.2.16 Actions upon reception of SystemInformationBlockType9 .............................................. 44
5.2.2.17 Actions upon reception of SystemInformationBlockType10 ............................................ 44
5.2.2.18 Actions upon reception of SystemInformationBlockType11 ........................................... 44
5.2.2.19 Actions upon reception of SystemInformationBlockType12 ........................................... 44
5.3.7.3 Actions following cell selection while T311 is running ........................................ 90
5.3.7.2 Initiation ............................................................................................................. 89
5.3.7.1 General ............................................................................................................. 88

5.3.6.3 Reception of the
5.3.6.2 Initiation ......................................................................................................... 87
5.3.6.1 Counter check ................................................................................................. 87
5.3.5.8 Radio Configuration involving full configuration option .................................. 86
5.3.5.7a T307 expiry (SCG change failure) ................................................................. 86
5.3.5.7 Void ................................................................................................................. 86

5.3.5.4 Reception of an
5.3.5.3 Reception of an
5.3.5.1 General ........................................................................................................... 78

5.3.4.3 Reception of the
5.3.4.1 General ........................................................................................................... 77

5.3.3.14 Access Barring check for NB-IoT ................................................................. 75
5.3.3.13 Access barring check for ACDC ................................................................... 75
5.3.3.12 EA B check .................................................................................................. 74
5.3.3.11 Access barring check .................................................................................... 74
5.3.3.7 T302, T303, T305, T306, or T308 expiry or stop ............................................ 71
5.3.3.6 T300 expiry .................................................................................................... 70
5.3.3.5 Cell re-selection while T300, T302, T303, T305, T306, or T308 is running .... 70
5.3.3.4 Reception of the
5.3.3.3 Actions related to transmission of RRCConnectionRequest message ......... 65
5.3.3.2 Initiation ........................................................................................................ 60
5.3.3.1a Conditions for establishing RRC Connection for sidelink communication/ discovery ... 59

5.3.3 RRC connection establishment ............................................................................ 58
5.3.3.1 General .......................................................................................................... 58
5.3.3.1a Conditions for establishing RRC Connection for sidelink communication/ discovery ... 59
5.3.3.2 Initiation ........................................................................................................ 60
5.3.3.3 Actions related to transmission of RRCConnectionRequest message ......... 65
5.3.3.3a Actions related to transmission of RRCConnectionResumeRequest message ... 65
5.3.3.4 Reception of the RRCConnectionSetup by the UE.......................................... 66
5.3.3.4a Reception of the RRCConnectionResume by the UE.................................... 68
5.3.3.5 Cell re-selection while T300, T302, T303, T305, T306, or T308 is running .... 70
5.3.3.6 T300 expiry .................................................................................................... 70
5.3.3.7 T302, T303, T305, T306, or T308 expiry or stop ............................................ 71
5.3.3.8 Reception of the RRCConnectionReject by the UE ....................................... 72
5.3.3.9 Abortion of RRC connection establishment .................................................. 72
5.3.3.10 Handling of SSAC related parameters ......................................................... 73
5.3.3.11 Access barring check .................................................................................... 74
5.3.3.12 EAB check .................................................................................................... 74
5.3.3.13 Access barring check for ACDC ................................................................. 75
5.3.3.14 Access Barring check for NB-IoT ................................................................. 75
5.3.4 Initial security activation ..................................................................................... 77
5.3.4.1 General .......................................................................................................... 77
5.3.4.2 Initiation ........................................................................................................ 77
5.3.4.3 Reception of the SecurityModeCommand by the UE ................................... 77

5.3.5 RRC connection reconfiguration ....................................................................... 78
5.3.5.1 General .......................................................................................................... 78
5.3.5.2 Initiation ........................................................................................................ 79
5.3.5.3 Reception of an RRCConnectionReconfiguration not including the mobilityControlInfo by the UE ...................................................... 79
5.3.5.4 Reception of an RRCConnectionReconfiguration including the mobilityControlInfo by the UE (handover) ................................................................. 81
5.3.5.5 Reconfiguration failure ................................................................................... 84
5.3.5.6 T304 expiry (handover failure) .......................................................... 85
5.3.5.7 Void ................................................................................................................. 86
5.3.5.7a T307 expiry (SCG change failure) ................................................................. 86
5.3.5.8 Radio Configuration involving full configuration option ................................. 86
5.3.6 Counter check ................................................................................................... 87
5.3.6.1 General .......................................................................................................... 87
5.3.6.2 Initiation ........................................................................................................ 87
5.3.6.3 Reception of the CounterCheck message by the UE ..................................... 87

5.3.7 RRC connection re-establishment ................................................................... 88
5.3.7.1 General .......................................................................................................... 88
5.3.7.2 Initiation ........................................................................................................ 89
5.3.7.3 Actions following cell selection while T311 is running .................................. 90
5.3.7.4 Actions related to transmission of RRCConnectionReestablishmentRequest message .............................................90
5.3.7.5 Reception of the RRCConnectionReestablishment by the UE .............................................................. 91
5.3.7.6 T311 expiry .................................................................................................................................................. 93
5.3.7.7 T301 expiry or selected cell no longer suitable .......................................................................................... 93
5.3.7.8 Reception of RRCConnectionReestablishmentReject by the UE ............................................................. 93
5.3.8 RRC connection release .................................................................................................................................. 93
5.3.8.1 General ..................................................................................................................................................... 93
5.3.8.2 Initiation .................................................................................................................................................. 93
5.3.8.3 Reception of the RRCConnectionRelease by the UE ................................................................................. 93
5.3.8.4 T320 expiry ......................................................................................................................................... 94
5.3.9 RRC connection release requested by upper layers ...................................................................................... 94
5.3.9.1 General .................................................................................................................................................. 94
5.3.9.2 Initiation ................................................................................................................................................ 94
5.3.10 Radio resource configuration .......................................................................................................................... 95
5.3.10.0 General ................................................................................................................................................... 95
5.3.10.1 SRB addition/ modification....................................................................................................................... 96
5.3.10.2 DRB release ......................................................................................................................................... 96
5.3.10.3 DRB addition/ modification ....................................................................................................................... 96
5.3.10.3a DC specific DRB addition or reconfiguration ................................................................................. 97
5.3.10.3b LWA specific DRB addition or reconfiguration ....................................................................................... 99
5.3.10.3c LWIP specific DRB addition or reconfiguration ..................................................................................... 100
5.3.10.3a SCe ll release ......................................................................................................................................... 100
5.3.10.3b SCell addition/ modification ................................................................................................................... 100
5.3.10.3c PSCell addition or modification .......................................................................................................... 101
5.3.10.4 MAC main reconfiguration ................................................................................................................... 101
5.3.10.5 Semi-persistent scheduling reconfiguration .......................................................................................... 101
5.3.10.6 Physical channel reconfiguration ........................................................................................................ 102
5.3.10.7 Radio Link Failure Timers and Constants reconfiguration ................................................................... 102
5.3.10.8 Time domain measurement resource restriction for serving cell .......................................................... 103
5.3.10.9 Other configuration ................................................................................................................................ 103
5.3.10.10 SCG reconfiguration ............................................................................................................................ 104
5.3.10.11 SCG dedicated resource configuration ................................................................................................ 106
5.3.10.12 Reconfiguration SCG or split DRB by drb-ToAddModList ....................................................................... 106
5.3.10.13 Neighbour cell information reconfiguration ....................................................................................... 106
5.3.10.14 Void ..................................................................................................................................................... 107
5.3.10.15 Sidelink dedicated configuration ......................................................................................................... 107
5.3.10.16 T370 expiry ......................................................................................................................................... 108
5.3.11 Radio link failure related actions .................................................................................................................. 108
5.3.11.1 Detection of physical layer problems in RRC_CONNECTED ..................................................................... 108
5.3.11.2 Recovery of physical layer problems .................................................................................................... 108
5.3.11.3 Detection of radio link failure ............................................................................................................... 108
5.3.12 UE actions upon leaving RRC_CONNECTED ............................................................................................. 110
5.3.13 UE actions upon PUCCH/ SRS release request .......................................................................................... 111
5.3.14 Proximity indication ....................................................................................................................................... 112
5.3.14.1 General .................................................................................................................................................. 112
5.3.14.2 Initiation ................................................................................................................................................ 112
5.3.14.3 Actions related to transmission of ProximityIndication message .......................................................... 112
5.3.15 Void ............................................................................................................................................................. 113
5.4 Inter-RAT mobility ............................................................................................................................................... 113
5.4.1 Introduction .................................................................................................................................................. 113
5.4.2 Handover to E-UTRA .................................................................................................................................... 113
5.4.2.1 General .................................................................................................................................................. 113
5.4.2.2 Initiation ................................................................................................................................................ 113
5.4.2.3 Reception of the RRCConnectionReconfiguration by the UE ............................................................... 114
5.4.2.4 Reconfiguration failure .......................................................................................................................... 115
5.4.2.5 T304 expiry (handover to E-UTRA failure) ......................................................................................... 116
5.4.3 Mobility from E-UTRA .................................................................................................................................. 116
5.4.3.1 General .................................................................................................................................................. 116
5.4.3.2 Initiation ................................................................................................................................................ 117
5.4.3.3 Reception of the MobilityFromEUTRACommand by the UE ................................................................. 117
5.4.3.4 Successful completion of the mobility from E-UTRA ............................................................................. 118
5.4.3.5 Mobility from E-UTRA failure ............................................................................................................... 118
5.4.4 Handover from E-UTRA preparation request (CDMA2000) .......................................................................................... 19
5.4.4.1 General ......................................................................................................................................................... 19
5.4.4.2 Initiation ......................................................................................................................................................... 19
5.4.4.3 Reception of the HandoverFromEUTRAPreparationRequest by the UE ...................................................... 19
5.4.5 UL handover preparation transfer (CDMA2000) ....................................................................................................... 20
5.4.5.1 General ......................................................................................................................................................... 20
5.4.5.2 Initiation ......................................................................................................................................................... 20
5.4.5.3 Actions related to transmission of the ULHandoverPreparationTransfer message ........................................ 20
5.4.5.4 Failure to deliver the ULHandoverPreparationTransfer message ............................................................... 20
5.4.6 Inter-RAT cell change order to E-UTRAN ................................................................................................................. 20
5.4.6.1 General ......................................................................................................................................................... 20
5.4.6.2 Initiation ......................................................................................................................................................... 21
5.4.6.3 UE fails to complete an inter-RAT cell change order .................................................................................... 21

5.5 Measurements .............................................................................................................................................................. 120
5.5.1 Introduction ........................................................................................................................................................... 121
5.5.2 Measurement configuration ...................................................................................................................................... 123
5.5.2.1 General ......................................................................................................................................................... 123
5.5.2.2 Measurement identity removal .................................................................................................................. 124
5.5.2.2a Measurement identity autonomous removal ............................................................................................ 124
5.5.2.3 Measurement identity addition/ modification ............................................................................................ 124
5.5.2.4 Measurement object removal .................................................................................................................... 125
5.5.2.5 Measurement object addition/ modification ............................................................................................ 125
5.5.2.6 Reporting configuration removal ............................................................................................................. 128
5.5.2.7 Reporting configuration addition/ modification ....................................................................................... 128
5.5.2.8 Quantity configuration .................................................................................................................................. 128
5.5.2.9 Measurement gap configuration ................................................................................................................ 129
5.5.2.10 Discovery signals measurement timing configuration .............................................................................. 129
5.5.2.11 RSSI measurement timing configuration ................................................................................................. 129
5.5.3 Performing measurements ......................................................................................................................................... 130
5.5.3.1 General ......................................................................................................................................................... 130
5.5.3.2 Layer 3 filtering .............................................................................................................................................. 132
5.5.4 Measurement report triggering .............................................................................................................................. 133
5.5.4.1 General ......................................................................................................................................................... 133
5.5.4.2 Event A1 (Serving becomes better than threshold) ...................................................................................... 137
5.5.4.3 Event A2 (Serving becomes worse than threshold) ....................................................................................... 137
5.5.4.4 Event A3 (Neighbour becomes offset better than PCell/ PSCell) ................................................................. 138
5.5.4.5 Event A4 (Neighbour becomes better than threshold) ................................................................................ 138
5.5.4.6 Event A5 (PCell/ PSCell becomes worse than threshold1 and neighbour becomes better than threshold2) ......................................................................................................................... 139
5.5.4.6a Event A6 (Neighbour becomes offset better than SCell) .......................................................................... 140
5.5.4.7 Event B1 (Inter RAT neighbour becomes better than threshold) ............................................................... 141
5.5.4.8 Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2) ................................................................................................................................................ 141
5.5.4.9 Event C1 (CSI-RS resource becomes better than threshold) ....................................................................... 142
5.5.4.10 Event C2 (CSI-RS resource becomes offset better than reference CSI-RS resource) .............................. 143
5.5.4.11 Event W1 (WLAN becomes better than a threshold) ................................................................................ 143
5.5.4.12 Event W2 (All WLAN inside WLAN mobility set becomes worse than threshold1 and a WLAN outside WLAN mobility set becomes better than threshold2) ...................................................................................... 144
5.5.4.13 Event W3 (All WLAN inside WLAN mobility set becomes worse than a threshold) .............................. 145
5.5.5 Measurement reporting ............................................................................................................................................... 145
5.5.6 Measurement related actions ..................................................................................................................................... 149
5.5.6.1 Actions upon handover and re-establishment ............................................................................................ 149
5.5.6.2 Speed dependant scaling of measurement related parameters ........................................................................ 150
5.5.7 Inter-frequency RSTD measurement indication ...................................................................................................... 151
5.5.7.1 General ......................................................................................................................................................... 151
5.5.7.2 Initiation ......................................................................................................................................................... 151
5.5.7.3 Actions related to transmission of InterFreqRSTDMeasurementIndication message ................................ 151

5.6 Other ............................................................................................................................................................................. 152
5.6.0 General........................................................................................................................................................................ 152
5.6.1 DL information transfer .............................................................................................................................................. 152
5.6.1.1 General ......................................................................................................................................................... 152
5.6.1.2 Initiation ......................................................................................................................................................... 152

5.6.1 DL information transfer
5.6.1.3 Reception of the DLInformationTransfer by the UE ................................................................. 152
5.6.2 UL information transfer ........................................................................................................ 153
5.6.2.1 General .................................................................................................................................. 153
5.6.2.2 Initiation .................................................................................................................................. 153
5.6.2.3 Actions related to transmission of ULInformationTransfer message ................................ 153
5.6.2.4 Failure to deliver ULInformationTransfer message ........................................................... 153
5.6.3 UE capability transfer ........................................................................................................... 154
5.6.3.1 General .................................................................................................................................. 154
5.6.3.2 Initiation .................................................................................................................................. 154
5.6.3.3 Reception of the UECapabilityEnquiry by the UE ................................................................. 154
5.6.4 CSFB to 1x Parameter transfer ............................................................................................. 157
5.6.4.1 General .................................................................................................................................. 157
5.6.4.2 Initiation .................................................................................................................................. 157
5.6.4.3 Actions related to transmission of CSFBParametersRequestCDMA2000 message ............ 158
5.6.4.4 Reception of the CSFBParametersResponseCDMA2000 message ........................................ 158
5.6.5 UE Information .................................................................................................................... 158
5.6.5.1 General .................................................................................................................................. 158
5.6.5.2 Initiation .................................................................................................................................. 158
5.6.5.3 Reception of the UEInformationRequest message .............................................................. 158
5.6.6 Logged Measurement Configuration .................................................................................... 160
5.6.6.1 General .................................................................................................................................. 160
5.6.6.2 Initiation .................................................................................................................................. 160
5.6.6.3 Reception of the LoggedMeasurementConfiguration by the UE ........................................ 160
5.6.6.4 T330 expiry .......................................................................................................................... 160
5.6.7 Release of Logged Measurement Configuration ................................................................. 161
5.6.7.1 General .................................................................................................................................. 161
5.6.7.2 Initiation .................................................................................................................................. 161
5.6.8 Measurements logging .......................................................................................................... 161
5.6.8.1 General .................................................................................................................................. 161
5.6.8.2 Initiation .................................................................................................................................. 161
5.6.9 In-device coexistence indication ........................................................................................... 164
5.6.9.1 General .................................................................................................................................. 164
5.6.9.2 Initiation .................................................................................................................................. 164
5.6.9.3 Actions related to transmission of InDeviceCoexIndication message ................................. 165
5.6.10 UE Assistance Information .................................................................................................. 166
5.6.10.1 General .................................................................................................................................. 166
5.6.10.2 Initiation .................................................................................................................................. 166
5.6.10.3 Actions related to transmission of UEAssistanceInformation message ......................... 166
5.6.11 Mobility history information .............................................................................................. 166
5.6.11.1 General .................................................................................................................................. 166
5.6.11.2 Initiation .................................................................................................................................. 167
5.6.12 RAN-assisted WLAN interworking ..................................................................................... 167
5.6.12.1 General .................................................................................................................................. 167
5.6.12.2 Dedicated WLAN offload configuration ............................................................................ 167
5.6.12.3 WLAN offload RAN evaluation .......................................................................................... 167
5.6.12.4 T350 expiry or stop ............................................................................................................... 168
5.6.12.5 Cell selection/ re-selection while T350 is running ............................................................... 168
5.6.13 SCG failure information ..................................................................................................... 168
5.6.13.1 General .................................................................................................................................. 168
5.6.13.2 Initiation .................................................................................................................................. 168
5.6.13.3 Actions related to transmission of SCGFailureInformation message ............................. 169
5.6.14 LTE-WLAN Aggregation ..................................................................................................... 169
5.6.14.1 Introduction .......................................................................................................................... 169
5.6.14.2 Reception of LWA configuration ......................................................................................... 170
5.6.14.3 Release of LWA configuration ............................................................................................. 170
5.6.15 WLAN connection management ....................................................................................... 170
5.6.15.1 Introduction .......................................................................................................................... 170
5.6.15.2 WLAN connection status reporting ................................................................................... 171
5.6.15.2.1 General .................................................................................................................................. 171
5.6.15.2.2 Initiation .................................................................................................................................. 171
5.6.15.2.3 Actions related to transmission of WLANConnectionStatusReport message .......... 171
5.6.15.3 T351 Expiry (WLAN connection attempt timeout) ............................................................ 171
5.6.15.4 WLAN status monitoring
5.6.16 RAN controlled LTE-WLAN interworking
5.6.16.1 General
5.6.16.2 WLAN traffic steering command
5.6.17 LTE-WLAN aggregation with IPsec tunnel
5.6.17.1 General
5.6.17.2 LWIP reconfiguration
5.6.17.3 LWIP release
5.7 Generic error handling
5.7.1 General
5.7.2 ASN.1 violation or encoding error
5.7.3 Field set to a not comprehended value
5.7.4 Mandatory field missing
5.7.5 Not comprehended field
5.8 MBMS
5.8.1 Introduction
5.8.1.1 General
5.8.1.2 Scheduling
5.8.1.3 MCCH information validity and notification of changes
5.8.2 MCCH information acquisition
5.8.2.1 General
5.8.2.2 Initiation
5.8.2.3 MCCH information acquisition by the UE
5.8.2.4 Actions upon reception of the MBMSNAreaConfiguration message
5.8.2.5 Actions upon reception of the MBMSCountingRequest message
5.8.3 MBMS PTM radio bearer configuration
5.8.3.1 General
5.8.3.2 Initiation
5.8.3.3 MRB establishment
5.8.3.4 MRB release
5.8.4 MBMS Counting Procedure
5.8.4.1 General
5.8.4.2 Initiation
5.8.4.3 Reception of the MBMSCountingRequest message by the UE
5.8.5 MBMS interest indication
5.8.5.1 General
5.8.5.2 Initiation
5.8.5.3 Determine MBMS frequencies of interest
5.8.5.4 Actions related to transmission of MBMsisInterestIndication message
5.8.6 SC-PTM
5.8.6.1 Introduction
5.8.6.2 SC-MCCH information acquisition
5.8.6.3 SC-PTM radio bearer configuration
5.8.6.4 Procedures
5.9 RN procedures
5.9.1 RN reconfiguration
5.9.1.1 General
5.9.1.2 Initiation
5.9.1.3 Reception of the RNReconfiguration by the RN
5.10 Sidelink
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.10.1a</td>
<td>Conditions for sidelink communication operation</td>
<td>188</td>
</tr>
<tr>
<td>5.10.2</td>
<td>Sidelink UE information</td>
<td>189</td>
</tr>
<tr>
<td>5.10.2.1</td>
<td>General</td>
<td>189</td>
</tr>
<tr>
<td>5.10.2.2</td>
<td>Initiation</td>
<td>190</td>
</tr>
<tr>
<td>5.10.2.3</td>
<td>Actions related to transmission of SidelinkUEInformation message</td>
<td>194</td>
</tr>
<tr>
<td>5.10.3</td>
<td>Sidelink communication monitoring</td>
<td>196</td>
</tr>
<tr>
<td>5.10.4</td>
<td>Sidelink communication transmission</td>
<td>197</td>
</tr>
<tr>
<td>5.10.5</td>
<td>Sidelink discovery monitoring</td>
<td>198</td>
</tr>
<tr>
<td>5.10.6</td>
<td>Sidelink discovery announcement</td>
<td>199</td>
</tr>
<tr>
<td>5.10.6a</td>
<td>Sidelink discovery announcement pool selection</td>
<td>202</td>
</tr>
<tr>
<td>5.10.6b</td>
<td>Sidelink discovery announcement reference carrier selection</td>
<td>202</td>
</tr>
<tr>
<td>5.10.7</td>
<td>Sidelink synchronisation information transmission</td>
<td>203</td>
</tr>
<tr>
<td>5.10.7.1</td>
<td>General</td>
<td>203</td>
</tr>
<tr>
<td>5.10.7.2</td>
<td>Initiation</td>
<td>204</td>
</tr>
<tr>
<td>5.10.7.3</td>
<td>Transmission of SLSS</td>
<td>205</td>
</tr>
<tr>
<td>5.10.7.4</td>
<td>Transmission of MasterInformationBlock-SL message</td>
<td>206</td>
</tr>
<tr>
<td>5.10.7.5</td>
<td>Void</td>
<td>207</td>
</tr>
<tr>
<td>5.10.8</td>
<td>Sidelink synchronisation reference</td>
<td>207</td>
</tr>
<tr>
<td>5.10.8.1</td>
<td>General</td>
<td>207</td>
</tr>
<tr>
<td>5.10.8.2</td>
<td>Selection and reselection of synchronisation reference UE (SyncRef UE)</td>
<td>207</td>
</tr>
<tr>
<td>5.10.9</td>
<td>Sidelink common control information</td>
<td>208</td>
</tr>
<tr>
<td>5.10.9.1</td>
<td>General</td>
<td>208</td>
</tr>
<tr>
<td>5.10.9.2</td>
<td>Actions related to reception of MasterInformationBlock-SL message</td>
<td>208</td>
</tr>
<tr>
<td>5.10.10</td>
<td>Sidelink relay UE operation</td>
<td>208</td>
</tr>
<tr>
<td>5.10.10.1</td>
<td>General</td>
<td>208</td>
</tr>
<tr>
<td>5.10.10.2</td>
<td>AS-conditions for relay related sidelink communication transmission by sidelink relay UE</td>
<td>208</td>
</tr>
<tr>
<td>5.10.10.3</td>
<td>AS-conditions for relay PS related sidelink discovery transmission by sidelink relay UE</td>
<td>208</td>
</tr>
<tr>
<td>5.10.10.4</td>
<td>Sidelink relay UE threshold conditions</td>
<td>209</td>
</tr>
<tr>
<td>5.10.11</td>
<td>Sidelink remote UE operation</td>
<td>209</td>
</tr>
<tr>
<td>5.10.11.1</td>
<td>General</td>
<td>209</td>
</tr>
<tr>
<td>5.10.11.2</td>
<td>AS-conditions for relay related sidelink communication transmission by sidelink remote UE</td>
<td>209</td>
</tr>
<tr>
<td>5.10.11.3</td>
<td>AS-conditions for relay PS related sidelink discovery transmission by sidelink remote UE</td>
<td>210</td>
</tr>
<tr>
<td>5.10.11.4</td>
<td>Selection and reselection of sidelink relay UE</td>
<td>210</td>
</tr>
<tr>
<td>5.10.11.5</td>
<td>Sidelink remote UE threshold conditions</td>
<td>210</td>
</tr>
</tbody>
</table>
6   Protocol data units, formats and parameters (tabular & ASN.1) ................................................................. 211
6.1   General ....................................................................................................................................................... 211
6.2   RRC messages ............................................................................................................................................... 213
6.2.1  General message structure ..................................................................................................................... 213
   - EUTRA-RRC-Definitions ................................................................................................................................. 213
   - BCCH-BCH-Message ...................................................................................................................................... 213
   - BCCH-DL-SCH-Message ................................................................................................................................. 214
   - BCCH-DL-SCH-Message-BR ........................................................................................................................... 214
   - MCCCH-Message .......................................................................................................................................... 215
   - PCCH-Message ............................................................................................................................................. 216
   - DL-CCCH-Message ..................................................................................................................................... 216
   - DL-DCCH-Message ..................................................................................................................................... 217
   - UL-CCCH-Message ..................................................................................................................................... 218
   - UL-DCCH-Message ..................................................................................................................................... 218
   - SC-MCCH-Message .................................................................................................................................... 220
6.2.2  Message definitions .................................................................................................................................. 220
   - CounterCheck ........................................................................................................................................... 220
   - CounterCheckResponse ............................................................................................................................... 222
   - CSFBParametersRequestCDMA2000 ............................................................................................................... 223
   - CSFBParametersResponseCDMA2000 ............................................................................................................. 224
   - DLInformationTransfer ............................................................................................................................. 225
   - HandoverFromEUTRAPreparationRequest (CDMA2000) .................................................................................. 226
   - InDeviceCoexIndicator ............................................................................................................................... 227
   - InterFreqRSTDMeasurementIndication ....................................................................................................... 231
   - LoggedMeasurementConfiguration ............................................................................................................. 233
   - MasterInformationBlock ............................................................................................................................ 235
   - MBMSCountingRequest ............................................................................................................................... 236

ETSI
- MBMSCntnResponse ................................................................. 237
- MBMSInterestIndication .......................................................... 238
- MBSNFAreaConfiguration ......................................................... 239
- MeasurementReport ............................................................... 240
- MobilityFromEUTRACommand ............................................... 241
- Paging ................................................................................. 246
- ProximityIndication .............................................................. 248
- RNReconfiguration .............................................................. 249
- RNReconfigurationComplete ................................................... 250
- RRCConnectionReconfiguration ............................................... 251
- RRCConnectionReconfigurationComplete .................................. 259
- RRCConnectionReestablishment ............................................... 260
- RRCConnectionReestablishmentComplete .................................. 261
- RRCConnectionReestablishmentReject ...................................... 263
- RRCConnectionReestablishmentRequest .................................... 264
- RRCConnectionReject .......................................................... 265
- RRCConnectionRelease ....................................................... 266
- RRCConnectionRequest ....................................................... 273
- RRCConnectionResume ........................................................ 275
- RRCConnectionResumeComplete ............................................. 276
- RRCConnectionResumeRequest ................................................ 277
- RRCConnectionSetup ........................................................ 278
- RRCConnectionSetupComplete ............................................... 279
- SCGFailureInformation .......................................................... 282
- SCPTMConfiguration .......................................................... 283
- SecurityModeCommand ....................................................... 283
- SecurityModeComplete ....................................................... 285
- SecurityModeFailure .......................................................... 285
- SidelinkUEInformation ........................................................ 286
- SystemInformation ............................................................. 289
- SystemInformationBlockType1 ................................................ 291
- UEAssistanceInformation ...................................................... 299
- UECapabilityEnquiry ........................................................... 300
- UECapabilityInformation ...................................................... 302
- UEInformationRequest ........................................................ 303
- UEInformationResponse ........................................................ 305
- ULHandoverPrepareTransfer (CDMA2000) ............................... 314
- ULInformationTransfer ........................................................ 315
- WLANConnectionStatusReport ............................................ 316

6.3 RRC information elements ......................................................... 317

6.3.1 System information blocks .................................................... 317
- SystemInformationBlockType2 ................................................ 317
- SystemInformationBlockType3 ................................................ 323
- SystemInformationBlockType4 ................................................ 327
- SystemInformationBlockType5 ................................................ 328
- SystemInformationBlockType6 ................................................ 335
- SystemInformationBlockType7 ................................................ 339
- SystemInformationBlockType8 ................................................ 341
- SystemInformationBlockType9 ................................................ 348
- SystemInformationBlockType10 ............................................... 348
- SystemInformationBlockType11 ............................................... 349
- SystemInformationBlockType12 ............................................... 350
- SystemInformationBlockType13 ............................................... 351
- SystemInformationBlockType14 ............................................... 351
- SystemInformationBlockType15 ............................................... 352
- SystemInformationBlockType16 ............................................... 354
- SystemInformationBlockType17 ............................................... 355
- SystemInformationBlockType18 ............................................... 356
- SystemInformationBlockType19 ............................................... 357
- SystemInformationBlockType20 ............................................... 361

6.3.2 Radio resource control information elements .................................................. 362
- AntennaInfo .......................................................................... 362
6.3.4 Mobility control information elements

- Security control information elements
  - NextHopChainingCount
  - SecurityAlgorithmConfig
  - ShortMAC-I

- Mobility control information elements
  - AdditionalSpectrumEmission
  - ARFCN-ValueCDMA2000
  - ARFCN-ValueEUTRA
  - ARFCN-ValueGERAN
  - ARFCN-ValueUTRA
- BandclassCDMA2000
- BandIndicatorGERAN
- CarrierFreqCDMA2000
- CarrierFreqGERAN
- CarrierFreqsGERAN
- CarrierFreqListMBMS
- CDMA2000-Type
- CellIdentity
- CellIndexList
- CellReselectionPriority
- CellSelectionInfoCE
- CellReselectionSubPriority
- CSFB-RegistrationParam1XRTT
- CellGlobalIdEUTRA
- CellGlobalIdUTRA
- CellGlobalIdGERAN
- CellGlobalIdCDMA2000
- CellSelectionInfoNFreq
- CSG-Identity
- FreqBandIndicator
- MobilityControlInfo
- MobilityParametersCDMA2000 (1xRTT)
- MobilityStateParameters
- MultiBandInfoList
- NS-PmaxList
- PhysCellId
- PhysCellIdRange
- PhysCellIdRangeUTRA-FDDList
- PhysCellIdCDMA2000
- PhysCellIdGERAN
- PhysCellIdUTRA-FDD
- PhysCellIdUTRA-TDD
- PLMN-Identity
- PLMN-IdentityList3
- PreRegistrationInfoHRPD
- Q-QualMin
- Q-RxLevMin
- Q-OffsetRange
- Q-OffsetRangeInterRAT
- ReselectionThreshold
- ReselectionThresholdQ
- SCellIndex
- ServCellIndex
- SpeedStateScaleFactors
- SystemInfoListGERAN
- SystemTimeInfoCDMA2000
- TrackingAreaCode
- T-Reselection
- T-ReselectionEUTRA-CE

6.3.5 Measurement information elements
- AllowedMeasBandwidth
- CSI-RSRP-Range
- Hysteresis
- LocationInfo
- MBSFN-RSRQ-Range
- MeasConfig
- MeasDS-Config
- MeasGapConfig
- MeasId
- MeasIdToAddModList
- MeasObjectCDMA2000
- MeasObjectEUTRA
<table>
<thead>
<tr>
<th>Information Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.3.6 Other information elements</td>
</tr>
<tr>
<td>AbsoluteTimeInfo</td>
</tr>
<tr>
<td>AreaConfiguration</td>
</tr>
<tr>
<td>C-RNTI</td>
</tr>
<tr>
<td>DedicatedInfoCDMA2000</td>
</tr>
<tr>
<td>DedicatedInfoNAS</td>
</tr>
<tr>
<td>FilterCoefficient</td>
</tr>
<tr>
<td>LoggingDuration</td>
</tr>
<tr>
<td>LoggingInterval</td>
</tr>
<tr>
<td>MeasSubframePattern</td>
</tr>
<tr>
<td>MMEC</td>
</tr>
<tr>
<td>NeighCellConfig</td>
</tr>
<tr>
<td>OtherConfig</td>
</tr>
<tr>
<td>RAND-CDMA2000 (1xRTT)</td>
</tr>
<tr>
<td>RAT-Type</td>
</tr>
<tr>
<td>ResumeIdentity</td>
</tr>
<tr>
<td>RRC-TransactionIdentifier</td>
</tr>
<tr>
<td>S-TMSI</td>
</tr>
<tr>
<td>TraceReference</td>
</tr>
<tr>
<td>UE-CapabilityRAT-ContainerList</td>
</tr>
<tr>
<td>UE-EUTRA-Capability</td>
</tr>
<tr>
<td>UE-RadioPagingInfo</td>
</tr>
<tr>
<td>UE-TimersAndConstants</td>
</tr>
<tr>
<td>VisitedCellInfoList</td>
</tr>
<tr>
<td>WLAN-OffloadConfig</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Information Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.3.7 MBMS information elements</td>
</tr>
<tr>
<td>MBMS-NotificationConfig</td>
</tr>
<tr>
<td>MBMS-ServiceList</td>
</tr>
<tr>
<td>MBSFN-AreaId</td>
</tr>
<tr>
<td>MBSFN-AreaInfoList</td>
</tr>
<tr>
<td>MBSFN-SubframeConfig</td>
</tr>
<tr>
<td>PMCH-InfoList</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Information Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.3.7a SC-PTM information elements</td>
</tr>
<tr>
<td>SC-MTCCH-InfoList</td>
</tr>
<tr>
<td>SCPTM-NeighbourCellList</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Information Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.3.8 Sidelink information elements</td>
</tr>
<tr>
<td>SL-CommConfig</td>
</tr>
<tr>
<td>SL-CommResourcePool</td>
</tr>
<tr>
<td>SL-CP-Len</td>
</tr>
</tbody>
</table>
6.7.1 General NB-IoT message structure ................................................................................................. 661

6.7.2 NB-IoT Message definitions ........................................................................................................ 667

6.7.3 NB-IoT information elements ........................................................................................................ 691

6.7.3.1 NB-IoT System information blocks ............................................................................................ 691
10 Radio information related interactions between network nodes .................................................. 750
10.1 General .................................................. 750
10.2 Inter-node RRC messages .................................................. 750
  10.2.1 General .................................................. 750
  10.2.2 Message definitions .................................................. 752
  10.2.2.1 HandoverCommand .................................................. 752
  10.2.2.2 HandoverPreparationInformation .................................................. 753
  10.2.2.3 SCG-Config .................................................. 756
  10.2.2.4 SCG-ConfigInfo .................................................. 757
  10.2.2.5 UEPagingCoverageInformation .................................................. 761
  10.2.2.6 UERadioAccessCapabilityInformation .................................................. 762
  10.2.2.7 UERadioPagingInformation .................................................. 763
10.3 Inter-node RRC information element definitions .................................................. 764
  10.3.1 AS-Config .................................................. 764
  10.3.2 AS-Context .................................................. 766
  10.3.3 ReestablishmentInfo .................................................. 767
  10.3.4 RRM-Config .................................................. 768
10.4 Inter-node RRC multiplicity and type constraint values .................................................. 770
  10.4.1 Multiplicity and type constraints definitions .................................................. 770
  10.4.2 End of EUTRA-InterNodeDefinitions .................................................. 770
10.5 Mandatory information in AS-Config .................................................. 770
10.6 Inter-node NB-IoT messages .................................................. 771
  10.6.1 General .................................................. 771
  10.6.2 Message definitions .................................................. 772
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:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.
1 Scope

The present document specifies the Radio Resource Control protocol for the radio interface between UE and E-UTRAN as well as for the radio interface between RN and E-UTRAN.

The scope of the present document also includes:

- the radio related information transported in a transparent container between source eNB and target eNB upon inter eNB handover;
- the radio related information transported in a transparent container between a source or target eNB and another system upon inter RAT handover.

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".
[3] 3GPP TS 36.302: "Evolved Universal Terrestrial Radio Access (E-UTRA); Services provided by the physical layer ".
[10] 3GPP TS 22.011: "Service accessibility".


[16] 3GPP TS 36.133: "Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management".

[17] 3GPP TS 25.101: "Universal Terrestrial Radio Access (UTRA); User Equipment (UE) radio transmission and reception (FDD)".

[18] 3GPP TS 25.102: "Universal Terrestrial Radio Access (UTRA); User Equipment (UE) radio transmission and reception (TDD)".


[20] 3GPP TS 45.005: "Radio transmission and reception".

[21] 3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation".

[22] 3GPP TS 36.212: "Evolved Universal Terrestrial Radio Access (E-UTRA); Multiplexing and channel coding".

[23] 3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures".


[26] 3GPP2 C.S0024-C v2.0: "cdma2000 High Rate Packet Data Air Interface Specification".

[27] 3GPP TS 23.003: "Numbering, addressing and identification".

[28] 3GPP TS 45.008: "Radio subsystem link control".

[29] 3GPP TS 25.133: "Requirements for Support of Radio Resource Management (FDD)".


[31] 3GPP TS 36.401: "Evolved Universal Terrestrial Radio Access (E-UTRA); Architecture description".

[32] 3GPP TS 33.401: "3GPP System Architecture Evolution (SAE); Security architecture".

[33] 3GPP2 A.S0008-C v4.0: "Interoperability Specification (IOS) for High Rate Packet Data (HRPD) Radio Access Network Interfaces with Session Control in the Access Network".

[34] 3GPP2 C.S0004-F v1.0: "Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems".

[35] 3GPP TS 24.301: "Non-Access-Stratum (NAS) protocol for Evolved Packet System (EPS); Stage 3".

[36] 3GPP TS 44.060: "General Packet Radio Service (GPRS); Mobile Station (MS) - Base Station System (BSS) interface; Radio Link Control/Medium Access Control (RLC/MAC) protocol".

[37] 3GPP TS 23.041: "Technical realization of Cell Broadcast Service (CBS)".

[38] 3GPP TS 23.038: "Alphabets and Language".
3GPP TS 36.341: "Evolved Universal Terrestrial Radio Access (E-UTRAN); S1 Application Protocol (S1 AP)".

3GPP TS 25.304: "Universal Terrestrial Radio Access (UTRAN); User Equipment (UE) procedures in idle mode and procedures for cell reselection in connected mode".


3GPP TS 36.101: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception".

3GPP TS 44.005: "Data Link (DL) Layer General Aspects".

3GPP2 C.S0087-A v2.0: "E-UTRAN - cdma2000 HRPD Connectivity and Interworking Air Interface Specification"

3GPP TS 44.018: "Mobile radio interface layer 3 specification; Radio Resource Control (RRC) protocol".

3GPP TS 25.223: "Spreading and modulation (TDD)".

3GPP TS 36.104: "Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception".

3GPP TS 36.214: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer - Measurements".

3GPP TS 24.008: "Mobile radio interface layer 3 specification; Core network protocols; Stage 3".

3GPP TS 45.010: "Radio subsystem synchronization".

3GPP TS 23.272: "Circuit Switched Fallback in Evolved Packet System; Stage 2".

3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN)".

3GPP2 C.S0097-0 v3.0: "E-UTRAN - cdma2000 1x Connectivity and Interworking Air Interface Specification".

3GPP TS 36.355: "LTE Positioning Protocol (LPP)".

3GPP TS 36.216: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer for relaying operation".

3GPP TS 23.246: "Multimedia Broadcast/Multicast Service (MBMS); Architecture and functional description".

3GPP TS 26.346: "Multimedia Broadcast/Multicast Service (MBMS); Protocols and codecs".

3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace; Trace control and configuration management".

3GPP TS 22.368: "Service Requirements for Machine Type Communications; Stage 1".

3GPP TS 37.320: "Universal Terrestrial Radio Access (UTRA) and Evolved Universal Terrestrial Radio Access (E-UTRA); Radio measurement collection for Minimization of Drive Tests (MDT); Overall description; Stage 2".

3GPP TS 23.216: "Single Radio Voice Call Continuity (SRVCC); Stage 2".

3GPP TS 22.146: "Multimedia Broadcast/Multicast Service (MBMS); Stage 1".

3GPP TR 36.816: "Evolved Universal Terrestrial Radio Access (E-UTRA); Study on signalling and procedure for interference avoidance for in-device coexistence".

IS-GPS-200F: "Navstar GPS Space Segment/Navigation User Segment Interfaces".
3GPP TS 25.307: "Requirement on User Equipments (UEs) supporting a release-independent frequency band".

3GPP TS 24.312: "Access Network Discovery and Selection Function (ANDSF) Management Object (MO)".

IEEE 802.11-2012, Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications, IEEE Std.

3GPP TS 23.303: "Proximity-based services (ProSe); Stage 2".

3GPP TS 24.334: "Proximity-services (ProSe) User Equipment (UE) to ProSe function protocol aspects; Stage 3".

3GPP TS 24.333: "Proximity-services (ProSe) Management Objects (MO)".

3GPP TS 36.314: "Evolved Universal Terrestrial Radio Access (E-UTRA); Layer 2-Measurements".

3GPP TS 24.105: "Application specific Congestion control for Data Communication (ACDC) Management Object (MO)".

3GPP TS 23.179: "Functional architecture and information flows to support mission critical communication services; Stage 2".

3GPP TS 24.302: "Access to the 3GPP Evolved Packet Core (EPC) via non-3GPP access networks".

3GPP TS 23.402: "Architecture enhancements for non-3GPP accesses; Stage-2".

Wi-Fi Alliance® Technical Committee, Hotspot 2.0 Technical Task Group Hotspot 2.0 (Release 2) Technical Specification Version 3.11.

3GPP TS 22.101: "Service aspects; Service principles".

### Definitions, symbols and abbreviations

#### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 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 TR 21.905 [1].

**Anchor carrier:** In NB-IoT, a carrier where the UE assumes that NPSS/NSSS/NPBCH/SIB-NB are transmitted.

**Bandwidth Reduced:** Refers to operation in downlink and uplink with a limited channel bandwidth of 6 PRBs.

**Cellular IoT EPS Optimisation:** Provides improved support of small data transfer, as defined in TS 24.301 [35].

**Commercial Mobile Alert System:** Public Warning System that delivers Warning Notifications provided by Warning Notification Providers to CMAS capable UEs.

**Common access barring parameters:** The common access barring parameters refer to the access class barring parameters that are broadcast in SystemInformationBlockType2 outside the list of PLMN specific parameters (i.e. in ac-BarringPerPLMN-List).

**Control plane CIoT EPS optimisation:** Enables support of efficient transport of user data (IP, non-IP or SMS) over control plane via the MME without triggering data radio bearer establishment, as defined in TS 24.301 [35].

**CSG member cell:** A cell broadcasting the identity of the selected PLMN, registered PLMN or equivalent PLMN and for which the CSG whitelist of the UE includes an entry comprising cell's CSG ID and the respective PLMN identity.

**Dual Connectivity:** A UE in RRC_CONNECTED is configured with Dual Connectivity when configured with a Master and a Secondary Cell Group.
EU-Alert: Public Warning System that delivers Warning Notifications provided by Warning Notification Providers using the same AS mechanisms as defined for CMAS.

Field: The individual contents of an information element are referred as fields.

Floor: Mathematical function used to ‘round down’ i.e. to the nearest integer having a lower or equal value.

Information element: A structural element containing a single or multiple fields is referred as information element.

Korean Public Alert System (KPAS): Public Warning System that delivers Warning Notifications provided by Warning Notification Providers using the same AS mechanisms as defined for CMAS.

Master Cell Group: For a UE not configured with DC, the MCG comprises all serving cells. For a UE configured with DC, the MCG concerns a subset of the serving cells comprising of the PCell and zero or more secondary cells.

MBMS service: MBMS bearer service as defined in TS 23.246 [56] (i.e. provided via an MRB or an SC-MRB).

NB-IoT: NB-IoT allows access to network services via E-UTRA with a channel bandwidth limited to 180 kHz.

NB-IoT UE: A UE that uses NB-IoT.

Non-anchor carrier: In NB-IoT, a carrier where the UE does not assume that NPSS/NSSS/NPBCH/SIB-NB are transmitted.

Primary Cell: The cell, operating on the primary frequency, in which the UE either performs the initial connection establishment procedure or initiates the connection re-establishment procedure, or the cell indicated as the primary cell in the handover procedure.

Primary Secondary Cell: The SCG cell in which the UE is instructed to perform random access when performing the SCG change procedure.

Primary Timing Advance Group: Timing Advance Group containing the PCell or the PSCell.

PUCCH SCell: An SCell configured with PUCCH.

Secondary Cell: A cell, operating on a secondary frequency, which may be configured once an RRC connection is established and which may be used to provide additional radio resources.

Secondary Cell Group: For a UE configured with DC, the subset of serving cells not part of the MCG, i.e. comprising of the PSCell and zero or more other secondary cells.

Secondary Timing Advance Group: Timing Advance Group neither containing the PCell nor the PSCell. A secondary timing advance group contains at least one cell with configured uplink.

Serving Cell: For a UE in RRC_CONNECTED not configured with CA/ DC there is only one serving cell comprising of the primary cell. For a UE in RRC_CONNECTED configured with CA/ DC the term ‘serving cells’ is used to denote the set of one or more cells comprising of the primary cell and all secondary cells.

Sidelink: UE to UE interface for sidelink communication and sidelink discovery. The sidelink corresponds to the PC5 interface as defined in TS 23.303 [68].

Sidelink communication: AS functionality enabling ProSe Direct Communication as defined in TS 23.303 [68], between two or more nearby UEs, using E-UTRA technology but not traversing any network node.

Sidelink discovery: AS functionality enabling ProSe Direct Discovery as defined in TS 23.303 [68], using E-UTRA technology but not traversing any network node.

User plane CIoT EPS optimisation: Enables support for change from EMM-IDLE mode to EMM-CONNECTED mode without the need for using the Service Request procedure, as defined in TS 24.301 [35].

Timing Advance Group: A group of serving cells that is configured by RRC and that, for the cells with an UL configured, use the same timing reference cell and the same Timing Advance value. A Timing Advance Group only includes cells of the same cell group i.e. it either includes MCG cells or SCG cells.
3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1], TS 36.300 [9] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1] or TS 36.300 [9].

1xRTT CDMA2000 1x Radio Transmission Technology
AB Access Barring
ACDC Application specific Congestion control for Data Communication
ACK Acknowledgement
AM Acknowledged Mode
ANDSF Access Network Discovery and Selection Function
ARQ Automatic Repeat Request
AS Access Stratum
ASN.1 Abstract Syntax Notation One
BCCH Broadcast Control Channel
BCD Binary Coded Decimal
BCH Broadcast Channel
BL Bandwidth reduced Low complexity
BLER Block Error Rate
BR Bandwidth Reduced
BR-BCCH Bandwidth Reduced Broadcast Control Channel
CA Carrier Aggregation
CCCH Common Control Channel
CCO Cell Change Order
CE Coverage Enhancement
CG Cell Group
CioT Cellular IoT
CMAS Commercial Mobile Alert Service
CP Control Plane
C-RNTI Cell RNTI
CRS Cell-specific Reference Signal
CSFB CS fallback
CSG Closed Subscriber Group
CSI Channel State Information
DC Dual Connectivity
DCCH Dedicated Control Channel
DCI Downlink Control Information
DFN Direct Frame Number
DL Downlink
DL-SCH Downlink Shared Channel
DRB (user) Data Radio Bearer
DRX Discontinuous Reception
DTCH Dedicated Traffic Channel
EAB Extended Access Barring
eDRX Extended DRX
EHPLMN Equivalent Home Public Land Mobile Network
eIMTA Enhanced Interference Management and Traffic Adaptation
ENB Evolved Node B
EPC Evolved Packet Core
EPDCCCH Enhanced Physical Downlink Control Channel
EPS Evolved Packet System
ETWS Earthquake and Tsunami Warning System
E-UTRA Evolved Universal Terrestrial Radio Access
E-UTRAN Evolved Universal Terrestrial Radio Access Network
FDD Frequency Division Duplex
FFS For Further Study
GERAN GSM/EDGE Radio Access Network
GNSS Global Navigation Satellite System
G-RNTI Group RNTI
GSM Global System for Mobile Communications
ETSI

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3GPP TS 36.331 version 13.3.0 Release 13

HARQ  Hybrid Automatic Repeat Request
HFN  Hyper Frame Number
HPLMN  Home Public Land Mobile Network
HRPD  CDMA2000 High Rate Packet Data
H-SFN  Hyper SFN
IDC  In-Device Coexistence
IE  Information element
IMEI  International Mobile Equipment Identity
IMSI  International Mobile Subscriber Identity
IoT  Internet of Things
ISM  Industrial, Scientific and Medical
kB  Kilobyte (1000 bytes)
L1  Layer 1
L2  Layer 2
L3  Layer 3
LAA  Licensed-Assisted Access
LWA  LTE-WLAN Aggregation
LWAAP  LTE-WLAN Aggregation Adaptation Protocol
LWIP  LTE-WLAN Radio Level Integration with IPsec Tunnel
MAC  Medium Access Control
MBMS  Multimedia Broadcast Multicast Service
MBSFN  Multimedia Broadcast multicast service Single Frequency Network
MCG  Master Cell Group
MCPTT  Mission Critical Push To Talk
MDT  Minimization of Drive Tests
MIB  Master Information Block
MO  Mobile Originating
M/N  Not Applicable
NACC  Network Assisted Cell Change
NAICS  Network Assisted Interference Cancellation/Suppression
NAS  Non Access Stratum
NB-IoT  NarrowBand Internet of Things
NPBCH  Narrowband Physical Broadcast channel
NPDCCH  Narrowband Physical Downlink Control channel
NPDSCH  Narrowband Physical Downlink Shared channel
NPRACH  Narrowband Physical Random Access channel
NPSS  Narrowband Primary Synchronization Signal
NPUSCH  Narrowband Physical Uplink Shared channel
NRS  Narrowband Reference Signal
NSSS  Narrowband Secondary Synchronization Signal
PCCH  Paging Control Channel
PCell  Primary Cell
PDCCH  Physical Downlink Control Channel
PDCP  Packet Data Convergence Protocol
PDU  Protocol Data Unit
PLMN  Public Land Mobile Network
PMK  Pairwise Master Key
ProSe  Proximity based Services
PS  Public Safety (in context of sidelink), Packet Switched (otherwise)
PSCell  Primary Secondary Cell
PSK  Pre-Shared Key
PTAG  Primary Timing Advance Group
PUCCH  Physical Uplink Control Channel
QCI  QoS Class Identifier
QoS  Quality of Service
RACH  Random Access Channel
RAT  Radio Access Technology

ETSI
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB</td>
<td>Radio Bearer</td>
</tr>
<tr>
<td>RCLWI</td>
<td>RAN Controlled LTE-WLAN Integration</td>
</tr>
<tr>
<td>RLC</td>
<td>Radio Link Control</td>
</tr>
<tr>
<td>RMTC</td>
<td>RSSI Measurement Timing Configuration</td>
</tr>
<tr>
<td>RN</td>
<td>Relay Node</td>
</tr>
<tr>
<td>RNTI</td>
<td>Radio Network Temporary Identifier</td>
</tr>
<tr>
<td>ROHC</td>
<td>ROBust Header Compression</td>
</tr>
<tr>
<td>RPLMN</td>
<td>Registered Public Land Mobile Network</td>
</tr>
<tr>
<td>RRC</td>
<td>Radio Resource Control</td>
</tr>
<tr>
<td>RSCP</td>
<td>Received Signal Code Power</td>
</tr>
<tr>
<td>RSRP</td>
<td>Reference Signal Received Power</td>
</tr>
<tr>
<td>RSRQ</td>
<td>Reference Signal Received Quality</td>
</tr>
<tr>
<td>RSSI</td>
<td>Received Signal Strength Indicator</td>
</tr>
<tr>
<td>SAE</td>
<td>System Architecture Evolution</td>
</tr>
<tr>
<td>SAP</td>
<td>Service Access Point</td>
</tr>
<tr>
<td>SC</td>
<td>Sidelink Control</td>
</tr>
<tr>
<td>SCell</td>
<td>Secondary Cell</td>
</tr>
<tr>
<td>SCG</td>
<td>Secondary Cell Group</td>
</tr>
<tr>
<td>SC-MRB</td>
<td>Single Cell MRB</td>
</tr>
<tr>
<td>SC-RNTI</td>
<td>Single Cell RNTI</td>
</tr>
<tr>
<td>SD-RSRP</td>
<td>Sidelink Discovery Reference Signal Received Power</td>
</tr>
<tr>
<td>SFN</td>
<td>System Frame Number</td>
</tr>
<tr>
<td>SI</td>
<td>System Information</td>
</tr>
<tr>
<td>SIB</td>
<td>System Information Block</td>
</tr>
<tr>
<td>SI-RNTI</td>
<td>System Information RNTI</td>
</tr>
<tr>
<td>SL</td>
<td>Sidelink</td>
</tr>
<tr>
<td>SLSS</td>
<td>Sidelink Synchronisation Signal</td>
</tr>
<tr>
<td>SMC</td>
<td>Security Mode Control</td>
</tr>
<tr>
<td>SPS</td>
<td>Semi-Persistent Scheduling</td>
</tr>
<tr>
<td>SR</td>
<td>Scheduling Request</td>
</tr>
<tr>
<td>SRB</td>
<td>Signalling Radio Bearer</td>
</tr>
<tr>
<td>S-RSRP</td>
<td>Sidelink Reference Signal Received Power</td>
</tr>
<tr>
<td>SSAC</td>
<td>Service Specific Access Control</td>
</tr>
<tr>
<td>SSTD</td>
<td>SFN and Subframe Timing Difference</td>
</tr>
<tr>
<td>STAG</td>
<td>Secondary Timing Advance Group</td>
</tr>
<tr>
<td>S-TMSI</td>
<td>SAE Temporary Mobile Station Identifier</td>
</tr>
<tr>
<td>TA</td>
<td>Tracking Area</td>
</tr>
<tr>
<td>TAG</td>
<td>Timing Advance Group</td>
</tr>
<tr>
<td>TDD</td>
<td>Time Division Duplex</td>
</tr>
<tr>
<td>TDM</td>
<td>Time Division Multiplexing</td>
</tr>
<tr>
<td>TM</td>
<td>Transparent Mode</td>
</tr>
<tr>
<td>TPC-RNTI</td>
<td>Transmit Power Control RNTI</td>
</tr>
<tr>
<td>T-RPT</td>
<td>Time Resource Pattern of Transmission</td>
</tr>
<tr>
<td>TTT</td>
<td>Time To Trigger</td>
</tr>
<tr>
<td>UE</td>
<td>User Equipment</td>
</tr>
<tr>
<td>UICC</td>
<td>Universal Integrated Circuit Card</td>
</tr>
<tr>
<td>UL</td>
<td>Uplink</td>
</tr>
<tr>
<td>UL-SCH</td>
<td>Uplink Shared Channel</td>
</tr>
<tr>
<td>UM</td>
<td>Unacknowledged Mode</td>
</tr>
<tr>
<td>UP</td>
<td>User Plane</td>
</tr>
<tr>
<td>UTC</td>
<td>Coordinated Universal Time</td>
</tr>
<tr>
<td>UTRAN</td>
<td>Universal Terrestrial Radio Access Network</td>
</tr>
<tr>
<td>VoLTE</td>
<td>Voice over Long Term Evolution</td>
</tr>
<tr>
<td>WLAN</td>
<td>Wireless Local Area Network</td>
</tr>
<tr>
<td>WT</td>
<td>WLAN Termination</td>
</tr>
</tbody>
</table>

In the ASN.1, lower case may be used for some (parts) of the above abbreviations e.g. c-RNTI.
4 General

4.1 Introduction

In this specification, (parts of) procedures and messages specified for the UE equally apply to the RN for functionality necessary for the RN. There are also (parts of) procedures and messages which are only applicable to the RN in its communication with the E-UTRAN, in which case the specification denotes the RN instead of the UE. Such RN-specific aspects are not applicable to the UE.

NB-IoT is a non backward compatible variant of E-UTRAN supporting a reduced set of functionality. In this specification, (parts of) procedures and messages specified for the UE equally apply to the UE in NB-IoT. There are also some features and related procedures and messages that are not supported by UEs in NB-IoT.

In particular, the following features are not supported in NB-IoT and corresponding procedures and messages do not apply to the UE in NB-IoT:

- Connected mode mobility (Handover and measurement reporting);
- Inter-RAT cell reselection or inter-RAT mobility in connected mode;
- CSG;
- Relay Node (RN);
- Carrier Aggregation (CA);
- Dual connectivity (DC);
- GBR (QoS);
- ACB, EAB, SSAC and ACDC;
- MBMS;
- Self-configuration and self-optimisation;
- Measurement logging and reporting for network performance optimisation;
- Public warning systems e.g. CMAS, ETWS and PWS;
- Real time services (including emergency call);
- CS services and CS fallback;
- In-device coexistence;
- RAN assisted WLAN interworking;
- Network-assisted interference cancellation/suppression;
- Sidelink (including direct communication and direct discovery).

NOTE: In regard to mobility, NB-IoT is a separate RAT from E-UTRAN.

In this specification, there are also (parts of) procedures and messages which are only applicable to UEs in NB-IoT, in which case this is stated explicitly.

This specification is organised as follows:

- sub-clause 4.2 describes the RRC protocol model;
- sub-clause 4.3 specifies the services provided to upper layers as well as the services expected from lower layers;
- sub-clause 4.4 lists the RRC functions;
- clause 5 specifies RRC procedures, including UE state transitions;
- clause 6 specifies the RRC message in a mixed format (i.e. tabular & ASN.1 together);
- clause 7 specifies the variables (including protocol timers and constants) and counters to be used by the UE;
- clause 8 specifies the encoding of the RRC messages;
- clause 9 specifies the specified and default radio configurations;
- clause 10 specifies the RRC messages transferred across network nodes;
- clause 11 specifies the UE capability related constraints and performance requirements.

4.2 Architecture

4.2.1 UE states and state transitions including inter RAT

A UE is in RRC_CONNECTED when an RRC connection has been established. If this is not the case, i.e. no RRC connection is established, the UE is in RRC_IDLE state. The RRC states can further be characterised as follows:

- **RRC_IDLE**:
  - A UE specific DRX may be configured by upper layers (not applicable for NB-IoT);
  - UE controlled mobility;
  - The UE:
    - Monitors a Paging channel to detect incoming calls, system information change, for ETWS capable UEs, ETWS notification, and for CMAS capable UEs, CMAS notification;
    - Performs neighbouring cell measurements and cell (re-)selection;
    - Acquires system information.
  - Performs logging of available measurements together with location and time for logged measurement configured UEs.

- **RRC_CONNECTED**:
  - Transfer of unicast data to/from UE.
  - At lower layers, the UE may be configured with a UE specific DRX.
  - For UEs supporting CA, use of one or more SCells, aggregated with the PCell, for increased bandwidth;
  - For UEs supporting DC, use of one SCG, aggregated with the MCG, for increased bandwidth;
  - Network controlled mobility, i.e. handover and cell change order with optional network assistance (NACC) to GERAN (not applicable for NB-IoT);
  - The UE:
    - Monitors a Paging channel and/ or System Information Block Type 1 contents to detect system information change, for ETWS capable UEs, ETWS notification, and for CMAS capable UEs, CMAS notification (not applicable for NB-IoT);
    - Monitors control channels associated with the shared data channel to determine if data is scheduled for it;
    - Provides channel quality and feedback information (not applicable for NB-IoT);
    - Performs neighbouring cell measurements and measurement reporting (not applicable for NB-IoT);
    - Acquires system information (not applicable for NB-IoT).
The following figure not only provides an overview of the RRC states in E-UTRA, but also illustrates the mobility support between E-UTRAN, UTRAN and GERAN.

Figure 4.2.1-1: E-UTRA states and inter RAT mobility procedures, 3GPP

The following figure illustrates the mobility support between E-UTRAN, CDMA2000 1xRTT and CDMA2000 HRPD. The details of the CDMA2000 state models are out of the scope of this specification.

Figure 4.2.1-2: Mobility procedures between E-UTRA and CDMA2000

The inter-RAT handover procedure(s) supports the case of signalling, conversational services, non-conversational services and combinations of these.

In addition to the state transitions shown in Figure 4.2.1-1 and Figure 4.2.1-2, there is support for connection release with redirection information from E-UTRA RRC_CONNECTED to GERAN, UTRAN and CDMA2000 (HRPD Idle/1xRTT Dormant mode).

For NB-IoT, mobility between E-UTRA and UTRAN, GERAN and between E-UTRA and CDMA2000 1xRTT and CDMA2000 HRPD is not supported and hence only the E-UTRA states depicted in Figure 4.2.1-1 are applicable.

4.2.2 Signalling radio bearers

"Signalling Radio Bearers" (SRBs) are defined as Radio Bearers (RB) that are used only for the transmission of RRC and NAS messages. More specifically, the following SRBs are defined:
- SRB0 is for RRC messages using the CCCH logical channel;
- SRB1 is for RRC messages (which may include a piggybacked NAS message) as well as for NAS messages prior to the establishment of SRB2, all using DCCH logical channel;
- For NB-IoT, SRB1bis is for RRC messages (which may include a piggybacked NAS message) as well as for NAS messages prior to the activation of security, all using DCCH logical channel;
- SRB2 is for RRC messages which include logged measurement information as well as for NAS messages, all using DCCH logical channel. SRB2 has a lower-priority than SRB1 and is always configured by E-UTRAN after security activation. SRB2 is not applicable for NB-IoT.

In downlink piggybacking of NAS messages is used only for one dependant (i.e. with joint success/ failure) procedure: bearer establishment/ modification/ release. In uplink NAS message piggybacking is used only for transferring the initial NAS message during connection setup.

NOTE: The NAS messages transferred via SRB2 are also contained in RRC messages, which however do not include any RRC protocol control information.

Once security is activated, all RRC messages on SRB1 and SRB2, including those containing NAS or non-3GPP messages, are integrity protected and ciphered by PDCP. NAS independently applies integrity protection and ciphering to the NAS messages.

For a UE configured with DC, all RRC messages, regardless of the SRB used and both in downlink and uplink, are transferred via the MCG.

4.3 Services

4.3.1 Services provided to upper layers

The RRC protocol offers the following services to upper layers:

- Broadcast of common control information;
- Notification of UEs in RRC_IDLE, e.g. about a terminating call, for ETWS, for CMAS;
- Transfer of dedicated control information, i.e. information for one specific UE.

4.3.2 Services expected from lower layers

In brief, the following are the main services that RRC expects from lower layers:

- PDCP: integrity protection and ciphering;
- RLC: reliable and in-sequence transfer of information, without introducing duplicates and with support for segmentation and concatenation.

Further details about the services provided by Packet Data Convergence Protocol layer (e.g. integrity and ciphering) are provided in TS 36.323 [8]. The services provided by Radio Link Control layer (e.g. the RLC modes) are specified in TS 36.322 [7]. Further details about the services provided by Medium Access Control layer (e.g. the logical channels) are provided in TS 36.321 [6]. The services provided by physical layer (e.g. the transport channels) are specified in TS 36.302 [3].

4.4 Functions

The RRC protocol includes the following main functions:

- Broadcast of system information:
  - Including NAS common information;
- Information applicable for UEs in RRC_IDLE, e.g. cell (re-)selection parameters, neighbouring cell information and information (also) applicable for UEs in RRC_CONNECTED, e.g. common channel configuration information.

- Including ETWS notification, CMAS notification (not applicable for NB-IoT);

- RRC connection control:
  - Paging;
  - Establishment/ modification/ suspension / resumption / release of RRC connection, including e.g. assignment/ modification of UE identity (C-RNTI), establishment/ modification/ release of SRB1, SRB1bis and SRB2, access class barring;
  - Initial security activation, i.e. initial configuration of AS integrity protection (SRBs) and AS ciphering (SRBs, DRBs);
  - For RNs, configuration of AS integrity protection for DRBs;
  - RRC connection mobility including e.g. intra-frequency and inter-frequency handover, associated security handling, i.e. key/ algorithm change, specification of RRC context information transferred between network nodes;

**NOTE 1:** In NB-IoT, only key change (but no re-keying) at RRC Connection Resumption and RRC context information transfer are applicable.

  - Establishment/ modification/ release of RBs carrying user data (DRBs);
  - Radio configuration control including e.g. assignment/ modification of ARQ configuration, HARQ configuration, DRX configuration;
  - For RNs, RN-specific radio configuration control for the radio interface between RN and E-UTRAN;
  - In case of CA, cell management including e.g. change of PCell, addition/ modification/ release of SCell(s) and addition/modification/release of STAG(s);
  - In case of DC, cell management including e.g. change of PSCell, addition/ modification/ release of SCG cell(s) and addition/modification/release of SCG TAG(s).
  - QoS control including assignment/ modification of semi-persistent scheduling (SPS) configuration information for DL and UL, assignment/ modification of parameters for UL rate control in the UE, i.e. allocation of a priority and a prioritised bit rate (PBR) for each RB (not applicable for NB-IoT);
  - Recovery from radio link failure;
  - In case of LWA, RCLWI and LWIP, WLAN mobility set management including e.g. addition/ modification/ release of WLAN(s) from the WLAN mobility set;
  - Inter-RAT mobility including e.g. security activation, transfer of RRC context information (not applicable for NB-IoT);
  - Measurement configuration and reporting (not applicable for NB-IoT):
    - Establishment/ modification/ release of measurements (e.g. intra-frequency, inter-frequency and inter-RAT measurements);
    - Setup and release of measurement gaps;
    - Measurement reporting;
    - Other functions including e.g. transfer of dedicated NAS information and non-3GPP dedicated information, transfer of UE radio access capability information, support for E-UTRAN sharing (multiple PLMN identities);
    - Generic protocol error handling;
    - Support of self-configuration and self-optimisation (not applicable for NB-IoT);
- Support of measurement logging and reporting for network performance optimisation [60] (not applicable for NB-IoT);

NOTE 2: Random access is specified entirely in the MAC including initial transmission power estimation.

5  Procedures

5.1  General

5.1.1  Introduction

The procedural requirements are structured according to the main functional areas: system information (5.2), connection control (5.3), inter-RAT mobility (5.4) and measurements (5.5). In addition sub-clause 5.6 covers other aspects e.g. NAS dedicated information transfer, UE capability transfer, sub-clause 5.7 specifies the generic error handling, sub-clause 5.8 covers MBMS, clause 5.8 cover SC-PTM (i.e. MBMS service reception via SC-MRB) sub-clause 5.9 covers RN-specific procedures and sub-clause 5.10 covers sidelink.

For NB-IoT, only a subset of the above procedural requirements applies: system information (5.2), connection control (5.3), some part of other aspects (5.6), and general error handling (5.7). Subclauses inter-RAT mobility (5.4), measurements (5.5), MBMS (5.8), RN procedures (5.9) and Sidelink (5.10) are not applicable in NB-IoT.

5.1.2  General requirements

The UE shall:

1> process the received messages in order of reception by RRC, i.e. the processing of a message shall be completed before starting the processing of a subsequent message;

NOTE 1: E-UTRAN may initiate a subsequent procedure prior to receiving the UE's response of a previously initiated procedure.

1> within a sub-clause execute the steps according to the order specified in the procedural description;

1> consider the term 'radio bearer' (RB) to cover SRBs and DRBs but not MRBs unless explicitly stated otherwise;

1> set the rrc-TransactionIdentifier in the response message, if included, to the same value as included in the message received from E-UTRAN that triggered the response message;

1> upon receiving a choice value set to setup:

2> apply the corresponding received configuration and start using the associated resources, unless explicitly specified otherwise;

1> upon receiving a choice value set to release:

2> clear the corresponding configuration and stop using the associated resources;

1> upon handover to E-UTRA; or

1> upon receiving an RRCConnectionReconfiguration message including the fullConfig:

2> apply the Conditions in the ASN.1 for inclusion of the fields for the DRB/PDCP/RLC setup during the reconfiguration of the DRBs included in the drb-ToAddModList;

NOTE 2: At each point in time, the UE keeps a single value for each field except for during handover when the UE temporarily stores the previous configuration so it can revert back upon handover failure. In other words: when the UE reconfigures a field, the existing value is released except for during handover.

NOTE 3: Although not explicitly stated, the UE initially considers all functionality to be deactivated/ released until it is explicitly stated that the functionality is setup/ activated. Correspondingly, the UE initially considers lists to be empty e.g. the list of radio bearers, the list of measurements.
1> upon receiving an extension field comprising the entries in addition to the ones carried by the original field (regardless of whether E-UTRAN may signal more entries in total); apply the following generic behaviour if explicitly stated to be applicable:

2> create a combined list by concatenating the additional entries included in the extension field to the original field while maintaining the order among both the original and the additional entries;

2> for the combined list, created according to the previous, apply the same behaviour as defined for the original field;

NOTE 4: A field comprising a list of entries normally includes "list" in the field name. The typical way to extend (the size of) such a list is to introduce a field comprising the additional entries, which should include "listExt" in the name of the field/IE. E.g. field1List-RAT, field1ListExt-RAT.

5.2 System information

5.2.1 Introduction

5.2.1.1 General

System information is divided into the MasterInformationBlock (MIB) and a number of SystemInformationBlocks (SIBs). The MIB includes a limited number of most essential and most frequently transmitted parameters that are needed to acquire other information from the cell, and is transmitted on BCH. SIBs other than SystemInformationBlockType1 are carried in SystemInformation (SI) messages and mapping of SIBs to SI messages is flexibly configurable by schedulingInfoList included in SystemInformationBlockType1, with restrictions that: each SIB is contained only in a single SI message, and at most once in that message; only SIBs having the same scheduling requirement (periodicity) can be mapped to the same SI message; SystemInformationBlockType2 is always mapped to the SI message that corresponds to the first entry in the list of SI messages in schedulingInfoList. There may be multiple SI messages transmitted with the same periodicity. SystemInformationBlockType1 and all SI messages are transmitted on DL-SCH.

The Bandwidth reduced Low Complexity (BL) UEs and UEs in Coverage Enhancement (CE) apply Bandwidth Reduced (BR) version of the SIB or SI messages. A UE considers itself in enhanced coverage as specified in TS 36.304 [4]. In this and subsequent clauses, anything applicable for a particular SIB or SI message equally applies to the corresponding BR version unless explicitly stated otherwise.

For NB-IoT, a reduced set of system information block with similar functionality but different content is defined; the UE applies the NB-IoT (NB) version of the MIB and the SIBs. These are denoted MasterInformationBlock-NB and SystemInformationBlockTypeX-NB in this specification. All other system information blocks (without NB suffix) are not applicable to NB-IoT; this is not further stated in the corresponding text.

NOTE 1: The physical layer imposes a limit to the maximum size a SIB can take. When DCI format 1C is used the maximum allowed by the physical layer is 1736 bits (217 bytes) while for format 1A the limit is 2216 bits (277 bytes), see TS 36.212 [22] and TS 36.213 [23]. For BL UEs and UEs in CE, the maximum SIB and SI message size is 936 bits, see TS 36.213 [23]. For NB-IoT, the maximum SIB and SI message size is 680 bits, see TS 36.213 [23].

In addition to broadcasting, E-UTRAN may provide SystemInformationBlockType1, including the same parameter values, via dedicated signalling i.e., within an RRCConnectionReconfiguration message.

The UE applies the system information acquisition and change monitoring procedures for the PCell, except when being a BL UE or a UE in CE or a NB-IoT UE in RRC_CONNECTED mode while T311 is not running. For an SCell, E-UTRAN provides, via dedicated signalling, all system information relevant for operation in RRC_CONNECTED when adding the SCell. However, a UE that is configured with DC shall acquire the MasterInformationBlock of the PSCell but use it only to determine the SFN timing of the SCG, which may be different from the MCG. Upon change of the relevant system information of a configured SCell, E-UTRAN releases and subsequently adds the concerned SCell, which may be done with a single RRCConnectionReconfiguration message. If the UE is receiving or interested to receive an MBMS service in a cell, the UE shall apply the system information acquisition and change monitoring procedure to acquire parameters relevant for MBMS operation and apply the parameters acquired from system information only for MBMS operation for this cell.
NOTE 2: E-UTRAN may configure via dedicated signalling different parameter values than the ones broadcast in the concerned SCell.

An RN configured with an RN subframe configuration does not need to apply the system information acquisition and change monitoring procedures. Upon change of any system information relevant to an RN, E-UTRAN provides the system information blocks containing the relevant system information to an RN configured with an RN subframe configuration via dedicated signalling using the RNRconfiguration message. For RNs configured with an RN subframe configuration, the system information contained in this dedicated signalling replaces any corresponding stored system information and takes precedence over any corresponding system information acquired through the system information acquisition procedure. The dedicated system information remains valid until overridden.

NOTE 3: E-UTRAN may configure an RN, via dedicated signalling, with different parameter values than the ones broadcast in the concerned cell.

5.2.1.2 Scheduling

The MIB uses a fixed schedule with a periodicity of 40 ms and repetitions made within 40 ms. The first transmission of the MIB is scheduled in subframe #0 of radio frames for which the SFN mod 4 = 0, and repetitions are scheduled in subframe #0 of all other radio frames. For TDD/FDD system with a bandwidth larger than 1.4 MHz that supports BL UEs or UEs in CE, MIB transmission may be repeated in subframe#9 of the previous radio frame for FDD and subframe #5 of the same radio frame for TDD.

The SystemInformationBlockType1 uses a fixed schedule with a periodicity of 80 ms and repetitions made within 80 ms. The first transmission of SystemInformationBlockType1 is scheduled in subframe #5 of radio frames for which the SFN mod 8 = 0, and repetitions are scheduled in subframe #5 of all other radio frames for which SFN mod 2 = 0.

For BL UEs or UEs in CE, MIB is applied which may be provided with additional repetitions, while for SIB1 and further SI messages, separate messages are used which are scheduled independently and with content that may differ. The separate instance of SIB1 is named as SystemInformationBlockType1-BR. The SystemInformationBlockType1-BR uses a schedule with a periodicity of 80ms. TBS for SystemInformationBlockType1-BR and the repetitions made within 80ms are indicated via schedulingInfoSIB1-BR in MIB.

The SI messages are transmitted within periodically occurring time domain windows (referred to as SI-windows) using dynamic scheduling. Each SI message is associated with a SI-window and the SI-windows of different SI messages do not overlap. That is, within one SI-window only the corresponding SI is transmitted. The length of the SI-window is common for all SI messages, and is configurable. Within the SI-window, the corresponding SI message can be transmitted a number of times in any subframe other than MBSFN subframes, uplink subframes in TDD, and subframe #5 of radio frames for which SFN mod 2 = 0. The UE acquires the detailed time-domain scheduling (and other information, e.g. frequency-domain scheduling, used transport format) from decoding SI-RNTI on PDCCH (see TS 36.321 [6]). For a BL UE or a UE in CE, the detailed time/frequency domain scheduling information for the SI messages is provided in SystemInformationBlockType1-BR.

For UEs other than BL UE or UEs in CE SI-RNTI is used to address SystemInformationBlockType1 as well as all SI messages.

SystemInformationBlockType1 configures the SI-window length and the transmission periodicity for the SI messages.

5.2.1.2a Scheduling for NB-IoT

The MasterInformationBlock-NB (MIB-NB) uses a fixed schedule with a periodicity of 640 ms and repetitions made within 640 ms. The first transmission of the MIB-NB is scheduled in subframe #0 of radio frames for which the SFN mod 64 = 0 and repetitions are scheduled in subframe #0 of all other radio frames. The transmissions are arranged in 8 independently decodable blocks of 80 ms duration.

The SystemInformationBlockType1-NB (SIB1-NB) uses a fixed schedule with a periodicity of 2560 ms. SIB1-NB transmission occurs in subframe #4 of every other frame in 16 continuous frames. The starting frame for the first transmission of the SIB1-NB is derived from the cell PCID and the number of repetitions within the 2560 ms period and repetitions are made, equally spaced, within the 2560 ms period (see TS 36.213 [23]). TBS for SystemInformationBlockType1-NB and the repetitions made within the 2560 ms are indicated by schedulingInfoSIB1 field in the MIB-NB.

The SI messages are transmitted within periodically occurring time domain windows (referred to as SI-windows) using scheduling information provided in SystemInformationBlockType1-NB. Each SI message is associated with a SI-
window and the SI-windows of different SI messages do not overlap. That is, within one SI-window only the corresponding SI is transmitted. The length of the SI-window is common for all SI messages, and is configurable.

Within the SI-window, the corresponding SI message can be transmitted a number of times over 2 or 8 consecutive NB-IoT downlink subframes depending on TBS. The UE acquires the detailed time/frequency domain scheduling information and other information, e.g. used transport format for the SI messages from schedulingInfoList field in SystemInformationBlockType1-NB. The UE is not required to accumulate several SI messages in parallel but may need to accumulate a SI message across multiple SI windows, depending on coverage condition.

SystemInformationBlockType1-NB configures the SI-window length and the transmission periodicity for all SI messages.

5.2.1.3 System information validity and notification of changes

Change of system information (other than for ETWS, CMAS and EAB parameters and other than for AB parameters for NB-IoT) only occurs at specific radio frames, i.e. the concept of a modification period is used. System information may be transmitted a number of times with the same content within a modification period, as defined by its scheduling. The modification period boundaries are defined by SFN values for which SFN mod m = 0, where m is the number of radio frames comprising the modification period. The modification period is configured by system information. If H-SFN is provided in SystemInformationBlockType1-BR, modification period boundaries for BL UEs and UEs in CE are defined by SFN values for which (H-SFN * 1024 + SFN) mod m = 0. For NB-IoT, H-SFN is always provided and the modification period boundaries are defined by SFN values for which (H-SFN * 1024 + SFN) mod m = 0.

To enable system information update notification for RRC_IDLE UEs configured to use a DRX cycle longer than the modification period, an eDRX acquisition period is defined. The boundaries of the eDRX acquisition period are determined by H-SFN values for which H-SFN mod 256 = 0. For NB-IoT, the boundaries of the eDRX acquisition period are determined by H-SFN values for which H-SFN mod 1024 = 0.

When the network changes (some of the) system information, it first notifies the UEs about this change, i.e. this may be done throughout a modification period. In the next modification period, the network transmits the updated system information. These general principles are illustrated in figure 5.2.1.3-1, in which different colours indicate different system information. Upon receiving a change notification, the UE not configured to use a DRX cycle that is longer than the modification period acquires the new system information immediately from the start of the next modification period. Upon receiving a change notification applicable to eDRX, a UE in RRC_IDLE configured to use a DRX cycle that is longer than the modification period acquires the updated system information immediately from the start of the next eDRX acquisition period. The UE applies the previously acquired system information until the UE acquires the new system information. The possible boundaries of modification for SystemInformationBlockType1-BR are defined by SFN values for which SFN mod 512 = 0 except for notification of ETWS/CMAS for which the eNB may change SystemInformationBlockType1-BR content at any time. For NB-IoT, the possible boundaries of modification for SystemInformationBlockType1-NB are defined by SFN values for which (H-SFN * 1024 + SFN) mod 4096 = 0.

![Figure 5.2.1.3-1: Change of system Information](image)

The Paging message is used to inform UEs in RRC_IDLE and UEs in RRC_CONNECTED about a system information change. If the UE is in RRC_CONNECTED or is not configured to use a DRX cycle longer than the modification period in RRC_IDLE, and receives a Paging message including the systemInfoModification, it knows that the system information will change at the next modification period boundary. If a UE in RRC_IDLE is configured to use a DRX cycle longer than the modification period, and the notification is received in a Paging message including the systemInfoModification-eDRX, it acquires the updated system information at the next eDRX acquisition period boundary. Although the UE may be informed about changes in system information, no further details are provided e.g. regarding which system information will change, except if systemInfoValueTagSI is received by BL UEs or UEs in CE.
In RRC_CONNECTED, BL UEs or UEs in CE or NB-IoT UEs are not required to acquire system information except when T311 is running or upon handover where the UE is only required to acquire the MasterInformationBlock in the target PCell. In RRC_IDLE, E-UTRAN may notify BL UEs or UEs in CE or NB-IoT UEs about SI update, and except for NB-IoT, ETWS and CMAS notification and EAB modification, using Direct Indication information, as specified in 6.6 (or 6.7.5 in NB-IoT) and TS 36.212 [22].

NOTE: Upon system information change essential for BL UEs, UEs in CE, or NB-IoT UEs in RRC_CONNECTED, E-UTRAN may initiate connection release.

SystemInformationBlockType1 (or MasterInformationBlock-NB in NB-IoT) includes a value tag systemInfoValueTag, that indicates if a change has occurred in the SI messages. UEs may use systemInfoValueTag, e.g. upon return from out of coverage, to verify if the previously stored SI messages are still valid. Additionally, for other than BL UEs or UEs in CE or NB-IoT UEs, the UE considers stored system information to be invalid after 3 hours from the moment it was successfully confirmed as valid, unless specified otherwise. BL UE or UE in CE considers stored system information to be invalid after 24 hours from the moment it was successfully confirmed as valid, unless the UE is configured by parameter si-ValidityTime to consider stored system information to be invalid 3 hours after validity confirmation. NB-IoT UE considers stored system information to be invalid after 24 hours from the moment it was successfully confirmed as valid. If a BL UE, UE in CE or NB-IoT UE in RRC_CONNECTED state considers the stored system information invalid, the UE shall continue using the stored system information while in RRC_CONNECTED state in the serving cell.

For BL UEs or UEs in CE or NB-IoT UEs, the change of specific SI message can additionally be indicated by a SI message specific value tag systemInfoValueTagSI. If systemInfoValueTag included in the SystemInformationBlockType1-BR (or MasterInformationBlock-NB in NB-IoT) is different from the one of the stored system information and if systemInfoValueTagSI is included in the SystemInformationBlockType1-BR (or SystemInformationBlockType1-NB in NB-IoT) for a specific SI message and is different from the stored one, the UE shall consider this specific SI message to be invalid. If only systemInfoValueTag is included and is different from the stored one, the BL UE or UE in CE should consider any stored system information except SystemInformationBlockType10, SystemInformationBlockType11, SystemInformationBlockType12 and SystemInformationBlockType14 to be invalid; the NB-IoT UE should consider any stored system information except SystemInformationBlockType14-NB to be invalid.

E-UTRAN may not update systemInfoValueTag upon change of some system information e.g. ETWS information, CMAS information, regularly changing parameters like time information (SystemInformationBlockType8, SystemInformationBlockType16, hyperSFN-MSB in SystemInformationBlockType1-NB), EAB and AB parameters. Similarly, E-UTRAN may not include the systemInfoModification within the Paging message upon change of some system information.

The UE that is not configured to use a DRX cycle longer than the modification period verifies that stored system information remains valid by either checking systemInfoValueTag in SystemInformationBlockType1 (or MasterInformationBlock-NB in NB-IoT) after the modification period boundary, or attempting to find the systemInfoModification indication at least modificationPeriodCoeff times during the modification period in case no paging is received, in every modification period. If no paging message is received by the UE during a modification period, the UE may assume that no change of system information will occur at the next modification period boundary. If UE in RRC_CONNECTED, during a modification period, receives one paging message, it may deduce from the presence/absence of systemInfoModification whether a change of system information other than ETWS information, CMAS information and EAB parameters will occur in the next modification period or not.

When the RRC_IDLE UE is configured with a DRX cycle that is longer than the modification period, and at least one modification period boundary has passed since the UE last verified validity of stored system information, the UE verifies that stored system information remains valid by checking the systemInfoValueTag before establishing or resuming an RRC connection.

ETWS and/or CMAS capable UEs in RRC_CONNECTED shall attempt to read paging at least once every defaultPagingCycle to check whether ETWS and/or CMAS notification is present or not.

5.2.1.4 Indication of ETWS notification

ETWS primary notification and/ or ETWS secondary notification can occur at any point in time. The Paging message is used to inform ETWS capable UEs in RRC_IDLE and UEs in RRC_CONNECTED about presence of an ETWS primary notification and/ or ETWS secondary notification. If the UE receives a Paging message including the etws-Indication, it shall start receiving the ETWS primary notification and/ or ETWS secondary notification according to schedulingInfoList contained in SystemInformationBlockType1. If the UE receives Paging message including the etws-
**Indication** while it is acquiring ETWS notification(s), the UE shall continue acquiring ETWS notification(s) based on the previously acquired schedulingInfoList until it re-acquires schedulingInfoList in SystemInformationBlockType1.

NOTE: The UE is not required to periodically check schedulingInfoList contained in SystemInformationBlockType1, but Paging message including the etws-Indication triggers the UE to re-acquire schedulingInfoList contained in SystemInformationBlockType1 for scheduling changes for SystemInformationBlockType10 and SystemInformationBlockType11. The UE may or may not receive a Paging message including the etws-Indication and/or systemInfoModification when ETWS is no longer scheduled.

ETWS primary notification is contained in SystemInformationBlockType10 and ETWS secondary notification is contained in SystemInformationBlockType11. Segmentation can be applied for the delivery of a secondary notification. The segmentation is fixed for transmission of a given secondary notification within a cell (i.e. the same segment size for a given segment with the same messageIdentifier, serialNumber and warningMessageSegmentNumber). An ETWS secondary notification corresponds to a single CB data IE as defined according to TS 23.041 [37].

### 5.2.1.5 Indication of CMAS notification

CMAS notification can occur at any point in time. The Paging message is used to inform CMAS capable UEs in RRC_IDLE and UEs in RRC_CONNECTED about presence of one or more CMAS notifications. If the UE receives a Paging message including the cmas-Indication, it shall start receiving the CMAS notifications according to schedulingInfoList contained in SystemInformationBlockType1. If the UE receives Paging message including the cmas-Indication while it is acquiring CMAS notification(s), the UE shall continue acquiring CMAS notification(s) based on the previously acquired schedulingInfoList until it re-acquires schedulingInfoList in SystemInformationBlockType1.

NOTE: The UE is not required to periodically check schedulingInfoList contained in SystemInformationBlockType1, but Paging message including the cmas-Indication triggers the UE to re-acquire schedulingInfoList contained in SystemInformationBlockType1 for scheduling changes for SystemInformationBlockType12. The UE may or may not receive a Paging message including the cmas-Indication and/or systemInfoModification when SystemInformationBlockType12 is no longer scheduled.

CMAS notification is contained in SystemInformationBlockType12. Segmentation can be applied for the delivery of a CMAS notification. The segmentation is fixed for transmission of a given CMAS notification within a cell (i.e. the same segment size for a given segment with the same messageIdentifier, serialNumber and warningMessageSegmentNumber). E-UTRAN does not interleave transmissions of CMAS notifications, i.e. all segments of a given CMAS notification transmission are transmitted prior to those of another CMAS notification. A CMAS notification corresponds to a single CB data IE as defined according to TS 23.041 [37].

### 5.2.1.6 Notification of EAB parameters change

Change of EAB parameters can occur at any point in time. The EAB parameters are contained in SystemInformationBlockType14. The Paging message is used to inform EAB capable UEs in RRC_IDLE about a change of EAB parameters or that SystemInformationBlockType14 is no longer scheduled. If the UE receives a Paging message including the eab-ParamModification, it shall acquire SystemInformationBlockType14 according to schedulingInfoList contained in SystemInformationBlockType1. If the UE receives a Paging message including the eab-ParamModification while it is acquiring SystemInformationBlockType14, the UE shall continue acquiring SystemInformationBlockType14 based on the previously acquired schedulingInfoList until it re-acquires schedulingInfoList in SystemInformationBlockType1.

NOTE: The EAB capable UE is not expected to periodically check schedulingInfoList contained in SystemInformationBlockType1.

### 5.2.1.7 Access Barring parameters change in NB-IoT

Change of Access Barring (AB) parameters can occur at any point in time. The AB parameters are contained in SystemInformationBlockType14-NB. Update of the AB parameters does not impact the systemInfoValueTag in the MasterInformationBlock-NB or the systemInfoValueTagSI in SystemInformationBlockType1-NB.

A NB-IoT UE checks ab-Enabled indication in the MasterInformationBlock-NB to know whether access barring is enabled. If access barring is enabled the UE shall not initiate the RRC connection establishment / resume for all access causes except mobile terminating calls until the UE has a valid version of SystemInformationBlockType14-NB.
5.2.2 System information acquisition

5.2.2.1 General

The UE applies the system information acquisition procedure to acquire the AS- and NAS- system information that is broadcasted by the E-UTRAN. The procedure applies to UEs in RRC_IDLE and UEs in RRC_CONNECTED.

For BL UE, UE in CE and NB-IoT UE, specific conditions apply, as specified below.

5.2.2.2 Initiation

The UE shall apply the system information acquisition procedure upon selecting (e.g. upon power on) and upon re-selecting a cell, after handover completion, after entering E-UTRA from another RAT, upon return from out of coverage, upon receiving a notification that the system information has changed, upon receiving an indication about the presence of an ETWS notification, upon receiving an indication about the presence of a CMAS notification, upon receiving a notification that the EAB parameters have changed, upon receiving a request from CDMA2000 upper layers and upon exceeding the maximum validity duration. Unless explicitly stated otherwise in the procedural specification, the system information acquisition procedure overwrites any stored system information, i.e. delta configuration is not applicable for system information and the UE discontinues using a field if it is absent in system information unless explicitly specified otherwise.

In RRC_CONNECTED, BL UEs and UEs in CE are required to acquire system information when T311 is running or upon handover where the UE is only required to acquire the MasterInformationBlock in the target PCell.

NOTE: Upon handover, E-UTRAN provides system information required by the UE in RRC_CONNECTED except MIB with RRC signalling, i.e. systemInformationBlockType1Dedicated and mobilityControlInfo.

5.2.2.3 System information required by the UE

The UE shall:

1> ensure having a valid version, as defined below, of (at least) the following system information, also referred to as the ‘required’ system information:

2> if in RRC_IDLE:

3> if the UE is a NB-IoT UE:

4> the MasterInformationBlock-NB and SystemInformationBlockType1-NB as well as SystemInformationBlockType2-NB through SystemInformationBlockType5-NB;

3> else:

4> the MasterInformationBlock and SystemInformationBlockType1 (or SystemInformationBlockType1-BR depending on whether the UE is a BL UE or the UE in CE) as well as SystemInformationBlockType2 through SystemInformationBlockType8 (depending on support of the concerned RATs), SystemInformationBlockType17 (depending on support of RAN-assisted WLAN interworking);
2> if in RRC_CONNECTED; and
2> the UE is not a BL UE; and
2> the UE is not in CE; and
2> the UE is not a NB-IoT UE:
3> the MasterInformationBlock, SystemInformationBlockType1 and SystemInformationBlockType2 as well as SystemInformationBlockType8 (depending on support of CDMA2000), SystemInformationBlockType17 (depending on support of RAN-assisted WLAN interworking);
2> if in RRC_CONNECTED and T311 is running; and
2> the UE is a BL UE or the UE is in CE or the UE is a NB-IoT UE;
3> the MasterInformationBlock (or MasterInformationBlock-NB in NB-IoT), SystemInformationBlockType1-BR (or SystemInformationBlockType1-NB in NB-IoT) and SystemInformationBlockType2 (or SystemInformationBlockType2-NB in NB-IoT);
1> delete any stored system information after 3 hours or 24 hours from the moment it was confirmed to be valid as defined in 5.2.1.3, unless specified otherwise;
1> consider any stored system information except SystemInformationBlockType10, SystemInformationBlockType11, systemInformationBlockType12 and systemInformationBlockType14 (systemInformationBlockType14-NB in NB-IoT) to be invalid if systemInfoValueTag included in the SystemInformationBlockType1 (MasterInformationBlock-NB in NB-IoT) is different from the one of the stored system information and in case of NB-IoT UEs, BL UEs and UEs in CE, systemInfoValueTagSI is not broadcasted. Otherwise consider system information validity as defined in 5.2.1.3;

5.2.2.4 System information acquisition by the UE

The UE shall:
1> apply the specified BCCH configuration defined in 9.1.1.1 or BR-BCCH configuration defined in 9.1.1.8;
1> if the procedure is triggered by a system information change notification:
2> if the UE uses an idle DRX cycle longer than the modification period:
3> start acquiring the required system information, as defined in 5.2.2.3, from the next eDRX acquisition period boundary;
2> else
3> start acquiring the required system information, as defined in 5.2.2.3, from the beginning of the modification period following the one in which the change notification was received;
NOTE 1: The UE continues using the previously received system information until the new system information has been acquired.
1> if the UE is in RRC_IDLE and enters a cell for which the UE does not have stored a valid version of the system information required in RRC_IDLE, as defined in 5.2.2.3:
2> acquire, using the system information acquisition procedure as defined in 5.2.3, the system information required in RRC_IDLE, as defined in 5.2.2.3;
1> following successful handover completion to a PCell for which the UE does not have stored a valid version of the system information required in RRC_CONNECTED, as defined in 5.2.2.3:
2> acquire, using the system information acquisition procedure as defined in 5.2.3, the system information required in RRC_CONNECTED, as defined in 5.2.2.3;
2> upon acquiring the concerned system information:
discard the corresponding radio resource configuration information included in the radioResourceConfigCommon previously received in a dedicated message, if any;

1> following a request from CDMA2000 upper layers:

2> acquire SystemInformationBlockType8, as defined in 5.2.3;

1> neither initiate the RRC connection establishment/resume procedure nor initiate transmission of the RRCConnectionReestablishmentRequest message until the UE has a valid version of the MasterInformationBlock (MasterInformationBlock-NB in NB-IoT) and SystemInformationBlockType1 (SystemInformationBlockType1-NB in NB-IoT) messages as well as SystemInformationBlockType2 (SystemInformationBlockType2-NB in NB-IoT);

1> not initiate the RRC connection establishment subject to EAB until the UE has a valid version of SystemInformationBlockType14, if broadcast;

1> if the UE is ETWS capable:

2> upon entering a cell during RRC_IDLE, following successful handover or upon connection re-establishment:

3> discard any previously buffered warningMessageSegment;

3> clear, if any, the current values of messageIdentifier and serialNumber for SystemInformationBlockType11;

2> when the UE acquires SystemInformationBlockType1 following ETWS indication, upon entering a cell during RRC_IDLE, following successful handover or upon connection re-establishment:

3> if schedulingInfoList indicates that SystemInformationBlockType10 is present:

4> if the UE is in CE:

5> start acquiring SystemInformationBlockType10;

4> else

5> start acquiring SystemInformationBlockType10 immediately;

3> if schedulingInfoList indicates that SystemInformationBlockType11 is present:

4> start acquiring SystemInformationBlockType11 immediately;

NOTE 2: UEs shall start acquiring SystemInformationBlockType10 and SystemInformationBlockType11 as described above even when systemInfoValueTag in SystemInformationBlockType1 has not changed.

1> if the UE is CMAS capable:

2> upon entering a cell during RRC_IDLE, following successful handover or upon connection re-establishment:

3> discard any previously buffered warningMessageSegment;

3> clear, if any, stored values of messageIdentifier and serialNumber for SystemInformationBlockType12 associated with the discarded warningMessageSegment;

2> when the UE acquires SystemInformationBlockType1 following CMAS indication, upon entering a cell during RRC_IDLE, following successful handover and upon connection re-establishment:

3> if schedulingInfoList indicates that SystemInformationBlockType12 is present:

4> acquire SystemInformationBlockType12;

NOTE 3: UEs shall start acquiring SystemInformationBlockType12 as described above even when systemInfoValueTag in SystemInformationBlockType1 has not changed.

1> if the UE is interested to receive MBMS services:

2> if the UE is capable of MBMS reception as specified in 5.8:
if schedulingInfoList indicates that SystemInformationBlockType13 is present and the UE does not have stored a valid version of this system information block:

1. acquire SystemInformationBlockType13;

2. if the UE is capable of SC-PTM reception as specified in 5.8a:

3. if schedulingInfoList indicates that SystemInformationBlockType20 is present and the UE does not have stored a valid version of this system information block:

1. acquire SystemInformationBlockType20;

2. if the UE is capable of MBMS Service Continuity:

3. if schedulingInfoList indicates that SystemInformationBlockType15 is present and the UE does not have stored a valid version of this system information block:

1. acquire SystemInformationBlockType15;

1. if the UE is EAB capable:

2. when the UE does not have stored a valid version of SystemInformationBlockType14 upon entering RRC_IDLE, or when the UE acquires SystemInformationBlockType1 following EAB parameters change notification, or upon entering a cell during RRC_IDLE, or before establishing an RRC connection if using eDRX with DRX cycle longer than the modification period:

3. if schedulingInfoList indicates that SystemInformationBlockType14 is present:

1. start acquiring SystemInformationBlockType14 immediately;

3. else:

4. discard SystemInformationBlockType14, if previously received;

NOTE 4: EAB capable UEs start acquiring SystemInformationBlockType14 as described above even when systemInfoValueTag in SystemInformationBlockType1 has not changed.

NOTE 5: EAB capable UEs maintain an up to date SystemInformationBlockType14 in RRC_IDLE.

1. if the UE is capable of sidelink communication and is configured by upper layers to receive or transmit sidelink communication:

2. if the cell used for sidelink communication meets the S-criteria as defined in TS 36.304 [4]; and

2. if schedulingInfoList indicates that SystemInformationBlockType18 is present and the UE does not have stored a valid version of this system information block:

1. acquire SystemInformationBlockType18;

1. if the UE is capable of sidelink discovery and is configured by upper layers to receive or transmit sidelink discovery announcements on the primary frequency:

2. if schedulingInfoList of the serving cell/ PCell indicates that SystemInformationBlockType19 is present and the UE does not have stored a valid version of this system information block:

1. acquire SystemInformationBlockType19;

1. if the UE is capable of sidelink discovery and, for each of the one or more frequencies included in discInterFreqList, if included in SystemInformationBlockType19 and for which the UE is configured by upper layers to receive sidelink discovery announcements on:

2. if SystemInformationBlockType19 of the serving cell/ PCell does not provide the corresponding reception resources; and

2. if schedulingInfoList of the cell on the concerned frequency indicates that SystemInformationBlockType19 is present and the UE does not have stored a valid version of this system information block:

3. acquire SystemInformationBlockType19;
1> if the UE is capable of sidelink discovery and, for each of the one or more frequencies included in `discInterFreqList`, if included in `SystemInformationBlockType19` and for which the UE is configured by upper layers to transmit sidelink discovery announcements on:

2> if `SysemInformationBlockType19` of the serving cell/ PCell includes `discTxResourcesInterFreq` which is set to `acquireSI-FromCarrier`; and

2> if `schedulingInfoList` of the cell on the concerned frequency indicates that `SystemInformationBlockType19` is present and the UE does not have stored a valid version of this system information block:

3> acquire `SystemInformationBlockType19`;

1> if the UE is a NB-IoT UE and if `ab-Enabled` included in `MasterInformationBlock-NB` is set to `TRUE`:

2> not initiate the RRC connection establishment/resume procedure for all access causes except mobile terminating calls until the UE has a valid version of `SystemInformationBlockType14-NB`;

The UE may apply the received SIBs immediately, i.e. the UE does not need to delay using a SIB until all SI messages have been received. The UE may delay applying the received SIBs until completing lower layer procedures associated with a received or a UE originated RRC message, e.g. an ongoing random access procedure.

NOTE 6: While attempting to acquire a particular SIB, if the UE detects from `schedulingInfoList` that it is no longer present, the UE should stop trying to acquire the particular SIB.

5.2.2.5 Essential system information missing

The UE shall:

1> if in RRC_IDLE or in RRC_CONNECTED while T311 is running:

2> if the UE is unable to acquire the `MasterInformationBlock` (`MasterInformationBlock-NB` in NB-IoT); or

2> if the UE is neither a BL UE nor in CE nor in NB-IoT and the UE is unable to acquire the `SystemInformationBlockType1`; or

2> if the BL UE or UE in CE is unable to acquire `SystemInformationBlockType1-BR` or `SystemInformationBlockType1-BR` is not scheduled; or

2> if the NB-IoT UE is unable to acquire the `SystemInformationBlockType1-NB`:

3> consider the cell as barred in accordance with TS 36.304 [4]; and

3> perform barring as if `intraFreqReselection` is set to `allowed`, and as if the `csg-Indication` is set to `FALSE`;

2> else if the UE is unable to acquire the `SystemInformationBlockType2` (or `SystemInformationBlockType2-NB` in NB-IoT);

3> treat the cell as barred in accordance with TS 36.304 [4];

5.2.2.6 Actions upon reception of the `MasterInformationBlock` message

Upon receiving the `MasterInformationBlock` message the UE shall:

1> apply the radio resource configuration included in the `phich-Config`;

1> if the UE is in RRC_IDLE or if the UE is in RRC_CONNECTED while T311 is running:

2> if the UE has no valid system information stored according to 5.2.2.3 for the concerned cell:

3> apply the received value of `dl-Bandwidth` to the `ul-Bandwidth` until `SystemInformationBlockType2` is received;

Upon receiving the `MasterInformationBlock-NB` message the UE shall:

1> apply the radio resource configuration included in accordance with the `operationModeInfo`.
5.2.2.7 Actions upon reception of the SystemInformationBlockType1 message

Upon receiving the SystemInformationBlockType1 either via broadcast or via dedicated signalling, the UE shall:

1> if in RRC_IDLE or in RRC_CONNECTED while T311 is running; and

1> if the UE is a category 0 UE according to TS 36.306 [5]; and

1> if category0Allowed is not included in SystemInformationBlockType1:
   2> consider the cell as barred in accordance with TS 36.304 [4];

1> if in RRC_CONNECTED while T311 is not running, and the UE supports multi-band cells as defined by bit 31 in featureGroupIndicators:
   2> disregard the freqBandIndicator and multiBandInfoList, if received, while in RRC_CONNECTED;
   2> forward the cellIdentity to upper layers;
   2> forward the trackingAreaCode to upper layers;

1> else:
   2> if the frequency band indicated in the freqBandIndicator is part of the frequency bands supported by the UE and it is not a downlink only band; or
   2> if the UE supports multiBandInfoList, and if one or more of the frequency bands indicated in the multiBandInfoList are part of the frequency bands supported by the UE and they are not downlink only bands:
      3> forward the cellIdentity to upper layers;
      3> forward the trackingAreaCode to upper layers;

3> if, for the frequency band selected by the UE (from freqBandIndicator or multiBandInfoList), the freqBandInfo or the multiBandInfoList-v10j0 is present and the UE capable of multiNS-Pmax supports at least one additionalSpectrumEmission in the NS-PmaxList within the freqBandInfo or multiBandInfoList-v10j0:
   4> apply the first listed additionalSpectrumEmission which it supports among the values included in NS-PmaxList within freqBandInfo or multiBandInfoList-v10j0;
   4> if the additionalPmax is present in the same entry of the selected additionalSpectrumEmission within NS-PmaxList:
      5> apply the additionalPmax;
   4> else:
      5> apply the p-Max;
   3> else:
      4> apply the additionalSpectrumEmission in SystemInformationBlockType2 and the p-Max;
   2> else:
      3> consider the cell as barred in accordance with TS 36.304 [4]; and
      3> perform barring as if intraFreqReselection is set to notAllowed, and as if the csg-Indication is set to FALSE;

Upon receiving the SystemInformationBlockType1-NB, the UE shall:

1> if the frequency band indicated in the freqBandIndicator is part of the frequency bands supported by the UE and it is not a downlink only band; or

1> if one or more of the frequency bands indicated in the multiBandInfoList are part of the frequency bands supported by the UE and they are not downlink only bands:
2> forward the cellIdentity to upper layers;
2> forward the trackingAreaCode to upper layers;
2> forward the attachWithoutPDN-Connectivity to upper layers, if received for the selected PLMN;
2> if, for the frequency band selected by the UE (from freqBandIndicator or multiBandInfoList), the freqBandInfo is present and the UE capable of multiNS-Pmax supports at least one additionalSpectrumEmission in the NS-PmaxList within the freqBandInfo:

3> apply the first listed additionalSpectrumEmission which it supports among the values included in NS-PmaxList within freqBandInfo;
3> if the additionalPmax is present in the same entry of the selected additionalSpectrumEmission within NS-PmaxList:
  4> apply the additionalPmax;
3> else:
  4> apply the p-Max;
  2> else:
3> apply the additionalSpectrumEmission in SystemInformationBlockType2-NB and the p-Max;
1> else:
  2> consider the cell as barred in accordance with TS 36.304 [4]; and
  2> perform barring as if intraFreqReselection is set to notAllowed.

5.2.2.8 Actions upon reception of SystemInformation messages

No UE requirements related to the contents of the SystemInformation messages apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/or within the corresponding field descriptions.

5.2.2.9 Actions upon reception of SystemInformationBlockType2

Upon receiving SystemInformationBlockType2, the UE shall:

1> apply the configuration included in the radioResourceConfigCommon;
1> if upper layers indicate that a (UE specific) paging cycle is configured:
  2> apply the shortest of the (UE specific) paging cycle and the defaultPagingCycle included in the radioResourceConfigCommon;
1> if the mbsfn-SubframeConfigList is included:
  2> consider that DL assignments may occur in the MBSFN subframes indicated in the mbsfn-SubframeConfigList under the conditions specified in [23, 7.1];
1> apply the specified PCCH configuration defined in 9.1.1.3;
1> not apply the timeAlignmentTimerCommon;
1> if in RRC_CONNECTED and UE is configured with RLF timers and constants values received within rlf-TimersAndConstants:
  2> not update its values of the timers and constants in ue-TimersAndConstants except for the value of timer T300;
1> if in RRC_CONNECTED while T311 is not running; and the UE supports multi-band cells as defined by bit 31 in featureGroupIndicators or multipleNS-Pmax:
2> disregard the additionalSpectrumEmission and ul-CarrierFreq, if received, while in RRC_CONNECTED;
1> forward attachWithoutPDN-Connectivity to upper layers, if received for the selected PLMN;
1> forward cp-CIoT-EPS-Optimisation to upper layers, if received for the selected PLMN;
1> forward up-CIoT-EPS-Optimisation to upper layers, if received for the selected PLMN;

Upon receiving SystemInformationBlockType2-NB, the UE shall:
1> apply the configuration included in the radioResourceConfigCommon;
1> apply the defaultPagingCycle included in the radioResourceConfigCommon;
1> apply the specified PCCH configuration defined in 9.1.1.3.

5.2.2.10 Actions upon reception of SystemInformationBlockType3

Upon receiving SystemInformationBlockType3, the UE shall:
1> if in RRC_IDLE, the redistributionServingInfo is included and the UE is redistribution capable:
    2> perform E-UTRAN inter-frequency redistribution procedure as specified in TS 36.304 [4, 5.2.4.10];

No UE requirements related to the contents of SystemInformationBlockType3-NB apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.11 Actions upon reception of SystemInformationBlockType4

No UE requirements related to the contents of this SystemInformationBlock (SystemInformationBlockType4 or SystemInformationBlockType4-NB) apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.12 Actions upon reception of SystemInformationBlockType5

Upon receiving SystemInformationBlockType5, the UE shall:
1> if in RRC_IDLE, the redistributionInterFreqInfo is included and the UE is redistribution capable:
    2> perform E-UTRAN inter-frequency redistribution procedure as specified in TS 36.304 [4, 5.2.4.10];

No UE requirements related to the contents of SystemInformationBlockType5-NB apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.13 Actions upon reception of SystemInformationBlockType6

No UE requirements related to the contents of this SystemInformationBlock apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.14 Actions upon reception of SystemInformationBlockType7

No UE requirements related to the contents of this SystemInformationBlock apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.15 Actions upon reception of SystemInformationBlockType8

Upon receiving SystemInformationBlockType8, the UE shall:
1> if sib8-PerPLMN-List is included and the UE is capable of network sharing for CDMA2000:
    2> apply the CDMA2000 parameters below corresponding to the RPLMN;
1> if the `systemTimeInfo` is included:
   2> forward the `systemTimeInfo` to CDMA2000 upper layers;

1> if the UE is in RRC_IDLE and if `searchWindowSize` is included:
   2> forward the `searchWindowSize` to CDMA2000 upper layers;

1> if `parametersHRPD` is included:
   2> forward the `preRegistrationInfoHRPD` to CDMA2000 upper layers only if the UE has not received the `preRegistrationInfoHRPD` within an `RRConnectionReconfiguration` message after entering this cell;
   2> if the `cellReselectionParametersHRPD` is included:
     3> forward the `neighCellList` to the CDMA2000 upper layers;

1> if the `parameters1XRTT` is included:
   2> if the `csfb-RegistrationParam1XRTT` is included:
     3> forward the `csfb-RegistrationParam1XRTT` to the CDMA2000 upper layers which will use this information to determine if a CS registration/re-registration towards CDMA2000 1xRTT in the EUTRA cell is required;
     2> else:
       3> indicate to CDMA2000 upper layers that CSFB Registration to CDMA2000 1xRTT is not allowed;
       2> if the `longCodeState1XRTT` is included:
         3> forward the `longCodeState1XRTT` to CDMA2000 upper layers;
         2> if the `cellReselectionParameters1XRTT` is included:
           3> forward the `neighCellList` to the CDMA2000 upper layers;
           2> if the `csfb-SupportForDualRxUEs` is included:
             3> forward `csfb-SupportForDualRxUEs` to the CDMA2000 upper layers;
             2> else:
               3> forward `csfb-SupportForDualRxUEs`, with its value set to `FALSE`, to the CDMA2000 upper layers;
               2> if `ac-BarringConfig1XRTT` is included:
                 3> forward `ac-BarringConfig1XRTT` to the CDMA2000 upper layers;
                 2> if the `csfb-DualRxTxSupport` is included:
                   3> forward `csfb-DualRxTxSupport` to the CDMA2000 upper layers;
                   2> else:
                     3> forward `csfb-DualRxTxSupport`, with its value set to `FALSE`, to the CDMA2000 upper layers;

5.2.2.16 Actions upon reception of `SystemInformationBlockType9`

Upon receiving `SystemInformationBlockType9`, the UE shall:

1> if `hnb-Name` is included, forward the `hnb-Name` to upper layers;

5.2.2.17 Actions upon reception of `SystemInformationBlockType10`

Upon receiving `SystemInformationBlockType10`, the UE shall:

1> forward the received `warningType`, `messageIdentifier` and `serialNumber` to upper layers;
5.2.2.18 Actions upon reception of SystemInformationBlockType11

Upon receiving SystemInformationBlockType11, the UE shall:

1. if there is no current value for messageIdentifier and serialNumber for SystemInformationBlockType11; or
2. if either the received value of messageIdentifier or of serialNumber or of both are different from the current values of messageIdentifier and serialNumber for SystemInformationBlockType11:
   1. use the received values of messageIdentifier and serialNumber for SystemInformationBlockType11 as the current values of messageIdentifier and serialNumber for SystemInformationBlockType11;
   2. discard any previously buffered warningMessageSegment;
   3. if all segments of a warning message have been received:
      1. assemble the warning message from the received warningMessageSegment;
      2. forward the received warning message, messageIdentifier, serialNumber and dataCodingScheme to upper layers;
      3. stop reception of SystemInformationBlockType11;
      4. discard the current values of messageIdentifier and serialNumber for SystemInformationBlockType11;
   4. else:
      1. store the received warningMessageSegment;
      2. continue reception of SystemInformationBlockType11;

The UE should discard any stored warningMessageSegment and the current value of messageIdentifier and serialNumber for SystemInformationBlockType11 if the complete warning message has not been assembled within a period of 3 hours.

5.2.2.19 Actions upon reception of SystemInformationBlockType12

Upon receiving SystemInformationBlockType12, the UE shall:

1. if the SystemInformationBlockType12 contains a complete warning message:
   2. forward the received warning message, messageIdentifier, serialNumber and dataCodingScheme to upper layers;
   3. continue reception of SystemInformationBlockType12;
   4. else:
      1. if the received values of messageIdentifier and serialNumber are the same (each value is the same) as a pair for which a warning message is currently being assembled:
         2. store the received warningMessageSegment;
3> if all segments of a warning message have been received:
   4> assemble the warning message from the received warningMessageSegment;
   4> forward the received warning message, messageIdentifier, serialNumber and dataCodingScheme to upper layers;
   4> stop assembling a warning message for this messageIdentifier and serialNumber and delete all stored information held for it;
3> continue reception of SystemInformationBlockType12;
   2> else if the received values of messageIdentifier and/or serialNumber are not the same as any of the pairs for which a warning message is currently being assembled:
3> start assembling a warning message for this messageIdentifier and serialNumber pair;
3> store the received warningMessageSegment;
3> continue reception of SystemInformationBlockType12;

The UE should discard warningMessageSegment and the associated values of messageIdentifier and serialNumber for SystemInformationBlockType12 if the complete warning message has not been assembled within a period of 3 hours.

NOTE: The number of warning messages that a UE can re-assemble simultaneously is a function of UE implementation.

5.2.2.20 Actions upon reception of SystemInformationBlockType13

No UE requirements related to the contents of this SystemInformationBlock apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.21 Actions upon reception of SystemInformationBlockType14

No UE requirements related to the contents of this SystemInformationBlock (SystemInformationBlockType14 or SystemInformationBlockType14-NB) apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.22 Actions upon reception of SystemInformationBlockType15

No UE requirements related to the contents of this SystemInformationBlock apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.23 Actions upon reception of SystemInformationBlockType16

No UE requirements related to the contents of this SystemInformationBlock (SystemInformationBlockType16 or SystemInformationBlockType16-NB) apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.2.24 Actions upon reception of SystemInformationBlockType17

Upon receiving SystemInformationBlockType17, the UE shall:

1> if wlan-OffloadConfigCommon corresponding to the RPLMN is included:
   2> if the UE is not configured with rclwi-Configuration with command set to steerToWLAN:
3> apply the wlan-Id-List corresponding to the RPLMN;
   2> if not configured with the wlan-OffloadConfigDedicated:
3> apply the wlan-OffloadConfigCommon corresponding to the RPLMN;
5.2.2.25 Actions upon reception of SystemInformationBlockType18

Upon receiving SystemInformationBlockType18, the UE shall:

1> if SystemInformationBlockType18 message includes the commConfig:
   2> if configured to receive sidelink communication:
   3> from the next SC period, as defined by sc-Period, use the resource pool indicated by commRxPool for sidelink communication monitoring, as specified in 5.10.3;
   2> if configured to transmit sidelink communication:
   3> from the next SC period, as defined by sc-Period, use the resource pool indicated by commTxPoolNormalCommon, commTxPoolNormalCommonExt or by commTxPoolExceptional for sidelink communication transmission, as specified in 5.10.4;

5.2.2.26 Actions upon reception of SystemInformationBlockType19

Upon receiving SystemInformationBlockType19, the UE shall:

1> if SystemInformationBlockType19 message includes the discConfig or discConfigPS:
   2> from the next discovery period, as defined by discPeriod, use the resources indicated by discRxPool, discRxResourcesInterFreq or discRxPoolPS for sidelink discovery monitoring, as specified in 5.10.5;
   2> if SystemInformationBlockType19 message includes the discTxPoolCommon or discTxPoolPS-Common and the UE is in RRC_IDLE:
   3> from the next discovery period, as defined by discPeriod, use the resources indicated by discTxPoolCommon or discTxPoolPS-Common for sidelink discovery announcement, as specified in 5.10.6;
   2> if the SystemInformationBlockType19 message includes the discTxPowerInfo:
   3> use the power information included in discTxPowerInfo for sidelink discovery transmission on the serving frequency, as specified in TS 36.213 [23];
   1> if SystemInformationBlockType19 message includes the discConfigRelay:
   2> if the SystemInformationBlockType19 message includes the txPowerInfo:
   3> use the power information included in txPowerInfo for sidelink discovery transmission on the corresponding non-serving frequency, as specified in TS 36.213 [23];

5.2.2.27 Actions upon reception of SystemInformationBlockType20

No UE requirements related to the contents of this SystemInformationBlock apply other than those specified elsewhere e.g. within procedures using the concerned system information, and/ or within the corresponding field descriptions.

5.2.3 Acquisition of an SI message

When acquiring an SI message, the UE shall:

1> determine the start of the SI-window for the concerned SI message as follows:
   2> for the concerned SI message, determine the number n which corresponds to the order of entry in the list of SI messages configured by schedulingInfoList in SystemInformationBlockType1;
   2> determine the integer value \( x = (n - 1) \times w \), where \( w \) is the si-WindowLength;
   2> the SI-window starts at the subframe \( \#a \), where \( a = x \mod 10 \), in the radio frame for which SFN mod \( T = \text{FLOOR}(x/10) \), where \( T \) is the si-Periodicity of the concerned SI message;

NOTE: E-UTRAN should configure an SI-window of 1 ms only if all SIs are scheduled before subframe \( \#5 \) in radio frames for which SFN mod 2 = 0.
1. receive DL-SCH using the SI-RNTI from the start of the SI-window and continue until the end of the SI-window whose absolute length in time is given by $\text{si-WindowLength}$, or until the SI message was received, excluding the following subframes:
   2. subframe #5 in radio frames for which SFN mod 2 = 0;
   2. any MBSFN subframes;
   2. any uplink subframes in TDD;
1. if the SI message was not received by the end of the SI-window, repeat reception at the next SI-window occasion for the concerned SI message;

5.2.3a Acquisition of an SI message by BL UE or UE in CE or a NB-IoT UE

When acquiring an SI message, the BL UE or UE in CE or NB-IoT UE shall:

1. determine the start of the SI-window for the concerned SI message as follows:
   2. for the concerned SI message, determine the number $n$ which corresponds to the order of entry in the list of SI messages configured by schedulingInfoList in SystemInformationBlockType1-BR (or SystemInformationBlockType1-NB in NB-IoT);
   2. determine the integer value $x = (n - 1) \times w$, where $w$ is the $\text{si-WindowLength-BR}$ (or $\text{si-WindowLength}$ in NB-IoT);
   2. if the UE is a NB-IoT UE:
      3. the SI-window starts at the subframe #0 in the radio frame for which $(H \cdot \text{SFN} \times 1024 + \text{SFN}) \mod T = \text{FLOOR}(x/10) + \text{Offset}$, where $T$ is the $\text{si-Periodicity}$ of the concerned SI message and, Offset is the offset of the start of the SI-Window ($\text{si-RadioFrameOffset}$);
   2. else:
      3. the SI-window starts at the subframe #0 in the radio frame for which SFN mod $T = \text{FLOOR}(x/10)$, where $T$ is the $\text{si-Periodicity}$ of the concerned SI message;
1. if the UE is a NB-IoT UE:
   2. receive and accumulate SI message transmissions on DL-SCH from the start of the SI-window and continue until the end of the SI-window whose absolute length in time is given by $\text{si-WindowLength}$, starting from the radio frames as provided in $\text{si-RepetitionPattern}$ and in subframes as provided in $\text{downlinkBitmap}$, or until successful decoding of the accumulated SI message transmissions excluding the subframes used for transmission of NPSS, NSSS, MasterInformationBlock-NB and SystemInformationBlockType1-NB. If there are not enough subframes for one SI message transmission in the radio frames as provided in $\text{si-RepetitionPattern}$, the UE shall continue to receive the SI message transmission in the radio frames following the radio frame indicated in $\text{si-RepetitionPattern}$;
1. else:
   2. receive and accumulate SI message transmissions on DL-SCH on narrowband provided by $\text{si-Narrowband}$, from the start of the SI-window and continue until the end of the SI-window whose absolute length in time is given by $\text{si-WindowLength-BR}$, only in radio frames as provided in $\text{si-RepetitionPattern}$ and subframes as provided in $\text{fdd-DownlinkOrTddSubframeBitmapBR}$ in $\text{bandwidthReducedAccessRelatedInfo}$, or until successful decoding of the accumulated SI message transmissions;
1. if the SI message was not possible to decode from the accumulated SI message transmissions by the end of the SI-window, continue reception and accumulation of SI message transmissions on DL-SCH in the next SI-window occasion for the concerned SI message;
5.3 Connection control

5.3.1 Introduction

5.3.1.1 RRC connection control

RRC connection establishment involves the establishment of SRB1. E-UTRAN completes RRC connection establishment prior to completing the establishment of the S1 connection, i.e. prior to receiving the UE context information from the EPC. Consequently, AS security is not activated during the initial phase of the RRC connection. During this initial phase of the RRC connection, the E-UTRAN may configure the UE to perform measurement reporting, but the UE only sends the corresponding measurement reports after successful security activation. However, the UE only accepts a handover message when security has been activated.

NOTE: In case the serving frequency broadcasts multiple overlapping bands, E-UTRAN can only configure measurements after having obtained the UE capabilities, as the measurement configuration needs to be set according to the band selected by the UE.

Upon receiving the UE context from the EPC, E-UTRAN activates security (both ciphering and integrity protection) using the initial security activation procedure. The RRC messages to activate security (command and successful response) are integrity protected, while ciphering is started only after completion of the procedure. That is, the response to the message used to activate security is not ciphered, while the subsequent messages (e.g. used to establish SRB2 and DRBs) are both integrity protected and ciphered.

After having initiated the initial security activation procedure, E-UTRAN initiates the establishment of SRB2 and DRBs, i.e. E-UTRAN may do this prior to receiving the confirmation of the initial security activation from the UE. In any case, E-UTRAN will apply both ciphering and integrity protection for the RRC connection reconfiguration messages used to establish SRB2 and DRBs. E-UTRAN should release the RRC connection if the initial security activation and/or the radio bearer establishment fails (i.e. security activation and DRB establishment are triggered by a joint S1-procedure, which does not support partial success).

For SRB2 and DRBs, security is always activated from the start, i.e. the E-UTRAN does not establish these bearers prior to activating security.

For some radio configuration fields, a critical extension has been defined. A switch from the original version of the field to the critically extended version is allowed using any connection reconfiguration. The UE reverts to the original version of some critically extended fields upon handover and re-establishment as specified elsewhere in this specification. Otherwise, switching a field from the critically extended version to the original version is only possible using the handover or re-establishment procedure with the full configuration option. This also applies for fields that are critically extended within a release (i.e. original and extended version defined in same release).

After having initiated the initial security activation procedure, E-UTRAN may configure a UE that supports CA, with one or more SCells in addition to the PCell that was initially configured during connection establishment. The PCell is used to provide the security inputs and upper layer system information (i.e. the NAS mobility information e.g. TAI). SCells are used to provide additional downlink and optionally uplink radio resources. When not configured with DC all SCells the UE is configured with, if any, are part of the MCG. When configured with DC however, some of the SCells are part of a SCG. In this case, user data carried by a DRB may either be transferred via MCG (i.e. MCG-DRB), via SCG (SCG-DRB) or via both MCG and SCG in DL while E-UTRAN configures the CG used in UL (split DRB). An RRC connection reconfiguration message may be used to change the DRB type from MCG-DRB to SCG-DRB or to split DRB, as well as from SCG-DRB or split DRB to MCG-DRB.

SCG change is a synchronous SCG reconfiguration procedure (i.e. involving RA to the PSCell) including reset/re-establishment of layer 2 and, if SCG DRBs are configured, refresh of security. The procedure is used in a number of different scenarios e.g. SCG establishment, PSCell change, Key refresh, change of DRB type. The UE performs the SCG change related actions upon receiving an RRCConnectionReconfiguration message including mobilityControlInfoSCG, see 5.3.10.10.

The release of the RRC connection normally is initiated by E-UTRAN. The procedure may be used to re-direct the UE to an E-UTRA frequency or an inter-RAT carrier frequency. Only in exceptional cases, as specified within this specification, TS 36.300 [9], TS 36.304 [4] or TS 24.301 [35], may the UE abort the RRC connection, i.e. move to RRC_IDLE without notifying E-UTRAN.
The suspension of the RRC connection is initiated by E-UTRAN. When the RRC connection is suspended, the UE stores the UE AS context and the resumemIdentity, and transitions to RRC_IDLE state. The RRC message to suspend the RRC connection is integrity protected and ciphered. Suspension can only be performed when at least 1 DRB is successfully established.

The resumption of a suspended RRC connection is initiated by upper layers when the UE has a stored UE AS context, RRC connection resume is permitted by E-UTRAN and the UE needs to transit from RRC_IDLE state to RRC_CONNECTED state. When the RRC connection is resumed, RRC configures the UE according to the RRC connection resume procedure based on the stored UE AS context and any RRC configuration received from E-UTRAN. The RRC connection resume procedure re-activates security and re-establishes SRB(s) and DRB(s). The request to resume the RRC connection includes the resumemIdentity. The request is not ciphered, but protected with a message authentication code.

In response to a request to resume the RRC connection, E-UTRAN may resume the suspended RRC connection, reject the request to resume and instruct the UE to either keep or discard the stored context, or setup a new RRC connection.

5.3.1.2 Security

AS security comprises of the integrity protection of RRC signalling (SRBs) as well as the ciphering of RRC signalling (SRBs) and user data (DRBs).

RRC handles the configuration of the security parameters which are part of the AS configuration: the integrity protection algorithm, the ciphering algorithm and two parameters, namely the keyChangeIndicator and the nextHopChainingCount, which are used by the UE to determine the AS security keys upon handover, connection re-establishment and/or connection resume.

The integrity protection algorithm is common for signalling radio bearers SRB1 and SRB2. The ciphering algorithm is common for all radio bearers (i.e. SRB1, SRB2 and DRBs). Neither integrity protection nor ciphering applies for SRB0.

RRC integrity and ciphering are always activated together, i.e. in one message/procedure. RRC integrity and ciphering are never de-activated. However, it is possible to switch to a 'NULL' ciphering algorithm (eea0).

The 'NULL' integrity protection algorithm (eia0) is used only for the UE in limited service mode [32, TS33.401]. In case the 'NULL' integrity protection algorithm is used, 'NULL' ciphering algorithm is also used.

NOTE 1: Lower layers discard RRC messages for which the integrity check has failed and indicate the integrity verification check failure to RRC.

The AS applies three different security keys: one for the integrity protection of RRC signalling (K_RRCint), one for the ciphering of RRC signalling (K_RRCenc) and one for the ciphering of user data (K_UPenc). All three AS keys are derived from the K_cNB key. The K_cNB is based on the K_ASEME key, which is handled by upper layers.

Upon connection establishment new AS keys are derived. No AS-parameters are exchanged to serve as inputs for the derivation of the new AS keys at connection establishment.

The integrity and ciphering of the RRC message used to perform handover is based on the security configuration used prior to the handover and is performed by the source eNB.

The integrity and ciphering algorithms can only be changed upon handover. The four AS keys (K_cNB, K_RRCint, K_RRCenc and K_UPenc) change upon every handover, connection re-establishment and connection resume. The keyChangeIndicator is used upon handover and indicates whether the UE should use the keys associated with the K_ASEME key taken into use with the latest successful NAS SMC procedure. The nextHopChainingCount parameter is used upon handover, connection re-establishment and connection resume by the UE when deriving the new K_cNB that is used to generate K_RRCint, K_RRCenc and K_UPenc (see TS 33.401 [32]). An intra cell handover procedure may be used to change the keys in RRC_CONNECTED.

For each radio bearer an independent counter (COUNT, as specified in TS 36.323 [8]) is maintained for each direction. For each DRB, the COUNT is used as input for ciphering. For each SRB, the COUNT is used as input for both ciphering and integrity protection. It is not allowed to use the same COUNT value more than once for a given security key. At connection resume the COUNT is reset. In order to limit the signalling overhead, individual messages/packets include a short sequence number (PDCP SN, as specified in TS 36.323 [8]). In addition, an overflow counter mechanism is used: the hyper frame number (TX_HFN and RX_HFN, as specified in TS 36.323 [8]). The HFN needs to be synchronized between the UE and the eNB. The eNB is responsible for avoiding reuse of the COUNT with the same RB identity and with the same K_cNB, e.g. due to the transfer of large volumes of data, release and establishment of
new RBs. In order to avoid such re-use, the eNB may e.g. use different RB identities for successive RB establishments, trigger an intra cell handover or an RRC_CONNECTED to RRC_IDLE to RRC_CONNECTED transition.

For each SRB, the value provided by RRC to lower layers to derive the 5-bit BEARER parameter used as input for ciphering and for integrity protection is the value of the corresponding srb-Identity with the MSBs padded with zeroes.

In case of DC, a separate K_{eNB} is used for SCG-DRBs (S-K_{eNB}). This key is derived from the key used for the MCG (K_{eNB}) and an SCG counter that is used to ensure freshness. To refresh the S-K_{eNB} e.g. when the COUNT will wrap around, E-UTRAN employs an SCG change, i.e. an RRCConnectionReconfiguration message including mobilityControlInfoSCG. When performing handover, while at least one SCG-DRB remains configured, both K_{eNB} and S-K_{eNB} are refreshed. In such case E-UTRAN performs handover with SCG change i.e. an RRCConnectionReconfiguration message including both mobilityControlInfo and mobilityControlInfoSCG. The ciphering algorithm is common for all radio bearers within a CG but may be different between MCG and SCG. The ciphering algorithm for SCG DRBs can only be changed upon SCG change.

5.3.1.2a RN security

For RNs, AS security follows the procedures in 5.3.1.2. Furthermore, E-UTRAN may configure per DRB whether or not integrity protection is used. The use of integrity protection may be configured only upon DRB establishment and reconfigured only upon handover or upon the first reconfiguration following RRC connection re-establishment.

To provide integrity protection on DRBs between the RN and the E-UTRAN, the K_{c,up} key is derived from the KeNB key as described in TS33.401 [32]. The same integrity protection algorithm used for SRBs also applies to the DRBs. The K_{c,up} changes at every handover and RRC connection re-establishment and is based on an updated K_{eNB} which is derived by taking into account the nextHopChainingCount. The COUNT value maintained for DRB ciphering is also used for integrity protection, if the integrity protection is configured for the DRB.

5.3.1.3 Connected mode mobility

In RRC_CONNECTED, the network controls UE mobility, i.e. the network decides when the UE shall connect to which E-UTRA cell(s), or inter-RAT cell. For network controlled mobility in RRC_CONNECTED, the PCell can be changed using an RRCConnectionReconfiguration message including the mobilityControlInfo (handover), whereas the SCell(s) can be changed using the RRCConnectionReconfiguration message either with or without the mobilityControlInfo.

An SCG can be established, reconfigured or released by using an RRCConnectionReconfiguration message with or without the mobilityControlInfo. In case Random Access to the PSCell is required upon SCG reconfiguration, E-UTRAN employs the SCG change procedure (i.e. an RRCConnectionReconfiguration message including the mobilityControlInfoSCG). The PSCell can only be changed using the SCG change procedure and by release and addition of the PSCell.

The network triggers the handover procedure e.g. based on radio conditions, load. To facilitate this, the network may configure the UE to perform measurement reporting (possibly including the configuration of measurement gaps). The network may also initiate handover blindly, i.e. without having received measurement reports from the UE.

Before sending the handover message to the UE, the source eNB prepares one or more target cells. The source eNB selects the target PCell. The source eNB may also provide the target eNB with a list of best cells on each frequency for which measurement information is available, in order of decreasing RSRP. The source eNB may also include available measurement information for the cells provided in the list. The target eNB decides which SCells are configured for use after handover, which may include cells other than the ones indicated by the source eNB. If an SCG is configured, handover involves either SCG release or SCG change. In case the UE was configured with DC, the target eNB indicates in the handover message whether the UE shall release the entire SCG configuration. Upon connection re-establishment, the UE releases the entire SCG configuration except for the DRB configuration, while E-UTRAN in the first reconfiguration message following the re-establishment either releases the DRB(s) or reconfigures the DRB(s) MCG DRB(s).

The target eNB generates the message used to perform the handover, i.e. the message including the AS-configuration to be used in the target cell(s). The source eNB transparently (i.e. does not alter values/ content) forwards the handover message/ information received from the target to the UE. When appropriate, the source eNB may initiate data forwarding for (a subset of) the DRBs.

After receiving the handover message, the UE attempts to access the target PCell at the first available RACH occasion according to Random Access resource selection defined in TS 36.321 [6], i.e. the handover is asynchronous.
Consequently, when allocating a dedicated preamble for the random access in the target PCell, E-UTRA shall ensure it is available from the first RACH occasion the UE may use. Upon successful completion of the handover, the UE sends a message used to confirm the handover.

If the target eNB does not support the release of RRC protocol which the source eNB used to configure the UE, the target eNB may be unable to comprehend the UE configuration provided by the source eNB. In this case, the target eNB should use the full configuration option to reconfigure the UE for Handover and Re-establishment. Full configuration option includes an initialization of the radio configuration, which makes the procedure independent of the configuration used in the source cell(s) with the exception that the security algorithms are continued for the RRC re-establishment.

After the successful completion of handover, PDCP SDUs may be re-transmitted in the target cell(s). This only applies for DRBs using RLC-AM mode and for handovers not involving full configuration option. The further details are specified in TS 36.323 [8]. After the successful completion of handover not involving full configuration option, the SN and the HFN are reset except for the DRBs using RLC-AM mode (for which both SN and HFN continue). For reconfigurations involving the full configuration option, the PDCP entities are newly established (SN and HFN do not continue) for all DRBs irrespective of the RLC mode. The further details are specified in TS 36.323 [8].

One UE behaviour to be performed upon handover is specified, i.e. this is regardless of the handover procedures used within the network (e.g. whether the handover includes X2 or S1 signalling procedures).

The source eNB should, for some time, maintain a context to enable the UE to return in case of handover failure. After having detected handover failure, the UE attempts to resume the RRC connection either in the source PCell or in another cell using the RRC re-establishment procedure. This connection resumption succeeds only if the accessed cell is prepared, i.e. concerns a cell of the source eNB or of another eNB towards which handover preparation has been performed. The cell in which the re-establishment procedure succeeds becomes the PCell while SCells and STAGs, if configured, are released.

Normal measurement and mobility procedures are used to support handover to cells broadcasting a CSG identity. In addition, E-UTRAN may configure the UE to report that it is entering or leaving the proximity of cell(s) included in its CSG whitelist. Furthermore, E-UTRAN may request the UE to provide additional information broadcast by the handover candidate cell e.g. global cell identity, CSG identity, CSG membership status.

**NOTE:** E-UTRAN may use the "proximity report" to configure measurements as well as to decide whether or not to request additional information broadcast by the handover candidate cell. The additional information is used to verify whether or not the UE is authorised to access the target PCell and may also be needed to identify handover candidate cell (PCI confusion i.e. when the physical layer identity that is included in the measurement report does not uniquely identify the cell).

### 5.3.1.4 Connection control in NB-IoT

In NB-IoT, during the RRC connection establishment procedure, SRB1bis is established implicitly with SRB1. SRB1bis uses the logical channel identity defined in 9.1.2a, with the same configuration as SRB1 but no PDCP entity. SRB1bis is used until security is activated. The RRC messages to activate security (command and successful response) are sent over SRB1 being integrity protected and ciphering is started after completion of the procedure. Once security is activated, new RRC messages shall be transmitted using SRB1. A NB-IoT UE that only supports the Control Plane CIoT EPS optimisation (see TS 24.301 [35]) only establishes SRB1bis.

A NB-IoT UE only supports 0, 1 or 2 DRBs, depending on its capability. A NB-IoT UE that only supports the Control Plane CIoT EPS optimisation (see TS 24.301 [35]) does not need to support any DRBs and associated procedures.

Table 5.3.1.4-1 lists the procedures that are applicable for NB-IoT. All other procedures are not applicable; this is not further stated in the corresponding procedures.
Table 5.3.1.4-1: Connection control procedures applicable to a NB-IoT UE

<table>
<thead>
<tr>
<th>Sub-clause</th>
<th>Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3.2</td>
<td>Paging</td>
</tr>
<tr>
<td>5.3.3</td>
<td>RRC connection establishment</td>
</tr>
<tr>
<td></td>
<td>RRC connection resume (see NOTE)</td>
</tr>
<tr>
<td>5.3.4</td>
<td>Initial security activation (see NOTE)</td>
</tr>
<tr>
<td>5.3.5</td>
<td>RRC connection reconfiguration (see NOTE)</td>
</tr>
<tr>
<td>5.3.7</td>
<td>RRC connection re-establishment (see NOTE)</td>
</tr>
<tr>
<td>5.3.8</td>
<td>RRC connection release</td>
</tr>
<tr>
<td>5.3.9</td>
<td>RRC connection release requested by upper layers</td>
</tr>
<tr>
<td>5.3.10</td>
<td>Radio resource configuration</td>
</tr>
<tr>
<td>5.3.11</td>
<td>Radio link failure related actions</td>
</tr>
<tr>
<td>5.3.12</td>
<td>UE actions upon leaving RRC_CONNECTED</td>
</tr>
</tbody>
</table>

NOTE: Not applicable for a UE that only supports the Control Plane CIoT EPS optimisation (see TS 24.301 [35]).

5.3.2 Paging

5.3.2.1 General

![Paging Diagram]

The purpose of this procedure is:

- to transmit paging information to a UE in RRC_IDLE and/ or;
- to inform UEs in RRC_IDLE and UEs other than NB-IoT UEs in RRC_CONNECTED about a system information change and/ or;
- to inform UEs other than NB-IoT UEs about an ETWS primary notification and/ or ETWS secondary notification and/ or;
- to inform UEs other than NB-IoT UEs about an EAB parameters modification and/ or;
- to inform UEs other than NB-IoT UEs in RRC_IDLE about an EUTRAN inter-frequency redistribution procedure.

The paging information is provided to upper layers, which in response may initiate RRC connection establishment, e.g. to receive an incoming call.

5.3.2.2 Initiation

E-UTRAN initiates the paging procedure by transmitting the Paging message at the UE’s paging occasion as specified in TS 36.304 [4]. E-UTRAN may address multiple UEs within a Paging message by including one PagingRecord for each UE. E-UTRAN may also indicate a change of system information, and/ or provide an ETWS notification or a CMAS notification in the Paging message.
5.3.2.3 Reception of the Paging message by the UE

Upon receiving the Paging message, the UE shall:

1. if in RRC_IDLE, for each of the PagingRecord, if any, included in the Paging message:
   2. if the ue-Identity included in the PagingRecord matches one of the UE identities allocated by upper layers:
      3. forward the ue-Identity and, except for NB-IoT, the cn-Domain to the upper layers;

1. if the systemInfoModification is included; or
   1. if the UE is configured with a DRX cycle longer than the modification period and the systemInfoModification-eDRX is included:
      2. re-acquire the required system information using the system information acquisition procedure as specified in 5.2.2.

1. if the etws-Indication is included and the UE is ETWS capable:
   2. re-acquire SystemInformationBlockType1 immediately, i.e., without waiting until the next system information modification period boundary;
      2. if the schedulingInfoList indicates that SystemInformationBlockType10 is present:
         3. acquire SystemInformationBlockType10;

NOTE: If the UE is in CE, it is up to UE implementation when to start acquiring SystemInformationBlockType10.
      2. if the schedulingInfoList indicates that SystemInformationBlockType11 is present:
         3. acquire SystemInformationBlockType11;

1. if the cmas-Indication is included and the UE is CMAS capable:
   2. re-acquire SystemInformationBlockType1 immediately, i.e., without waiting until the next system information modification period boundary as specified in 5.2.1.5;
      2. if the schedulingInfoList indicates that SystemInformationBlockType12 is present:
         3. acquire SystemInformationBlockType12;

1. if in RRC_IDLE, the eab-ParamModification is included and the UE is EAB capable:
   2. consider previously stored SystemInformationBlockType14 as invalid;
   2. re-acquire SystemInformationBlockType1 immediately, i.e., without waiting until the next system information modification period boundary as specified in 5.2.1.6;
      2. re-acquire SystemInformationBlockType14 using the system information acquisition procedure as specified in 5.2.2.4;

1. if in RRC_IDLE, the redistributionIndication is included and the UE is redistribution capable:
   2. Perform E-UTRAN inter-frequency redistribution procedure as specified in TS 36.304 (5.2.4.10, [4]);
5.3.3 RRC connection establishment

5.3.3.1 General

Figure 5.3.3.1-1: RRC connection establishment, successful

UE → EUTRAN

RRCConnectionRequest

RRCConnectionSetup

RRCConnectionSetupComplete

Figure 5.3.3.1-2: RRC connection establishment, network reject

UE → EUTRAN

RRCConnectionRequest

RRCConnectionReject

Figure 5.3.3.1-3: RRC connection resume, successful

UE → EUTRAN

RRCConnectionResumeRequest

RRCConnectionResume

RRCConnectionResumeComplete
The purpose of this procedure is to establish or resume an RRC connection. RRC connection establishment involves SRB1 (and SRB1bis for NB-IoT) establishment. The procedure is also used to transfer the initial NAS dedicated information/message from the UE to E-UTRAN.

E-UTRAN applies the procedure as follows:

- When establishing an RRC connection:
  - to establish SRB1 and, for NB-IoT, SRB1bis;
- When resuming an RRC connection:
  - to restore the AS configuration from a stored context including resuming SRB(s) and DRB(s).

5.3.3.1a Conditions for establishing RRC Connection for sidelink communication/discovery

For sidelink communication an RRC connection is initiated only in the following case:

1> if configured by upper layers to transmit non-relay related sidelink communication and related data is available for transmission:

2> if SystemInformationBlockType18 is broadcast by the cell on which the UE camps; and if the valid version of SystemInformationBlockType18 does not include commTxPoolNormalCommon;

1> if configured by upper layers to transmit relay related sidelink communication:

2> if the UE is acting as sidelink relay UE; and if SystemInformationBlockType18 is broadcast by the cell on which the UE camps; or

2> if the UE has a selected sidelink relay UE; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met and if SystemInformationBlockType18 is broadcast by the cell on which the UE camps; and
if the valid version of SystemInformationBlockType18 does not include commTxPoolNormalCommon or commTxAllowRelayCommon;

For sidelink discovery an RRC connection is initiated only in the following case:

1> if configured by upper layers to transmit non-PS related sidelink discovery announcements:

2> if the frequency on which the UE is configured to transmit non-PS related sidelink discovery announcements concerns the camped frequency; and SystemInformationBlockType19 of the cell on which the UE camps does not include discTxPoolCommon-r12; or

2> if the frequency on which the UE is configured to transmit non-PS related sidelink discovery announcements is included in discInterFreqList in SystemInformationBlockType19 broadcast by the cell on which the UE camps, with discTxResourcesInterFreq included within discResourcesNonPS and set to requestDedicated;

1> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements:

2> if the frequency on which the UE is configured to transmit non-relay PS related sidelink discovery announcements concerns the camped frequency; and SystemInformationBlockType19 of the cell on which the UE camps includes discConfigPS but does not include discTxPoolPS-Common; or

2> if the frequency on which the UE is configured to transmit non-relay PS related sidelink discovery announcements is included in discInterFreqList in SystemInformationBlockType19 broadcast by the cell on which the UE camps, with discTxResourcesInterFreq within discResourcesPS included and set to requestDedicated;

1> if configured by upper layers to transmit relay PS related sidelink discovery announcements:

2> if the UE is acting as sidelink relay UE; and if the sidelink relay UE threshold conditions as specified in 5.10.10.4 are met; or

2> if the UE is selecting a sidelink relay UE / has a selected sidelink relay UE; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met:

3> if the frequency on which the UE is configured to transmit relay PS related sidelink discovery announcements concerns the camped frequency; and SystemInformationBlockType19 of the cell on which the UE camps includes discConfigRelay and discConfigPS but does not include discTxPoolPS-Common;

NOTE: Upper layers initiate an RRC connection. The interaction with NAS is left to UE implementation.

5.3.3.2 Initiation

The UE initiates the procedure when upper layers request establishment or resume of an RRC connection while the UE is in RRC_IDLE.

Except for NB-IoT, upon initiation of the procedure, the UE shall:

1> if SystemInformationBlockType2 includes ac-BarringPerPLMN-List and the ac-BarringPerPLMN-List contains an AC-BarringPerPLMN entry with the plmn-IdentityIndex corresponding to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]):

2> select the AC-BarringPerPLMN entry with the plmn-IdentityIndex corresponding to the PLMN selected by upper layers;

2> in the remainder of this procedure, use the selected AC-BarringPerPLMN entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the common access barring parameters included in SystemInformationBlockType2;

1> else

2> in the remainder of this procedure use the common access barring parameters (i.e. presence or absence of these parameters) included in SystemInformationBlockType2;
1> if SystemInformationBlockType2 contains ACDC-BarringPerPLMN-List and the ACDC-BarringPerPLMN-List contains an ACDC-BarringPerPLMN entry with the plmn-IdentityIndex corresponding to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]):

2> select the ACDC-BarringPerPLMN entry with the plmn-IdentityIndex corresponding to the PLMN selected by upper layers;

2> in the remainder of this procedure, use the selected ACDC-BarringPerPLMN entry for ACDC barring check (i.e. presence or absence of access barring parameters in this entry) irrespective of the ACDC-BarringForCommon parameters included in SystemInformationBlockType2;

1> else:

2> in the remainder of this procedure use the ACDC-BarringForCommon (i.e. presence or absence of these parameters) included in SystemInformationBlockType2 for ACDC barring check;

1> if upper layers indicate that the RRC connection is subject to EAB (see TS 24.301 [35]):

2> if the result of the EAB check, as specified in 5.3.3.12, is that access to the cell is barred:

3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that EAB is applicable, upon which the procedure ends;

1> else if the UE is establishing the RRC connection for mobile terminating calls:

2> if timer T302 is running:

3> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile terminating calls is applicable, upon which the procedure ends;

1> else if the UE is establishing the RRC connection for emergency calls:

2> if SystemInformationBlockType2 includes the ac-BarringInfo:

3> if the ac-BarringForEmergency is set to TRUE:

4> if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 [10] and TS 23.122 [11]:

NOTE 1: ACs 12, 13, 14 are only valid for use in the home country and ACs 11, 15 are only valid for use in the HPLMN/ EHPLMN.
if the \textit{ac-BarringInfo} includes \textit{ac-BarringForMO-Data}, and for all of these valid Access Classes for the UE, the corresponding bit in the \textit{ac-BarringForSpecialAC} contained in \textit{ac-BarringForMO-Data} is set to one:

consider access to the cell as barred;

else:

consider access to the cell as barred;

if access to the cell is barred:

inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication, upon which the procedure ends;

else if the UE is establishing the RRC connection for mobile originating calls:

perform access barring check as specified in 5.3.3.11, using T303 as "Tbarring" and \textit{ac-BarringForMO-Data} as "AC barring parameter";

if access to the cell is barred:

else if the UE is establishing the RRC connection for mobile originating signalling:

perform access barring check as specified in 5.3.3.11, using T305 as "Tbarring" and \textit{ac-BarringForMO-Signalling} as "AC barring parameter";

if access to the cell is barred:

else if the UE is establishing the RRC connection for mobile originating CS fallback:

perform access barring check as specified in 5.3.3.11, using T306 as "Tbarring" and \textit{ac-BarringForCSFB} as "AC barring parameter";

if access to the cell is barred:

else:

perform access barring check as specified in 5.3.3.11, using T306 as "Tbarring" and \textit{ac-BarringForMO-Data} as "AC barring parameter";

if access to the cell is barred:
if timer T303 is not running, start T303 with the timer value of T306;

inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating CS fallback and mobile originating calls is applicable, due to ac-BarringForMO-Data, upon which the procedure ends;

else if the UE is establishing the RRC connection for mobile originating MMTTEL voice, mobile originating MMTTEL video, mobile originating SMSoIP or mobile originating SMS:

if the UE is establishing the RRC connection for mobile originating MMTTEL voice and SystemInformationBlockType2 includes ac-BarringSkipForMMTELVoice; or

if the UE is establishing the RRC connection for mobile originating MMTTEL video and SystemInformationBlockType2 includes ac-BarringSkipForMMTELVideo; or

if the UE is establishing the RRC connection for mobile originating SMSoIP or SMS and SystemInformationBlockType2 includes ac-BarringSkipForSMS:

consider access to the cell as not barred;

else:

if establishmentCause received from higher layers is set to mo-Signalling (including the case that mo-Signalling is replaced by highPriorityAccess according to 3GPP TS 24.301 [35] or by mo-VoiceCall according to the subclause 5.3.3.3):

perform access barring check as specified in 5.3.3.11, using T305 as "Tbarring" and ac-BarringForMO-Signalling as "AC barring parameter";

if access to the cell is barred:

inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating signalling is applicable, upon which the procedure ends;

if establishmentCause received from higher layers is set to mo-Data (including the case that mo-Data is replaced by highPriorityAccess according to 3GPP TS 24.301 [35] or by mo-VoiceCall according to the subclause 5.3.3.3):

perform access barring check as specified in 5.3.3.11, using T303 as "Tbarring" and ac-BarringForMO-Data as "AC barring parameter";

if access to the cell is barred:

if SystemInformationBlockType2 includes ac-BarringForCSFB or the UE does not support CS fallback:

inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating calls is applicable, upon which the procedure ends;

else (SystemInformationBlockType2 does not include ac-BarringForCSFB and the UE supports CS fallback):

if timer T306 is not running, start T306 with the timer value of T303;

inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring for mobile originating calls and mobile originating CS fallback is applicable, upon which the procedure ends;

if the UE is resuming an RRC connection:

release the MCG SCell(s), if configured, in accordance with 5.3.10.3a;

release powerPrefIndicationConfig, if configured and stop timer T340, if running;

release reportProximityConfig and clear any associated proximity status reporting timer;
release obtainLocationConfig, if configured;
release idc-Config, if configured;
release measSubframePatternPCell, if configured;
release the entire SCG configuration, if configured, except for the DRB configuration (as configured by drb-ToAddModListSCG);
release naics-Info for the PCell, if configured;
release the LWA configuration, if configured, as described in 5.6.14.3;
release the LWIP configuration, if configured, as described in 5.6.17.3;
apply the default physical channel configuration as specified in 9.2.4;
apply the default semi-persistent scheduling configuration as specified in 9.2.3;
apply the default MAC main configuration as specified in 9.2.2;
apply the CCCH configuration as specified in 9.1.1.2;
apply the timeAlignmentTimerCommon included in SystemInformationBlockType2;
start timer T300;
if the UE is resuming an RRC connection:
initiate transmission of the RRConnectionResumeRequest message in accordance with 5.3.3.3a;
else:
if stored, discard the UE AS context and resumeIdentity;
initiate transmission of the RRConnectionRequest message in accordance with 5.3.3.3;
NOTE 2: Upon initiating the connection establishment procedure, the UE is not required to ensure it maintains up to date system information applicable only for UEs in RRC_IDLE state. However, the UE needs to perform system information acquisition upon cell re-selection.

For NB-IoT, upon initiation of the procedure, the UE shall:
if the UE is establishing or resuming the RRC connection for mobile originating exception data; or
if the UE is establishing or resuming the RRC connection for mobile originating data; or
if the UE is establishing or resuming the RRC connection for delay tolerant access; or
if the UE is establishing or resuming the RRC connection for mobile originating signalling;
perform access barring check as specified in 5.3.3.14;
if access to the cell is barred:
inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication and that access barring is applicable, upon which the procedure ends;
apply the default physical channel configuration as specified in 9.2.4;
apply the default MAC main configuration as specified in 9.2.2;
apply the CCCH configuration as specified in 9.1.1.2;
start timer T300;
if the UE is establishing an RRC connection:
initiate transmission of the RRConnectionRequest message in accordance with 5.3.3.3;
else if the UE is resuming an RRC connection:

> initiate transmission of the \textit{RRCConnectionResumeRequest} message in accordance with 5.3.3.3a;

NOTE 3: Upon initiating the connection establishment or resumption procedure, the UE is not required to ensure it maintains up to date system information applicable only for UEs in RRC\_IDLE state. However, the UE needs to perform system information acquisition upon cell re-selection.

### 5.3.3.3 Actions related to transmission of \textit{RRCConnectionRequest} message

The UE shall set the contents of \textit{RRCConnectionRequest} message as follows:

1> set the \textit{ue-Identity} as follows:

2> if upper layers provide an S-TMSI:

3> set the \textit{ue-Identity} to the value received from upper layers;

2> else:

3> draw a random value in the range 0 .. $2^{40}-1$ and set the \textit{ue-Identity} to this value;

NOTE 1: Upper layers provide the S-TMSI if the UE is registered in the TA of the current cell.

1> if the UE supports \textit{mo-VoiceCall} establishment cause and UE is establishing the RRC connection for mobile originating MMTEL voice and \textit{SystemInformationBlockType2} includes \textit{voiceServiceCauseIndication}:

2> set the \textit{establishmentCause} to \textit{mo-VoiceCall};

1> else:

2> set the \textit{establishmentCause} in accordance with the information received from upper layers;

1> if the UE is a NB-IoT UE:

2> if the UE supports multi-tone transmission, include \textit{multiToneSupport};

2> if the UE supports multi-carrier operation, include \textit{multiCarrierSupport};

The UE shall submit the \textit{RRCConnectionRequest} message to lower layers for transmission.

The UE shall continue cell re-selection related measurements as well as cell re-selection evaluation. If the conditions for cell re-selection are fulfilled, the UE shall perform cell re-selection as specified in 5.3.3.5.

### 5.3.3.3a Actions related to transmission of \textit{RRCConnectionResumeRequest} message

The UE shall set the contents of \textit{RRCConnectionResumeRequest} message as follows:

1> if the UE is a NB-IoT UE; or

1> if field \textit{useFullResumeID} is signalled in \textit{SystemInformationBlockType2}:

2> set the \textit{resumeID} to the stored \textit{resumeIdentity};

1> else

2> set the \textit{truncatedResumeID} to include bits in bit position 9 to 20 and 29 to 40 from the left in the stored \textit{resumeIdentity}.

1> if the UE supports \textit{mo-VoiceCall} establishment cause and UE is resuming the RRC connection for mobile originating MMTEL voice and \textit{SystemInformationBlockType2} includes \textit{voiceServiceCauseIndication}:

2> set the \textit{resumeCause} to \textit{mo-VoiceCall};

1> else

2> set the \textit{resumeCause} in accordance with the information received from upper layers;
1> set the shortResumeMAC-I to the 16 least significant bits of the MAC-I calculated:

2> over the ASN.1 encoded as per section 8 (i.e., a multiple of 8 bits) VarShortResumeMAC-Input (or VarShortResumeMAC-Input-NB in NB-IoT);

2> with the KRRCint key and the previously configured integrity protection algorithm; and

2> with all input bits for COUNT, BEARER and DIRECTION set to binary ones;

The UE shall submit the RRCConnectionResumeRequest message to lower layers for transmission.

The UE shall continue cell re-selection related measurements as well as cell re-selection evaluation. If the conditions for cell re-selection are fulfilled, the UE shall perform cell re-selection as specified in 5.3.3.5.

### 5.3.3.4 Reception of the RRCConnectionSetup by the UE

NOTE: Prior to this, lower layer signalling is used to allocate a C-RNTI. For further details see TS 36.321 [6];

The UE shall:

1> if the RRCConnectionSetup is received in response to an RRCConnectionResumeRequest:

2> discard the stored UE AS context and resumeIdentity;

2> indicate to upper layers that the RRC connection resume has been fallbacked;

1> perform the radio resource configuration procedure in accordance with the received radioResourceConfigDedicated and as specified in 5.3.10;

1> if stored, discard the cell reselection priority information provided by the idleModeMobilityControlInfo or inherited from another RAT;

1> stop timer T300;

1> stop timer T302, if running;

1> stop timer T303, if running;

1> stop timer T305, if running;

1> stop timer T306, if running;

1> stop timer T308, if running;

1> perform the actions as specified in 5.3.3.7;

1> stop timer T320, if running;

1> stop timer T350, if running;

1> perform the actions as specified in 5.6.12.4;

1> release rclwi-Configuration, if configured, as specified in 5.6.16.2;

1> stop timer T360, if running;

1> enter RRC_CONNECTED;

1> stop the cell re-selection procedure;

1> consider the current cell to be the PCell;

1> set the content of RRCConnectionSetupComplete message as follows:

2> if the RRCConnectionSetup is received in response to an RRCConnectionResumeRequest:

3> if upper layers provide an S-TMSI:
4> set the s-TMSI to the value received from upper layers;

2> set the selectedPLMN-Identity to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]) from the PLMN(s) included in the plmn-IdentityList in SystemInformationBlockType1 (or SystemInformationBlockType1-NB in NB-IoT);

2> if upper layers provide the 'Registered MME', include and set the registeredMME as follows:

3> if the PLMN identity of the 'Registered MME' is different from the PLMN selected by the upper layers:

4> include the plmnIdentity in the registeredMME and set it to the value of the PLMN identity in the 'Registered MME' received from upper layers;

3> set the mmegi and the mmec to the value received from upper layers;

2> except for NB-IoT, if upper layers provided the 'Registered MME':

3> include and set the gummei-Type to the value provided by the upper layers;

2> if the UE supports CIoT EPS optimisation(s):

3> include attachWithoutPDN-Connectivity if received from upper layers;

3> include up-CIoT-EPS-Optimisation if received from upper layers;

3> except for NB-IoT, include cp-CIoT-EPS-Optimisation if received from upper layers;

2> if connecting as an RN:

3> include the rn-SubframeConfigReq;

2> set the dedicatedInfoNAS to include the information received from upper layers;

2> except for NB-IoT:

3> if the UE has radio link failure or handover failure information available in VarRLF-Report and if the RPLMN is included in plmn-IdentityList stored in VarRLF-Report:

4> include rlf-InfoAvailable;

3> if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport:

4> include logMeasAvailableMBSFN;

3> else if the UE has logged measurements available for E-UTRA and if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport:

4> include logMeasAvailable;

3> if the UE has connection establishment failure information available in VarConnEstFailReport and if the RPLMN is equal to plmn-Identity stored in VarConnEstFailReport:

4> include connEstFailInfoAvailable;

3> include the mobilityState and set it to the mobility state (as specified in TS 36.304 [4]) of the UE just prior to entering RRC_CONNECTED state;

3> if the UE supports storage of mobility history information and the UE has mobility history information available in VarMobilityHistoryReport:

4> include the mobilityHistoryAvail;

2> if UE needs UL gaps during continuous uplink transmission:

3> include ue-CE-NeedULGaps;
submit the *RRCConnectionSetupComplete* message to lower layers for transmission, upon which the procedure ends;

5.3.3.4a Reception of the **RRCConnectionResume** by the UE

The UE shall:

1> stop timer T300;

1> restore the RRC configuration and security context from the stored UE AS context:

1> restore the PDCP state and re-establish PDCP entities for all SRBs and DRBs;

1> if *drb-ContinueROHC* is included:

2> indicate to lower layers that stored UE AS context is used and that *drb-ContinueROHC* is configured;

2> continue the header compression protocol context for the DRBs configured with the header compression protocol;

1> else:

2> indicate to lower layers that stored UE AS context is used;

2> reset the header compression protocol context for the DRBs configured with the header compression protocol;

1> discard the stored UE AS context and **resumeIdentity**;

1> perform the radio resource configuration procedure in accordance with the received *
radioResourceConfigDedicated* and as specified in 5.3.10;

1> resume SRBs and DRBs;

1> if stored, discard the cell reselection priority information provided by the *idleModeMobilityControlInfo* or inherited from another RAT;

1> if the **RRCConnectionResume** message includes the *measConfig*:

2> perform the measurement configuration procedure as specified in 5.5.2;

1> stop timer T302, if running;

1> stop timer T303, if running;

1> stop timer T305, if running;

1> stop timer T306, if running;

1> stop timer T308, if running;

1> perform the actions as specified in 5.3.3.7;

1> stop timer T320, if running;

1> stop timer T350, if running;

1> perform the actions as specified in 5.6.12.4;

1> stop timer T360, if running;

1> update the $K_{SNB}$ key based on the $K_{ASME}$ key to which the current $K_{SNB}$ is associated, using the *nextHopChainingCount* value indicated in the **RRCConnectionResume** message, as specified in TS 33.401 [32];

1> store the *nextHopChainingCount* value;
1> derive the $K_{RRC\text{int}}$ key associated with the previously configured integrity algorithm, as specified in TS 33.401 [32];

1> request lower layers to verify the integrity protection of the $RRC\text{ConnectionResume}$ message, using the previously configured algorithm and the $K_{RRC\text{int}}$ key;

1> if the integrity protection check of the $RRC\text{ConnectionResume}$ message fails:

2> perform the actions upon leaving RRC\_CONNECTED as specified in 5.3.12, with release cause ‘other’, upon which the procedure ends;

1> derive the $K_{RRC\text{enc}}$ key and the $K_{UP\text{enc}}$ key associated with the previously configured ciphering algorithm, as specified in TS 33.401 [32];

1> configure lower layers to activate integrity protection using the previously configured algorithm and the $K_{RRC\text{int}}$ key immediately, i.e., integrity protection shall be applied to all subsequent messages received and sent by the UE;

1> configure lower layers to apply the ciphering algorithm, the $K_{RRC\text{enc}}$ key and the $K_{UP\text{enc}}$ key, i.e. the ciphering configuration shall be applied to all subsequent messages received and sent by the UE;

1> enter RRC\_CONNECTED;

1> indicate to upper layers that the suspended RRC connection has been resumed;

1> stop the cell re-selection procedure;

1> consider the current cell to be the PCell;

1> set the content of $RRC\text{ConnectionResumeComplete}$ message as follows:

2> set the $selectedPLMN-Identity$ to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]) from the PLMN(s) included in the $plmn-IdentityList$ in $SystemInformationBlockType1$;

2> set the $dedicatedInfoNAS$ to include the information received from upper layers;

2> except for NB-IoT:

3> if the UE has radio link failure or handover failure information available in $VarRLF-Report$ and if the RPLMN is included in $plmn-IdentityList$ stored in $VarRLF-Report$:

4> include $rlf-InfoAvailable$;

3> if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in $plmn-IdentityList$ stored in $VarLogMeasReport$:

4> include $logMeasAvailableMBSFN$;

3> else if the UE has logged measurements available for E-UTRA and if the RPLMN is included in $plmn-IdentityList$ stored in $VarLogMeasReport$:

4> include $logMeasAvailable$;

3> if the UE has connection establishment failure information available in $VarConnEstFailReport$ and if the RPLMN is equal to $plmn-Identity$ stored in $VarConnEstFailReport$:

4> include $connEstFailInfoAvailable$;

3> include the $mobilityState$ and set it to the mobility state (as specified in TS 36.304 [4]) of the UE just prior to entering RRC\_CONNECTED state;

3> if the UE supports storage of mobility history information and the UE has mobility history information available in $VarMobilityHistoryReport$:

4> include $mobilityHistoryAvail$;

1> submit the $RRC\text{ConnectionResumeComplete}$ message to lower layers for transmission;
1. the procedure ends.

5.3.3.5 Cell re-selection while T300, T302, T303, T305, T306, or T308 is running

The UE shall:

1. if cell reselection occurs while T300, T302, T303, T305, T306, or T308 is running:
   2. if timer T302, T303, T305, T306, and/or T308 is running:
      3. stop timer T302, T303, T305, T306, and T308, whichever ones were running;
     3. perform the actions as specified in 5.3.3.7;
      2. if timer T300 is running:
     3. stop timer T300;

3. reset MAC, release the MAC configuration and re-establish RLC for all RBs that are established;

3. inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication;

5.3.3.6 T300 expiry

The UE shall:

1. if timer T300 expires:
   2. reset MAC, release the MAC configuration and re-establish RLC for all RBs that are established;
      2. if the UE is a NB-IoT UE and connEstFailOffset is included in SystemInformationBlockType2-NB:
         3. use connEstFailOffset for the parameter Qoffsettemp for the concerned cell when performing cell selection and reselection according to TS 36.304 [4];

NOTE 0: For NB-IoT, the number of times that the UE detects T300 expiry on the same cell before applying connEstFailOffset and the amount of time that the UE applies connEstFailOffset before removing the offset from evaluation of the cell is up to UE implementation.

2. else if the UE supports RRC Connection Establishment failure temporary Qoffset and T300 has expired a consecutive connEstFailCount times on the same cell for which txFailParams is included in SystemInformationBlockType2:
   3. for a period as indicated by connEstFailOffsetValidity:
      4. use connEstFailOffset for the parameter Qoffsettemp for the concerned cell when performing cell selection and reselection according to TS 36.304 [4] and TS 25.304 [40];

NOTE 1: When performing cell selection, if no suitable or acceptable cell can be found, it is up to UE implementation whether to stop using connEstFailOffset for the parameter Qoffsettemp during connEstFailOffsetValidity for the concerned cell.

2. except for NB-IoT, store the following connection establishment failure information in the VarConnEstFailReport by setting its fields as follows:

3. clear the information included in VarConnEstFailReport, if any;

3. set the plmn-Identity to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]) from the PLMN(s) included in the plmn-IdentityList in SystemInformationBlockType1;

3. set the failedCellId to the global cell identity of the cell where connection establishment failure is detected;

3. set the measResultFailedCell to include the RSRP and RSRQ, if available, of the cell where connection establishment failure is detected and based on measurements collected up to the moment the UE detected the failure;
3> if available, set the `measResultNeighCells`, in order of decreasing ranking-criterion as used for cell re-selection, to include neighbouring cell measurements for at most the following number of neighbouring cells: 6 intra-frequency and 3 inter-frequency neighbours per frequency as well as 3 inter-RAT neighbours, per frequency/ set of frequencies (GERAN) per RAT and according to the following:

4> for each neighbour cell included, include the optional fields that are available;

NOTE 2: The UE includes the latest results of the available measurements as used for cell re-selection evaluation, which are performed in accordance with the performance requirements as specified in TS 36.133 [16].

3> if detailed location information is available, set the content of the `locationInfo` as follows:

4> include the `locationCoordinates`;

4> include the `horizontalVelocity`, if available;

3> set the `numberOfPreamblesSent` to indicate the number of preambles sent by MAC for the failed random access procedure;

3> set `contentionDetected` to indicate whether contention resolution was not successful as specified in TS 36.321 [6] for at least one of the transmitted preambles for the failed random access procedure;

3> set `maxTxPowerReached` to indicate whether or not the maximum power level was used for the last transmitted preamble, see TS 36.321 [6];

2> inform upper layers about the failure to establish the RRC connection or failure to resume the RRC connection with suspend indication, upon which the procedure ends;

The UE may discard the connection establishment failure information, i.e. release the UE variable `VarConnEstFailReport`, 48 hours after the failure is detected, upon power off or upon detach.

5.3.3.7 T302, T303, T305, T306, or T308 expiry or stop

The UE shall:

1> if timer T302 expires or is stopped:

2> inform upper layers about barring alleviation for mobile terminating access;

2> if timer T303 is not running:

3> inform upper layers about barring alleviation for mobile originating calls;

2> if timer T305 is not running:

3> inform upper layers about barring alleviation for mobile originating signalling;

2> if timer T306 is not running:

3> inform upper layers about barring alleviation for mobile originating CS fallback;

2> if timer T308 is not running:

3> inform upper layers about barring alleviation for ACDC;

1> if timer T303 expires or is stopped:

2> if timer T302 is not running:

3> inform upper layers about barring alleviation for mobile originating calls;

1> if timer T305 expires or is stopped:

2> if timer T302 is not running:

3> inform upper layers about barring alleviation for mobile originating signalling;
5.3.3.8 Reception of the \texttt{RRCConnectionReject} by the UE

The UE shall:

1. stop timer T300;
2. reset MAC and release the MAC configuration;
3. except for NB-IoT, start timer T302, with the timer value set to the \textit{waitTime};
4. if the UE is a NB-IoT UE; or
5. if the \textit{extendedWaitTime} is present and the UE supports delay tolerant access:
   1. forward the \textit{extendedWaitTime} to upper layers;
6. if \textit{deprioritisationReq} is included and the UE supports RRC Connection Reject with deprioritisation:
   1. start or restart timer T325 with the timer value set to the \textit{deprioritisationTimer} signalled;
   2. store the \textit{deprioritisationReq} until T325 expiry;

\textbf{NOTE:} The UE stores the deprioritisation request irrespective of any cell reselection absolute priority assignments (by dedicated or common signalling) and regardless of RRC connections in E-UTRAN or other RATs unless specified otherwise.

1. if the \texttt{RRCConnectionReject} is received in response to an \texttt{RRCConnectionResumeRequest}:
   1. if the \texttt{rrc-SuspendIndication} is not present:
      1. discard the stored UE AS context and \texttt{resumeIdentity};
      2. inform upper layers about the failure to resume the RRC connection without suspend indication and that access barring for mobile originating calls, mobile originating signalling, mobile terminating access and except for NB-IoT for mobile originating CS fallback is applicable, upon which the procedure ends;
   2. else:
      1. inform upper layers about the failure to resume the RRC connection with suspend indication and that access barring for mobile originating calls, mobile originating signalling, mobile terminating access and except for NB-IoT for mobile originating CS fallback is applicable, upon which the procedure ends;

3. inform upper layers about the failure to establish the RRC connection and that access barring for mobile originating calls, mobile originating signalling, mobile terminating access and except for NB-IoT for mobile originating CS fallback is applicable, upon which the procedure ends;

5.3.3.9 Abortion of RRC connection establishment

If upper layers abort the RRC connection establishment procedure while the UE has not yet entered \texttt{RRC\_CONNECTED}, the UE shall:

1. stop timer T300, if running;
reset MAC, release the MAC configuration and re-establish RLC for all RBs that are established;

5.3.3.10 Handling of SSAC related parameters

Upon request from the upper layers, the UE shall:

1> if SystemInformationBlockType2 includes ac-BarringPerPLMN-List and the ac-BarringPerPLMN-List contains an AC-BarringPerPLMN entry with the plmn-IdentityIndex corresponding to the PLMN selected by upper layers (see TS 23.122 [11]; TS 24.301 [35]):

   2> select the AC-BarringPerPLMN entry with the plmn-IdentityIndex corresponding to the PLMN selected by upper layers;

   2> in the remainder of this procedure, use the selected AC-BarringPerPLMN entry (i.e. presence or absence of access barring parameters in this entry) irrespective of the common access barring parameters included in SystemInformationBlockType2;

1> else:

   2> in the remainder of this procedure use the common access barring parameters (i.e. presence or absence of these parameters) included in SystemInformationBlockType2;

1> set the local variables BarringFactorForMMTEL-Voice and BarringTimeForMMTEL-Voice as follows:

   2> if ssac-BarringForMMTEL-Voice is present:

      3> if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 [10] and TS 23.122 [11], and

      NOTE: ACs 12, 13, 14 are only valid for use in the home country and ACs 11, 15 are only valid for use in the HPLMN/ EHPLMN.

      3> if, for at least one of these Access Classes, the corresponding bit in the ac-BarringForSpecialAC contained in ssac-BarringForMMTEL-Voice is set to zero:

         4> set BarringFactorForMMTEL-Voice to one and BarringTimeForMMTEL-Voice to zero;

      3> else:

         4> set BarringFactorForMMTEL-Voice and BarringTimeForMMTEL-Voice to the value of ac-BarringFactor and ac-BarringTime included in ssac-BarringForMMTEL-Voice, respectively;

   2> else set BarringFactorForMMTEL-Voice to one and BarringTimeForMMTEL-Voice to zero;

1> set the local variables BarringFactorForMMTEL-Video and BarringTimeForMMTEL-Video as follows:

   2> if ssac-BarringForMMTEL-Video is present:

      3> if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 [10] and TS 23.122 [11], and

      3> if, for at least one of these Access Classes, the corresponding bit in the ac-BarringForSpecialAC contained in ssac-BarringForMMTEL-Video is set to zero:

         4> set BarringFactorForMMTEL-Video to one and BarringTimeForMMTEL-Video to zero;

      3> else:

         4> set BarringFactorForMMTEL-Video and BarringTimeForMMTEL-Video to the value of ac-BarringFactor and ac-BarringTime included in ssac-BarringForMMTEL-Video, respectively;

   2> else set BarringFactorForMMTEL-Video to one and BarringTimeForMMTEL-Video to zero;

1> forward the variables BarringFactorForMMTEL-Voice, BarringTimeForMMTEL-Voice, BarringFactorForMMTEL-Video and BarringTimeForMMTEL-Video to the upper layers;
5.3.3.11 Access barring check

1> if timer T302 or "Tbarring" is running:

2> consider access to the cell as barred;

1> else if SystemInformationBlockType2 includes "AC barring parameter":

2> if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 [10] and TS 23.122 [11], and

NOTE: ACs 12, 13, 14 are only valid for use in the home country and ACs 11, 15 are only valid for use in the HPLMN/ EHPLMN.

2> for at least one of these valid Access Classes the corresponding bit in the \text{ac-BarringForSpecialAC} contained in "AC barring parameter" is set to zero:

3> consider access to the cell as not barred;

2> else:

3> draw a random number \( \text{rand} \) uniformly distributed in the range \( 0 \leq \text{rand} < 1 \);

3> if \( \text{rand} \) is lower than the value indicated by \text{ac-BarringFactor} included in "AC barring parameter":

4> consider access to the cell as not barred;

3> else:

4> consider access to the cell as barred;

1> else:

2> consider access to the cell as not barred;

1> if access to the cell is barred and both timers T302 and "Tbarring" are not running:

2> draw a random number \( \text{rand} \) that is uniformly distributed in the range \( 0 \leq \text{rand} < 1 \);

2> start timer "Tbarring" with the timer value calculated as follows, using the \text{ac-BarringTime} included in "AC barring parameter":

\[
\text{"Tbarring"} = (0.7 + 0.6 \cdot \text{rand}) \cdot \text{ac-BarringTime};
\]

5.3.3.12 EAB check

The UE shall:

1> if SystemInformationBlockType14 is present and includes the \text{eab-Param}:

2> if the \text{eab-Common} is included in the \text{eab-Param}:

3> if the UE belongs to the category of UEs as indicated in the \text{eab-Category} contained in \text{eab-Common}; and

3> if for the Access Class of the UE, as stored on the USIM and with a value in the range 0..9, the corresponding bit in the \text{eab-BarringBitmap} contained in \text{eab-Common} is set to one:

4> consider access to the cell as barred;

3> else:

4> consider access to the cell as not barred due to EAB;

2> else (the \text{eab-PerPLMN-List} is included in the \text{eab-Param}):

3> select the entry in the \text{eab-PerPLMN-List} corresponding to the PLMN selected by upper layers (see TS 23.122 [11], TS 24.301 [35]);
if the `eab-Config` for that PLMN is included:

1. if the UE belongs to the category of UEs as indicated in the `eab-Category` contained in `eab-Config`;
2. and
3. if for the Access Class of the UE, as stored on the USIM and with a value in the range 0..9, the corresponding bit in the `eab-BarringBitmap` contained in `eab-Config` is set to one:
4. consider access to the cell as barred;
5. else:
6. consider access to the cell as not barred due to EAB;
7. else:
8. consider access to the cell as not barred due to EAB;

### 5.3.3.13 Access barring check for ACDC

The UE shall:

1. if timer T302 is running:
2. consider access to the cell as barred;
3. else if `SystemInformationBlockType2` includes "ACDC barring parameter":
   1. draw a random number `rand` uniformly distributed in the range: $0 \leq \text{rand} < 1$;
   2. if `rand` is lower than the value indicated by `ac-BarringFactor` included in "ACDC barring parameter":
      1. consider access to the cell as not barred;
      2. else:
         1. consider access to the cell as barred;
   3. else:
      1. consider access to the cell as not barred;
4. else:
   1. consider access to the cell as not barred;
5. if access to the cell is barred and timer T302 is not running:
   1. draw a random number `rand` that is uniformly distributed in the range $0 \leq \text{rand} < 1$;
   2. start timer "Tbarring" with the timer value calculated as follows, using the `ac-BarringTime` included in "ACDC barring parameter":
      
      "Tbarring" = $(0.7 + 0.6 \times \text{rand}) \times \text{ac-BarringTime}$. 

### 5.3.3.14 Access Barring check for NB-IoT

The UE shall:

1. if `ab-Enabled` included in `MasterInformationBlock-NB` is set to `TRUE` and `SystemInformationBlockType14-NB` is broadcast:
2. if the `ab-Common` is included in `ab-Param`:
3. if the UE belongs to the category of UEs as indicated in the `ab-Category` contained in `ab-Common`; and
3> if for the Access Class of the UE, as stored on the USIM and with a value in the range 0..9, the corresponding bit in the \textit{ab-BarringBitmap} contained in \textit{ab-Common} is set to \textit{one}:

4> if the \texttt{establishmentCause} received from higher layers is set to \texttt{mo-ExceptionData} and \texttt{ab-BarringForExceptionData} is set to \texttt{FALSE} in the \textit{ab-Common}:

5> consider access to the cell as not barred;

4> else:

5> if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 \cite{10} and TS 23.122 \cite{11} and for at least one of these valid Access Classes for the UE, the corresponding bit in the \texttt{ab-BarringForSpecialAC} contained in \textit{ab-Common} is set to \texttt{zero}:

\begin{verbatim}
NOTE 1: ACs 12, 13, 14 are only valid for use in the home country and ACs 11, 15 are only valid for use in the HPLMN/ EHPLMN.
\end{verbatim}

6> consider access to the cell as not barred;

5> else:

6> consider access to the cell as barred;

3> else:

4> consider access to the cell as not barred;

2> else (the \textit{ab-PerPLMN-List} is included in the \textit{ab-Param}):

3> select the \textit{ab-PerPLMN} entry in \textit{ab-PerPLMN-List} corresponding to the PLMN selected by upper layers (see TS 23.122 \cite{11}, TS 24.301 \cite{35});

3> if the \textit{ab-Config} for that PLMN is included:

4> if the UE belongs to the category of UEs as indicated in the \textit{ab-Category} contained in \textit{ab-Config}; and

4> if for the Access Class of the UE, as stored on the USIM and with a value in the range 0..9, the corresponding bit in the \textit{ab-BarringBitmap} contained in \textit{ab-Config} is set to \textit{one}:

5> if the \texttt{establishmentCause} received from higher layers is set to \texttt{mo-ExceptionData} and \texttt{ab-BarringForExceptionData} is set to \texttt{FALSE} in the \textit{ab-Config}:

6> consider access to the cell as not barred;

5> else:

6> if the UE has one or more Access Classes, as stored on the USIM, with a value in the range 11..15, which is valid for the UE to use according to TS 22.011 \cite{10} and TS 23.122 \cite{11} and for at least one of these valid Access Classes for the UE, the corresponding bit in the \texttt{ab-BarringForSpecialAC} contained in \textit{ab-Config} is set to \texttt{zero}:

\begin{verbatim}
NOTE 2: ACs 12, 13, 14 are only valid for use in the home country and ACs 11, 15 are only valid for use in the HPLMN/ EHPLMN.
\end{verbatim}

7> consider access to the cell as not barred;

6> else:

7> consider access to the cell as barred;

4> else:

5> consider access to the cell as not barred;

3> else:

\begin{verbatim}
ETSI
\end{verbatim}
The purpose of this procedure is to activate AS security upon RRC connection establishment.

5.3.4.2 Initiation

E-UTRAN initiates the security mode command procedure to a UE in RRC_CONNECTED. Moreover, E-UTRAN applies the procedure as follows:

- when only SRB1 is established, i.e. prior to establishment of SRB2 and/or DRBs.

5.3.4.3 Reception of the SecurityModeCommand by the UE

The UE shall:

1. derive the $K_{eNB}$ key, as specified in TS 33.401 [32];
2. derive the $K_{RRC}$ key associated with the integrityProtAlgorithm indicated in the SecurityModeCommand message, as specified in TS 33.401 [32];
3. request lower layers to verify the integrity protection of the SecurityModeCommand message, using the algorithm indicated by the integrityProtAlgorithm as included in the SecurityModeCommand message and the $K_{RRC}$ key;
4. if the SecurityModeCommand message passes the integrity protection check:
2> derive the $K_{\text{RRCenc}}$ key and the $K_{\text{UPenc}}$ key associated with the $\text{cipheringAlgorithm}$ indicated in the $\text{SecurityModeCommand}$ message, as specified in TS 33.401 [32];

2> if connected as an RN:

3> derive the $K_{\text{UPint}}$ key associated with the $\text{integrityProtAlgorithm}$ indicated in the $\text{SecurityModeCommand}$ message, as specified in TS 33.401 [32];

2> configure lower layers to apply integrity protection using the indicated algorithm and the $K_{\text{RRCint}}$ key immediately, i.e. integrity protection shall be applied to all subsequent messages received and sent by the UE, including the $\text{SecurityModeComplete}$ message;

2> configure lower layers to apply ciphering using the indicated algorithm, the $K_{\text{RRCenc}}$ key and the $K_{\text{UPenc}}$ key after completing the procedure, i.e. ciphering shall be applied to all subsequent messages received and sent by the UE, except for the $\text{SecurityModeComplete}$ message which is sent unciphered;

2> if connected as an RN:

3> configure lower layers to apply integrity protection using the indicated algorithm and the $K_{\text{UPint}}$ key, for DRBs that are subsequently configured to apply integrity protection, if any;

2> consider AS security to be activated;

2> upon RRC connection establishment, if UE does not need UL gaps during continuous uplink transmission:

3> configure lower layers to stop using UL gaps during continuous uplink transmission in FDD for $\text{SecurityModeComplete}$ message and subsequent uplink transmission in RRC_CONNECTED except for UL transmissions as specified in TS36.211 [21];

2> submit the $\text{SecurityModeComplete}$ message to lower layers for transmission, upon which the procedure ends;

1> else:

2> continue using the configuration used prior to the reception of the $\text{SecurityModeCommand}$ message, i.e. neither apply integrity protection nor ciphering.

2> submit the $\text{SecurityModeFailure}$ message to lower layers for transmission, upon which the procedure ends;

5.3.5 RRC connection reconfiguration

5.3.5.1 General

![Figure 5.3.5.1-1: RRC connection reconfiguration, successful](image-url)
The purpose of this procedure is to modify an RRC connection, e.g. to establish/modify/release RBs, to perform handover, to setup/modify/release measurements, to add/modify/release SCells. As part of the procedure, NAS dedicated information may be transferred from E-UTRAN to the UE.

5.3.5.2 Initiation

E-UTRAN may initiate the RRC connection reconfiguration procedure to a UE in RRC_CONNECTED. E-UTRAN applies the procedure as follows:

- the mobilityControlInfo is included only when AS-security has been activated, and SRB2 with at least one DRB are setup and not suspended;
- the establishment of RBs (other than SRB1, that is established during RRC connection establishment) is included only when AS security has been activated;
- the addition of SCells is performed only when AS security has been activated;

5.3.5.3 Reception of an RRCConnectionReconfiguration not including the mobilityControlInfo by the UE

If the RRCConnectionReconfiguration message does not include the mobilityControlInfo and the UE is able to comply with the configuration included in this message, the UE shall:

1> if this is the first RRCConnectionReconfiguration message after successful completion of the RRC connection re-establishment procedure:
   2> re-establish PDCP for SRB2 and for all DRBs that are established, if any;
   2> re-establish RLC for SRB2 and for all DRBs that are established, if any;
   2> if the RRCConnectionReconfiguration message includes the fullConfig:
      3> perform the radio configuration procedure as specified in 5.3.5.8;
   2> if the RRCConnectionReconfiguration message includes the radioResourceConfigDedicated:
      3> perform the radio resource configuration procedure as specified in 5.3.10;
   2> resume SRB2 and all DRBs that are suspended, if any;

NOTE 1: The handling of the radio bearers after the successful completion of the PDCP re-establishment, e.g. the re-transmission of unacknowledged PDCP SDUs (as well as the associated status reporting), the handling of the SN and the HFN, is specified in TS 36.323 [8].

NOTE 2: The UE may discard SRB2 messages and data that it receives prior to completing the reconfiguration used to resume these bearers.

1> else:
   2> if the RRCConnectionReconfiguration message includes the radioResourceConfigDedicated:
3> perform the radio resource configuration procedure as specified in 5.3.10;

NOTE 3: If the RRCConnectionReconfiguration message includes the establishment of radio bearers other than SRB1, the UE may start using these radio bearers immediately, i.e. there is no need to wait for an outstanding acknowledgment of the SecurityModeComplete message.

1> if the received RRCConnectionReconfiguration includes the sCellToReleaseList:
   2> perform SCell release as specified in 5.3.10.3a;

1> if the received RRCConnectionReconfiguration includes the sCellToAddModList:
   2> perform SCell addition or modification as specified in 5.3.10.3b;

1> if the received RRCConnectionReconfiguration includes the scg-Configuration; or

1> if the current UE configuration includes one or more split DRBs and the received RRCConnectionReconfiguration includes radioResourceConfigDedicated including drb-ToAddModList:
   2> perform SCG reconfiguration as specified in 5.3.10.10;

1> if the received RRCConnectionReconfiguration includes the systemInformationBlockType1Dedicated:
   2> perform the actions upon reception of the SystemInformationBlockType1 message as specified in 5.2.2.7;

1> if the RRCConnectionReconfiguration message includes the dedicatedInfoNASList:
   2> forward each element of the dedicatedInfoNASList to upper layers in the same order as listed;

1> if the RRCConnectionReconfiguration message includes the measConfig:
   2> perform the measurement configuration procedure as specified in 5.5.2;

1> perform the measurement identity autonomous removal as specified in 5.5.2.2a;

1> if the RRCConnectionReconfiguration message includes the otherConfig:
   2> perform the other configuration procedure as specified in 5.3.10.9;

1> if the RRCConnectionReconfiguration message includes the sl-DiscConfig or sl-CommConfig:
   2> perform the sidelink dedicated configuration procedure as specified in 5.3.10.15;

1> if the RRCConnectionReconfiguration message includes wlan-OffloadInfo:
   2> perform the dedicated WLAN offload configuration procedure as specified in 5.6.12.2;

1> if the RRCConnectionReconfiguration message includes rclwi-Configuration:
   2> perform the WLAN traffic steering command procedure as specified in 5.6.16.2;

1> if the RRCConnectionReconfiguration message includes lwa-Configuration:
   2> perform the LWA configuration procedure as specified in 5.6.14.2;

1> if the RRCConnectionReconfiguration message includes lwip-Configuration:
   2> perform the LWIP reconfiguration procedure as specified in 5.6.17.2;

1> upon RRC connection establishment, if UE does not need UL gaps during continuous uplink transmission:
   2> configure lower layers to stop using UL gaps during continuous uplink transmission in FDD for RRCConnectionReconfigurationComplete message and subsequent uplink transmission in RRC_CONNECTED except for UL transmissions as specified in TS36.211 [21];

1> submit the RRCConnectionReconfigurationComplete message to lower layers for transmission using the new configuration, upon which the procedure ends;
5.3.5.4 Reception of an RRCConnectionReconfiguration including the mobilityControlInfo by the UE (handover)

If the RRCConnectionReconfiguration message includes the mobilityControlInfo and the UE is able to comply with the configuration included in this message, the UE shall:

1> stop timer T310, if running;
1> stop timer T312, if running;
1> start timer T304 with the timer value set to t304, as included in the mobilityControlInfo;
1> stop timer T370, if running;
1> if the carrierFreq is included:
   2> consider the target PCell to be one on the frequency indicated by the carrierFreq with a physical cell identity indicated by the targetPhysCellId;
1> else:
   2> consider the target PCell to be one on the frequency of the source PCell with a physical cell identity indicated by the targetPhysCellId;
1> start synchronising to the DL of the target PCell;

NOTE 1: The UE should perform the handover as soon as possible following the reception of the RRC message triggering the handover, which could be before confirming successful reception (HARQ and ARQ) of this message.

1> if BL UE or UE in CE:
   2> acquire the MasterInformationBlock in the target PCell;
1> reset MCG MAC and SCG MAC, if configured;
1> re-establish PDCP for all RBs that are established;

NOTE 2: The handling of the radio bearers after the successful completion of the PDCP re-establishment, e.g. the re-transmission of unacknowledged PDCP SDUs (as well as the associated status reporting), the handling of the SN and the HFN, is specified in TS 36.323 [8].

1> re-establish MCG RLC and SCG RLC, if configured, for all RBs that are established;
1> configure lower layers to consider the SCell(s) other than the PSCell, if configured, to be in deactivated state;
1> apply the value of the newUE-Identity as the C-RNTI;
1> if the RRCConnectionReconfiguration message includes the fullConfig:
   2> perform the radio configuration procedure as specified in 5.3.5.8;
1> configure lower layers in accordance with the received radioResourceConfigCommon;
1> configure lower layers in accordance with any additional fields, not covered in the previous, if included in the received mobilityControlInfo;
1> if the received RRCConnectionReconfiguration includes the sCellToReleaseList:
   2> perform SCell release as specified in 5.3.10.3a;
1> if the received RRCConnectionReconfiguration includes the scg-Configuration; or
1> if the current UE configuration includes one or more split DRBs and the received RRCConnectionReconfiguration includes radioResourceConfigDedicated including drb-ToAddModList:
   2> perform SCG reconfiguration as specified in 5.3.10.10;
1> if the `RRCConnectionReconfiguration` message includes the `radioResourceConfigDedicated`:
   
   2> perform the radio resource configuration procedure as specified in 5.3.10;

1> if the `keyChangeIndicator` received in the `securityConfigHO` is set to TRUE:
   
   2> update the $K_{NB}$ key based on the $K_{ASM}$ key taken into use with the latest successful NAS SMC procedure, as specified in TS 33.401 [32];

1> else:
   
   2> update the $K_{NB}$ key based on the current $K_{NB}$ or the NH, using the `nextHopChainingCount` value indicated in the `securityConfigHO`, as specified in TS 33.401 [32];

1> store the `nextHopChainingCount` value;

1> if the `securityAlgorithmConfig` is included in the `securityConfigHO`:
   
   2> derive the $K_{RRCint}$ key associated with the `integrityProtAlgorithm`, as specified in TS 33.401 [32];

   2> if connected as an RN:
      
      3> derive the $K_{UPint}$ key associated with the `integrityProtAlgorithm`, as specified in TS 33.401 [32];

      2> derive the $K_{RRCenc}$ key and the $K_{UPenc}$ key associated with the `cipheringAlgorithm`, as specified in TS 33.401 [32];

   1> else:
      
      2> derive the $K_{RRCint}$ key associated with the current integrity algorithm, as specified in TS 33.401 [32];

      2> if connected as an RN:
         
         3> derive the $K_{UPint}$ key associated with the current integrity algorithm, as specified in TS 33.401 [32];

      2> derive the $K_{RRCenc}$ key and the $K_{UPenc}$ key associated with the current ciphering algorithm, as specified in TS 33.401 [32];

1> configure lower layers to apply the integrity protection algorithm and the $K_{RRCint}$ key, i.e. the integrity protection configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

1> configure lower layers to apply the ciphering algorithm, the $K_{RRCenc}$ key and the $K_{UPenc}$ key, i.e. the ciphering configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

1> if connected as an RN:
   
   2> configure lower layers to apply the integrity protection algorithm and the $K_{UPint}$ key, for current or subsequently established DRBs that are configured to apply integrity protection, if any;

1> if the received `RRCConnectionReconfiguration` includes the `sCellToAddModList`:
   
   2> perform SCell addition or modification as specified in 5.3.10.3b;

1> if the received `RRCConnectionReconfiguration` includes the `systemInformationBlockType1Dedicated`:
   
   2> perform the actions upon reception of the `SystemInformationBlockType1` message as specified in 5.2.2.7;

1> perform the measurement related actions as specified in 5.5.6.1;

1> if the `RRCConnectionReconfiguration` message includes the `measConfig`:
   
   2> perform the measurement configuration procedure as specified in 5.5.2;

1> perform the measurement identity autonomous removal as specified in 5.5.2.2a;

1> release `reportProximityConfig` and clear any associated proximity status reporting timer;
1> if the `RRCConnectionReconfiguration` message includes the `otherConfig`:
   2> perform the other configuration procedure as specified in 5.3.10.9;

1> if the `RRCConnectionReconfiguration` message includes the `sl-DiscConfig` or `sl-CommConfig`:
   2> perform the sidelink dedicated configuration procedure as specified in 5.3.10.15;

1> if the `RRCConnectionReconfiguration` message includes `wlan-OffloadInfo`:
   2> perform the dedicated WLAN offload configuration procedure as specified in 5.6.12.2;

1> release the LWA configuration, if configured, as described in 5.6.14.3;

1> release the LWIP configuration, if configured, as described in 5.6.17.3;

1> if the `RRCConnectionReconfiguration` message includes `rclwi-Configuration`:
   2> perform the WLAN traffic steering command procedure as specified in 5.6.16.2;

1> if the `RRCConnectionReconfiguration` message includes `lwa-Configuration`:
   2> perform the LWA configuration procedure as specified in 5.6.14.2;

1> if the `RRCConnectionReconfiguration` message includes `lwip-Configuration`:
   2> perform the LWIP reconfiguration procedure as specified in 5.6.17.2;

1> set the content of `RRCConnectionReconfigurationComplete` message as follows:

   2> if the UE has radio link failure or handover failure information available in `VarRLF-Report` and if the RPLMN is included in `plmn-IdentityList` stored in `VarRLF-Report`:
      3> include `rlf-InfoAvailable`;

   2> if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in `plmn-IdentityList` stored in `VarLogMeasReport` and if T330 is not running:
      3> include `logMeasAvailableMBSFN`;

   3> include `logMeasAvailable`;

   2> else if the UE has logged measurements available for E-UTRA and if the RPLMN is included in `plmn-IdentityList` stored in `VarLogMeasReport`:

   3> include `connEstFailInfoAvailable`;

1> submit the `RRCConnectionReconfigurationComplete` message to lower layers for transmission;

1> if MAC successfully completes the random access procedure:

   2> stop timer T304;

   2> apply the parts of the CQI reporting configuration, the scheduling request configuration and the sounding RS configuration that do not require the UE to know the SFN of the target PCell, if any;

   2> apply the parts of the measurement and the radio resource configuration that require the UE to know the SFN of the target PCell (e.g. measurement gaps, periodic CQI reporting, scheduling request configuration, sounding RS configuration), if any, upon acquiring the SFN of the target PCell;

NOTE 3: Whenever the UE shall setup or reconfigure a configuration in accordance with a field that is received it applies the new configuration, except for the cases addressed by the above statements.

   2> if the UE is configured to provide IDC indications:
if the UE has transmitted an **InDeviceCoexIndication** message during the last 1 second preceding reception of the **RRCConnectionReconfiguration** message including **mobilityControlInfo**:

4> initiate transmission of the **InDeviceCoexIndication** message in accordance with 5.6.9.3;

2> if the UE is configured to provide power preference indications:

3> if the UE has transmitted a **UEAssistanceInformation** message during the last 1 second preceding reception of the **RRCConnectionReconfiguration** message including **mobilityControlInfo**:

4> initiate transmission of the **UEAssistanceInformation** message in accordance with 5.6.10.3;

2> if **SystemInformationBlockType15** is broadcast by the PCell:

3> if the UE has transmitted a **MBMSInterestIndication** message during the last 1 second preceding reception of the **RRCConnectionReconfiguration** message including **mobilityControlInfo**:

4> ensure having a valid version of **SystemInformationBlockType15** for the PCell;

4> determine the set of MBMS frequencies of interest in accordance with 5.8.5.3;

4> determine the set of MBMS services of interest in accordance with 5.8.5.3a;

4> initiate transmission of the **MBMSInterestIndication** message in accordance with 5.8.5.4;

2> if **SystemInformationBlockType18** is broadcast by the target PCell; and the UE transmitted a **SidelinkUEInformation** message indicating a change of sidelink communication related parameters relevant in target PCell (i.e. change of **commRxInterestedFreq** or **commTxResourceReq**, **commTxResourceReqUC** if **SystemInformationBlockType18** includes **commTxResourceUC-ReqAllowed** or **commTxResourceInfoReqRelay** if PCell broadcasts **SystemInformationBlockType19** including **discConfigRelay**) during the last 1 second preceding reception of the **RRCConnectionReconfiguration** message including **mobilityControlInfo**; or

2> if **SystemInformationBlockType19** is broadcast by the target PCell; and the UE transmitted a **SidelinkUEInformation** message indicating a change of sidelink discovery related parameters relevant in target PCell (i.e. change of **discRxInterest** or **discTxResourceReq**, **discTxResourceReqPS** if **SystemInformationBlockType19** includes **discConfigPS** or **discRxGapReq** or **discTxGapReq** if the UE is configured with **gapRequestsAllowedDedicated** set to true or if the UE is not configured with **gapRequestsAllowedDedicated** and **SystemInformationBlockType19** includes **gapRequestsAllowedCommon**) during the last 1 second preceding reception of the **RRCConnectionReconfiguration** message including **mobilityControlInfo**;

3> initiate transmission of the **SidelinkUEInformation** message in accordance with 5.10.2.3;

2> the procedure ends;

NOTE 4: The UE is not required to determine the SFN of the target PCell by acquiring system information from that cell before performing RACH access in the target PCell, except for BL UEs or UEs in CE.

### 5.3.5.5 Reconfiguration failure

The UE shall:

1> if the UE is unable to comply with (part of) the configuration included in the **RRCConnectionReconfiguration** message:

2> continue using the configuration used prior to the reception of **RRCConnectionReconfiguration** message;

2> if security has not been activated:

3> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause other;

2> else:

3> initiate the connection re-establishment procedure as specified in 5.3.7, upon which the connection reconfiguration procedure ends;
NOTE 1: The UE may apply above failure handling also in case the `RRCConnectionReconfiguration` message causes a protocol error for which the generic error handling as defined in 5.7 specifies that the UE shall ignore the message.

NOTE 2: If the UE is unable to comply with part of the configuration, it does not apply any part of the configuration, i.e. there is no partial success/failure.

5.3.5.6 T304 expiry (handover failure)

The UE shall:

1> if T304 expires (handover failure):

   NOTE 1: Following T304 expiry any dedicated preamble, if provided within the `rach-ConfigDedicated`, is not available for use by the UE anymore.

2> revert back to the configuration used in the source PCell, excluding the configuration configured by the `physicalConfigDedicated`, the `mac-MainConfig` and the `sps-Config`;

2> store the following handover failure information in `VarRLF-Report` by setting its fields as follows:

3> clear the information included in `VarRLF-Report`, if any;

3> set the `plmn-IdentityList` to include the list of EPLMNs stored by the UE (i.e. includes the RPLMN);

3> set the `measResultLastServCell` to include the RSRP and RSRQ, if available, of the source PCell based on measurements collected up to the moment the UE detected handover failure and in accordance with the following:

4> if the UE includes `rsrqResult`, include the `lastServCellRSRQ-Type`;

3> set the `measResultNeighCells` to include the best measured cells, other than the source PCell, ordered such that the best cell is listed first, and based on measurements collected up to the moment the UE detected handover failure, and set its fields as follows;

4> if the UE was configured to perform measurements for one or more EUTRA frequencies, include the `measResultListEUTRA`;

4> if the UE includes `rsrqResult`, include the `rsrq-Type`;

4> if the UE was configured to perform measurement reporting for one or more neighbouring UTRA frequencies, include the `measResultListUTRA`;

4> if the UE was configured to perform measurement reporting for one or more neighbouring GERAN frequencies, include the `measResultListGERAN`;

4> if the UE was configured to perform measurement reporting for one or more neighbouring CDMA2000 frequencies, include the `measResultsCDMA2000`;

4> for each neighbour cell included, include the optional fields that are available;

NOTE 2: The measured quantities are filtered by the L3 filter as configured in the mobility measurement configuration. The measurements are based on the time domain measurement resource restriction, if configured. Blacklisted cells are not required to be reported.

3> if detailed location information is available, set the content of the `locationInfo` as follows:

4> include the `locationCoordinates`;

4> include the `horizontalVelocity`, if available;

3> set the `failedPCellId` to the global cell identity, if available, and otherwise to the physical cell identity and carrier frequency of the target PCell of the failed handover;

3> include `previousPCellId` and set it to the global cell identity of the PCell where the last `RRCConnectionReconfiguration` message including `mobilityControlInfo` was received;
3> set the `timeConnFailure` to the elapsed time since reception of the last `RRCConnectionReconfiguration` message including the `mobilityControlInfo`;

3> set the `connectionFailureType` to 'hof';

3> set the `c-RNTI` to the C-RNTI used in the source PCell;

2> initiate the connection re-establishment procedure as specified in 5.3.7, upon which the RRC connection reconfiguration procedure ends;

The UE may discard the handover failure information, i.e. release the UE variable `VarRLF-Report`, 48 hours after the failure is detected, upon power off or upon detach.

NOTE 3: E-UTRAN may retrieve the handover failure information using the UE information procedure with `rlf-ReportReq` set to `true`, as specified in 5.6.5.3.

5.3.5.7 Void

5.3.5.7a T307 expiry (SCG change failure)

The UE shall:

1> if T307 expires:

NOTE 1: Following T307 expiry any dedicated preamble, if provided within the `rach-ConfigDedicatedSCG`, is not available for use by the UE anymore.

2> initiate the SCG failure information procedure as specified in 5.6.13 to report SCG change failure;

5.3.5.8 Radio Configuration involving full configuration option

The UE shall:

1> release/ clear all current dedicated radio configurations except the MCG C-RNTI, the MCG security configuration and the PDCP, RLC, logical channel configurations for the RBs and the logged measurement configuration;

NOTE 1: Radio configuration is not just the resource configuration but includes other configurations like `MeasConfig` and `OtherConfig`.

1> if the `RRCConnectionReconfiguration` message includes the `mobilityControlInfo`:

2> release/ clear all current common radio configurations;

2> use the default values specified in 9.2.5 for timer T310, T311 and constant N310, N311;

1> else:

2> use values for timers T301, T310, T311 and constants N310, N311, as included in `ue-TimersAndConstants` received in `SystemInformationBlockType2`;

1> apply the default physical channel configuration as specified in 9.2.4;

1> apply the default semi-persistent scheduling configuration as specified in 9.2.3;

1> apply the default MAC main configuration as specified in 9.2.2;

1> if the UE is a NB-IoT UE; or

1> for each `srb-Identity` value included in the `srb-ToAddModList` (SRB reconfiguration):

2> apply the specified configuration defined in 9.1.2 for the corresponding SRB;

2> apply the corresponding default RLC configuration for the SRB specified in 9.2.1.1 for SRB1 or in 9.2.1.2 for SRB2;
2> apply the corresponding default logical channel configuration for the SRB as specified in 9.2.1.1 for SRB1 or in 9.2.1.2 for SRB2;

NOTE 2: This is to get the SRBs (SRB1 and SRB2 for handover and SRB2 for reconfiguration after reestablishment) to a known state from which the reconfiguration message can do further configuration.

1> for each eps-BearerIdentity value included in the drb-ToAddModList that is part of the current UE configuration:
2> release the PDCP entity;
2> release the RLC entity or entities;
2> release the DTCH logical channel;
2> release the drb-identity;

NOTE 3: This will retain the eps-bearerIdentity but remove the DRBs including drb-identity of these bearers from the current UE configuration and trigger the setup of the DRBs within the AS in Section 5.3.10.3 using the new configuration. The eps-bearerIdentity acts as the anchor for associating the released and re-setup DRB. In the AS the DRB re-setup is equivalent with a new DRB setup (including new PDCP and logical channel configurations).

1> for each eps-BearerIdentity value that is part of the current UE configuration but not part of the drb-ToAddModList:
2> perform DRB release as specified in 5.3.10.2;

5.3.6 Counter check

5.3.6.1 General

![Diagram](image)

Figure 5.3.6.1-1: Counter check procedure

The counter check procedure is used by E-UTRAN to request the UE to verify the amount of data sent/received on each DRB. More specifically, the UE is requested to check if, for each DRB, the most significant bits of the COUNT match with the values indicated by E-UTRAN.

NOTE: The procedure enables E-UTRAN to detect packet insertion by an intruder (a 'man in the middle').

5.3.6.2 Initiation

E-UTRAN initiates the procedure by sending a CounterCheck message.

NOTE: E-UTRAN may initiate the procedure when any of the COUNT values reaches a specific value.

5.3.6.3 Reception of the CounterCheck message by the UE

Upon receiving the CounterCheck message, the UE shall:
for each DRB that is established:
2> if no COUNT exists for a given direction (uplink or downlink) because it is a uni-directional bearer configured only for the other direction:
3> assume the COUNT value to be 0 for the unused direction;
2> if the \textit{drb-Identity} is not included in the \textit{drb-CountMSB-InfoList}:
3> include the DRB in the \textit{drb-CountInfoList} in the \textit{CounterCheckResponse} message by including the \textit{drb-Identity}, the \textit{count-Uplink} and the \textit{count-Downlink} set to the value of the corresponding COUNT;
2> else if, for at least one direction, the most significant bits of the COUNT are different from the value indicated in the \textit{drb-CountMSB-InfoList}:
3> include the DRB in the \textit{drb-CountInfoList} in the \textit{CounterCheckResponse} message by including the \textit{drb-Identity}, the \textit{count-Uplink} and the \textit{count-Downlink} set to the value of the corresponding COUNT;
1> for each DRB that is included in the \textit{drb-CountMSB-InfoList} in the \textit{CounterCheck} message that is not established:
2> include the DRB in the \textit{drb-CountInfoList} in the \textit{CounterCheckResponse} message by including the \textit{drb-Identity}, the \textit{count-Uplink} and the \textit{count-Downlink} with the most significant bits set identical to the corresponding values in the \textit{drb-CountMSB-InfoList} and the least significant bits set to zero;
1> submit the \textit{CounterCheckResponse} message to lower layers for transmission upon which the procedure ends;

5.3.7 RRC connection re-establishment

5.3.7.1 General

![Diagram of RRC connection re-establishment](image)

Figure 5.3.7.1-1: RRC connection re-establishment, successful

![Diagram of RRC connection re-establishment](image)

Figure 5.3.7.1-2: RRC connection re-establishment, failure
The purpose of this procedure is to re-establish the RRC connection, which involves the resumption of SRB1 operation, the re-activation of security and the configuration of only the PCell.

A UE in RRC_CONNECTED, for which security has been activated, may initiate the procedure in order to continue the RRC connection. The connection re-establishment succeeds only if the concerned cell is prepared i.e. has a valid UE context. In case E-UTRAN accepts the re-establishment, SRB1 operation resumes while the operation of other radio bearers remains suspended. If AS security has not been activated, the UE does not initiate the procedure but instead moves to RRC_IDLE directly.

E-UTRAN applies the procedure as follows:
- to reconfigure SRB1 and to resume data transfer only for this RB;
- to re-activate AS security without changing algorithms.

5.3.7.2 Initiation

The UE shall only initiate the procedure when AS security has been activated. The UE initiates the procedure when one of the following conditions is met:

1. upon detecting radio link failure, in accordance with 5.3.11; or
2. upon handover failure, in accordance with 5.3.5.6; or
3. upon mobility from E-UTRA failure, in accordance with 5.4.3.5; or
4. upon integrity check failure indication from lower layers; or
5. upon an RRC connection reconfiguration failure, in accordance with 5.3.5.5;

Upon initiation of the procedure, the UE shall:

1. stop timer T310, if running;
2. stop timer T312, if running;
3. stop timer T313, if running;
4. stop timer T307, if running;
5. start timer T311;
6. stop timer T370, if running;
7. suspend all RBs except SRB0;
8. reset MAC;
9. release the MCG SCell(s), if configured, in accordance with 5.3.10.3a;
10. apply the default physical channel configuration as specified in 9.2.4;
11. except for NB-IoT, for the MCG, apply the default semi-persistent scheduling configuration as specified in 9.2.3;
12. for the MCG, apply the default MAC main configuration as specified in 9.2.2;
13. release **powerPrefIndicationConfig**, if configured and stop timer T340, if running;
14. release **reportProximityConfig**, if configured and clear any associated proximity status reporting timer;
15. release **obtainLocationConfig**, if configured;
16. release **idc-Config**, if configured;
17. release **measSubframePatternPCell**, if configured;
5.3.7.3 Actions following cell selection while T311 is running

Upon selecting a suitable E-UTRA cell, the UE shall:

1> stop timer T311;
1> start timer T301;
1> apply the timeAlignmentTimerCommon included in SystemInformationBlockType2;
1> initiate transmission of the RRCConnectionReestablishmentRequest message in accordance with 5.3.7.4;

NOTE: This procedure applies also if the UE returns to the source PCell.

Upon selecting an inter-RAT cell, the UE shall:

1> if the selected cell is a UTRA cell, and if the UE supports Radio Link Failure Report for Inter-RAT MRO, include selectedUTRA-CellId in the VarRLF-Report and set it to the physical cell identity and carrier frequency of the selected UTRA cell;

1> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'RRC connection failure';

5.3.7.4 Actions related to transmission of RRCConnectionReestablishmentRequest message

Except for NB-IoT, if the procedure was initiated due to radio link failure or handover failure, the UE shall:

1> set the reestablishmentCellId in the VarRLF-Report to the global cell identity of the selected cell;

The UE shall set the contents of RRCConnectionReestablishmentRequest message as follows:

1> set the ue-Identity as follows:

2> set the c-RNTI to the C-RNTI used in the source PCell (handover and mobility from E-UTRA failure) or used in the PCell in which the trigger for the re-establishment occurred (other cases);

2> set the physCellId to the physical cell identity of the source PCell (handover and mobility from E-UTRA failure) or of the PCell in which the trigger for the re-establishment occurred (other cases);

2> set the shortMAC-I to the 16 least significant bits of the MAC-I calculated:

3> over the ASN.1 encoded as per section 8 (i.e., a multiple of 8 bits) VarShortMAC-Input (or VarShortMAC-Input-NB in NB-IoT);

3> with the K_{RRCint} key and integrity protection algorithm that was used in the source PCell (handover and mobility from E-UTRA failure) or of the PCell in which the trigger for the re-establishment occurred (other cases); and

3> with all input bits for COUNT, BEARER and DIRECTION set to binary ones;

1> set the reestablishmentCause as follows:
2> if the re-establishment procedure was initiated due to reconfiguration failure as specified in 5.3.5.5 (the UE is unable to comply with the reconfiguration):

3> set the reestablishmentCause to the value reconfigurationFailure;

2> else if the re-establishment procedure was initiated due to handover failure as specified in 5.3.5.6 (intra-LTE handover failure) or 5.4.3.5 (inter-RAT mobility from EUTRA failure):

3> set the reestablishmentCause to the value handoverFailure;

2> else:

3> set the reestablishmentCause to the value otherFailure;

The UE shall submit the RRCConnectionReestablishmentRequest message to lower layers for transmission.

5.3.7.5 Reception of the RRCConnectionReestablishment by the UE

NOTE 1: Prior to this, lower layer signalling is used to allocate a C-RNTI. For further details see TS 36.321 [6];

The UE shall:

1> stop timer T301;

1> consider the current cell to be the PCell;

1> re-establish PDCP for SRB1;

1> re-establish RLC for SRB1;

1> perform the radio resource configuration procedure in accordance with the received radioResourceConfigDedicated and as specified in 5.3.10;

1> resume SRB1;

NOTE 2: E-UTRAN should not transmit any message on SRB1 prior to receiving the RRCConnectionReestablishmentComplete message.

1> update the K_{ENB} key based on the K_{ASME} key to which the current K_{ENB} is associated, using the nextHopChainingCount value indicated in the RRCConnectionReestablishment message, as specified in TS 33.401 [32];

1> store the nextHopChainingCount value;

1> derive the K_{RRCint} key associated with the previously configured integrity algorithm, as specified in TS 33.401 [32];

1> derive the K_{UPint} key associated with the previously configured ciphering algorithm, as specified in TS 33.401 [32];

1> if connected as an RN:

2> derive the K_{UPint} key associated with the previously configured integrity algorithm, as specified in TS 33.401 [32];

1> configure lower layers to activate integrity protection using the previously configured algorithm and the K_{RRCint} key immediately, i.e., integrity protection shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

1> if connected as an RN:

2> configure lower layers to apply integrity protection using the previously configured algorithm and the K_{UPint} key, for subsequently resumed or subsequently established DRBs that are configured to apply integrity protection, if any;
1> configure lower layers to apply ciphering using the previously configured algorithm, the $K_\text{RRCenc}$ key and the $K_\text{UPenc}$ key immediately, i.e., ciphering shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;

1> if the UE is not a NB-IoT UE:

2> set the content of $\text{RRConnectionReestablishmentComplete}$ message as follows:

3> if the UE has radio link failure or handover failure information available in $\text{VarRLF-Report}$ and if the RPLMN is included in $\text{plmn-IdentityList}$ stored in $\text{VarRLF-Report}$:

4> include the $\text{rlf-InfoAvailable}$;

3> if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in $\text{plmn-IdentityList}$ stored in $\text{VarLogMeasReport}$ and if T330 is not running:

4> include $\text{logMeasAvailableMBSFN}$;

3> else if the UE has logged measurements available for E-UTRA and if the RPLMN is included in $\text{plmn-IdentityList}$ stored in $\text{VarLogMeasReport}$:

4> include the $\text{logMeasAvailable}$;

3> if the UE has connection establishment failure information available in $\text{VarConnEstFailReport}$ and if the RPLMN is equal to $\text{plmn-Identity}$ stored in $\text{VarConnEstFailReport}$:

4> include the $\text{connEstFailInfoAvailable}$;

2> perform the measurement related actions as specified in 5.5.6.1;

2> perform the measurement identity autonomous removal as specified in 5.5.2.2a;

1> submit the $\text{RRConnectionReestablishmentComplete}$ message to lower layers for transmission;

1> if $\text{SystemInformationBlockType15}$ is broadcast by the PCell:

2> if the UE has transmitted an $\text{MBMSInterestIndication}$ message during the last 1 second preceding detection of radio link failure:

3> determine the set of MBMS frequencies of interest in accordance with 5.8.5.3;

3> determine the set of MBMS services of interest in accordance with 5.8.5.3a;

3> initiate transmission of the $\text{MBMSInterestIndication}$ message in accordance with 5.8.5.4;

1> if $\text{SystemInformationBlockType18}$ is broadcast by the PCell; and the UE transmitted a $\text{SidelinkUEInformation}$ message indicating a change of sidelink communication related parameters relevant in PCell (i.e. change of $\text{commRxInterestedFreq}$ or $\text{commTxResourceReq}$, $\text{commTxResourceReqUC}$ if $\text{SystemInformationBlockType18}$ includes $\text{commTxResourceUC-ReqAllowed}$ or $\text{commTxResourceInfoReqRelay}$ if PCell broadcasts $\text{SystemInformationBlockType19}$ including $\text{discConfigRelay}$) during the last 1 second preceding detection of radio link failure; or

1> if $\text{SystemInformationBlockType19}$ is broadcast by the PCell; and the UE transmitted a $\text{SidelinkUEInformation}$ message indicating a change of sidelink discovery related parameters relevant in PCell (i.e. change of $\text{discRxInterest}$ or $\text{discTxResourceReq}$, $\text{discTxResourceReqPS}$ if $\text{SystemInformationBlockType19}$ includes $\text{discConfigPS}$ or $\text{discRxGapReq}$ or $\text{discTxGapReq}$ if the UE is configured with $\text{gapRequestsAllowedDedicated}$ set to true or if the UE is not configured with $\text{gapRequestsAllowedDedicated}$ and $\text{SystemInformationBlockType19}$ includes $\text{gapRequestsAllowedCommon}$) during the last 1 second preceding detection of radio link failure:

2> initiate transmission of the $\text{SidelinkUEInformation}$ message in accordance with 5.10.2.3;

1> the procedure ends;
5.3.7.6 T311 expiry

Upon T311 expiry, the UE shall:

1> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'RRC connection failure';

5.3.7.7 T301 expiry or selected cell no longer suitable

The UE shall:

1> if timer T301 expires; or

1> if the selected cell becomes no longer suitable according to the cell selection criteria as specified in TS 36.304 [4]:

2> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'RRC connection failure';

5.3.7.8 Reception of RRCConnectionReestablishmentReject by the UE

Upon receiving the RRCConnectionReestablishmentReject message, the UE shall:

1> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'RRC connection failure';

5.3.8 RRC connection release

5.3.8.1 General

![Diagram](image)

Figure 5.3.8.1-1: RRC connection release, successful

The purpose of this procedure is:

- to release the RRC connection, which includes the release of the established radio bearers as well as all radio resources;

or:

- to suspend the RRC connection, which includes the suspension of the established radio bearers.

5.3.8.2 Initiation

E-UTRAN initiates the RRC connection release procedure to a UE in RRC_CONNECTED.

5.3.8.3 Reception of the RRCConnectionRelease by the UE

The UE shall:

1> delay the following actions defined in this sub-clause 60 ms from the moment the RRCConnectionRelease message was received or optionally when lower layers indicate that the receipt of the RRCConnectionRelease message has been successfully acknowledged, whichever is earlier;

1> if the RRCConnectionRelease message includes the idleModeMobilityControlInfo:
store the cell reselection priority information provided by the idleModeMobilityControlInfo;

if the t320 is included:

start timer T320, with the timer value set according to the value of t320;

else:

apply the cell reselection priority information broadcast in the system information;

if the releaseCause received in the RRCConnectionRelease message indicates loadBalancingTAURequired:

perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'load balancing TAU required';

else if the releaseCause received in the RRCConnectionRelease message indicates cs-FallbackHighPriority:

perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'CS Fallback High Priority';

else:

if the extendedWaitTime is present; and

if the UE supports delay tolerant access or the UE is a NB-IoT UE:

forward the extendedWaitTime to upper layers;

if the releaseCause received in the RRCConnectionRelease message indicates rrc-Suspend:

perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause "RRC suspension";

else:

perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'other';

5.3.8.4 T320 expiry
The UE shall:

if T320 expires:

if stored, discard the cell reselection priority information provided by the idleModeMobilityControlInfo or inherited from another RAT;

apply the cell reselection priority information broadcast in the system information;

5.3.9 RRC connection release requested by upper layers

5.3.9.1 General

The purpose of this procedure is to release the RRC connection. Access to the current PCell may be barred as a result of this procedure.

NOTE: Upper layers invoke the procedure, e.g. upon determining that the network has failed an authentication check, see TS 24.301 [35].

5.3.9.2 Initiation

The UE initiates the procedure when upper layers request the release of the RRC connection. The UE shall not initiate the procedure for power saving purposes.

The UE shall:

if the upper layers indicate barring of the PCell:
2> treat the PCell used prior to entering RRC_IDLE as barred according to TS 36.304 [4];
1> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'other';

5.3.10 Radio resource configuration

5.3.10.0 General

The UE shall:

1> if the received radioResourceConfigDedicated includes the srb-ToAddModList:
   2> perform the SRB addition or reconfiguration as specified in 5.3.10.1;
1> if the received radioResourceConfigDedicated includes the drb-ToReleaseList:
   2> perform DRB release as specified in 5.3.10.2;
1> if the received radioResourceConfigDedicated includes the drb-ToAddModList:
   2> perform DRB addition or reconfiguration as specified in 5.3.10.3;
1> if the received radioResourceConfigDedicated includes the mac-MainConfig:
   2> perform MAC main reconfiguration as specified in 5.3.10.4;
1> if the received radioResourceConfigDedicated includes sps-Config:
   2> perform SPS reconfiguration according to 5.3.10.5;
1> if the received radioResourceConfigDedicated includes the physicalConfigDedicated:
   2> reconfigure the physical channel configuration as specified in 5.3.10.6.
1> if the received radioResourceConfigDedicated includes the rlf-TimersAndConstants:
   2> reconfigure the values of timers and constants as specified in 5.3.10.7;
1> if the received radioResourceConfigDedicated includes the measSubframePatternPCell:
   2> reconfigure the time domain measurement resource restriction for the serving cell as specified in 5.3.10.8;
1> if the received radioResourceConfigDedicated includes the naics-Info:
   2> perform NAICS neighbour cell information reconfiguration for the PCell as specified in 5.3.10.13;
1> if the received RadioResourceConfigDedicatedPSCell includes the naics-Info:
   2> perform NAICS neighbour cell information reconfiguration for the PSCell as specified in 5.3.10.13;
1> if the received RadioResourceConfigDedicatedSCell-r10 includes the naics-Info:
   2> perform NAICS neighbour cell information reconfiguration for the SCell as specified in 5.3.10.13;

5.3.10.1 SRB addition/ modification

The UE shall:

1> if the UE is a NB-IoT UE and SRB1 is not established; or
1> for each srb-Identity value included in the srb-ToAddModList that is not part of the current UE configuration (SRB establishment):
   2> if the UE is not a NB-IoT UE that only supports the Control Plane CIoT EPS optimisation:
3> apply the specified configuration defined in 9.1.2 for the corresponding SRB;
3> establish a PDCP entity and configure it with the current (MCG) security configuration, if applicable;
3> establish an (MCG) RLC entity in accordance with the received rlc-Config;
3> establish a (MCG) DCCH logical channel in accordance with the received logicalChannelConfig and with the logical channel identity set in accordance with 9.1.2;

2> if the UE is a NB-IoT UE:

3> apply the specified configuration defined in 9.1.2 for SRB1bis;
3> establish an (MCG) RLC entity in accordance with the received rlc-Config;
3> establish a (MCG) DCCH logical channel in accordance with the received logicalChannelConfig and with the logical channel identity set in accordance with 9.1.2.1a;

1> if the UE is a NB-IoT UE and SRB1 is established; or

1> for each srb-Identity value included in the srb-ToAddModList that is part of the current UE configuration (SRB reconfiguration):

2> reconfigure the RLC entity in accordance with the received rlc-Config;
2> reconfigure the DCCH logical channel in accordance with the received logicalChannelConfig;

5.3.10.2 DRB release

The UE shall:

1> for each drb-Identity value included in the drb-ToReleaseList that is part of the current UE configuration (DRB release); or

1> for each drb-identity value that is to be released as the result of full configuration option according to 5.3.5.8:

2> release the PDCP entity;
2> release the RLC entity or entities;
2> release the DTCH logical channel;

1> if the procedure was triggered due to handover:

2> indicate the release of the DRB(s) and the eps-BearerIdentity of the released DRB(s) to upper layers after successful handover;

1> else:

2> indicate the release of the DRB(s) and the eps-BearerIdentity of the released DRB(s) to upper layers immediately.

NOTE: The UE does not consider the message as erroneous if the drb-ToReleaseList includes any drb-Identity value that is not part of the current UE configuration.

5.3.10.3 DRB addition/ modification

The UE shall:

1> for each drb-Identity value included in the drb-ToAddModList that is not part of the current UE configuration (DRB establishment including the case when full configuration option is used):

2> if the concerned entry of drb-ToAddModList includes the drb-TypeLWA set to TRUE (i.e. add LWA DRB):

3> perform the LWA specific DRB addition or reconfiguration as specified in 5.3.10.3a2;

2> if the concerned entry of drb-ToAddModList includes the drb-TypeLWIP (i.e. add LWIP DRB):
3> perform LWIP specific DRB addition or reconfiguration as specified in 5.3.10.3a3;
   2> else if \texttt{drb-ToAddModListSCG} is not received or does not include the \texttt{drb-Identity} value (i.e. add MCG DRB);

3> establish a PDCP entity and configure it with the current MCG security configuration and in accordance with the received \texttt{pdcp-Config};

3> establish an MCG RLC entity or entities in accordance with the received \texttt{rlc-Config};

3> establish an MCG DTCH logical channel in accordance with the received \texttt{logicalChannelIdentity} and the received \texttt{logicalChannelConfig};
   2> if the \texttt{RRConnectionReconfiguration} message includes the \texttt{fullConfig} IE:

3> associate the established DRB with corresponding included \texttt{eps-BearerIdentity};
   2> else:

3> indicate the establishment of the DRB(s) and the \texttt{eps-BearerIdentity} of the established DRB(s) to upper layers;
   1> for each \texttt{drb-Identity} value included in the \texttt{drb-ToAddModList} that is part of the current UE configuration (DRB reconfiguration);
   2> if the DRB indicated by \texttt{drb-Identity} is an LWA DRB (i.e. LWA to LTE only or reconfigure LWA DRB):

3> perform the LWA specific DRB reconfiguration as specified in 5.3.10.3a2;
   2> else if the concerned entry of \texttt{drb-ToAddModList} includes the \texttt{drb-TypeLWA} set to \texttt{TRUE} (i.e. LTE only to LWA DRB);

3> perform the LWA specific DRB reconfiguration as specified in 5.3.10.3a2;
   2> if the concerned entry of \texttt{drb-ToAddModList} includes the \texttt{drb-TypeLWIP} (i.e. add or reconfigure LWIP DRB);

3> perform LWIP specific DRB addition or reconfiguration as specified in 5.3.10.3a3;
   2> if \texttt{drb-ToAddModListSCG} is not received or does not include the \texttt{drb-Identity} value:

3> if the DRB indicated by \texttt{drb-Identity} is an MCG DRB (reconfigure MCG):
   4> if the \texttt{pdcp-Config} is included:
      5> reconfigure the PDCP entity in accordance with the received \texttt{pdcp-Config};
   4> if the \texttt{rlc-Config} is included:
      5> reconfigure the RLC entity or entities in accordance with the received \texttt{rlc-Config};
   4> if the \texttt{logicalChannelConfig} is included:
      5> reconfigure the DTCH logical channel in accordance with the received \texttt{logicalChannelConfig};

NOTE: Removal and addition of the same \texttt{drb-Identity} in a single \texttt{radioResourceConfigDedicated} is not supported. In case \texttt{drb-Identity} is removed and added due to handover or re-establishment with the full configuration option, the eNB can use the same value of \texttt{drb-Identity}.

### 5.3.10.3a1 DC specific DRB addition or reconfiguration

For the \texttt{drb-Identity} value for which this procedure is initiated, the UE shall:

1> if \texttt{drb-ToAddModListSCG} is received and includes the \texttt{drb-Identity} value; and \texttt{drb-Identity} value is not part of the current UE configuration (i.e. DC specific DRB establishment):
   2> if \texttt{drb-ToAddModList} is received and includes the \texttt{drb-Identity} value (i.e. add split DRB):
3> establish a PDCP entity and configure it with the current MCG security configuration and in accordance with the pdcp-Config included in drb-ToAddModList;

3> establish an MCG RLC entity and an MCG DTCH logical channel in accordance with the rlc-Config, logicalChannelIdentity and logicalChannelConfig included in drb-ToAddModList;

3> establish an SCG RLC entity and an SCG DTCH logical channel in accordance with the rlc-ConfigSCG, logicalChannelIdentitySCG and logicalChannelConfigSCG included in drb-ToAddModListSCG;

2> else (i.e. add SCG DRB):

3> establish a PDCP entity and configure it with the current SCG security configuration and in accordance with the pdcp-Config included in drb-ToAddModListSCG;

3> establish an SCG RLC entity or entities and an SCG DTCH logical channel in accordance with the rlc-ConfigSCG, logicalChannelIdentitySCG and logicalChannelConfigSCG included in drb-ToAddModListSCG;

2> indicate the establishment of the DRB(s) and the eps-BearerIdentity of the established DRB(s) to upper layers;

1> else (i.e. DC specific DRB modification; drb-ToAddModList and/or drb-ToAddModListSCG received):

2> if the DRB indicated by drb-Identity is a split DRB:

3> if drb-ToAddModList is received and includes the drb-Identity value, while for this entry drb-TypeChange is included and set to toMCG (i.e. split to MCG):

4> release the SCG RLC entity and the SCG DTCH logical channel;

4> reconfigure the PDCP entity in accordance with the pdcp-Config, if included in drb-ToAddModList;

4> reconfigure the MCG RLC entity and/ or the MCG DTCH logical channel in accordance with the rlc-Config and logicalChannelConfig, if included in drb-ToAddModList;

3> else (i.e. reconfigure split):

4> reconfigure the PDCP entity in accordance with the pdcp-Config, if included in drb-ToAddModList;

4> reconfigure the MCG RLC entity and/ or the MCG DTCH logical channel in accordance with the rlc-Config and logicalChannelConfig, if included in drb-ToAddModList;

4> reconfigure the SCG RLC entity and/ or the SCG DTCH logical channel in accordance with the rlc-ConfigSCG and logicalChannelConfigSCG, if included in drb-ToAddModListSCG;

2> if the DRB indicated by drb-Identity is an SCG DRB:

3> if drb-ToAddModList is received and includes the drb-Identity value, while for this entry drb-TypeChange is included and set to toMCG (i.e. SCG to MCG):

4> reconfigure the PDCP entity with the current MCG security configuration and in accordance with the pdcp-Config, if included in drb-ToAddModList;

4> reconfigure the MCG RLC entity or entities and the MCG DTCH logical channel to be an MCG RLC entity or entities and an MCG DTCH logical channel;

4> reconfigure the SCG RLC entity or entities and/ or the SCG DTCH logical channel in accordance with the rlc-Config, logicalChannelIdentity and logicalChannelConfig, if included in drb-ToAddModList;

3> else (i.e. drb-ToAddModListSCG is received and includes the drb-Identity value i.e. reconfigure SCG):

4> reconfigure the PDCP entity in accordance with the pdcp-Config, if included in drb-ToAddModListSCG;

4> reconfigure the SCG RLC entity or entities and/ or the SCG DTCH logical channel in accordance with the rlc-ConfigSCG and logicalChannelConfigSCG, if included in drb-ToAddModListSCG;
if the DRB indicated by drb-Identity is an MCG DRB:

if drb-ToAddModListSCG is received and includes the drb-Identity value, while for this entry drb-Type is included and set to split (i.e. MCG to split):

1. reconfigure the PDCP entity in accordance with the pdcp-Config, if included in drb-ToAddModList;
2. reconfigure the MCG RLC entity and/or the MCG DTCH logical channel in accordance with the rlc-Config and logicalChannelConfig, if included in drb-ToAddModList;
3. establish an SCG RLC entity and an SCG DTCH logical channel in accordance with the rlc-ConfigSCG, logicalChannelIdentitySCG and logicalChannelConfigSCG, included in drb-ToAddModListSCG;

else (i.e. drb-Type is included and set to scg i.e. MCG to SCG):

1. reconfigure the PDCP entity with the current SCG security configuration and in accordance with the pdcp-Config, if included in drb-ToAddModListSCG;
2. reconfigure the MCG RLC entity or entities and the MCG DTCH logical channel to be an SCG RLC entity or entities and an SCG DTCH logical channel;
3. reconfigure the SCG RLC entity or entities and/or the SCG DTCH logical channel in accordance with the rlc-ConfigSCG, logicalChannelIdentitySCG and logicalChannelConfigSCG, if included in drb-ToAddModListSCG;

else (i.e. reconfigure LWA DRB):

1. reconfigure the PDCP entity in accordance with the pdcp-Config, if included in drb-ToAddModList;

5.3.10.3a2 LWA specific DRB addition or reconfiguration

For the drb-Identity value for which this procedure is initiated, the UE shall:

1. if the drb-Identity value is not part of the current UE configuration (i.e. add LWA DRB):
   1. establish a PDCP entity and configure it with the current security configuration and in accordance with the pdcp-Config included in drb-ToAddModList;
   2. establish an RLC entity and an DTCH logical channel in accordance with the rlc-Config, logicalChannelIdentity and logicalChannelConfig included in drb-ToAddModList;
   3. enable data handling for this DRB at the LWAAP entity;
   4. indicate the establishment of the DRB and the eps-BearerIdentity of the established DRB to upper layers;

else if the DRB indicated by drb-Identity is not an LWA DRB (i.e. LTE only to LWA DRB):

1. reconfigure the PDCP entity in accordance with the pdcp-Config, if included in drb-ToAddModList;
2. reconfigure the RLC entity and/or the DTCH logical channel in accordance with the rlc-Config and logicalChannelConfig, if included in drb-ToAddModList;
3. enable data handling for this DRB at the LWAAP entity;

else if the concerned entry of drb-ToAddModList includes the drb-TypeLWA set to FALSE (i.e. LWA to LTE only DRB):

1. reconfigure the PDCP entity in accordance with the pdcp-Config, if included in drb-ToAddModList;
2. reconfigure the RLC entity and/or the DTCH logical channel in accordance with the rlc-Config and logicalChannelConfig, if included in drb-ToAddModList;
3. perform PDCP data recovery as specified in TS 36.323 [8];
4. disable data handling for this DRB at the LWAAP entity;

else (i.e. reconfigure LWA DRB):

1. reconfigure the PDCP entity in accordance with the pdcp-Config, if included in drb-ToAddModList;
2> reconfigure the RLC entity and/or the DTCH logical channel in accordance with the rlc-Config and logicalChannelConfig, if included in drb-ToAddModList;

5.3.10.3a3  LWIP specific DRB addition or reconfiguration

For the drb-Identity value for which this procedure is initiated, the UE shall:

1> if the drb-TypeLWIP is set to lwip:
   2> indicate to higher layers to use LWIP resources in both UL and DL for the DRB associated with the drb-Identity;

1> if the drb-TypeLWIP is set to lwip-DL-only:
   2> indicate to higher layers to use LWIP resources in the DL only for the DRB associated with the drb-Identity;

1> if the drb-TypeLWIP is set to lwip-UL-only:
   2> indicate to higher layers to use LWIP resources in the UL only for the DRB associated with the drb-Identity;

1> if the drb-TypeLWIP is set to eutran:
   2> indicate to higher layers to stop using LWIP resources for the DRB associated with the drb-Identity;

5.3.10.3a  SCell release

The UE shall:

1> if the release is triggered by reception of the sCellToReleaseList or the sCellToReleaseListSCG:
   2> for each sCellIndex value included either in the sCellToReleaseList or in the sCellToReleaseListSCG:

3> if the current UE configuration includes an SCell with value sCellIndex:
   4> release the SCell;

1> if the release is triggered by RRC connection re-establishment:
   2> release all SCells that are part of the current UE configuration;

5.3.10.3b  SCell addition/ modification

The UE shall:

1> for each sCellIndex value included either in the sCellToAddModList or in the sCellToAddModListSCG that is not part of the current UE configuration (SCell addition):
   2> add the SCell, corresponding to the cellIdentification, in accordance with the radioResourceConfigCommonSCell and radioResourceConfigDedicatedSCell, both included either in the sCellToAddModList or in the sCellToAddModListSCG;
   2> configure lower layers to consider the SCell to be in deactivated state;
   2> for each measId included in the measIdList within VarMeasConfig:

3> if SCells are not applicable for the associated measurement; and

3> if the concerned SCell is included in cellsTriggeredList defined within the VarMeasReportList for this measId:
   4> remove the concerned SCell from cellsTriggeredList defined within the VarMeasReportList for this measId;

1> for each sCellIndex value included either in the sCellToAddModList or in the sCellToAddModListSCG that is part of the current UE configuration (SCell modification):
2> modify the SCell configuration in accordance with the radioResourceConfigDedicatedSCell, included either in the sCellToAddModList or in the sCellToAddModListSCG;

5.3.10.3c PSCell addition or modification

The UE shall:

1> if the PSCell is not part of the current UE configuration (i.e. PSCell addition):
   2> add the PSCell, corresponding to the cellIdentification, in accordance with the received radioResourceConfigCommonPSCell and radioResourceConfigDedicatedPSCell;
   2> configure lower layers to consider the PSCell to be in activated state;

1> if the PSCell is part of the current UE configuration (i.e. PSCell modification):
   2> modify the PSCell configuration in accordance with the received radioResourceConfigDedicatedPSCell;

5.3.10.4 MAC main reconfiguration

Except for NB-IoT, the UE shall:

1> if the procedure is triggered to perform SCG MAC main reconfiguration:
   2> if SCG MAC is not part of the current UE configuration (i.e. SCG establishment):
      3> create an SCG MAC entity;
      2> reconfigure the SCG MAC main configuration as specified in the following i.e. assuming it concerns the SCG MAC whenever MAC main configuration is referenced and that it is based on the received mac-MainConfigSCG instead of mac-MainConfig:
         1> reconfigure the MAC main configuration in accordance with the received mac-MainConfig other than stag-ToReleaseList and stag-ToAddModList;
      1> if the received mac-MainConfig includes the stag-ToReleaseList:
         2> for each STAG-Id value included in the stag-ToReleaseList that is part of the current UE configuration:
            3> release the STAG indicated by STAG-Id;
      1> if the received mac-MainConfig includes the stag-ToAddModList:
         2> for each stag-Id value included in stag-ToAddModList that is not part of the current UE configuration (STAG addition):
            3> add the STAG, corresponding to the stag-Id, in accordance with the received timeAlignmentTimerSTAG;
            2> for each stag-Id value included in stag-ToAddModList that is part of the current UE configuration (STAG modification):
               3> reconfigure the STAG, corresponding to the stag-Id, in accordance with the received timeAlignmentTimerSTAG;
      For NB-IoT, the UE shall:
      1> reconfigure the MAC main configuration in accordance with the received mac-MainConfig;

5.3.10.5 Semi-persistent scheduling reconfiguration

The UE shall:

1> reconfigure the semi-persistent scheduling in accordance with the received sps-Config;
5.3.10.6 Physical channel reconfiguration

Except for NB-IoT, the UE shall:

1> if the \textit{antennaInfo-r10} is included in the received \textit{physicalConfigDedicated} and the previous version of this field that was received by the UE was \textit{antennaInfo} (without suffix i.e. the version defined in REL-8):
   2> apply the default antenna configuration as specified in 9.2.4;

1> if the \textit{cqi-ReportConfig-r10} is included in the received \textit{physicalConfigDedicated} and the previous version of this field that was received by the UE was \textit{cqi-ReportConfig} (without suffix i.e. the version defined in REL-8):
   2> apply the default CQI reporting configuration as specified in 9.2.4;

\textbf{NOTE:} Application of the default configuration involves release of all extensions introduced in REL-9 and later.

1> reconfigure the physical channel configuration in accordance with the received \textit{physicalConfigDedicated};

1> if the \textit{antennaInfo} is included and set to \textit{explicitValue}:
   2> if the configured \textit{transmissionMode} is \textit{tm1}, \textit{tm2}, \textit{tm5}, \textit{tm6} or \textit{tm7}; or
   2> if the configured \textit{transmissionMode} is \textit{tm8} and \textit{pmi-RI-Report} is not present; or
   2> if the configured \textit{transmissionMode} is \textit{tm9} and \textit{pmi-RI-Report} is not present; or
   2> if the configured \textit{transmissionMode} is \textit{tm9} and \textit{pmi-RI-Report} is present and \textit{antennaPortsCount} within \textit{csi-RS} is set to \textit{an1}:
   3> release \textit{ri-ConfigIndex} in \textit{cqi-ReportPeriodic}, if previously configured;

1> else if the \textit{antennaInfo} is included and set to \textit{defaultValue}:
   2> release \textit{ri-ConfigIndex} in \textit{cqi-ReportPeriodic}, if previously configured;

For NB-IoT, the UE shall:

1> if the \textit{carrierConfigDedicated} is not included in the received \textit{physicalConfigDedicated}:
   2> if the UE is configured with a carrier configuration previously received in \textit{carrierConfigDedicated}:
   3> use the carrier configuration received in \textit{carrierConfigDedicated};

2> else:

3> use the carrier configuration received for the anchor carrier in the system information;

1> else:
   2> use the carrier configuration received in \textit{carrierConfigDedicated};

2> start to use the new carrier immediately after the last transport block carrying the RRC message has been acknowledged by the MAC layer, and any subsequent RRC response message sent for the current RRC procedure is therefore sent on the new carrier;

1> reconfigure the physical channel configuration in accordance with the received \textit{physicalConfigDedicated}.

5.3.10.7 Radio Link Failure Timers and Constants reconfiguration

The UE shall:

1> if the received \textit{rlf-TimersAndConstants} is set to release:
   2> use values for timers T301, T310, T311 and constants N310, N311, as included in \textit{ue-TimersAndConstants} received in \textit{SystemInformationBlockType2} (or \textit{SystemInformationBlockType2-NB} in NB-IoT);

1> else:
2> reconfigure the value of timers and constants in accordance with received rlf-TimersAndConstants;
1> if the received rlf-TimersAndConstantsSCG is set to release:
2> stop timer T313, if running, and
2> release the value of timer t313 as well as constants n313 and n314;
1> else:
2> reconfigure the value of timers and constants in accordance with received rlf-TimersAndConstantsSCG;

5.3.10.8 Time domain measurement resource restriction for serving cell

The UE shall:
1> if the received measSubframePatternPCell is set to release:
2> release the time domain measurement resource restriction for the PCell, if previously configured
1> else:
2> apply the time domain measurement resource restriction for the PCell in accordance with the received measSubframePatternPCell;

5.3.10.9 Other configuration

The UE shall:
1> if the received otherConfig includes the reportProximityConfig:
2> if proximityIndicationEUTRA is set to enabled:
3> consider itself to be configured to provide proximity indications for E-UTRA frequencies in accordance with 5.3.14;
2> else:
3> consider itself not to be configured to provide proximity indications for E-UTRA frequencies;
2> if proximityIndicationUTRA is set to enabled:
3> consider itself to be configured to provide proximity indications for UTRA frequencies in accordance with 5.3.14;
2> else:
3> consider itself not to be configured to provide proximity indications for UTRA frequencies;
1> if the received otherConfig includes the obtainLocation:
2> attempt to have detailed location information available for any subsequent measurement report;
NOTE: The UE is requested to attempt to have valid detailed location information available whenever sending a measurement report for which it is configured to include available detailed location information. The UE may not succeed e.g. because the user manually disabled the GPS hardware, due to no/poor satellite coverage. Further details, e.g. regarding when to activate GNSS, are up to UE implementation.
1> if the received otherConfig includes the idc-Config:
2> if idc-Indication is included (i.e. set to setup):
3> consider itself to be configured to provide IDC indications in accordance with 5.6.9;
3> if idc-Indication-UL-CA is included (i.e. set to setup):
4> consider itself to be configured to indicate UL CA related information in IDC indications in accordance with 5.6.9;
2> else:
3> consider itself not to be configured to provide IDC indications;

2> if autonomousDenialParameters is included:
3> consider itself to be allowed to deny any transmission in a particular UL subframe if during the number of subframes indicated by autonomousDenialValidity, preceeding and including this particular subframe, it autonomously denied fewer UL subframes than indicated by autonomousDenialSubframes;

2> else:
3> consider itself not to be allowed to deny any UL transmission;

1> if the received otherConfig includes the powerPrefIndicationConfig:

2> if powerPrefIndicationConfig is set to setup:
3> consider itself to be configured to provide power preference indications in accordance with 5.6.10;

2> else:
3> consider itself not to be configured to provide power preference indications;

5.3.10.10 SCG reconfiguration

The UE shall:

1> if the received scg-Configuration is set to release or includes the mobilityControlInfoSCG (i.e. SCG release/ change):

2> if mobilityControlInfo is not received (i.e. SCG release/ change without HO):
3> reset SCG MAC, if configured;

3> for each drb-Identity value that is part of the current UE configuration:

4> if the DRB indicated by drb-Identity is an SCG DRB:

5> re-establish the PDCP entity and the SCG RLC entity or entities;

4> if the DRB indicated by drb-Identity is a split DRB:

5> perform PDCP data recovery and re-establish the SCG RLC entity;

4> if the DRB indicated by drb-Identity is an MCG DRB; and

4> drb-ToAddModListSCG is received and includes the drb-Identity value, while for this entry drb-Type is included and set to scg (i.e. MCG to SCG):

5> re-establish the PDCP entity and the MCG RLC entity or entities;

3> configure lower layers to consider the SCG SCell(s), except for the PCell, to be in deactivated state;

1> if the received scg-Configuration is set to release:

2> release the entire SCG configuration, except for the DRB configuration (i.e. as configured by drb-ToAddModListSCG);

2> if the current UE configuration includes one or more split or SCG DRBs and the received RRCConnectionReconfiguration message includes radioResourceConfigDedicated including drb-ToAddModList:

3> reconfigure the SCG or split DRB by drb-ToAddModList as specified in 5.3.10.12;

2> stop timer T313, if running;
2> stop timer T307, if running;
1> else:
  2> if the received scg-ConfigPartMCG includes the scg-Counter:
    3> update the S-K_{NB} key based on the K_{NB} key and using the received scg-Counter value, as specified in TS 33.401 [32];
    3> derive the K_{UPenc} key associated with the cipheringAlgorithmSCG included in mobilityControlInfoSCG within the received scg-ConfigPartSCG, as specified in TS 33.401 [32];
    3> configure lower layers to apply the ciphering algorithm and the K_{UPenc} key;
      2> if the received scg-ConfigPartSCG includes the radioResourceConfigDedicatedSCG:
        3> reconfigure the dedicated radio resource configuration for the SCG as specified in 5.3.10.11;
        2> if the current UE configuration includes one or more split or SCG DRBs and the received RRCConnectionReconfiguration message includes radioResourceConfigDedicated including drb-ToAddModList:
          3> reconfigure the SCG or split DRB by drb-ToAddModList as specified in 5.3.10.12;
          2> if the received scg-ConfigPartSCG includes the sCellToReleaseListSCG:
            3> perform SCell release for the SCG as specified in 5.3.10.3a;
            2> if the received scg-ConfigPartSCG includes the pCellToAddMod:
              3> perform PSCell addition or modification as specified in 5.3.10.3c;
                NOTE 0: This procedure is also used to release the PSCell e.g. PSCell change, SI change for the PSCell.
                2> if the received scg-ConfigPartSCG includes the sCellToAddModListSCG:
                  3> perform SCell addition or modification as specified in 5.3.10.3b;
                  2> configure lower layers in accordance with mobilityControlInfoSCG, if received;
                  2> if the received scg-ConfigPartSCG includes the mobilityControlInfoSCG (i.e. SCG change):
                    3> resume all SCG DRBs and resume SCG transmission for split DRBs, if suspended;
                    3> stop timer T313, if running;
                    3> start timer T307 with the timer value set to t307, as included in the mobilityControlInfoSCG;
                    3> start synchronising to the DL of the target PSCell;
                    3> initiate the random access procedure on the PSCell, as specified in TS 36.321 [6]:
                      NOTE 1: The UE is not required to determine the SFN of the target PSCell by acquiring system information from that cell before performing RACH access in the target PSCell.
                      3> the procedure ends, except that the following actions are performed when MAC successfully completes the random access procedure on the PSCell:
                        4> stop timer T307;
                        4> apply the parts of the CQI reporting configuration, the scheduling request configuration and the sounding RS configuration that do not require the UE to know the SFN of the target PSCell, if any;
                        4> apply the parts of the measurement and the radio resource configuration that require the UE to know the SFN of the target PSCell (e.g. periodic CQI reporting, scheduling request configuration, sounding RS configuration), if any, upon acquiring the SFN of the target PSCell;
NOTE 2: Whenever the UE shall setup or reconfigure a configuration in accordance with a field that is received it applies the new configuration, except for the cases addressed by the above statements.

5.3.10.11 SCG dedicated resource configuration

The UE shall:

1> if the received `radioResourceConfigDedicatedSCG` includes the `drb-ToAddModListSCG`:

2> for each `drb-Identity` value included in the `drb-ToAddModListSCG` perform the DC specific DRB addition or reconfiguration as specified in 5.3.10.3a1

1> if the received `radioResourceConfigDedicatedSCG` includes the `mac-MainConfigSCG`:

2> perform the SCG MAC main reconfiguration as specified in 5.3.10.4;

1> if the received `radioResourceConfigDedicatedSCG` includes the `rlf-TimersAndConstantsSCG`:

2> reconfigure the values of timers and constants as specified in 5.3.10.7;

5.3.10.12 Reconfiguration SCG or split DRB by `drb-ToAddModList`

The UE shall:

1> for each split or SCG DRBs that is part of the current configuration:

2> if the corresponding `drb-Identity` value is included in the received `drb-ToAddModList`; and:

2> if the corresponding `drb-Identity` value is not included in the received `drb-ToAddModListSCG` (i.e. reconfigure split, split to MCG or SCG to MCG):

3> perform the DC specific DRB addition or reconfiguration as specified in 5.3.10.3a1;

5.3.10.13 Neighbour cell information reconfiguration

The UE shall:

1> if the received `naics-Info` is set to `release`:

2> instruct lower layer to release all the NAICS neighbour cell information for the concerned cell, if previously configured;

1> if the received `naics-Info` includes the `neighCellsToReleaseList-r12`:

2> for each `physCellId-r12` value included in the `neighCellsToReleaseList-r12` that is part of the current NAICS neighbour cell information of the concerned cell:

3> instruct lower layer to release the NAICS neighbour cell information for the concerned cell;

1> if the received `naics-Info` includes the `NeighCellsToAddModList-r12`:

2> for each `physCellId-r12` value included in the `neighCellsToAddModList-r12` that is not part of the current NAICS neighbour cell information of the concerned cell:

3> instruct lower layer to add the NAICS neighbour cell information for the concerned cell;

1> if the received `naics-Info` includes the `NeighCellsToAddModList-r12`:

2> for each `physCellId-r12` value included in the `neighCellsToAddModList-r12` that is part of the current NAICS neighbour cell information of the concerned cell:

3> instruct lower layer to modify the NAICS neighbour cell information in accordance with the received `NeighCellsInfo` for the concerned cell;
5.3.10.14 Void

5.3.10.15 Sidelink dedicated configuration

The UE shall:

1> if the RRCConnectionReconfiguration message includes the sl-CommConfig:

   2> if commTxResources is included and set to setup:

   3> from the next SC period use the resources indicated by commTxResources for sidelink communication transmission, as specified in 5.10.4;

   2> else if commTxResources is included and set to release:

3> from the next SC period, release the resources allocated for sidelink communication transmission previously configured by commTxResources;

   1> if the RRCConnectionReconfiguration message includes the sl-DiscConfig:

   2> if discTxResources is included and set to setup:

   3> from the next discovery period, as defined by discPeriod, use the resources indicated by discTxResources for sidelink discovery announcement, as specified in 5.10.6;

   2> else if discTxResources is included and set to release:

3> from the next discovery period, as defined by discPeriod, release the resources allocated for sidelink discovery announcement previously configured by discTxResources;

   1> if discTxResourcesPS is included and set to setup:

   3> from the next discovery period, as defined by discPeriod, use the resources indicated by discTxResourcesPS for sidelink discovery announcement, as specified in 5.10.6;

   2> else if discTxResourcesPS is included and set to release:

3> from the next discovery period, as defined by discPeriod, release the resources allocated for sidelink discovery announcement previously configured by discTxResourcesPS;

   2> if discTxInterFreqInfo is included and set to setup:

   3> from the next discovery period, as defined by discPeriod, use the resources indicated by discTxInterFreqInfo for sidelink discovery announcement, as specified in 5.10.6;

   2> else if discTxInterFreqInfo is included and set to release:

3> from the next discovery period, as defined by discPeriod, release the resources allocated for sidelink discovery announcement previously configured by discTxInterFreqInfo;

   2> if discRxGapConfig is included and set to setup:

   3> from the next gap period, as defined by gapPeriod, use the gaps indicated by discRxGapConfig for sidelink discovery monitoring, as specified in 5.10.5;

   2> else if discRxGapConfig is included and set to release:

3> from the next gap period, as defined by gapPeriod, release the gaps configured for sidelink discovery monitoring previously configured by discRxGapConfig;

   2> if discTxGapConfig is included and set to setup:

   3> from the next gap period, as defined by gapPeriod, use the gaps indicated by discTxGapConfig for sidelink discovery announcement, as specified in 5.10.6;

   2> else if discTxGapConfig is included and set to release:
3> from the next gap period, as defined by $gapPeriod$, release the gaps configured for sidelink discovery announcement previously configured by $discTxGapConfig$;

2> if $discSysInfoToReportConfig$ is included and set to $setup$;
3> start timer T370 with the timer value set to 60s;
2> else if $discSysInfoToReportConfig$ is included and set to $release$;
3> stop timer T370 and release $discSysInfoToReportConfig$;

5.3.10.16 T370 expiry

The UE shall:
1> if T370 expires:
2> release $discSysInfoToReportConfig$;

5.3.11 Radio link failure related actions

5.3.11.1 Detection of physical layer problems in RRC_CONNECTED

The UE shall:
1> upon receiving N310 consecutive "out-of-sync" indications for the PCell from lower layers while neither T300, T301, T304 nor T311 is running:
2> start timer T310;

1> upon receiving N313 consecutive "out-of-sync" indications for the PSCell from lower layers while T307 is not running:
2> start T313;

NOTE: Physical layer monitoring and related autonomous actions do not apply to SCells except for the PSCell.

5.3.11.2 Recovery of physical layer problems

Upon receiving N311 consecutive "in-sync" indications for the PCell from lower layers while T310 is running, the UE shall:
1> stop timer T310;
1> stop timer T312, if running;

NOTE 1: In this case, the UE maintains the RRC connection without explicit signalling, i.e. the UE maintains the entire radio resource configuration.

NOTE 2: Periods in time where neither "in-sync" nor "out-of-sync" is reported by layer 1 do not affect the evaluation of the number of consecutive "in-sync" or "out-of-sync" indications.

Upon receiving N314 consecutive "in-sync" indications for the PSCell from lower layers while T313 is running, the UE shall:
1> stop timer T313;

5.3.11.3 Detection of radio link failure

The UE shall:
1> upon T310 expiry; or
1> upon T312 expiry; or
1> upon random access problem indication from MCG MAC while neither T300, T301, T304 nor T311 is running; or

1> upon indication from MCG RLC that the maximum number of retransmissions has been reached for an SRB or for an MCG or split DRB:

2> consider radio link failure to be detected for the MCG i.e. RLF;

2> except for NB-IoT, store the following radio link failure information in the \textit{VarRLF-Report} by setting its fields as follows:

3> clear the information included in \textit{VarRLF-Report}, if any;

3> set the \textit{plmn-IdentityList} to include the list of EPLMNs stored by the UE (i.e. includes the RPLMN);

3> set the \textit{measResultLastServCell} to include the RSRP and RSRQ, if available, of the PCell based on measurements collected up to the moment the UE detected radio link failure;

3> set the \textit{measResultNeighCells} to include the best measured cells, other than the PCell, ordered such that the best cell is listed first, and based on measurements collected up to the moment the UE detected radio link failure, and set its fields as follows:

4> if the UE was configured to perform measurements for one or more EUTRA frequencies, include the \textit{measResultListEUTRA};

4> if the UE was configured to perform measurement reporting for one or more neighbouring UTRA frequencies, include the \textit{measResultListUTRA};

4> if the UE was configured to perform measurement reporting for one or more neighbouring GERAN frequencies, include the \textit{measResultListGERAN};

4> if the UE was configured to perform measurement reporting for one or more neighbouring CDMA2000 frequencies, include the \textit{measResultsCDMA2000};

4> for each neighbour cell included, include the optional fields that are available;

NOTE 1: The measured quantities are filtered by the L3 filter as configured in the mobility measurement configuration. The measurements are based on the time domain measurement resource restriction, if configured. Blacklisted cells are not required to be reported.

3> if detailed location information is available, set the content of the \textit{locationInfo} as follows:

4> include the \textit{locationCoordinates};

4> include the \textit{horizontalVelocity}, if available;

3> set the \textit{failedPCellId} to the global cell identity, if available, and otherwise to the physical cell identity and carrier frequency of the PCell where radio link failure is detected;

3> set the \textit{tac-FailedPCell} to the tracking area code, if available, of the PCell where radio link failure is detected;

3> if an \textit{RRCConnectionReconfiguration} message including the \textit{mobilityControlInfo} was received before the connection failure:

4> if the last \textit{RRCConnectionReconfiguration} message including the \textit{mobilityControlInfo} concerned an intra E-UTRA handover:

5> include the \textit{previousPCellId} and set it to the global cell identity of the PCell where the last \textit{RRCConnectionReconfiguration} message including \textit{mobilityControlInfo} was received;

5> set the \textit{timeConnFailure} to the elapsed time since reception of the last \textit{RRCConnectionReconfiguration} message including the \textit{mobilityControlInfo};

4> if the last \textit{RRCConnectionReconfiguration} message including the \textit{mobilityControlInfo} concerned a handover to E-UTRA from UTRA and if the UE supports Radio Link Failure Report for Inter-RAT MRO:
The UE shall:
1> upon T313 expiry; or
1> upon random access problem indication from SCG MAC; or
1> upon indication from SCG RLC that the maximum number of retransmissions has been reached for an SCG or split DRB:
   2> consider radio link failure to be detected for the SCG i.e. SCG-RLF;
   2> initiate the SCG failure information procedure as specified in 5.6.13 to report SCG radio link failure;

The UE may discard the radio link failure information, i.e. release the UE variable VarRLF-Report, 48 hours after the radio link failure is detected, upon power off or upon detach.

5.3.12  UE actions upon leaving RRC_CONNECTED

Upon leaving RRC_CONNECTED, the UE shall:
1> reset MAC;
1> stop all timers that are running except T320, T325 and T330;
1> if leaving RRC_CONNECTED was triggered by suspension of the RRC:
   2> re-establish RLC entities for all SRBs and DRBs;
   2> store the UE AS Context including the current RRC configuration, the current security context, the PDCP state including ROHC state, C-RNTI used in the source PCell, the cellIdentity and the physical cell identity of the source PCell;
   2> store the following information provided by E-UTRAN:
the resumeIdentity;

- suspend all SRB(s) and DRB(s);
- indicate the suspension of the RRC connection to upper layers;

else:
- release all radio resources, including release of the RLC entity, the MAC configuration and the associated PDCP entity for all established RBs;
- indicate the release of the RRC connection to upper layers together with the release cause;

if leaving RRC_CONNECTED was triggered neither by reception of the MobilityFromEUTRACommand message nor by selecting an inter-RAT cell while T311 was running:

- if timer T350 is configured:
  - start timer T350;
  - apply rclwi-Configuration if configured, otherwise apply the wlan-Id-List corresponding to the RPLMN included in SystemInformationBlockType17;
- else:
  - release the wlan-OffloadConfigDedicated, if received;
  - if the wlan-OffloadConfigCommon corresponding to the RPLMN is broadcast by the cell:
    - apply the wlan-OffloadConfigCommon corresponding to the RPLMN included in SystemInformationBlockType17;
    - apply steerToWLAN if configured, otherwise apply the wlan-Id-List corresponding to the RPLMN included in SystemInformationBlockType17;
  - enter RRC_IDLE and perform procedures as specified in TS 36.304 [4, 5.2.7];
- else:
  - release the wlan-OffloadConfigDedicated, if received;

NOTE: BL UEs or UEs in CE verifies validity of SI when released to RRC_IDLE.

- release the LWA configuration, if configured, to upper layers;
- release the LWIP configuration, if configured, as described in 5.6.17.3;

### 5.3.13 UE actions upon PUCCH/ SRS release request

Upon receiving a PUCCH release request from lower layers, for an indicated serving cell the UE shall:

- apply the default physical channel configuration for cqi-ReportConfig for the indicated serving cell as specified in 9.2.4 and release cqi-ReportConfigSCell, for each SCell that sends HARQ feedback on the indicated serving cell, if any;
- apply the default physical channel configuration for schedulingRequestConfig as specified in 9.2.4, for the concerned CG;

Upon receiving an SRS release request from lower layers, for an indicated serving cell the UE shall:

- apply the default physical channel configuration for soundingRS-UL-ConfigDedicated, as specified in 9.2.4;

NOTE: Upon PUCCH/ SRS release request, the UE does not modify the soundingRS-UL-ConfigDedicatedAperiodic i.e. it does not apply the default for this field (release).
5.3.14 Proximity indication

5.3.14.1 General

The purpose of this procedure is to indicate that the UE is entering or leaving the proximity of one or more CSG member cells. The detection of proximity is based on an autonomous search function as defined in TS 36.304 [4].

5.3.14.2 Initiation

A UE in RRC_CONNECTED shall:

1> if the UE enters the proximity of one or more CSG member cell(s) on an E-UTRA frequency while proximity indication is enabled for such E-UTRA cells; or

1> if the UE enters the proximity of one or more CSG member cell(s) on an UTRA frequency while proximity indication is enabled for such UTRA cells; or

1> if the UE leaves the proximity of all CSG member cell(s) on an E-UTRA frequency while proximity indication is enabled for such E-UTRA cells; or

1> if the UE leaves the proximity of all CSG member cell(s) on an UTRA frequency while proximity indication is enabled for such UTRA cells:

2> if the UE has previously not transmitted a ProximityIndication for the RAT and frequency during the current RRC connection, or if more than 5 s has elapsed since the UE has last transmitted a ProximityIndication (either entering or leaving) for the RAT and frequency:

3> initiate transmission of the ProximityIndication message in accordance with 5.3.14.3;

NOTE: In the conditions above, "if the UE enters the proximity of one or more CSG member cell(s)" includes the case of already being in the proximity of such cell(s) at the time proximity indication for the corresponding RAT is enabled.

5.3.14.3 Actions related to transmission of ProximityIndication message

The UE shall set the contents of ProximityIndication message as follows:

1> if the UE applies the procedure to report entering the proximity of CSG member cell(s):

2> set type to entering;

1> else if the UE applies the procedure to report leaving the proximity of CSG member cell(s):

2> set type to leaving;

1> if the proximity indication was triggered for one or more CSG member cell(s) on an E-UTRA frequency:

2> set the carrierFreq to eutra with the value set to the E-ARFCN value of the E-UTRA cell(s) for which proximity indication was triggered;
else if the proximity indication was triggered for one or more CSG member cell(s) on a UTRA frequency:

- set the \texttt{carrierFreq} to \texttt{utra} with the value set to the ARFCN value of the UTRA cell(s) for which proximity indication was triggered;

The UE shall submit the \textit{ProximityIndication} message to lower layers for transmission.

5.3.15 Void

5.4 Inter-RAT mobility

5.4.1 Introduction

The general principles of connected mode mobility are described in 5.3.1.3. The general principles of the security handling upon connected mode mobility are described in 5.3.1.2.

For the (network controlled) inter RAT mobility from E-UTRA for a UE in RRC\_CONNECTED, a single procedure is defined that supports both handover, cell change order with optional network assistance (NACC) and enhanced CS fallback to CDMA2000 1xRTT. In case of mobility to CDMA2000, the eNB decides when to move to the other RAT while the target RAT determines to which cell the UE shall move.

5.4.2 Handover to E-UTRA

5.4.2.1 General

![Diagram of Handover to E-UTRA, successful](image)

The purpose of this procedure is to, under the control of the network, transfer a connection between the UE and another Radio Access Network (e.g. GERAN or UTRAN) to E-UTRAN.

The handover to E-UTRA procedure applies when SRBs, possibly in combination with DRBs, are established in another RAT. Handover from UTRAN to E-UTRAN applies only after integrity has been activated in UTRAN.

5.4.2.2 Initiation

The RAN using another RAT initiates the handover to E-UTRA procedure, in accordance with the specifications applicable for the other RAT, by sending the \textit{RRCConnectionReconfiguration} message via the radio access technology from which the inter-RAT handover is performed.

E-UTRAN applies the procedure as follows:

- to activate ciphering, possibly using NULL algorithm, if not yet activated in the other RAT;
- to establish SRB1, SRB2 and one or more DRBs, i.e. at least the DRB associated with the default EPS bearer is established;
5.4.2.3 Reception of the *RRCConnectionReconfiguration* by the UE

If the UE is able to comply with the configuration included in the *RRCConnectionReconfiguration* message, the UE shall:

1. apply the default physical channel configuration as specified in 9.2.4;
2. apply the default semi-persistent scheduling configuration as specified in 9.2.3;
3. apply the default MAC main configuration as specified in 9.2.2;
4. start timer T304 with the timer value set to $t_{304}$, as included in the mobilityControlInfo;
5. consider the target PCell to be one on the frequency indicated by the *carrierFreq* with a physical cell identity indicated by the *targetPhysCellId*;
6. start synchronising to the DL of the target PCell;
7. set the C-RNTI to the value of the *newUE-Identity*;
8. for the target PCell, apply the downlink bandwidth indicated by the *dl-Bandwidth*;
9. for the target PCell, apply the uplink bandwidth indicated by (the absence or presence of) the *ul-Bandwidth*;
10. configure lower layers in accordance with the received *radioResourceConfigCommon*;
11. configure lower layers in accordance with any additional fields, not covered in the previous, if included in the received mobilityControlInfo;
12. perform the radio resource configuration procedure as specified in 5.3.10;
13. forward the *nas-SecurityParamToEUTRA* to the upper layers;
14. derive the $K_{\text{ANB}}$ key, as specified in TS 33.401 [32];
15. derive the $K_{\text{RRCint}}$ key associated with the *integrityProtAlgorithm*, as specified in TS 33.401 [32];
16. derive the $K_{\text{RRCenc}}$ key and the $K_{\text{UPenc}}$ key associated with the *cipheringAlgorithm*, as specified in TS 33.401 [32];
17. configure lower layers to apply the indicated integrity protection algorithm and the $K_{\text{RRCint}}$ key immediately, i.e. the indicated integrity protection configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
18. configure lower layers to apply the indicated ciphering algorithm, the $K_{\text{RRCenc}}$ key and the $K_{\text{UPenc}}$ key immediately, i.e. the indicated ciphering configuration shall be applied to all subsequent messages received and sent by the UE, including the message used to indicate the successful completion of the procedure;
19. if the received *RRCConnectionReconfiguration* includes the *sCellToAddModList*:
   1. perform SCell addition as specified in 5.3.10.3b;
20. if the *RRCConnectionReconfiguration* message includes the *measConfig*:
   1. perform the measurement configuration procedure as specified in 5.5.2;
21. perform the measurement identity autonomous removal as specified in 5.5.2.2a;
22. if the *RRCConnectionReconfiguration* message includes the *otherConfig*:
   1. perform the other configuration procedure as specified in 5.3.10.9;
23. if the *RRCConnectionReconfiguration* message includes *wlan-OffloadInfo*:
   1. perform the dedicated WLAN offload configuration procedure as specified in 5.6.12.2;
24. if the *RRCConnectionReconfiguration* message includes *rclwi-Configuration*:
   1. perform the WLAN traffic steering command procedure as specified in 5.6.16.2;
1> if the RRCConnectionReconfiguration message includes lwa-Configuration:
   2> perform the LWA configuration procedure as specified in 5.6.14.2;

1> if the RRCConnectionReconfiguration message includes lwip-Configuration:
   2> perform the LWIP reconfiguration procedure as specified in 5.6.17.2;

1> set the content of RRCConnectionReconfigurationComplete message as follows:
   2> if the UE has radio link failure or handover failure information available in VarRLF-Report and if the RPLMN is included in plmn-IdentityList stored in VarRLF-Report:
      3> include rlf-InfoAvailable;
   2> else if the UE has MBSFN logged measurements available for E-UTRA and if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport and if T330 is not running:
      3> include logMeasAvailableMBSFN;
   2> else if the UE has logged measurements available for E-UTRA and if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport:
      3> include the logMeasAvailable;
   2> if the UE has connection establishment failure information available in VarConnEstFailReport and if the RPLMN is equal to plmn-Identity stored in VarConnEstFailReport:
      3> include connEstFailInfoAvailable;

1> submit the RRCConnectionReconfigurationComplete message to lower layers for transmission using the new configuration;

1> if the RRCConnectionReconfiguration message does not include rlf-TimersAndConstants set to setup:
   2> use the default values specified in 9.2.5 for timer T310, T311 and constant N310, N311;

1> if MAC successfully completes the random access procedure:
   2> stop timer T304;
   2> apply the parts of the CQI reporting configuration, the scheduling request configuration and the sounding RS configuration that do not require the UE to know the SFN of the target PCell, if any;
   2> apply the parts of the measurement and the radio resource configuration that require the UE to know the SFN of the target PCell (e.g. measurement gaps, periodic CQI reporting, scheduling request configuration, sounding RS configuration), if any, upon acquiring the SFN of the target PCell;

NOTE 1: Whenever the UE shall setup or reconfigure a configuration in accordance with a field that is received it applies the new configuration, except for the cases addressed by the above statements.

2> enter E-UTRA RRC_CONNECTED, upon which the procedure ends;

NOTE 2: The UE is not required to determine the SFN of the target PCell by acquiring system information from that cell before performing RACH access in the target PCell.

5.4.2.4 Reconfiguration failure

The UE shall:

1> if the UE is unable to comply with (part of) the configuration included in the RRCConnectionReconfiguration message:
   2> perform the actions defined for this failure case as defined in the specifications applicable for the other RAT;
NOTE 1: The UE may apply above failure handling also in case the RRCConnectionReconfiguration message causes a protocol error for which the generic error handling as defined in 5.7 specifies that the UE shall ignore the message.

NOTE 2: If the UE is unable to comply with part of the configuration, it does not apply any part of the configuration, i.e. there is no partial success/failure.

5.4.2.5 T304 expiry (handover to E-UTRA failure)

The UE shall:

1> upon T304 expiry (handover to E-UTRA failure):
   2> reset MAC;
   2> perform the actions defined for this failure case as defined in the specifications applicable for the other RAT;

5.4.3 Mobility from E-UTRA

5.4.3.1 General

The purpose of this procedure is to move a UE in RRC_CONNECTED to a cell using another Radio Access Technology (RAT), e.g. GERAN, UTRA or CDMA2000 systems. The mobility from E-UTRA procedure covers the following type of mobility:

- handover, i.e. the MobilityFromEUTRACommand message includes radio resources that have been allocated for the UE in the target cell;
- cell change order, i.e. the MobilityFromEUTRACommand message may include information facilitating access of and/ or connection establishment in the target cell, e.g. system information. Cell change order is applicable only to GERAN; and
- enhanced CS fallback to CDMA2000 1xRTT, i.e. the MobilityFromEUTRACommand message includes radio resources that have been allocated for the UE in the target cell. The enhanced CS fallback to CDMA2000 1xRTT may be combined with concurrent handover or redirection to CDMA2000 HRPD.
NOTE: For the case of dual receiver/transmitter enhanced CS fallback to CDMA2000 1xRTT, the DLInformationTransfer message is used instead of the MobilityFromEUTRACommand message (see TS 36.300 [9]).

5.4.3.2 Initiation

E-UTRAN initiates the mobility from E-UTRA procedure to a UE in RRC_CONNECTED, possibly in response to a MeasurementReport message or in response to reception of CS fallback indication for the UE from MME, by sending a MobilityFromEUTRACommand message. E-UTRAN applies the procedure as follows:

- the procedure is initiated only when AS-security has been activated, and SRB2 with at least one DRB are setup and not suspended;

5.4.3.3 Reception of the MobilityFromEUTRACommand by the UE

The UE shall be able to receive a MobilityFromEUTRACommand message and perform a cell change order to GERAN, even if no prior UE measurements have been performed on the target cell.

The UE shall:

1> stop timer T310, if running;
1> stop timer T312, if running;
1> if the MobilityFromEUTRACommand message includes the purpose set to handover:
   2> if the targetRAT-Type is set to utra or geran:
   3> consider inter-RAT mobility as initiated towards the RAT indicated by the targetRAT-Type included in the MobilityFromEUTRACommand message;

3> forward the nas-SecurityParamFromEUTRA to the upper layers;
3> access the target cell indicated in the inter-RAT message in accordance with the specifications of the target RAT;
   3> if the targetRAT-Type is set to geran:
      4> use the contents of systemInformation, if provided for PS Handover, as the system information to begin access on the target GERAN cell;

NOTE 1: If there are DRBs for which no radio bearers are established in the target RAT as indicated in the targetRAT-MessageContainer in the message, the E-UTRA RRC part of the UE does not indicate the release of the concerned DRBs to the upper layers. Upper layers may derive which bearers are not established from information received from the AS of the target RAT.

NOTE 2: In case of SR-VCC, the DRB to be replaced is specified in [61].

2> else if the targetRAT-Type is set to cdma2000-1XRTT or cdma2000-HRPD:
3> forward the targetRAT-Type and the targetRAT-MessageContainer to the CDMA2000 upper layers for the UE to access the cell(s) indicated in the inter-RAT message in accordance with the specifications of the CDMA2000 target-RAT;
   1> else if the MobilityFromEUTRACommand message includes the purpose set to cellChangeOrder:
      2> start timer T304 with the timer value set to t304, as included in the MobilityFromEUTRACommand message;
   2> if the targetRAT-Type is set to geran:
      3> if networkControlOrder is included in the MobilityFromEUTRACommand message:
         4> apply the value as specified in TS 44.060 [36];
      3> else:
         4> acquire networkControlOrder and apply the value as specified in TS 44.060 [36];
3> use the contents of **systemInformation**, if provided, as the system information to begin access on the target GERAN cell;

2> establish the connection to the target cell indicated in the **CellChangeOrder**;

NOTE 3: The criteria for success or failure of the cell change order to GERAN are specified in TS 44.060[36].

1> if the **MobilityFromEUTRACommand** message includes the **purpose** set to e-CSFB:

2> if **messageContCDMA2000-1XRTT** is present:

3> forward the **messageContCDMA2000-1XRTT** to the CDMA2000 upper layers for the UE to access the cell(s) indicated in the inter-RAT message in accordance with the specification of the target RAT;

2> if **mobilityCDMA2000-HRPD** is present and is set to **handover**:

3> forward the **messageContCDMA2000-HRPD** to the CDMA2000 upper layers for the UE to access the cell(s) indicated in the inter-RAT message in accordance with the specification of the target RAT;

2> if **mobilityCDMA2000-HRPD** is present and is set to **redirection**:

3> forward the **redirectCarrierCDMA2000-HRPD** to the CDMA2000 upper layers;

NOTE 4: When the CDMA2000 upper layers in the UE receive both the **messageContCDMA2000-1XRTT** and **messageContCDMA2000-HRPD** the UE performs concurrent access to both CDMA2000 1xRTT and CDMA2000 HRPD RAT.

NOTE 5: The UE should perform the handover, the cell change order or enhanced 1xRTT CS fallback as soon as possible following the reception of the RRC message **MobilityFromEUTRACommand**, which could be before confirming successful reception (HARQ and ARQ) of this message.

### 5.4.3.4 Successful completion of the mobility from E-UTRA

Upon successfully completing the handover, the cell change order or enhanced 1xRTT CS fallback, the UE shall:

1> perform the actions upon leaving RRC_CONNECTED as specified in 5.3.12, with release cause 'other';

NOTE: If the UE performs enhanced 1xRTT CS fallback along with concurrent mobility to CDMA2000 HRPD and the connection to either CDMA2000 1xRTT or CDMA2000 HRPD succeeds, then the mobility from E-UTRA is considered successful.

### 5.4.3.5 Mobility from E-UTRA failure

The UE shall:

1> if T304 expires (mobility from E-UTRA failure); or

1> if the UE does not succeed in establishing the connection to the target radio access technology; or

1> if the UE is unable to comply with (part of) the configuration included in the **MobilityFromEUTRACommand** message; or

1> if there is a protocol error in the inter RAT information included in the **MobilityFromEUTRACommand** message, causing the UE to fail the procedure according to the specifications applicable for the target RAT:

2> stop T304, if running;

2> if the **ex-FallbackIndicator** in the **MobilityFromEUTRACommand** message was set to **TRUE** or e-CSFB was present:

3> indicate to upper layers that the CS fallback procedure has failed;

2> revert back to the configuration used in the source PCell, excluding the configuration configured by the **physicalConfigDedicated**, **mac-MainConfig** and **sps-Config**;

2> initiate the connection re-establishment procedure as specified in 5.3.7;
NOTE: For enhanced CS fallback to CDMA2000 1xRTT, the above UE behavior applies only when the UE is attempting the enhanced 1xRTT CS fallback and connection to the target radio access technology fails or if the UE is attempting enhanced 1xRTT CS fallback along with concurrent mobility to CDMA2000 HRPD and connection to both the target radio access technologies fails.

5.4.4 Handover from E-UTRA preparation request (CDMA2000)

5.4.4.1 General

The purpose of this procedure is to trigger the UE to prepare for handover or enhanced 1xRTT CS fallback to CDMA2000 by requesting a connection with this network. The UE may use this procedure to concurrently prepare for handover to CDMA2000 HRPD along with preparation for enhanced CS fallback to CDMA2000 1xRTT. This procedure applies to CDMA2000 capable UEs only.

This procedure is also used to trigger the UE which supports dual Rx/Tx enhanced 1xCSFB to redirect its second radio to CDMA2000 1xRTT.

The handover from E-UTRA preparation request procedure applies when signalling radio bearers are established.

5.4.4.2 Initiation

E-UTRAN initiates the handover from E-UTRA preparation request procedure to a UE in RRC_CONNECTED, possibly in response to a MeasurementReport message or CS fallback indication for the UE, by sending a HandoverFromEUTRAPreparationRequest message. E-UTRA initiates the procedure only when AS security has been activated.

5.4.4.3 Reception of the HandoverFromEUTRAPreparationRequest by the UE

Upon reception of the HandoverFromEUTRAPreparationRequest message, the UE shall:

1> if dualRxTxRedirectIndicator is present in the received message:
   2> forward dualRxTxRedirectIndicator to the CDMA2000 upper layers;
   2> forward redirectCarrierCDMA2000-1XRTT to the CDMA2000 upper layers, if included;
1> else:
   2> indicate the request to prepare handover or enhanced 1xRTT CS fallback and forward the cdma2000-Type to the CDMA2000 upper layers;
   2> if cdma2000-Type is set to type1XRTT:
5> forward the rand and the mobilityParameters to the CDMA2000 upper layers;
   2> if concurrPrepCDMA2000-HRPD is present in the received message:
5> forward concurrPrepCDMA2000-HRPD to the CDMA2000 upper layers;
   2> else:
5> forward concurrPrepCDMA2000-HRPD, with its value set to FALSE, to the CDMA2000 upper layers;
5.4.5 UL handover preparation transfer (CDMA2000)

5.4.5.1 General

![Figure 5.4.5.1-1: UL handover preparation transfer](image)

The purpose of this procedure is to tunnel the handover related CDMA2000 dedicated information or enhanced 1xRTT CS fallback related CDMA2000 dedicated information from UE to E-UTRAN when requested by the higher layers. The procedure is triggered by the higher layers on receipt of **HandoverFromEUTRAPreparationRequest** message. If preparing for enhanced CS fallback to CDMA2000 1xRTT and handover to CDMA2000 HRPD, the UE sends two consecutive **ULHandoverPreparationTransfer** messages to E-UTRAN, one per addressed CDMA2000 RAT Type. This procedure applies to CDMA2000 capable UEs only.

5.4.5.2 Initiation

A UE in RRC_CONNECTED initiates the UL handover preparation transfer procedure whenever there is a need to transfer handover or enhanced 1xRTT CS fallback related non-3GPP dedicated information. The UE initiates the UL handover preparation transfer procedure by sending the **ULHandoverPreparationTransfer** message.

5.4.5.3 Actions related to transmission of the **ULHandoverPreparationTransfer** message

The UE shall set the contents of the **ULHandoverPreparationTransfer** message as follows:

1> include the **cdma2000-Type** and the **dedicatedInfo**;

1> if the **cdma2000-Type** is set to **type1XRTT**:

2> include the **meid** and set it to the value received from the CDMA2000 upper layers;

1> submit the **ULHandoverPreparationTransfer** message to lower layers for transmission, upon which the procedure ends;

5.4.5.4 Failure to deliver the **ULHandoverPreparationTransfer** message

The UE shall:

1> if the UE is unable to guarantee successful delivery of **ULHandoverPreparationTransfer** messages:

2> inform upper layers about the possible failure to deliver the information contained in the concerned **ULHandoverPreparationTransfer** message;

5.4.6 Inter-RAT cell change order to E-UTRAN

5.4.6.1 General

The purpose of the inter-RAT cell change order to E-UTRAN procedure is to transfer, under the control of the source radio access technology, a connection between the UE and another radio access technology (e.g. GSM/ GPRS) to E-UTRAN.
5.4.6.2 Initiation

The procedure is initiated when a radio access technology other than E-UTRAN, e.g. GSM/GPRS, using procedures specific for that RAT, orders the UE to change to an E-UTRAN cell. In response, upper layers request the establishment of an RRC connection as specified in subclause 5.3.3.

NOTE: Within the message used to order the UE to change to an E-UTRAN cell, the source RAT should specify the identity of the target E-UTRAN cell as specified in the specifications for that RAT.

The UE shall:

1> upon receiving an *RRCConnectionSetup* message:

2> consider the inter-RAT cell change order procedure to have completed successfully;

5.4.6.3 UE fails to complete an inter-RAT cell change order

If the inter-RAT cell change order fails the UE shall return to the other radio access technology and proceed as specified in the appropriate specifications for that RAT.

The UE shall:

1> upon failure to establish the RRC connection as specified in subclause 5.3.3:

2> consider the inter-RAT cell change order procedure to have failed;

NOTE: The cell change was network ordered. Therefore, failure to change to the target PCell should not cause the UE to move to UE-controlled cell selection.

5.5 Measurements

5.5.1 Introduction

The UE reports measurement information in accordance with the measurement configuration as provided by E-UTRAN. E-UTRAN provides the measurement configuration applicable for a UE in RRC_CONNECTED by means of dedicated signalling, i.e. using the *RRCConnectionReconfiguration* or *RRCConnectionResume* message.

The UE can be requested to perform the following types of measurements:

- Intra-frequency measurements: measurements at the downlink carrier frequency(ies) of the serving cell(s).
- Inter-frequency measurements: measurements at frequencies that differ from any of the downlink carrier frequency(ies) of the serving cell(s).
- Inter-RAT measurements of UTRA frequencies.
- Inter-RAT measurements of GERAN frequencies.
- Inter-RAT measurements of CDMA2000 HRPD or CDMA2000 1xRTT or WLAN frequencies.

The measurement configuration includes the following parameters:

1. Measurement objects: The objects on which the UE shall perform the measurements.

   - For intra-frequency and inter-frequency measurements a measurement object is a single E-UTRA carrier frequency. Associated with this carrier frequency, E-UTRAN can configure a list of cell specific offsets, a list of ‘blacklisted’ cells and a list of ‘whitelisted’ cells. Blacklisted cells are not considered in event evaluation or measurement reporting.

   - For inter-RAT UTRA measurements a measurement object is a set of cells on a single UTRA carrier frequency.

   - For inter-RAT GERAN measurements a measurement object is a set of GERAN carrier frequencies.
- For inter-RAT CDMA2000 measurements a measurement object is a set of cells on a single (HRPD or 1xRTT) carrier frequency.

- For inter-RAT WLAN measurements a measurement object is a set of WLAN identifiers and optionally a set of WLAN frequencies.

NOTE 1: Some measurements using the above mentioned measurement objects, only concern a single cell, e.g. measurements used to report neighbouring cell system information, PCell UE Rx-Tx time difference, or a pair of cells, e.g. SSTD measurements between the PCell and the PSCell.

2. Reporting configurations: A list of reporting configurations where each reporting configuration consists of the following:

- Reporting criterion: The criterion that triggers the UE to send a measurement report. This can either be periodical or a single event description.

- Reporting format: The quantities that the UE includes in the measurement report and associated information (e.g. number of cells to report).

3. Measurement identities: A list of measurement identities where each measurement identity links one measurement object with one reporting configuration. By configuring multiple measurement identities it is possible to link more than one measurement object to the same reporting configuration, as well as to link more than one reporting configuration to the same measurement object. The measurement identity is used as a reference number in the measurement report.

4. Quantity configurations: One quantity configuration is configured per RAT type. The quantity configuration defines the measurement quantities and associated filtering used for all event evaluation and related reporting of that measurement type. One filter can be configured per measurement quantity.

5. Measurement gaps: Periods that the UE may use to perform measurements, i.e. no (UL, DL) transmissions are scheduled.

E-UTRAN only configures a single measurement object for a given frequency (except for WLAN), i.e. it is not possible to configure two or more measurement objects for the same frequency with different associated parameters, e.g. different offsets and/or blacklists. E-UTRAN may configure multiple instances of the same event e.g. by configuring two reporting configurations with different thresholds.

The UE maintains a single measurement object list, a single reporting configuration list, and a single measurement identities list. The measurement object list includes measurement objects, that are specified per RAT type, possibly including intra-frequency object(s) (i.e. the object(s) corresponding to the serving frequency(ies)), inter-frequency object(s) and inter-RAT objects. Similarly, the reporting configuration list includes E-UTRA and inter-RAT reporting configurations. Any measurement object can be linked to any reporting configuration of the same RAT type. Some reporting configurations may not be linked to a measurement object. Likewise, some measurement objects may not be linked to a reporting configuration.

The measurement procedures distinguish the following types of cells:

1. The serving cell(s) - these are the PCell and one or more SCells, if configured for a UE supporting CA.

2. Listed cells - these are cells listed within the measurement object(s) or, for inter-RAT WLAN, the WLANs matching the WLAN identifiers configured in the measurement object or the WLAN the UE is connected to.

3. Detected cells - these are cells that are not listed within the measurement object(s) but are detected by the UE on the carrier frequency(ies) indicated by the measurement object(s).

For E-UTRA, the UE measures and reports on the serving cell(s), listed cells, detected cells and, for RSSI and channel occupancy measurements, the UE measures and reports on any reception on the indicated frequency. For inter-RAT UTRA, the UE measures and reports on listed cells and optionally on cells that are within a range for which reporting is allowed by E-UTRAN. For inter-RAT GERAN, the UE measures and reports on detected cells. For inter-RAT CDMA2000, the UE measures and reports on listed cells. For inter-RAT WLAN, the UE measures and reports on listed cells.

NOTE 2: For inter-RAT UTRA and CDMA2000, the UE measures and reports also on detected cells for the purpose of SON.
NOTE 3: This specification is based on the assumption that typically CSG cells of home deployment type are not indicated within the neighbour list. Furthermore, the assumption is that for non-home deployments, the physical cell identity is unique within the area of a large macro cell (i.e. as for UTRAN).

Whenever the procedural specification, other than contained in sub-clause 5.5.2, refers to a field it concerns a field included in the VarMeasConfig unless explicitly stated otherwise i.e. only the measurement configuration procedure covers the direct UE action related to the received measConfig.

### 5.5.2 Measurement configuration

#### 5.5.2.1 General

E-UTRAN applies the procedure as follows:

- to ensure that, whenever the UE has a measConfig, it includes a measObject for each serving frequency;
- to configure at most one measurement identity using a reporting configuration with the purpose set to reportCGI;
- for serving frequencies, set the EARFCN within the corresponding measObject according to the band as used for reception/ transmission;
- to configure at most one measurement identity using a reporting configuration with ul-DelayConfig;

The UE shall:

1. if the received measConfig includes the measObjectToRemoveList:
   2. perform the measurement object removal procedure as specified in 5.5.2.4;
2. if the received measConfig includes the measObjectToAddModList:
   2. perform the measurement object addition/ modification procedure as specified in 5.5.2.5;
3. if the received measConfig includes the reportConfigToRemoveList:
   2. perform the reporting configuration removal procedure as specified in 5.5.2.6;
4. if the received measConfig includes the reportConfigToAddModList:
   2. perform the reporting configuration addition/ modification procedure as specified in 5.5.2.7;
5. if the received measConfig includes the quantityConfig:
   2. perform the quantity configuration procedure as specified in 5.5.2.8;
6. if the received measConfig includes the measIdToRemoveList:
   2. perform the measurement identity removal procedure as specified in 5.5.2.2;
7. if the received measConfig includes the measIdToAddModList:
   2. perform the measurement identity addition/ modification procedure as specified in 5.5.2.3;
8. if the received measConfig includes the measGapConfig:
   2. perform the measurement gap configuration procedure as specified in 5.5.2.9;
9. if the received measConfig includes the s-Measure:
   2. set the parameter s-Measure within VarMeasConfig to the lowest value of the RSRP ranges indicated by the received value of s-Measure;
10. if the received measConfig includes the preRegistrationInfoHRPD:
    2. forward the preRegistrationInfoHRPD to CDMA2000 upper layers;
1> if the received measConfig includes the speedStatePars:
   2> set the parameter speedStatePars within VarMeasConfig to the received value of speedStatePars;

1> if the received measConfig includes the allowInterruptions:
   2> set the parameter allowInterruptions within VarMeasConfig to the received value of allowInterruptions;

### 5.5.2.2 Measurement identity removal

The UE shall:

1> for each measId included in the received measIdToRemoveList that is part of the current UE configuration in VarMeasConfig:
   2> remove the entry with the matching measId from the measIdList within the VarMeasConfig;
   2> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
   2> stop the periodical reporting timer or timer T321, whichever one is running, and reset the associated information (e.g. timeToTrigger) for this measId;

NOTE: The UE does not consider the message as erroneous if the measIdToRemoveList includes any measId value that is not part of the current UE configuration.

### 5.5.2.2a Measurement identity autonomous removal

The UE shall:

1> for each measId included in the measIdList within VarMeasConfig:
   2> if the associated reportConfig concerns an event involving a serving cell while the concerned serving cell is not configured; or
   2> if the associated reportConfig concerns an event involving a WLAN mobility set while the concerned WLAN mobility set is not configured:
   3> remove the measId from the measIdList within the VarMeasConfig;
   3> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
   3> stop the periodical reporting timer if running, and reset the associated information (e.g. timeToTrigger) for this measId;

NOTE 1: The above UE autonomous removal of measIds applies only for measurement events A1, A2, A6, and also applies for events A3 and A5 if configured for PSCell and W2 and W3, if configured.

NOTE 2: When performed during re-establishment, the UE is only configured with a primary frequency (i.e. the SCell(s) and WLAN mobility set are released, if configured).

### 5.5.2.3 Measurement identity addition/ modification

E-UTRAN applies the procedure as follows:

- configure a measId only if the corresponding measurement object, the corresponding reporting configuration and the corresponding quantity configuration, are configured;

The UE shall:

1> for each measId included in the received measIdToAddModList:
   2> if an entry with the matching measId exists in the measIdList within the VarMeasConfig:
      3> replace the entry with the value received for this measId;
   2> else:
add a new entry for this measId within the VarMeasConfig;

2> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;

2> stop the periodical reporting timer or timer T321, whichever one is running, and reset the associated information (e.g. timeToTrigger) for this measId;

2> if the triggerType is set to periodical and the purpose is set to reportCGI in the reportConfig associated with this measId:

3> if the measObject associated with this measId concerns E-UTRA:

   4> if the si-RequestForHO is included in the reportConfig associated with this measId:

      5> if the UE is a category 0 UE according to TS 36.306 [5]:

         6> start timer T321 with the timer value set to 190 ms for this measId;

      5> else:

         6> start timer T321 with the timer value set to 150 ms for this measId;

   4> else:

      5> start timer T321 with the timer value set to 1 second for this measId;

3> else if the measObject associated with this measId concerns UTRA:

   4> if the si-RequestForHO is included in the reportConfig associated with this measId:

      5> for UTRA FDD, start timer T321 with the timer value set to 2 seconds for this measId;

      5> for UTRA TDD, start timer T321 with the timer value set to [1 second] for this measId;

   4> else:

      5> start timer T321 with the timer value set to 8 seconds for this measId;

3> else:

   4> start timer T321 with the timer value set to 8 seconds for this measId;

5.5.2.4 Measurement object removal

The UE shall:

1> for each measObjectId included in the received measObjectToRemoveList that is part of the current UE configuration in VarMeasConfig:

   2> remove the entry with the matching measObjectId from the measObjectList within the VarMeasConfig;

   2> remove all measId associated with this measObjectId from the measIdList within the VarMeasConfig, if any;

   2> if a measId is removed from the measIdList:

      3> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;

   3> stop the periodical reporting timer or timer T321, whichever one is running, and reset the associated information (e.g. timeToTrigger) for this measId;

NOTE: The UE does not consider the message as erroneous if the measObjectToRemoveList includes any measObjectId value that is not part of the current UE configuration.

5.5.2.5 Measurement object addition/ modification

The UE shall:
for each measObjectId included in the received measObjectToAddModList:

if an entry with the matching measObjectId exists in the measObjectList within the VarMeasConfig, for this entry:

reconfigure the entry with the value received for this measObject, except for the fields cellsToAddModList, blackCellsToAddModList, whiteCellsToModAddList, altTTT-CellsToAddModList, cellsToRemoveList, blackCellsToRemoveList, whiteCellsToRemoveList, altTTT-CellsToRemoveList, measSubframePatternConfigNeigh, measDS-Config, wlanToAddModList and wlanToRemoveList;

if the received measObject includes the cellsToRemoveList:

for each cellIndex included in the cellsToRemoveList:

remove the entry with the matching cellIndex from the cellsToAddModList;

if the received measObject includes the cellsToAddModList:

for each cellIndex value included in the cellsToAddModList:

if an entry with the matching cellIndex exists in the cellsToAddModList:

replace the entry with the value received for this cellIndex;

else:

add a new entry for the received cellIndex to the cellsToAddModList;

if the received measObject includes the blackCellsToRemoveList:

for each cellIndex included in the blackCellsToRemoveList:

remove the entry with the matching cellIndex from the blackCellsToAddModList;

NOTE 1: For each cellIndex included in the blackCellsToRemoveList that concerns overlapping ranges of cells, a cell is removed from the black list of cells only if all cell indexes containing it are removed.

if the received measObject includes the blackCellsToAddModList:

for each cellIndex included in the blackCellsToAddModList:

if an entry with the matching cellIndex is included in the blackCellsToAddModList:

replace the entry with the value received for this cellIndex;

else:

add a new entry for the received cellIndex to the blackCellsToAddModList;

if the received measObject includes the whiteCellsToRemoveList:

for each cellIndex included in the whiteCellsToRemoveList:

remove the entry with the matching cellIndex from the whiteCellsToAddModList;

NOTE 2: For each cellIndex included in the whiteCellsToRemoveList that concerns overlapping ranges of cells, a cell is removed from the white list of cells only if all cell indexes containing it are removed.

if the received measObject includes the whiteCellsToAddModList:

for each cellIndex included in the whiteCellsToAddModList:

if an entry with the matching cellIndex is included in the whiteCellsToAddModList:

replace the entry with the value received for this cellIndex;

else:
6> add a new entry for the received cellIndex to the whiteCellsToAddModList;

3> if the received measObject includes the altTTT-CellsToRemoveList:
   4> for each cellIndex included in the altTTT-CellsToRemoveList:
      5> remove the entry with the matching cellIndex from the altTTT-CellsToAddModList;

NOTE 3: For each cellIndex included in the altTTT-CellsToRemoveList that concerns overlapping ranges of cells, a cell is removed from the list of cells only if all cell indexes containing it are removed.

3> if the received measObject includes the altTTT-CellsToAddModList:
   4> for each cellIndex value included in the altTTT-CellsToAddModList:
      5> if an entry with the matching cellIndex exists in the altTTT-CellsToAddModList:
         6> replace the entry with the value received for this cellIndex;
      5> else:
         6> add a new entry for the received cellIndex to the altTTT-CellsToAddModList;

3> if the received measObject includes measSubframePatternConfigNeigh:
   4> set measSubframePatternConfigNeigh within the VarMeasConfig to the value of the received field

3> if the received measObject includes measDS-Config:
   4> if measDS-Config is set to setup:
      5> if the received measDS-Config includes the measCSI-RS-ToRemoveList:
         6> for each measCSI-RS-Id included in the measCSI-RS-ToRemoveList:
            7> remove the entry with the matching measCSI-RS-Id from the measCSI-RS-ToAddModList;
      5> if the received measDS-Config includes the measCSI-RS-ToAddModList, for each measCSI-RS-Id value included in the measCSI-RS-ToAddModList:
         6> if an entry with the matching measCSI-RS-Id exists in the measCSI-RS-ToAddModList:
            7> replace the entry with the value received for this measCSI-RS-Id;
      6> else:
         7> add a new entry for the received measCSI-RS-Id to the measCSI-RS-ToAddModList;
      5> set other fields of the measDS-Config within the VarMeasConfig to the value of the received fields;
   4> else:
      5> release the discovery signals measurement configuration;

3> for each measId associated with this measObjectId in the measIdList within the VarMeasConfig, if any:
   4> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
   4> stop the periodical reporting timer or timer T321, whichever one is running, and reset the associated information (e.g. timeToTrigger) for this measId;

3> if the received measObject includes the wlan-ToRemoveList:
   4> for each WLAN-Identifiers included in the wlan-ToRemoveList:
5> remove the entry with the matching WLAN-Identifiers from the wlan-ToAddModList;

NOTE 3a: Matching of WLAN-Identifiers requires that all WLAN identifier fields should be same.

3> if the received measObject includes the wlan-ToAddModList:
   4> for each WLAN-Identifiers included in the wlan-ToAddModList:
      5> add a new entry for the received WLAN-Identifiers to the wlan-ToAddModList;
   2> else:
3> add a new entry for the received measObject to the measObjectList within VarMeasConfig;

NOTE 4: UE does not need to retain cellForWhichToReportCGI in the measObject after reporting cgi-Info.

5.5.2.6 Reporting configuration removal

The UE shall:

1> for each reportConfigId included in the received reportConfigToRemoveList that is part of the current UE configuration in VarMeasConfig:
   2> remove the entry with the matching reportConfigId from the reportConfigList within the VarMeasConfig;
   2> remove all measId associated with the reportConfigId from the measIdList within the VarMeasConfig, if any;
   2> if a measId is removed from the measIdList:
      3> remove the measurement reporting entry for this measId from the VarMeasReportList, if included;
      3> stop the periodical reporting timer or timer T321, whichever one is running, and reset the associated information (e.g. timeToTrigger) for this measId;

NOTE: The UE does not consider the message as erroneous if the reportConfigToRemoveList includes any reportConfigId value that is not part of the current UE configuration.

5.5.2.7 Reporting configuration addition/ modification

The UE shall:

1> for each reportConfigId included in the received reportConfigToAddModList:
   2> if an entry with the matching reportConfigId exists in the reportConfigList within the VarMeasConfig, for this entry:
      3> reconfigure the entry with the value received for this reportConfig;
   3> for each measId associated with this reportConfigId included in the measIdList within the VarMeasConfig, if any:
      4> remove the measurement reporting entry for this measId from in VarMeasReportList, if included;
      4> stop the periodical reporting timer or timer T321, whichever one is running, and reset the associated information (e.g. timeToTrigger) for this measId;
   2> else:
3> add a new entry for the received reportConfig to the reportConfigList within the VarMeasConfig;

5.5.2.8 Quantity configuration

The UE shall:

1> for each RAT for which the received quantityConfig includes parameter(s):
5.5.2.9 Measurement gap configuration

The UE shall:

1> if measGapConfig is set to setup:

2> if a measurement gap configuration is already setup, release the measurement gap configuration;

2> setup the measurement gap configuration indicated by the measGapConfig in accordance with the received gapOffset, i.e., the first subframe of each gap occurs at an SFN and subframe meeting the following condition (SFN and subframe of MCG cells):

\[
\text{SFN mod } T = \text{FLOOR}(\text{gapOffset}/10); \\
\text{subframe} = \text{gapOffset} \mod 10;
\]

with \( T = \text{MGRP}/10 \) as defined in TS 36.133 [16];

NOTE: The UE applies a single gap, which timing is relative to the MCG cells, even when configured with DC.

1> else:

2> release the measurement gap configuration;

5.5.2.10 Discovery signals measurement timing configuration

The UE shall setup the discovery signals measurement timing configuration (DMTC) in accordance with the received dmtc-PeriodOffset, i.e., the first subframe of each DMTC occasion occurs at an SFN and subframe of the PCell meeting the following condition:

\[
\text{SFN mod } T = \text{FLOOR}(\text{dmtc-Offset}/10); \\
\text{subframe} = \text{dmtc-Offset} \mod 10;
\]

with \( T = \text{dmtc-Periodicity}/10 \);

On the concerned frequency, the UE shall not consider discovery signals transmission in subframes outside the DMTC occasion.

5.5.2.11 RSSI measurement timing configuration

The UE shall setup the RSSI measurement timing configuration (RMTC) in accordance with the received rmtc-Period, rmtc-SubframeOffset if configured otherwise determined by the UE randomly, i.e. the first symbol of each RMTC occasion occurs at first symbol of an SFN and subframe of the PCell meeting the following condition:

\[
\text{SFN mod } T = \text{FLOOR}(\text{rmtc-SubframeOffset}/10); \\
\text{subframe} = \text{rmtc-SubframeOffset} \mod 10;
\]

with \( T = \text{rmtc-Period}/10 \);

On the concerned frequency, the UE shall not consider RSSI measurements outside the configured RMTC occasion which lasts for measDuration for RSSI and channel occupancy measurements.
5.5.3 Performing measurements

5.5.3.1 General

For all measurements, except for UE Rx–Tx time difference measurements, RSSI, UL PDCP Packet Delay per QCI measurement, channel occupancy measurements, and except for WLAN measurements of Band, Carrier Info, Available Admission Capacity, Backhaul Bandwidth, Channel Utilization, and Station Count, the UE applies the layer 3 filtering as specified in 5.5.3.2, before using the measured results for evaluation of reporting criteria or for measurement reporting.

The UE shall:

1> whenever the UE has a measConfig, perform RSRP and RSRQ measurements for each serving cell as follows:

2> for the PCell, apply the time domain measurement resource restriction in accordance with measSubframePatternPCell, if configured;

2> if the UE supports CRS based discovery signals measurement:

3> for each SCell in deactivated state, apply the discovery signals measurement timing configuration in accordance with measDS-Config, if configured within the measObject corresponding to the frequency of the SCell;

1> if the UE has a measConfig with rs-sinr-Config configured, perform RS-SINR (as indicated in the associated reportConfig) measurements as follows:

2> perform the corresponding measurements on the frequency indicated in the associated measObject using available idle periods or using autonomous gaps as necessary;

1> for each measId included in the measIdList within VarMeasConfig:

2> if the purpose for the associated reportConfig is set to reportCGI:

3> if si-RequestForHO is configured for the associated reportConfig:

4> perform the corresponding measurements on the frequency and RAT indicated in the associated measObject using autonomous gaps as necessary;

3> else:

4> perform the corresponding measurements on the frequency and RAT indicated in the associated measObject using available idle periods or using autonomous gaps as necessary;

NOTE 1: If autonomous gaps are used to perform measurements, the UE is allowed to temporarily abort communication with all serving cell(s), i.e. create autonomous gaps to perform the corresponding measurements within the limits specified in TS 36.133 [16]. Otherwise, the UE only supports the measurements with the purpose set to reportCGI only if E-UTRAN has provided sufficient idle periods.

3> try to acquire the global cell identity of the cell indicated by the cellForWhichToReportCGI in the associated measObject by acquiring the relevant system information from the concerned cell;

3> if the cell indicated by the cellForWhichToReportCGI included in the associated measObject is an E-UTRAN cell:

4> try to acquire the CSG identity, if the CSG identity is broadcast in the concerned cell;

4> try to acquire the trackingAreaCode in the concerned cell;

4> try to acquire the list of additional PLMN Identities, as included in the plmn-IdentityList, if multiple PLMN identities are broadcast in the concerned cell;

4> if the includeMultiBandInfo is configured:

5> try to acquire the freqBandIndicator in the SystemInformationBlockType1 of the concerned cell;

5> try to acquire the list of additional frequency band indicators, as included in the multiBandInfoList, if multiple frequency band indicators are included in the SystemInformationBlockType1 of the concerned cell;
5> try to acquire the freqBandIndicatorPriority, if the freqBandIndicatorPriority is included in the SystemInformationBlockType1 of the concerned cell;

NOTE 2: The 'primary' PLMN is part of the global cell identity.

3> if the cell indicated by the cellForWhichToReportCGI included in the associated measObject is a UTRAN cell:
   4> try to acquire the LAC, the RAC and the list of additional PLMN Identities, if multiple PLMN identities are broadcast in the concerned cell;
   4> try to acquire the CSG identity, if the CSG identity is broadcast in the concerned cell;
3> if the cell indicated by the cellForWhichToReportCGI included in the associated measObject is a GERAN cell:
   4> try to acquire the RAC in the concerned cell;
3> if the cell indicated by the cellForWhichToReportCGI included in the associated measObject is a CDMA2000 cell and the cdma2000-Type included in the measObject is typeHRPD:
   4> try to acquire the Sector ID in the concerned cell;
3> if the cell indicated by the cellForWhichToReportCGI included in the associated measObject is a CDMA2000 cell and the cdma2000-Type included in the measObject is type1XRTT:
   4> try to acquire the BASE ID, SID and NID in the concerned cell;

2> if the ul-DelayConfig is configured for the associated reportConfig:

3> ignore the measObject;
3> configure the PDCP layer to perform UL PDCP Packet Delay per QCI measurement;
2> else:
3> if a measurement gap configuration is setup; or
3> if the UE does not require measurement gaps to perform the concerned measurements:
   4> if s-Measure is not configured; or
   4> if s-Measure is configured and the PCell RSRP, after layer 3 filtering, is lower than this value; or
   4> if measDS-Config is configured in the associated measObject:
   5> if the UE supports CSI-RS based discovery signals measurement; and
   5> if the eventId in the associated reportConfig is set to eventC1 or eventC2, or if reportStrongestCSI-RSs is included in the associated reportConfig:
   6> perform the corresponding measurements of CSI-RS resources on the frequency indicated in the concerned measObject, applying the discovery signals measurement timing configuration in accordance with measDS-Config in the concerned measObject;
   6> if reportCRS-Meas is included in the associated reportConfig, perform the corresponding measurements of neighbouring cells on the frequencies indicated in the concerned measObject as follows:
   7> for neighbouring cells on the primary frequency, apply the time domain measurement resource restriction in accordance with measSubframePatternConfigNeigh, if configured in the concerned measObject;
   7> apply the discovery signals measurement timing configuration in accordance with measDS-Config in the concerned measObject;

5> else:
6> perform the corresponding measurements of neighbouring cells on the frequencies and RATs indicated in the concerned measObject as follows:

7> for neighbouring cells on the primary frequency, apply the time domain measurement resource restriction in accordance with measSubframePatternConfigNeigh, if configured in the concerned measObject;

7> if the UE supports CRS based discovery signals measurement, apply the discovery signals measurement timing configuration in accordance with measDS-Config, if configured in the concerned measObject;

4> if the ue-RxTxTimeDiffPeriodical is configured in the associated reportConfig:

5> perform the UE Rx–Tx time difference measurements on the PCell;

4> if the reportSSTD-Meas is set to true in the associated reportConfig:

5> perform SSTD measurements between the PCell and the PSCell;

4> if the measRSSI-ReportConfig is configured in the associated reportConfig:

5> perform the RSSI and channel occupancy measurements on the frequency indicated in the associated measObject;

2> perform the evaluation of reporting criteria as specified in 5.5.4;

NOTE 3: The s-Measure defines when the UE is required to perform measurements. The UE is however allowed to perform measurements also when the PCell RSRP exceeds s-Measure, e.g., to measure cells broadcasting a CSG identity following use of the autonomous search function as defined in TS 36.304 [4].

NOTE 4: The UE may not perform the WLAN measurements it is configured with e.g. due to connection to another WLAN based on user preferences as specified in TS 23.402 [75] or due to turning off WLAN.

5.5.3.2 Layer 3 filtering

The UE shall:

1> for each measurement quantity that the UE performs measurements according to 5.5.3.1:

NOTE 1: This does not include quantities configured solely for UE Rx-Tx time difference, SSTD measurements and RSSI, channel occupancy measurements, WLAN measurements of Band, Carrier Info, Available Admission Capacity, Backhaul Bandwidth, Channel Utilization, and Station Count, and UL PDCP Packet Delay per QCI measurement i.e. for those types of measurements the UE ignores the triggerQuantity and reportQuantity.

2> filter the measured result, before using for evaluation of reporting criteria or for measurement reporting, by the following formula:

\[ F_n = (1 - a) \cdot F_{n-1} + a \cdot M_n \]

where

\( M_n \) is the latest received measurement result from the physical layer;

\( F_n \) is the updated filtered measurement result, that is used for evaluation of reporting criteria or for measurement reporting;

\( F_{n-1} \) is the old filtered measurement result, where \( F_0 \) is set to \( M_1 \) when the first measurement result from the physical layer is received; and

\( a = 1/2^k \cdot (a/k) \), where \( k \) is the filterCoefficient for the corresponding measurement quantity received by the quantityConfig;

2> adapt the filter such that the time characteristics of the filter are preserved at different input rates, observing that the filterCoefficient \( k \) assumes a sample rate equal to 200 ms;
NOTE 2: If $k$ is set to 0, no layer 3 filtering is applicable.

NOTE 3: The filtering is performed in the same domain as used for evaluation of reporting criteria or for measurement reporting, i.e., logarithmic filtering for logarithmic measurements.

NOTE 4: The filter input rate is implementation dependent, to fulfil the performance requirements set in [16]. For further details about the physical layer measurements, see TS 36.133 [16].

5.5.4 Measurement report triggering

5.5.4.1 General

If security has been activated successfully, the UE shall:

1. for each $measId$ included in the $measIdList$ within $VarMeasConfig$:
   2. if the corresponding $reportConfig$ includes a purpose set to $reportStrongestCellsForSON$:
   3. consider any neighbouring cell detected on the associated frequency to be applicable;
   2. else if the corresponding $reportConfig$ includes a purpose set to $reportCGI$:
   3. consider any neighbouring cell detected on the associated frequency/ set of frequencies (GERAN) which has a physical cell identity matching the value of the $cellForWhichToReportCGI$ included in the corresponding $measObject$ within the $VarMeasConfig$ to be applicable;
   2. else:
   3. if the corresponding $measObject$ concerns E-UTRA:
      4. if the $ue-RxTxTimeDiffPeriodical$ is configured in the corresponding $reportConfig$:
         5. consider only the PCell to be applicable;
      4. else if the $reportSSTD-Meas$ is set to $true$ in the corresponding $reportConfig$:
         5. consider the PSCell to be applicable;
      4. else if the $eventA1$ or $eventA2$ is configured in the corresponding $reportConfig$:
         5. consider only the serving cell to be applicable;
      4. else if $eventC1$ or $eventC2$ is configured in the corresponding $reportConfig$; or if $reportStrongestCSI-RSs$ is included in the corresponding $reportConfig$:
         5. consider a CSI-RS resource on the associated frequency to be applicable when the concerned CSI-RS resource is included in the $measCSI-RS-ToAddModList$ defined within the $VarMeasConfig$ for this $measId$;
      4. else if $measRSSI-ReportConfig$ is configured in the corresponding $reportConfig$:
         5. consider the resource indicated by the $rmRc-Config$ on the associated frequency to be applicable;
      4. else:
         5. if $useWhiteCellList$ is set to $TRUE$:
            6. consider any neighbouring cell detected on the associated frequency to be applicable when the concerned cell is included in the $whiteCellsToAddModList$ defined within the $VarMeasConfig$ for this $measId$;
         5. else:
            6. consider any neighbouring cell detected on the associated frequency to be applicable when the concerned cell is not included in the $blackCellsToAddModList$ defined within the $VarMeasConfig$ for this $measId$;
5> for events involving a serving cell on one frequency and neighbours on another frequency, consider the serving cell on the other frequency as a neighbouring cell;

4> if the corresponding reportConfig includes alternativeTimeToTrigger and if the UE supports alternativeTimeToTrigger:

5> use the value of alternativeTimeToTrigger as the time to trigger instead of the value of timeToTrigger in the corresponding reportConfig for cells included in the altTTT-CellsToAddModList of the corresponding measObject;

3> else if the corresponding measObject concerns UTRA or CDMA2000:

4> consider a neighbouring cell on the associated frequency to be applicable when the concerned cell is included in the cellsToAddModList defined within the VarMeasConfig for this measId (i.e. the cell is included in the white-list);

NOTE 0: The UE may also consider a neighbouring cell on the associated UTRA frequency to be applicable when the concerned cell is included in the csg-allowedReportingCells within the VarMeasConfig for this measId, if configured in the corresponding measObjectUTRA (i.e. the cell is included in the range of physical cell identities for which reporting is allowed).

3> else if the corresponding measObject concerns GERAN:

4> consider a neighbouring cell on the associated set of frequencies to be applicable when the concerned cell matches the ncc-Permitted defined within the VarMeasConfig for this measId;

3> else if the corresponding measObject concerns WLAN:

4> consider a WLAN on the associated set of frequencies, as indicated by carrierFreq or on all WLAN frequencies when carrierFreq is not present, to be applicable if the WLAN matches all WLAN identifiers of at least one entry within wlan-Id-List for this measId;

2> if the triggerType is set to event and if the entry condition applicable for this event, i.e. the event corresponding with the eventId of the corresponding reportConfig within VarMeasConfig, is fulfilled for one or more applicable cells for all measurements after layer 3 filtering taken during timeToTrigger defined for this event within the VarMeasConfig, while the VarMeasReportList does not include an measurement reporting entry for this measId (a first cell triggers the event):

3> include a measurement reporting entry within the VarMeasReportList for this measId;

3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;

3> include the concerned cell(s) in the cellsTriggeredList defined within the VarMeasReportList for this measId;

3> if the UE supports T312 and if useT312 is included for this event and if T310 is running:

4> if T312 is not running:

5> start timer T312 with the value configured in the corresponding measObject;

3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> if the triggerType is set to event and if the entry condition applicable for this event, i.e. the event corresponding with the eventId of the corresponding reportConfig within VarMeasConfig, is fulfilled for one or more applicable cells not included in the cellsTriggeredList for all measurements after layer 3 filtering taken during timeToTrigger defined for this event within the VarMeasConfig (a subsequent cell triggers the event):

3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;

3> include the concerned cell(s) in the cellsTriggeredList defined within the VarMeasReportList for this measId;

3> if the UE supports T312 and if useT312 is included for this event and if T310 is running:

4> if T312 is not running:

5> start timer T312 with the value configured in the corresponding measObject;
3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> if the triggerType is set to event and if the leaving condition applicable for this event is fulfilled for one or more of the cells included in the cellsTriggeredList defined within the VarMeasReportList for this measId for all measurements after layer 3 filtering taken during timeToTrigger defined within the VarMeasConfig for this event:

3> remove the concerned cell(s) in the cellsTriggeredList defined within the VarMeasReportList for this measId;

3> if the UE supports T312 and if useT312 is included for this event and if T310 is running:

4> if T312 is not running:

5> start timer T312 with the value configured in the corresponding measObject;

3> if reportOnLeave is set to TRUE for the corresponding reporting configuration or if a6-ReportOnLeave is set to TRUE for the corresponding reporting configuration:

4> initiate the measurement reporting procedure, as specified in 5.5.5;

3> if the cellsTriggeredList defined within the VarMeasReportList for this measId is empty:

4> remove the measurement reporting entry within the VarMeasReportList for this measId;

4> stop the periodical reporting timer for this measId, if running;

2> if the triggerType is set to event and if the entry condition applicable for this event, i.e. the event corresponding with the eventId of the corresponding reportConfig within VarMeasConfig, is fulfilled for one or more applicable CSI-RS resources for all measurements after layer 3 filtering taken during timeToTrigger defined within the VarMeasConfig, while the VarMeasReportList does not include an measurement reporting entry for this measId (i.e. a first CSI-RS resource triggers the event):

3> include a measurement reporting entry within the VarMeasReportList for this measId;

3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;

3> include the concerned CSI-RS resource(s) in the csi-RS-TriggeredList defined within the VarMeasReportList for this measId;

3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> if the triggerType is set to event and if the entry condition applicable for this event, i.e. the event corresponding with the eventId of the corresponding reportConfig within VarMeasConfig, is fulfilled for one or more applicable CSI-RS resources not included in the csi-RS-TriggeredList for all measurements after layer 3 filtering taken during timeToTrigger defined for this event within the VarMeasConfig (i.e. a subsequent CSI-RS resource triggers the event):

3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;

3> include the concerned CSI-RS resource(s) in the csi-RS-TriggeredList defined within the VarMeasReportList for this measId;

3> initiate the measurement reporting procedure, as specified in 5.5.5;

2> if the triggerType is set to event and if the leaving condition applicable for this event is fulfilled for one or more of the CSI-RS resources included in the csi-RS-TriggeredList defined within the VarMeasReportList for this measId for all measurements after layer 3 filtering taken during timeToTrigger defined within the VarMeasConfig for this event:

3> remove the concerned CSI-RS resource(s) in the csi-RS-TriggeredList defined within the VarMeasReportList for this measId;

3> if c1-ReportOnLeave is set to TRUE for the corresponding reporting configuration or if c2-ReportOnLeave is set to TRUE for the corresponding reporting configuration:

4> initiate the measurement reporting procedure, as specified in 5.5.5;
3> if the csi-RS-TriggeredList defined within the VarMeasReportList for this measId is empty:
   4> remove the measurement reporting entry within the VarMeasReportList for this measId;
   4> stop the periodical reporting timer for this measId, if running;
2> if measRSSI-ReportConfig is included and if a (first) measurement result is available:
3> include a measurement reporting entry within the VarMeasReportList for this measId;
3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
3> initiate the measurement reporting procedure as specified in 5.5.5 immediately when RSSI sample values are reported by the physical layer after the first L1 measurement duration;
   2> else if the purpose is included and set to reportStrongestCells or to reportStrongestCellsForSON and if a (first) measurement result is available:
3> include a measurement reporting entry within the VarMeasReportList for this measId;
3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
3> if the purpose is set to reportStrongestCells and reportStrongestCSI-RSs is not included:
   4> if the triggerType is set to periodical and the corresponding reportConfig includes the ul-DelayConfig:
      5> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after a first measurement result is provided by lower layers;
   4> else if the reportAmount exceeds 1:
      5> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for the PCell;
   4> else (i.e. the reportAmount is equal to 1):
      5> initiate the measurement reporting procedure, as specified in 5.5.5, immediately after the quantity to be reported becomes available for the PCell and for the strongest cell among the applicable cells, or becomes available for the pair of PCell and the PSCell in case of SSTD measurements;
3> else:
   4> initiate the measurement reporting procedure, as specified in 5.5.5, when it has determined the strongest cells on the associated frequency;
   2> upon expiry of the periodical reporting timer for this measId:
3> initiate the measurement reporting procedure, as specified in 5.5.5;
   2> if the purpose is included and set to reportCGI and if the UE acquired the information needed to set all fields of cgi-Info for the requested cell:
3> include a measurement reporting entry within the VarMeasReportList for this measId;
3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
3> stop timer T321;
3> initiate the measurement reporting procedure, as specified in 5.5.5;
   2> upon expiry of the T321 for this measId:
3> include a measurement reporting entry within the VarMeasReportList for this measId;
3> set the numberOfReportsSent defined within the VarMeasReportList for this measId to 0;
3> initiate the measurement reporting procedure, as specified in 5.5.5;
NOTE 2: The UE does not stop the periodical reporting with triggerType set to event or to periodical while the corresponding measurement is not performed due to the PCell RSRP being equal to or better than s-Measure or due to the measurement gap not being setup.

NOTE 3: If the UE is configured with DRX, the UE may delay the measurement reporting for event triggered and periodical triggered measurements until the Active Time, which is defined in TS 36.321 [6].

5.5.4.2 Event A1 (Serving becomes better than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition A1-1, as specified below, is fulfilled;
1> consider the leaving condition for this event to be satisfied when condition A1-2, as specified below, is fulfilled;
1> for this measurement, consider the primary or secondary cell that is configured on the frequency indicated in the associated measObjectEUTRA to be the serving cell;

Inequality A1-1 (Entering condition)

\[ Ms - Hys > Thresh \]

Inequality A1-2 (Leaving condition)

\[ Ms + Hys < Thresh \]

The variables in the formula are defined as follows:

- \( Ms \) is the measurement result of the serving cell, not taking into account any offsets.
- \( Hys \) is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigEUTRA for this event).
- \( Thresh \) is the threshold parameter for this event (i.e. a1-Threshold as defined within reportConfigEUTRA for this event).

\( Ms \) is expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

\( Hys \) is expressed in dB.

\( Thresh \) is expressed in the same unit as \( Ms \).

5.5.4.3 Event A2 (Serving becomes worse than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition A2-1, as specified below, is fulfilled;
1> consider the leaving condition for this event to be satisfied when condition A2-2, as specified below, is fulfilled;
1> for this measurement, consider the primary or secondary cell that is configured on the frequency indicated in the associated measObjectEUTRA to be the serving cell;

Inequality A2-1 (Entering condition)

\[ Ms + Hys < Thresh \]

Inequality A2-2 (Leaving condition)

\[ Ms - Hys > Thresh \]

The variables in the formula are defined as follows:

- \( Ms \) is the measurement result of the serving cell, not taking into account any offsets.
- \( Hys \) is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigEUTRA for this event).
**Thresh** is the threshold parameter for this event (i.e. \textit{a2-Threshold} as defined within \textit{reportConfigEUTRA} for this event).

\textit{Ms} is expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

\textit{Hys} is expressed in dB.

**Thresh** is expressed in the same unit as \textit{Ms}.

### 5.5.4.4 Event A3 (Neighbour becomes offset better than PCell/ PSCell)

The UE shall:

1. consider the entering condition for this event to be satisfied when condition A3-1, as specified below, is fulfilled;
1. consider the leaving condition for this event to be satisfied when condition A3-2, as specified below, is fulfilled;
1. if \textit{usePSCell} of the corresponding \textit{reportConfig} is set to \textit{true}:
   2. use the PSCell for \textit{Mp}, \textit{Ofp} and \textit{Ocp};
1. else:
   2. use the PCell for \textit{Mp}, \textit{Ofp} and \textit{Ocp};

**NOTE** The cell(s) that triggers the event is on the frequency indicated in the associated \textit{measObject} which may be different from the frequency used by the PCell/ PSCell.

**Inequality A3-1 (Entering condition)**

\[ Mn + Ofn + Ocn - Hys > Mp + Ofp + Ocp + Off \]

**Inequality A3-2 (Leaving condition)**

\[ Mn + Ofn + Ocn + Hys < Mp + Ofp + Ocp + Off \]

The variables in the formula are defined as follows:

\textit{Mn} is the measurement result of the neighbouring cell, not taking into account any offsets.

\textit{Ofn} is the frequency specific offset of the frequency of the neighbour cell (i.e. \textit{offsetFreq} as defined within \textit{measObjectEUTRA} corresponding to the frequency of the neighbour cell).

\textit{Ocn} is the cell specific offset of the neighbour cell (i.e. \textit{cellIndividualOffset} as defined within \textit{measObjectEUTRA} corresponding to the frequency of the neighbour cell), and set to zero if not configured for the neighbour cell.

\textit{Mp} is the measurement result of the PCell/ PSCell, not taking into account any offsets.

\textit{Ofp} is the frequency specific offset of the frequency of the PCell/ PSCell (i.e. \textit{offsetFreq} as defined within \textit{measObjectEUTRA} corresponding to the frequency of the PCell/ PSCell).

\textit{Ocp} is the cell specific offset of the PCell/ PSCell (i.e. \textit{cellIndividualOffset} as defined within \textit{measObjectEUTRA} corresponding to the frequency of the PCell/ PSCell), and is set to zero if not configured for the PCell/ PSCell.

\textit{Hys} is the hysteresis parameter for this event (i.e. \textit{hysteresis} as defined within \textit{reportConfigEUTRA} for this event).

\textit{Off} is the offset parameter for this event (i.e. \textit{a3-Offset} as defined within \textit{reportConfigEUTRA} for this event).

\textit{Mn}, \textit{Mp} are expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

\textit{Ofn}, \textit{Ocn}, \textit{Ofp}, \textit{Ocp}, \textit{Hys}, \textit{Off} are expressed in dB.

### 5.5.4.5 Event A4 (Neighbour becomes better than threshold)

The UE shall:

1. consider the entering condition for this event to be satisfied when condition A4-1, as specified below, is fulfilled;
1> consider the leaving condition for this event to be satisfied when condition A4-2, as specified below, is fulfilled;

Inequality A4-1 (Entering condition)

\[ M_\text{n} + O_\text{fn} + O_\text{cn} - H_\text{ys} > Thresh \]

Inequality A4-2 (Leaving condition)

\[ M_\text{n} + O_\text{fn} + O_\text{cn} + H_\text{ys} < Thresh \]

The variables in the formula are defined as follows:

- \( M_\text{n} \) is the measurement result of the neighbouring cell, not taking into account any offsets.
- \( O_\text{fn} \) is the frequency specific offset of the frequency of the neighbour cell (i.e. offsetFreq as defined within measObjectEUTRA corresponding to the frequency of the neighbour cell).
- \( O_\text{cn} \) is the cell specific offset of the neighbour cell (i.e. cellIndividualOffset as defined within measObjectEUTRA corresponding to the frequency of the neighbour cell), and set to zero if not configured for the neighbour cell.
- \( H_\text{ys} \) is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigEUTRA for this event).
- \( Thresh \) is the threshold parameter for this event (i.e. a4-Threshold as defined within reportConfigEUTRA for this event).

\( M_\text{n} \) is expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.

\( O_\text{fn}, O_\text{cn}, H_\text{ys} \) are expressed in dB.

\( Thresh \) is expressed in the same unit as \( M_\text{n} \).

### 5.5.4.6 Event A5 (PCell/ PSCell becomes worse than threshold1 and neighbour becomes better than threshold2)

The UE shall:

1> consider the entering condition for this event to be satisfied when both condition A5-1 and condition A5-2, as specified below, are fulfilled;

1> consider the leaving condition for this event to be satisfied when condition A5-3 or condition A5-4, i.e. at least one of the two, as specified below, is fulfilled;

1> if \( usePSCell \) of the corresponding reportConfig is set to true:

2> use the PSCell for \( M_\text{p} \);

1> else:

2> use the PCell for \( M_\text{p} \);

NOTE: The cell(s) that triggers the event is on the frequency indicated in the associated measObject which may be different from the frequency used by the PCell/ PSCell.

Inequality A5-1 (Entering condition 1)

\[ M_\text{p} + H_\text{ys} < Threshl \]

Inequality A5-2 (Entering condition 2)

\[ M_\text{n} + O_\text{fn} + O_\text{cn} - H_\text{ys} > Thresh2 \]

Inequality A5-3 (Leaving condition 1)

\[ M_\text{p} - H_\text{ys} > Threshl \]

Inequality A5-4 (Leaving condition 2)
\[ Mn + Ofn + Ocn + Hys < \text{Thresh2} \]

The variables in the formula are defined as follows:

- **Mp** is the measurement result of the PCell/ PSCell, not taking into account any offsets.
- **Mn** is the measurement result of the neighbouring cell, not taking into account any offsets.
- **Ofn** is the frequency specific offset of the frequency of the neighbour cell (i.e. `offsetFreq` as defined within `measObjectEUTRA` corresponding to the frequency of the neighbour cell).
- **Ocn** is the cell specific offset of the neighbour cell (i.e. `cellIndividualOffset` as defined within `measObjectEUTRA` corresponding to the frequency of the neighbour cell), and set to zero if not configured for the neighbour cell.
- **Hys** is the hysteresis parameter for this event (i.e. `hysteresis` as defined within `reportConfigEUTRA` for this event).
- **Thresh1** is the threshold parameter for this event (i.e. `a5-Threshold1` as defined within `reportConfigEUTRA` for this event).
- **Thresh2** is the threshold parameter for this event (i.e. `a5-Threshold2` as defined within `reportConfigEUTRA` for this event).
- **Mn, Mp** are expressed in dBm in case of RSRP, or in dB in case of RSRQ and RS-SINR.
- **Ofn, Ocn, Hys** are expressed in dB.
- **Thresh1** is expressed in the same unit as **Mp**.
- **Thresh2** is expressed in the same unit as **Mn**.

### 5.5.4.6a Event A6 (Neighbour becomes offset better than SCell)

The UE shall:

1. consider the entering condition for this event to be satisfied when condition A6-1, as specified below, is fulfilled;
2. consider the leaving condition for this event to be satisfied when condition A6-2, as specified below, is fulfilled;
3. for this measurement, consider the (secondary) cell that is configured on the frequency indicated in the associated `measObjectEUTRA` to be the serving cell;

**NOTE:** The neighbour(s) is on the same frequency as the SCell i.e. both are on the frequency indicated in the associated `measObject`.

Inequality A6-1 (Entering condition)

\[ Mn + Ocn - Hys > Ms + Ocs + Off \]

Inequality A6-2 (Leaving condition)

\[ Mn + Ocn + Hys < Ms + Ocs + Off \]

The variables in the formula are defined as follows:

- **Mn** is the measurement result of the neighbouring cell, not taking into account any offsets.
- **Ocn** is the cell specific offset of the neighbour cell (i.e. `cellIndividualOffset` as defined within `measObjectEUTRA` corresponding to the frequency of the neighbour cell), and set to zero if not configured for the neighbour cell.
- **Ms** is the measurement result of the serving cell, not taking into account any offsets.
- **Ocs** is the cell specific offset of the serving cell (i.e. `cellIndividualOffset` as defined within `measObjectEUTRA` corresponding to the serving frequency), and is set to zero if not configured for the serving cell.
- **Hys** is the hysteresis parameter for this event (i.e. `hysteresis` as defined within `reportConfigEUTRA` for this event).
- **Off** is the offset parameter for this event (i.e. `a6-Offset` as defined within `reportConfigEUTRA` for this event).
5.5.4.7 Event B1 (Inter RAT neighbour becomes better than threshold)

The UE shall:

1> for UTRA and CDMA2000, only trigger the event for cells included in the corresponding measurement object;
2> consider the entering condition for this event to be satisfied when condition B1-1, as specified below, is fulfilled;
3> consider the leaving condition for this event to be satisfied when condition B1-2, as specified below, is fulfilled;

Inequality B1-1 (Entering condition)
\[ Mn + Ofn - Hys > \text{Thresh} \]

Inequality B1-2 (Leaving condition)
\[ Mn + Ofn + Hys < \text{Thresh} \]

The variables in the formula are defined as follows:

- \( Mn \) is the measurement result of the inter-RAT neighbour cell, not taking into account any offsets. For CDMA 2000 measurement result, \( \text{pilotStrength} \) is divided by -2.
- \( Ofn \) is the frequency specific offset of the frequency of the inter-RAT neighbour cell (i.e. \( \text{offsetFreq} \) as defined within the \( \text{measObject} \) corresponding to the frequency of the neighbour inter-RAT cell).
- \( Hys \) is the hysteresis parameter for this event (i.e. \( \text{hysteresis} \) as defined within \( \text{reportConfigInterRAT} \) for this event).
- \( \text{Thresh} \) is the threshold parameter for this event (i.e. \( b1\text{-Threshold} \) as defined within \( \text{reportConfigInterRAT} \) for this event). For CDMA2000, \( b1\text{-Threshold} \) is divided by -2.

- \( Mn \) is expressed in dBm or in dB, depending on the measurement quantity of the inter-RAT neighbour cell.
- \( Ofn, Hys \) are expressed in dB.
- \( \text{Thresh} \) is expressed in the same unit as \( Mn \).

5.5.4.8 Event B2 (PCell becomes worse than threshold1 and inter RAT neighbour becomes better than threshold2)

The UE shall:

1> for UTRA and CDMA2000, only trigger the event for cells included in the corresponding measurement object;
2> consider the entering condition for this event to be satisfied when both condition B2-1 and condition B2-2, as specified below, are fulfilled;
3> consider the leaving condition for this event to be satisfied when condition B2-3 or condition B2-4, i.e. at least one of the two, as specified below, is fulfilled;

Inequality B2-1 (Entering condition 1)
\[ Mp + Hys < \text{Thresh} \]

Inequality B2-2 (Entering condition 2)
\[ Mn + Ofn - Hys > \text{Thresh2} \]

Inequality B2-3 (Leaving condition 1)
\[ Mp - Hys > \text{Threshl} \]
Inequality B2-4 (Leaving condition 2)

\[ M_n + O_fn + Hys < \text{Thresh2} \]

The variables in the formula are defined as follows:

- \( M_p \) is the measurement result of the PCell, not taking into account any offsets.
- \( M_n \) is the measurement result of the inter-RAT neighbour cell, not taking into account any offsets. For CDMA2000 measurement result, \( \text{pilotStrength} \) is divided by -2.
- \( O_{fn} \) is the frequency specific offset of the frequency of the inter-RAT neighbour cell (i.e. \( \text{offsetFreq as defined within the measObject corresponding to the frequency of the inter-RAT neighbour cell} \)).
- \( Hys \) is the hysteresis parameter for this event (i.e. \( \text{hysteresis as defined within reportConfigInterRAT for this event} \)).
- \( \text{Thresh1} \) is the threshold parameter for this event (i.e. \( b2-\text{Threshold1} \) as defined within reportConfigInterRAT for this event).
- \( \text{Thresh2} \) is the threshold parameter for this event (i.e. \( b2-\text{Threshold2} \) as defined within reportConfigInterRAT for this event). For CDMA2000, \( b2-\text{Threshold2} \) is divided by -2.
- \( M_p \) is expressed in dBm in case of RSRP, or in dB in case of RSRQ.
- \( M_n \) is expressed in dBm or dB, depending on the measurement quantity of the inter-RAT neighbour cell.
- \( O_{fn}, Hys \) are expressed in dB.
- \( \text{Thresh1} \) is expressed in the same unit as \( M_p \).
- \( \text{Thresh2} \) is expressed in the same unit as \( M_n \).

5.5.4.9 Event C1 (CSI-RS resource becomes better than threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition C1-1, as specified below, is fulfilled;
1> consider the leaving condition for this event to be satisfied when condition C1-2, as specified below, is fulfilled:

Inequality C1-1 (Entering condition)

\[ M_{cr} + O_{cr} - Hys > \text{Thresh} \]

Inequality C1-2 (Leaving condition)

\[ M_{cr} + O_{cr} + Hys < \text{Thresh} \]

The variables in the formula are defined as follows:

- \( M_{cr} \) is the measurement result of the CSI-RS resource, not taking into account any offsets.
- \( O_{cr} \) is the CSI-RS specific offset (i.e. \( \text{csi-RS-IndividualOffset as defined within measObjectEUTRA corresponding to the frequency of the CSI-RS resource} \), and set to zero if not configured for the CSI-RS resource).
- \( Hys \) is the hysteresis parameter for this event (i.e. \( \text{hysteresis as defined within reportConfigEUTRA for this event} \)).
- \( \text{Thresh} \) is the threshold parameter for this event (i.e. \( c1-\text{Threshold} \) as defined within reportConfigEUTRA for this event).

\( M_{cr}, \text{Thresh} \) are expressed in dBm.

\( O_{cr}, Hys \) are expressed in dB.
5.5.4.10 Event C2 (CSI-RS resource becomes offset better than reference CSI-RS resource)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition C2-1, as specified below, is fulfilled;
1> consider the leaving condition for this event to be satisfied when condition C2-2, as specified below, is fulfilled;

NOTE: The CSI-RS resource(s) that triggers the event is on the same frequency as the reference CSI-RS resource, i.e. both are on the frequency indicated in the associated measObject.

Inequality C2-1 (Entering condition)

\[ Mcr + Ocr - Hys > Mref + Oref + Off \]

Inequality C2-2 (Leaving condition)

\[ Mcr + Ocr + Hys < Mref + Oref + Off \]

The variables in the formula are defined as follows:

- **Mcr** is the measurement result of the CSI-RS resource, not taking into account any offsets.
- **Ocr** is the CSI-RS specific offset of the CSI-RS resource (i.e. csi-RS-IndividualOffset as defined within measObjectEUTRA corresponding to the frequency of the CSI-RS resource), and set to zero if not configured for the CSI-RS resource.
- **Mref** is the measurement result of the reference CSI-RS resource (i.e. c2-RefCSI-RS as defined within reportConfigEUTRA for this event), not taking into account any offsets.
- **Oref** is the CSI-RS specific offset of the reference CSI-RS resource (i.e. csi-RS-IndividualOffset as defined within measObjectEUTRA corresponding to the frequency of the reference CSI-RS resource), and is set to zero if not configured for the reference CSI-RS resource.
- **Hys** is the hysteresis parameter for this event (i.e. hysteresis as defined within reportConfigEUTRA for this event).
- **Off** is the offset parameter for this event (i.e. c2-Offset as defined within reportConfigEUTRA for this event).

\[ Mcr, Mref \] are expressed in dBm.

\[ Ocr, Oref, Hys, Off \] are expressed in dB.

5.5.4.11 Event W1 (WLAN becomes better than a threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when wlan-MobilitySet within VarWLAN-MobilityConfig does not contain any entries and condition W1-1, as specified below, is fulfilled;
1> consider the leaving condition for this event to be satisfied when condition W1-2, as specified below, is fulfilled;

Inequality W1-1 (Entering condition)

\[ Mn - Hys > Thresh \]

Inequality W1-2 (Leaving condition)

\[ Mn + Hys < Thresh \]

The variables in the formula are defined as follows:

- **Mn** is the measurement result of WLAN(s) configured in the measurement object, not taking into account any offsets.
- **Hys** is the hysteresis parameter for this event.
5.5.4.12 Event W2 (All WLAN inside WLAN mobility set becomes worse than threshold1 and a WLAN outside WLAN mobility set becomes better than threshold2)

The UE shall:

1> consider the entering condition for this event to be satisfied when both conditions W2-1 and W2-2 as specified below are fulfilled;

1> consider the leaving condition for this event to be satisfied when condition W2-3 or condition W2-4, i.e. at least one of the two, as specified below is fulfilled;

Inequality W2-1 (Entering condition 1)

\[ Ms + Hys < \text{Thresh1} \]

Inequality W2-2 (Entering condition 2)

\[ Mn - Hys > \text{Thresh2} \]

Inequality W2-3 (Leaving condition 1)

\[ Ms - Hys > \text{Thresh1} \]

Inequality W2-4 (Leaving condition 2)

\[ Mn + Hys < \text{Thresh2} \]

The variables in the formula are defined as follows:

\( Ms \) is the measurement result of WLAN(s) which matches all WLAN identifiers of at least one entry within \( wlan-MobilitySet \) in VarWLAN-MobilityConfig, not taking into account any offsets.

\( Mn \) is the measurement result of WLAN(s) configured in the measurement object which does not match all WLAN identifiers of any entry within \( wlan-MobilitySet \) in VarWLAN-MobilityConfig, not taking into account any offsets.

\( Hys \) is the hysteresis parameter for this event.

\( \text{Thresh1} \) is the threshold parameter for this event (i.e. \( w2-Threshold1 \) as defined within reportConfigInterRAT for this event).

\( \text{Thresh2} \) is the threshold parameter for this event (i.e. \( w2-Threshold2 \) as defined within reportConfigInterRAT for this event).

\( Mn, Ms \) are expressed in dBm.

\( Hys \) is expressed in dB.

\( \text{Thresh1} \) is expressed in the same unit as \( Ms \).

\( \text{Thresh2} \) is expressed in the same unit as \( Mn \).
5.5.4.13 Event W3 (All WLAN inside WLAN mobility set becomes worse than a threshold)

The UE shall:

1> consider the entering condition for this event to be satisfied when condition W3-1, as specified below, is fulfilled;

1> consider the leaving condition for this event to be satisfied when condition W3-2, as specified below, is fulfilled;

Inequality W3-1 (Entering condition)

\[ M_S + HYS < THRESH \]

Inequality W3-2 (Leaving condition)

\[ M_S - HYS > THRESH \]

The variables in the formula are defined as follows:

- \( M_S \) is the measurement result of WLAN(s) which matches all WLAN identifiers of at least one entry within wlan-MobilitySet in VarWLAN-MobilityConfig, not taking into account any offsets.
- \( HYS \) is the hysteresis parameter for this event.
- \( THRESH \) is the threshold parameter for this event (i.e. \( w3-\text{Threshold} \) as defined within reportConfigInterRAT for this event).

\( M_S \) is expressed in dBm.

\( HYS \) is expressed in dB.

\( THRESH \) is expressed in the same unit as \( M_S \).

5.5.5 Measurement reporting

![Figure 5.5.5-1: Measurement reporting](image)

The purpose of this procedure is to transfer measurement results from the UE to E-UTRAN. The UE shall initiate this procedure only after successful security activation.

For the \( \text{measId} \) for which the measurement reporting procedure was triggered, the UE shall set the \( \text{measResults} \) within the \( \text{MeasurementReport} \) message as follows:

1> set the \( \text{measId} \) to the measurement identity that triggered the measurement reporting;

1> set the \( \text{measResultPCell} \) to include the quantities of the PCell;

1> set the \( \text{measResultServFreqList} \) to include for each SCell that is configured, if any, within \( \text{measResultSCell} \) the quantities of the concerned SCell, if available according to performance requirements in [16];

1> if the \( \text{reportConfig} \) associated with the \( \text{measId} \) that triggered the measurement reporting includes \( \text{reportAddNeighMeas} \):

2> for each serving frequency for which \( \text{measObjectId} \) is referenced in the \( \text{measIdList} \), other than the frequency corresponding with the \( \text{measId} \) that triggered the measurement reporting:
set the measResultServFreqList to include within measResultBestNeighCell the physCellId and the quantities of the best non-serving cell, based on RSRP, on the concerned serving frequency;

if there is at least one applicable neighbouring cell to report:

set the measResultNeighCells to include the best neighbouring cells up to maxReportCells in accordance with the following:

if the triggerType is set to event:

include the cells included in the cellsTriggeredList as defined within the VarMeasReportList for this measId;

else:

include the applicable cells for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;

NOTE 1: The reliability of the report (i.e. the certainty it contains the strongest cells on the concerned frequency) depends on the measurement configuration i.e. the reportInterval. The related performance requirements are specified in TS 36.133 [16].

for each cell that is included in the measResultNeighCells, include the physCellId;

if the triggerType is set to event; or the purpose is set to reportStrongestCells or to reportStrongestCellsForSON:

for each included cell, include the layer 3 filtered measured results in accordance with the reportConfig for this measId, ordered as follows:

if the measObject associated with this measId concerns E-UTRA:

set the measResult to include the quantity(ies) indicated in the reportQuantity within the concerned reportConfig in order of decreasing triggerQuantity, i.e. the best cell is included first;

if the measObject associated with this measId concerns UTRA FDD and if ReportConfigInterRAT includes the reportQuantityUTRA-FDD:

set the measResult to include the quantities indicated by the reportQuantityUTRA-FDD within the quantityConfig, i.e. the best cell is included first;

if the measObject associated with this measId concerns UTRA FDD and if ReportConfigInterRAT does not include the reportQuantityUTRA-FDD; or

if the measObject associated with this measId concerns UTRA TDD, GERAN or CDMA2000:

set the measResult to the quantity as configured for the concerned RAT within the quantityConfig in order of either decreasing quantity for UTRA and GERAN or increasing quantity for CDMA2000 pilotStrength, i.e. the best cell is included first;

else if the purpose is set to reportCGI:

if the mandatory present fields of the cgi-Info for the cell indicated by the cellForWhichToReportCGI in the associated measObject have been obtained:

if the includeMultiBandInfo is configured:

include the freqBandIndicator;

if the cell broadcasts the multiBandInfoList, include the multiBandInfoList;

if the cell broadcasts the freqBandIndicatorPriority, include the freqBandIndicatorPriority;

if the cell broadcasts a CSG identity:

include the csg-Identity;
6> include the csg-MemberStatus and set it to member if the cell is a CSG member cell;

5> if the si-RequestForHO is configured within the reportConfig associated with this measId:

6> include the/cgi-Info containing all the fields that have been successfully acquired and in accordance with the following:

7> if the cell is a CSG member cell, determine the subset of the PLMN identities, starting from the second entry of PLMN identities in the broadcast information, that meet the following conditions:

a) equal to the RPLMN or an EPLMN; and

b) the CSG whitelist of the UE includes an entry comprising of the concerned PLMN identity and the CSG identity broadcast by the cell;

7> if the subset of PLMN identities determined according to the previous includes at least one PLMN identity, include the plmn-IdentityList and set it to include this subset of the PLMN identities;

7> if the cell is a CSG member cell, include the primaryPLMN-Suitable if the primary PLMN meets conditions a) and b) specified above;

5> else:

6> include the/cgi-Info containing all the fields that have been successfully acquired and in accordance with the following:

7> include in the plmn-IdentityList the list of identities starting from the second entry of PLMN Identities in the broadcast information;

1> for the cells included according to the previous (i.e. covering the PCell, the SCells, the best non-serving cells on serving frequencies as well as neighbouring EUTRA cells) include results according to the extended RSRQ if corresponding results are available according to the associated performance requirements defined in 36.133 [16];

1> if there is at least one applicable CSI-RS resource to report:

2> set the measResultCSI-RS-List to include the best CSI-RS resources up to maxReportCells in accordance with the following:

3> if the triggerType is set to event:

4> include the CSI-RS resources included in the csi-RS-TriggeredList as defined within the VarMeasReportList for this measId;

3> else:

4> include the applicable CSI-RS resources for which the new measurement results became available since the last periodical reporting or since the measurement was initiated or reset;

NOTE 2: The reliability of the report (i.e. the certainty it contains the strongest CSI-RS resources on the concerned frequency) depends on the measurement configuration i.e. the reportInterval. The related performance requirements are specified in TS 36.133 [16].

3> for each CSI-RS resource that is included in the measResultCSI-RS-List:

4> include the measCSI-RS-Id;

4> include the layer 3 filtered measured results in accordance with the reportConfig for this measId, ordered as follow:

5> set the csi-RSRP-Result to include the quantity indicated in the reportQuantity within the concerned reportConfig in order of decreasing triggerQuantityCSI-RS, i.e. the best CSI-RS resource is included first;

4> if reportCRS-Meas is included within the associated reportConfig, and the cell indicated by physCellId of this CSI-RS resource is not a serving cell:
5> set the measResultNeighCells to include the cell indicated by physCellId of this CSI-RS resource, and include the physCellId;

5> set the rsrpResult to include the RSRP of the concerned cell, if available according to performance requirements in [16];

5> set the rsrqResult to include the RSRQ of the concerned cell, if available according to performance requirements in [16];

1> if the ue-RxTxTimeDiffPeriodical is configured within the corresponding reportConfig for this measId;

2> set the ue-RxTxTimeDiffResult to the measurement result provided by lower layers;

2> set the currentSFN;

1> if the measRSSI-ReportConfig is configured within the corresponding reportConfig for this measId:

2> set the rssi-Result to the average of sample value(s) provided by lower layers in the reportInterval;

2> set the channelOccupancy to the rounded percentage of sample values which are beyond to the channelOccupancyThreshold within all the sample values in the reportInterval;

1> if uplink PDCP delay results are available:

2> set the ul-PDCP-DelayResultList to include the uplink PDCP delay results available;

1> if the includeLocationInfo is configured in the corresponding reportConfig for this measId and detailed location information that has not been reported is available, set the content of the locationInfo as follows:

2> include the locationCoordinates;

2> if available, include the gnss-TOD-msec;

1> if the reportSSTD-Meas is set to true within the corresponding reportConfig for this measId:

2> set the measResultSSTD to the measurement results provided by lower layers;

1> increment the numberOfReportsSent as defined within the VarMeasReportList for this measId by 1;

1> stop the periodical reporting timer, if running;

1> if the numberOfReportsSent as defined within the VarMeasReportList for this measId is less than the reportAmount as defined within the corresponding reportConfig for this measId:

2> start the periodical reporting timer with the value of reportInterval as defined within the corresponding reportConfig for this measId;

1> else:

2> if the triggerType is set to periodical:

3> remove the entry within the VarMeasReportList for this measId;

3> remove this measId from the measIdList within VarMeasConfig;

1> if the measured results are for CDMA2000 HRPD:

2> set the preRegistrationStatusHRPD to the UE’s CDMA2000 upper layer’s HRPD preRegistrationStatus;

1> if the measured results are for CDMA2000 1xRTT:

2> set the preRegistrationStatusHRPD to FALSE;

1> if the measured results are for WLAN:

2> set the measResultListWLAN to include the quantities within the quantityConfigWLAN for the following WLAN(s) up to maxReportCells:
3> include WLAN the UE is connected to, if any;
3> include WLAN in order of decreasing WLAN RSSI, i.e. the best WLAN is included first, for WLANs which do not
match all WLAN identifiers of any entry within wlan-MobilitySet in VarWLAN-MobilityConfig;

2> for each included WLAN:
3> set wlan-Identifiers to include all WLAN identifiers that can be acquired for the WLAN measured;
3> set connectedWLAN to TRUE if the UE is connected to the WLAN measured;
3> if reportQuantityWLAN exists within the ReportConfigInterRAT within the VarMeasConfig for this measId:
4> if bandRequestWLAN is set to TRUE:
  5> set bandWLAN to include WLAN band of the WLAN measured;
4> if carrierInfoRequestWLAN is set to TRUE:
  5> set carrierInfoWLAN to include WLAN carrier information of the WLAN measured if it can be
     acquired;
4> if availableAdmissionCapacityRequestWLAN is set to TRUE:
  5> set the measResult to include availableAdmissionCapacityWLAN if it can be acquired;
4> if backhaulDL-BandwidthRequestWLAN is set to TRUE:
  5> set the measResult to include backhaulDL-BandwidthWLAN if it can be acquired;
4> if backhaulUL-BandwidthRequestWLAN is set to TRUE:
  5> set the measResult to include backhaulUL-BandwidthWLAN if it can be acquired;
4> if channelUtilizationRequestWLAN is set to TRUE:
  5> set the measResult to include channelUtilizationWLAN if it can be acquired;
4> if stationCountRequestWLAN is set to TRUE:
  5> set the measResult to include stationCountWLAN if it can be acquired;
1> submit the MeasurementReport message to lower layers for transmission, upon which the procedure ends;

5.5.6 Measurement related actions

5.5.6.1 Actions upon handover and re-establishment

E-UTRAN applies the handover procedure as follows:
- when performing the handover procedure, as specified in 5.3.5.4, ensure that a measObjectId corresponding to
  each handover target serving frequency is configured as a result of the procedures described in this sub-clause
  and in 5.3.5.4;
- when changing the band while the physical frequency remains unchanged, E-UTRAN releases the measObject
  corresponding to the source frequency and adds a measObject corresponding to the target frequency (i.e. it does
  not reconfigure the measObject);

E-UTRAN applies the re-establishment procedure as follows:
- when performing the connection re-establishment procedure, as specified in 5.3.7, ensure that a measObjectId
  corresponding each target serving frequency is configured as a result of the procedure described in this sub-
  clause and the subsequent connection reconfiguration procedure immediately following the re-establishment
  procedure;
- in the first reconfiguration following the re-establishment when changing the band while the physical frequency
  remains unchanged, E-UTRAN releases the measObject corresponding to the source frequency and adds a
  measObject corresponding to the target frequency (i.e. it does not reconfigure the measObject);

The UE shall:

1> for each measId included in the measIdList within VarMeasConfig:
   2> if the triggerType is set to periodical:
   3> remove this measId from the measIdList within VarMeasConfig:

1> if the procedure was triggered due to a handover or successful re-establishment and the procedure involves a
change of primary frequency, update the measId values in the measIdList within VarMeasConfig as follows:
   2> if a measObjectId value corresponding to the target primary frequency exists in the measObjectList within
VarMeasConfig:
      3> for each measId value in the measIdList:
         4> if the measId value is linked to the measObjectId value corresponding to the source primary
frequency:
            5> link this measId value to the measObjectId value corresponding to the target primary frequency;
         4> else if the measId value is linked to the measObjectId value corresponding to the target primary
frequency:
            5> link this measId value to the measObjectId value corresponding to the source primary frequency;
      2> else:
      3> remove all measId values that are linked to the measObjectId value corresponding to the source primary frequency;

1> remove all measurement reporting entries within VarMeasReportList;
   1> stop the periodical reporting timer or timer T321, whichever one is running, as well as associated information
(e.g. timeToTrigger) for all measId;
   1> release the measurement gaps, if activated;

NOTE: If the UE requires measurement gaps to perform inter-frequency or inter-RAT measurements, the UE
resumes the inter-frequency and inter-RAT measurements after the E-UTRAN has setup the measurement
gaps.

5.5.6.2 Speed dependant scaling of measurement related parameters

The UE shall adjust the value of the following parameter configured by the E-UTRAN depending on the UE speed:
timeToTrigger. The UE shall apply 3 different levels, which are selected as follows:

The UE shall:

1> perform mobility state detection using the mobility state detection as specified in TS 36.304 [4] with the
following modifications:
   2> counting handovers instead of cell reselections;
   2> applying the parameter applicable for RRC_CONNECTED as included in speedStatePars within
VarMeasConfig;
1> if high mobility state is detected:
   2> use the timeToTrigger value multiplied by sf-High within VarMeasConfig;
1> else if medium mobility state is detected:
   2> use the timeToTrigger value multiplied by sf-Medium within VarMeasConfig;
else:
  no scaling is applied;

5.5.7 Inter-frequency RSTD measurement indication

5.5.7.1 General

The purpose of this procedure is to indicate to the network that the UE is going to start/stop OTDOA inter-frequency RSTD measurements which require measurement gaps as specified in [16, 8.1.2.6].

NOTE: It is a network decision to configure the measurement gap.

5.5.7.2 Initiation

The UE shall:

1. if and only if upper layers indicate to start performing inter-frequency RSTD measurements and the UE requires measurement gaps for these measurements while measurement gaps are either not configured or not sufficient:
   2. initiate the procedure to indicate start;

NOTE 1: The UE verifies the measurement gap situation only upon receiving the indication from upper layers. If at this point in time sufficient gaps are available, the UE does not initiate the procedure. Unless it receives a new indication from upper layers, the UE is only allowed to further repeat the procedure in the same PCell once per frequency if the provided measurement gaps are insufficient.

1. if and only if upper layers indicate to stop performing inter-frequency RSTD measurements:
   2. initiate the procedure to indicate stop;

NOTE 2: The UE may initiate the procedure to indicate stop even if it did not previously initiate the procedure to indicate start.

5.5.7.3 Actions related to transmission of \textit{InterFreqRSTDMeasurementIndication} message

The UE shall set the contents of \textit{InterFreqRSTDMeasurementIndication} message as follows:

1. set the \textit{rstd-InterFreqIndication} as follows:
   2. if the procedure is initiated to indicate start of inter-frequency RSTD measurements:

3. set the \textit{rstd-InterFreqInfoList} according to the information received from upper layers:
   2. else if the procedure is initiated to indicate stop of inter-frequency RSTD measurements:

3. set the \textit{rstd-InterFreqIndication} to the value \textit{stop};

1. submit the \textit{InterFreqRSTDMeasurementIndication} message to lower layers for transmission, upon which the procedure ends;
5.6 Other

5.6.0 General

For NB-IoT, only a subset of the procedures described in this sub-clause apply.

Table 5.6.0-1 specifies the procedures that are applicable to NB-IoT. All other procedures are not applicable to NB-IoT; this is not further stated in the corresponding procedures.

<table>
<thead>
<tr>
<th>Sub-clause</th>
<th>Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.6.1</td>
<td>DL information transfer</td>
</tr>
<tr>
<td>5.6.2</td>
<td>UL information transfer</td>
</tr>
<tr>
<td>5.6.3</td>
<td>UE Capability transfer</td>
</tr>
</tbody>
</table>

5.6.1 DL information transfer

5.6.1.1 General

The purpose of this procedure is to transfer NAS or (tunnelled) non-3GPP dedicated information from E-UTRAN to a UE in RRC_CONNECTED.

5.6.1.2 Initiation

E-UTRAN initiates the DL information transfer procedure whenever there is a need to transfer NAS or non-3GPP dedicated information. E-UTRAN initiates the DL information transfer procedure by sending the DLInformationTransfer message.

5.6.1.3 Reception of the DLInformationTransfer by the UE

Upon receiving DLInformationTransfer message, the UE shall:

1. if the UE is a NB-IoT UE; or
2. if the dedicatedInfoType is set to dedicatedInfoNAS:
   1. forward the dedicatedInfoNAS to the NAS upper layers.
3. if the dedicatedInfoType is set to dedicatedInfoCDMA2000-1XRTT or to dedicatedInfoCDMA2000-HRPD:
   1. forward the dedicatedInfoCDMA2000 to the CDMA2000 upper layers;
5.6.2 UL information transfer

5.6.2.1 General

The purpose of this procedure is to transfer NAS or (tunnelled) non-3GPP dedicated information from the UE to E-UTRAN.

5.6.2.2 Initiation

A UE in RRC_CONNECTED initiates the UL information transfer procedure whenever there is a need to transfer NAS or non-3GPP dedicated information, except at RRC connection establishment or resume in which case the NAS information is piggybacked to the RRCConnectionSetupComplete or RRCConnectionResumeComplete message correspondingly. The UE initiates the UL information transfer procedure by sending the ULInformationTransfer message. When CDMA2000 information has to be transferred, the UE shall initiate the procedure only if SRB2 is established.

5.6.2.3 Actions related to transmission of ULInformationTransfer message

The UE shall set the contents of the ULInformationTransfer message as follows:

1> if there is a need to transfer NAS information:

  2> if the UE is a NB-IoT UE:

    3> set the dedicatedInfoNAS to include the information received from upper layers;

  2> else, set the dedicatedInfoType to include the dedicatedInfoNAS;

1> if there is a need to transfer CDMA2000 1XRTT information:

  2> set the dedicatedInfoType to include the dedicatedInfoCDMA2000-1XRTT;

1> if there is a need to transfer CDMA2000 HRPD information:

  2> set the dedicatedInfoType to include the dedicatedInfoCDMA2000-HRPD;

1> upon RRC connection establishment, if UE supports the Control Plane CIoT EPS optimisation and UE does not need UL gaps during continuous uplink transmission:

  2> configure lower layers to stop using UL gaps during continuous uplink transmission in FDD for ULInformationTransfer message and subsequent uplink transmission in RRC_CONNECTED except for UL transmissions as specified in TS36.211 [21];

1> submit the ULInformationTransfer message to lower layers for transmission, upon which the procedure ends;

5.6.2.4 Failure to deliver ULInformationTransfer message

The UE shall:

1> if the UE is a NB-IoT UE, AS security is not started and radio link failure occurs before the successful delivery of ULInformationTransfer messages has been confirmed by lower layers; or
1> if mobility (i.e. handover, RRC connection re-establishment) occurs before the successful delivery of ULInformationTransfer messages has been confirmed by lower layers:

2> inform upper layers about the possible failure to deliver the information contained in the concerned ULInformationTransfer messages;

### 5.6.3 UE capability transfer

#### 5.6.3.1 General

The purpose of this procedure is to transfer UE radio access capability information from the UE to E-UTRAN.

If the UE has changed its E-UTRAN radio access capabilities, the UE shall request higher layers to initiate the necessary NAS procedures (see TS 23.401 [41]) that would result in the update of UE radio access capabilities using a new RRC connection.

**NOTE:** Change of the UE’s GERAN UE radio capabilities in RRC_IDLE is supported by use of Tracking Area Update.

#### 5.6.3.2 Initiation

E-UTRAN initiates the procedure to a UE in RRC_CONNECTED when it needs (additional) UE radio access capability information.

#### 5.6.3.3 Reception of the UECapabilityEnquiry by the UE

The UE shall:

1> for NB-IoT, set the contents of UECapabilityInformation message as follows:

2> include the UE Radio Access Capability Parameters within the ue-Capability-Container;

2> include ue-RadioPagingInfo;

2> submit the UECapabilityInformation message to lower layers for transmission, upon which the procedure ends;

1> else, set the contents of UECapabilityInformation message as follows:

3> if the ue-CapabilityRequest includes eutra:

4> include the UE-EUTRA-Capability within a ue-CapabilityRAT-Container and with the rat-Type set to eutra;

3> if the UE supports FDD and TDD:

4> set all fields of UECapabilityInformation, except field fdd-Add-UE-EUTRA-Capabilities and tdd-Add-UE-EUTRA-Capabilities (including their sub-fields), to include the values applicable for both FDD and TDD (i.e. functionality supported by both modes);
4> if (some of) the UE capability fields have a different value for FDD and TDD:

5> if for FDD, the UE supports additional functionality compared to what is indicated by the previous fields of \textit{UECapabilityInformation}:

6> include field \textit{fdd-Add-UE-EUTRA-Capabilities} and set it to include fields reflecting the additional functionality applicable for FDD;

5> if for TDD, the UE supports additional functionality compared to what is indicated by the previous fields of \textit{UECapabilityInformation}:

6> include field \textit{tdd-Add-UE-EUTRA-Capabilities} and set it to include fields reflecting the additional functionality applicable for TDD;

\textbf{NOTE 1:} The UE includes fields of \textit{XDD-Add-UE-EUTRA-Capabilities} in accordance with the following:

- The field is included only if one or more of its sub-fields (or bits in the feature group indicators string) has a value that is different compared to the value signalled elsewhere within \textit{UE-EUTRA-Capability}; (this value signalled elsewhere is also referred to as the \textit{Common value}, that is supported for both XDD modes)

- For the fields that are included in \textit{XDD-Add-UE-EUTRA-Capabilities}, the UE sets:

  - the sub-fields (or bits in the feature group indicators string) that are not allowed to be different to the same value as the \textit{Common value};

  - the sub-fields (or bits in the feature group indicators string) that are allowed to be different to a value indicating at least the same functionality as indicated by the \textit{Common value};

3> else (UE supports single xDD mode):

4> set all fields of \textit{UECapabilityInformation}, except field \textit{fdd-Add-UE-EUTRA-Capabilities} and \textit{tdd-Add-UE-EUTRA-Capabilities} (including their sub-fields), to include the values applicable for the xDD mode supported by the UE;

3> compile a list of band combinations, candidate for inclusion in the \textit{UECapabilityInformation} message, comprising of band combinations supported by the UE according to the following priority order (i.e. listed in order of decreasing priority):

4> include all non-CA bands, regardless of whether UE supports carrier aggregation, only:

  - if the UE includes \textit{ue-Category-v1020} (i.e. indicating category 6 to 8); or

  - if for at least one of the non-CA bands, the UE supports more MIMO layers with TM9 and TM10 than implied by the UE category; or

  - if the UE supports TM10 with one or more CSI processes;

4> if the \textit{UECapabilityEnquiry} message includes \textit{requestedFrequencyBands} and UE supports \textit{requestedFrequencyBands}:

5> include all 2DL+1UL CA band combinations, only consisting of bands included in \textit{requestedFrequencyBands};

5> include all other CA band combinations, only consisting of bands included in \textit{requestedFrequencyBands}, and prioritized in the order of \textit{requestedFrequencyBands}, (i.e. first include remaining band combinations containing the first-listed band, then include remaining band combinations containing the second-listed band, and so on);

4> else (no requested frequency bands):

5> include all 2DL+1UL CA band combinations;

5> include all other CA band combinations;

4> if UE supports \textit{maximumCCsRetrieval} and if the \textit{UECapabilityEnquiry} message includes the \textit{requestedMaxCCsDL} and the \textit{requestedMaxCCsUL} (i.e. both UL and DL maximums are given):
5> remove from the list of candidates the band combinations for which the number of CCs in DL exceeds the value indicated in the requestedMaxCCsDL and for which the number of CCs in UL exceeds the value indicated in the requestedMaxCCsUL;

5> indicate in requestedCCsUL the same value as received in requestedMaxCCsUL;

5> indicate in requestedCCsDL the same value as received in requestedMaxCCsDL;

4> else if UE supports maximumCCsRetrieval and if the UECapabilityEnquiry message includes the requestedMaxCCsDL (i.e. only DL maximum limit is given):

5> remove from the list of candidates the band combinations for which the number of CCs in DL exceeds the value indicated in the requestedMaxCCsDL;

5> indicate value in requestedCCsDL the same value as received in requestedMaxCCsDL;

4> else if UE supports maximumCCsRetrieval and if the UECapabilityEnquiry message includes the requestedMaxCCsUL (i.e. only UL maximum limit is given):

5> remove from the list of candidates the band combinations for which the number of CCs in UL exceeds the value indicated in the requestedMaxCCsUL;

5> indicate in requestedCCsUL the same value as received in requestedMaxCCsUL;

4> if the UE supports reducedIntNonContComb and the UECapabilityEnquiry message includes requestReducedIntrNonContComb:

5> indicate value true in reducedIntNonContComb;

5> remove from the list of candidates the intra-band non-contiguous CA band combinations which support is implied by another intra-band non-contiguous CA band combination included in the list of candidates as specified in TS 36.306 [5, 4.3.5.21]:

4> if the UE supports requestReducedFormat and UE supports skipFallbackCombinations and UECapabilityEnquiry message includes requestSkipFallbackComb:

5> set skipFallbackCombRequested to true;

5> for each band combination included in the list of candidates (including 2DL+1UL CA band combinations), starting with the ones with the lowest number of DL and UL carriers, that concerns a fallback band combination of another band combination included in the list of candidates as specified in TS 36.306 [5]:

6> remove the band combination from the list of candidates;

6> include differentFallbackSupported in the band combination included in the list of candidates whose fallback concerns the removed band combination, if its capabilities differ from the removed band combination;

3> if the UECapabilityEnquiry message includes requestReducedFormat and UE supports requestReducedFormat:

4> include in supportedBandCombinationReduced as many as possible of the band combinations included in the list of candidates, including the non-CA combinations, determined according to the rules and priority order defined above;

3> else

4> if the UECapabilityEnquiry message includes requestedFrequencyBands and UE supports requestedFrequencyBands:

5> include in supportedBandCombination as many as possible of the band combinations included in the list of candidates, including the non-CA combinations and up to 5DL+5UL CA band combinations, determined according to the rules and priority order defined above;

5> include in supportedBandCombinationAdd as many as possible of the remaining band combinations included in the list of candidates, (i.e. the candidates not included in...
supportedBandCombination), up to 5DL+5UL CA band combinations, determined according to the rules and priority order defined above;

4> else

5> include in supportedBandCombination as many as possible of the band combinations included in the list of candidates, including the non-CA combinations and up to 5DL+5UL CA band combinations, determined according to the rules defined above;

5> if it is not possible to include in supportedBandCombination all the band combinations to be included according to the above, selection of the subset of band combinations to be included is left up to UE implementation;

4> indicate in requestedBands the same bands and in the same order as included in requestedFrequencyBands, if received;

3> if the UE is a category 0 or M1 UE, or supports any UE capability information in ue-RadioPagingInfo, according to TS 36.306 [5]:

4> include ue-RadioPagingInfo and set the fields according to TS 36.306 [5];

2> if the ue-CapabilityRequest includes geran-cs and if the UE supports GERAN CS domain:

3> include the UE radio access capabilities for GERAN CS within a ue-CapabilityRAT-Container and with the rat-Type set to geran-cs;

2> if the ue-CapabilityRequest includes geran-ps and if the UE supports GERAN PS domain:

3> include the UE radio access capabilities for GERAN PS within a ue-CapabilityRAT-Container and with the rat-Type set to geran-ps;

2> if the ue-CapabilityRequest includes utra and if the UE supports UTRA:

3> include the UE radio access capabilities for UTRA within a ue-CapabilityRAT-Container and with the rat-Type set to utra;

2> if the ue-CapabilityRequest includes cdma2000-1XRTT and if the UE supports CDMA2000 1xRTT:

3> include the UE radio access capabilities for CDMA2000 within a ue-CapabilityRAT-Container and with the rat-Type set to cdma2000-1XRTT;

1> submit the UECapabilityInformation message to lower layers for transmission, upon which the procedure ends;

5.6.4 CSFB to 1x Parameter transfer

5.6.4.1 General

![Figure 5.6.4.1-1: CSFB to 1x Parameter transfer](image)

The purpose of this procedure is to transfer the CDMA2000 1xRTT parameters required to register the UE in the CDMA2000 1xRTT network for CSFB support.
5.6.4.2 Initiation

A UE in RRC_CONNECTED initiates the CSFB to 1x parameter transfer procedure upon request from the CDMA2000 upper layers. The UE initiates the CSFB to 1x parameter transfer procedure by sending the CSFBParametersRequestCDMA2000 message.

5.6.4.3 Actions related to transmission of CSFBParametersRequestCDMA2000 message

The UE shall:

1> submit the CSFBParametersRequestCDMA2000 message to lower layers for transmission using the current configuration;

5.6.4.4 Reception of the CSFBParametersResponseCDMA2000 message

Upon reception of the CSFBParametersResponseCDMA2000 message, the UE shall:

1> forward the rand and the mobilityParameters to the CDMA2000 1xRTT upper layers;

5.6.5 UE Information

5.6.5.1 General

The UE information procedure is used by E-UTRAN to request the UE to report information.

5.6.5.2 Initiation

E-UTRAN initiates the procedure by sending the UEInformationRequest message. E-UTRAN should initiate this procedure only after successful security activation.

5.6.5.3 Reception of the UEInformationRequest message

Upon receiving the UEInformationRequest message, the UE shall, only after successful security activation:

1> if rach-ReportReq is set to true, set the contents of the rach-Report in the UEInformationResponse message as follows:

2> set the numberOfPreamblesSent to indicate the number of preambles sent by MAC for the last successfully completed random access procedure;

2> if contention resolution was not successful as specified in TS 36.321 [6] for at least one of the transmitted preambles for the last successfully completed random access procedure:

3> set the contentionDetected to true;

2> else:
3> set the `contentionDetected` to `false`;

1> if `rlf-ReportReq` is set to `true` and the UE has radio link failure information or handover failure information available in `VarRLF-Report` and if the RPLMN is included in `plmn-IdentityList` stored in `VarRLF-Report`:

2> set `timeSinceFailure` in `VarRLF-Report` to the time that elapsed since the last radio link or handover failure in E-UTRA;

2> set the `rlf-Report` in the `UEInformationResponse` message to the value of `rlf-Report` in `VarRLF-Report`;

2> discard the `rlf-Report` from `VarRLF-Report` upon successful delivery of the `UEInformationResponse` message confirmed by lower layers;

1> if `connEstFailReportReq` is set to `true` and the UE has connection establishment failure information in `VarConnEstFailReport` and if the RPLMN is equal to `plmn-Identity` stored in `VarConnEstFailReport`:

2> set `timeSinceFailure` in `VarConnEstFailReport` to the time that elapsed since the last connection establishment failure in E-UTRA;

2> set the `connEstFailReport` in the `UEInformationResponse` message to the value of `connEstFailReport` in `VarConnEstFailReport`;

2> discard the `connEstFailReport` from `VarConnEstFailReport` upon successful delivery of the `UEInformationResponse` message confirmed by lower layers;

1> if the `logMeasReportReq` is present and if the RPLMN is included in `plmn-IdentityList` stored in `VarLogMeasReport`:

2> if `VarLogMeasReport` includes one or more logged measurement entries, set the contents of the `logMeasReport` in the `UEInformationResponse` message as follows:

3> include the `absoluteTimeStamp` and set it to the value of `absoluteTimeInfo` in the `VarLogMeasReport`;

3> include the `traceReference` and set it to the value of `traceReference` in the `VarLogMeasReport`;

3> include the `traceRecordingSessionRef` and set it to the value of `traceRecordingSessionRef` in the `VarLogMeasReport`;

3> include the `tce-Id` and set it to the value of `tce-Id` in the `VarLogMeasReport`;

3> include the `logMeasInfoList` and set it to include one or more entries from `VarLogMeasReport` starting from the entries logged first;

3> if the `VarLogMeasReport` includes one or more additional logged measurement entries that are not included in the `logMeasInfoList` within the `UEInformationResponse` message:

4> include the `logMeasAvailable`;

1> else:

1> if `mobilityHistoryReportReq` is set to true:

2> include the `mobilityHistoryReport` and set it to include entries from `VarMobilityHistoryReport`;

2> include in the `mobilityHistoryReport` an entry for the current cell, possibly after removing the oldest entry if required, and set its fields as follows:

3> set `visitedCellId` to the global cell identity of the current cell;

3> set field `timeSpent` to the time spent in the current cell;

1> if the `logMeasReport` is included in the `UEInformationResponse`:

2> submit the `UEInformationResponse` message to lower layers for transmission via SRB2;

2> discard the logged measurement entries included in the `logMeasInfoList` from `VarLogMeasReport` upon successful delivery of the `UEInformationResponse` message confirmed by lower layers;
2> submit the UEInformationResponse message to lower layers for transmission via SRB1;

5.6.6 Logged Measurement Configuration

5.6.6.1 General

![LoggedMeasurementConfiguration Diagram]

Figure 5.6.6.1-1: Logged measurement configuration

The purpose of this procedure is to configure the UE to perform logging of measurement results while in RRC_IDLE and to perform logging of measurement results for MBSFN in both RRC_IDLE and RRC_CONNECTED. The procedure applies to logged measurements capable UEs that are in RRC_CONNECTED.

NOTE E-UTRAN may retrieve stored logged measurement information by means of the UE information procedure.

5.6.6.2 Initiation

E-UTRAN initiates the logged measurement configuration procedure to UE in RRC_CONNECTED by sending the LoggedMeasurementConfiguration message.

5.6.6.3 Reception of the LoggedMeasurementConfiguration by the UE

Upon receiving the LoggedMeasurementConfiguration message the UE shall:

1> discard the logged measurement configuration as well as the logged measurement information as specified in 5.6.7;
1> store the received loggingDuration, loggingInterval and areaConfiguration, if included, in VarLogMeasConfig;
1> if the LoggedMeasurementConfiguration message includes plmn-IdentityList:
   2> set plmn-IdentityList in VarLogMeasReport to include the RPLMN as well as the PLMNs included in plmn-IdentityList;
   1> else:
   2> set plmn-IdentityList in VarLogMeasReport to include the RPLMN;
1> store the received absoluteTimeInfo, traceReference, traceRecordingSessionRef and tce-Id in VarLogMeasReport;
1> store the received targetMBSFN-AreaList, if included, in VarLogMeasConfig;
1> start timer T330 with the timer value set to the loggingDuration;

5.6.6.4 T330 expiry

Upon expiry of T330 the UE shall:
1> release VarLogMeasConfig;

The UE is allowed to discard stored logged measurements, i.e. to release VarLogMeasReport, 48 hours after T330 expiry.

5.6.7 Release of Logged Measurement Configuration

5.6.7.1 General

The purpose of this procedure is to release the logged measurement configuration as well as the logged measurement information.

5.6.7.2 Initiation

The UE shall initiate the procedure upon receiving a logged measurement configuration in another RAT. The UE shall also initiate the procedure upon power off or detach.

The UE shall:

1> stop timer T330, if running;

1> if stored, discard the logged measurement configuration as well as the logged measurement information, i.e. release the UE variables VarLogMeasConfig and VarLogMeasReport;

5.6.8 Measurements logging

5.6.8.1 General

This procedure specifies the logging of available measurements by a UE in RRC_IDLE that has a logged measurement configuration and the logging of available measurements by a UE in both RRC_IDLE and RRC_CONNECTED if targetMBSFN-AreaList is included in VarLogMeasConfig.

5.6.8.2 Initiation

While T330 is running, the UE shall:

1> if measurement logging is suspended:

2> if during the last logging interval the IDC problems detected by the UE is resolved, resume measurement logging;

1> if not suspended, perform the logging in accordance with the following:

2> if targetMBSFN-AreaList is included in VarLogMeasConfig:

3> if the UE is camping normally on an E-UTRA cell or is connected to E-UTRA; and

3> if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport; and

3> if the PCell (in RRC_CONNECTED) or cell where the UE is camping (in RRC_IDLE) is part of the area indicated by areaConfiguration if configured in VarLogMeasConfig:

4> for MBSFN areas, indicated in targetMBSFN-AreaList, from which the UE is receiving MBMS service:

5> perform MBSFN measurements in accordance with the performance requirements as specified in TS 36.133 [16];

NOTE 1: When configured to perform MBSFN measurement logging by targetMBSFN-AreaList, the UE is not required to receive additional MBSFN subframes, i.e. logging is based on the subframes corresponding to the MBMS services the UE is receiving.
3GPP TS 36.331 version 13.3.0 Release 13

5> perform logging at regular time intervals as defined by the loggingInterval in VarLogMeasConfig, but only for those intervals for which MBSFN measurement results are available as specified in TS 36.133 [16];

2> else if the UE is camping normally on an E-UTRA cell and if the RPLMN is included in plmn-IdentityList stored in VarLogMeasReport and, if the cell is part of the area indicated by areaConfiguration if configured in VarLogMeasConfig:

3> perform the logging at regular time intervals, as defined by the loggingInterval in VarLogMeasConfig;

2> when adding a logged measurement entry in VarLogMeasReport, include the fields in accordance with the following:

3> if the UE detected IDC problems during the last logging interval;
   4> if measResultServCell in VarLogMeasReport is not empty;
   5> include InDeviceCoexDetected;
   5> suspend measurement logging from the next logging interval;

4> else;
   5> suspend measurement logging;

NOTE 1A: The UE may detect the start of IDC problems as early as Phase 1 as described in 23.4 of TS 36.300 [9].

3> set the relativeTimeStamp to indicate the elapsed time since the moment at which the logged measurement configuration was received;

3> if detailed location information became available during the last logging interval, set the content of the locationInfo as follows:
   4> include the locationCoordinates;

3> if targetMBSFN-AreaList is included in VarLogMeasConfig:
   4> for each MBSFN area, for which the mandatory measurements result fields became available during the last logging interval:
      5> set the rsrpResultMBSFN, rsrqResultMBSFN to include measurement results that became available during the last logging interval;
      5> include the fields signallingBLER-Result or dataBLER-MCH-ResultList if the concerned BLER results are available,
      5> set the mbsfn-AreaId and carrierFrequency to indicate the MBSFN area in which the UE is receiving MBSFN transmission;

4> if in RRC_CONNECTED:
   5> set the servCellIdentity to indicate global cell identity of the PCell;
   5> set the measResultServCell to include the layer 3 filtered measured results of the PCell;
   5> if available, set the measResultNeighCells to include the layer 3 filtered measured results of SCell(s) and neighbouring cell(s) measurements that became available during the last logging interval, in order of decreasing RSRP, for at most the following number of cells: 6 intra-frequency and 3 inter-frequency cells per frequency and according to the following:
      6> for each cell included, include the optional fields that are available;
   5> if available, optionally set the measResultNeighCells to include the layer 3 filtered measured results of neighbouring cell(s) measurements that became available during the last logging interval, in order of decreasing RSCP(UTRA)/RSSI(GERAN)/PilotStrength(cdma2000), for at most the following number of cells: 3 inter-RAT cells per frequency (UTRA, cdma2000)/set of frequencies (GERAN), and according to the following:
6> for each cell included, include the optional fields that are available;

4> if in RRC_IDLE:
5> set the servCellIdentity to indicate global cell identity of the serving cell;
5> set the measResultServCell to include the quantities of the serving cell;
5> if available, set the measResultNeighCells, in order of decreasing ranking-criterion as used for cell re-selection, to include neighbouring cell measurements that became available during the last logging interval for at most the following number of neighbouring cells: 6 intra-frequency and 3 inter-frequency neighbours per frequency and according to the following:
6> for each neighbour cell included, include the optional fields that are available;
5> if available, optionally set the measResultNeighCells, in order of decreasing ranking-criterion as used for cell re-selection, to include neighbouring cell measurements that became available during the last logging interval, for at most the following number of cells: 3 inter-RAT cells per frequency (UTRA, cdma2000)/set of frequencies (GERAN), and according to the following:
6> for each cell included, include the optional fields that are available;
4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include results according to the extended RSRQ if corresponding results are available according to the associated performance requirements defined in TS 36.133 [16];
4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include RSRQ type if the result was based on measurements using a wider band or using all OFDM symbols;

NOTE 2: The UE includes the latest results in accordance with the performance requirements as specified in TS 36.133 [16]. E.g. RSRP and RSRQ results are available only if the UE has a sufficient number of results/receives a sufficient number of subframes during the logging interval.

3> else:
4> set the servCellIdentity to indicate global cell identity of the cell the UE is camping on;
4> set the measResultServCell to include the quantities of the cell the UE is camping on;
4> if available, set the measResultNeighCells, in order of decreasing ranking-criterion as used for cell re-selection, to include neighbouring cell measurements that became available during the last logging interval for at most the following number of neighbouring cells: 6 intra-frequency and 3 inter-frequency neighbours per frequency as well as 3 inter-RAT neighbours, per frequency/set of frequencies (GERAN) per RAT and according to the following:
5> for each neighbour cell included, include the optional fields that are available;
4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include results according to the extended RSRQ if corresponding results are available according to the associated performance requirements defined in TS 36.133 [16];
4> for the cells included according to the previous (i.e. covering previous and current serving cells as well as neighbouring EUTRA cells) include RSRQ type if the result was based on measurements using a wider band or using all OFDM symbols;

NOTE 3: The UE includes the latest results of the available measurements as used for cell reselection evaluation in RRC_IDLE or as used for evaluation of reporting criteria or for measurement reporting according to 5.5.3 in RRC_CONNECTED, which are performed in accordance with the performance requirements as specified in TS 36.133 [16].

2> when the memory reserved for the logged measurement information becomes full, stop timer T330 and perform the same actions as performed upon expiry of T330, as specified in 5.6.6.4;
5.6.9 In-device coexistence indication

5.6.9.1 General

![Diagram: In-device coexistence indication]

The purpose of this procedure is to inform E-UTRAN about (a change of) the In-Device Coexistence (IDC) problems experienced by the UE in RRC_CONNECTED, as described in TS 36.300 [9], and to provide the E-UTRAN with information in order to resolve them.

5.6.9.2 Initiation

A UE capable of providing IDC indications may initiate the procedure when it is configured to provide IDC indications and upon change of IDC problem information.

Upon initiating the procedure, the UE shall:

1> if configured to provide IDC indications:
   
2> if the UE did not transmit an `InDeviceCoexIndication` message since it was configured to provide IDC indications:

3> if on one or more frequencies for which a `measObjectEUTRA` is configured, the UE is experiencing IDC problems that it cannot solve by itself; or

3> if configured to provide IDC indications for UL CA; and if on one or more supported UL CA combination comprising of carrier frequencies for which a measurement object is configured, the UE is experiencing IDC problems that it cannot solve by itself:

   4> initiate transmission of the `InDeviceCoexIndication` message in accordance with 5.6.9.3;

2> else:

3> if the set of frequencies, for which a `measObjectEUTRA` is configured and on which the UE is experiencing IDC problems that it cannot solve by itself, is different from the set indicated in the last transmitted `InDeviceCoexIndication` message; or

3> if for one or more of the frequencies in the previously reported set of frequencies, the `interferenceDirection` is different from the value indicated in the last transmitted `InDeviceCoexIndication` message; or

3> if the TDM assistance information is different from the assistance information included in the last transmitted `InDeviceCoexIndication` message; or

3> if configured to provide IDC indications for UL CA; and if the `victimSystemType` is different from the value indicated in the last transmitted `InDeviceCoexIndication` message; or

3> if configured to provide IDC indications for UL CA; and if the set of supported UL CA combinations on which the UE is experiencing IDC problems that it cannot solve by itself and that the UE includes in `affectedCarrierFreqCombList` according to 5.6.9.3, is different from the set indicated in the last transmitted `InDeviceCoexIndication` message:

   4> initiate transmission of the `InDeviceCoexIndication` message in accordance with 5.6.9.3;
NOTE 1: The term 'IDC problems' refers to interference issues applicable across several subframes/slots where not necessarily all the subframes/slots are affected.

NOTE 2: For the frequencies on which a serving cell or serving cells is configured that is activated, IDC problems consist of interference issues that the UE cannot solve by itself, during either active data exchange or upcoming data activity which is expected in up to a few hundred milliseconds.
For frequencies on which a SCeU or SCeUs is configured that is deactivated, reporting IDC problems indicates an anticipation that the activation of the SCeU or SCeUs would result in interference issues that the UE would not be able to solve by itself.
For a non-serving frequency, reporting IDC problems indicates an anticipation that if the non-serving frequency or frequencies became a serving frequency or serving frequencies then this would result in interference issues that the UE would not be able to solve by itself.

5.6.9.3 Actions related to transmission of InDeviceCoexIndication message

The UE shall set the contents of the InDeviceCoexIndication message as follows:

1> if there is at least one E-UTRA carrier frequency, for which a measurement object is configured, that is affected by IDC problems:

2> include the field affectedCarrierFreqList with an entry for each affected E-UTRA carrier frequency for which a measurement object is configured;

2> for each E-UTRA carrier frequency included in the field affectedCarrierFreqList, include interferenceDirection and set it accordingly;

2> include Time Domain Multiplexing (TDM) based assistance information:

3> if the UE has DRX related assistance information that could be used to resolve the IDC problems:

4> include drx-CycleLength, drx-Offset and drx-ActiveTime;

3> else (the UE has desired subframe reservation patterns related assistance information that could be used to resolve the IDC problems):

4> include idc-SubframePatternList;

3> use the MCG as timing reference if TDM based assistance information regarding the SCG is included;

1> if the UE is configured to provide UL CA information and there is a supported UL CA combination comprising of carrier frequencies for which a measurement object is configured, that is affected by IDC problems:

2> include victimSystemType in ul-CA-AssistanceInfo;

2> if the UE sets victimSystemType to wlan or Bluetooth:

3> include affectedCarrierFreqCombList in ul-CA-AssistanceInfo with an entry for each supported UL CA combination comprising of carrier frequencies for which a measurement object is configured, that is affected by IDC problems;

2> else:

3> optionally include affectedCarrierFreqCombList in ul-CA-AssistanceInfo with an entry for each supported UL CA combination comprising of carrier frequencies for which a measurement object is configured, that is affected by IDC problems;

NOTE 1: When sending an InDeviceCoexIndication message to inform E-UTRAN the IDC problems, the UE includes all assistance information (rather than providing e.g. the changed part(s) of the assistance information).

NOTE 2: Upon not anymore experiencing a particular IDC problem that the UE previously reported, the UE provides an IDC indication with the modified contents of the InDeviceCoexIndication message (e.g. by an empty message).

The UE shall submit the InDeviceCoexIndication message to lower layers for transmission.
5.6.10 UE Assistance Information

5.6.10.1 General

The purpose of this procedure is to inform E-UTRAN of the UE’s power saving preference. Upon configuring the UE to provide power preference indications E-UTRAN may consider that the UE does not prefer a configuration primarily optimised for power saving until the UE explicitly indicates otherwise.

5.6.10.2 Initiation

A UE capable of providing power preference indications in RRC_CONNECTED may initiate the procedure in several cases including upon being configured to provide power preference indications and upon change of power preference.

Upon initiating the procedure, the UE shall:

1> if configured to provide power preference indications:

2> if the UE did not transmit a UEAssistanceInformation message since it was configured to provide power preference indications; or

2> if the current power preference is different from the one indicated in the last transmission of the UEAssistanceInformation message and timer T340 is not running:

3> initiate transmission of the UEAssistanceInformation message in accordance with 5.6.10.3;

5.6.10.3 Actions related to transmission of UEAssistanceInformation message

The UE shall set the contents of the UEAssistanceInformation message:

1> if the UE prefers a configuration primarily optimised for power saving:

2> set powerPrefIndication to lowPowerConsumption;

1> else:

2> start or restart timer T340 with the timer value set to the powerPrefIndicationTimer;

2> set powerPrefIndication to normal;

The UE shall submit the UEAssistanceInformation message to lower layers for transmission.

5.6.11 Mobility history information

5.6.11.1 General

This procedure specifies how the mobility history information is stored by the UE, covering RRC_CONNECTED and RRC_IDLE.
5.6.11.2  Initiation

If the UE supports storage of mobility history information, the UE shall:

1> Upon change of cell, consisting of PCell in RRC_CONNECTED or serving cell in RRC_IDLE, to another E-UTRA or inter-RAT cell or when entering out of service:
   2> include an entry in variable VarMobilityHistoryReport possibly after removing the oldest entry, if necessary, according to following:
   3> if the global cell identity of the previous PCell/ serving cell is available:
       4> include the global cell identity of that cell in the field visitedCellId of the entry;
   3> else:
       4> include the physical cell identity and carrier frequency of that cell in the field visitedCellId of the entry;
   3> set the field timeSpent of the entry as the time spent in the previous PCell/ serving cell;
1> upon entering E-UTRA (in RRC_CONNECTED or RRC_IDLE) while previously out of service and/ or using another RAT:
   2> include an entry in variable VarMobilityHistoryReport possibly after removing the oldest entry, if necessary, according to following:
   3> set the field timeSpent of the entry as the time spent outside E-UTRA;

5.6.12  RAN-assisted WLAN interworking

5.6.12.1  General

The purpose of this procedure is to facilitate access network selection and traffic steering between E-UTRAN and WLAN.

If required by upper layers (see TS 24.312 [66], the UE shall provide an up-to-date set of the applicable parameters provided by wlan-OffloadConfigCommon or wlan-OffloadConfigDedicated to upper layers, and inform upper layers when no parameters are configured. The parameter set from either wlan-OffloadConfigCommon or wlan-OffloadConfigDedicated is selected as specified in subclauses 5.2.2.24, 5.3.12, 5.6.12.2 and 5.6.12.4.

5.6.12.2  Dedicated WLAN offload configuration

The UE shall:

1> if the received wlan-OffloadInfo is set to release:
   2> release wlan-OffloadConfigDedicated and t350;
   2> if the wlan-OffloadConfigCommon corresponding to the RPLMN is broadcast by the cell:
   3> apply the wlan-OffloadConfigCommon corresponding to the RPLMN included in SystemInformationBlockType17;
   1> else:
       2> apply the received wlan-OffloadConfigDedicated;

5.6.12.3  WLAN offload RAN evaluation

The UE shall:

1> if the UE is configured with either wlan-OffloadConfigCommon or wlan-OffloadConfigDedicated; and
1> if the UE is in RRC_IDLE or none of rclwi-Configuration, lwa-Configuration and lwip-Configuration is configured:

2> provide measurement results required for the evaluation of the network selection and traffic steering rules as defined in TS 24.312 [66] to upper layers;

2> evaluate the network selection and traffic steering rules as defined in TS 36.304 [4] using WLAN identifiers as indicated in other subclauses (either provided in steerToWLAN included in rclwi-Configuration or in wlan-Id-List included in SystemInformationBlockType17);

5.6.12.4 T350 expiry or stop

The UE shall:

1> if T350 expires or is stopped:

2> release the wlan-OffloadConfigDedicated and t350;

2> release rclwi-Configuration if configured;

2> if the wlan-OffloadConfigCommon corresponding to the RPLMN is broadcast by the cell:

3> apply the wlan-OffloadConfigCommon and the wlan-Id-List corresponding to the RPLMN included in SystemInformationBlockType17;

5.6.12.5 Cell selection/ re-selection while T350 is running

The UE shall:

1> if, while T350 is running, the UE selects/ reselects a cell which is not the PCell when the wlan-OffloadDedicated was configured:

2> stop timer T350;

2> perform the actions as specified in 5.6.12.4;

5.6.13 SCG failure information

5.6.13.1 General

![Diagram](image)

Figure 5.6.13.1-1: SCG failure information

The purpose of this procedure is to inform E-UTRAN about an SCG failure the UE has experienced i.e. SCG radio link failure, SCG change failure.

5.6.13.2 Initiation

A UE initiates the procedure to report SCG failures when SCG transmission is not suspended and when one of the following conditions is met:

1> upon detecting radio link failure for the SCG, in accordance with 5.3.11; or
Upon initiating the procedure, the UE shall:

1> suspend all SCG DRBs and suspend SCG transmission for split DRBs;
1> reset SCG-MAC;
1> stop T307;
1> initiate transmission of the *SCGFailureInformation* message in accordance with 5.6.13.3;

### 5.6.13.3 Actions related to transmission of *SCGFailureInformation* message

The UE shall set the contents of the *SCGFailureInformation* message as follows:

1> if the UE initiates transmission of the *SCGFailureInformation* message to provide SCG radio link failure information:
   2> include *failureType* and set it to the trigger for detecting SCG radio link failure;
1> else if the UE initiates transmission of the *SCGFailureInformation* message to provide SCG change failure information:
   2> include *failureType* and set it to *scg-ChangeFailure*;
1> else if the UE initiates transmission of the *SCGFailureInformation* message due to exceeding maximum uplink transmission timing difference:
   2> include *failureType* and set it to *maxUL-TimingDiff*;
1> set the *measResultServFreqList* to include for each SCG cell that is configured, if any, within *measResultSCell* the quantities of the concerned SCell, if available according to performance requirements in [16];
1> for each SCG serving frequency included in *measResultServFreqList*, include within *measResultBestNeighCell* the *physCellId* and the quantities of the best non-serving cell, based on RSRP, on the concerned serving frequency;
1> set the *measResultNeighCells* to include the best measured cells on non-serving E-UTRA frequencies, ordered such that the best cell is listed first, and based on measurements collected up to the moment the UE detected the failure, and set its fields as follows;
   2> if the UE was configured to perform measurements for one or more non-serving EUTRA frequencies and measurement results are available, include the *measResultListEUTRA*;
   2> for each neighbour cell included, include the optional fields that are available;

NOTE 2: The measured quantities are filtered by the L3 filter as configured in the mobility measurement configuration. The measurements are based on the time domain measurement resource restriction, if configured. Blacklisted cells are not required to be reported.

The UE shall submit the *SCGFailureInformation* message to lower layers for transmission.

### 5.6.14 LTE-WLAN Aggregation

#### 5.6.14.1 Introduction

E-UTRAN can configure the UE to connect to a WLAN and configure bearers for LWA (referred to as LWA DRBs). The UE uses the WLAN parameters received from E-UTRAN in performing WLAN measurements. The UE also performs WLAN connection management as described in 5.6.15 while LWA is configured.
5.6.14.2 Reception of LWA configuration

Upon reception of LWA configuration, the UE shall:

1> if the received \texttt{lwa-Configuration} is set to \textit{release}:
   2> release the LWA configuration as described in 5.6.14.3;
1> else:
   2> if the received \texttt{lwa-Config} includes \texttt{lwa-WT-Counter}:
   3> determine the S-KWT key based on the K_{NB} key and received \texttt{lwa-WT-Counter} value, as specified in TS 33.401 [32];
   4> forward the S-KWT key to upper layers to be used as a PMK or PSK for WLAN authentication;
   2> if the received \texttt{lwa-Config} includes \texttt{lwa-MobilityConfig}:
   3> if the received \texttt{lwa-MobilityConfig} includes \texttt{wlan-ToReleaseList}:
      4> for each WLAN-Identifiers included in \texttt{wlan-ToReleaseList}:
         5> remove the WLAN-Identifiers if already part of the current \texttt{wlan-MobilitySet} in VarWLAN-MobilityConfig;
   3> if the received \texttt{lwa-MobilityConfig} includes \texttt{wlan-ToAddList}:
      4> for each WLAN-Identifiers included in \texttt{wlan-ToAddList}:
         5> add the WLAN-Identifiers to the current \texttt{wlan-MobilitySet} in VarWLAN-MobilityConfig;
   3> if the received \texttt{lwa-MobilityConfig} includes \texttt{associationTimer}:
      4> start or restart timer T351 with the timer value set to the \texttt{associationTimer};
   3> if the received \texttt{lwa-MobilityConfig} includes \texttt{successReportRequested}:
      4> set \texttt{successReportRequested} in VarWLAN-MobilityConfig to the value of \texttt{successReportRequested};
   3> start WLAN Status Monitoring as described in 5.6.15.4;

5.6.14.3 Release of LWA configuration

To release the LWA configuration, the UE shall:

1> for each LWA DRB that is part of the current UE configuration:
   2> disable data handling for this DRB at the LWAAP entity;
   2> perform PDCP data recovery as specified in TS 36.323 [8];
1> delete any existing values in VarWLAN-MobilityConfig and VarWLAN-Status;
1> stop timer T351, if running;
1> stop WLAN status monitoring and WLAN connection attempts for LWA;

5.6.15 WLAN connection management

5.6.15.1 Introduction

WLAN connection management procedures in this section are triggered as specified in other sections where the UE is using a WLAN connection for LWA, RCLWI or LWIP.

The UE stores the current WLAN mobility set, which is a set of one or more WLAN identifier(s) (e.g. BSSID, SSID, HESSID) in \texttt{wlan-MobilitySet} in VarWLAN-MobilityConfig. This WLAN mobility set can be configured and updated by
the eNB. A WLAN is considered to be inside the WLAN mobility set if its identifiers match all WLAN identifiers of at least one entry in wlan-MobilitySet and outside the WLAN mobility set otherwise. When the UE receives a new or updated WLAN mobility set, it initiates connection to a WLAN inside the WLAN mobility set, if not already connected to such a WLAN, and starts WLAN status monitoring as described in 5.6.15.4. The UE can perform WLAN mobility within the WLAN mobility set (connect or reconnect to a WLAN inside the WLAN mobility set) without any signalling to E-UTRAN.

The UE reports the WLAN connection status information to E-UTRAN as described in 5.6.15.2. The information in this report is based on the monitoring of WLAN connection as described in 5.6.15.4.

5.6.15.2 WLAN connection status reporting

5.6.15.2.1 General

![Figure 5.6.15.2.1-1: WLAN connection status reporting](image)

The purpose of this procedure is to inform E-UTRAN about the status of WLAN connection for LWA, RCLWI, or LWIP.

5.6.15.2.2 Initiation

The UE in RRC_CONNECTED initiates the WLAN status reporting procedure when it connects successfully to a WLAN inside WLAN mobility set while T351 is running after a WLAN mobility set change or after a lwa-WT-Counter update (if success report is requested by the eNB) or its connection or connection attempts to all WLAN(s) inside WLAN mobility set fails in accordance with WLAN Status Monitoring described in 5.6.15.4 or when T351 expires.

Upon initiating the procedure, the UE shall:

1> initiate transmission of the WLANConnectionStatusReport message in accordance with 5.6.15.2.3;

5.6.15.2.3 Actions related to transmission of WLANConnectionStatusReport message

The UE shall set the contents of the WLANConnectionStatusReport message as follows:

1> set wlan-status to status in VarWLAN-Status;

1> submit the WLANConnectionStatusReport message to lower layers for transmission, upon which the procedure ends;

5.6.15.3 T351 Expiry (WLAN connection attempt timeout)

Upon T351 expiry, the UE shall:

1> set the status in VarWLAN-Status to failureTimeout;

1> perform WLAN connection status reporting procedure in 5.6.15.2;

1> stop WLAN status monitoring and WLAN connection attempts;

5.6.15.4 WLAN status monitoring

To perform WLAN status monitoring, the UE shall:
1> if UE is not configured with rclwi-Configuration and WLAN connection to a WLAN inside the WLAN mobility set is successfully established or maintained after a WLAN mobility set configuration update or after a lwa-WT-Counter update:
   2> set the status in VarWLAN-Status to successfulAssociation;
   2> stop timer T351, if running;
   2> if successReportRequested in VarWLAN-MobilityConfig is set to TRUE:
      3> perform WLAN Connection Status Reporting procedure in 5.6.15.2;
1> if WLAN connection or connection attempts to all WLAN(s) inside WLAN mobility set fails:
   2> if the failure is due to WLAN radio link issues:
      3> set the status in VarWLAN-Status to failureWlanRadioLink;
      2> else if the failure is due to UE internal problems related to WLAN:
      3> set the status in VarWLAN-Status to failureWlanUnavailable;
      NOTE 1: The UE internal problems related to WLAN includes connection to another WLAN based on user preferences or turning off WLAN connection or connection rejection from WLAN or other WLAN problems.
      2> stop timer T351, if running;
      2> perform WLAN Connection Status Reporting procedure in 5.6.15.2;
      2> if the UE is configured with rclwi-Configuration:
         3> release rclwi-Configuration and inform upper layers of a move-traffic-from-WLAN indication (see TS 24.302 [74]);
         2> stop WLAN Status Monitoring and WLAN connection attempts;

5.6.16 RAN controlled LTE-WLAN interworking

5.6.16.1 General
The purpose of this procedure is to perform RAN-controlled LTE-WLAN interworking (RCLWI) i.e. control access network selection and traffic steering between E-UTRAN and WLAN.

5.6.16.2 WLAN traffic steering command
The UE shall:
1> if the received rclwi-Configuration is set to setup:
   2> if the command is set to steerToWLAN:
      3> inform the upper layers of a move-traffic-to-WLAN indication along with the WLAN identifier lists in steerToWLAN (see TS 24.302 [74]);
      3> store steerToWLAN in wlan-MobilitySet in VarWLAN-MobilityConfig;
      3> perform the WLAN status monitoring procedure as specified in 5.6.15.4 using steerToWLAN as the WLAN mobility set;
      2> else:
         3> inform the upper layers of a move-traffic-from-WLAN indication (see TS 24.302 [74]);
         3> clear wlan-MobilitySet in VarWLAN-MobilityConfig;
         3> stop performing the WLAN status monitoring procedure as specified in 5.6.15.4;
3GPP TS 36.331 version 13.3.0 Release 13

5.6.17 LTE-WLAN aggregation with IPsec tunnel

5.6.17.1 General

The WLAN resources that are used over the LWIP tunnel as described in TS 36.300 [9] established as part of LWIP procedures are referred to as 'LWIP resources'. The purpose of this section is to specify procedures to indicate to higher layers to initiate the establishment/release of the LWIP tunnel over WLAN and to indicate which DRB(s) shall use the LWIP resources.

5.6.17.2 LWIP reconfiguration

The UE shall:

1> if the received lwip-Configuration is set to release:
   2> release the LWIP configuration, if configured, as described in 5.6.17.3;
1> else:
   2> if lwip-MobilityConfig is included:
      3> if the received lwip-MobilityConfig includes wlan-ToReleaseList:
         4> for each WLAN-Identifiers included in wlan-ToReleaseList:
            5> remove the WLAN-Identifiers if already part of the current wlan-MobilitySet in VarWLAN-MobilityConfig;
      3> if the received lwip-MobilityConfig includes wlan-ToAddList:
         4> for each WLAN-Identifiers included in wlan-ToAddList:
            5> add the WLAN-Identifiers to the current wlan-MobilitySet in VarWLAN-MobilityConfig;
      3> if the received lwip-MobilityConfig includes associationTimer:
         4> start timer T351 with the timer value set according to the value of associationTimer;
      3> if the received lwip-MobilityConfig includes successReportRequested:
         4> set successReportRequested in VarWLAN-MobilityConfig to the value of successReportRequested;
      3> start WLAN Status Monitoring as described in 5.6.15.4;
         2> if tunnelConfigLWIP is included:
            3> indicate to higher layers to configure the LWIP tunnel according to the received tunnelConfigLWIP [32];
            2> if lwip-Counter is included:
               3> determine the LWIP-PSK based on the K_{eNB} key and received lwip-Counter value, as specified in TS 33.401 [32];
               3> forward the LWIP-PSK to upper layers for LWIP tunnel establishment;
5.6.17.3 LWIP release

The UE shall:

1> delete any existing values in \textit{VarWLAN-MobilityConfig} and \textit{VarWLAN-Status};

1> stop timer T351, if running;

1> release the \textit{lwip-Configuration};

1> indicate to higher layers to stop all DRBs from using the LWIP resources;

1> indicate to higher layers to release the LWIP tunnel [32];

1> stop WLAN status monitoring and WLAN connection attempts for LWIP;

5.7 Generic error handling

5.7.1 General

The generic error handling defined in the subsequent sub-clauses applies unless explicitly specified otherwise e.g. within the procedure specific error handling.

The UE shall consider a value as not comprehended when it is set:

- to an extended value that is not defined in the version of the transfer syntax supported by the UE.

- to a spare or reserved value unless the specification defines specific behaviour that the UE shall apply upon receiving the concerned spare/ reserved value.

The UE shall consider a field as not comprehended when it is defined:

- as spare or reserved unless the specification defines specific behaviour that the UE shall apply upon receiving the concerned spare/ reserved field.

5.7.2 ASN.1 violation or encoding error

The UE shall:

1> when receiving an RRC message on the BCCH, BR-BCCH, PCCH, CCCH, MCCH, SC-MCCH or SBCCH for which the abstract syntax is invalid [13]:

2> ignore the message;

NOTE: This section applies in case one or more fields is set to a value, other than a spare, reserved or extended value, not defined in this version of the transfer syntax. E.g. in the case the UE receives value 12 for a field defined as \textit{INTEGER (1..11)}. In cases like this, it may not be possible to reliably detect which field is in the error hence the error handling is at the message level.

5.7.3 Field set to a not comprehended value

The UE shall, when receiving an \textit{RRC} message on any logical channel:

1> if the message includes a field that has a value that the UE does not comprehend:

2> if a default value is defined for this field:

3> treat the message while using the default value defined for this field;

2> else if the concerned field is optional:

3> treat the message as if the field were absent and in accordance with the need code for absence of the concerned field;
else:
3> treat the message as if the field were absent and in accordance with sub-clause 5.7.4;

5.7.4 Mandatory field missing

The UE shall:

1> if the message includes a field that is mandatory to include in the message (e.g. because conditions for mandatory presence are fulfilled) and that field is absent or treated as absent:

2> if the RRC message was received on DCCH or CCCH:

3> ignore the message;

else:
3> if the field concerns a (sub-field of) an entry of a list (i.e. a SEQUENCE OF):

4> treat the list as if the entry including the missing or not comprehended field was not present;

3> else if the field concerns a sub-field of another field, referred to as the 'parent' field i.e. the field that is one nesting level up compared to the erroneous field:

4> consider the 'parent' field to be set to a not comprehended value;

4> apply the generic error handling to the subsequent 'parent' field(s), until reaching the top nesting level i.e. the message level;

3> else (field at message level):

4> ignore the message;

NOTE 1: The error handling defined in these sub-clauses implies that the UE ignores a message with the message type or version set to a not comprehended value.

NOTE 2: The nested error handling for messages received on logical channels other than DCCH and CCCH applies for errors in extensions also, even for errors that can be regarded as invalid E-UTRAN operation e.g. E-UTRAN not observing conditional presence.

The following ASN.1 further clarifies the levels applicable in case of nested error handling for errors in extension fields.

```
-- /example/ ASN1START

-- Example with extension addition group

ItemInfoList ::=      SEQUENCE (SIZE (1..max)) OF ItemInfo

ItemInfo ::=      SEQUENCE {
      itemIdentity      INTEGER (1..max),
      field1         Field1,   -- Need ON
      field2        Field2     OPTIONAL,   -- Cond Cond1
      ...
      [ field3-r9      Field3-r9    OPTIONAL,   -- Cond Cond1
```
field4-r9  Field4-r9  OPTIONAL  -- Need ON
[
]

-- Example with traditional non-critical extension (empty sequence)

BroadcastInfoBlock1 ::=  SEQUENCE {
  itemIdentity        INTEGER (1..max),
  field1              Field1,    
  field2              Field2     OPTIONAL,   -- Need ON
  nonCriticalExtension    BroadcastInfoBlock1-v940-IEs OPTIONAL
}

BroadcastInfoBlock1-v940-IEs ::=  SEQUENCE {
  field3-r9       Field3-r9    OPTIONAL,   -- Cond Cond1
  field4-r9       Field4-r9    OPTIONAL,   -- Need ON
  nonCriticalExtension    SEQUENCE {}    OPTIONAL   -- Need OP
}

-- ASN1STOP

The UE shall, apply the following principles regarding the levels applicable in case of nested error handling:

- an extension addition group is not regarded as a level on its own. E.g. in the ASN.1 extract in the previous, a error regarding the conditionality of field3 would result in the entire itemInfo entry to be ignored (rather than just the extension addition group containing field3 and field4)

- a traditional nonCriticalExtension is not regarded as a level on its own. E.g. in the ASN.1 extract in the previous, a error regarding the conditionality of field3 would result in the entire BroadcastInfoBlock1 to be ignored (rather than just the non critical extension containing field3 and field4).

5.7.5 Not comprehended field

The UE shall, when receiving an RRC message on any logical channel:

1> if the message includes a field that the UE does not comprehend:

2> treat the rest of the message as if the field was absent;

NOTE: This section does not apply to the case of an extension to the value range of a field. Such cases are addressed instead by the requirements in section 5.7.3.
5.8 MBMS

5.8.1 Introduction

5.8.1.1 General

In general the control information relevant only for UEs supporting MBMS is separated as much as possible from unicast control information. Most of the MBMS control information is provided on a logical channel specific for MBMS common control information: the MCCH. E-UTRA employs one MCCH logical channel per MBSFN area. In case the network configures multiple MBSFN areas, the UE acquires the MBMS control information from the MCCHs that are configured to identify if services it is interested to receive are ongoing. The action applicable when the UE is unable to simultaneously receive MBMS and unicast services is up to UE implementation. In this release of the specification, an MBMS capable UE is only required to support reception of a single MBMS service at a time, and reception of more than one MBMS service (also possibly on more than one MBSFN area) in parallel is left for UE implementation. The MCCH carries the $\text{MBSFNAreaConfiguration}$ message, which indicates the MBMS sessions that are ongoing as well as the (corresponding) radio resource configuration. The MCCH may also carry the $\text{MBMSCountingRequest}$ message, when E-UTRAN wishes to count the number of UEs in RRC_CONNECTED that are receiving or interested to receive one or more specific MBMS services.

A limited amount of MBMS control information is provided on the BCCH. This primarily concerns the information needed to acquire the MCCH(s). This information is carried by means of a single MBMS specific $\text{SystemInformationBlock: SystemInformationBlockType13}$. An MBSFN area is identified solely by the $\text{mbsfn-AreaId}$ in $\text{SystemInformationBlockType13}$. At mobility, the UE considers that the MBSFN area is continuous when the source cell and the target cell broadcast the same value in the $\text{mbsfn-AreaId}$.

5.8.1.2 Scheduling

The MCCH information is transmitted periodically, using a configurable repetition period. Scheduling information is not provided for MCCH i.e. both the time domain scheduling as well as the lower layer configuration are semi-statically configured, as defined within $\text{SystemInformationBlockType13}$. For MBMS user data, which is carried by the MTCH logical channel, E-UTRAN periodically provides MCH scheduling information (MSI) at lower layers (MAC). This MCH information only concerns the time domain scheduling i.e. the frequency domain scheduling and the lower layer configuration are semi-statically configured. The periodicity of the MSI is configurable and defined by the MCH scheduling period.

5.8.1.3 MCCH information validity and notification of changes

Change of MCCH information only occurs at specific radio frames, i.e. the concept of a modification period is used. Within a modification period, the same MCCH information may be transmitted a number of times, as defined by its scheduling (which is based on a repetition period). The modification period boundaries are defined by SFN values for which SFN mod $m$= 0, where $m$ is the number of radio frames comprising the modification period. The modification period is configured by means of $\text{SystemInformationBlockType13}$.

When the network changes (some of) the MCCH information, it notifies the UEs about the change during a first modification period. In the next modification period, the network transmits the updated MCCH information. These general principles are illustrated in figure 5.8.1.3-1, in which different colours indicate different MCCH information. Upon receiving a change notification, a UE interested to receive MBMS services acquires the new MCCH information immediately from the start of the next modification period. The UE applies the previously acquired MCCH information until the UE acquires the new MCCH information.
Indication of an MBMS specific RNTI, the M-RNTI (see TS 36.321 [6]), on PDCCH is used to inform UEs in RRC_IDLE and UEs in RRC_CONNECTED about an MCCH information change. When receiving an MCCH information change notification, the UE knows that the MCCH information will change at the next modification period boundary. The notification on PDCCH indicates which of the MCCHs will change, which is done by means of an 8-bit bitmap. Within this bitmap, the bit at the position indicated by the field notificationIndicator is used to indicate changes for that MBSFN area: if the bit is set to "1", the corresponding MCCH will change. No further details are provided e.g. regarding which MCCH information will change. The MCCH information change notification is used to inform the UE about a change of MCCH information upon session start or about the start of MBMS counting.

The MCCH information change notifications on PDCCH are transmitted periodically and are carried on MBSFN subframes only. These MCCH information change notification occasions are common for all MCCHs that are configured, and configurable by parameters included in SystemInformationBlockType13: a repetition coefficient, a radio frame offset and a subframe index. These common notification occasions are based on the MCCH with the shortest modification period.

NOTE 1: E-UTRAN may modify the MBMS configuration information provided on MCCH at the same time as updating the MBMS configuration information carried on BCCH i.e. at a coinciding BCCH and MCCH modification period. Upon detecting that a new MCCH is configured on BCCH, a UE interested to receive one or more MBMS services should acquire the MCCH, unless it knows that the services it is interested in are not provided by the corresponding MBSFN area.

A UE that is receiving an MBMS service via MRB shall acquire the MCCH information from the start of each modification period. A UE interested to receive MBMS from a carrier on which dl-Bandwidth included in MasterInformationBlock is set to n6 shall acquire the MCCH information at least once every MCCH modification period. A UE that is not receiving an MBMS service via MRB, as well as UEs that are receiving an MBMS service via MRB but potentially interested to receive other services not started yet in another MBSFN area from a carrier on which dl-Bandwidth included in MasterInformationBlock is other than n6, shall verify that the stored MCCH information remains valid by attempting to find the MCCH information change notification at least notificationRepetitionCoeff times during the modification period of the applicable MCCH(s), if no MCCH information change notification is received.

NOTE 2: In case the UE is aware which MCCH(s) E-UTRAN uses for the service(s) it is interested to receive, the UE may only need to monitor change notifications for a subset of the MCCHs that are configured, referred to as the 'applicable MCCH(s)' in the above.

5.8.2 MCCH information acquisition

5.8.2.1 General

![Figure 5.8.2.1-1: MCCH information acquisition](image-url)
The UE applies the MCCH information acquisition procedure to acquire the MBMS control information that is broadcasted by the E-UTRAN. The procedure applies to MBMS capable UEs that are in RRC_IDLE or in RRC_CONNECTED.

5.8.2.2 Initiation

A UE interested to receive MBMS services shall apply the MCCH information acquisition procedure upon entering the corresponding MBSFN area (e.g. upon power on, following UE mobility) and upon receiving a notification that the MCCH information has changed. A UE that is receiving an MBMS service shall apply the MCCH information acquisition procedure to acquire the MCCH, that corresponds with the service that is being received, at the start of each modification period.

Unless explicitly stated otherwise in the procedural specification, the MCCH information acquisition procedure overwrites any stored MCCH information, i.e. delta configuration is not applicable for MCCH information and the UE discontinues using a field if it is absent in MCCH information unless explicitly specified otherwise.

5.8.2.3 MCCH information acquisition by the UE

An MBMS capable UE shall:

1> if the procedure is triggered by an MCCH information change notification:

   2> start acquiring the MBSFNAreaConfiguration message and the MBMSCountingRequest message if present, from the beginning of the modification period following the one in which the change notification was received;

   NOTE 1: The UE continues using the previously received MCCH information until the new MCCH information has been acquired.

1> if the UE enters an MBSFN area:

   2> acquire the MBSFNAreaConfiguration message and the MBMSCountingRequest message if present, at the next repetition period;

1> if the UE is receiving an MBMS service:

   2> start acquiring the MBSFNAreaConfiguration message and the MBMSCountingRequest message if present, that both concern the MBSFN area of the service that is being received, from the beginning of each modification period;

5.8.2.4 Actions upon reception of the MBSFNAreaConfiguration message

No UE requirements related to the contents of this MBSFNAreaConfiguration apply other than those specified elsewhere e.g. within procedures using the concerned system information, the corresponding field descriptions.

5.8.2.5 Actions upon reception of the MBMSCountingRequest message

Upon receiving MBMSCountingRequest message, the UE shall perform the MBMS Counting procedure as specified in 5.8.4.

5.8.3 MBMS PTM radio bearer configuration

5.8.3.1 General

The MBMS PTM radio bearer configuration procedure is used by the UE to configure RLC, MAC and the physical layer upon starting and/or stopping to receive an MRB. The procedure applies to UEs interested to receive one or more MBMS services.

   NOTE: In case the UE is unable to receive an MBMS service due to capability limitations, upper layers may take appropriate action e.g. terminate a lower priority unicast service.
5.8.3.2 Initiation

The UE applies the MRB establishment procedure to start receiving a session of a service it has an interest in. The procedure may be initiated e.g. upon start of the MBMS session, upon (re-)entry of the corresponding MBSFN service area, upon becoming interested in the MBMS service, upon removal of UE capability limitations inhibiting reception of the concerned service.

The UE applies the MRB release procedure to stop receiving a session. The procedure may be initiated e.g. upon stop of the MBMS session, upon leaving the corresponding MBSFN service area, upon losing interest in the MBMS service, when capability limitations start inhibiting reception of the concerned service.

5.8.3.3 MRB establishment

Upon MRB establishment, the UE shall:

1. establish an RLC entity in accordance with the configuration specified in 9.1.1.4;
2. configure an MTCH logical channel in accordance with the received logicalChannelIdentity, applicable for the MRB, as included in the MBSFNAreaConfiguration message;
3. configure the physical layer in accordance with the pmch-Config, applicable for the MRB, as included in the MBSFNAreaConfiguration message;
4. inform upper layers about the establishment of the MRB by indicating the corresponding tmgi and sessionId;

5.8.3.4 MRB release

Upon MRB release, the UE shall:

1. release the RLC entity as well as the related MAC and physical layer configuration;
2. inform upper layers about the release of the MRB by indicating the corresponding tmgi and sessionId;

5.8.4 MBMS Counting Procedure

5.8.4.1 General

![Figure 5.8.4.1-1: MBMS Counting procedure](image)

The MBMS Counting procedure is used by the E-UTRAN to count the number of RRC_CONNECTED mode UEs which are receiving via an MRB or interested to receive via an MRB the specified MBMS services.

The UE determines interest in an MBMS service, that is identified by the TMGI, by interaction with upper layers.

5.8.4.2 Initiation

E-UTRAN initiates the procedure by sending an MBMSCountingRequest message.
5.8.4.3 Reception of the \textit{MBMSCountingRequest} message by the UE

Upon receiving the \textit{MBMSCountingRequest} message, the UE in RRC\_CONNECTED mode shall:

1. if the \textit{SystemInformationBlockType1}, that provided the scheduling information for the \textit{systemInformationBlockType13} that included the configuration of the MCCH via which the \textit{MBMSCountingRequest} message was received, contained the identity of the Registered PLMN; and

2. if the UE is receiving via an MRB or interested to receive via an MRB at least one of the services in the received \textit{countingRequestList}:

3. if more than one entry is included in the \textit{mbsfn-AreaInfoList} received in the \textit{SystemInformationBlockType13} that included the configuration of the MCCH via which the \textit{MBMSCountingRequest} message was received:

3. include the \textit{mbsfn-AreaIndex} in the \textit{MBMSCountingResponse} message and set it to the index of the entry in the \textit{mbsfn-AreaInfoList} within the received \textit{SystemInformationBlockType13} that corresponds with the MBSFN area used to transfer the received \textit{MBMSCountingRequest} message;

4. for each MBMS service included in the received \textit{countingRequestList}:

3. if the UE is receiving via an MRB or interested to receive via an MRB this MBMS service:

4. include an entry in the \textit{countingResponseList} within the \textit{MBMSCountingResponse} message with \textit{countingResponseService} set it to the index of the entry in the \textit{countingRequestList} within the received \textit{MBMSCountingRequest} that corresponds with the MBMS service the UE is receiving or interested to receive;

5. submit the \textit{MBMSCountingResponse} message to lower layers for transmission upon which the procedure ends;

\textbf{NOTE 1:} UEs that are receiving an MBMS User Service [56] by means of a Unicast Bearer Service [57] (i.e. via a DRB), but are interested to receive the concerned MBMS User Service [56] via an MBMS Bearer Service (i.e. via an MRB), respond to the counting request.

\textbf{NOTE 2:} If ciphering is used at upper layers, the UE does not respond to the counting request if it can not decipher the MBMS service for which counting is performed (see TS 22.146 [62, 5.3]).

\textbf{NOTE 3:} The UE treats the \textit{MBMSCountingRequest} messages received in each modification period independently. In the unlikely case E-UTRAN would repeat an \textit{MBMSCountingRequest} (i.e. including the same services) in a subsequent modification period, the UE responds again. The UE provides at most one \textit{MBMSCountingResponse} message to multiple transmission attempts of an \textit{MBMSCountingRequest} messages in a given modification period.

5.8.5 MBMS interest indication

5.8.5.1 General

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure.png}
\caption{5.8.5.1-1: MBMS interest indication}
\end{figure}

The purpose of this procedure is to inform E-UTRAN that the UE is receiving or is interested to receive MBMS service(s) via an MRB or SC-MRB, and if so, to inform E-UTRAN about the priority of MBMS versus unicast reception.
5.8.5.2 Initiation

An MBMS or SC-PTM capable UE in RRC_CONNECTED may initiate the procedure in several cases including upon successful connection establishment, upon entering or leaving the service area, upon session start or stop, upon change of interest, upon change of priority between MBMS reception and unicast reception or upon change to a PCell broadcasting SystemInformationBlockType15.

Upon initiating the procedure, the UE shall:

1> if SystemInformationBlockType15 is broadcast by the PCell:
   2> ensure having a valid version of SystemInformationBlockType15 for the PCell;
   2> if the UE did not transmit an MBMSInterestIndication message since last entering RRC_CONNECTED state; or
   2> if since the last time the UE transmitted an MBMSInterestIndication message, the UE connected to a PCell not broadcasting SystemInformationBlockType15;

3> if the set of MBMS frequencies of interest, determined in accordance with 5.8.5.3, is not empty:
   4> initiate transmission of the MBMSInterestIndication message in accordance with 5.8.5.4;

2> else:

3> if the set of MBMS frequencies of interest, determined in accordance with 5.8.5.3, has changed since the last transmission of the MBMSInterestIndication message; or

3> if the prioritisation of reception of all indicated MBMS frequencies compared to reception of any of the established unicast bearers has changed since the last transmission of the MBMSInterestIndication message:
   4> initiate transmission of the MBMSInterestIndication message in accordance with 5.8.5.4;

NOTE: The UE may send an MBMSInterestIndication even when it is able to receive the MBMS services it is interested in i.e. to avoid that the network allocates a configuration inhibiting MBMS reception.

3> else if SystemInformationBlockType20 is broadcast by the PCell:
   4> if since the last time the UE transmitted an MBMSInterestIndication message, the UE connected to a PCell not broadcasting SystemInformationBlockType20; or
   4> if the set of MBMS services of interest determined in accordance with 5.8.5.3a is different from mbms-Services included in the last transmission of the MBMSInterestIndication message;

5> initiate the transmission of the MBMSInterestIndication message in accordance with 5.8.5.4.

5.8.5.3 Determine MBMS frequencies of interest

The UE shall:

1> consider a frequency to be part of the MBMS frequencies of interest if the following conditions are met:
   2> at least one MBMS session the UE is receiving or interested to receive via an MRB or SC-MRB is ongoing or about to start; and

NOTE 1: The UE may determine whether the session is ongoing from the start and stop time indicated in the User Service Description (USD), see 3GPP TS 36.300 [9] or 3GPP TS 26.346 [57].

2> for at least one of these MBMS sessions SystemInformationBlockType15 acquired from the PCell includes for the concerned frequency one or more MBMS SAIs as indicated in the USD for this session; and

NOTE 2: The UE considers a frequency to be part of the MBMS frequencies of interest even though E-UTRAN may (temporarily) not employ an MRB or SC-MRB for the concerned session. I.e. the UE does not verify if the session is indicated on (SC-)-MCCH.
NOTE 3: The UE considers the frequencies of interest independently of any synchronization state, e.g. [9, Annex J.1]

2> the UE is capable of simultaneously receiving MRBs and/or is capable of simultaneously receiving SC-MRBs on the set of MBMS frequencies of interest, regardless of whether a serving cell is configured on each of these frequencies or not; and

2> the supportedBandCombination the UE included in UE-EUTRA-Capability contains at least one band combination including the set of MBMS frequencies of interest;

NOTE 4: Indicating a frequency implies that the UE supports SystemInformationBlockType13 or SystemInformationBlockType20 acquisition for the concerned frequency i.e. the indication should be independent of whether a serving cell is configured on that frequency.

NOTE 5: When evaluating which frequencies it can receive simultaneously, the UE does not take into account the serving frequencies that are currently configured i.e. it only considers MBMS frequencies it is interested to receive.

NOTE 6: The set of MBMS frequencies of interest includes at most one frequency for a given physical frequency. The UE only considers a physical frequency to be part of the MBMS frequencies of interest if it supports at least one of the bands indicated for this physical frequency in SystemInformationBlockType1 (for serving frequency) or SystemInformationBlockType15 (for neighbouring frequencies). In this case, E-UTRAN may assume the UE supports MBMS reception on any of the bands supported by the UE (i.e. according to supportedBandCombination).

5.8.5.3a Determine MBMS services of interest

The UE shall:

1> consider a MBMS service to be part of the MBMS services of interest if the following conditions are met:

2> the UE is SC-PTM capable; and

2> the UE is receiving or interested to receive this service via an SC-MRB; and

2> one session of this service is ongoing or about to start; and

2> one or more MBMS SAIs in the USD for this service is included in SystemInformationBlockType15 acquired from the PCell for a frequency belonging to the set of MBMS frequencies of interest, determined according to 5.8.5.3.

5.8.5.4 Actions related to transmission of MBMSInterestIndication message

The UE shall set the contents of the MBMSInterestIndication message as follows:

1> if the set of MBMS frequencies of interest, determined in accordance with 5.8.5.3, is not empty:

2> include mbms-FreqList and set it to include the MBMS frequencies of interest sorted by decreasing order of interest, using the EARFCN corresponding with freqBandIndicator included in SystemInformationBlockType1 (for serving frequency), if applicable, and the EARFCN(s) as included in SystemInformationBlockType15 (for neighbouring frequencies);

NOTE 1: The EARFCN included in mbms-FreqList is merely used to indicate a physical frequency the UE is interested to receive i.e. the UE may not support the band corresponding to the included EARFCN (but it does support at least one of the bands indicated in system information for the concerned physical frequency).

2> include mbms-Priority if the UE prioritises reception of all indicated MBMS frequencies above reception of any of the unicast bearers;

2> if SystemInformationBlockType20 is broadcast by the PCell:

3> include mbms-Services and set it to indicate the set of MBMS services of interest determined in accordance with 5.8.5.3a;
NOTE 2: If the UE prioritises MBMS reception and unicast data cannot be supported because of congestion on the MBMS carrier(s), E-UTRAN may initiate release of unicast bearers. It is up to E-UTRAN implementation whether all bearers or only GBR bearers are released. E-UTRAN does not initiate re-establishment of the released unicast bearers upon alleviation of the congestion.

The UE shall submit the MBMSInterestIndication message to lower layers for transmission.

5.8a SC-PTM

5.8a.1 Introduction

5.8a.1.1 General

SC-PTM control information is provided on a specific logical channel: the SC-MCCH. The SC-MCCH carries the SCPTMConfiguration message which indicates the MBMS sessions that are ongoing as well as the (corresponding) information on when each session may be scheduled, i.e. scheduling period, scheduling window and start offset. The SCPTMConfiguration message also provides information about the neighbour cells transmitting the MBMS sessions which are ongoing on the current cell.

A limited amount of SC-PTM control information is provided on the BCCH. This primarily concerns the information needed to acquire the SC-MCCH.

5.8a.1.2 SC-MCCH scheduling

The SC-MCCH information (i.e. information transmitted in messages sent over SC-MCCH) is transmitted periodically, using a configurable repetition period. SC-MCCH transmissions (and the associated radio resources and MCS) are indicated on PDCCH.

5.8a.1.3 SC-MCCH information validity and notification of changes

Change of SC-MCCH information only occurs at specific radio frames, i.e. the concept of a modification period is used. Within a modification period, the same SC-MCCH information may be transmitted a number of times, as defined by its scheduling (which is based on a repetition period). The modification period boundaries are defined by SFN values for which SFN mod \( m = 0 \), where \( m \) is the number of radio frames comprising the modification period. The modification period is configured by means of SystemInformationBlockType20.

When the network changes (some of) the SC-MCCH information, it notifies the UEs about the change in the first subframe which can be used for SC-MCCH transmission in a repetition period. LSB bit in 8-bit bitmap when set to '1' indicates the change in SC-MCCH. Upon receiving a change notification, a UE interested to receive MBMS services transmitted using SC-PTM acquires the new SC-MCCH information starting from the same subframe. The UE applies the previously acquired SC-MCCH information until the UE acquires the new SC-MCCH information.

5.8a.1.4 Procedures

The SC-PTM capable UE receiving or interested to receive MBMS service(s) via SC-MRB applies SC-PTM procedures described in 5.8a and the MBMS interest indication procedure as specified in 5.8.5.
5.8a.2 SC-MCCH information acquisition

5.8a.2.1 General

Figure 5.8a.2.1-1: SC-MCCH information acquisition

The UE applies the SC-MCCH information acquisition procedure to acquire the SC-PTM control information that is broadcast by the E-UTRAN. The procedure applies to SC-PTM capable UEs that are in RRC_IDLE or in RRC_CONNECTED.

5.8a.2.2 Initiation

A UE interested to receive MBMS services via SC-MRB shall apply the SC-MCCH information acquisition procedure upon entering the cell broadcasting SystemInformationBlockType20 (e.g. upon power on, following UE mobility) and upon receiving a notification that the SC-MCCH information has changed. A UE that is receiving an MBMS service via SC-MRB shall apply the SC-MCCH information acquisition procedure to acquire the SC-MCCH information that corresponds with the service that is being received, at the start of each modification period.

Unless explicitly stated otherwise in the procedural specification, the SC-MCCH information acquisition procedure overwrites any stored SC-MCCH information, i.e. delta configuration is not applicable for SC-MCCH information and the UE discontinues using a field if it is absent in SC-MCCH information unless explicitly specified otherwise.

5.8a.2.3 SC-MCCH information acquisition by the UE

A SC-PTM capable UE shall:

1> if the procedure is triggered by an SC-MCCH information change notification:
   2> start acquiring the SCPTMConfiguration message from the subframe where the change notification was received;

NOTE 1: The UE continues using the previously received SC-MCCH information until the new SC-MCCH information has been acquired.

1> if the UE enters a cell broadcasting SystemInformationBlockType20:
   2> acquire the SCPTMConfiguration message at the next repetition period;

1> if the UE is receiving an MBMS service via an SC-MRB:
   2> start acquiring the SCPTMConfiguration message from the beginning of each modification period.

5.8a.2.4 Actions upon reception of the SCPTMConfiguration message

No UE requirements related to the contents of this SCPTMConfiguration apply other than those specified elsewhere e.g. within procedures using the concerned system information, the corresponding field descriptions.
5.8a.3 SC-PTM radio bearer configuration

5.8a.3.1 General

The SC-PTM radio bearer configuration procedure is used by the UE to configure RLC, MAC and the physical layer upon starting and/or stopping to receive an SC-MRB transmitted on SC-MTCH. The procedure applies to SC-PTM capable UEs that are in RRC_CONNECTED or in RRC_IDLE and are interested to receive one or more MBMS services via SC-MRB.

NOTE: In case the UE is unable to receive an MBMS service via an SC-MRB due to capability limitations, upper layers may take appropriate action e.g. terminate a lower priority unicast service.

5.8a.3.2 Initiation

The UE applies the SC-MRB establishment procedure to start receiving a session of a MBMS service it has an interest in. The procedure may be initiated e.g. upon start of the MBMS session, upon entering a cell providing via SC-MRB a MBMS service in which the UE has interest, upon becoming interested in the MBMS service, upon removal of UE capability limitations inhibiting reception of the concerned service.

The UE applies the SC-MRB release procedure to stop receiving a session. The procedure may be initiated e.g. upon stop of the MBMS session, upon leaving the cell where a SC-MRB is established, upon losing interest in the MBMS service, when capability limitations start inhibiting reception of the concerned service.

5.8a.3.3 SC-MRB establishment

Upon SC-MRB establishment, the UE shall:

1> establish an RLC entity in accordance with the configuration specified in 9.1.1.7;

1> configure a SC-MTCH logical channel applicable for the SC-MRB and instruct MAC to receive DL-SCH on the cell where the SCPTMConfiguration message was received for the MBMS service for which the SC-MRB is established and using g-RNTI and sc-mtch-SchedulingInfo (if included) in this message for this MBMS service:

1> configure the physical layer in accordance with the sc-mtch-InfoList, applicable for the SC-MRB, as included in the SCPTMConfiguration message;

1> inform upper layers about the establishment of the SC-MRB by indicating the corresponding tmgi and sessionId;

5.8a.3.4 SC-MRB release

Upon SC-MRB release, the UE shall:

1> release the RLC entity as well as the related MAC and physical layer configuration;

1> inform upper layers about the release of the SC-MRB by indicating the corresponding tmgi and sessionId;
5.9 RN procedures

5.9.1 RN reconfiguration

5.9.1.1 General

The purpose of this procedure is to configure/reconfigure the RN subframe configuration and/or to update the system information relevant for the RN in RRC_CONNECTED.

5.9.1.2 Initiation

E-UTRAN may initiate the RN reconfiguration procedure to an RN in RRC_CONNECTED when AS security has been activated.

5.9.1.3 Reception of the RNReconfiguration by the RN

The RN shall:

1> if the rn-SystemInfo is included:
   2> if the systemInformationBlockType1 is included:
3> act upon the received SystemInformationBlockType1 as specified in 5.2.2.7;
   2> if the SystemInformationBlockType2 is included:
3> act upon the received SystemInformationBlockType2 as specified in 5.2.2.9;
1> if the rn-SubframeConfig is included:
   2> reconfigure lower layers in accordance with the received subframeConfigPatternFDD or subframeConfigPatternTDD;
   2> if the rpdcch-Config is included:
      3> reconfigure lower layers in accordance with the received rpdcch-Config;
1> submit the RNReconfigurationComplete message to lower layers for transmission, upon which the procedure ends;

5.10 Sidelink

5.10.1 Introduction

The sidelink communication and associated synchronisation resource configuration applies for the frequency at which it was received/acquired. Moreover, for a UE configured with one or more SCells, the sidelink communication and
associated synchronisation resource configuration provided by dedicated signalling applies for the PCell/ the primary frequency. The sidelink discovery and associated synchronisation resource configuration applies for the frequency at which it was received/acquired or the indicated frequency in the configuration. For a UE configured with one or more SCells, the sidelink discovery and associated synchronisation resource configuration provided by dedicated signalling applies for the the PCell/ the primary frequency / any other indicated frequency.

NOTE 1: Upper layers configure the UE to receive or transmit sidelink communication on a specific frequency, to monitor or transmit non-PS related sidelink discovery announcements on one or more frequencies or to monitor or transmit PS related sidelink discovery announcements on a specific frequency, but only if the UE is authorised to perform these particular ProSe related sidelink activities.

NOTE 2: It is up to UE implementation which actions to take (e.g. termination of unicast services, detach) when it is unable to perform the desired sidelink activities, e.g. due to UE capability limitations.

Sidelink communication consists of one-to-many and one-to-one sidelink communication. One-to-many sidelink communication consists of relay related and non-relay related one-to-many sidelink communication. One-to-one sidelink communication consists of relay related and non-relay related one-to-one sidelink communication. In relay related one-to-one sidelink communication the communicating parties consist of one sidelink relay UE and one sidelink remote UE.

Sidelink discovery consists of public safety related (PS related) and non-PS related sidelink discovery. PS related sidelink discovery consists of relay related and non-relay related PS related sidelink discovery. Upper layers indicate to RRC whether a particular sidelink announcement is PS related or non-PS related.

The specification covers the use of UE to network sidelink relays by specifying the additional requirements that apply for a sidelink relay UE and a sidelink remote UE. I.e. for such UEs the regular sidelink UE requirements equally apply unless explicitly stated otherwise.

5.10.1a Conditions for sidelink communication operation

When it is specified that the UE shall perform sidelink communication operation only if the conditions defined in this section are met, the UE shall perform sidelink communication operation only if:

1> if the UE’s serving cell is suitable (RRC_IDLE or RRC_CONNECTED); and if either the selected cell on the frequency used for sidelink communication operation belongs to the registered or equivalent PLMN as specified in TS 24.334 [69] or the UE is out of coverage on the frequency used for sidelink communication operation as defined in TS 36.304 [4, 11.4]; or

1> if the UE is camped on a serving cell (RRC_IDLE) on which it fulfils the conditions to support sidelink communication in limited service state as specified in TS 23.303 [68, 4.5.6]; and if either the serving cell is on the frequency used for sidelink communication operation or the UE is out of coverage on the frequency used for sidelink communication operation as defined in TS 36.304 [4, 11.4]; or

1> if the UE has no serving cell (RRC_IDLE);

5.10.1b Conditions for PS related sidelink discovery operation

When it is specified that the UE shall perform PS related sidelink discovery operation only if the conditions defined in this section are met, the UE shall perform PS related sidelink discovery operation only if:

1> if the UE’s serving cell is suitable (RRC_IDLE or RRC_CONNECTED); and if either the selected cell on the frequency used for PS related sidelink discovery operation belongs to the registered or other PLMN as specified in TS 24.334 [69] or the UE is out of coverage on the frequency used for PS related sidelink discovery operation as defined in TS 36.304 [4, 11.4]; or

1> if the UE is camped on a serving cell (RRC_IDLE) on which it fulfils the conditions to support sidelink discovery in limited service state as specified in TS 23.303 [68, 4.5.6]; and if either the serving cell is on the frequency used for PS related sidelink discovery operation or the UE is out of coverage on the frequency used for PS related sidelink discovery operation as defined in TS 36.304 [4, 11.4]; or

1> if the UE has no serving cell (RRC_IDLE);
5.10.1c Conditions for non-PS related sidelink discovery operation

When it is specified that the UE shall perform non-PS related sidelink discovery operation only if the conditions defined in this section are met, the UE shall perform non-PS related sidelink discovery operation only if:

1> if the UE’s serving cell (RRC_IDLE) or PCell (RRC_CONNECTED) is suitable; and if the selected cell on the frequency used for non-PS related sidelink discovery operation belongs to the registered or other PLMN as specified in TS 24.334 [69].

5.10.2 Sidelink UE information

5.10.2.1 General

The purpose of this procedure is to inform E-UTRAN that the UE is interested or no longer interested to receive sidelink communication or discovery, as well as to request assignment or release of transmission resources for sidelink communication or discovery announcements or sidelink discovery gaps and to report parameters related to sidelink discovery from system information of inter-frequency/PLMN cells.
5.10.2.2 Initiation

A UE capable of sidelink communication or discovery that is in RRC_CONNECTED may initiate the procedure to indicate it is (interested in) receiving sidelink communication or discovery in several cases including upon successful connection establishment, upon change of interest, upon change to a PCell broadcasting SystemInformationBlockType18 or SystemInformationBlockType19. A UE capable of sidelink communication or discovery may initiate the procedure to request assignment of dedicated resources for the concerned sidelink communication transmission or discovery announcements or to request sidelink discovery gaps for sidelink discovery transmission or sidelink discovery reception and a UE capable of inter-frequency/PLMN sidelink discovery parameter reporting may initiate the procedure to report parameters related to sidelink discovery from system information of inter-frequency/PLMN cells.

NOTE 1: A UE in RRC_IDLE that is configured to transmit sidelink communication/ discovery announcements, while SystemInformationBlockType18/ SystemInformationBlockType19 does not include the resources for transmission (in normal conditions), initiates connection establishment in accordance with 5.3.3.1a.

Upon initiating the procedure, the UE shall:

1. if SystemInformationBlockType18 is broadcast by the PCell:
   2. ensure having a valid version of SystemInformationBlockType18 for the PCell;
   3. if configured by upper layers to receive sidelink communication:
      4. if the UE did not transmit a SidelinkUEInformation message since last entering RRC_CONNECTED state; or
      5. if since the last time the UE transmitted a SidelinkUEInformation message the UE connected to a PCell not broadcasting SystemInformationBlockType18; or

NOTE 2: After handover/ re-establishment from a source PCell not broadcasting SystemInformationBlockType18 the UE repeats the same interest information that it provided previously as such a source PCell may not forward the interest information.

3. if the last transmission of the SidelinkUEInformation message did not include commRxInterestedFreq; or if the frequency configured by upper layers to receive sidelink communication on has changed since the last transmission of the SidelinkUEInformation message:
   4. initiate transmission of the SidelinkUEInformation message to indicate the sidelink communication reception frequency of interest in accordance with 5.10.2.3;

2. else:

3. if the last transmission of the SidelinkUEInformation message included commRxInterestedFreq:
   4. initiate transmission of the SidelinkUEInformation message to indicate it is no longer interested in sidelink communication reception in accordance with 5.10.2.3;

2. if configured by upper layers to transmit non-relay related one-to-many sidelink communication:

3. if the UE did not transmit a SidelinkUEInformation message since last entering RRC_CONNECTED state; or

3. if since the last time the UE transmitted a SidelinkUEInformation message the UE connected to a PCell not broadcasting SystemInformationBlockType18; or

3. if the last transmission of the SidelinkUEInformation message did not include commTxResourceReq; or if the information carried by the commTxResourceReq has changed since the last transmission of the SidelinkUEInformation message:
   4. initiate transmission of the SidelinkUEInformation message to indicate the non-relay related one-to-many sidelink communication transmission resources required by the UE in accordance with 5.10.2.3;

2. else:

3. if the last transmission of the SidelinkUEInformation message included commTxResourceReq:
   4. initiate transmission of the SidelinkUEInformation message to indicate it no longer requires non-relay related one-to-many sidelink communication transmission resources in accordance with 5.10.2.3;
if configured by upper layer to transmit relay related one-to-many sidelink communication:

3> if the UE did not transmit a SidelinkUEInformation message since entering RRC_CONNECTED state; or
3> if since the last time the UE transmitted a SidelinkUEInformation message the UE connected to a PCell not broadcasting SystemInformationBlockType18, connected to a PCell not broadcasting SystemInformationBlockType19 or broadcasting SystemInformationBlockType19 not including discConfigRelay; or
3> if the last transmission of SidelinkUEInformation message did not include commTxResourceReqRelay; or if the information carried by the commTxResourceReqRelay has changed since the last transmission of the SidelinkUEInformation message:

4> if the UE is acting as sidelink relay UE:

5> initiate transmission of the SidelinkUEInformation message to indicate the relay related one-to-many sidelink communication transmission resources required by the UE in accordance with 5.10.2.3;

2> else:

3> if the last transmission of the SidelinkUEInformation message included commTxResourceReqRelay:

4> initiate transmission of the SidelinkUEInformation message to indicate it no longer requires relay related one-to-many sidelink communication transmission resources in accordance with 5.10.2.3;

2> if configured by upper layers to transmit non-relay related one-to-one sidelink communication:

3> if the UE did not transmit a SidelinkUEInformation message since last entering RRC_CONNECTED state; or
3> if since the last time the UE transmitted a SidelinkUEInformation message the UE connected to a PCell not broadcasting SystemInformationBlockType18 or connected to a PCell broadcasting SystemInformationBlockType18 not including commTxResourceUC-ReqAllowed; or
3> if the last transmission of the SidelinkUEInformation message did not include commTxResourceReqUC; or if the information carried by the commTxResourceReqUC has changed since the last transmission of the SidelinkUEInformation message:

4> if commTxResourceUC-ReqAllowed is included in SystemInformationBlockType18:

5> initiate transmission of the SidelinkUEInformation message to indicate the non-relay related one-to-one sidelink communication transmission resources required by the UE in accordance with 5.10.2.3;

2> else:

3> if the last transmission of the SidelinkUEInformation message included commTxResourceReqUC:

4> initiate transmission of the SidelinkUEInformation message to indicate it no longer requires non-relay related one-to-one sidelink communication transmission resources in accordance with 5.10.2.3;

2> if configured by upper layers to transmit relay related one-to-one sidelink communication:

3> if the UE did not transmit a SidelinkUEInformation message since last entering RRC_CONNECTED state; or
3> if since the last time the UE transmitted a SidelinkUEInformation message the UE connected to a PCell not broadcasting SystemInformationBlockType18, connected to a PCell not broadcasting SystemInformationBlockType19 or broadcasting SystemInformationBlockType19 not including discConfigRelay; or
3> if the last transmission of the SidelinkUEInformation message did not include commTxResourceReqRelayUC; or if the information carried by the commTxResourceReqRelayUC has changed since the last transmission of the SidelinkUEInformation message:

4> if the UE is acting as sidelink relay UE; or:

4> if the UE has a selected sidelink relay UE; and if SystemInformationBlockType19 is broadcast by the PCell and includes discConfigRelay; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met;
5> initiate transmission of the *SidelinkUEInformation* message to indicate the relay related one-to-one sidelink communication transmission resources required by the UE in accordance with 5.10.2.3;

2> else:

3> if the last transmission of the *SidelinkUEInformation* message included *commTxResourceReqRelayUC*:

4> initiate transmission of the *SidelinkUEInformation* message to indicate it no longer requires relay related one-to-one sidelink communication transmission resources in accordance with 5.10.2.3;

1> if *SystemInformationBlockType19* is broadcast by the PCell:

2> ensure having a valid version of *SystemInformationBlockType19* for the PCell;

2> if configured by upper layers to receive sidelink discovery announcements on a serving frequency or on one or more frequencies included in *discInterFreqList*, if included in *SystemInformationBlockType19* of the PCell:

3> if the UE did not transmit a *SidelinkUEInformation* message since last entering RRC_CONNECTED state; or

3> if since the last time the UE transmitted a *SidelinkUEInformation* message the UE connected to a PCell not broadcasting *SystemInformationBlockType19*; or

3> if the last transmission of the *SidelinkUEInformation* message did not include *discRxInterest*:

4> initiate transmission of the *SidelinkUEInformation* message to indicate it is interested in sidelink discovery reception in accordance with 5.10.2.3;

2> else:

3> if the last transmission of the *SidelinkUEInformation* message included *discRxInterest*:

4> initiate transmission of the *SidelinkUEInformation* message to indicate it is no longer interested in sidelink discovery reception in accordance with 5.10.2.3;

2> if the UE is configured by upper layers to transmit non-PS related sidelink discovery announcements on the primary frequency or on one or more frequencies included in *discInterFreqList*, if included in *SystemInformationBlockType19* of the PCell, with *discTxResourcesInterFreq* included within *discResourcesNonPS* and not set to *noTxOnCarrier*:

3> if the UE did not transmit a *SidelinkUEInformation* message since last entering RRC_CONNECTED state; or

3> if since the last time the UE transmitted a *SidelinkUEInformation* message the UE connected to a PCell not broadcasting *SystemInformationBlockType19* or connected to a PCell broadcasting *SystemInformationBlockType19* not including *discTxResourcesInterFreq* within *discResourcesNonPS* or *discTxResourcesInterFreq* did not include all frequencies for which the UE will request resources; or

3> if the last transmission of the *SidelinkUEInformation* message did not include *discTxResourceReq*; or if the non-PS related sidelink discovery announcement resources required by the UE have changed (i.e. resulting in a change of *discTxResourceReq*) since the last transmission of the *SidelinkUEInformation* message:

4> initiate transmission of the *SidelinkUEInformation* message to indicate the non-PS related sidelink discovery announcement resources required by the UE in accordance with 5.10.2.3;

2> else:

3> if the last transmission of the *SidelinkUEInformation* message included *discTxResourceReq*:

4> initiate transmission of the *SidelinkUEInformation* message to indicate it no longer requires non-PS related sidelink discovery announcement resources in accordance with 5.10.2.3;

2> if configured by upper layers to transmit PS related sidelink discovery announcements on the primary frequency or, in case of non-relay PS related sidelink discovery announcements, on a frequency included in *discInterFreqList*, if included in *SystemInformationBlockType19*, with *discTxResourcesInterFreq* included within *discResourcesPS* and not set to *noTxOnCarrier*:

3> if the UE did not transmit a *SidelinkUEInformation* message since last entering RRC_CONNECTED state; or
3> if the last time the UE transmitted a SidelinkUEInformation message the UE connected to a PCell not broadcasting SystemInformationBlockType19, connected to a PCell broadcasting SystemInformationBlockType19 not including discConfigPS, or in case of non-relay PS related transmission: (connected to a PCell broadcasting SystemInformationBlockType19 not including discTxResourcesInterFreq within discResourcesPS or for which discTxResourcesInterFreq did not include all frequencies for which the UE will request resources), or in case of relay related PS sidelink discovery announcements: (connected to a PCell broadcasting SystemInformationBlockType19 not including discConfigRelay) sidelink; or

3> if the last transmission of the SidelinkUEInformation message did not include discTxResourceReqPS; or if the PS related sidelink discovery announcement resources required by the UE have changed (i.e. resulting in a change of discTxResourceReqPS) since the last transmission of the SidelinkUEInformation message:

4> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements; or

4> if the UE is acting as sidelink relay UE; and if SystemInformationBlockType19 includes discConfigRelay; and if the sidelink relay UE threshold conditions as specified in 5.10.10.4 are met; or

4> if the UE is selecting a sidelink relay UE / has a selected sidelink relay UE; and if SystemInformationBlockType19 includes discConfigRelay; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met:

5> initiate transmission of the SidelinkUEInformation message to indicate the PS related sidelink discovery announcement resources required by the UE in accordance with 5.10.2.3;

2> else:

3> if the last transmission of the SidelinkUEInformation message included discTxResourceReqPS:

4> initiate transmission of the SidelinkUEInformation message to indicate it no longer requires PS related sidelink discovery announcement resources in accordance with 5.10.2.3;

2> if configured by upper layers to monitor or transmit sidelink discovery announcements; and if the UE requires sidelink discovery gaps, to perform such actions:

3> if the UE did not transmit a SidelinkUEInformation message since last entering RRC_CONNECTED state; or

3> if since the last time the UE transmitted a SidelinkUEInformation message the UE connected to a PCell not broadcasting SystemInformationBlockType19 or connected to a PCell broadcasting SystemInformationBlockType19 not including gapRequestsAllowedCommon while at the same time the UE was not configured with gapRequestsAllowedDedicated; or

3> if the last transmission of the SidelinkUEInformation message did not include the gaps required to monitor or transmit the sidelink discovery announcements (i.e. UE requiring gaps to monitor discovery announcements while discRxGapReq was not included or UE requiring gaps to transmit discovery announcements while discTxGapReq was not included); or if the sidelink discovery gaps required by the UE have changed (i.e. resulting in a change of discRxGapReq or discTxGapReq) since the last transmission of the SidelinkUEInformation message:

4> if the UE is configured with gapRequestsAllowedDedicated set to true; or

4> if the UE is not configured with gapRequestsAllowedDedicated and gapRequestsAllowedCommon is included in SystemInformationBlockType19:

5> initiate transmission of the SidelinkUEInformation message to indicate the sidelink discovery gaps required by the UE in accordance with 5.10.2.3;

2> else:

3> if the last transmission of the SidelinkUEInformation message included discTxGapReq or discRxGapReq:

4> initiate transmission of the SidelinkUEInformation message to indicate it no longer requires sidelink discovery gaps in accordance with 5.10.2.3;

2> if the UE acquired the relevant parameters from the system information of one or more cells on a carrier included in the discSysInfoToReportConfig and T370 is running:

3> if the UE has configured lower layers to transmit or monitor the sidelink discovery announcements on those cells:
4) initiate transmission of the SidelinkUEInformation message to report the acquired system information parameters and stop T370;

5.10.2.3  Actions related to transmission of SidelinkUEInformation message

The UE shall set the contents of the SidelinkUEInformation message as follows:

1) if the UE initiates the procedure to indicate it is (no more) interested to receive sidelink communication or discovery or to request (configuration/release) of sidelink communication or discovery transmission resources (i.e. UE includes all concerned information, irrespective of what triggered the procedure):

2) if SystemInformationBlockType18 is broadcast by the PCell:

3) if configured by upper layers to receive sidelink communication:

4) include commRxInterestedFreq and set it to the sidelink communication frequency;

3) if configured by upper layers to transmit non-relay related one-to-many sidelink communication:

4) include commTxResourceReq and set its fields as follows:

5) set carrierFreq to indicate the sidelink communication frequency i.e. the same value as indicated in commRxInterestedFreq if included;

5) set destinationInfoList to include the non-relay related one-to-many sidelink communication transmission destination(s) for which it requests E-UTRAN to assign dedicated resources;

3) if configured by upper layers to transmit non-relay related one-to-one sidelink communication; and

3) if commTxResourceUC-ReqAllowed is included in SystemInformationBlockType18:

4) include commTxResourceReqUC and set its fields as follows:

5) set carrierFreq to indicate the one-to-one sidelink communication frequency i.e. the same value as indicated in commRxInterestedFreq if included;

5) set destinationInfoList to include the non-relay related one-to-one sidelink communication transmission destination(s) for which it requests E-UTRAN to assign dedicated resources;

3) if configured by upper layers to transmit relay related one-to-one sidelink communication; and

3) if SystemInformationBlockType19 is broadcast by the PCell including discConfigRelay; and

3) if the UE is acting as sidelink relay UE; or if the UE has a selected sidelink relay UE; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met:

4) include commTxResourceReqRelayUC and set its fields as follows:

5) set destinationInfoList to include the one-to-one sidelink communication transmission destination(s) for which it requests E-UTRAN to assign dedicated resources;

4) include ue-Type and set it to relayUE if the UE is acting as sidelink relay UE and to remoteUE otherwise;

3) if configured by upper layers to transmit relay related one-to-many sidelink communication; and

3) if SystemInformationBlockType19 is broadcast by the PCell including discConfigRelay; and

3) if the UE is acting as sidelink relay UE:

4) include commTxResourceReqRelay and set its fields as follows:

5) set destinationInfoList to include the one-to-many sidelink communication transmission destination(s) for which it requests E-UTRAN to assign dedicated resources;

4) include ue-Type and set it to relayUE;
if SystemInformationBlockType19 is broadcast by the PCell:

if configured by upper layers to receive sidelink discovery announcements on a serving frequency or one or more frequencies included in discInterFreqList, if included in SystemInformationBlockType19:

include discRxInterest;

if the UE is configured by upper layers to transmit non-PS related sidelink discovery announcements:

for each frequency on which the UE is configured to transmit non-PS related sidelink discovery announcements that concerns the primary frequency or that is included in discInterFreqList with discTxResourcesInterFreq included within discResourcesNonPS and not set to noTxOnCarrier:

for the first frequency, include discTxResourceReq and set it to indicate the number of discovery messages for sidelink discovery announcement(s) for which it requests E-UTRAN to assign dedicated resources as well as the concerned frequency, if different from the primary;

for any additional frequency, include discTxResourceReqAddFreq and set it to indicate the number of discovery messages for sidelink discovery announcement(s) for which it requests E-UTRAN to assign dedicated resources as well as the concerned frequency;

if configured by upper layers to transmit PS related sidelink discovery announcements; and

if the frequency on which the UE is configured to transmit PS related sidelink discovery announcements either concerns the primary frequency or, in case of non-relay PS related sidelink discovery announcements, is included in discInterFreqList with discTxResourcesInterFreq included within discResourcesPS and not set to noTxOnCarrier:

if configured by upper layers to transmit non-relay PS related sidelink discovery announcements and SystemInformationBlockType19 includes discConfigPS; or

if the UE is acting as sidelink relay UE; and if SystemInformationBlockType19 includes discConfigRelay; and if the sidelink relay UE threshold conditions as specified in 5.10.10.4 are met; or

if the UE is selecting a sidelink relay UE / has a selected sidelink relay UE; and if SystemInformationBlockType19 includes discConfigRelay; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met:

include discTxResourceReqPS and set it to indicate the number of discovery messages for PS related sidelink discovery announcement(s) for which it requests E-UTRAN to assign dedicated resources as well as the concerned frequency, if different from the primary;

else if the UE initiates the procedure to request sidelink discovery transmission and/ or reception gaps:

if the UE is configured with gapRequestsAllowedDedicated set to true; or

if the UE is not configured with gapRequestsAllowedDedicated and gapRequestsAllowedCommon is included in SystemInformationBlockType19:

if the UE requires sidelink discovery gaps to monitor the sidelink discovery announcements the UE is configured to monitor by upper layers:

include discRxGapReq and set it to indicate, for each frequency that either concerns the primary frequency or is included in discInterFreqList on which the UE is configured to monitor sidelink discovery announcements and for which it requires sidelink discovery gaps to do so, the gap pattern(s) as well as the concerned frequency, if different from the primary;

if the UE requires sidelink discovery gaps to transmit the sidelink discovery announcements the UE is configured to transmit by upper layers:

include discTxGapReq and set it to indicate, for each frequency that either concerns the primary or is included in discInterFreqList on which the UE is configured to transmit sidelink discovery announcements and for which it requires sidelink discovery gaps to do so, the gap pattern(s) as well as the concerned frequency, if different from the primary;

else if the UE initiates the procedure to report the system information parameters related to sidelink discovery of carriers other than the primary:
include discSysInfoReportFreqList and set it to report the system information parameter acquired from the cells on those carriers;

The UE shall submit the SidelinkUEInformation message to lower layers for transmission.

5.10.3 Sidelink communication monitoring

A UE capable of sidelink communication that is configured by upper layers to receive sidelink communication shall:

1> if the conditions for sidelink communication operation as defined in 5.10.1a are met:

2> if in coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]:

3> if the cell chosen for sidelink communication reception broadcasts SystemInformationBlockType18 including commRxPool:

4> configure lower layers to monitor sidelink control information and the corresponding data using the pool of resources indicated by commRxPool;

NOTE 1: If commRxPool includes one or more entries including rxParametersNCell, the UE may only monitor such entries if the associated PSS/SSS or SLSSIDs is detected. When monitoring such pool(s), the UE applies the timing of the concerned PSS/SSS or SLSS.

2> else (i.e. out of coverage on the sidelink carrier):

3> configure lower layers to monitor sidelink control information and the corresponding data using the pool of resources that were preconfigured (i.e. preconfigComm in SL-Preconfiguration defined in 9.3);

NOTE 2: The UE may monitor in accordance with the timing of the selected SyncRef UE, or if the UE does not have a selected SyncRef UE, based on the UE’s own timing.
5.10.4 Sidelink communication transmission

A UE capable of sidelink communication that is configured by upper layers to transmit non-relay related sidelink communication and has related data to be transmitted or a UE capable of relay related sidelink communication that is configured by upper layers to transmit relay related sidelink communications and satisfies the conditions for relay related sidelink communication specified in this section shall:

1> if the conditions for sidelink communication operation as defined in 5.10.1a are met:

2> if in coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]:

3> if the UE is in RRC_CONNECTED and uses the PCell for sidelink communication:

4> if the UE is configured, by the current PCell/ the PCell in which physical layer problems or radio link failure was detected, with commTxResources set to scheduled:

5> if T310 or T311 is running; and if the PCell at which the UE detected physical layer problems or radio link failure broadcasts SystemInformationBlockType18 including commTxPoolExceptional; or

5> if T301 is running and the cell on which the UE initiated connection re-establishment broadcasts SystemInformationBlockType18 including commTxPoolExceptional:

6> configure lower layers to transmit the sidelink control information and the corresponding data using the pool of resources indicated by the first entry in commTxPoolExceptional;

5> else:

6> configure lower layers to request E-UTRAN to assign transmission resources for sidelink communication;

4> else if the UE is configured with commTxPoolNormalDedicated or commTxPoolNormalDedicatedExt:

5> if priorityList is included for the entries of commTxPoolNormalDedicated or commTxPoolNormalDedicatedExt:

6> configure lower layers to transmit the sidelink control information and the corresponding data using the one or more pools of resources indicated by commTxPoolNormalDedicated or commTxPoolNormalDedicatedExt i.e. indicate all entries of this field to lower layers;

5> else:

6> configure lower layers to transmit the sidelink control information and the corresponding data using the pool of resources indicated by the first entry in commTxPoolNormalDedicated;

3> else (i.e. sidelink communication in RRC_IDLE or on cell other than PCell in RRC_CONNECTED):

4> if the cell chosen for sidelink communication transmission broadcast SystemInformationBlockType18:

5> if SystemInformationBlockType18 includes commTxPoolNormalCommon:

6> if priorityList is included for the entries of commTxPoolNormalCommon or commTxPoolNormalCommonExt:

7> configure lower layers to transmit the sidelink control information and the corresponding data using the one or more pools of resources indicated by commTxPoolNormalCommon and/or commTxPoolNormalCommonExt i.e. indicate all entries of these fields to lower layers;

6> else:

7> configure lower layers to transmit the sidelink control information and the corresponding data using the pool of resources indicated by the first entry in commTxPoolNormalCommon;
The conditions for relay related sidelink communication are as follows:

1> if the transmission concerns sidelink relay communication; and the UE is capable of sidelink relay or sidelink remote operation:

2> if the UE is in RRC_IDLE; and if the UE has a selected sidelink relay UE: configure lower layers to transmit the sidelink control information and the corresponding data using the resources, as specified previously in this section, only if the following condition is met:

3> if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met; and if the UE configured lower layers with a pool of resources included in SystemInformationBlockType18 (i.e. commTxPoolNormalCommon, commTxPoolNormalCommonExt or commTxPoolExceptional); and commTxAllowRelayCommon is included in SystemInformationBlockType18;

2> if the UE is in RRC_CONNECTED: configure lower layers to transmit the sidelink control information and the corresponding data using the resources, as specified previously in this section, only if the following condition is met:

3> if the UE configured lower layers with resources provided by dedicated signalling (i.e. commTxResources); and the UE is configured with commTxAllowRelayDedicated set to true;

5.10.5 Sidelink discovery monitoring

A UE capable of non-PS related sidelink discovery that is configured by upper layers to monitor non-PS related sidelink discovery announcements shall:

1> for each frequency the UE is configured to monitor non-PS related sidelink discovery announcements on, prioritising the frequencies included in discInterFreqList, if included in SystemInformationBlockType19:

2> if the PCell or the cell the UE is camping on indicates the pool of resources to monitor sidelink discovery announcements on by discRxResourcesInterFreq in discResourcesNonPS within discInterFreqList in SystemInformationBlockType19:

3> configure lower layers to monitor sidelink discovery announcements using the pool of resources indicated by discRxResourcesInterFreq in discResourcesNonPS within SystemInformationBlockType19;

2> else if the cell used for sidelink discovery monitoring broadcasts SystemInformationBlockType19:
3GPP TS 36.331 version 13.3.0 Release 13

5.10.6 Sidelink discovery announcement

A UE capable of non-PS related sidelink discovery that is configured by upper layers to transmit non-PS related sidelink discovery announcements shall, for each frequency the UE is configured to transmit such announcements on:

NOTE: In case the configured resources are insufficient it is up to UE implementation to decide which sidelink discovery announcements to transmit.

1> if the frequency used to transmit sidelink discovery announcements concerns the serving frequency (RRC_IDLE) or primary frequency (RRC_CONNECTED):
if the UE’s serving cell (RRC_IDLE) or PCell (RRC_CONNECTED) is suitable as defined in TS 36.304 [4]:

if the UE is in RRC_CONNECTED (i.e. PCell is used for sidelink discovery announcement):

if the UE is configured with discTxResources set to scheduled:

- configure lower layers to transmit the sidelink discovery announcement using the assigned resources indicated by scheduled in discTxResources;

else if the UE is configured with discTxPoolDedicated (i.e. discTxResources set to ue-Selected):

- select an entry of the list of resource pool entries in discTxPoolDedicated and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;

else if T300 is not running (i.e. UE in RRC_IDLE, announcing via serving cell):

if SystemInformationBlockType19 of the serving cell includes discTxPoolCommon:

- select an entry of the list of resource pool entries in discTxPoolCommon and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;

else if, for the frequency used to transmit sidelink discovery announcements on, the UE is configured with dedicated resources (i.e. with discTxResources-r12, if discTxCarrierFreq is included in discTxInterFreqInfo, or with discTxResources within discTxInfoInterFreqListAdd in discTxInterFreqInfo); and the conditions for non-PS related sidelink discovery operation as defined in 5.10.1c are met:

if the UE is configured with discTxResources set to scheduled:

- configure lower layers to transmit the sidelink discovery announcement using the assigned resources indicated by scheduled in discTxResources;

else if the UE is configured with discTxResources set to ue-Selected:

- select an entry of the list of resource pool entries in ue-Selected and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;

else if the frequency used to transmit sidelink discovery announcements on is included in discInterFreqList within SystemInformationBlockType19 of the serving cell/ PCell, and discTxResourcesInterFreq within discResourcesNonPS in the corresponding entry of discInterFreqList is set to discTxPoolCommon (i.e. serving cell/ PCell broadcasts pool of resources) and the conditions for non-PS related sidelink discovery operation as defined in 5.10.1c are met; or

else if discTxPoolCommon is included in SystemInformationBlockType19 acquired from cell selected on the sidelink discovery announcement frequency; and the conditions for non-PS related sidelink discovery operation as defined in 5.10.1c are met:

- select an entry of the list of resource pool entries in discTxPoolCommon and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;

else if the UE is configured with discTxGapConfig and requires sidelink discovery gaps to transmit sidelink discovery announcements on the concerned frequency:

- configure lower layers to transmit on the concerned frequency using the sidelink discovery gaps indicated by discTxGapConfig;

else:

- configure lower layers to transmit on the concerned frequency without affecting normal operation;

A UE capable of PS related sidelink discovery that is configured by upper layers to transmit PS related sidelink discovery announcements shall:

if out of coverage on the frequency used to transmit PS related sidelink discovery announcements as defined in TS 36.304 [4, 11.4] and the conditions for PS-related sidelink discovery operation as defined in 5.10.1b are met:

if configured by upper layers to transmit non-relay PS related sidelink discovery announcements; or
2> if the UE is selecting a sidelink relay UE/ has a selected sidelink relay UE:

3> configure lower layers to transmit sidelink discovery announcements using the pool of resources that were preconfigured and in accordance with the following:

4> randomly select, using a uniform distribution, an entry of preconfigDisc in SL-Preconfiguration defined in 9.3;

4> using the timing of the selected SyncRef UE, or if the UE does not have a selected SyncRef UE, based on the UEs own timing;

1> else if the frequency used to transmit sidelink discovery announcements concerns the serving frequency (RRC_IDLE) or primary frequency (RRC_CONNECTED) and the conditions for PS related sidelink discovery operation as defined in 5.10.1b are met:

2> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements; or

2> if the UE is acting as sidelink relay UE; and if the UE is in RRC_IDLE; and if the sidelink relay UE threshold conditions as specified in 5.10.10.4 are met; or

2> if the UE is acting as sidelink relay UE; and if the UE is in RRC_CONNECTED; or

2> if the UE is selecting a sidelink relay UE / has a selected sidelink relay UE; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met:

3> if the UE is configured with discTxPoolPS-Dedicated; or

3> if the UE is in RRC_IDLE; and if discTxPoolPS-Common is included in SystemInformationBlockType19:

4> select an entry of the list of resource pool entries and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;

3> else if the UE is configured with discTxResourcesPS set to scheduled:

4> configure lower layers to transmit the sidelink discovery announcement using the assigned resources indicated by scheduled in discTxResourcesPS;

1> else if, for the frequency used to transmit sidelink discovery announcements on, the UE is configured with dedicated resources (i.e. with discTxResourcesPS in discTxInterFreqInfo within sl-DiscConfig); and the conditions for PS related sidelink discovery operation as defined in 5.10.1b are met:

2> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements:

3> if the UE is configured with discTxResourcesPS set to ue-Selected:

4> select an entry of the list of resource pool entries in ue-Selected and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;

1> else if the frequency used to transmit sidelink discovery announcements on is included in discInterFreqList within SystemInformationBlockType19 of the serving cell/ PCell, while discTxResourcesInterFreq within discResourcesPS in the corresponding entry of discInterFreqList is set to discTxPoolCommon (i.e. serving cell/ PCell broadcasts pool of resources) and the conditions for PS related sidelink discovery operation as defined in 5.10.1b are met:

2> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements:

3> select an entry of the list of resource pool entries in discTxPoolCommon and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;

1> else if discTxPoolPS-Common is included in SystemInformationBlockType19 acquired from cell selected on the sidelink discovery announcement frequency; and the conditions for PS related sidelink discovery operation as defined in 5.10.1b are met:
2> if configured by upper layers to transmit non-relay PS related sidelink discovery announcements:
3> select an entry of the list of resource pool entries in \textit{discTxPoolPS-Common} and configure lower layers to use it to transmit the sidelink discovery announcements as specified in 5.10.6a;

1> if the UE is configured with \textit{discTxGapConfig} and requires gaps to transmit sidelink discovery announcements on the concerned frequency:
2> configure lower layers to transmit on the concerned frequency using the gaps indicated by \textit{discTxGapConfig},
1> else:
2> configure lower layers to transmit on the concerned frequency without affecting normal operation;

5.10.6a Sidelink discovery announcement pool selection

A UE that is configured with a list of resource pool entries for sidelink discovery announcement transmission (i.e. by \textit{SL-DiscTxPoolList}) shall:

1> if \textit{poolSelection} is set to \textit{rsrpBased}:
2> select a pool from the list of pools the UE is configured with for which the RSRP measurement of the reference cell selected as defined in 5.10.6b, after applying the layer 3 filter defined by \textit{quantityConfig} as specified in 5.5.3.2, is in-between \textit{threshLow} and \textit{threshHigh};
1> else:
2> randomly select, using a uniform distribution, a pool from the list of pools the UE is configured with;
1> configure lower layers to transmit the sidelink discovery announcement using the selected pool of resources;

NOTE 1: When performing resource pool selection based on RSRP, the UE uses the latest results of the available measurements used for cell reselection evaluation in RRC\_IDLE/ for measurement report triggering evaluation in RRC\_CONNECTED, which are performed in accordance with the performance requirements specified in TS 36.133 [16].

5.10.6b Sidelink discovery announcement reference carrier selection

A UE capable of sidelink discovery that is configured by upper layers to transmit sidelink discovery announcements shall:

1> for each frequency the UE is transmitting sidelink discovery announcements on, select a cell to be used as reference for synchronisation and DL measurements in accordance with the following:
2> if the frequency concerns the primary frequency:
3> use the PCell as reference;
2> else if the frequency concerns a secondary frequency:
3> use the concerned SCell as reference;
2> else if the UE is configured with \textit{discTxRefCarrierDedicated} for the frequency:
3> use the cell indicated by this field as reference;
2> else if the UE is configured with \textit{refCarrierCommon} for the frequency:
3> use the serving cell (RRC\_IDLE)/ PCell (RRC\_CONNECTED) as reference;
2> else:
3> use the DL frequency paired with the one used to transmit sidelink discovery announcements on as reference;
5.10.7 Sidelink synchronisation information transmission

5.10.7.1 General

The purpose of this procedure is to provide synchronisation information to a UE. For sidelink discovery, the synchronisation information concerns a Sidelink Synchronisation Signal (SLSS) and, in case of PS related discovery, also timing information and some additional configuration parameters (i.e. the MasterInformationBlock-SL message), while for sidelink communication it concerns an SLSS and the MasterInformationBlock-SL message. A UE transmits synchronisation information either when E-UTRAN configures it to do so by dedicated signalling (i.e. network based), or when not configured by dedicated signalling (i.e. UE based) and E-UTRAN broadcasts (in coverage) or pre-configures a threshold (out of coverage).

The synchronisation information transmitted by the UE may be derived from information/ signals received from E-UTRAN (in coverage) or received from a UE acting as synchronisation reference for the transmitting UE. In the remainder, the UE acting as synchronisation reference is referred to as SyncRef UE.
5.10.7.2 Initiation

A UE capable of SLSS transmission shall, when transmitting sidelink discovery announcements in accordance with 5.10.6 and when the following conditions are met:

1. if in coverage on the frequency used for sidelink discovery, as defined in TS 36.304 [4, 11.4];
2. if the UE is in RRC_CONNECTED; and if networkControlledSyncTx is configured and set to on; or
2. if networkControlledSyncTx is not configured; and syncTxThreshIC is included in SystemInformationBlockType19; and the RSRP measurement of the reference cell, selected as defined in 5.10.6b, is below the value of syncTxThreshIC:
3. if the sidelink discovery announcements are not PS related; or if syncTxPeriodic is not included:
   4. transmit SLSS on the frequency used for sidelink discovery in accordance with 5.10.7.3 and TS 36.211 [21];
3. else:
   4. transmit SLSS on the frequency used for sidelink discovery in accordance with 5.10.7.3 and TS 36.211 [21];
4. transmit the MasterInformationBlock-SL message on the frequency used for sidelink discovery, in the same subframe as SLSS, and in accordance with 5.10.7.4;
1. else (i.e. out of coverage, PS):
   2. if syncTxThreshOoC is included in the preconfigured sidelink parameters (i.e. SL-Preconfiguration defined in 9.3); and the UE has not selected SyncRef UE or the S-RSRP measurement result of the selected SyncRef UE is below the value of syncTxThreshOoC:
3. transmit SLSS on the frequency used for sidelink discovery in accordance with 5.10.7.3 and TS 36.211 [21];
3. transmit the MasterInformationBlock-SL message on the frequency used for sidelink discovery, in the same subframe as SLSS, and in accordance with 5.10.7.4;

A UE capable of sidelink communication that is configured by upper layers to transmit sidelink communication shall, irrespective of whether or not it has data to transmit:

1. if the conditions for sidelink communication operation as defined in 5.10.1a are met:
   2. if in RRC_CONNECTED; and if networkControlledSyncTx is configured and set to on;
3. transmit SLSS in accordance with 5.10.7.3 and TS 36.211 [21];
3. transmit the MasterInformationBlock-SL message, in the same subframe as SLSS, and in accordance with 5.10.7.4;

A UE shall, when transmitting sidelink communication in accordance with 5.10.4 and when the following conditions are met:

1. if in coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]:
   2. if the UE is in RRC_CONNECTED; and networkControlledSyncTx is not configured; and syncTxThreshIC is included in SystemInformationBlockType18; and the RSRP measurement of the cell chosen for sidelink communication transmission is below the value of syncTxThreshIC; or
   2. if the UE is in RRC_IDLE; and syncTxThreshIC is included in SystemInformationBlockType18; and the RSRP measurement of the cell chosen for sidelink communication transmission is below the value of syncTxThreshIC:
3. transmit SLSS in accordance with 5.10.7.3 and TS 36.211 [21];
3. transmit the MasterInformationBlock-SL message, in the same subframe as SLSS, and in accordance with 5.10.7.4;
1. else (i.e. out of coverage):
3GPP TS 36.331 version 13.3.0 Release 13

5.10.7.3 Transmission of SLSS

The UE shall select the SLSSID and the subframe in which to transmit SLSS as follows:

1> if triggered by sidelink discovery announcement and in coverage on the frequency used for sidelink discovery, as defined in TS 36.304 [4, 11.4]:

2> select the SLSSID included in the entry of discSyncConfig included in the received SystemInformationBlockType19, that includes txParameters;

2> use syncOffsetIndicator corresponding to the selected SLSSID;

2> for each pool used for the transmission of discovery announcements (each corresponding to the selected SLSSID):

3> if a subframe indicated by syncOffsetIndicator corresponds to the first subframe of the discovery transmission pool;

4> if discTxGapConfig is configured and includes the concerned subframe; or the subframe is not used for regular uplink transmission:

5> select the concerned subframe;

3> else

4> if discTxGapConfig is configured and includes the concerned subframe; or the subframe is not used for regular uplink transmission:

5> select the subframe indicated by syncOffsetIndicator that precedes and which, in time domain, is nearest to the first subframe of the discovery transmission pool;

3> if the sidelink discovery announcements concern PS; and if syncTxPeriodic is included:

4> additionally select each subframe that periodically occurs 40 subframes after the selected subframe;

1> if triggered by sidelink communication and in coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]:

2> select the SLSSID included in the entry of commSyncConfig that is included in the received SystemInformationBlockType18 and includes txParameters;

2> use syncOffsetIndicator corresponding to the selected SLSSID;

2> if in RRC_CONNECTED; and if networkControlledSyncTx is configured and set to on:

3> select the subframe(s) indicated by syncOffsetIndicator;

2> else (when transmitting communication):

3> select the subframe(s) indicated by syncOffsetIndicator within the SC period in which the UE intends to transmit sidelink control information or data;

1> else (i.e. out of coverage on sidelink carrier):

2> select the synchronisation reference UE (i.e. SyncRef UE) as defined in 5.10.8;

2> if the UE has a selected SyncRef UE and inCoverage in the MasterInformationBlock-SL message received from this UE is set to TRUE; or
if the UE has a selected SyncRef UE and inCoverage in the MasterInformationBlock-SL message received from this UE is set to FALSE while the SLSS from this UE is part of the set defined for out of coverage, see TS 36.211 [21]:

select the same SLSSID as the SLSSID of the selected SyncRef UE;

select the subframe in which to transmit the SLSS according to the syncOffsetIndicator1 or syncOffsetIndicator2 included in the preconfigured sidelink parameters (i.e. preconfigSync in SL-Preconfiguration defined in 9.3), such that the subframe timing is different from the SLSS of the selected SyncRef UE;

else if the UE has a selected SyncRef UE:

select the SLSSID from the set defined for out of coverage having an index that is 168 more than the index of the SLSSID of the selected SyncRef UE, see TS 36.211 [21];

select the subframe in which to transmit the SLSS according to syncOffsetIndicator1 or syncOffsetIndicator2 included in the preconfigured sidelink parameters (i.e. preconfigSync in SL-Preconfiguration defined in 9.3), such that the subframe timing is different from the SLSS of the selected SyncRef UE;

else (i.e. no SyncRef UE selected):

randomly select, using a uniform distribution, an SLSSID from the set of sequences defined for out of coverage, see TS 36.211 [21];

select the subframe in which to transmit the SLSS according to syncOffsetIndicator1 or syncOffsetIndicator2 (arbitrary selection between these) included in the preconfigured sidelink parameters (i.e. preconfigSync in SL-Preconfiguration defined in 9.3);

5.10.7.4 Transmission of MasterInformationBlock-SL message

The UE shall set the contents of the MasterInformationBlock-SL message as follows:

if in coverage on the frequency used for the sidelink operation (communication or discovery) that triggered this procedure as defined in TS 36.304 [4, 11.4]:

set inCoverage to TRUE;

set sl-Bandwidth to the value of ul-Bandwidth as included in the received SystemInformationBlockType2 of the cell chosen for the concerned sidelink operation;

if tdd-Config is included in the received SystemInformationBlockType1:

set subframeAssignmentSL to the value representing the same meaning as of subframeAssignment that is included in tdd-Config in the received SystemInformationBlockType1;

else:

set subframeAssignmentSL to none;

if triggered by sidelink communication; and if syncInfoReserved is included in an entry of commSyncConfig from the received SystemInformationBlockType18:

set reserved to the value of syncInfoReserved in the received SystemInformationBlockType18;

if triggered by sidelink discovery; and if syncInfoReserved is included in an entry of discSyncConfig from the received SystemInformationBlockType19:

set reserved to the value of syncInfoReserved in the received SystemInformationBlockType19;

else:

set all bits in reserved to 0;

else if the UE has a selected SyncRef UE (as defined in 5.10.8):

set inCoverage to FALSE;
5.10.7.5 Void

5.10.8 Sidelink synchronisation reference

5.10.8.1 General

The purpose of this procedure is to select a synchronisation reference and used a.o. when transmitting sidelink communication, sidelink discovery or synchronisation information.

5.10.8.2 Selection and reselection of synchronisation reference UE (SyncRef UE)

The UE shall:

1> for the frequency used for sidelink communication or discovery, if out of coverage on that frequency as defined in TS 36.304 [4, 11.4]:

2> perform a full search (i.e. covering all subframes and all possible SLSSID) to detect candidate SLSS, in accordance with TS 36.133 [16]

2> when evaluating the one or more detected SLSSID, apply layer 3 filtering as specified in 5.5.3.2 using the preconfigured filterCoefficient as defined in 9.3, before using the S-RSRP measurement results;

2> if the UE has selected a SyncRef UE:

3> if the S-RSRP of the strongest candidate SyncRef UE exceeds the minimum requirement TS 36.133 [16] by syncRefMinHyst and the strongest candidate SyncRef UE belongs to the same priority group as the current SyncRef UE and the S-RSRP of the strongest candidate SyncRef UE exceeds the S-RSRP of the current SyncRef UE by syncRefDiffHyst; or

3> if the S-RSRP of the candidate SyncRef UE exceeds the minimum requirement TS 36.133 [16] by syncRefMinHyst and the candidate SyncRef UE belongs to a higher priority group than the current SyncRef UE; or

3> if the S-RSRP of the current SyncRef UE is less than the minimum requirement TS 36.133 [16]:

4> consider no SyncRef UE to be selected;

2> if the UE has not selected a SyncRef UE,

3> if the UE detects one or more SLSSID for which the S-RSRP exceeds the minimum requirement defined in TS 36.133 [16] by syncRefMinHyst and for which the UE received the corresponding MasterInformationBlock-SL message (candidate SyncRef UEs), select a SyncRef UE according to the following priority order:

4> UEs of which inCoverage, included in the MasterInformationBlock-SL message received from this UE, is set to TRUE, starting with the UE with the highest S-RSRP result (priority group 1);

4> UE which SLSSID is part of the set defined for in coverage, starting with the UE with the highest S-RSRP result (priority group 2);

4> Other UEs, starting with the UE with the highest S-RSRP result (priority group 3);
5.10.9  Sidelink common control information

5.10.9.1  General

The sidelink common control information is carried by a single message, the MasterInformationBlock-SL (MIB-SL) message. The MIB-SL includes timing information as well as some configuration parameters and is transmitted via SL-BCH.

The MIB-SL uses a fixed schedule with a periodicity of 40 ms without repetitions. In particular, the MIB-SL is scheduled in subframes indicated by syncOffsetIndicator i.e. for which (10*DFN + subframe number) mod 40 = syncOffsetIndicator.

The sidelink common control information may change at any transmission i.e. neither a modification period nor a change notification mechanism is used.

A UE configured to receive or transmit sidelink communication or PS related sidelink discovery shall:

1> if the UE has a selected SyncRef UE, as specified in 5.10.8.2:
2> ensure having a valid version of the MasterInformationBlock-SL message of that SyncRefUE:

5.10.9.2  Actions related to reception of MasterInformationBlock-SL message

Upon receiving MasterInformationBlock-SL, the UE shall:

1> apply the values of sl-Bandwidth, subframeAssignmentSL, directFrameNumber and directSubframeNumber included in the received MasterInformationBlock-SL message;

5.10.10  Sidelink relay UE operation

5.10.10.1  General

This procedure is used by a UE supporting sidelink relay UE operation and involves evaluation of the AS-layer conditions that need to be met in order for upper layers to configure a sidelink relay UE to receive/ transmit relay related PS sidelink discovery/ relay related sidelink communication. The AS-layer conditions merely comprise of being configured with radio resources that can be used for transmission.

A UE that fulfils the criteria specified in 5.10.10.2 and 5.10.10.3 and that is configured by higher layers accordingly is acting as a sidelink relay UE.

5.10.10.2  AS-conditions for relay related sidelink communication transmission by sidelink relay UE

A UE capable of sidelink relay UE operation shall inform upper layers that it is configured with radio resources that can be used for relay related sidelink communication transmission if the following conditions are met:

1> if in RRC_CONNECTED; and if the UE is configured with commTxResources; and the UE is configured with commTxAllowRelayDedicated set to true;

5.10.10.3  AS-conditions for relay PS related sidelink discovery transmission by sidelink relay UE

A UE capable of sidelink relay UE operation shall inform upper layers that it is configured with radio resources that can be used for relay PS related sidelink discovery transmission if the following conditions are met:

1> if in RRC_IDLE; and if the UE’s serving cell is suitable as defined in TS 36.304 [4]; and if SystemInformationBlockType19 includes discConfigPS including discTxPoolPS-Common and discConfigRelay; and if the sidelink relay UE threshold conditions as specified in 5.10.10.4 are met;
1> else if in RRC_CONNECTED; and if discTxResourcesPS is configured;
5.10.10.4 Sidelink relay UE threshold conditions

A UE capable of sidelink relay UE operation shall:

1> if the threshold conditions specified in this section were not met:

2> if neither \( \text{threshHigh} \) nor \( \text{threshLow} \) is included in \( \text{relayUE-Config} \) within \( \text{SystemInformationBlockType19} \):

3> consider the threshold conditions to be met (entry);

2> else if \( \text{threshHigh} \) is not included in \( \text{relayUE-Config} \) within \( \text{SystemInformationBlockType19} \); or the RSRP measurement of the PCell, or the cell on which the UE camps, is below \( \text{threshHigh} \) by \( hystMax \) (also included within \( \text{relayUE-Config} \)); and

2> if \( \text{threshLow} \) is not included in \( \text{relayUE-Config} \) within \( \text{SystemInformationBlockType19} \); or the RSRP measurement of the PCell, or the cell on which the UE camps, is above \( \text{threshLow} \) by \( hystMin \) (also included within \( \text{relayUE-Config} \));

3> consider the threshold conditions to be met (entry);

1> else:

2> if \( \text{threshHigh} \) is included in \( \text{relayUE-Config} \) within \( \text{SystemInformationBlockType19} \); and the RSRP measurement of the PCell, or the cell on which the UE camps, is above \( \text{threshHigh} \) (also included within \( \text{relayUE-Config} \)); or

2> if \( \text{threshLow} \) is included in \( \text{relayUE-Config} \) within \( \text{SystemInformationBlockType19} \); and the RSRP measurement of the PCell, or the cell on which the UE camps, is below \( \text{threshLow} \) (also included within \( \text{relayUE-Config} \));

3> consider the threshold conditions not to be met (leave);

5.10.11 Sidelink remote UE operation

5.10.11.1 General

This procedure is used by a UE supporting sidelink remote UE operation and involves evaluation of the AS-layer conditions that need to be met in order for upper layers to configure a sidelink remote UE to receive/ transmit relay related sidelink PS discovery/ relay related sidelink communication. The AS-layer conditions merely comprise of being configured with radio resources that can be used for transmission, as well as whether or not having a selected sidelink relay UE.

5.10.11.2 AS-conditions for relay related sidelink communication transmission by sidelink remote UE

A UE capable of sidelink remote UE operation shall inform upper layers whether it is configured with radio resources that can be used for relay related sidelink communication transmission if the following conditions are met:

1> if the UE is out of coverage; and is preconfigured with \( \text{SL-Preconfiguration} \) including \( \text{discTxPoolList} \) and \( \text{preconfigRelay} \);

1> else if in RRC_IDLE; and if the UE”s serving cell is suitable as defined in TS 36.304 [4]; and if \( \text{SystemInformationBlockType18} \) includes \( \text{commTxPoolNormalCommon} \) and \( \text{commTxAllowRelayCommon} \); and if \( \text{SystemInformationBlockType19} \) includes \( \text{discConfigRelay} \); and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met;

1> else if in RRC_CONNECTED; and if the UE is configured with \( \text{commTxResources} \); and the UE is configured with \( \text{commTxAllowRelayDedicated} \) set to \( \text{true} \);
5.10.11.3 AS-conditions for relay PS related sidelink discovery transmission by sidelink remote UE

A UE capable of sidelink remote UE operation shall inform upper layers whether it is configured with radio resources that can be used for relay PS related sidelink discovery transmission if the following conditions are met:

1> if the UE is out of coverage; and is preconfigured with SL-Preconfiguration including discTxPoolList and preconfigRelay;

1> else if in RRC_IDLE; and if the UE’s serving cell is suitable as defined in TS 36.304 [4]; and if SystemInformationBlockType19 includes discConfigPS including discTxPoolPS-Common and discConfigRelay; and if the sidelink remote UE threshold conditions as specified in 5.10.11.5 are met;

1> else if in RRC_CONNECTED; and if discTxResourcesPS is configured;

5.10.11.4 Selection and reselection of sidelink relay UE

A UE capable of sidelink remote UE operation that is configured by upper layers to search for a sidelink relay UE shall:

1> if out of coverage on the frequency used for sidelink communication, as defined in TS 36.304 [4, 11.4]; or

1> if the serving frequency is used for sidelink communication and the RSRP measurement of the cell on which the UE camps (RRC_IDLE)/ the PCell (RRC_CONNECTED) is below threshHigh within remoteUE-Config:

2> search for candidate sidelink relay UEs, in accordance with TS 36.133 [16]

2> when evaluating the one or more detected sidelink relay UEs, apply layer 3 filtering as specified in 5.5.3.2 across measurements that concern the same ProSe Relay UE ID and using the filterCoefficient in SystemInformationBlockType19 (in coverage) or the preconfigured filterCoefficient as defined in 9.3(out of coverage), before using the SD-RSRP measurement results;

NOTE 1: The details of the interaction with upper layers are up to UE implementation.

2> if the UE does not have a selected sidelink relay UE:

3> select a candidate sidelink relay UE which SD-RSRP exceeds q-RxLevMin included in either reselectionInfoIC (in coverage) or reselectionInfoOoC (out of coverage) by minHyst;

3> else if SD-RSRP of the currently selected sidelink relay UE is below q-RxLevMin included in either reselectionInfoIC (in coverage) or reselectionInfoOoC (out of coverage); or if upper layers indicate not to use the currently selected sidelink relay: (i.e. sidelink relay UE reselection):

3> select a candidate sidelink relay UE which SD-RSRP exceeds q-RxLevMin included in either reselectionInfoIC (in coverage) or reselectionInfoOoC (out of coverage) by minHyst;

3> else if the UE did not detect any candidate sidelink relay UE which SD-RSRP exceeds q-RxLevMin included in either reselectionInfoIC (in coverage) or reselectionInfoOoC (out of coverage); or if upper layers indicate not to use the currently selected sidelink relay: (i.e. sidelink relay UE reselection):

NOTE 2: The UE may perform sidelink relay UE reselection in a manner resulting in selection of the sidelink relay UE, amongst all candidate sidelink relay UEs meeting higher layer criteria, that has the best radio link quality. Further details, including interaction with upper layers, are up to UE implementation.

5.10.11.5 Sidelink remote UE threshold conditions

A UE capable of sidelink remote UE operation shall:

1> if the threshold conditions specified in this section were not met:

2> if threshHigh is not included in remoteUE-Config within SystemInformationBlockType19; or

2> if threshHigh is included in remoteUE-Config within SystemInformationBlockType19; and the RSRP measurement of the PCell, or the cell on which the UE camps, is below threshHigh by hystMax (also included within remoteUE-Config):
3> consider the threshold conditions to be met (entry);

1> else:

2> if threshHigh is included in remoteUE-Config within SystemInformationBlockType19; and the RSRP measurement of the PCell, or the cell on which the UE camps, is above threshHigh (also included within remoteUE-Config):

3> consider the threshold conditions not to be met (leave);

### 6 Protocol data units, formats and parameters (tabular & ASN.1)

#### 6.1 General

The contents of each RRC message is specified in sub-clause 6.2 using ASN.1 to specify the message syntax and using tables when needed to provide further detailed information about the fields specified in the message syntax. The syntax of the information elements that are defined as stand-alone abstract types is further specified in a similar manner in sub-clause 6.3.

The need for fields to be present in a message or an abstract type, i.e., the ASN.1 fields that are specified as OPTIONAL in the abstract notation (ASN.1), is specified by means of comment text tags attached to the OPTIONAL statement in the abstract syntax. All comment text tags are available for use in the downlink direction only. The meaning of each tag is specified in table 6.1-1.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| Cond conditionTag (Used in downlink only) | Conditionally present  
A field for which the need is specified by means of conditions. For each conditionTag, the need is specified in a tabular form following the ASN.1 segment. In case, according to the conditions, a field is not present, the UE takes no action and where applicable shall continue to use the existing value (and/ or the associated functionality) unless explicitly stated otherwise (e.g. in the conditional presence table or in the description of the field itself). |
| Need OP (Used in downlink only) | Optionally present  
A field that is optional to signal. For downlink messages, the UE is not required to take any special action on absence of the field beyond what is specified in the procedural text or the field description table following the ASN.1 segment. The UE behaviour on absence should be captured either in the procedural text or in the field description. |
| Need ON (Used in downlink only) | Optionally present, No action  
A field that is optional to signal. If the message is received by the UE, and in case the field is absent, the UE takes no action and where applicable shall continue to use the existing value (and/ or the associated functionality). |
| Need OR (Used in downlink only) | Optionally present, Release  
A field that is optional to signal. If the message is received by the UE, and in case the field is absent, the UE shall discontinue/ stop using/ delete any existing value (and/ or the associated functionality). |

Any field with Need ON in system information shall be interpreted as Need OR.

Need codes may not be specified for a parent extension field/ extension group, used in downlink, which includes one or more child extension fields. Upon absence of such a parent extension field/ extension group, the UE shall:

- For each individual child extension field, including extensions that are mandatory to include in the optional group, act in accordance with the need code that is defined for the extension;
- Apply this behaviour not only for child extension fields included directly within the optional parent extension field/ extension group, but also for extension fields defined at further nesting levels as long as for none of the fields in-between the concerned extension field and the parent extension field a need code is specified.
NOTE 1: The above applies for groups of non-critical extensions using double brackets (referred to as extension groups), as well as non-critical extensions at the end of a message or at the end of a structure contained in a BIT STRING or OCTET STRING (referred to as parent extension fields).

Need codes, conditions and ASN.1 defaults specified for a particular (child) field only apply in case the (parent) field including the particular field is present. This rule does not apply for optional parent extension fields/extension groups without need codes,

NOTE 2: The previous rule implies that E-UTRAN has to include such a parent extension field to release a child field that is either:

- Optional with need OR, or
- Conditional while the UE releases the child field when absent.

The handling of need codes as specified in the previous is illustrated by means of an example, as shown in the following ASN.1.

```asn1
-- /example/ ASN1START

RRCMessage-r8-IEs ::= SEQUENCE {
    field1 InformationElement1,  
    field2 InformationElement2 OPTIONAL, -- Need ON  
    nonCriticalExtension RRCMessage-v8a0-IEs OPTIONAL
}

RRCMessage-v8a0-IEs ::= SEQUENCE {
    field3 InformationElement3 OPTIONAL, -- Need ON  
    nonCriticalExtension RRCMessage-v940-IEs OPTIONAL
}

RRCMessage-v940-IEs ::= SEQUENCE {
    field4 InformationElement4 OPTIONAL, -- Need OR  
    nonCriticalExtension SEQUENCE {} OPTIONAL
}

InformationElement1 ::= SEQUENCE {
    field11 InformationElement11 OPTIONAL, -- Need ON  
    field12 InformationElement12 OPTIONAL, -- Need OR  
    ....  
    [[ field13 InformationElement13 OPTIONAL, -- Need OR  
      field14 InformationElement14 OPTIONAL -- Need ON  
    ]]  
```
The handling of need codes as specified in the previous implies that:

- if field2 in RRCMessage-r8-IEs is absent, the UE does not modify field21;
- if field2 in RRCMessage-r8-IEs is present but does not include field21, the UE releases field21;
- if the extension group containing field13 is absent, the UE releases field13 and does not modify field14;
- if nonCriticalExtension defined by IE RRCMessage-v8a0-IEs is absent, the UE does not modify field3 and releases field4;

6.2 RRC messages

NOTE: The messages included in this section reflect the current status of the discussions. Additional messages may be included at a later stage.

6.2.1 General message structure

EUTRA-RRC-Definitions

This ASN.1 segment is the start of the E-UTRA RRC PDU definitions.
BCCH-BCH-Message ::= SEQUENCE {
    message          BCCH-BCH-MessageType
}

BCCH-BCH-MessageType ::=      MasterInformationBlock

-- ASN1STOP

-- BCCH-DL-SCH-Message

The BCCH-DL-SCH-Message class is the set of RRC messages that may be sent from the E-UTRAN to the UE via DL-SCH on the BCCH logical channel.

-- ASN1START

BCCH-DL-SCH-Message ::= SEQUENCE {
    message          BCCH-DL-SCH-MessageType
}

BCCH-DL-SCH-MessageType ::= CHOICE {
    c1       CHOICE {
        systemInformation      SystemInformation,
        systemInformationBlockType1    SystemInformationBlockType1
    },
    messageClassExtension SEQUENCE {}
}

-- ASN1STOP

-- BCCH-DL-SCH-Message-BR

The BCCH-DL-SCH-Message-BR class is the set of RRC messages that may be sent from the E-UTRAN to the UE via DL-SCH on the BR-BCCH logical channel.

-- ASN1START

BCCH-DL-SCH-Message-BR ::= SEQUENCE {
    message          BCCH-DL-SCH-MessageType-BR-r13
BCCH-DL-SCH-MessageType-BR-r13 ::= CHOICE {
  c1 CHOICE {
    systemInformation-BR-r13 SystemInformation-BR-r13,
    systemInformationBlockType1-BR-r13 SystemInformationBlockType1-BR-r13
  },
  messageClassExtension SEQUENCE { }
}

-- ASN1STOP

MCCH-Message

The MCCH-Message class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the MCCH logical channel.

-- ASN1START

MCCH-Message ::= SEQUENCE { 
  message MCCH-MessageType 
}

MCCH-MessageType ::= CHOICE { 
  c1 CHOICE {
    mbsfnAreaConfiguration-r9 MBSFNAreaConfiguration-r9
  },
  later CHOICE { 
    c2 CHOICE{ 
      mbmsCountingRequest-r10 MBMSCountingRequest-r10
    },
    messageClassExtension SEQUENCE { }
  } 
}

-- ASN1STOP
The **PCCH-Message** class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the PCCH logical channel.

```asn1
PCCH-Message ::= SEQUENCE {
  message              PCCH-MessageType
}

PCCH-MessageType ::= CHOICE {
  c1                   CHOICE {
    paging             Paging,
  },
  messageClassExtension SEQUENCE {}
}
```

The **DL-CCCH-Message** class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the downlink CCCH logical channel.

```asn1
DL-CCCH-Message ::= SEQUENCE {
  message      DL-CCCH-MessageType
}

DL-CCCH-MessageType ::= CHOICE {
  c1          CHOICE {
    rrcConnectionReestabishment    RRCConnectionReestabishment,
    rrcConnectionReestabishmentReject    RRCConnectionReestabishmentReject,
    rrcConnectionReject             RRCConnectionReject,
    rrcConnectionSetup              RRCConnectionSetup
  },
  messageClassExtension SEQUENCE {}
}
The DL-DCCH-Message class is the set of RRC messages that may be sent from the E-UTRAN to the UE or from the E-UTRAN to the RN on the downlink DCCH logical channel.

```
DL-DCCH-Message ::= SEQUENCE {
  message     DL-DCCH-MessageType
}

DL-DCCH-MessageType ::= CHOICE {
  c 1       CHOICE {
    csfbParametersResponseCDMA2000   CSFBParametersResponseCDMA2000,
    dlInformationTransfer     DLInformationTransfer,
    handoverFromEUTRAPreparationRequest   HandoverFromEUTRAPreparationRequest,
    mobilityFromEUTRACommand    MobilityFromEUTRACommand,
    rrcConnectionReconfiguration   RRCCconnectionReconfiguration,
    rrcConnectionRelease     RRCCconnectionRelease,
    securityModeCommand      SecurityModeCommand,
    ueCapabilityEnquiry      UECapabilityEnquiry,
    counterCheck       CounterCheck,
    ueInformationRequest-r9     UEInformationRequest-r9,
    loggedMeasurementConfiguration-r10  LoggedMeasurementConfiguration-r10,
    rnReconfiguration-r10     RNReconfiguration-r10,
    rrcConnectionResume-r13     RRCConnectionResume-r13,
  },
  messageClassExtension SEQUENCE {}
}
```

The UL-CCCH-Message class is the set of RRC messages that may be sent from the UE to the E-UTRAN on the uplink CCCH logical channel.

---

```asn1
UL-CCCH-Message ::= SEQUENCE {
    message             UL-CCCH-MessageType
}

UL-CCCH-MessageType ::= CHOICE {
    c 1  CHOICE {
        rrcConnectionReestablishmentRequest  RRCConnectionReestablishmentRequest,
        rrcConnectionRequest                 RRCConnectionRequest
    },
    messageClassExtension CHOICE {
        c 2  CHOICE {
            rrcConnectionResumeRequest-r13   RRCConnectionResumeRequest-r13
        },
        messageClassExtensionFuture-r13  SEQUENCE {}
    }
}
---

UL-DCCH-Message class is the set of RRC messages that may be sent from the UE to the E-UTRAN or from the RN to the E-UTRAN on the uplink DCCH logical channel.

---

```asn1
UL-DCCH-Message ::= SEQUENCE {
    message             UL-DCCH-MessageType
}

UL-DCCH-MessageType ::= CHOICE {
    c1  CHOICE {
```
csfbParametersRequestCDMA2000, CSFBParametersRequestCDMA2000,
measurementReport, MeasurementReport,
rrcConnectionReconfigurationComplete, RRCConnectionReconfigurationComplete,
rrcConnectionReestablishmentComplete, RRCConnectionReestablishmentComplete,
rrcConnectionSetupComplete, RRCConnectionSetupComplete,
securityModeComplete, SecurityModeComplete,
securityModeFailure, SecurityModeFailure,
ueCapabilityInformation, UECapabilityInformation,
ulHandoverPreparationTransfer, ULHandoverPreparationTransfer,
ulInformationTransfer, ULInformationTransfer,
counterCheckResponse, CounterCheckResponse,
ueInformationResponse-r9, UEInformationResponse-r9,
proximityIndication-r9, ProximityIndication-r9,
rnReconfigurationComplete-r10, RNReconfigurationComplete-r10,
mbmsCountingResponse-r10, MBMSCountingResponse-r10,
interFreqRSTDMeasurementIndication-r10, InterFreqRSTDMeasurementIndication-r10
},
messageClassExtension CHOICE {
  c2        CHOICE {
    ueAssistanceInformation-r11, UEAssistanceInformation-r11,
inDeviceCoexIndication-r11, InDeviceCoexIndication-r11,
mbmsInterestIndication-r11, MBMSInterestIndication-r11,
scgFailureInformation-r12, SCGFailureInformation-r12,
sidelinkUEInformation-r12, SidelinkUEInformation-r12,
wlanConnectionStatusReport-r13, WLANConnectionStatusReport-r13,
rrcConnectionResumeComplete-r13, RRCCConnectionResumeComplete-r13,
spare9 NULL, spare8 NULL, spare7 NULL,
spare6 NULL, spare5 NULL, spare4 NULL,
spare3 NULL, spare2 NULL, spare1 NULL
  },
messageClassExtensionFuture-r11 SEQUENCE {} 
}

-- ASN1STOP
SC-MCCH-Message

The SC-MCCH-Message class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the SC-MCCH logical channel.

---

6.2.2 Message definitions

-- CounterCheck

The CounterCheck message is used by the E-UTRAN to indicate the current COUNT MSB values associated to each DRB and to request the UE to compare these to its COUNT MSB values and to report the comparison results to E-UTRAN.

Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: E-UTRAN to UE

CounterCheck message

---
c1 CHOICE {
  counterCheck-r8 CounterCheck-r8-IEs,
    spare3 NULL, spare2 NULL, spare1 NULL
},
criticalExtensionsFuture SEQUENCE {}
}

CounterCheck-r8-IEs ::= SEQUENCE {
  drb-CountMSB-InfoList DRB-CountMSB-InfoList,
  nonCriticalExtension CounterCheck-v8a0-IEs OPTIONAL
}

CounterCheck-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

DRB-CountMSB-InfoList ::= SEQUENCE (SIZE (1..maxDRB)) OF DRB-CountMSB-Info

DRB-CountMSB-Info ::= SEQUENCE {
  drb-Identity DRB-
  Identity,
  countMSB-Uplink INTEGER(0..33554431),
  countMSB-Downlink INTEGER(0..33554431)
}

-- ASN1STOP

**CounterCheck field descriptions**

- **count-MSB-Downlink**: Indicates the value of 25 MSBs from downlink COUNT associated to this DRB.
- **count-MSB-Uplink**: Indicates the value of 25 MSBs from uplink COUNT associated to this DRB.
- **drb-CountMSB-InfoList**: Indicates the MSBs of the COUNT values of the DRBs.
CounterCheckResponse

The CounterCheckResponse message is used by the UE to respond to a CounterCheck message.

Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: UE to E-UTRAN

CounterCheckResponse message

-- ASN1START

CounterCheckResponse ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    counterCheckResponse-r8    CounterCheckResponse-r8-IEs,
    criticalExtensionsFuture   SEQUENCE {}   
  }
}

CounterCheckResponse-r8-IEs ::= SEQUENCE {
  drb-CountInfoList     DRB-CountInfoList,
  nonCriticalExtension    CounterCheckResponse-v8a0-IEs  OPTIONAL
}

CounterCheckResponse-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}

DRB-CountInfoList ::= SEQUENCE (SIZE (0..maxDRB)) OF DRB-CountInfo

DRB-CountInfo ::= SEQUENCE {
  drb-Identity
  count-Uplink     INTEGER(0..4294967295),
  count-Downlink     INTEGER(0..4294967295)
}
CountCheckResponse field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>count-Downlink</td>
<td>Indicates the value of downlink COUNT associated to this DRB.</td>
</tr>
<tr>
<td>count-Uplink</td>
<td>Indicates the value of uplink COUNT associated to this DRB.</td>
</tr>
<tr>
<td>drb-CountList</td>
<td>Indicates the COUNT values of the DRBs.</td>
</tr>
</tbody>
</table>

-- CSFBParametersRequestCDMA2000 --

The CSFBParametersRequestCDMA2000 message is used by the UE to obtain the CDMA2000 1xRTT Parameters from the network. The UE needs these parameters to generate the CDMA2000 1xRTT Registration message used to register with the CDMA2000 1xRTT Network which is required to support CSFB to CDMA2000 1xRTT.

Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: UE to E-UTRAN

CSFBParametersRequestCDMA2000 message

-- ASN1START

CSFBParametersRequestCDMA2000 ::= SEQUENCE {
criticalExtensions  CHOICE {
csfbParametersRequestCDMA2000-r8 CSFBParametersRequestCDMA2000-r8-IEs,
criticalExtensionsFuture SEQUENCE { }
criticalExtensions }
}

CSFBParametersRequestCDMA2000-r8-IEs ::= SEQUENCE {
nonCriticalExtension CSFBParametersRequestCDMA2000-v8a0-IEs OPTIONAL
}

CSFBParametersRequestCDMA2000-v8a0-IEs ::= SEQUENCE {
lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension SEQUENCE {} OPTIONAL
}
The `CSFBParametersResponseCDMA2000` message is used to provide the CDMA2000 1xRTT Parameters to the UE so the UE can register with the CDMA2000 1xRTT Network to support CSFB to CDMA2000 1xRTT.

- **Signalling radio bearer:** SRB1
- **RLC-SAP:** AM
- **Logical channel:** DCCH
- **Direction:** E-UTRAN to UE

### `CSFBParametersResponseCDMA2000` message

```
CSFBParametersResponseCDMA2000 ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions      CHOICE {
    csfbParametersResponseCDMA2000-r8  CSFBParametersResponseCDMA2000-r8-IEs,
    criticalExtensionsFuture    SEQUENCE {}
  }
}
```

### `CSFBParametersResponseCDMA2000-r8-IEs` ::= SEQUENCE {

- **rand** RAND-CDMA2000,
- **mobilityParameters** MobilityParametersCDMA2000,
- **nonCriticalExtension** CSFBParametersResponseCDMA2000-v8a0-IEs OPTIONAL

```
CSFBParametersResponseCDMA2000-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}
```

---

---

---
The `DLInformationTransfer` message is used for the downlink transfer of NAS or non-3GPP dedicated information.

Signalling radio bearer: SRB2 or SRB1 (only if SRB2 not established yet. If SRB2 is suspended, E-UTRAN does not send this message until SRB2 is resumed.)

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

### DLInformationTransfer message

```asn1
DLInformationTransfer ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions   CHOICE {
    c1   CHOICE {
      dlInformationTransfer-r8   DLInformationTransfer-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE { }
  }
}

DLInformationTransfer-r8-IEs ::= SEQUENCE {
  dedicatedInfoType   CHOICE {
    dedicatedInfoNAS     DedicatedInfoNAS,
    dedicatedInfoCDMA2000-1XRTT   DedicatedInfoCDMA2000,
    dedicatedInfoCDMA2000-HRPD   DedicatedInfoCDMA2000
  },
  nonCriticalExtension   DLInformationTransfer-v8a0-IEs  OPTIONAL
}

DLInformationTransfer-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING  OPTIONAL,
  nonCriticalExtension   SEQUENCE { }  OPTIONAL
}
```
HandoverFromEUTRAPreparationRequest (CDMA2000)

The HandoverFromEUTRAPreparationRequest message is used to trigger the handover preparation procedure with a CDMA2000 RAT. This message is also used to trigger a tunneled preparation procedure with a CDMA2000 1xRTT RAT to obtain traffic channel resources for the enhanced CS fallback to CDMA2000 1xRTT, which may also involve a concurrent preparation for handover to CDMA2000 HRPD. Also, this message is used to trigger the dual Rx/Tx redirection procedure with a CDMA2000 1xRTT RAT.

Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: E-UTRAN to UE

HandoverFromEUTRAPreparationRequest message

```asn1
HandoverFromEUTRAPreparationRequest ::= SEQUENCE {
  rrc-TransactionIdentifier RRC-TransactionIdentifier,
  criticalExtensions CHOICE {
    c1 CHOICE {
      handoverFromEUTRAPreparationRequest-r8
      HandoverFromEUTRAPreparationRequest-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture SEQUENCE {}
  }
}
```
```
HandoverFromEUTRAPreparationRequest-r8-IEs ::= SEQUENCE {
  cdma2000-Type CDMA2000-Type,
  rand RAND-CDMA2000 OPTIONAL, -- Cond cdma2000-Type
  mobilityParameters MobilityParametersCDMA2000 OPTIONAL, -- Cond cdma2000-Type
  nonCriticalExtension HandoverFromEUTRAPreparationRequest-v890-IEs OPTIONAL
}
```
```
HandoverFromEUTRAPreparationRequest-v890-IEs ::= SEQUENCE {
  lateNonCriticalExtension OCTET STRING OPTIONAL,
}
HandoverFromEUTRApreparationRequest-v920-IEs ::= SEQUENCE {
  concurrPrepCDMA2000-HRPD-r9 BOOLEAN OPTIONAL, -- Cond cdma2000-Type
  nonCriticalExtension HandoverFromEUTRApreparationRequest-v1020-IEs OPTIONAL
}

HandoverFromEUTRApreparationRequest-v1020-IEs ::= SEQUENCE {
  dualRxTxRedirectIndicator-r10 ENUMERATED {true} OPTIONAL, -- Cond cdma2000-1XRTT
  redirectCarrierCDMA2000-1XRTT-r10 CarrierFreqCDMA2000 OPTIONAL, -- Cond dualRxTxRedirect
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- ASN1STOP

--- HandoverFromEUTRApreparationRequest field descriptions

<table>
<thead>
<tr>
<th>Field description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>concurrPrepCDMA2000-HRPD</strong></td>
<td>Value TRUE indicates that upper layers should initiate concurrent preparation for handover to CDMA2000 HRPD in addition to preparation for enhanced CS fallback to CDMA2000 1xRTT.</td>
</tr>
<tr>
<td><strong>dualRxTxRedirectIndicator</strong></td>
<td>Value TRUE indicates that the second radio of the dual Rx/Tx UE is being redirected to CDMA2000 1xRTT [51].</td>
</tr>
<tr>
<td><strong>redirectCarrierCDMA2000-1XRTT</strong></td>
<td>Used to indicate the CDMA2000 1xRTT carrier frequency where the UE is being redirected to.</td>
</tr>
</tbody>
</table>

--- Conditional presence Explanation

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>cdma2000-1XRTT</td>
<td>The field is optionally present, need ON, if the cdma2000-Type = type1XRTT; otherwise it is not present.</td>
</tr>
<tr>
<td>cdma2000-Type</td>
<td>The field is mandatory present if the cdma2000-Type = type1XRTT; otherwise it is not present.</td>
</tr>
<tr>
<td>dualRxTxRedirect</td>
<td>The field is optionally present, need ON, if dualRxTxRedirectIndicator is present; otherwise it is not present.</td>
</tr>
</tbody>
</table>

--- InDeviceCoexIndication

The InDeviceCoexIndication message is used to inform E-UTRAN about IDC problems which can not be solved by the UE itself, as well as to provide information that may assist E-UTRAN when resolving these problems.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

--- InDeviceCoexIndication message

-- ASN1START
InDeviceCoexIndication-r11 ::= SEQUENCE {
  criticalExtensions CHOICE {
    c1 CHOICE {
      inDeviceCoexIndication-r11 InDeviceCoexIndication-r11-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture SEQUENCE {}
  }
}

InDeviceCoexIndication-r11-IEs ::= SEQUENCE {
  affectedCarrierFreqList-r11 AffectedCarrierFreqList-r11 OPTIONAL,
  tdm-AssistanceInfo-r11 TDM-AssistanceInfo-r11 OPTIONAL,
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  nonCriticalExtension InDeviceCoexIndication-v11d0-IEs OPTIONAL
}

InDeviceCoexIndication-v11d0-IEs ::= SEQUENCE {
  ul-CA-AssistanceInfo-r11 SEQUENCE {
    affectedCarrierFreqCombList-r11 AffectedCarrierFreqCombList-r11 OPTIONAL,
    victimSystemType-r11 VictimSystemType-r11 OPTIONAL,
  } nonCriticalExtension InDeviceCoexIndication-v1310-IEs OPTIONAL
}

InDeviceCoexIndication-v1310-IEs ::= SEQUENCE {
  affectedCarrierFreqList-v1310 AffectedCarrierFreqList-v1310 OPTIONAL,
  affectedCarrierFreqCombList-r13 AffectedCarrierFreqCombList-r13 OPTIONAL,
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

AffectedCarrierFreqList-r11 ::=SEQUENCE (SIZE (1..maxFreqIDC-r11)) OF AffectedCarrierFreq-r11

AffectedCarrierFreqList-v1310 ::= SEQUENCE (SIZE (1..maxFreqIDC-r11)) OF AffectedCarrierFreq-v1310
AffectedCarrierFreq-r11 ::= SEQUENCE {
  carrierFreq-r11     MeasObjectId,
  interferenceDirection-r11 ENUMERATED {eutra, other, both, spare}
}

AffectedCarrierFreq-v1310 ::= SEQUENCE {
  carrierFreq-v1310     MeasObjectId-v1310 OPTIONAL
}

AffectedCarrierFreqCombList-r11 ::= SEQUENCE (SIZE (1..maxCombIDC-r11)) OF AffectedCarrierFreqComb-r11

AffectedCarrierFreqCombList-r13 ::= SEQUENCE (SIZE (1..maxCombIDC-r11)) OF AffectedCarrierFreqComb-r13

AffectedCarrierFreqComb-r11 ::= SEQUENCE (SIZE (2..maxServCell-r10)) OF MeasObjectId

AffectedCarrierFreqComb-r13 ::= SEQUENCE (SIZE (2..maxServCell-r13)) OF MeasObjectId-r13

TDM-AssistanceInfo-r11 ::= CHOICE {
  drx-AssistanceInfo-r11    SEQUENCE {
    drx-CycleLength-r11     ENUMERATED {sf40, sf64, sf80, sf128, sf160, sf256, spare2, spare1},
    drx-Offset-r11         INTEGER (0..255) OPTIONAL,
    drx-ActiveTime-r11     ENUMERATED {sf20, sf30, sf40, sf60, sf80, sf100, spare2, spare1}
  },
  idc-SubframePatternList-r11   IDC-SubframePatternList-r11,
  ...
}

IDC-SubframePatternList-r11 ::= SEQUENCE (SIZE (1..maxSubframePatternIDC-r11)) OF IDC-SubframePattern-r11

IDC-SubframePattern-r11 ::= CHOICE {
  subframePatternFDD-r11     BIT STRING (SIZE (4)),
}
subframePatternTDD-r11    CHOICE {
    subframeConfig0-r11      BIT STRING (SIZE (70)),
    subframeConfig1-5-r11    BIT STRING (SIZE (10)),
    subframeConfig6-r11     BIT STRING (SIZE (60))
},
...

VictimSystemType-r11 ::= SEQUENCE {
    gps-r11        ENUMERATED {true}    OPTIONAL,
    glonass-r11       ENUMERATED {true}    OPTIONAL,
    bds-r11        ENUMERATED {true}    OPTIONAL,
    galileo-r11       ENUMERATED {true}    OPTIONAL,
    wlan-r11       ENUMERATED {true}    OPTIONAL,
    bluetooth-r11      ENUMERATED {true}    OPTIONAL
}

-- ASN1STOP
**InDeviceCoexIndication field descriptions**

**AffectedCarrierFreq**
If `carrierFreq-v1310` is included, `carrierFreq-r11` is ignored by eNB.

**affectedCarrierFreqCombList**
Indicates a list of E-UTRA carrier frequencies that are affected by IDC problems due to Inter-Modulation Distortion and harmonics from E-UTRA when configured with UL CA. `affectedCarrierFreqCombList-r13` is used when more than 5 serving cells are configured or affected combinations contain `MeasObjectId` larger than 32. If `affectedCarrierFreqCombList-r13` is included, `affectedCarrierFreqCombList-r11` shall not be included.

**affectedCarrierFreqList**
List of E-UTRA carrier frequencies affected by IDC problems. If E-UTRAN includes `affectedCarrierFreqList-v1310` it includes the same number of entries, and listed in the same order, as in `affectedCarrierFreqList-r11`.

**drx-ActiveTime**
Indicates the desired active time that the E-UTRAN is recommended to configure. Value in number of subframes. Value sf20 corresponds to 20 subframes, sf30 corresponds to 30 subframes and so on.

**drx-CycleLength**
Indicates the desired DRX cycle length that the E-UTRAN is recommended to configure. Value in number of subframes. Value sf40 corresponds to 40 subframes, sf64 corresponds to 64 subframes and so on.

**drx-Offset**
Indicates the desired DRX starting offset that the E-UTRAN is recommended to configure. The UE shall set the value of `drx-Offset` smaller than the value of `drx-CycleLength`. The starting frame and subframe satisfy the relation: \([(SFN * 10) + \text{subframe number}] \mod (drx-CycleLength) = drx-Offset\.

**idc-SubframePatternList**
A list of one or more subframe patterns indicating which HARQ process E-UTRAN is requested to abstain from using. Value 0 indicates that E-UTRAN is requested to abstain from using the subframe. For FDD, the radio frame in which the pattern starts (i.e. the radio frame in which the first/leftmost bit of the `subframePatternFDD` corresponds to subframe #0) occurs when SFN mod 2 = 0. For TDD, the first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string divided by 10. The UE shall indicate a subframe pattern that follows HARQ time line, as specified in TS 36.213 [23], i.e, if a subframe is set to 1 in the subframe pattern, also the corresponding subframes carrying the potential UL grant [23, 8.0], the UL HARQ retransmission [23, 8.0] and the DL/UL HARQ feedback [23, 7.3, 8.3 and 9.1.2] shall be set to 1.

**interferenceDirection**
Indicates the direction of IDC interference. Value `eutra` indicates that only E-UTRA is victim of IDC interference, value `other` indicates that only another radio is victim of IDC interference and value `both` indicates that both E-UTRA and another radio are victims of IDC interference. The other radio refers to either the ISM radio or GNSS (see 3GPP TR 36.816 [63]).

**victimSystemType**
Indicate the list of victim system types to which IDC interference is caused from E-UTRA when configured with UL CA. Value `gps`, `glonass`, `bds` and `galileo` indicates the type of GNSS. Value `wlan` indicates WLAN and value `bluetooth` indicates Bluetooth.

---

**InterFreqRSTDMeasurementIndication**

The `InterFreqRSTDMeasurementIndication` message is used to indicate that the UE is going to either start or stop OTDOA inter-frequency RSTD measurement which requires measurement gaps as specified in TS 36.133 [16, 8.1.2.6].

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

**InterFreqRSTDMeasurementIndication message**

```asn1
InterFreqRSTDMeasurementIndication-r10 ::= SEQUENCE {
  criticalExtensions   CHOICE {
    c1   CHOICE {
      interFreqRSTDMeasurementIndication-r10 InterFreqRSTDMeasurementIndication-r10-IEs,
    }
  }
}
```

spare3 NULL, spare2 NULL, spare1 NULL
}
criticalExtensionsFuture SEQUENCE {}
}

InterFreqRSTDMeasurementIndication-r10-IEs ::= SEQUENCE {
  rstd-InterFreqIndication-r10 CHOICE {
    start SEQUENCE {
      rstd-InterFreqInfoList-r10 RSTD-InterFreqInfoList-r10
    },
    stop NULL
  },
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

RSTD-InterFreqInfoList-r10 ::= SEQUENCE (SIZE(1..maxRSTD-Freq-r10)) OF RSTD-InterFreqInfo-r10

RSTD-InterFreqInfo-r10 ::= SEQUENCE {
  carrierFreq-r10 ARFCN-ValueEUTRA,
  measPRS-Offset-r10 INTEGER (0..39),
  ...
  [ carrierFreq-v1090 ARFCN-ValueEUTRA-v9e0 OPTIONAL
  ]
}

-- ASN1STOP
InterFreqRSTDMeasurementIndication field descriptions

carrierFreq
The EARFCN value of the carrier received from upper layers for which the UE needs to perform the inter-frequency RSTD measurements. If the UE includes carrierFreq-v1090, it shall set carrierFreq-r10 to maxEARFCN.

measPRS-Offset
Indicates the requested gap offset for performing inter-frequency RSTD measurements. It is the smallest subframe offset from the beginning of subframe 0 of SFN=0 of the serving cell of the requested gap for measuring PRS positioning occasions in the carrier frequency carrierFreq for which the UE needs to perform the inter-frequency RSTD measurements. The PRS positioning occasion information is received from upper layers. The value of measPRS-Offset is obtained by mapping the starting subframe of the PRS positioning occasion in the measured cell onto the corresponding subframe in the serving cell and is calculated as the serving cell’s number of subframes from SFN=0 mod 40.

The UE shall take into account any additional time required by the UE to start PRS measurements on the other carrier when it does this mapping for determining the measPRS-Offset.

NOTE: Figure 6.2.2-1 illustrates the measPRS-Offset field.

rstd-InterFreqIndication
Indicates the inter-frequency RSTD measurement action, i.e. the UE is going to start or stop inter-frequency RSTD measurement.

-- LoggedMeasurementConfiguration

The LoggedMeasurementConfiguration message is used by E-UTRAN to configure the UE to perform logging of measurement results while in RRC_IDLE or to perform logging of measurement results for MBSFN while in both RRC_IDLE and RRC_CONNECTED. It is used to transfer the logged measurement configuration for network performance optimisation, see TS 37.320 [60].

Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: E-UTRAN to UE

LoggedMeasurementConfiguration message

-- ASN1START

LoggedMeasurementConfiguration-r10 ::= SEQUENCE {
  criticalExtensions   CHOICE {
  
}
CHOICE {
  loggedMeasurementConfiguration-r10 LoggedMeasurementConfiguration-r10-IEs,
  spare3 NULL, spare2 NULL, spare1 NULL
},
criticalExtensionsFuture SEQUENCE {}
}

LoggedMeasurementConfiguration-r10-IEs ::= SEQUENCE {
  traceReference-r10 TraceReference-r10,
  traceRecordingSessionRef-r10 OCTET STRING (SIZE (2)),
  tce-Id-r10 OCTET STRING (SIZE (1)),
  absoluteTimeInfo-r10 AbsoluteTimeInfo-r10,
  areaConfiguration-r10 AreaConfiguration-r10 OPTIONAL, -- Need OR
  loggingDuration-r10 LoggingDuration-r10,
  loggingInterval-r10 LoggingInterval-r10,
  nonCriticalExtension LoggedMeasurementConfiguration-v1080-IEs OPTIONAL
}

LoggedMeasurementConfiguration-v1080-IEs ::= SEQUENCE {
  lateNonCriticalExtension-r10 OCTET STRING OPTIONAL,
  nonCriticalExtension LoggedMeasurementConfiguration-v1130-IEs OPTIONAL
}

LoggedMeasurementConfiguration-v1130-IEs ::= SEQUENCE {
  plmn-IdentityList-r11 PLMN-IdentityList3-r11 OPTIONAL, -- Need OR
  areaConfiguration-v1130 AreaConfiguration-v1130 OPTIONAL, -- Need OR
  nonCriticalExtension LoggedMeasurementConfiguration-v1250-IEs OPTIONAL
}

LoggedMeasurementConfiguration-v1250-IEs ::= SEQUENCE {
  targetMBSFN-AreaList-r12 TargetMBSFN-AreaList-r12 OPTIONAL, -- Need OP
  nonCriticalExtension SEQUENCE {} OPTIONAL
}
LoggedMeasurementConfiguration field descriptions

absoluteTimeInfo
Indicates the absolute time in the current cell.

areaConfiguration
Used to restrict the area in which the UE performs measurement logging to cells broadcasting either one of the included cell identities or one of the included tracking area codes/identities.

plmn-IdentityList
Indicates a set of PLMNs defining when the UE performs measurement logging as well as the associated status indication and information retrieval i.e. the UE performs these actions when the RPLMN is part of this set of PLMNs.

targetMBSFN-AreaList
Used to indicate logging of MBSFN measurements and further restrict the area and frequencies for which the UE performs measurement logging for MBSFN. If both MBSFN area id and carrier frequency are present, a specific MBSFN area is indicated. If only carrier frequency is present, all MBSFN areas on that carrier frequency are indicated. If there is no entry in the list, any MBSFN area is indicated.

tce-Id
Parameter Trace Collection Entity Id: See TS 32.422 [58].

traceRecordingSessionRef
Parameter Trace Recording Session Reference: See TS 32.422 [58]

-- MasterInformationBlock

The MasterInformationBlock includes the system information transmitted on BCH.

  Signalling radio bearer: N/A
  RLC-SAP: TM
  Logical channel: BCCH
  Direction: E-UTRAN to UE

-- ASN1START

MasterInformationBlock ::= SEQUENCE {
  dl-Bandwidth     ENUMERATED { n6, n15, n25, n50, n75, n100},
  phich-Config     PHICH-Config
}
systemFrameNumber BIT STRING (SIZE (8)),
schedulingInfoSIB1-BR-r13 INTEGER (0..31),
spare BIT STRING (SIZE (5))
}

-- ASN1STOP

### MasterInformationBlock field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>dl-Bandwidth</strong></td>
<td>Parameter: transmission bandwidth configuration, NRB in downlink, see TS 36.101 [42, table 5.6-1]. n6 corresponds to 6 resource blocks, n15 to 15 resource blocks and so on.</td>
</tr>
<tr>
<td><strong>phich-Config</strong></td>
<td>Specifies the PHICH configuration. If the UE is a BL UE or UE in CE, it shall ignore this field.</td>
</tr>
<tr>
<td><strong>schedulingInfoSIB1-BR</strong></td>
<td>This field contains an index to a table that defines SystemInformationBlockType1-BR scheduling information. The table is specified in TS 36.213 [23, Table 7.1.6-1 and Table 7.1.7.2.7-1]. Value 0 means SystemInformationBlockType1-BR is not scheduled.</td>
</tr>
<tr>
<td><strong>systemFrameNumber</strong></td>
<td>Defines the 8 most significant bits of the SFN. As indicated in TS 36.211 [21, 6.6.1], the 2 least significant bits of the SFN are acquired implicitly in the P-BCH decoding, i.e. timing of 40ms P-BCH TTI indicates 2 least significant bits (within 40ms P-BCH TTI, the first radio frame: 00, the second radio frame: 01, the third radio frame: 10, the last radio frame: 11). One value applies for all serving cells of a Cell Group (i.e. MCG or SCG). The associated functionality is common (i.e. not performed independently for each cell).</td>
</tr>
</tbody>
</table>

---

**MBMSCountingRequest**

The **MBMSCountingRequest** message is used by E-UTRAN to count the UEs that are receiving or interested to receive specific MBMS services.

- Signalling radio bearer: N/A
- RLC-SAP: UM
- Logical channel: MCCH
- Direction: E-UTRAN to UE

---

**MBMSCountingRequest message**

```
MBMSCountingRequest-r10 ::= SEQUENCE {
  countingRequestList-r10   CountingRequestList-r10,
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  nonCriticalExtension     SEQUENCE {} OPTIONAL
}

CountingRequestList-r10 ::= SEQUENCE (SIZE (1..maxServiceCount)) OF CountingRequestInfo-r10
```
**MBMSCountingResponse**

The *MBMSCountingResponse* message is used by the UE to respond to an *MBMSCountingRequest* message.

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: UE to E-UTRAN

**MBMSCountingResponse message**

```asn1
MBMSCountingResponse-r10 ::= SEQUENCE {
criticalExtensions     CHOICE {
c1           CHOICE {
countingResponse-r10 MBMSCountingResponse-r10-IEs,
spare3 NULL, spare2 NULL, spare1 NULL,
},
criticalExtensionsFuture   SEQUENCE { }
}
}
```

```asn1
MBMSCountingResponse-r10-IEs ::= SEQUENCE {
mbsfn-AreaIndex-r10 INTEGER (0..maxMBSFN-Area-1) OPTIONAL,
countingResponseList-r10 CountingResponseList-r10 OPTIONAL,
lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension   SEQUENCE { } OPTIONAL
}
```
CountingResponseList-r10 ::= SEQUENCE (SIZE (1..maxServiceCount)) OF CountingResponseInfo-r10

CountingResponseInfo-r10 ::= SEQUENCE {
  countingResponseService-r10 INTEGER (0..maxServiceCount-1),
  ...
}

-- ASN1STOP

### MBMSCountingResponse field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>countingResponseList</td>
<td>List of MBMS services which the UE is receiving or interested to receive. Value 0 for field countingResponseService corresponds to the first entry in countingRequestList within MBMSCountingRequest, value 1 corresponds to the second entry in this list and so on.</td>
</tr>
<tr>
<td>mbsfn-AreaIndex</td>
<td>Index of the entry in field mbsfn-AreaInfoList within SystemInformationBlockType13. Value 0 corresponds to the first entry in mbsfn-AreaInfoList within SystemInformationBlockType13, value 1 corresponds to the second entry in this list and so on.</td>
</tr>
</tbody>
</table>

---

**MBMSInterestIndication**

The `MBMSInterestIndication` message is used to inform E-UTRAN that the UE is receiving/interested to receive or no longer receiving/interested to receive MBMS via an MRB or SC-MRB.

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: UE to E-UTRAN

### MBMSInterestIndication message

-- ASN1START

MBMSInterestIndication-r11 ::= SEQUENCE {
  criticalExtensions CHOICE {
    c1 CHOICE {
      interestIndication-r11 MBMSInterestIndication-r11-IEs,
    spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture SEQUENCE { }
  }
}

-- ASN1STOP
MBMSInterestIndication-r11-IEs ::= SEQUENCE {
    mbms-FreqList-r11 CarrierFreqListMBMS-r11 OPTIONAL,
    mbms-Priority-r11 ENUMERATED {true} OPTIONAL,
    lateNonCriticalExtension OCTET STRING OPTIONAL,
    nonCriticalExtension MBMSInterestIndication-v1310-IEs OPTIONAL
}

MBMSInterestIndication-v1310-IEs ::= SEQUENCE {
    mbms-Services-r13 MBMS-ServiceList-r13 OPTIONAL,
    nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- ASN1STOP

<table>
<thead>
<tr>
<th>MBMSInterestIndication field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>mbms-FreqList</strong></td>
</tr>
<tr>
<td><strong>mbms-Priority</strong></td>
</tr>
</tbody>
</table>

-- MBSFNAreaConfiguration

The `MBSFNAreaConfiguration` message contains the MBMS control information applicable for an MBSFN area. For each MBSFN area included in `SystemInformationBlockType13` E-UTRAN configures an MCCH (i.e. the MCCH identifies the MBSFN area) and signals the `MBSFNAreaConfiguration` message.

Signalling radio bearer: N/A

RLC-SAP: UM

Logical channel: MCCH

Direction: E-UTRAN to UE

-- ASN1START

MBSFNAreaConfiguration-r9 ::= SEQUENCE {
    commonSF-Alloc-r9 CommonSF-AllocPatternList-r9,
    commonSF-AllocPeriod-r9 ENUMERATED {
        rf4, rf8, rf16, rf32, rf64, rf128, rf256},
    pmch-InfoList-r9 PMCH-InfoList-r9,
}
**MBSFNAreaConfiguration** field descriptions

**commonSF-Alloc**
Indicates the subframes allocated to the MBSFN area. E-UTRAN always sets this field to cover at least the subframes configured by SystemInformationBlockType13 for this MCCH, regardless of whether any MBMS sessions are ongoing.

**commonSF-AllocPeriod**
Indicates the period during which resources corresponding with field commonSF-Alloc are divided between the (P)MCH that are configured for this MBSFN area. The subframe allocation patterns, as defined by commonSF-Alloc, repeat continuously during this period. Value rf4 corresponds to 4 radio frames, rf8 corresponds to 8 radio frames and so on. The commonSF-AllocPeriod starts in the radio frames for which: SFN mod commonSF-AllocPeriod = 0.

**pmch-InfoList**
EUTRAN may include pmch-InfoListExt even if pmch-InfoList does not include maxPMCH-PerMBSFN entries. EUTRAN configures at most maxPMCH-PerMBSFN entries i.e. across pmch-InfoList and pmch-InfoListExt.

---

**MeasurementReport**

The MeasurementReport message is used for the indication of measurement results.

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: UE to E-UTRAN

**MeasurementReport message**

---

MeasurementReport ::= SEQUENCE {
criticalExtensions  CHOICE {
  c1    CHOICE {
    measurementReport-r8    MeasurementReport-r8-IEs,
    spare7 NULL,
    spare6 NULL, spare5 NULL, spare4 NULL,
    spare3 NULL, spare2 NULL, spare1 NULL
  },
  criticalExtensionsFuture   SEQUENCE {}
}

MeasurementReport-r8-IEs ::=  SEQUENCE {
  measResults       MeasResults,
  nonCriticalExtension    MeasurementReport-v8a0-IEs       OPTIONAL
}

MeasurementReport-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}

-- ASN1STOP

– MobilityFromEUTRACCommand

The MobilityFromEUTRACCommand message is used to command handover or a cell change from E-UTRA to another RAT (3GPP or non-3GPP), or enhanced CS fallback to CDMA2000 1xRTT.

  Signalling radio bearer: SRB1
  RLC-SAP: AM
  Logical channel: DCCH
  Direction: E-UTRAN to UE

  MobilityFromEUTRACCommand message

-- ASN1START

MobilityFromEUTRACCommand ::=  SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
criticalextractions CHOICE {
c1 CHOICE {
mobilityFromEUTRACommand-r8 MobilityFromEUTRACommand-r8-IEs,
mobilityFromEUTRACommand-r9 MobilityFromEUTRACommand-r9-IEs,
spare2 NULL, spare1 NULL
},
criticalExtensionsFuture SEQUENCE {}
}

MobilityFromEUTRACommand-r8-IEs ::= SEQUENCE {
cs-FallbackIndicator BOOLEAN,
purpose CHOICE{
handover Handover,
cellChangeOrder CellChangeOrder
},
nonCriticalExtension MobilityFromEUTRACommand-v8a0-IEs OPTIONAL
}

MobilityFromEUTRACommand-v8a0-IEs ::= SEQUENCE {
lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension MobilityFromEUTRACommand-v8d0-IEs OPTIONAL
}

MobilityFromEUTRACommand-v8d0-IEs ::= SEQUENCE {
bandIndicator BandIndicatorGERAN OPTIONAL, -- Cond GERAN
nonCriticalExtension SEQUENCE {} OPTIONAL
}

MobilityFromEUTRACommand-r9-IEs ::= SEQUENCE {
cs-FallbackIndicator BOOLEAN,
purpose CHOICE{
handover Handover,
cellChangeOrder CellChangeOrder,
e-CSFB-r9 E-CSFB-r9
},
nonCriticalExtension MobilityFromEUTRACommand-v9d0-IEs OPTIONAL
}

MobilityFromEUTRACommand-v9d0-IEs ::= SEQUENCE {
lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension MobilityFromEUTRACommand-v9d0-IEs OPTIONAL
}
nonCriticalExtension MobilityFromEUTRACommand-v930-IEs OPTIONAL
}

MobilityFromEUTRACommand-v930-IEs ::= SEQUENCE {
    lateNonCriticalExtension OCTET STRING OPTIONAL,
    nonCriticalExtension MobilityFromEUTRACommand-v960-IEs OPTIONAL
}

MobilityFromEUTRACommand-v960-IEs ::= SEQUENCE {
    bandIndicator BandIndicatorGERAN OPTIONAL, -- Cond GERAN
    nonCriticalExtension SEQUENCE {} OPTIONAL
}

Handover ::= SEQUENCE {
    targetRAT-Type ENUMERATED {
        utra, geran, cdma2000-1XRTT, cdma2000-HRPD,
        spare4, spare3, spare2, spare1, ...},
    targetRAT-MessageContainer OCTET STRING,
    nas-SecurityParamFromEUTRA OCTET STRING (SIZE (1)) OPTIONAL, -- Cond UTRAGERAN
    systemInformation SI-OrPSI-GERAN OPTIONAL -- Cond PSHO
}

CellChangeOrder ::= SEQUENCE {
    t304 ENUMERATED {
        ms100, ms200, ms500, ms1000,
        ms2000, ms4000, ms8000, ms10000-v1310},
    targetRAT-Type CHOICE {
        geran SEQUENCE {
            physCellId PhysCellIdGERAN,
            carrierFreq CarrierFreqGERAN,
            networkControlOrder BIT STRING (SIZE (2)) OPTIONAL, -- Need OP
            systemInformation SI-OrPSI-GERAN OPTIONAL -- Need OP
        },
    }
}
SI-OrPSI-GERAN ::= CHOICE {
    si    SystemInfoListGERAN,
    psi    SystemInfoListGERAN
}

E-CSFB-r9 ::= SEQUENCE {
    messageContCDMA2000-1XRTT-r9 OCTET STRING OPTIONAL, -- Need ON
    mobilityCDMA2000-HRPD-r9 ENUMERATED {
        handover, redirection
    } OPTIONAL, -- Need OP
    messageContCDMA2000-HRPD-r9 OCTET STRING OPTIONAL, -- Cond concHO
    redirectCarrierCDMA2000-HRPD-r9 CarrierFreqCDMA2000 OPTIONAL  -- Cond concRedir
}

-- ASN1STOP
**MobilityFromEUTRACommand field descriptions**

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>bandIndicator</strong></td>
<td>Indicates how to interpret the ARFCN of the BCCH carrier.</td>
</tr>
<tr>
<td><strong>carrierFreq</strong></td>
<td>Contains the carrier frequency of the target GERAN cell.</td>
</tr>
<tr>
<td><strong>cs-FallbackIndicator</strong></td>
<td>Value true indicates that the CS fallback procedure to UTRAN or GERAN is triggered.</td>
</tr>
<tr>
<td><strong>messageContCDMA2000-1xRTT</strong></td>
<td>This field contains a message specified in CDMA2000 1xRTT standard that either tells the UE to move to specific 1xRTT target cell(s) or indicates a failure to allocate resources for the enhanced CS fallback to CDMA2000 1xRTT.</td>
</tr>
<tr>
<td><strong>messageContCDMA2000-HRPD</strong></td>
<td>This field contains a message specified in CDMA2000 HRPD standard that either tells the UE to move to specific HRPD target cell(s) or indicates a failure to allocate resources for the handover to CDMA2000 HRPD.</td>
</tr>
<tr>
<td><strong>mobilityCDMA2000-HRPD</strong></td>
<td>This field indicates whether or not mobility to CDMA2000 HRPD is to be performed by the UE and it also indicates the type of mobility to CDMA2000 HRPD that is to be performed; If this field is not present the UE shall perform only the enhanced CS fallback to CDMA2000 1xRTT.</td>
</tr>
<tr>
<td><strong>nas-SecurityParamFromEUTRA</strong></td>
<td>Used to deliver the key synchronisation and Key freshness for the E-UTRAN to UTRAN handovers as specified in TS 33.401. The content of the parameter is defined in TS24.301.</td>
</tr>
<tr>
<td><strong>networkControlOrder</strong></td>
<td>Parameter NETWORK_CONTROL_ORDER in TS 44.060 [36].</td>
</tr>
<tr>
<td><strong>purpose</strong></td>
<td>Indicates which type of mobility procedure the UE is requested to perform. EUTRAN always applies value e-CSFB in case of enhanced CS fallback to CDMA2000 (e.g. also when that procedure results in handover to CDMA2000 1XRTT only, in handover to CDMA2000 HRPD only or in redirection to CDMA2000 HRPD only).</td>
</tr>
<tr>
<td><strong>redirectCarrierCDMA2000-HRPD</strong></td>
<td>The redirectCarrierCDMA2000-HRPD indicates a CDMA2000 carrier frequency and is used to redirect the UE to a HRPD carrier frequency.</td>
</tr>
<tr>
<td><strong>SystemInfoListGERAN</strong></td>
<td>If purpose = CellChangeOrder and if the field is not present, the UE has to acquire SI/PSI from the GERAN cell.</td>
</tr>
<tr>
<td><strong>t304</strong></td>
<td>Timer T304 as described in section 7.3. Value ms100 corresponds with 100 ms, ms200 corresponds with 200 ms and so on. EUTRAN includes extended value ms10000-v1310 only when UE supports CE.</td>
</tr>
<tr>
<td><strong>targetRAT-Type</strong></td>
<td>Indicates the target RAT type.</td>
</tr>
<tr>
<td><strong>targetRAT-MessageContainer</strong></td>
<td>The field contains a message specified in another standard, as indicated by the targetRAT-Type, and carries information about the target cell identifier(s) and radio parameters relevant for the target radio access technology.</td>
</tr>
</tbody>
</table>

**NOTE 1:** A complete message is included, as specified in the other standard.

### Conditional presence

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>concHO</td>
<td>The field is mandatory present if the mobilityCDMA2000-HRPD is set to ‘handover’; otherwise the field is optional present, need ON.</td>
</tr>
<tr>
<td>concRedir</td>
<td>The field is mandatory present if the mobilityCDMA2000-HRPD is set to ‘redirection’; otherwise the field is not present.</td>
</tr>
<tr>
<td>GERAN</td>
<td>The field should be present if the purpose is set to ‘handover’ and the targetRAT-Type is set to ‘geran’; otherwise the field is not present.</td>
</tr>
<tr>
<td>PSHO</td>
<td>The field is mandatory present in case of PS handover toward GERAN; otherwise the field is optionally present, but not used by the UE.</td>
</tr>
<tr>
<td>UTRAGERAN</td>
<td>The field is mandatory present if the targetRAT-Type is set to ‘utra’ or ‘geran’; otherwise the field is not present.</td>
</tr>
</tbody>
</table>

**NOTE 1:** The correspondence between the value of the targetRAT-Type, the standard to apply and the message contained within the targetRAT-MessageContainer is shown in the table below:
### Paging

The *Paging* message is used for the notification of one or more UEs.

- **Signalling radio bearer:** N/A
- **RLC-SAP:** TM
- **Logical channel:** PCCH
- **Direction:** E-UTRAN to UE

#### Paging message

```asn1
Paging ::= SEQUENCE {
PagingRecordList PagingRecordList OPTIONAL, -- Need ON
systemInfoModification ENUMERATED {true} OPTIONAL, -- Need ON
etws-Indication ENUMERATED {true} OPTIONAL, -- Need ON
nonCriticalExtension Paging-v890-IEs OPTIONAL
}
Paging-v890-IEs ::= SEQUENCE {
lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension Paging-v920-IEs OPTIONAL
}
Paging-v920-IEs ::= SEQUENCE {
cmas-Indication-r9 ENUMERATED {true} OPTIONAL, -- Need ON
nonCriticalExtension Paging-v1130-IEs OPTIONAL
}
Paging-v1130-IEs ::= SEQUENCE {
}
```

eab-ParamModification-r11 ENUMERATED {true} OPTIONAL, -- Need ON
nonCriticalExtension Paging-v1310-IEs OPTIONAL
}
Paging-v1310-IEs ::= SEQUENCE {
    redistributionIndication-r13 ENUMERATED {true} OPTIONAL, -- Need ON
    systemInfoModification-eDRX-r13 ENUMERATED {true} OPTIONAL, -- Need ON
    nonCriticalExtension SEQUENCE {} OPTIONAL
}
PagingRecordList ::= SEQUENCE (SIZE (1..maxPageRec)) OF PagingRecord

PagingRecord ::= SEQUENCE {
    ue-Identity PagingUE-Identity,
    cn-Domain ENUMERATED {ps, cs},
    ...
}
PagingUE-Identity ::= CHOICE {
    s-TMSI S-TMSI,
    imsi IMSI,
    ...
}
IMSI ::= SEQUENCE (SIZE (6..21)) OF IMSI-Digit

IMSI-Digit ::= INTEGER (0..9)

-- ASN1STOP
### Paging field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>cmas-Indication</strong></td>
<td>If present: indication of a CMAS notification.</td>
</tr>
<tr>
<td><strong>cn-Domain</strong></td>
<td>Indicates the origin of paging.</td>
</tr>
<tr>
<td><strong>eab-ParamModification</strong></td>
<td>If present: indication of an EAB parameters (SIB14) modification.</td>
</tr>
<tr>
<td><strong>etws-Indication</strong></td>
<td>If present: indication of an ETWS primary notification and/or ETWS secondary notification.</td>
</tr>
<tr>
<td><strong>imsi</strong></td>
<td>The International Mobile Subscriber Identity, a globally unique permanent subscriber identity, see TS 23.003 [27]. The first element contains the first IMSI digit, the second element contains the second IMSI digit and so on.</td>
</tr>
<tr>
<td><strong>redistributionIndication</strong></td>
<td>If present: indication to trigger E-UTRAN inter-frequency redistribution procedure as specified in TS 36.304 [4, 5.2.4.10].</td>
</tr>
<tr>
<td><strong>systemInfoModification</strong></td>
<td>If present: indication of a BCCH modification other than SIB10, SIB11, SIB12 and SIB14. This indication does not apply to UEs using eDRX cycle longer than the BCCH modification period.</td>
</tr>
<tr>
<td><strong>systemInfoModification-eDRX</strong></td>
<td>If present: indication of a BCCH modification other than SIB10, SIB11, SIB12 and SIB14. This indication applies only to UEs using eDRX cycle longer than the BCCH modification period.</td>
</tr>
<tr>
<td><strong>ue-Identity</strong></td>
<td>Provides the NAS identity of the UE that is being paged.</td>
</tr>
</tbody>
</table>

---

**ProximityIndication**

The *ProximityIndication* message is used to indicate that the UE is entering or leaving the proximity of one or more CSG member cell(s).

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: UE to E-UTRAN

### ProximityIndication message

-- ASN1START

```
ProximityIndication-r9 ::= SEQUENCE {
    criticalExtensions OPTIONAL CHOICE {
        c1 CHOICE {
            proximityIndication-r9 ProximityIndication-r9-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture SEQUENCE { }
    }
}
```

```
ProximityIndication-r9-IEs ::= SEQUENCE {
    type-r9 ENUMERATED {entering, leaving},
}
```

-- ASN1END
ProximityIndication field descriptions

| carrierFreq | Indicates the RAT and frequency of the CSG member cell(s), for which the proximity indication is sent. For E-UTRA and UTRA frequencies, the UE shall set the ARFCN according to a band it previously considered suitable for accessing (one of) the CSG member cell(s), for which the proximity indication is sent. |
| type | Used to indicate whether the UE is entering or leaving the proximity of CSG member cell(s). |

-- RNReconfiguration

The **RNReconfiguration** is a command to modify the RN subframe configuration and/or to convey changed system information.

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: E-UTRAN to RN

**RNReconfiguration message**

-- ASN1START

RNReconfiguration-r10 ::= SEQUENCE {
  rrc-TransactionIdentifier  RRC-TransactionIdentifier,
  criticalExtensions  CHOICE {
    c1  CHOICE {
    
    },
  
}
RNReconfigurationComplete

The **RNReconfigurationComplete** message is used to confirm the successful completion of an RN reconfiguration.

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: RN to E-UTRAN

**RNReconfigurationComplete message**

---

```
RNReconfigurationComplete-r10 ::= SEQUENCE {
  rrc-TransactionIdentifier    RRC-TransactionIdentifier,
  criticalExtensions           CHOICE {
    spare3 NULL, spare2 NULL, spare1 NULL
    },
  criticalExtensionsFuture     SEQUENCE { }
}
```
RRCConnectionReconfiguration

The **RRCConnectionReconfiguration** message is the command to modify an RRC connection. It may convey information for measurement configuration, mobility control, radio resource configuration (including RBs, MAC main configuration and physical channel configuration) including any associated dedicated NAS information and security configuration.

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: E-UTRAN to UE

**RRCConnectionReconfiguration message**

```asn1
RRCConnectionReconfiguration ::= SEQUENCE {
    rrc-TransactionIdentifier   RRC-TransactionIdentifier,
    criticalExtensions     CHOICE {
        c 1          CHOICE {
            rrcConnectionReconfiguration-r8   RRCConnectionReconfiguration-r8-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture SEQUENCE { } }
}
```

---

c1

```asn1
RNReconfigurationComplete-r10-IEs ::= SEQUENCE {
    lateNonCriticalExtension    OCTET STRING    OPTIONAL,
    nonCriticalExtension     SEQUENCE {}     OPTIONAL
}
```

---

-- ASN1STOP

**-- RRCConnectionReconfiguration**

The **RRCConnectionReconfiguration** message is the command to modify an RRC connection. It may convey information for measurement configuration, mobility control, radio resource configuration (including RBs, MAC main configuration and physical channel configuration) including any associated dedicated NAS information and security configuration.

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: E-UTRAN to UE

**RRCConnectionReconfiguration message**

```asn1
RRCConnectionReconfiguration ::= SEQUENCE {
    rrc-TransactionIdentifier   RRC-TransactionIdentifier,
    criticalExtensions     CHOICE {
        c 1          CHOICE {
            rrcConnectionReconfiguration-r8   RRCConnectionReconfiguration-r8-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture SEQUENCE { } }
}
```
criticalExtensionsFuture  SEQUENCE { }
}

RRCConnectionReconfiguration-r8-IEs ::= SEQUENCE {
  measConfig       MeasConfig      OPTIONAL, -- Need ON
  mobilityControlInfo     MobilityControlInfo    OPTIONAL, -- Cond HO
  dedicatedInfoNASList    SEQUENCE (SIZE(1..maxDRB)) OF
                               DedicatedInfoNAS   OPTIONAL, -- Cond nonHO
  radioResourceConfigDedicated RadioResourceConfigDedicated     OPTIONAL, -- Cond HO-toEUTRA
  securityConfigHO     SecurityConfigHO    OPTIONAL, -- Cond HO
  nonCriticalExtension    RRCConnectionReconfiguration-v890-IEs OPTIONAL
}

RRCConnectionReconfiguration-v890-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING (CONTAINING RRCConnectionReconfiguration-v8m0-IEs) OPTIONAL,
  nonCriticalExtension    RRCConnectionReconfiguration-v920-IEs  OPTIONAL
}

-- Late non-critical extensions:
RRCConnectionReconfiguration-v8m0-IEs ::= SEQUENCE {
  -- Following field is only for pre REL-10 late non-critical extensions
  lateNonCriticalExtension   OCTET STRING          OPTIONAL,
  nonCriticalExtension    RRCConnectionReconfiguration-v10i0-IEs   OPTIONAL
}

RRCConnectionReconfiguration-v10i0-IEs ::= SEQUENCE {
  antennaInfoDedicatedPCell-v10i0   AntennaInfoDedicated-v10i0   OPTIONAL, -- Need ON
  -- Following field is only for late non-critical extensions from REL-10
  nonCriticalExtension    SEQUENCE { }             OPTIONAL
}

-- Regular non-critical extensions:
RRCConnectionReconfiguration-v920-IEs ::= SEQUENCE {

otherConfig-r9       OtherConfig-r9       OPTIONAL, -- Need ON
fullConfig-r9        ENUMERATED {true}    OPTIONAL, -- Cond HO-Reestab
nonCriticalExtension RRCConnectionReconfiguration-v1020-IEs OPTIONAL

RRCConnectionReconfiguration-v1020-IEs ::= SEQUENCE {
  sCellToReleaseList-r10  SCellToReleaseList-r10  OPTIONAL, -- Need ON
  sCellToAddModList-r10   SCellToAddModList-r10   OPTIONAL, -- Need ON
  nonCriticalExtension    RRCConnectionReconfiguration-v1130-IEs OPTIONAL
}

RRCConnectionReconfiguration-v1130-IEs ::= SEQUENCE {
  systemInformationBlockType1Dedicated-r11 OCTET STRING (CONTAINING SystemInformationBlockType1) OPTIONAL, -- Need ON
  nonCriticalExtension    RRCConnectionReconfiguration-v1250-IEs OPTIONAL
}

RRCConnectionReconfiguration-v1250-IEs ::= SEQUENCE {
  wlan-OffloadInfo-r12    CHOICE {
    release              NULL,
    setup                SEQUENCE {
      wlan-OffloadConfigDedicated-r12  WLAN-OffloadConfig-r12,
      t350-r12              ENUMERATED {min5, min10, min20, min30, min60, min120, min180, spare1} OPTIONAL -- Need OR
    }
  }
  scg-Configuration-r12   SCG-Configuration-r12 OPTIONAL, -- Cond nonFullConfig
  sl-SyncTxControl-r12    SL-SyncTxControl-r12 OPTIONAL, -- Need ON
  sl-DiscConfig-r12       SL-DiscConfig-r12   OPTIONAL, -- Need ON
  sl-CommConfig-r12       SL-CommConfig-r12   OPTIONAL, -- Need ON
  nonCriticalExtension    RRCConnectionReconfiguration-v1310-IEs OPTIONAL
}

RRCConnectionReconfiguration-v1310-IEs ::= SEQUENCE {
  sCellToReleaseListExt-r13  SCellToReleaseListExt-r13  OPTIONAL, -- Need ON
sCellToAddModListExt-r13 ::= SCellToA
dModListExt-r13 OPTIONAL, -- Need ON
lwa-Configuration-r13 ::= LWA-Configuration-r13 OPTIONAL, -- Need ON
lwip-Configuration-r13 ::= LWIP-Configuration-r13 OPTIONAL, -- Need ON
rclwi-Configuration-r13 ::= RCLWI-Configuration-r13 OPTIONAL, -- Need ON
nonCriticalExtension ::= SEQUENCE {} OPTIONAL

SL-SyncTxControl-r12 ::= SEQUENCE {
networkControlledSyncTx-r12 ::= ENUMERATED {on, off} OPTIONAL -- Need OP
}

PSCellToAddMod-r12 ::= SEQUENCE {
sCellIndex-r12 ::= SCellIndex-r10,
cellIdentification-r12 ::= SEQUENCE {
  physCellId-r12 ::= PhysCellId,
dl-CarrierFreq-r12 ::= ARFCN-ValueEUTRA-r9
} OPTIONAL, -- Cond SCellAdd
radioResourceConfigCommonPSCell-r12 ::= RadioResourceConfigCommonPSCell-r12 OPTIONAL, -- Cond SCellAdd
radioResourceConfigDedicatedPSCell-r12 ::= RadioResourceConfigDedicatedPSCell-r12 OPTIONAL, -- Cond SCellAdd2
  ....
  [[ antennaInfoDedicatedPSCell-v1280 ::= AntennaInfoDedicated-v10i8 OPTIONAL -- Need ON
  ]],
  [[ sCellIndex-r13 ::= SCellIndex-r13 OPTIONAL -- Need ON
  ]]
}

PowerCoordinationInfo-r12 ::= SEQUENCE {
p-MeNB-r12 ::= INTEGER (1..16),
p-SeNB-r12 ::= INTEGER (1..16),
powerControlMode-r12 ::= INTEGER (1..2)
}

SCellToAddModList-r10 ::= SEQUENCE (SIZE (1..maxSCell-r10)) OF SCellToAddMod-r10
SCellToAddModListExt-r13 ::= SEQUENCE (SIZE (1..maxSCell-r13)) OF SCellToAddModExt-r13

SCellToAddMod-r10 ::= SEQUENCE {
  sCellIndex-r10          SCellIndex-r10,
  cellIdentification-r10  SEQUENCE {
    physCellId-r10         PhysCellId,
    dl-CarrierFreq-r10     ARFCN-ValueEUTRA
  } OPTIONAL, -- Cond SCellAdd
  radioResourceConfigDedicatedSCell-r10 RadioResourceConfigDedicatedSCell-r10 OPTIONAL, -- Cond SCellAdd2
    ...,[[ dl-CarrierFreq-v1090 ARFCN-ValueEUTRA-v9e0 OPTIONAL -- Cond EARFCN-max
  ]],
  [ [ antennaInfoDedicatedSCell-v10i0 AntennaInfoDedicated-v10i0 OPTIONAL -- Need ON
  ]]}

SCellToAddModExt-r13 ::= SEQUENCE {
  sCellIndex-r13          SCellIndex-r13,
  cellIdentification-r13  SEQUENCE {
    physCellId-r13         PhysCellId,
    dl-CarrierFreq-r13     ARFCN-ValueEUTRA-r9
  } OPTIONAL, -- Cond SCellAdd
  antennaInfoDedicatedSCell-r13 AntennaInfoDedicated-v10i0 OPTIONAL -- Need ON
}

SCellToReleaseList-r10 ::= SEQUENCE (SIZE (1..maxSCell-r10)) OF SCellIndex-r10

SCellToReleaseListExt-r13 ::= SEQUENCE (SIZE (1..maxSCell-r13)) OF SCellIndex-r13

SCG-Configuration-r12 ::= CHOICE {

release NULL,

setup SEQUENCE {
    scg-ConfigPartMCG-r12 SEQUENCE {
        scg-Counter-r12 INTEGER (0..65535) OPTIONAL, -- Need ON
        powerCoordinationInfo-r12 PowerCoordinationInfo-r12 OPTIONAL, -- Need ON
        ... }
    OPTIONAL, -- Need ON
    scg-ConfigPartSCG-r12 SCG-ConfigPartSCG-r12 OPTIONAL -- Need ON
}

SCG-ConfigPartSCG-r12 ::= SEQUENCE {
    radioResourceConfigDedicatedSCG-r12 RadioResourceConfigDedicatedSCG-r12 OPTIONAL, -- Need ON
    sCellToReleaseListSCG-r12 SCellToReleaseList-r10 OPTIONAL, -- Need ON
    pSCellToAddMod-r12 PSCellToAddMod-r12 OPTIONAL, -- Need ON
    sCellToAddModListSCG-r12 SCellToAddModList-r10 OPTIONAL, -- Need ON
    mobilityControlInfoSCG-r12 MobilityControlInfoSCG-r12 OPTIONAL, -- Need ON
    ...
    [ sCellToReleaseListSCG-Ext-r13 SCellToReleaseListExt-r13 OPTIONAL, -- Need ON
    sCellToAddModListSCG-Ext-r13 SCellToAddModListExt-r13 OPTIONAL -- Need ON
    ]
}

SecurityConfigHO ::= SEQUENCE {
    handoverType CHOICE {
        intraLTE SEQUENCE {
            securityAlgorithmConfig SecurityAlgorithmConfig OPTIONAL, -- Cond fullConfig
            keyChangeIndicator BOOLEAN,
            nextHopChainingCount NextHopChainingCount
        }
    }
    interRAT SEQUENCE {
        securityAlgorithmConfig SecurityAlgorithmConfig,
        nas-SecurityParamToEUTRA OCTET STRING (SIZE(6))
    }
}
},
...
}

-- ASN1STOP
**RRConnectionReconfiguration field descriptions**

**dedicatedInfoNASList**
This field is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for each PDU in the list.

**fullConfig**
Indicates the full configuration option is applicable for the RRC Connection Reconfiguration message.

**keyChangeIndicator**
true is used only in an intra-cell handover when a KeNB key is derived from a KASME key taken into use through the latest successful NAS SMC procedure, as described in TS 33.401 [32] for KeNB re-keying. false is used in an intra-LTE handover when the new KeNB key is obtained from the current KeNB key or from the NH as described in TS 33.401 [32].

**lwa-Configuration**
This field is used to provide parameters for LWA configuration. E-UTRAN does not simultaneously configure LWA with DC, LWIP or RCLWI for a UE.

**lwip-Configuration**
This field is used to provide parameters for LWIP configuration. E-UTRAN does not simultaneously configure LWIP with DC, LWA or RCLWI for a UE.

**nas-securityParamToEUTRA**
This field is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for this field, although it affects activation of AS-security after inter-RAT handover to E-UTRA. The content is defined in TS 24.301.

**networkControlledSyncTx**
This field indicates whether the UE shall transmit synchronisation information (i.e. become synchronisation source). Value On indicates the UE to transmit synchronisation information while value Off indicates the UE to not transmit such information.

**nextHopChainingCount**
Parameter NCC: See TS 33.401 [32]

**p-MeNB**
Indicates the guaranteed power for the MeNB, as specified in TS 36.213 [23]. The value N corresponds to N-1 in TS 36.213 [23].

**powerControlMode**
Indicates the power control mode used in DC. Value 1 corresponds to DC power control mode 1 and value 2 indicates DC power control mode 2, as specified in TS 36.213 [23].

**p-SeNB**
Indicates the guaranteed power for the SeNB as specified in TS 36.213 [23, Table 5.1.4.2-1]. The value N corresponds to N-1 in TS 36.213 [23].

**rclwi-Configuration**
WLAN traffic steering command as specified in 5.6.16.2. E-UTRAN does not simultaneously configure RCLWI with DC, LWA or LWIP for a UE.

**sCellIndex**
In case of DC, the SCellIndex is unique within the scope of the UE i.e. an SCG cell can not use the same value as used for an MCG cell. For pSCellToAddMod, if sCellIndex-r13 is present the UE shall ignore sCellIndex-r12. sCellIndex-r13 in sCellToAddModListExt-r13 shall not have same values as sCellIndex-r10 in sCellToAddModList-r10.

**sCellToAddModList, sCellToAddModListExt**
Indicates the SCell to be added or modified. Field sCellToAddModList is used to add the first 4 SCells with sCellIndex-r10 while sCellToAddModListExt is used to add the rest.

**sCellToReleaseList, sCellToReleaseListExt**
Indicates the SCell to be released. The field is used to release the PSCell e.g. upon change of PSCell, upon system information change for the PSCell.

**scg-Counter**
A counter used upon initial configuration of SCG security as well as upon refresh of S-Kenb. E-UTRAN includes the field upon SCG change when one or more SCG DRBs are configured. Otherwise E-UTRAN does not include the field.

**t350**
Timer T350 as described in section 7.3. Value minN corresponds to N minutes.
<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>EARFCN-max</td>
<td>The field is mandatory present if dl-CarrierFreq-r10 is included and set to maxEARFCN. Otherwise the field is not present.</td>
</tr>
<tr>
<td>fullConfig</td>
<td>This field is mandatory present for handover within E-UTRA when the fullConfig is included; otherwise it is optionally present, Need OP.</td>
</tr>
<tr>
<td>HO</td>
<td>The field is mandatory present in case of handover within E-UTRA or to E-UTRA; otherwise the field is not present.</td>
</tr>
<tr>
<td>HO-Reestab</td>
<td>This field is optionally present, need ON, in case of handover within E-UTRA or upon the first reconfiguration after RRC connection re-establishment; otherwise the field is not present.</td>
</tr>
<tr>
<td>HO-toEUTRA</td>
<td>The field is mandatory present in case of handover to E-UTRA or for reconfigurations when fullConfig is included; otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td>nonFullConfig</td>
<td>The field is not present in case of handover within E-UTRA or to E-UTRA; otherwise it is optionally present, need ON.</td>
</tr>
<tr>
<td>nonHO</td>
<td>The field is not present in case of handover within E-UTRA or to E-UTRA; otherwise it is optionally present, need ON.</td>
</tr>
<tr>
<td>SCellAdd</td>
<td>The field is mandatory present upon SCell addition; otherwise it is not present.</td>
</tr>
<tr>
<td>SCellAdd2</td>
<td>The field is mandatory present upon SCell addition; otherwise it is optionally present, need ON.</td>
</tr>
</tbody>
</table>

---

**RRConnectionReconfigurationComplete**

The `RRConnectionReconfigurationComplete` message is used to confirm the successful completion of an RRC connection reconfiguration.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

**RRCConnectionReconfigurationComplete message**

```
-- ASN1START

RRConnectionReconfigurationComplete ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    rrcConnectionReconfigurationComplete-r8
      RRCConnectionReconfigurationComplete-r8-IEs,
    criticalExtensionsFuture   SEQUENCE { }
  },
}

RRConnectionReconfigurationComplete-r8-IEs ::= SEQUENCE {
  nonCriticalExtension   RRCConnectionReconfigurationComplete-v8a0-IEs OPTIONAL
}

RRConnectionReconfigurationComplete-v8a0-IEs ::= SEQUENCE {
}

-- ASN1END
```
lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension RRCConnectionReconfigurationComplete-v1020-IEs OPTIONAL
}

RRCConnectionReconfigurationComplete-v1020-IEs ::= SEQUENCE {
  rlf-InfoAvailable-r10 ENUMERATED {true} OPTIONAL,
  logMeasAvailable-r10 ENUMERATED {true} OPTIONAL,
  nonCriticalExtension RRCConnectionReconfigurationComplete-v1130-IEs OPTIONAL
}

RRCConnectionReconfigurationComplete-v1130-IEs ::= SEQUENCE {
  connEstFailInfoAvailable-r11 ENUMERATED {true} OPTIONAL,
  nonCriticalExtension RRCConnectionReconfigurationComplete-v1250-IEs OPTIONAL
}

RRCConnectionReconfigurationComplete-v1250-IEs ::= SEQUENCE {
  logMeasAvailableMBSFN-r12 ENUMERATED {true} OPTIONAL,
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- ASN1STOP

-- RRCConnectionReestablishment

The **RRCConnectionReestablishment** message is used to re-establish SRB1.

Signalling radio bearer: SRB0
RLC-SAP: TM
Logical channel: CCCH
Direction: E-UTRAN to UE

**RRCConnectionReestablishment message**

-- ASN1START

RRCConnectionReestablishment ::= SEQUENCE {
  rrc-TransactionIdentifier RRC-TransactionIdentifier,
  criticalExtensions CHOICE {


RRConnectionReestablishmentComplete

The **RRConnectionReestablishmentComplete** message is used to confirm the successful completion of an RRC connection reestablishment.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

---

**RRConnectionReestablishmentComplete message**

---

**RRConnectionReestablishmentComplete ::= SEQUENCE {**

**rrc-TransactionIdentifier** RRC-TransactionIdentifier,**

**--- ASN1STOP**
criticalExtensions
   CHOICE {
      rrcConnectionReestablishmentComplete-r8
         RRCConnectionReestablishmentComplete-r8-IEs,
      criticalExtensionsFuture
         SEQUENCE { }
   }
}

RRCConnectionReestablishmentComplete-r8-IEs ::= SEQUENCE {
   nonCriticalExtension
      RRCConnectionReestablishmentComplete-v920-IEs OPTIONAL
}

RRCConnectionReestablishmentComplete-v920-IEs ::= SEQUENCE {
   rlf-InfoAvailable-r9
      ENUMERATED {true} OPTIONAL,
   nonCriticalExtension
      RRCConnectionReestablishmentComplete-v8a0-IEs OPTIONAL
}

RRCConnectionReestablishmentComplete-v8a0-IEs ::= SEQUENCE {
   lateNonCriticalExtension
      OCTET STRING OPTIONAL,
   nonCriticalExtension
      RRCConnectionReestablishmentComplete-v1020-IEs OPTIONAL
}

RRCConnectionReestablishmentComplete-v1020-IEs ::= SEQUENCE {
   logMeasAvailable-r10
      ENUMERATED {true} OPTIONAL,
   nonCriticalExtension
      RRCConnectionReestablishmentComplete-v1130-IEs OPTIONAL
}

RRCConnectionReestablishmentComplete-v1130-IEs ::= SEQUENCE {
   connEstFailInfoAvailable-r11
      ENUMERATED {true} OPTIONAL,
   nonCriticalExtension
      RRCConnectionReestablishmentComplete-v1250-IEs OPTIONAL
}

RRCConnectionReestablishmentComplete-v1250-IEs ::= SEQUENCE {
   logMeasAvailableMBSFN-r12
      ENUMERATED {true} OPTIONAL,
   nonCriticalExtension
      SEQUENCE { } OPTIONAL
}
**RRConnectionReestablishmentComplete field descriptions**

| rlf-InfoAvailable | This field is used to indicate the availability of radio link failure or handover failure related measurements |

---

**RRConnectionReestablishmentReject**

The **RRConnectionReestablishmentReject** message is used to indicate the rejection of an RRC connection reestablishment request.

- Signalling radio bearer: SRB0
- RLC-SAP: TM
- Logical channel: CCCH
- Direction: E-UTRAN to UE

**RRConnectionReestablishmentReject message**

---

```plaintext
RRConnectionReestablishmentReject ::= SEQUENCE {
criticalExtensions     CHOICE {
  rrcConnectionReestablishmentReject-r8
    RRCConnectionReestablishmentReject-r8-IEs,
criticalExtensionsFuture   SEQUENCE {} 
} }

RRCConnectionReestablishmentReject-r8-IEs ::= SEQUENCE {
  nonCriticalExtension    RRCConnectionReestablishmentReject-v8a0-IEs OPTIONAL
}

RRCConnectionReestablishmentReject-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING OPTIONAL,
  nonCriticalExtension    SEQUENCE {} OPTIONAL
}
```

---

-- ASN1STOP
**RRCConnectionReestablishmentRequest**

The **RRCConnectionReestablishmentRequest** message is used to request the reestablishment of an RRC connection.

- Signalling radio bearer: SRB0
- RLC-SAP: TM
- Logical channel: CCCH
- Direction: UE to E-UTRAN

**RRCConnectionReestablishmentRequest message**

```asn1
RRCConnectionReestablishmentRequest ::= SEQUENCE {
  criticalExtensions CHOICE {
    rrcConnectionReestablishmentRequest-r8
      RRCConnectionReestablishmentRequest-r8-Ies,
    criticalExtensionsFuture SEQUENCE { }
  }
}

RRCConnectionReestablishmentRequest-r8-Ies ::= SEQUENCE {
  ue-Identity ReestabUE-Identity,
  reestablishmentCause ReestablishmentCause,
  spare BIT STRING (SIZE (2))
}

ReestabUE-Identity ::= SEQUENCE {
  c-RNTI C-RNTI,
  physCellId PhysCellId,
  shortMAC-I ShortMAC-I
}

ReestablishmentCause ::= ENUMERATED {
  reconfigurationFailure, handoverFailure,
  otherFailure, spare1 }
```

---

**ASN1STOP**
**RRCConnectionReestablishmentRequest field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>physCellId</td>
<td>The Physical Cell Identity of the PCell the UE was connected to prior to the failure.</td>
</tr>
<tr>
<td>reestablishmentCause</td>
<td>Indicates the failure cause that triggered the re-establishment procedure. eNB is not expected to reject a RRCConnectionReestablishmentRequest due to unknown cause value being used by the UE.</td>
</tr>
<tr>
<td>ue-Identity</td>
<td>UE identity included to retrieve UE context and to facilitate contention resolution by lower layers.</td>
</tr>
</tbody>
</table>

---

**RRCConnectionReject**

The **RRCConnectionReject** message is used to reject the RRC connection establishment.

- Signalling radio bearer: SRB0
- RLC-SAP: TM
- Logical channel: CCCH
- Direction: E-UTRAN to UE

---

**RRCConnectionReject message**

```
-- ASN1START

RRCConnectionReject ::= SEQUENCE {
  criticalExtensions CHOICE {
    c1 CHOICE {
      rrcConnectionReject-r8 RRCConnectionReject-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
  }
  criticalExtensionsFuture SEQUENCE {}
}

RRCConnectionReject-r8-IEs ::= SEQUENCE {
  waitTime INTEGER (1..16),
  nonCriticalExtension RRCConnectionReject-v8a0-IEs OPTIONAL
}

RRCConnectionReject-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  nonCriticalExtension RRCConnectionReject-v1020-IEs OPTIONAL
}

-- ASN1END
```
RRCConnectionReject-v1020-IEs ::= SEQUENCE {
  extendedWaitTime-r10    INTEGER (1..1800)     OPTIONAL, -- Need ON
  nonCriticalExtension    RRCConnectionReject-v1130-IEs  OPTIONAL
}

RRCConnectionReject-v1130-IEs ::= SEQUENCE {
  deprioritisationReq-r11    SEQUENCE {
    deprioritisationType-r11   ENUMERATED {frequency, e-utra},
    deprioritisationTimer-r11   ENUMERATED {min5, min10, min15, min30}
  }                  OPTIONAL, -- Need ON
  nonCriticalExtension    RRCConnectionReject-v1320-IEs       OPTIONAL
}

RRCConnectionReject-v1320-IEs ::= SEQUENCE {
  rrc-SuspendIndication-r13    ENUMERATED {true}    OPTIONAL, -- Need ON
  nonCriticalExtension     SEQUENCE {}      OPTIONAL
}

-- ASN1STOP

RRCConnectionReject field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>deprioritisationReq</td>
<td>Indicates whether the current frequency or RAT is to be de-prioritised. The UE shall be able to store a deprioritisation request for up to 8 frequencies (applicable when receiving another frequency specific deprioritisation request before T325 expiry).</td>
</tr>
<tr>
<td>deprioritisationTimer</td>
<td>Indicates the period for which either the current carrier frequency or E-UTRA is deprioritised. Value minN corresponds to N minutes.</td>
</tr>
<tr>
<td>extendedWaitTime</td>
<td>Value in seconds for the wait time for Delay Tolerant access requests.</td>
</tr>
<tr>
<td>rrc-SuspendIndication</td>
<td>If present, this field indicates that the UE should remain suspended and not release its stored context.</td>
</tr>
<tr>
<td>waitTime</td>
<td>Wait time value in seconds.</td>
</tr>
</tbody>
</table>

RRCConnectionRelease

The \textit{RRCConnectionRelease} message is used to command the release of an RRC connection.
Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: E-UTRAN to UE

**RRConnectionRelease message**

```asn1
RRConnectionRelease ::= SEQUENCE {
    rr-TransactionIdentifier  RRC-TransactionIdentifier,
    criticalExtensions     CHOICE {
        c1               CHOICE {
            rrcConnectionRelease-r8    RRCConnectionRelease-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture   SEQUENCE { }
    }
}

RRConnectionRelease-r8-IEs ::= SEQUENCE {
    releaseCause      ReleaseCause,
    redirectedCarrierInfo    RedirectedCarrierInfo    OPTIONAL, -- Need ON
    idleModeMobilityControlInfo   IdleModeMobilityControlInfo   OPTIONAL, -- Need OP
    nonCriticalExtension    RRCConnectionRelease-v890-IEs  OPTIONAL
}

RRConnectionRelease-v890-IEs ::= SEQUENCE {
    lateNonCriticalExtension   OCTET STRING (CONTAINING RRCConnectionRelease-v9e0-IEs) OPTIONAL,
    nonCriticalExtension    RRCConnectionRelease-v920-IEs   OPTIONAL
}

-- Late non critical extensions
RRConnectionRelease-v9e0-IEs ::= SEQUENCE {
    redirectedCarrierInfo-v9e0    RedirectedCarrierInfo-v9e0    OPTIONAL, -- Cond NoRedirect-r8
    idleModeMobilityControlInfo-v9e0    IdleModeMobilityControlInfo-v9e0    OPTIONAL, -- Cond
    IdleInfoEUTRA
}
nonCriticalExtension  SEQUENCE {}          OPTIONAL

-- Regular non critical extensions

RRRConectionRelease-v920-IEs ::= SEQUENCE {
    cellInfoList-r9  CHOICE {
        geran-r9   CellInfoListGERAN-r9,
       utra-FDD-r9  CellInfoListUTRA-FDD-r9,
       utra-TDD-r9  CellInfoListUTRA-TDD-r9,
        ....
       utra-TDD-r10  CellInfoListUTRA-TDD-r10
    }               OPTIONAL,  -- Cond Redirection
    nonCriticalExtension   RRRConectionRelease-v1020-IEs  OPTIONAL
}

RRRConectionRelease-v1020-IEs ::=SEQUENCE {
    extendedWaitTime-r10    INTEGER (1..1800)  OPTIONAL,  -- Need ON
    nonCriticalExtension   RRRConectionRelease-v1320-IEs  OPTIONAL
}

RRRConectionRelease-v1320-IEs ::= SEQUENCE {
    resumeIdentity-r13     ResumeIdentity-r13    OPTIONAL,  -- Need OR
    nonCriticalExtension    SEQUENCE {}      OPTIONAL
}

ReleaseCause ::=    ENUMERATED {loadBalancingTAUrequired,
                               other, cs-FallbackHighPriority-v1020, rrc-Suspend-v1320}

RedirectedCarrierInfo ::=   CHOICE {
    eutra         ARFCN-ValueEUTRA,
    geran         CarrierFREQsGERAN,
   utra-FDD       ARFCN-ValueUTRA,
   utra-TDD       ARFCN-ValueUTRA,
    cdma2000-HRPD  CarrierFreqCDMA2000,
    cdma2000-1xRTT CarrierFreqCDMA2000,
IdleModeMobilityControlInfo ::= SEQUENCE {
    freqPriorityListEUTRA FreqPriorityListEUTRA OPTIONAL, -- Need ON
    freqPriorityListGERAN FreqPriorityListGERAN OPTIONAL, -- Need ON
    freqPriorityListUTRA-FDD FreqPriorityListUTRA-FDD OPTIONAL, -- Need ON
    freqPriorityListUTRA-TDD FreqPriorityListUTRA-TDD OPTIONAL, -- Need ON
    bandClassPriorityListHRPD BandClassPriorityListHRPD OPTIONAL, -- Need ON
    bandClassPriorityList1XRTT BandClassPriorityList1XRTT OPTIONAL, -- Need ON
    t320 ENUMERATED {
        min5, min10, min20, min30, min60, min120, min180,
        spare1} OPTIONAL, -- Need OR
    ...
}

IdleModeMobilityControlInfo-v9e0 ::= SEQUENCE {
    freqPriorityListEUTRA-v9e0 FreqPriorityListEUTRA-v9e0 OPTIONAL, -- Need ON
    freqPriorityListExtEUTRA-v1310 FreqPriorityListExtEUTRA-v1310 OPTIONAL, -- Need ON
}

FreqPriorityListEUTRA ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA

FreqPriorityListEUTRA-v9e0 ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA-v9e0

FreqPriorityListUTRA ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA
FreqPriorityListExtEUTRA-r12 ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA-r12

FreqPriorityListEUTRA-v1310 ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA-v1310

FreqPriorityListExtEUTRA-v1310 ::= SEQUENCE (SIZE (1..maxFreq)) OF FreqPriorityEUTRA-v1310

FreqPriorityEUTRA ::= SEQUENCE {
  carrierFreq       ARFCN-ValueEUTRA,
  cellReselectionPriority    CellReselectionPriority
}

FreqPriorityEUTRA-v9e0 ::= SEQUENCE {
  carrierFreq-v9e0     ARFCN-ValueEUTRA-v9e0  OPTIONAL -- Cond EARFCN-max
}

FreqPriorityEUTRA-r12 ::= SEQUENCE {
  carrierFreq-r12       ARFCN-ValueEUTRA-r9,
  cellReselectionPriority-r12    CellReselectionPriority
}

FreqPriorityEUTRA-v1310 ::= SEQUENCE {
  cellReselectionSubPriority-r13    CellReselectionSubPriority-r13   OPTIONAL  -- Need ON
}

FREQsPriorityListGERAN ::=   SEQUENCE (SIZE (1..maxGNFG)) OF FreqsPriorityGERAN

FreqsPriorityGERAN ::=   SEQUENCE {
  carrierFREQs     CarrierFreqsGERAN,
  cellReselectionPriority    CellReselectionPriority
}

FreqPriorityListUTRA-FDD ::=  SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF FreqPriorityUTRA-FDD

FreqPriorityUTRA-FDD ::=   SEQUENCE {
  carrierFreq       ARFCN-ValueUTRA,
FreqPriorityListUTRA-TDD ::= SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF FreqPriorityUTRA-TDD

FreqPriorityUTRA-TDD ::= SEQUENCE {
carrierFreq        ARFCN-ValueUTRA,
cellReselectionPriority    CellReselectionPriority
}

BandClassPriorityListHRPD ::= SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandClassPriorityHRPD

BandClassPriorityHRPD ::= SEQUENCE {
bandClass        BandclassCDMA2000,
cellReselectionPriority    CellReselectionPriority
}

BandClassPriorityList1XRTT ::= SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandClassPriority1XRTT

BandClassPriority1XRTT ::= SEQUENCE {
bandClass        BandclassCDMA2000,
cellReselectionPriority    CellReselectionPriority
}

CellInfoListGERAN-r9 ::= SEQUENCE (SIZE (1..maxCellInfoGERAN-r9)) OF CellInfoGERAN-r9

CellInfoGERAN-r9 ::= SEQUENCE {
physCellId-r9      PhysCellIdGERAN,
carrierFreq-r9      CarrierFreqGERAN,
systemInformation-r9    SystemInfoListGERAN
}

CellInfoListUTRA-FDD-r9 ::= SEQUENCE (SIZE (1..maxCellInfoUTRA-r9)) OF CellInfoUTRA-FDD-r9

CellInfoUTRA-FDD-r9 ::= SEQUENCE {
}
physCellId-r9               PhysCellIdUTRA-FDD,
utra-BCCH-Container-r9     OCTET STRING
}

CellInfoListUTRA-TDD-r9 ::= SEQUENCE (SIZE (1..maxCellInfoUTRA-r9)) OF CellInfoUTRA-TDD-r9

CellInfoUTRA-TDD-r9 ::= SEQUENCE {
physCellId-r9               PhysCellIdUTRA-TDD,
utra-BCCH-Container-r9     OCTET STRING
}

CellInfoListUTRA-TDD-r10 ::= SEQUENCE (SIZE (1..maxCellInfoUTRA-r9)) OF CellInfoUTRA-TDD-r10

CellInfoUTRA-TDD-r10 ::= SEQUENCE {
physCellId-r10              PhysCellIdUTRA-TDD,
carrierFreq-r10             ARFCN-ValueUTRA,
utra-BCCH-Container-r10     OCTET STRING
}

-- ASN1STOP
**RRCConnectionRelease field descriptions**

**carrierFreq or bandClass**  
The carrier frequency (UTRA and E-UTRA) and band class (HRPD and 1xRTT) for which the associated cellReselectionPriority is applied.

**carrierFreqs**  
The list of GERAN carrier frequencies organised into one group of GERAN carrier frequencies.

**cellInfoList**  
Used to provide system information of one or more cells on the redirected inter-RAT carrier frequency. The system information can be used if, upon redirection, the UE selects an inter-RAT cell indicated by the physCellID and carrierFreq (GERAN and UTRA TDD) or by the physCellID (other RATs). The choice shall match the redirectedCarrierInfo. In particular, E-UTRAN only applies valueutra-TDD-r10 in case redirectedCarrierInfo is set toutra-TDD-r10.

**extendedWaitTime**  
Value in seconds for the wait time for Delay Tolerant access requests.

**freqPriorityListX**  
Provides a cell reselection priority for each frequency, by means of separate lists for each RAT (including E-UTRA). The UE shall be able to store at least 3 occurrences of FreqPriorityGERAN. If E-UTRAN includes freqPriorityListEUTRA-v9e0 and/or freqPriorityListEUTRA-v1310 it includes the same number of entries, and listed in the same order, as in freqPriorityListEUTRA (i.e. without suffix). Field freqPriorityListExt includes additional neighbouring inter-frequencies, i.e. extending the size of the inter-frequency carrier list using the general principles specified in 5.1.2. EUTRAN only includes freqPriorityListExtEUTRA if freqPriorityListEUTRA (i.e without suffix) contains maxFreq entries. If E-UTRAN includes freqPriorityListExtEUTRA-v1310 it includes the same number of entries, and listed in the same order, as in freqPriorityListExtEUTRA-r12.

**idleModeMobilityControlInfo**  
Provides dedicated cell reselection priorities. Used for cell reselection as specified in TS 36.304 [4]. For E-UTRA and UTRA frequencies, a UE that supports multi-band cells for the concerned RAT considers the dedicated priorities to be common for all overlapping bands (i.e. regardless of the ARFCN that is used).

**redirectedCarrierInfo**  
The redirectedCarrierInfo indicates a carrier frequency (downlink for FDD) and is used to redirect the UE to an E-UTRA or an inter-RAT carrier frequency, by means of the cell selection upon leaving RRC_CONNECTED as specified in TS 36.304 [4].

**releaseCause**  
The releaseCause is used to indicate the reason for releasing the RRC Connection. The cause value cs-FallbackHighPriority is only applicable when redirectedCarrierInfo is present with the value set toutra-FDD, utra-TDD orutra-TDD-r10. E-UTRAN should not set the releaseCause to loadBalancingTAURequired or to cs-FallbackHighPriority if the extendedWaitTime is present.

**systemInformation**  
Container for system information of the GERAN cell i.e. one or more System Information (SI) messages as defined in TS 44.018 [45, table 9.1.1].

**t320**  
Timer T320 as described in section 7.3. Value minN corresponds to N minutes.

**utra-BCCH-Container**  
Contains System Information Container message as defined in TS 25.331 [19].

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>EARFCN-max</td>
<td>The field is mandatory present if the corresponding carrierFreq (i.e. without suffix) is set to maxEARFCN. Otherwise the field is not present.</td>
</tr>
<tr>
<td>IdleInfoEUTRA</td>
<td>The field is optionally present, need OP, if the IdleModeMobilityControlInfo (i.e. without suffix) is included and includes freqPriorityListEUTRA; otherwise the field is not present.</td>
</tr>
<tr>
<td>NoRedirect-r8</td>
<td>The field is optionally present, need OP, if the redirectedCarrierInfo (i.e. without suffix) is not included; otherwise the field is not present.</td>
</tr>
<tr>
<td>Redirection</td>
<td>The field is optionally present, need ON, if the redirectedCarrierInfo is included and set to geran,utra-FDD,utra-TDD orutra-TDD-r10; otherwise the field is not present.</td>
</tr>
</tbody>
</table>

**RRCConnectionRequest**

The RRCConnectionRequest message is used to request the establishment of an RRC connection.
Signalling radio bearer: SRB0
RLC-SAP: TM
Logical channel: CCCH
Direction: UE to E-UTRAN

**RRCConnectionRequest message**

```asn1
RRCConnectionRequest ::= SEQUENCE {
criticalExtensions          CHOICE {
   rrcConnectionRequest-r8    RRCConnectionRequest-r8-IEs,
criticalExtensionsFuture    SEQUENCE { }
}
}

RRCConnectionRequest-r8-IEs ::= SEQUENCE {
ue-Identity               InitialUE-Identity,
establishmentCause         EstablishmentCause,
spare                      BIT STRING (SIZE (1))
}

InitialUE-Identity ::= CHOICE {
s-TMSI                     S-TMSI,
randomValue                BIT STRING (SIZE (40))
}

EstablishmentCause ::= ENUMERATED {
emergency, highPriorityAccess, mt-Access, mo-Signalling,
mo-Data, delayTolerantAccess-v1020, mo-VoiceCall-v1280, spare1
}
```

-- ASN1STOP
**RRCConnectionRequest field descriptions**

<table>
<thead>
<tr>
<th>establishmentCause</th>
<th>Provides the establishment cause for the RRC connection request as provided by the upper layers. W.r.t. the cause value names: highPriorityAccess concerns AC11..AC15, &quot;mt&quot; stands for &quot;Mobile Terminating&quot; and &quot;mo&quot; for &quot;Mobile Originating. ENB is not expected to reject a RRCConnectionRequest due to unknown cause value being used by the UE.</th>
</tr>
</thead>
<tbody>
<tr>
<td>randomValue</td>
<td>Integer value in the range 0 to $2^{30} - 1$.</td>
</tr>
<tr>
<td>ue-Identity</td>
<td>UE identity included to facilitate contention resolution by lower layers.</td>
</tr>
</tbody>
</table>

---

**RRCConnectionResume**

The *RRCConnectionResume* message is used to resume the suspended RRC connection.

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: E-UTRAN to UE

**RRCConnectionResume message**

```asn1
RRCConnectionResume-r13 ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c 1          CHOICE  {
      rrcConnectionResume-r13    RRCConnectionResume-r13-IEs,
      spare3          NULL,
      spare2          NULL,
      spare1          NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
}

RRCConnectionResume-r13-IEs ::= SEQUENCE {
  radioResourceConfigDedicated-r13   RadioResourceConfigDedicated OPTIONAL, -- Need ON
  nextHopChainingCount-r13          NextHopChainingCount,
  measConfig-r13                   MeasConfig OPTIONAL, -- Need ON
  antennaInfoDedicatedPCell-r13    AntennaInfoDedicated-v10i0 OPTIONAL, -- Need ON
  drb-ContinueROHC-r13             ENUMERATED {true} OPTIONAL, -- Need OP
}
```
lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension SEQUENCE {} OPTIONAL

RRCConnectionResume field descriptions


drb-ContinueROHC
This field indicates whether to continue or reset the header compression protocol context for the DRBs configured with
the header compression protocol. Presence of the field indicates that the header compression protocol context
continues while absence indicates that the header compression protocol context is reset.

RRCConnectionResumeComplete

The *RRCConnectionResumeComplete* message is used to confirm the successful completion of an RRC connection
resumption

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

RRCConnectionResumeComplete message

-- ASN1START

RRCConnectionResumeComplete-r13 ::= SEQUENCE {
  rrc-TransactionIdentifier RRC-TransactionIdentifier,
  criticalExtensions CHOICE {
    rrcConnectionResumeComplete-r13 RRCConnectionResumeComplete-r13-IEs,
    criticalExtensionsFuture SEQUENCE {}
  }
}

RRCConnectionResumeComplete-r13-IEs ::= SEQUENCE {
  selectedPLMN-Identity-r13 INTEGER (1..maxPLMN-r11) OPTIONAL,
  dedicatedInfoNAS-r13 DedicatedInfoNAS OPTIONAL,
  rlf-InfoAvailable-r13 ENUMERATED {true} OPTIONAL,
  logMeasAvailable-r13 ENUMERATED {true} OPTIONAL,
  connEstFailInfoAvailable-r13 ENUMERATED {true} OPTIONAL,
  mobilityState-r13 ENUMERATED {normal, medium, high, spare} OPTIONAL,
}


The **RRCConnectionResumeRequest** message is used to request the resumption of a suspended RRC connection.

- **Signalling radio bearer:** SRB0
- **RLC-SAP:** TM
- **Logical channel:** CCCH
- **Direction:** UE to E-UTRAN

**RRCConnectionResumeRequest message**

```
RRCConnectionResumeRequest-r13 ::= SEQUENCE {
  criticalExtensions CHOICE {
    rrcConnectionResumeRequest-r13 RRCConnectionResumeRequest-r13-IEs,
    criticalExtensionsFuture SEQUENCE {}}
}

RRCConnectionResumeRequest-r13-IEs ::= SEQUENCE {
  resumeIdentity-r13 CHOICE {
    resumeID-r13 ResumeIdentity-r13,
    truncatedResumeID-r13 BIT STRING (SIZE (24))},
  shortResumeMAC-I-r13 BIT STRING (SIZE (16)),
  resumeCause-r13 ResumeCause,
  spare BIT STRING (SIZE (1))
}
```
ResumeCause ::= ENUMERATED {
            emergency, highPriorityAccess, mt-Access, mo-Signalling,
            mo-Data, delayTolerantAccess-v1020, mo-VoiceCall-v1280, spare1 }

-- ASN1STOP

**RRCConnectionResumeRequest field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>resumeCause</td>
<td>Provides the resume cause for the RRC connection resume request as provided by the upper layers.</td>
</tr>
<tr>
<td>resumeIdentity</td>
<td>UE identity to facilitate UE context retrieval at eNB</td>
</tr>
<tr>
<td>shortResumeMAC-I</td>
<td>Authentication token to facilitate UE authentication at eNB</td>
</tr>
</tbody>
</table>

-- ASN1START

**RRCConnectionSetup**

The **RRCConnectionSetup** message is used to establish SRB1.

- Signalling radio bearer: SRB0
- RLC-SAP: TM
- Logical channel: CCCH
- Direction: E-UTRAN to UE

**RRCConnectionSetup message**

```asn1
RRCConnectionSetup ::= SEQUENCE {
    rrc-TransactionIdentifier   RRC-TransactionIdentifier,
    criticalExtensions     CHOICE {
        c 1          CHOICE {
            rrcConnectionSetup-r8    RRCConnectionSetup-r8-IEs,
        spare7 NULL,
        spare6 NULL, spare5 NULL, spare4 NULL,
        spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture   SEQUENCE { } }
}

RRCConnectionSetup-r8-IEs ::= SEQUENCE {
}
```

ETSI
radioResourceConfigDedicated  RadioResourceConfigDedicated,
nonCriticalExtension  RRCConnectionSetup-v8a0-IEs  OPTIONAL
}

RRCConnectionSetup-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension  OCTET STRING  OPTIONAL,
  nonCriticalExtension  SEQUENCE {}  OPTIONAL
}

-- ASN1STOP

-- RRCConnectionSetupComplete

The **RRCConnectionSetupComplete** message is used to confirm the successful completion of an RRC connection establishment.

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: UE to E-UTRAN

**RRCConnectionSetupComplete message**

-- ASN1START

RRCConnectionSetupComplete ::=  SEQUENCE {
  rrc-TransactionIdentifier  RRC-TransactionIdentifier,
  criticalExtensions  CHOICE {
    c1  CHOICE{
      RRCConnectionSetupComplete-r8  RRCConnectionSetupComplete-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture  SEQUENCE {}  OPTIONAL
  }
}

RRCConnectionSetupComplete-r8-IEs ::= SEQUENCE {
  selectedPLMN-Identity  INTEGER (1..maxPLMN-r11),
  registeredMME  RegisteredMME  OPTIONAL,
}
dedicatedInfoNAS          DedicatedInfoNAS,
nonCriticalExtension     RRCConnectionSetupComplete-v8a0-IEs OPTIONAL
}

RRCConnectionSetupComplete-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    RRCConnectionSetupComplete-v1020-IEs OPTIONAL
}

RRCConnectionSetupComplete-v1020-IEs ::= SEQUENCE {
  gummei-Type-r10      ENUMERATED {native, mapped}   OPTIONAL,
  rlf-InfoAvailable-r10 ENUMERATED {true}     OPTIONAL,
  logMeasAvailable-r10    ENUMERATED {true}     OPTIONAL,
  rn-SubframeConfigReq-r10 ENUMERATED {required, notRequired} OPTIONAL,
  nonCriticalExtension    RRCConnectionSetupComplete-v1130-IEs OPTIONAL
}

RRCConnectionSetupComplete-v1130-IEs ::= SEQUENCE {
  connEstFailInfoAvailable-r11  ENUMERATED {true}    OPTIONAL,
  nonCriticalExtension    RRCConnectionSetupComplete-v1250-IEs  OPTIONAL
}

RRCConnectionSetupComplete-v1250-IEs ::= SEQUENCE {
  mobilityState-r12     ENUMERATED {normal, medium, high, spare} OPTIONAL,
  mobilityHistoryAvail-r12   ENUMERATED {true}     OPTIONAL,
  logMeasAvailableMBSFN-r12 ENUMERATED {true}    OPTIONAL,
  nonCriticalExtension    RRCConnectionSetupComplete-v1320-IEs      OPTIONAL
}

RRCConnectionSetupComplete-v1320-IEs ::= SEQUENCE {
  ce-ModeB-r13      ENUMERATED {supported}   OPTIONAL,
  s-TMSI-r13        S-TMSI       OPTIONAL,
  attachWithoutPDN-Connectivity-r13  ENUMERATED {true}    OPTIONAL,
  up-CIoT-EPS-Optimisation-r13 ENUMERATED {true}     OPTIONAL,
  cp-CIoT-EPS-Optimisation-r13   ENUMERATED {true}     OPTIONAL,
RRCConnectionSetupComplete-v1330-IEs ::= SEQUENCE {
    ue-CE-NeedULGaps-r13 ENUMERATED {true} OPTIONAL,
    nonCriticalExtension SEQUENCE {} OPTIONAL
}

RegisteredMME ::= SEQUENCE {
    plmn-Identity PLMN-Identity OPTIONAL,
    mmegi BIT STRING (SIZE (16)),
    mmec MMEC
}

--- ASN1STOP

### RRCConnectionSetupComplete field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>attachWithoutPDN-Connectivity</td>
<td>This field is used to indicate that the UE performs an Attach without PDN connectivity procedure, as indicated by the upper layers, TS 24.301 [35].</td>
</tr>
<tr>
<td>cp-CIoT-EPS-Optimisation</td>
<td>This field is included when the UE supports the control plane CIoT EPS Optimisation, see TS 24.301 [35].</td>
</tr>
<tr>
<td>ce-ModeB</td>
<td>Indicates whether the UE supports operation in CE mode B, as specified in TS 36.306 [5].</td>
</tr>
<tr>
<td>gummei-Type</td>
<td>This field is used to indicate whether the GUMMEI included is native (assigned by EPC) or mapped (from 2G/3G identifiers).</td>
</tr>
<tr>
<td>mmegi</td>
<td>Provides the Group Identity of the registered MME within the PLMN, as provided by upper layers, see TS 23.003 [27].</td>
</tr>
<tr>
<td>mobilityState</td>
<td>This field indicates the UE mobility state (as defined in TS 36.304 [4, 5.2.4.3]) just prior to UE going into RRC_CONNECTED state. The UE indicates the value of medium and high when being in Medium-mobility and High-mobility states respectively. Otherwise the UE indicates the value normal.</td>
</tr>
<tr>
<td>registeredMME</td>
<td>This field is used to transfer the GUMMEI of the MME where the UE is registered, as provided by upper layers.</td>
</tr>
<tr>
<td>rn-SubframeConfigReq</td>
<td>If present, this field indicates that the connection establishment is for an RN and whether a subframe configuration is requested or not.</td>
</tr>
<tr>
<td>selectedPLMN-Identity</td>
<td>Index of the PLMN selected by the UE from the plmn-IdentityList included in SIB1. 1 if the 1st PLMN is selected from the plmn-IdentityList included in SIB1, 2 if the 2nd PLMN is selected from the plmn-IdentityList included in SIB1 and so on.</td>
</tr>
<tr>
<td>up-CIoT-EPS-Optimisation</td>
<td>This field is included when the UE supports the User plane CIoT EPS Optimisation, see TS 24.301 [35].</td>
</tr>
<tr>
<td>ue-CE-NeedULGaps</td>
<td>Indicates that the UE needs uplink gaps during continuous uplink transmission in FDD as specified in TS 36.211 [21] and TS 36.306 [5].</td>
</tr>
</tbody>
</table>
SCGFailureInformation

The SCGFailureInformation message is used to provide information regarding failures detected by the UE.

Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: UE to E-UTRAN

SCGFailureInformation message

-- ASN1START

SCGFailureInformation-r12 ::= SEQUENCE {
criticalExtensions CHOICE {
c1 CHOICE {
scgFailureInformation-r12 SCGFailureInformation-r12-IEs,
spare3 NULL, spare2 NULL, spare1 NULL
}.criticalExtensionsFuture SEQUENCE { }
}

SCGFailureInformation-r12-IEs ::= SEQUENCE {
failureReportSCG-r12 FailureReportSCG-r12 OPTIONAL,
nonCriticalExtension SCGFailureInformation-v1310-IEs OPTIONAL
}

SCGFailureInformation-v1310-IEs ::= SEQUENCE {
lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension SEQUENCE {} OPTIONAL
}

FailureReportSCG-r12 ::= SEQUENCE {
failureType-r12 ENUMERATED {t313-Expiry, randomAccessProblem,
rlc-MaxNumRetx, scg-ChangeFailure },
measResultServFreqList-r12 MeasResultServFreqList-r10 OPTIONAL,
measResultNeighCells-r12 MeasResultList2EUTRA-r9 OPTIONAL,
...,
The **SCPTMConfiguration** message contains the control information applicable for MBMS services transmitted via SC-MRB.

Signalling radio bearer: N/A

RLC-SAP: UM

Logical channel: SC-MCCH

Direction: E-UTRAN to UE

**SCPTMConfiguration message**

```asn1
SCPTMConfiguration-r13 ::= SEQUENCE {
  sc-mtch-InfoList-r13   SC-MTCH-InfoList-r13,  
  scptm-NeighbourCellList-r13  SCPTM-NeighbourCellList-r13  OPTIONAL, -- Need OP
  lateNonCriticalExtension OCTET STRING      OPTIONAL,  
  nonCriticalExtension   SEQUENCE {}       OPTIONAL
}
```

**SCPTMConfiguration field descriptions**

- **sc-mtch-InfoList**
  Provides the configuration of each SC-MTCH in the current cell.

- **scptm-NeighbourCellList**
  List of neighbour cells providing MBMS services via SC-MRB. When absent, the UE shall assume that MBMS services listed in the **SCPTMConfiguration** message are not provided via SC-MRB in any neighbour cell.

**SecurityModeCommand**

The **SecurityModeCommand** message is used to command the activation of AS security.
Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: E-UTRAN to UE

SecurityModeCommand message

-- ASN1START

SecurityModeCommand ::= SEQUENCE {
    rrc-TransactionIdentifier       RRC-TransactionIdentifier,
    criticalExtensions     CHOICE {
        c1     CHOICE{
            securityModeCommand-r8    SecurityModeCommand-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture   SEQUENCE {}
    }
}

SecurityModeCommand-r8-IEs ::= SEQUENCE {
    securityConfigSMC     SecurityConfigSMC,
    nonCriticalExtension    SecurityModeCommand-v8a0-IEs  OPTIONAL
}

SecurityModeCommand-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension   OCTET STRING      OPTIONAL,
    nonCriticalExtension    SEQUENCE {}       OPTIONAL
}

SecurityConfigSMC ::=     SEQUENCE {
    securityAlgorithmConfig     SecurityAlgorithmConfig,
    ...
}

-- ASN1STOP
SecurityModeComplete

The SecurityModeComplete message is used to confirm the successful completion of a security mode command.

Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: UE to E-UTRAN

SecurityModeComplete message

-- ASN1START

SecurityModeComplete ::= SEQUENCE {
rnc-TransactionIdentifier RRC-TransactionIdentifier,
criticalExtensions CHOICE {
  securityModeComplete-r8 SecurityModeComplete-r8-IEs,
criticalExtensionsFuture SEQUENCE { }
}
}

SecurityModeComplete-r8-IEs ::= SEQUENCE {
  nonCriticalExtension SecurityModeComplete-v8a0-IEs OPTIONAL
}

SecurityModeComplete-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  nonCriticalExtension SEQUENCE { } OPTIONAL
}

-- ASN1STOP

SecurityModeFailure

The SecurityModeFailure message is used to indicate an unsuccessful completion of a security mode command.
Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: UE to E-UTRAN

**SecurityModeFailure message**

```asn1
SecurityModeFailure ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    securityModeFailure-r8    SecurityModeFailure-r8-IEs,
    criticalExtensionsFuture   SEQUENCE {} 
  }
}

SecurityModeFailure-r8-IEs ::= SEQUENCE {
  nonCriticalExtension    SecurityModeFailure-v8a0-IEs       OPTIONAL
}

SecurityModeFailure-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}
```

---

**SidelinkUEInformation**

The *SidelinkUEInformation* message is used for the indication of sidelink information to the eNB.

Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: UE to E-UTRAN

**SidelinkUEInformation message**

```asn1
-- ASN1START
```
SidelinkUEInformation-r12 ::= SEQUENCE {
  criticalExtensions CHOICE {
    c1 CHOICE {
      sidelinkUEInformation-r12  SidelinkUEInformation-r12-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture  SEQUENCE {
      ...  ...
nonCriticalExtension  SEQUENCE {} OPTIONAL

SL-CommTxResourceReq-r12 ::= SEQUENCE {
carrierFreq-r12     ARFCN-ValueEUTRA-r9 OPTIONAL,
destinationInfoList-r12   SL-DestinationInfoList-r12
}

SL-DiscTxResourceReqPerFreqList-r13 ::= SEQUENCE (SIZE (1..maxFreq)) OF SL-DiscTxResourceReq-r13

SL-DiscTxResourceReq-r13 ::= SEQUENCE {
carrierFreqDiscTx-r13   INTEGER (1..maxFreq) OPTIONAL,
discTxResourceReq-r13   INTEGER (1..63)
}

SL-DestinationInfoList-r12 ::= SEQUENCE (SIZE (1..maxSL-Dest-r12)) OF SL-DestinationIdentity-r12

SL-DestinationIdentity-r12 ::= BIT STRING (SIZE (24))

<table>
<thead>
<tr>
<th><strong>SidetlinkUEInformation field descriptions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>carrierFreqDiscTx</strong> Indicates the frequency by the index of the entry in field discInterFreqList within SystemInformationBlockType19. Value 1 corresponds to the first entry in discInterFreqList within SystemInformationBlockType19, value 2 corresponds to the second entry in this list and so on.</td>
</tr>
<tr>
<td><strong>commRxInterestedFreq</strong> Indicates the frequency on which the UE is interested to receive sidelink communication.</td>
</tr>
<tr>
<td><strong>commTxResourceReq</strong> Indicates the frequency on which the UE is interested to transmit non-relay related sidelink communication as well as the one-to-many sidelink communication transmission destination(s) for which the UE requests E-UTRAN to assign dedicated resources. NOTE 1.</td>
</tr>
<tr>
<td><strong>commTxResourceReqRelay</strong> Indicates the relay related one-to-many sidelink communication transmission destination(s) for which the sidelink relay UE requests E-UTRAN to assign dedicated resources.</td>
</tr>
<tr>
<td><strong>commTxResourceReqRelayUC</strong> Indicates the relay related one-to-one sidelink communication transmission destination(s) for which the sidelink relay UE or sidelink remote UE requests E-UTRAN to assign dedicated resources i.e. either contains the unicast destination identity of the sidelink relay UE or of the sidelink remote UE.</td>
</tr>
<tr>
<td><strong>commTxResourceReqUC</strong> Indicates the frequency on which the UE is interested to transmit non-relay related one-to-one sidelink communication as well as the sidelink communication transmission destination(s) for which the UE requests E-UTRAN to assign dedicated resources. NOTE 1.</td>
</tr>
<tr>
<td><strong>destinationInfoList</strong> Indicates the destination(s) for relay or non-relay related one-to-one or one-to-many sidelink communication. For one-to-one sidelink communication the destination is identified by the ProSe UE ID for unicast communication, while for one-to-many the destination it is identified by the ProSe Layer-2 Group ID as specified in TS 23.303 [68].</td>
</tr>
<tr>
<td><strong>discRxInterest</strong> Indicates that the UE is interested to monitor sidelink discovery announcements.</td>
</tr>
<tr>
<td><strong>discSysInfoReportFreqList</strong> Indicates, for one or more frequencies, a list of sidelink discovery related parameters acquired from system Information of cells on configured inter-frequency carriers.</td>
</tr>
<tr>
<td><strong>discTxResourceReq</strong> Indicates the number of separate discovery message(s) the UE wants to transmit every discovery period. This field concerns the resources the UE requires every discovery period for transmitting sidelink discovery announcement(s).</td>
</tr>
<tr>
<td><strong>discTxResourceReqAddFreq</strong> Indicates, for any frequencies in addition to the one covered by discTxResourceReq, the number of separate discovery message(s) the UE wants to transmit every discovery period. This field concerns the resources the UE requires every discovery period for transmitting sidelink discovery announcement(s).</td>
</tr>
<tr>
<td><strong>discTxResourceReqPS</strong> Indicates the number of separate PS related discovery message(s) the UE wants to transmit every discovery period. This field concerns the resources the UE requires every discovery period for transmitting PS related sidelink discovery announcement(s).</td>
</tr>
</tbody>
</table>

NOTE 1: When configuring commTxResourceReq, commTxResourceReqUC, commTxResourceReqRelay and commTxResourceReqRelayUC, E-UTRAN configures at most maxSL-Dest-r12 destinations in total (i.e. as included in the four fields together).

---

**SystemInformation**

The SystemInformation message is used to convey one or more System Information Blocks. All the SIBs included are transmitted with the same periodicity. SystemInformation-BR uses the same structure as SystemInformation.

- Signalling radio bearer: N/A
- RLC-SAP: TM
- Logical channels: BCCH and BR-BCCH
- Direction: E-UTRAN to UE

**SystemInformation message**

---

-- ASN1START
SystemInformation-BR-r13 ::= SystemInformation

SystemInformation ::= SEQUENCE {
  criticalExtensions     CHOICE {
    systemInformation-r8    SystemInformation-r8-IEs,
    criticalExtensionsFuture   SEQUENCE {}}
}

SystemInformation-r8-IEs ::= SEQUENCE {
  sib-TypeAndInfo      SEQUENCE (SIZE (1..maxSIB)) OF CHOICE {
    sib2        SystemInformationBlockType2,
    sib3        SystemInformationBlockType3,
    sib4        SystemInformationBlockType4,
    sib5        SystemInformationBlockType5,
    sib6        SystemInformationBlockType6,
    sib7        SystemInformationBlockType7,
    sib8        SystemInformationBlockType8,
    sib9        SystemInformationBlockType9,
    sib10       SystemInformationBlockType10,
    sib11       SystemInformationBlockType11,
    ....
    sib12-v920       SystemInformationBlockType12-r9,
    sib13-v920       SystemInformationBlockType13-r9,
    sib14-v1130      SystemInformationBlockType14-r11,
    sib15-v1130      SystemInformationBlockType15-r11,
    sib16-v1130      SystemInformationBlockType16-r11,
    sib17-v1250      SystemInformationBlockType17-r12,
    sib18-v1250      SystemInformationBlockType18-r12,
    sib19-v1250      SystemInformationBlockType19-r12,
    sib20-v1310      SystemInformationBlockType20-r13
  },
  nonCriticalExtension    SystemInformation-v8a0-IEs   OPTIONAL
}
SystemInformation-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}

-- ASN1STOP

– SystemInformationBlockType1
SystemInformationBlockType1 contains information relevant when evaluating if a UE is allowed to access a cell and defines the scheduling of other system information. SystemInformationBlockType1-BR uses the same structure as SystemInformationBlockType1.

  Signalling radio bearer: N/A
  RLC-SAP: TM
  Logical channels: BCCH and BR-BCCH
  Direction: E-UTRAN to UE

SystemInformationBlockType1 message

-- ASN1START

SystemInformationBlockType1-BR-r13 ::= SystemInformationBlockType1

SystemInformationBlockType1 ::=  SEQUENCE {
  cellAccessRelatedInfo    SEQUENCE {
    plmn-IdentityList     PLMN-IdentityList,
    trackingAreaCode     TrackingAreaCode,
    cellIdentity      CellIdentity,
    cellBarred       ENUMERATED {barred, notBarred},
    intraFreqReselection    ENUMERATED {allowed, notAllowed},
    csg-Indication      BOOLEAN,
    csg-Identity      CSG-Identity   OPTIONAL -- Need OR
  },
  cellSelectionInfo     SEQUENCE {
    q-RxLevMin        Q-RxLevMin,
    q-RxLevMinOffset  INTEGER (1..8)   OPTIONAL -- Need OP
  },
  p-Max        P-Max      OPTIONAL,   -- Need OP

-- ASN1STOP
freqBandIndicator  FreqBandIndicator,  
schedulingInfoList  SchedulingInfoList,  
tdd-Config        TDD-Config OPTIONAL, -- Cond TDD  
si-WindowLength    ENUMERATED {  
ms1, ms2, ms5, ms10, ms15, ms20,  
ms40},  
systemInfoValueTag INTEGER (0..31),  
nonCriticalExtension  SystemInformationBlockType1-v890-IEs OPTIONAL  
}  

SystemInformationBlockType1-v890-IEs ::= SEQUENCE {  
lateNonCriticalExtension OCTET STRING (CONTAINING SystemInformationBlockType1-v8h0-IEs) OPTIONAL,  
nonCriticalExtension SystemInformationBlockType1-v920-IEs OPTIONAL  
}  

-- Late non critical extensions  
SystemInformationBlockType1-v8h0-IEs ::= SEQUENCE {  
multiBandInfoList MultiBandInfoList OPTIONAL, -- Need OR  
nonCriticalExtension SystemInformationBlockType1-v9e0-IEs OPTIONAL  
}  

SystemInformationBlockType1-v9e0-IEs ::= SEQUENCE {  
freqBandIndicator-v9e0 FreqBandIndicator-v9e0 OPTIONAL, -- Cond FBI-max  
multiBandInfoList-v9e0 MultiBandInfoList-v9e0 OPTIONAL, -- Cond mFBI-max  
nonCriticalExtension SystemInformationBlockType1-v10j0-IEs OPTIONAL  
}  

SystemInformationBlockType1-v10j0-IEs ::= SEQUENCE {  
freqBandInfo-r10 NS-PmaxList-r10 OPTIONAL, -- Need OR  
multiBandInfoList-v10j0 MultiBandInfoList-v10j0 OPTIONAL, -- Need OR  
nonCriticalExtension SEQUENCE {} OPTIONAL  
}  

-- Regular non critical extensions
SystemInformationBlockType1-v920-IEs ::= SEQUENCE {
  ims-EmergencySupport-r9 ENUMERATED {true} OPTIONAL, -- Need OR
  cellSelectionInfo-v920 CellSelectionInfo-v920 OPTIONAL, -- Cond RSRQ
  nonCriticalExtension SystemInformationBlockType1-v1130-IEs OPTIONAL
}

SystemInformationBlockType1-v1130-IEs ::= SEQUENCE {
  tdd-Config-v1130 TDD-Config-v1130 OPTIONAL, -- Cond TDD-OR
  cellSelectionInfo-v1130 CellSelectionInfo-v1130 OPTIONAL, -- Cond WB-RSRQ
  nonCriticalExtension SystemInformationBlockType1-v1250-IEs OPTIONAL
}

SystemInformationBlockType1-v1250-IEs ::= SEQUENCE {
  cellAccessRelatedInfo-v1250 SEQUENCE {
    category0Allowed-r12 ENUMERATED {true} OPTIONAL -- Need OP
  },
  cellSelectionInfo-v1250 CellSelectionInfo-v1250 OPTIONAL, -- Cond RSRQ2
  freqBandIndicatorPriority-r12 ENUMERATED {true} OPTIONAL, -- Cond mFBI
  nonCriticalExtension SystemInformationBlockType1-v1310-IEs OPTIONAL
}

SystemInformationBlockType1-v1310-IEs ::= SEQUENCE {
  hyperSFN-r13 BIT STRING (SIZE (10)) OPTIONAL, -- Need OR
  eDRX-Allowed-r13 ENUMERATED {true} OPTIONAL, -- Need OR
  cellSelectionInfoCE-r13 CellSelectionInfoCE-r13 OPTIONAL, -- Need OP
  bandwidthReducedAccessRelatedInfo-r13 SEQUENCE {
    si-WindowLength-BR-r13 ENUMERATED {
      ms20, ms40, ms60, ms80, ms120,
      ms160, ms200, spare
    },
    si-RepetitionPattern-r13 ENUMERATED {everyRF, every2ndRF, every4thRF,
      every8thRF},
    schedulingInfoList-BR-r13 SchedulingInfoList-BR-r13 OPTIONAL, -- Need OR
    fdd-DownlinkOrTddSubframeBitmapBR-r13 CHOICE {
      subframePattern10-r13 BIT STRING (SIZE (10)),
      subframePattern40-r13 BIT STRING (SIZE (40))
    }
  }
}
SystemInformationBlockType1-v1320-IEs ::= SEQUENCE {

freqHoppingParametersDL-r13  SEQUENCE {

mpdcch-pdsch-HoppingNB-r13    ENUMERATED {nb2, nb4} OPTIONAL, -- Need OR

interval-DLHoppingConfigCommonModeA-r13  CHOICE {

interval-FDD-r13     ENUMERATED {int1, int2, int4, int8},

interval-TDD-r13     ENUMERATED {int1, int5, int10, int20}

} OPTIONAL, -- Need OR

interval-DLHoppingConfigCommonModeB-r13  CHOICE {

interval-FDD-r13     ENUMERATED {int2, int4, int8, int16},

interval-TDD-r13     ENUMERATED {int5, int10, int20, int40}

} OPTIONAL, -- Need OR

mpdcch-pdsch-HoppingOffset-r13   INTEGER (1..maxAvailNarrowBands-r13) OPTIONAL -- Need OR

} OPTIONAL, -- Cond SI-Hopping

nonCriticalExtension          SEQUENCE {} OPTIONAL

}

PLMN-IdentityList ::= SEQUENCE (SIZE (1..maxPLMN-r11)) OF PLMN-IdentityInfo

PLMN-IdentityInfo ::= SEQUENCE {

plmn-Identity    PLMN-Identity,

cellReservedForOperatorUse  ENUMERATED {reserved, notReserved}

}

SchedulingInfoList ::= SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo
SchedulingInfo ::= SEQUENCE {
  si-Periodicity     ENUMERATED {
    rf8, rf16, rf32, rf64, rf128, rf256, rf512},
  sib-MappingInfo    SIB-MappingInfo
}

SchedulingInfoList-BR-r13 ::= SEQUENCE (SIZE (1..maxSI-Message)) OF SchedulingInfo-BR-r13

SchedulingInfo-BR-r13 ::= SEQUENCE {
  si-Narrowband-r13  INTEGER (1..maxAvailNarrowBands-r13),
  si-TBS-r13         ENUMERATED {b152, b208, b256, b328, b408, b504, b600, b712, b808, b936}
}

SIB-MappingInfo ::= SEQUENCE (SIZE (0..maxSIB-1)) OF SIB-Type

SIB-Type ::= ENUMERATED {
  sibType3, sibType4, sibType5, sibType6,
  sibType7, sibType8, sibType9, sibType10,
  sibType11, sibType12-v920, sibType13-v920,
  sibType14-v1130, sibType15-v1130,
  sibType16-v1130, sibType17-v1250, sibType18-v1250,
  ..., sibType19-v1250, sibType20-v1310}

SystemInfoValueTagList-r13 ::= SEQUENCE (SIZE (1..maxSI-Message)) OF SystemInfoValueTagSI-r13

SystemInfoValueTagSI-r13 ::= INTEGER (0..3)

CellSelectionInfo-v920 ::= SEQUENCE {
  q-QualMin-r9       Q-QualMin-r9,
  q-QualMinOffset-r9 INTEGER (1..8) OPTIONAL -- Need OP
}

CellSelectionInfo-v1130 ::= SEQUENCE {

q-QualMinWB-r11 Q-QualMin-r9
}

CellSelectionInfo-v1250 ::= SEQUENCE {
   q-QualMinRSRQ-OnAllSymbols-r12 Q-QualMin-r9
}

-- ASN1STOP
SystemInformationBlockType1 field descriptions

**bandwidthReducedAccessRelatedInfo**
Access related information for BL UEs and UEs in CE. NOTE 3.

**category0Allowed**
The presence of this field indicates category 0 UEs are allowed to access the cell.

**cellBarred**
barred means the cell is barred, as defined in TS 36.304 [4].

**cellIdentity**
Indicates the cell identity. NOTE 2.

**cellReservedForOperatorUse**
As defined in TS 36.304 [4].

**cellSelectionInfoCE**
Cell selection information for BL UEs and UEs in CE. NOTE 3.

**csg-Identity**
Identity of the Closed Subscriber Group the cell belongs to.

**csg-Indication**
If set to TRUE the UE is only allowed to access the cell if it is a CSG member cell, if selected during manual CSG selection or to obtain limited service, see TS 36.304 [4].

**eDRX-Allowed**
The presence of this field indicates if idle mode extended DRX is allowed in the cell. The UE shall stop using extended DRX in idle mode if "eDRX-Allowed" is not present.

**fdd-DownlinkOrTddSubframeBitmapBR**
The set of valid subframes for FDD downlink or TDD transmissions, see TS 36.213 [23].
The set of valid subframes is a subset of non-MBSFN subframes indicated in mbsfn-SubframeConfigList. If the field is not present all subframes are considered as valid subframes for FDD downlink transmission and all DL subframes according to the uplink-downlink configuration (see TS 36.211) are considered as valid subframes for TDD DL transmission. If mbsfn-SubframeConfigList is indicated in SystemInformationBlockType2, the field is present.
The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string divided by 10. Value 0 in the bitmap indicates that the corresponding subframe is invalid for transmission. Value 1 in the bitmap indicates that the corresponding subframe is valid for transmission.

**fdd-UplinkSubframeBitmapBR**
The set of valid subframes for FDD uplink transmissions for BL UEs, see TS 36.213 [23].
If the field is not present, then UE considers all uplink subframes as valid subframes for FDD uplink transmissions.
The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string divided by 10. Value 0 in the bitmap indicates that the corresponding subframe is invalid for transmission. Value 1 in the bitmap indicates that the corresponding subframe is valid for transmission.

**freqBandIndicatorPriority**
If the field is present and supported by the UE, the UE shall prioritize the frequency bands in the multiBandInfoList field in decreasing priority order. Only if the UE does not support any of the frequency band in multiBandInfoList, the UE shall use the value in freqBandIndicator field. Otherwise, the UE applies frequency band according to the rules defined in multiBandInfoList. NOTE 2.

**freqBandInfo**
A list of additionalPmax and additionalSpectrumEmission values as defined in TS 36.101 [42, table 6.2.4-1] for the frequency band in freqBandIndicator.

**hyperSFN**
Indicates hyper SFN which increments by one when the SFN wraps around.

**ims-EmergencySupport**
Indicates whether the cell supports IMS emergency bearer services for UEs in limited service mode. If absent, IMS emergency call is not supported by the network for the cell for UEs in limited service mode. NOTE 2.

**intraFreqReselection**
Used to control cell reselection to intra-frequency cells when the highest ranked cell is barred, or treated as barred by the UE, as specified in TS 36.304 [4]. NOTE 2.

**multiBandInfoList**
A list of additional frequency band indicators, as defined in TS 36.101 [42, table 5.5-1] that the cell belongs to. If the UE supports the frequency band in the freqBandIndicator field it shall apply that frequency band. Otherwise, the UE shall apply the first listed band which it supports in the multiBandInfoList field. If E-UTRAN includes multiBandInfoList-v9e0 it includes the same number of entries, and listed in the same order, as in multiBandInfoList (i.e. without suffix). See Annex D for more descriptions. The UE shall ignore the rule defined in this field description if freqBandIndicatorPriority is present and supported by the UE.

**multiBandInfoList-v10j0**
A list of additionalPmax and additionalSpectrumEmission values as defined in TS 36.101 [42, table 6.2.4-1] for the frequency bands in multiBandInfoList (i.e. without suffix) and multiBandInfoList-v9e0. If E-UTRAN includes multiBandInfoList-v10j0, it includes the same number of entries, and listed in the same order, as in multiBandInfoList (i.e. without suffix).

**plmn-IdentityList**
List of PLMN identities. The first listed PLMN\-Identity is the primary PLMN. NOTE 2.
### SystemInformationBlockType1 field descriptions

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>p-Max</strong></td>
<td>Value applicable for the cell. If absent the UE applies the maximum power according to the UE capability, NOTE 2.</td>
<td></td>
</tr>
<tr>
<td><strong>q-QualMin</strong></td>
<td>Parameter ‘Qualmin’ in TS 36.304 [4]. If cellSelectionInfo-v920 is not present, the UE applies the (default) value of negative infinity for Qqualmin. NOTE 1.</td>
<td></td>
</tr>
<tr>
<td><strong>q-QualMinRSRQ-OnAllSymbols</strong></td>
<td>If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols in accordance with TS 36.214 [48]. NOTE 1.</td>
<td></td>
</tr>
<tr>
<td><strong>q-QualMinOffset</strong></td>
<td>Parameter ‘Qqualminoffset’ in TS 36.304 [4]. Actual value Qqualminoffset = field value [dB]. If cellSelectionInfo-v920 is not present or the field is not present, the UE applies the (default) value of 0 dB for Qqualminoffset. Affects the minimum required quality level in the cell.</td>
<td></td>
</tr>
<tr>
<td><strong>q-QualMinWB</strong></td>
<td>If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, use a wider bandwidth in accordance with TS 36.133 [16]. NOTE 1.</td>
<td></td>
</tr>
<tr>
<td><strong>q-RxLevMinOffset</strong></td>
<td>Parameter Qrxlevminoffset in TS 36.304 [4]. Actual value Qrxlevminoffset = field value * 2 [dB]. If absent, the UE applies the (default) value of 0 dB for Qrxlevminoffset. Affects the minimum required Rx level in the cell.</td>
<td></td>
</tr>
<tr>
<td><strong>sib-MappingInfo</strong></td>
<td>List of the SIBs mapped to this SystemInformation message. There is no mapping information of SIB2; it is always present in the first SystemInformation message listed in the schedulingInfoList list.</td>
<td></td>
</tr>
<tr>
<td><strong>si-HoppingConfigCommon</strong></td>
<td>Frequency hopping activation/deactivation for BR versions of SI messages and MPDCCH/PDSCH of paging.</td>
<td></td>
</tr>
<tr>
<td><strong>si-Narrowband</strong></td>
<td>This field indicates the index of a narrowband used to broadcast the SI message towards low complexity UEs and UEs supporting CE, see TS 36.211 [21, 6.4.1] and TS 36.213 [23, 7.1.6]. Field values (1..maxAvailNarrowBands-r13) correspond to narrowband indices (0..[maxAvailNarrowBands-r13-1]) as specified in TS 36.211 [21].</td>
<td></td>
</tr>
<tr>
<td><strong>si-RepetitionPattern</strong></td>
<td>Indicates the radio frames within the SI window used for SI message transmission. Value everyRF corresponds to every radio frame, Value every2ndRF corresponds to every second radio frame, starting from the first radio frame of the SI window, and so on.</td>
<td></td>
</tr>
<tr>
<td><strong>si-Periodicity</strong></td>
<td>Periodicity of the SI-message in radio frames, such that rf8 denotes 8 radio frames, rf16 denotes 16 radio frames, and so on.</td>
<td></td>
</tr>
<tr>
<td><strong>si-TBS</strong></td>
<td>This field indicates the transport block size information used to broadcast the SI message towards low complexity UEs and UEs supporting CE, see TS 36.213 [23, Table 7.1.7.2.1-1] for a 6 PRB bandwidth and a QPSK modulation.</td>
<td></td>
</tr>
<tr>
<td><strong>schedulingInfoList-BR</strong></td>
<td>Indicates additional scheduling information of SI messages for BL UEs and UEs in CE. It includes the same number of entries, and listed in the same order, as in schedulingInfoList (without suffix).</td>
<td></td>
</tr>
<tr>
<td><strong>si-ValidityTime</strong></td>
<td>Indicates system information validity timer. If set to TRUE, the timer is set to 3h, otherwise the timer is set to 24h.</td>
<td></td>
</tr>
<tr>
<td><strong>si-WindowLength, si-WindowLength-BR</strong></td>
<td>Common SI scheduling window for all SIs. Unit in milliseconds, where ms1 denotes 1 millisecond, ms2 denotes 2 milliseconds and so on. In case si-WindowLength-BR-r13 is present and the UE is a BL UE or a UE in CE, the UE shall use si-WindowLength-BR-r13 and ignore the original field si-WindowLength (without suffix). UEs other than BL UEs or UEs in CE shall ignore the extension field si-WindowLength-BR-r13.</td>
<td></td>
</tr>
<tr>
<td><strong>startSymbolBR</strong></td>
<td>For BL UEs and UEs in CE, indicates the OFDM starting symbol for any MPDCCH, PDSCH scheduled on the same cell except the PDSCH carrying SystemInformationBlockType1-BR, see TS 36.213 [23]. Values 1, 2, and 3 are applicable for dl-Bandwidth greater than 10 resource blocks. Values 2, 3, and 4 are applicable otherwise.</td>
<td></td>
</tr>
<tr>
<td><strong>systemInfoValueTagList</strong></td>
<td>Indicates SI message specific value tags for BL UEs and UE in CE. It includes the same number of entries, and listed in the same order, as in SchedulingInfoList (without suffix).</td>
<td></td>
</tr>
<tr>
<td><strong>systemInfoValueTagSI</strong></td>
<td>SI message specific value tag as specified in subclause 5.2.1.3. Common for all SIBs within the SI message other than MIB, SIB1, SIB10, SIB11, SIB12 and SIB14.</td>
<td></td>
</tr>
<tr>
<td><strong>systemInfoValueTag</strong></td>
<td>Common for all SIBs other than MIB, SIB1, SIB10, SIB11, SIB12 and SIB14. Change of MIB and SIB1 is detected by acquisition of the corresponding message.</td>
<td></td>
</tr>
<tr>
<td><strong>tdd-Config</strong></td>
<td>Specifies the TDD specific physical channel configurations. NOTE 2.</td>
<td></td>
</tr>
<tr>
<td><strong>trackingAreaCode</strong></td>
<td>A trackingAreaCode that is common for all the PLMNs listed. NOTE2.</td>
<td></td>
</tr>
</tbody>
</table>
NOTE 1: The value the UE applies for parameter 'Qqualmin' in TS 36.304 [4] depends on the $q$-$QualMin$ fields signalled by E-UTRAN and supported by the UE. In case multiple candidate options are available, the UE shall select the highest priority candidate option according to the priority order indicated by the following table (top row is highest priority).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Included</td>
<td>Included</td>
<td>$q$-$QualMinRSRQ$-$OnAllSymbols$ – $(q$-$QualMin$ – $q$-$QualMinWB$)</td>
</tr>
<tr>
<td>Included</td>
<td>Not included</td>
<td>$q$-$QualMinRSRQ$-$OnAllSymbols$</td>
</tr>
<tr>
<td>Not included</td>
<td>Included</td>
<td>$q$-$QualMinWB$</td>
</tr>
<tr>
<td>Not included</td>
<td>Not included</td>
<td>$q$-$QualMin$</td>
</tr>
</tbody>
</table>

NOTE 2: E-UTRAN sets this field to the same value for all instances of SIB1 message that are broadcasted within the same cell.

NOTE 3: E-UTRAN configures this field only in the BR version of SIB1 message.

---

### UEAssistanceInformation

The `UEAssistanceInformation` message is used for the indication of UE assistance information to the eNB.

- **Signalling radio bearer:** SRB1
- **RLC-SAP:** AM
- **Logical channel:** DCCH
- **Direction:** UE to E-UTRAN

#### UEAssistanceInformation message

```asn1
UEAssistanceInformation-r11 ::= SEQUENCE {
  criticalExtensions CHOICE {
    c1 CHOICE {
    }
  }
}
```
UEAssistanceInformation-r11-IEs ::= SEQUENCE {
  powerPrefIndication-r11    ENUMERATED {normal, lowPowerConsumption} OPTIONAL,
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension       SEQUENCE {}       OPTIONAL
}

-- ASN1STOP

**UEAssistanceInformation** field descriptions

*powerPrefIndication*

Value `lowPowerConsumption` indicates the UE prefers a configuration that is primarily optimised for power saving. Otherwise the value is set to `normal`.

—

**UECapabilityEnquiry**

The *UECapabilityEnquiry* message is used to request the transfer of UE radio access capabilities for E-UTRA as well as for other RATs.

Signalling radio bearer: SRB1

RLC-SAP: AM

Logical channel: DCCH

Direction: E-UTRAN to UE

**UECapabilityEnquiry message**

-- ASN1START

UECapabilityEnquiry ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1     CHOICE {
      ueCapabilityEnquiry-r8    UECapabilityEnquiry-r8-IEs,
    spare3 NULL, spare2 NULL, spare1 NULL
    },
  criticalExtensionsFuture   SEQUENCE { }
}
criticalExtensionsFuture  SEQUENCE { } } ]

UECapabilityEnquiry-r8-IEs ::= SEQUENCE {
    ue-CapabilityRequest  UE-CapabilityRequest,
    nonCriticalExtension  UECapabilityEnquiry-v8a0-IEs  OPTIONAL
} ]

UECapabilityEnquiry-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension  OCTET STRING      OPTIONAL,
    nonCriticalExtension  UECapabilityEnquiry-v1180-IEs       OPTIONAL
} ]

UECapabilityEnquiry-v1180-IEs ::= SEQUENCE {
    requestedFrequencyBands-r11  SEQUENCE (SIZE (1..16)) OF FreqBandIndicator-r11 OPTIONAL,
    nonCriticalExtension  UECapabilityEnquiry-v1310-IEs        OPTIONAL
} ]

UECapabilityEnquiry-v1310-IEs ::= SEQUENCE {
    requestReducedFormat-r13  ENUMERATED {true}     OPTIONAL, -- Need ON
    requestSkipFallbackComb-r13 ENUMERATED {true}     OPTIONAL, -- Need ON
    requestedMaxCCsDL-r13     INTEGER (2..32)     OPTIONAL, -- Need ON
    requestedMaxCCsUL-r13     INTEGER (2..32)     OPTIONAL, -- Need ON
    requestReducedIntNonContComb-r13 ENUMERATED {true}     OPTIONAL, -- Need ON
    nonCriticalExtension    SEQUENCE {}      OPTIONAL
} ]

UE-CapabilityRequest ::= SEQUENCE (SIZE (1..maxRAT-Capabilities)) OF RAT-Type

-- ASN1STOP
**UECapabilityEnquiry field descriptions**

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>requestReducedFormat</td>
<td>Indicates that the UE if supported is requested to provide supported CA band combinations in the supportedBandCombinationReduced-r13 instead of the supportedBandCombination-r10. The E-UTRAN includes this field if requestSkipFallbackComb is included in the message.</td>
</tr>
<tr>
<td>requestSkipFallbackComb</td>
<td>Indicates that the UE shall explicitly exclude fallback CA band combinations in capability signalling.</td>
</tr>
<tr>
<td>ue-CapabilityRequest</td>
<td>List of the RATs for which the UE is requested to transfer the UE radio access capabilities i.e. E-UTRA, UTRA, GERAN-CS, GERAN-PS, CDMA2000.</td>
</tr>
<tr>
<td>requestedFrequencyBands</td>
<td>List of frequency bands for which the UE is requested to provide supported CA band combinations and non CA bands.</td>
</tr>
<tr>
<td>requestedMaxCCsDL, requestedMaxCCsUL</td>
<td>Indicates the maximum number of CCs for which the UE is requested to provide supported CA band combinations and non-CA bands.</td>
</tr>
<tr>
<td>requestReducedIntNonContComb</td>
<td>Indicates that the UE shall explicitly exclude supported intra-band non-contiguous CA band combinations other than included in capability signalling as specified in TS 36.306 [5, 4.3.5.21].</td>
</tr>
</tbody>
</table>

---

**UECapabilityInformation**

The *UECapabilityInformation* message is used to transfer of UE radio access capabilities requested by the E-UTRAN.

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: UE to E-UTRAN

**UECapabilityInformation message**

```
UECapabilityInformation ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c 1          CHOICE {
      ueCapabilityInformation-r8   UECapabilityInformation-r8-IEs,
      spare7 NULL,
      spare6 NULL, spare5 NULL, spare4 NULL,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE { }
  }
}

UECapabilityInformation-r8-IEs ::= SEQUENCE { }
```

---
UECapabilityInformation-v8a0-IEs ::= SEQUENCE {
    lateNonCriticalExtension   OCTET STRING      OPTIONAL,
    nonCriticalExtension    UECapabilityInformation-v1250-IEs OPTIONAL
}

UECapabilityInformation-v1250-IEs ::= SEQUENCE {
    ue-RadioPagingInfo-r12    UE-RadioPagingInfo-r12    OPTIONAL,
    nonCriticalExtension    SEQUENCE {}       OPTIONAL
}

UEInformationRequest

The UEInformationRequest is the command used by E-UTRAN to retrieve information from the UE.

Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: E-UTRAN to UE

UEInformationRequest message

UEInformationRequest-r9 ::= SEQUENCE {
    rrc-TransactionIdentifier  RRC-TransactionIdentifier,
    criticalExtensions           CHOICE {
        c1               CHOICE {
            ueInformationRequest-r9    UEInformationRequest-r9-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        }
    }
    criticalExtensionsFuture   SEQUENCE {}


UEInformationRequest-r9-IEs ::= SEQUENCE {
    rach-ReportReq-r9 BOOLEAN,
    rlf-ReportReq-r9 BOOLEAN,
    nonCriticalExtension UEInformationRequest-v930-IEs OPTIONAL
}

UEInformationRequest-v930-IEs ::= SEQUENCE {
    lateNonCriticalExtension OCTET STRING OPTIONAL,
    nonCriticalExtension UEInformationRequest-v1020-IEs OPTIONAL
}

UEInformationRequest-v1020-IEs ::= SEQUENCE {
    logMeasReportReq-r10 ENUMERATED {true} OPTIONAL, -- Need ON
    nonCriticalExtension UEInformationRequest-v1130-IEs OPTIONAL
}

UEInformationRequest-v1130-IEs ::= SEQUENCE {
    connEstFailReportReq-r11 ENUMERATED {true} OPTIONAL, -- Need ON
    nonCriticalExtension UEInformationRequest-v1250-IEs OPTIONAL
}

UEInformationRequest-v1250-IEs ::= SEQUENCE {
    mobilityHistoryReportReq-r12 ENUMERATED {true} OPTIONAL, -- Need ON
    nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- ASN1STOP

**UEInformationRequest field descriptions**

**rach-ReportReq**

This field is used to indicate whether the UE shall report information about the random access procedure.
UEInformationResponse

The UEInformationResponse message is used by the UE to transfer the information requested by the E-UTRAN.

Signalling radio bearer: SRB1 or SRB2 (when logged measurement information is included)

RLC-SAP: AM

Logical channel: DCCH

Direction: UE to E-UTRAN

---

**UEInformationResponse message**

```ascll
UEInformationResponse-r9 ::= SEQUENCE {
  rrc-TransactionIdentifier RRC-TransactionIdentifier,
  criticalExtensions CHOICE {
    c1 CHOICE {
      ueInformationResponse-r9 UEInformationResponse-r9-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture SEQUENCE {}
  }
}

UEInformationResponse-r9-IEs ::= SEQUENCE {
  rach-Report-r9 SEQUENCE {
    numberOfPreamblesSent-r9 NumberOfPreamblesSent-r11,
    contentionDetected-r9 BOOLEAN
  } OPTIONAL,
  rlf-Report-r9 RLF-Report-r9 OPTIONAL,
  nonCriticalExtension UEInformationResponse-v930-IEs OPTIONAL
}

---

-- Late non critical extensions

UEInformationResponse-v9e0-IEs ::= SEQUENCE {
  rlf-Report-v9e0 RLF-Report-v9e0 OPTIONAL,
  nonCriticalExtension SEQUENCE {} OPTIONAL
}
```
-- Regular non critical extensions

UEInformationResponse-v930-IEs ::= SEQUENCE {
    lateNonCriticalExtension OCTET STRING (CONTAINING UEInformationResponse-v9e0-IEs) OPTIONAL,
    nonCriticalExtension UEInformationResponse-v1020-IEs OPTIONAL
}

UEInformationResponse-v1020-IEs ::= SEQUENCE {
    logMeasReport-r10 LogMeasReport-r10 OPTIONAL,
    nonCriticalExtension UEInformationResponse-v1130-IEs OPTIONAL
}

UEInformationResponse-v1130-IEs ::= SEQUENCE {
    connEstFailReport-r11 ConnEstFailReport-r11 OPTIONAL,
    nonCriticalExtension UEInformationResponse-v1250-IEs OPTIONAL
}

UEInformationResponse-v1250-IEs ::= SEQUENCE {
    mobilityHistoryReport-r12 MobilityHistoryReport-r12 OPTIONAL,
    nonCriticalExtension SEQUENCE {} OPTIONAL
}

RLF-Report-r9 ::= SEQUENCE {
    measResultLastServCell-r9 SEQUENCE {
        rsrpResult-r9 RSRP-Range,
        rsrqResult-r9 RSRQ-Range OPTIONAL
    },
    measResultNeighCells-r9 SEQUENCE {
        measResultListEUTRA-r9 MeasResultList2EUTRA-r9 OPTIONAL,
        measResultListUTRA-r9 MeasResultList2UTRA-r9 OPTIONAL,
        measResultListGERAN-r9 MeasResultListGERAN OPTIONAL,
        measResultsCDMA2000-r9 MeasResultList2CDMA2000-r9 OPTIONAL
    } OPTIONAL,
    ...
    [ locationInfo-r10 LocationInfo-r10 OPTIONAL,

failedPCellId-r10          CHOICE {
    cellGlobalId-r10          CellGlobalIdEUTRA,
    pci-arfcn-r10             SEQUENCE {
        physCellId-r10          PhysCellId,
        carrierFreq-r10         ARFCN-ValueEUTRA
    }
}
reestablishmentCellId-r10  CellGlobalIdEUTRA  OPTIONAL,
timeConnFailure-r10       INTEGER (0..1023)  OPTIONAL,
connectionFailureType-r10 ENUMERATED {rlf, hof}  OPTIONAL,
previousPCellId-r10       CellGlobalIdEUTRA  OPTIONAL
]
[
  failedPCellId-v1090       SEQUENCE {
    carrierFreq-v1090         ARFCN-ValueEUTRA-v9e0
  }
]
[
  basicFields-r11          SEQUENCE {
    c-RNTI-r11                C-RNTI,
    rlf-Cause-r11             ENUMERATED {
                              t310-Expiry, randomAccessProblem,
                              rlc-MaxNumRetx, t312-Expiry-r12},
    timeSinceFailure-r11     TimeSinceFailure-r11
  }
]
previousUTRA-CellId-r11   SEQUENCE {
    carrierFreq-r11          ARFCN-ValueUTRA,
    physCellId-r11           CHOICE {
        fdd-r11               PhysCellIdUTRA-FDD,
        tdd-r11               PhysCellIdUTRA-TDD
    },
    cellGlobalId-r11         CellGlobalIdUTRA  OPTIONAL
}
selectedUTRA-CellId-r11   SEQUENCE {
    carrierFreq-r11          ARFCN-ValueUTRA,
    physCellId-r11           CHOICE {
        fdd-r11               PhysCellIdUTRA-FDD,
tdd-r11  PhysCellIdUTRA-TDD
  }
}
]
]
][ failedPCellId-v1250  SEQUENCE {
  tac-FailedPCell-r12   TrackingAreaCode
  }
  OPTIONAL,
  measResultLastServCell-v1250 RSRQ-Range-v1250 OPTIONAL,
  lastServCellRSRQ-Type-r12  RSRQ-Type-r12 OPTIONAL,
  measResultListEUTRA-v1250 MeasResultList2EUTRA-v1250 OPTIONAL
}]
][ drb-EstablishedWithQCI-1-r13  ENUMERATED {qci1} OPTIONAL
}]
}

RLF-Report-v9e0 ::=  SEQUENCE {
  measResultListEUTRA-v9e0  MeasResultList2EUTRA-v9e0
}

MeasResultList2EUTRA-r9 ::=  SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2EUTRA-r9

MeasResultList2EUTRA-v9e0 ::=  SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2EUTRA-v9e0

MeasResultList2EUTRA-v1250 ::=  SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2EUTRA-v1250

MeasResult2EUTRA-r9 ::=  SEQUENCE {
  carrierFreq-r9      ARFCN-ValueEUTRA,
  measResultList-r9     MeasResultListEUTRA
}

MeasResult2EUTRA-v9e0 ::=  SEQUENCE {
  carrierFreq-v9e0      ARFCN-ValueEUTRA-v9e0  OPTIONAL
}

MeasResult2EUTRA-v1250 ::=  SEQUENCE {

rsrq-Type-r12          RSRQ-Type-r12          OPTIONAL
}

MeasResultList2UTRA-r9 ::= SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2UTRA-r9

MeasResult2UTRA-r9 ::= SEQUENCE {
  carrierFreq-r9      ARFCN-ValueUTRA,
  measResultList-r9    MeasResultListUTRA
}

MeasResultList2CDMA2000-r9 ::= SEQUENCE (SIZE (1..maxFreq)) OF MeasResult2CDMA2000-r9

MeasResult2CDMA2000-r9 ::= SEQUENCE {
  carrierFreq-r9      CarrierFreqCDMA2000,
  measResultList-r9    MeasResultsCDMA2000
}

LogMeasReport-r10 ::= SEQUENCE {
  absoluteTimeStamp-r10    AbsoluteTimeInfo-r10,
  traceReference-r10      TraceReference-r10,
  traceRecordingSessionRef-r10  OCTET STRING (SIZE (2)),
  tce-Id-r10     OCTET STRING (SIZE (1)),
  logMeasInfoList-r10     LogMeasInfoList-r10,
  logMeasAvailable-r10    ENUMERATED {true} OPTIONAL,
  ...
}

LogMeasInfoList-r10 ::= SEQUENCE (SIZE (1..maxLogMeasReport-r10)) OF LogMeasInfo-r10

LogMeasInfo-r10 ::= SEQUENCE {
  locationInfo-r10       LocationInfo-r10          OPTIONAL,
  relativeTimeStamp-r10  INTEGER (0..7200),
  servCellIdentity-r10   CellGlobalIdEUTRA,
  measResultServCell-r10 SEQUENCE {
    rsrpResult-r10       RSRP-Range,
  }
  ...
}
rsrqResult-r10  RSRQ-Range
),
measResultNeighCells-r10  SEQUENCE {
  measResultListEUTRA-r10  MeasResultListEUTRA-r9  OPTIONAL,
  measResultListUTRA-r10   MeasResultListUTRA-r9  OPTIONAL,
  measResultListGERAN-r10  MeasResultListGERAN-r10 OPTIONAL,
  measResultListCDMA2000-r10 MeasResultListCDMA2000-r9 OPTIONAL
} OPTIONAL,
...,
[[  measResultListEUTRA-v1090 MeasResultListEUTRA-v9-r9 OPTIONAL
]],
[[  measResultListMBSFN-r12 MeasResultListMBSFN-r12 OPTIONAL,
    measResultServCell-v250 RSRQ-Range-v250 OPTIONAL,
    servCellRSRQ-Type-v250 RSRQ-Type-v250 OPTIONAL,
    measResultListEUTRA-v250 MeasResultListEUTRA-v250 OPTIONAL
]],
[[  inDeviceCoexDetected-r13 ENUMERATED {true} OPTIONAL
]],

MeasResultListMBSFN-r12 ::= SEQUENCE (SIZE (1..maxMBSFN-Area)) OF MeasResultMBSFN-r12

MeasResultMBSFN-r12 ::= SEQUENCE {
  mbsfn-Area-r12  SEQUENCE {
    mbsfn-AreaId-r12 MBSFN-AreaId-r12,
    carrierFreq-r12 ARFCN-ValueEUTRA-r9
  },
  rsrpResultMBSFN-r12 RSRP-Range,
  rsrqResultMBSFN-r12 MBSFN-RSRQ-Range-r12,
  signallingBLER-Result-r12 BLER-Result-r12 OPTIONAL,
  dataBLER-MCH-ResultList-r12 DataBLER-MCH-ResultList-r12 OPTIONAL,
  ...
}
DataBLER-MCH-ResultList-r12 ::= SEQUENCE (SIZE (1.. maxPMCH-PerMBSFN)) OF DataBLER-MCH-Result-r12

DataBLER-MCH-Result-r12 ::= SEQUENCE {
    mch-Index-r12       INTEGER (1..maxPMCH-PerMBSFN),
    dataBLER-Result-r12      BLER-Result-r12
}

BLER-Result-r12 ::= SEQUENCE {
    bler-r12         BLER-Range-r12,
    blocksReceived-r12      SEQUENCE {
        n-r12         BIT STRING (SIZE (3)),
        m-r12         BIT STRING (SIZE (8))
    }
}

BLER-Range-r12 ::= INTEGER(0..31)

MeasResultList2GERAN-r10 ::= SEQUENCE (SIZE (1..maxCellListGERAN)) OF MeasResultListGERAN

ConnEstFailReport-r11 ::= SEQUENCE {
    failedCellId-r11     CellGlobalIdEUTRA,
    locationInfo-r11     LocationInfo-r10    OPTIONAL,
    measResultFailedCell-r11    SEQUENCE {
        rsrpResult-r11       RSRP-Range,
        rsrqResult-r11       RSRQ-Range    OPTIONAL
    },
    measResultNeighCells-r11    SEQUENCE {
        measResultListEUTRA-r11    MeasResultList2EUTRA-r9   OPTIONAL,
        measResultListUTRA-r11    MeasResultList2UTRA-r9   OPTIONAL,
        measResultListGERAN-r11    MeasResultListGERAN    OPTIONAL,
        measResultsCDMA2000-r11    MeasResultList2CDMA2000-r9  OPTIONAL
    } OPTIONAL,
    numberOfPreamblesSent-r11   NumberOfPreamblesSent-r11,
    contentionDetected-r11    BOOLEAN,
maxTxPowerReached-r11 ::= BOOLEAN,
timeSinceFailure-r11 ::= TimeSinceFailure-r11,
measResultListEUTRA-v1130 ::= MeasResultList2EUTRA-v9e0  OPTIONAL,
...
[[
  measResultFailedCell-v1250 ::= RSRQ-Range-v1250  OPTIONAL,
  failedCellRSRQ-Type-r12 ::= RSRQ-Type-r12  OPTIONAL,
  measResultListEUTRA-v1250 ::= MeasResultList2EUTRA-v1250  OPTIONAL
]]
}

NumberOfPreamblesSent-r11 ::= INTEGER (1..200)

TimeSinceFailure-r11 ::= INTEGER (0..172800)

MobilityHistoryReport-r12 ::= VisitedCellInfoList-r12

-- ASN1STOP
### UEInformationResponse field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>absoluteTimeStamp</td>
<td>Indicates the absolute time when the logged measurement configuration logging is provided, as indicated by E-UTRAN within absoluteTimeInfo.</td>
</tr>
<tr>
<td>bler</td>
<td>Indicates the measured BLER value. The coding of BLER value is defined in TS 36.133 [16].</td>
</tr>
<tr>
<td>blocksReceived</td>
<td>Indicates total number of MCH blocks, which were received by the UE and used for the corresponding BLER calculation, within the measurement period as defined in TS 36.133 [16].</td>
</tr>
<tr>
<td>carrierFreq</td>
<td>In case the UE includes carrierFreq-v9e0 or carrierFreq-v1090, the UE shall set the corresponding entry of carrierFreq-r9 and/or carrierFreq-r10 respectively to maxEARFCN. For E-UTRA and UTRA frequencies, the UE sets the ARFCN according to the band used when obtaining the concerned measurement results.</td>
</tr>
<tr>
<td>connectionFailureType</td>
<td>This field is used to indicate whether the connection failure is due to radio link failure or handover failure.</td>
</tr>
<tr>
<td>contentionDetected</td>
<td>This field is used to indicate that contention was detected for at least one of the transmitted preambles, see TS 36.321 [6].</td>
</tr>
<tr>
<td>c-RNTI</td>
<td>This field indicates the C-RNTI used in the PCell upon detecting radio link failure or the C-RNTI used in the source PCell upon handover failure.</td>
</tr>
<tr>
<td>dataBLER-MCH-ResultList</td>
<td>Includes a BLER result per MCH on subframes using dataMCS, with the applicable MCH(s) listed in the same order as in pmch-InfoList within MBSFNAreaConfiguration.</td>
</tr>
<tr>
<td>drb-EstablishedWithQCI1</td>
<td>This field is used to indicate the radio link failure occurred while a bearer with QCI value equal to 1 was configured, see TS 24.301 [35].</td>
</tr>
<tr>
<td>failedCellId</td>
<td>This field is used to indicate the cell in which connection establishment failed.</td>
</tr>
<tr>
<td>failedPCellId</td>
<td>This field is used to indicate the PCell in which RLF is detected or the target PCell of the failed handover. The UE sets the EARFCN according to the band used for transmission/reception when the failure occurred.</td>
</tr>
<tr>
<td>inDeviceCoexDetected</td>
<td>Indicates that measurement logging is suspended due to IDC problem detection.</td>
</tr>
<tr>
<td>maxTxPowerReached</td>
<td>This field is used to indicate whether or not the maximum power level was used for the last transmitted preamble, see TS 36.321 [6].</td>
</tr>
<tr>
<td>mch-Index</td>
<td>Indicates the MCH by referring to the entry as listed in pmch-InfoList within MBSFNAreaConfiguration.</td>
</tr>
<tr>
<td>measResultFailedCell</td>
<td>This field refers to the last measurement results taken in the cell, where connection establishment failure happened.</td>
</tr>
<tr>
<td>measResultLastServCell</td>
<td>This field refers to the last measurement results taken in the PCell, where radio link failure or handover failure happened.</td>
</tr>
<tr>
<td>measResultListEUTRA-v9e0</td>
<td>If measResultListEUTRA-v9e0 is included, the UE shall include the same number of entries, and listed in the same order, as in measResultListEUTRA-v9r9.</td>
</tr>
<tr>
<td>measResultListEUTRA-v9r9</td>
<td>If measResultListEUTRA-v9r9 is included, the UE shall include the same number of entries, and listed in the same order, as in measResultListEUTRA-v9r9.</td>
</tr>
<tr>
<td>mobilityHistoryReport</td>
<td>This field is used to indicate the time of stay in 16 most recently visited E-UTRA cells or of stay out of E-UTRA.</td>
</tr>
<tr>
<td>numberOfPreamblesSent</td>
<td>This field is used to indicate the number of RACH preambles that were transmitted. Corresponds to parameter PREAMBLE_TRANSMISSION_COUNTER in TS 36.321 [6].</td>
</tr>
<tr>
<td>previousPCellId</td>
<td>This field is used to indicate the source PCell of the last handover (source PCell when the last RRC-Connection-Reconfiguration message including mobilityControlInfo was received).</td>
</tr>
</tbody>
</table>
**UEInformationResponse field descriptions**

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>previousUTRA-CellId</td>
<td>This field is used to indicate the source UTRA cell of the last successful handover to E-UTRAN, when RLF occurred at the target PCell. The UE sets the ARFCN according to the band used for transmission/reception on the concerned cell.</td>
</tr>
<tr>
<td>reestablishmentCellId</td>
<td>This field is used to indicate the cell in which the re-establishment attempt was made after connection failure.</td>
</tr>
<tr>
<td>relativeTimeStamp</td>
<td>Indicates the time of logging measurement results, measured relative to the <code>absoluteTimeStamp</code>. Value in seconds.</td>
</tr>
<tr>
<td>rlf-Cause</td>
<td>This field is used to indicate the cause of the last radio link failure that was detected. In case of handover failure information reporting (i.e., the <code>connectionFailureType</code> is set to ‘hof’), the UE is allowed to set this field to any value.</td>
</tr>
<tr>
<td>selectedUTRA-CellId</td>
<td>This field is used to indicate the UTRA cell that the UE selects after RLF is detected, while T311 is running. The UE sets the ARFCN according to the band selected for transmission/reception on the concerned cell.</td>
</tr>
<tr>
<td>signallingBLER-Result</td>
<td>Includes a BLER result of MBSFN subframes using <code>signallingMCS</code>.</td>
</tr>
<tr>
<td>tac-FailedPCell</td>
<td>This field is used to indicate the Tracking Area Code of the PCell in which RLF is detected.</td>
</tr>
<tr>
<td>timeConnFailure</td>
<td>This field is used to indicate the time elapsed since the last HO initialization until connection failure. Actual value = field value * 100ms. The maximum value 1023 means 102.3s or longer.</td>
</tr>
<tr>
<td>timeSinceFailure</td>
<td>This field is used to indicate the time that elapsed since the connection (establishment) failure. Value in seconds. The maximum value 172800 means 172800s or longer.</td>
</tr>
<tr>
<td>traceRecordingSessionRef</td>
<td>Parameter Trace Recording Session Reference: See TS 32.422 [58].</td>
</tr>
</tbody>
</table>

---

**ULHandoverPreparationTransfer (CDMA2000)**

The `ULHandoverPreparationTransfer` message is used for the uplink transfer of handover related CDMA2000 information when requested by the higher layers.

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: UE to E-UTRAN

**ULHandoverPreparationTransfer message**

```asn1
-- ASN1START

ULHandoverPreparationTransfer ::= SEQUENCE {
  criticalExtensions CHOICE {
    c1 CHOICE {
      ulHandoverPreparationTransfer-r8 ULHandoverPreparationTransfer-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture SEQUENCE {}
  }
}
```
---

**ULHandoverPreparationTransfer**

Field descriptions

**meid**
The 56 bit mobile identification number provided by the CDMA2000 Upper layers.

---

**ULInformationTransfer**

The **ULInformationTransfer** message is used for the uplink transfer of NAS or non-3GPP dedicated information.

- Signalling radio bearer: SRB2 or SRB1 (only if SRB2 not established yet). If SRB2 is suspended, the UE does not send this message until SRB2 is resumed.
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: UE to E-UTRAN

**ULInformationTransfer message**

---

```
ULInformationTransfer ::= SEQUENCE {
    criticalExtensions CHOICE {
        c1 CHOICE {
            ulInformationTransfer-r8 ULInformationTransfer-r8-IEs,
            spare3 NULL, spare2 NULL, spare1 NULL
        },
        criticalExtensionsFuture SEQUENCE {}
    }
}
```
ULInformationTransfer-r8-IEs ::= SEQUENCE {
  dedicatedInfoType   CHOICE {
    dedicatedInfoNAS     DedicatedInfoNAS,
    dedicatedInfoCDMA2000-1XRTT DedicatedInfoCDMA2000,
    dedicatedInfoCDMA2000-HRPD DedicatedInfoCDMA2000
  },
  nonCriticalExtension    ULInformationTransfer-v8a0-IEs       OPTIONAL
}

ULInformationTransfer-v8a0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}

WLANConnectionStatusReport

The WLANConnectionStatusReport message is used to inform the successful connection to WLAN or failure of the WLAN connection or connection attempt(s).

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: UE to E-UTRAN

WLANConnectionStatusReport message

WLANConnectionStatusReport-r13 ::= SEQUENCE {
  criticalExtensions   CHOICE {
    c1   CHOICE {
      wlanConnectionStatusReport-r13  WLANConnectionStatusReport-r13-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
  } criticalExtensionsFuture   SEQUENCE {}
WLANConnectionStatusReport-r13-IEs ::= SEQUENCE {
    wlan-Status-r13    WLAN-Status-r13,
    lateNonCriticalExtension  OCTET STRING OPTIONAL,
    nonCriticalExtension   SEQUENCE {} OPTIONAL
}

6.3 RRC information elements

6.3.1 System information blocks

– SystemInformationBlockType2

The IE SystemInformationBlockType2 contains radio resource configuration information that is common for all UEs.

NOTE: UE timers and constants related to functionality for which parameters are provided in another SIB are included in the corresponding SIB.

SystemInformationBlockType2 information element

-- ASN1START

SystemInformationBlockType2 ::=  SEQUENCE {
    ac-BarringInfo      SEQUENCE {
        ac-BarringForEmergency    BOOLEAN,
        ac-BarringForMO-Signalling   AC-BarringConfig OPTIONAL, -- Need OP
        ac-BarringForMO-Data    AC-BarringConfig OPTIONAL -- Need OP
    } OPTIONAL, -- Need OP
    radioResourceConfigCommon    RadioResourceConfigCommonSIB,
    ue-TimersAndConstants    UE-TimersAndConstants,
    freqInfo      SEQUENCE {
        ul-CarrierFreq      ARFCN-ValueEUTRA OPTIONAL, -- Need OP
        ul-Bandwidth      ENUMERATED {n6, n15, n25, n50, n75, n100}
optional, -- Need OP

additionalSpectrumEmission AdditionalSpectrumEmission

mbfsfn-SubframeConfigList MBSFN-SubframeConfigList optional, -- Need OR
timeAlignmentTimerCommon TimeAlignmentTimer,

lateNonCriticalExtension OCTET STRING (CONTAINING SystemInformationBlockType2-v8h0-IEs) optional,

[[ ssac-BarringForMMTEL-Voice-r9 AC-BarringConfig optional, -- Need OP
  ssac-BarringForMMTEL-Video-r9 AC-BarringConfig optional -- Need OP
]]

[[ ac-BarringForCSFB-r10 AC-BarringConfig optional -- Need OP
]]

[[
  ac-BarringSkipForMMTELVoice-r12 ENUMERATED {true} optional, -- Need OP
  ac-BarringSkipForMMTELVideo-r12 ENUMERATED {true} optional -- Need OP
  ac-BarringSkipForSMS-r12 ENUMERATED {true} optional -- Need OP
  ac-BarringPerPLMN-List-r12 AC-BarringPerPLMN-List-r12 optional -- Need OP
]]

[[
  voiceServiceCauseIndication-r12 ENUMERATED {true} optional -- Need OP
]]

[[
  acdc-BarringForCommon-r13 ACDC-BarringForCommon-r13 optional, -- Need OP
  acdc-BarringPerPLMN-List-r13 ACDC-BarringPerPLMN-List-r13 optional -- Need OP
]]

[[
  udt-RestrictingForCommon-r13 UDT-Restricting-r13 optional, -- Need OR
  udt-RestrictingPerPLMN-List-r13 UDT-RestrictingPerPLMN-List-r13 optional, -- Need OR
  cIoT-EPS-OptimisationInfo-r13 CIOT-EPS-OptimisationInfo-r13 optional, -- Need OR
  useFullResumeID-r13 ENUMERATED {true} optional -- Need OR
]]

]

SystemInformationBlockType2-v8h0-IEs ::= SEQUENCE {
  multiBandInfoList SEQUENCE (SIZE (1..maxMultiBands)) OF AdditionalSpectrumEmission
  optional, -- Need OR
}
nonCriticalExtension    SystemInformationBlockType2-v9e0-IEs OPTIONAL

}

SystemInformationBlockType2-v9e0-IEs ::= SEQUENCE {
    ul-CarrierFreq-v9e0     ARFCN-ValueEUTRA-v9e0 OPTIONAL, -- Cond ul-FreqMax
    nonCriticalExtension    SEQUENCE {}     OPTIONAL
}

AC-BarringConfig ::=    SEQUENCE {
    ac-BarringFactor     ENUMERATED {
        p00, p05, p10, p15, p20, p25, p30, p40,
        p50, p60, p70, p75, p80, p85, p90, p95},
    ac-BarringTime      ENUMERATED {s4, s8, s16, s32, s64, s128, s256, s512},
    ac-BarringForSpecialAC    BIT STRING (SIZE(5))
}

MBSFN-SubframeConfigList ::=    SEQUENCE (SIZE (1..maxMBSFN-Allocations)) OF MBSFN-SubframeConfig

AC-BarringPerPLMN-List-r12 ::=    SEQUENCE (SIZE (1.. maxPLMN-r11)) OF AC-BarringPerPLMN-r12

AC-BarringPerPLMN-r12 ::=    SEQUENCE {
    plmn-IdentityIndex-r12     INTEGER (1..maxPLMN-r11),
    ac-BarringInfo-r12      SEQUENCE {
        ac-BarringForEmergency-r12   BOOLEAN,
        ac-BarringForMO-Signalling-r12  AC-BarringConfig OPTIONAL, -- Need OP
        ac-BarringForMO-Data-r12   AC-BarringConfig OPTIONAL -- Need OP
    }               OPTIONAL, -- Need OP
    ac-BarringSkipForMMTELVoice-r12  ENUMERATED {true}  OPTIONAL, -- Need OP
    ac-BarringSkipForMMTELVideo-r12  ENUMERATED {true}  OPTIONAL, -- Need OP
    ac-BarringSkipForSMS-r12   ENUMERATED {true}  OPTIONAL, -- Need OP
    ac-BarringForCSFB-r12    AC-BarringConfig OPTIONAL, -- Need OP
    ssac-BarringForMMTEL-Voice-r12  AC-BarringConfig OPTIONAL, -- Need OP
    ssac-BarringForMMTEL-Video-r12  AC-BarringConfig OPTIONAL -- Need OP
}
ACDC-BarringForCommon-r13 ::= SEQUENCE {
  acdc-HPLMNonly-r13 BOOLEAN, 
  barringPerACDC-CategoryList-r13 BarringPerACDC-CategoryList-r13
}

ACDC-BarringPerPLMN-List-r13 ::= SEQUENCE (SIZE (1..maxPLMN-r11)) OF ACDC-BarringPerPLMN-r13

ACDC-BarringPerPLMN-r13 ::= SEQUENCE {
  plmn-IdentityIndex-r13 INTEGER (1..maxPLMN-r11),
  acdc-OnlyForHPLMN-r13 BOOLEAN,
  barringPerACDC-CategoryList-r13 BarringPerACDC-CategoryList-r13
}

BarringPerACDC-CategoryList-r13 ::= SEQUENCE (SIZE (1..maxACDC-Cat-r13)) OF BarringPerACDC-Category-r13

BarringPerACDC-Category-r13 ::= SEQUENCE {
  acdc-Category-r13 INTEGER (1..maxACDC-Cat-r13),
  acdc-BarringConfig-r13 SEQUENCE {
    ac-BarringFactor-r13 ENUMERATED {
      p00, p05, p10, p15, p20, p25, p30, p40,
      p50, p60, p70, p75, p80, p85, p90, p95},
    ac-BarringTime-r13 ENUMERATED {s4, s8, s16, s32, s64, s128, s256, s512} OPTIONAL -- Need OP
  }
}

UDT-Restricting-r13 ::= SEQUENCE {
  udt-Restricting-r13 ENUMERATED {true} OPTIONAL, -- Need OR
  udt-RestrictingTime-r13 ENUMERATED {s4, s8, s16, s32, s64, s128, s256, s512} OPTIONAL -- Need OR
}

UDT-RestrictingPerPLMN-List-r13 ::= SEQUENCE (SIZE (1..maxPLMN-r11)) OF UDT-RestrictingPerPLMN-r13

UDT-RestrictingPerPLMN-r13 ::= SEQUENCE {
  plmn-IdentityIndex-r13 INTEGER (1..maxPLMN-r11),
}
CIOT-EPS-OptimisationInfo-r13 ::= SEQUENCE (SIZE (1.. maxPLMN-r11)) OF CIOT-OptimisationPLMN-r13

CIOT-OptimisationPLMN-r13 ::= SEQUENCE {
    up-CIoT-EPS-Optimisation-r13 ENUMERATED {true} OPTIONAL, -- Need OP
    cp-CIoT-EPS-Optimisation-r13 ENUMERATED {true} OPTIONAL, -- Need OP
    attachWithoutPDN-Connectivity-r13 ENUMERATED {true} OPTIONAL -- Need OP
}

-- ASN1STOP
### SystemInformationBlockType2 field descriptions

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ac-BarringFactor</td>
<td>If the random number drawn by the UE is lower than this value, access is allowed. Otherwise the access is barred. The values are interpreted in the range [0,1): p00 = 0, p05 = 0.05, p10 = 0.10, …, p95 = 0.95. Values other than p00 can only be set if all bits of the corresponding ac-BarringForSpecialAC are set to 0.</td>
</tr>
<tr>
<td>ac-BarringForCSFB</td>
<td>Access class barring for mobile originating CS fallback.</td>
</tr>
<tr>
<td>ac-BarringForEmergency</td>
<td>Access class barring for AC 10.</td>
</tr>
<tr>
<td>ac-BarringForMO-Data</td>
<td>Access class barring for mobile originating calls.</td>
</tr>
<tr>
<td>ac-BarringForMO-Signalling</td>
<td>Access class barring for mobile originating signalling.</td>
</tr>
<tr>
<td>ac-BarringForSpecialAC</td>
<td>Access class barring for AC 11-15. The first/ leftmost bit is for AC 11, the second bit is for AC 12, and so on.</td>
</tr>
<tr>
<td>ac-BarringTime</td>
<td>Mean access barring time value in seconds.</td>
</tr>
<tr>
<td>acdc-BarringConfig</td>
<td>Barring configuration for an ACDC category. If the field is absent, access to the cell is considered as not barred for the ACDC category in accordance with subclause 5.3.3.13.</td>
</tr>
<tr>
<td>acdc-Category</td>
<td>Indicates the ACDC category as defined in TS 24.105 [72].</td>
</tr>
<tr>
<td>acdc-OnlyForHPLMN</td>
<td>Indicates whether ACDC is applicable for UEs not in their HPLMN for the corresponding PLMN. TRUE indicates that ACDC is applicable only for UEs in their HPLMN for the corresponding PLMN. FALSE indicates that ACDC is applicable for both UEs in their HPLMN and UEs not in their HPLMN for the corresponding PLMN.</td>
</tr>
<tr>
<td>additionalSpectrumEmission</td>
<td>The UE requirements related to IE AdditionalSpectrumEmission are defined in TS 36.101 [42, table 6.2.4-1]. NOTE 1.</td>
</tr>
<tr>
<td>attachWithoutPDN-Connectivity</td>
<td>If present, the field indicates that attach without PDN connectivity as specified in TS 24.301 [35] is supported for this PLMN.</td>
</tr>
<tr>
<td>barringPerACDC-CategoryList</td>
<td>A list of barring information per ACDC category according to the order defined in TS 22.011 [10]. The first entry in the list corresponds to the highest ACDC category of which applications are the least restricted in access attempts at a cell, the second entry in the list corresponds to the ACDC category of which applications are restricted more than applications of the highest ACDC category in access attempts at a cell, and so on. The last entry in the list corresponds to the lowest ACDC category of which applications are the most restricted in access attempts at a cell.</td>
</tr>
<tr>
<td>cp-CIoT-EPS-Optimisation</td>
<td>This field indicates if the UE is allowed to establish the connection with Control plane CIoT EPS Optimisation, see TS 24.301 [35].</td>
</tr>
<tr>
<td>mbsfn-SubframeConfigList</td>
<td>Defines the subframes that are reserved for MBSFN in downlink. NOTE 1.</td>
</tr>
<tr>
<td>multiBandInfoList</td>
<td>A list of AdditionalSpectrumEmission i.e. one for each additional frequency band included in multiBandInfoList in SystemInformationBlockType1, listed in the same order.</td>
</tr>
<tr>
<td>plmn-IdentityIndex</td>
<td>Index of the PLMN in plmn-IdentityList included in SIB1. Value 1 indicates the PLMN listed 1st in plmn-IdentityList included in SIB1. Value 2 indicates the PLMN listed 2nd in plmn-IdentityList included in SIB1 and so on. NOTE 1.</td>
</tr>
<tr>
<td>ssac-BarringForMMTEL-Video</td>
<td>Service specific access class barring for MMTEL video originating calls.</td>
</tr>
<tr>
<td>ssac-BarringForMMTEL-Voice</td>
<td>Service specific access class barring for MMTEL voice originating calls.</td>
</tr>
<tr>
<td>udt-RestrictingTime</td>
<td>If present and when the udt-RestrictingTime changes from TRUE, the UE runs a timer for a period equal to rand * udt-RestrictingTime, where rand is a random number drawn that is uniformly distributed in the range 0 ≤ rand &lt; 1 value in seconds. The timer stops if udt-RestrictingTime changes to TRUE. Upon timer expiry, the UE indicates to the higher layers that the restriction is alleviated.</td>
</tr>
<tr>
<td>ul-Bandwidth</td>
<td>Parameter: transmission bandwidth configuration, NRB, in uplink, see TS 36.101 [42, table 5.6-1]. Value n6 corresponds to 6 resource blocks, n15 to 15 resource blocks and so on. If for FDD this parameter is absent, the uplink bandwidth is equal to the downlink bandwidth. For TDD this parameter is absent and it is equal to the downlink bandwidth. NOTE 1.</td>
</tr>
<tr>
<td>Conditional presence</td>
<td>Explanation</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>ul-FreqMax</td>
<td>The field is mandatory present if ul-CarrierFreq (i.e. without suffix) is present and set to maxEARFCN. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

NOTE 1: E-UTRAN sets this field to the same value for all instances of SI message that are broadcasted within the same cell.

---

**SystemInformationBlockType3**

The IE `SystemInformationBlockType3` contains cell re-selection information common for intra-frequency, inter-frequency and/or inter-RAT cell re-selection (i.e. applicable for more than one type of cell re-selection but not necessarily all) as well as intra-frequency cell re-selection information other than neighbouring cell related.

**SystemInformationBlockType3 information element**

```asn1
SystemInformationBlockType3 ::= SEQUENCE {
  cellReselectionInfoCommon  SEQUENCE {
    q-Hyst ENUMERATED {
      dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,
      dB12, dB14, dB16, dB18, dB20, dB22, dB24},
    speedStateReselectionPars SEQUENCE {
      mobilityStateParameters MobilityStateParameters,
      q-HystSF SEQUENCE {
        sf-Medium ENUMERATED {
          dB-6, dB-4, dB-2, dB0},
        sf-High ENUMERATED {
          dB-6, dB-4, dB-2, dB0}
      }
    }
  }
}
```

cellReselectionServingFreqInfo  SEQUENCE {
  s-NonIntraSearch  ReselectionThreshold  OPTIONAL,  -- Need OP
  threshServingLow  ReselectionThreshold,
  cellReselectionPriority  CellReselectionPriority
},

intraFreqCellReselectionInfo  SEQUENCE {
  q-RxLevMin  Q-RxLevMin,
  p-Max  P-Max  OPTIONAL,  -- Need OP
  s-IntraSearch  ReselectionThreshold  OPTIONAL,  -- Need OP
  allowedMeasBandwidth  AllowedMeasBandwidth  OPTIONAL,  -- Need OP
  presenceAntennaPort1  PresenceAntennaPort1,
  neighCellConfig  NeighCellConfig,
  t-ReselectionEUTRA  T-Reselection,
  t-ReselectionEUTRA-SF  SpeedStateScaleFactors  OPTIONAL  -- Need OP
},

..., lateNonCriticalExtension  OCTET STRING (CONTAINING SystemInformationBlockType3-v10j0-IEs)  OPTIONAL,
[[ s-IntraSearch-v920  SEQUENCE {
  s-IntraSearchP-r9  ReselectionThreshold,
  s-IntraSearchQ-r9  ReselectionThresholdQ-r9
}  OPTIONAL,  -- Need OP
s-NonIntraSearch-v920  SEQUENCE {
  s-NonIntraSearchP-r9  ReselectionThreshold,
  s-NonIntraSearchQ-r9  ReselectionThresholdQ-r9
}  OPTIONAL,  -- Need OP
q-QualMin-r9  Q-QualMin-r9  OPTIONAL,  -- Need OP
threshServingLowQ-r9  ReselectionThresholdQ-r9  OPTIONAL  -- Need OP
}],
[[ q-QualMinWB-r11  Q-QualMin-r9  OPTIONAL  -- Cond WB-RSRQ
]];
[[ q-QualMinRSRQ-OnAllSymbols-r12  QualMin-r9  OPTIONAL  -- Cond
]];

QualMinRSRQ

RSRQ
]]);

[[cellReselectionServingFreqInfo-v1310 CellReselectionServingFreqInfo-v1310 OPTIONAL, -- Need OP
  redistributionServingInfo-r13 RedistributionServingInfo-r13 OPTIONAL, -- Need OR
  cellSelectionInfoCE-r13 CellSelectionInfoCE-r13 OPTIONAL, -- Need OP
  t-ReselectionEUTRA-CE-r13 T-ReselectionEUTRA-CE-r13 OPTIONAL -- Need OP
]]

RedistributionServingInfo-r13 ::= SEQUENCE {
  redistributionFactorServing-r13 INTEGER(0..10),
  redistributionFactorCell-r13 ENUMERATED{true} OPTIONAL, -- Need OP
  t360-r13 ENUMERATED {min4, min8, min16, min32, infinity, spare3, spare2, spare1},
  redistrOnPagingOnly-r13 ENUMERATED {true} OPTIONAL -- Need OP
}

CellReselectionServingFreqInfo-v1310 ::= SEQUENCE {
  cellReselectionSubPriority-r13 CellReselectionSubPriority-r13
}

-- Late non critical extensions

SystemInformationBlockType3-v10j0-IEs ::= SEQUENCE {
  freqBandInfo-r10 NS-PmaxList-r10 OPTIONAL, -- Need OR
  multiBandInfoList-v10j0 MultiBandInfoList-v10j0 OPTIONAL, -- Need OR
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- ASN1STOP
### SystemInformationBlockType3 field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>allowedMeasBandwidth</strong></td>
<td>If absent, the value corresponding to the downlink bandwidth indicated by the <em>dl-Bandwidth</em> included in MasterInformationBlock applies.</td>
</tr>
<tr>
<td><strong>cellSelectionInfoCE</strong></td>
<td>Parameters included in coverage enhancement S criteria. They may be used by the UE to select/reselect a cell in which it works in CE mode on the concerned non serving frequency. If absent, the UE acquires the information from the target cell on the concerned frequency.</td>
</tr>
<tr>
<td><strong>cellReselectionInfoCommon</strong></td>
<td>Cell re-selection information common for cells.</td>
</tr>
<tr>
<td><strong>cellReselectionServingFreqInfo</strong></td>
<td>Information common for Cell re-selection to inter-frequency and inter-RAT cells.</td>
</tr>
<tr>
<td><strong>freqBandInfo</strong></td>
<td>A list of <em>additionalPmax</em> and <em>additionalSpectrumEmission</em> values as defined in TS 36.101 [42, table 6.2.4-1] applicable for the intra-frequency neighbouring E-UTRA cells if the UE selects the frequency band from <em>freqBandIndicator</em> in SystemInformationBlockType1.</td>
</tr>
<tr>
<td><strong>intraFreqCellReselectionInfo</strong></td>
<td>Cell re-selection information common for intra-frequency cells.</td>
</tr>
<tr>
<td><strong>multiBandInfoList-v10j0</strong></td>
<td>A list of <em>additionalPmax</em> and <em>additionalSpectrumEmission</em> values as defined in TS 36.101 [42, table 6.2.4-1] applicable for the intra-frequency neighbouring E-UTRA cells if the UE selects the frequency bands in <em>multiBandInfoList</em> (i.e. without suffix) or <em>multiBandInfoList-v9e0</em>. If E-UTRAN includes <em>multiBandInfoList-v10j0</em>, it includes the same number of entries, and listed in the same order, as in <em>multiBandInfoList</em> (i.e. without suffix).</td>
</tr>
<tr>
<td><strong>p-Max</strong></td>
<td>Value applicable for the intra-frequency neighbouring E-UTRA cells. If absent the UE applies the maximum power according to the UE capability.</td>
</tr>
<tr>
<td><strong>redistOnPagingOnly</strong></td>
<td>If this field is present and the UE is redistribution capable, the UE shall only wait for the paging message to trigger E-UTRAN inter-frequency redistribution procedure as specified in 5.2.4.10 of TS 36.304 [4].</td>
</tr>
<tr>
<td><strong>q-Hyst</strong></td>
<td>Parameter <em>Qhyst</em> in TS 36.304 [4]. Value in dB. Value dB1 corresponds to 1 dB, dB2 corresponds to 2 dB and so on.</td>
</tr>
<tr>
<td><strong>q-HystSF</strong></td>
<td>Parameter ‘ScalingFactor for *Qhyst’ in TS 36.304 [4]. The sf-Medium and sf-High concern the additional hysteresis to be applied, in Medium and High Mobility state respectively, to <em>Qhyst</em> as defined in TS 36.304 [4]. In dB. Value dB-6 corresponds to -6dB, dB-4 corresponds to -4dB and so on.</td>
</tr>
<tr>
<td><strong>q-QualMin</strong></td>
<td>Parameter ‘*Qqualmin’ in TS 36.304 [4], applicable for intra-frequency neighbour cells. If the field is not present, the UE applies the (default) value of negative infinity for <em>Qqualmin</em>. NOTE 1.</td>
</tr>
<tr>
<td><strong>q-QualMinRSQ-OnAllSymbols</strong></td>
<td>If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols in accordance with TS 36.214 [48]. NOTE 1.</td>
</tr>
<tr>
<td><strong>q-QualMinWB</strong></td>
<td>If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, use a wider bandwidth in accordance with TS 36.133 [16]. NOTE 1.</td>
</tr>
<tr>
<td><strong>q-RxLevMin</strong></td>
<td>Parameter ‘*Qrxlevmin’ in TS 36.304 [4], applicable for intra-frequency neighbour cells.</td>
</tr>
<tr>
<td><strong>redistributionFactorCell</strong></td>
<td>If redistributionFactorCell is present, redistributionFactorServing is only applicable for the serving cell otherwise it is applicable for serving frequency.</td>
</tr>
<tr>
<td><strong>redistributionFactorServing</strong></td>
<td>Parameter redistributionFactorServing in TS 36.304 [4].</td>
</tr>
<tr>
<td><strong>s-IntraSearch</strong></td>
<td>Parameter ‘*SIntraSearchP’ in TS 36.304 [4]. If the field <em>s-IntraSearchP</em> is present, the UE applies the value of <em>s-IntraSearchP</em> instead. Otherwise if neither <em>s-IntraSearch</em> nor <em>s-IntraSearchP</em> is present, the UE applies the (default) value of infinity for <em>SIntraSearchP</em>.</td>
</tr>
<tr>
<td><strong>s-IntraSearchP</strong></td>
<td>Parameter ‘*SIntraSearchP’ in TS 36.304 [4]. See descriptions under <em>s-IntraSearch</em>.</td>
</tr>
<tr>
<td><strong>s-IntraSearchQ</strong></td>
<td>Parameter ‘*SIntraSearchQ’ in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of 0 dB for <em>SIntraSearchQ</em>.</td>
</tr>
<tr>
<td><strong>s-NonIntraSearch</strong></td>
<td>Parameter ‘*sNonIntraSearchP’ in TS 36.304 [4]. If the field <em>s-NonIntraSearchP</em> is present, the UE applies the value of <em>s-NonIntraSearchP</em> instead. Otherwise if neither <em>s-NonIntraSearch</em> nor <em>s-NonIntraSearchP</em> is present, the UE applies the (default) value of infinity for <em>sNonIntraSearchP</em>.</td>
</tr>
<tr>
<td><strong>s-NonIntraSearchP</strong></td>
<td>Parameter ‘*sNonIntraSearchP’ in TS 36.304 [4]. See descriptions under <em>s-NonIntraSearch</em>.</td>
</tr>
</tbody>
</table>
**SystemInformationBlockType3 field descriptions**

- **s-NonIntraSearchQ**
  Parameter ‘SnonIntraSearchQ’ in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of 0 dB for $S_{\text{nonIntraSearchQ}}$.

- **speedStateReelectionPars**
  Speed dependent reselection parameters, see TS 36.304 [4]. If this field is absent, i.e., mobilityStateParameters is also not present, UE behaviour is specified in TS 36.304 [4].

- **t360**
  Parameter ‘T360’ in TS 36.304 [4]. Value min4 corresponds to 4 minutes, value min8 corresponds to 8 minutes, and so on.

- **threshServingLow**
  Parameter ‘ThreshServingLow’ in TS 36.304 [4].

- **threshServingLowQ**
  Parameter ‘ThreshServingLowQ’ in TS 36.304 [4].

- **t-ReselectionEUTRA**
  Parameter ‘TreselectionEUTRA’ in TS 36.304 [4].

- **t-ReselectionEUTRA-SF**
  Parameter ‘Speed dependent ScalingFactor for TreselectionEUTRA’ in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].

**NOTE 1:** The value the UE applies for parameter ‘$Q_{\text{qualmin}}$’ in TS 36.304 [4] depends on the $q\cdot Q_{\text{qualmin}}$ fields signalled by E-UTRAN and supported by the UE. In case multiple candidate options are available, the UE shall select the highest priority candidate option according to the priority order indicated by the following table (top row is highest priority).

<table>
<thead>
<tr>
<th>q-QualMinRSRQ-OnAllSymbols</th>
<th>q-QualMinWB</th>
<th>Value of parameter ‘$Q_{\text{qualmin}}$’ in TS 36.304 [4]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Included</td>
<td>Included</td>
<td>$q\cdot Q_{\text{qualminRSRQ-OnAllSymbols}}$ – ($q\cdot Q_{\text{qualmin}}$ – q-QualMinWB)</td>
</tr>
<tr>
<td>Included</td>
<td>Not included</td>
<td>$q\cdot Q_{\text{qualminRSRQ-OnAllSymbols}}$</td>
</tr>
<tr>
<td>Not included</td>
<td>Included</td>
<td>q-QualMinWB</td>
</tr>
<tr>
<td>Not included</td>
<td>Not included</td>
<td>q-QualMin</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSRQ</td>
<td>The field is optionally present, Need OR, if threshServingLowQ is present in SIB3; otherwise it is not present.</td>
</tr>
<tr>
<td>WB-RSRQ</td>
<td>The field is optionally present, need OP if the measurement bandwidth indicated by allowedMeasBandwidth is 50 resource blocks or larger; otherwise it is not present.</td>
</tr>
</tbody>
</table>

---

**SystemInformationBlockType4**

The IE SystemInformationBlockType4 contains neighbouring cell related information relevant only for intra-frequency cell re-selection. The IE includes cells with specific re-selection parameters as well as blacklisted cells.

**SystemInformationBlockType4 information element**

---

**ASN1START**

SystemInformationBlockType4 ::= SEQUENCE {
  intraFreqNeighCellList IntraFreqNeighCellList OPTIONAL, -- Need OR
  intraFreqBlackCellList IntraFreqBlackCellList OPTIONAL, -- Need OR
  csg-PhysCellIdRange PhysCellIdRange OPTIONAL, -- Cond CSG
  ...,
  lateNonCriticalExtension OCTET STRING OPTIONAL
}

---

ETSI
IntraFreqNeighCellList ::= SEQUENCE (SIZE (1..maxCellIntra)) OF IntraFreqNeighCellInfo

IntraFreqNeighCellInfo ::= SEQUENCE {
  physCellId         PhysCellId,
  q-OffsetCell       Q-OffsetRange,
  ...
}

IntraFreqBlackCellList ::= SEQUENCE (SIZE (1..maxCellBlack)) OF PhysCellIdRange

--- ASN1STOP

**SystemInformationBlockType4 field descriptions**

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>csg-PhysCellIdRange</td>
<td>Set of physical cell identities reserved for CSG cells on the frequency on which this field was received. The received csg-PhysCellIdRange applies if less than 24 hours has elapsed since it was received and the UE is camped on a cell of the same primary PLMN where this field was received. The 3 hour validity restriction (section 5.2.1.3) does not apply to this field. The UE shall not apply any stored csg-PhysCellIdRange when it is in any cell selection state defined in TS 36.304 [4].</td>
</tr>
<tr>
<td>intraFreqBlackCellList</td>
<td>List of blacklisted intra-frequency neighbouring cells.</td>
</tr>
<tr>
<td>intraFreqNeighbCellList</td>
<td>List of intra-frequency neighbouring cells with specific cell re-selection parameters.</td>
</tr>
<tr>
<td>q-OffsetCell</td>
<td>Parameter ‘Qoffsets,n’ in TS 36.304 [4].</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSG</td>
<td>This field is optional, need OP, for non-CSG cells, and mandatory for CSG cells.</td>
</tr>
</tbody>
</table>

--- SystemInformationBlockType5

The IE SystemInformationBlockType5 contains information relevant only for inter-frequency cell re-selection i.e. information about other E-UTRA frequencies and inter-frequency neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency as well as cell specific re-selection parameters.

--- SystemInformationBlockType5 information element

-- ASN1START

SystemInformationBlockType5 ::= SEQUENCE {
  interFreqCarrierFreqList   InterFreqCarrierFreqList,
  ...
  lateNonCriticalExtension   OCTET STRING(CONTAINING SystemInformationBlockType5-v8h0-IEs) OPTIONAL,
  [interFreqCarrierFreqList-v1250InterFreqCarrierFreqList-v1250 OPTIONAL, -- Need OR
---
interFreqCarrierFreqListExt-r12  InterFreqCarrierFreqListExt-r12  OPTIONAL  -- Need OR
]

[[ interFreqCarrierFreqListExt-v1280 InterFreqCarrierFreqListExt-v1280  OPTIONAL  -- Need OR
]

[[ interFreqCarrierFreqList-v1310  InterFreqCarrierFreqList-v1310  OPTIONAL, -- Need OR
    interFreqCarrierFreqListExt-v1310 InterFreqCarrierFreqListExt-v1310 OPTIONAL  -- Need OR
]]
}

SystemInformationBlockType5-v8h0-IEs ::= SEQUENCE {
   interFreqCarrierFreqList-v8h0 SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v8h0
   OPTIONAL, -- Need OP
   nonCriticalExtension SystemInformationBlockType5-v9e0-IEs OPTIONAL
}

SystemInformationBlockType5-v9e0-IEs ::= SEQUENCE {
   interFreqCarrierFreqList-v9e0 SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v9e0
   OPTIONAL, -- Need OR
   nonCriticalExtension SystemInformationBlockType5-v10j0-IEs OPTIONAL
}

SystemInformationBlockType5-v10j0-IEs ::= SEQUENCE {
   interFreqCarrierFreqList-v10j0 SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v10j0
   OPTIONAL, -- Need OR
   nonCriticalExtension SEQUENCE {} OPTIONAL
}

InterFreqCarrierFreqList ::=  SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo

InterFreqCarrierFreqList-v1250 ::=SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1250

InterFreqCarrierFreqListExt-r12 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-r12

InterFreqCarrierFreqListExt-v1280 ::=SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1280

InterFreqCarrierFreqList-v1310 ::=SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-v1310
InterFreqCarrierFreqListExt-v1310 ::= SEQUENCE (SIZE (1.. maxFreq)) OF InterFreqCarrierFreqInfo-v1310

InterFreqCarrierFreqInfo ::= SEQUENCE {
  dl-CarrierFreq ARFCN-ValueEUTRA,
  q-RxLevMin Q-RxLevMin,
  p-Max P-Max OPTIONAL, -- Need OP
  t-ReselectionEUTRA T-Reselection,
  t-ReselectionEUTRA-SF SpeedStateScaleFactors OPTIONAL, -- Need OP
  threshX-High ReselectionThreshold,
  threshX-Low ReselectionThreshold,
  allowedMeasBandwidth AllowedMeasBandwidth,
  presenceAntennaPort1 PresenceAntennaPort1,
  cellReselectionPriority CellReselectionPriority OPTIONAL, -- Need OP
  neighCellConfig NeighCellConfig,
  q-OffsetFreq Q-OffsetRange DEFAULT dB0,
  interFreqNeighCellList InterFreqNeighCellList OPTIONAL, -- Need OR
  interFreqBlackCellList InterFreqBlackCellList OPTIONAL, -- Need OR
  ...
  [[ q-QualMin-r9 Q-QualMin-r9 OPTIONAL, -- Need OP
    threshX-Q-r9 SEQUENCE {
      threshX-HighQ-r9 ReselectionThresholdQ-r9,
      threshX-LowQ-r9 ReselectionThresholdQ-r9
    } OPTIONAL -- Cond RSRQ
  ]],
  [[ q-QualMinWB-r11 Q-QualMin-r9 OPTIONAL -- Cond WB-RSRQ
    ]]
}

InterFreqCarrierFreqInfo-v8h0 ::= SEQUENCE {
  multiBandInfoList MultiBandInfoList OPTIONAL -- Need OR
}

InterFreqCarrierFreqInfo-v9e0 ::= SEQUENCE {
  dl-CarrierFreq-v9e0 ARFCN-ValueEUTRA-v9e0 OPTIONAL, -- Cond dl-FreqMax
multiBandInfoList-v9e0              MultiBandInfoList-v9e0 OPTIONAL   -- Need OR

InterFreqCarrierFreqInfo-v10j0 ::= SEQUENCE {
   freqBandInfo-r10            NS-PmaxList-r10 OPTIONAL,   -- Need OR
   multiBandInfoList-v10j0     MultiBandInfoList-v10j0 OPTIONAL -- Need OR
}

InterFreqCarrierFreqInfo-v1250 ::= SEQUENCE {
   reducedMeasPerformance-r12  ENUMERATED {true} OPTIONAL,  -- Need OP
   q-QualMinRSRQ-OnAllSymbols-r12 Q-QualMin-r9 OPTIONAL -- Cond RSRQ2
}

InterFreqCarrierFreqInfo-r12 ::= SEQUENCE {
   dl-CarrierFreq-r12       ARFCN-ValueEUTRA-r9,
   q-RxLevMin-r12          Q-RxLevMin,
   p-Max-r12               P-Max OPTIONAL,   -- Need OP
   t-ReselectionEUTRA-r12   T-Reselection,
   t-ReselectionEUTRA-SF-r12 SpeedStateScaleFactors OPTIONAL,  -- Need OP
   threshX-High-r12        ReselectionThreshold,
   threshX-Low-r12         ReselectionThreshold,
   allowedMeasBandwidth-r12 AllowedMeasBandwidth,
   presenceAntennaPort1-r12 PresenceAntennaPort1,
   cellReselectionPriority-r12 CellReselectionPriority OPTIONAL,  -- Need OP
   neighCellConfig-r12     NeighCellConfig,
   q-OffsetFreq-r12        Q-OffsetRange DEFAULT dB0,
   interFreqNeighCellList-r12 InterFreqNeighCellList OPTIONAL,  -- Need OR
   interFreqBlackCellList-r12 InterFreqBlackCellList OPTIONAL,  -- Need OR
   q-QualMin-r12           Q-QualMin-r9 OPTIONAL,   -- Need OP
   threshX-Q-r12           SEQUENCE {
      threshX-HighQ-r12       ReselectionThresholdQ-r9,
      threshX-LowQ-r12       ReselectionThresholdQ-r9
   } OPTIONAL, -- Cond RSRQ
   q-QualMinWB-r12          Q-QualMin-r9 OPTIONAL, -- Cond WB-RSRQ
   multiBandInfoList-r12    MultiBandInfoList-r11 OPTIONAL, -- Need OR
reducedMeasPerformance-r12 ENUMERATED {true} OPTIONAL, -- Need OP
q-QualMinRSRQ-OnAllSymbols-r12 Q-QualMin-r9 OPTIONAL, -- Cond RSRQ2
...

InterFreqCarrierFreqInfo-v1310 ::= SEQUENCE {
  cellReelectionSubPriority-r13 CellReelectionSubPriority-r13 OPTIONAL, -- Need OP
  redistributionInterFreqInfo-r13 RedistributionInterFreqInfo-r13 OPTIONAL, -- Need OP
  cellSelectionInfoCE-r13 CellSelectionInfoCE-r13 OPTIONAL, -- Need OP
  t-ReselectionEUTRA-CE-r13 T-ReselectionEUTRA-CE-r13 OPTIONAL -- Need OP
}

InterFreqNeighCellList ::= SEQUENCE (SIZE (1..maxCellInter)) OF InterFreqNeighCellInfo

InterFreqNeighCellInfo ::= SEQUENCE {
  physCellId PhysCellId,
  q-OffsetCell Q-OffsetRange
}

InterFreqBlackCellList ::= SEQUENCE (SIZE (1..maxCellBlack)) OF PhysCellIdRange

RedistributionInterFreqInfo-r13 ::= SEQUENCE {
  redistributionFactorFreq-r13 RedistributionFactor-r13 OPTIONAL, -- Need OP
  redistributionNeighCellList-r13 RedistributionNeighCellList-r13 OPTIONAL -- Need OP
}

RedistributionNeighCellList-r13 ::= SEQUENCE (SIZE (1..maxCellInter)) OF RedistributionNeighCell-r13

RedistributionNeighCell-r13 ::= SEQUENCE {
  physCellId-r13 PhysCellId,
  redistributionFactorCell-r13 RedistributionFactor-r13
}

RedistributionFactor-r13 ::= INTEGER(1..10)
<table>
<thead>
<tr>
<th><strong>SystemInformationBlockType5 field descriptions</strong></th>
</tr>
</thead>
</table>
| **freqBandInfo**  
A list of additionalPmax and additionalSpectrumEmission values as defined in TS 36.101 [42, table 6.2.4-1] for the frequency band represented by dl-CarrierFreq for which cell reselection parameters are common. |

| **interFreqBlackCellList**  
List of blacklisted inter-frequency neighbouring cells. |

| **interFreqCarrierFreqList**  
List of neighbouring inter-frequencies. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the E-ARFCN used to indicate this. If E-UTRAN includes interFreqCarrierFreqList-v9e0, interFreqCarrierFreqList-v1250 and/or interFreqCarrierFreqList-v1310, it includes the same number of entries, and listed in the same order, as in interFreqCarrierFreqList (i.e. without suffix). See Annex D for more descriptions. |

| **interFreqCarrierFreqListExt**  
List of additional neighbouring inter-frequencies, i.e. extending the size of the inter-frequency carrier list using the general principles specified in 5.1.2. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the E-ARFCN used to indicate this. EUTRAN may include interFreqCarrierFreqListExt even if interFreqCarrierFreqList (i.e without suffix) does not include maxFreq entries. If E-UTRAN includes InterFreqCarrierFreqListExt-v1310 it includes the same number of entries, and listed in the same order, as in interFreqCarrierFreqListExt-r12. |

| **interFreqNeighCellList**  
List of inter-frequency neighbouring cells with specific cell re-selection parameters. |

| **multiBandInfoList**  
Indicates the list of frequency bands in addition to the band represented by dl-CarrierFreq for which cell reselection parameters are common. E-UTRAN indicates at most maxMultiBands frequency bands (i.e. the total number of entries across both multiBandInfoList and multiBandInfoList-v9e0 is below this limit). |

| **multiBandInfoList-v10j0**  
A list of additionalPmax and additionalSpectrumEmission values as defined in TS 36.101 [42, table 6.2.4-1] for the frequency bands in multiBandInfoList (i.e. without suffix) and multiBandInfoList-v9e0. If E-UTRAN includes multiBandInfoList-v10j0, it includes the same number of entries, and listed in the same order, as in multiBandInfoList (i.e. without suffix). |

| **p-Max**  
Value applicable for the neighbouring E-UTRA cells on this carrier frequency. If absent the UE applies the maximum power according to the UE capability. |

| **q-OffsetCell**  
Parameter ‘OffsetCell,n’ in TS 36.304 [4]. |

| **q-OffsetFreq**  
Parameter ‘OffsetFreq’ in TS 36.304 [4]. |

| **q-QualMin**  
Parameter ‘Qqualmin’ in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of negative infinity for Qqualmin. NOTE 1. |

| **q-QualMinRSRQ-OnAllSymbols**  
If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols in accordance with TS 36.214 [48]. NOTE 1. |

| **q-QualMinWB**  
If this field is present and supported by the UE, the UE shall, when performing RSRQ measurements, use a wider bandwidth in accordance with TS 36.133 [16]. NOTE 1. |

| **redistributionFactorFreq**  
Parameter redistributionFactorFreq in TS 36.304 [4]. |

| **redistributionFactorCell**  
Parameter redistributionFactorCell in TS 36.304 [4]. |

| **reducedMeasPerformance**  
Value TRUE indicates that the neighbouring inter-frequency is configured for reduced measurement performance, see TS 36.133 [16]. If the field is not included, the neighbouring inter-frequency is configured for normal measurement performance, see TS 36.133 [16]. |

| **threshX-High**  

| **threshX-HighQ**  
Parameter ‘ThreshX, HighQ’ in TS 36.304 [4]. |

| **threshX-Low**  
Parameter ‘ThreshX, LowP’ in TS 36.304 [4]. |

| **threshX-LowQ**  
Parameter ‘ThreshX, LowQ’ in TS 36.304 [4]. |

| **t-ReselectionEUTRA**  
Parameter ‘TreselectionEUTRA’ in TS 36.304 [4]. |

| **t-ReselectionEUTRA-SF**  
Parameter ‘Speed dependent ScalingFactor for TreselectionEUTRA’ in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4]. |
NOTE 1: The value the UE applies for parameter ‘Q\text{ualmin}’ in TS 36.304 [4] depends on the $q$-$\text{QualMin}$ fields signalled by E-UTRAN and supported by the UE. In case multiple candidate options are available, the UE shall select the highest priority candidate option according to the priority order indicated by the following table (top row is highest priority).

<table>
<thead>
<tr>
<th></th>
<th>q-$\text{QualMinRSRQ}$-OnAllSymbols</th>
<th>q-$\text{QualMinWB}$</th>
<th>Value of parameter ‘Q\text{ualmin}’ in TS 36.304 [4]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Included</td>
<td>Included</td>
<td>$q$-$\text{QualMinRSRQ}$-OnAllSymbols = ($q$-$\text{QualMin}$ – $q$-$\text{QualMinWB}$)</td>
<td></td>
</tr>
<tr>
<td>Included</td>
<td>Not included</td>
<td>$q$-$\text{QualMinRSRQ}$-OnAllSymbols</td>
<td></td>
</tr>
<tr>
<td>Not included</td>
<td>Included</td>
<td>$q$-$\text{QualMinWB}$</td>
<td></td>
</tr>
<tr>
<td>Not included</td>
<td>Not included</td>
<td>$q$-$\text{QualMin}$</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>$dl$-$\text{FreqMax}$</td>
<td>The field is mandatory present if, for the corresponding entry in $\text{InterFreqCarrierFreqList}$ (i.e. without suffix), $dl$-$\text{CarrierFreq}$ (i.e. without suffix) is set to $\text{maxEARFCN}$. Otherwise the field is not present.</td>
</tr>
<tr>
<td>RSRQ</td>
<td>The field is mandatory present if $\text{threshServingLowQ}$ is present in $\text{systemInformationBlockType3}$; otherwise it is not present.</td>
</tr>
<tr>
<td>RSRQ2</td>
<td>The field is mandatory present for all EUTRA carriers listed in SIB5 if $q$-$\text{QualMinRSRQ}$-OnAllSymbols is present in SIB3; otherwise it is not present and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>WB-RSRQ</td>
<td>The field is optionally present, need OP if the measurement bandwidth indicated by $\text{allowedMeasBandwidth}$ is 50 resource blocks or larger; otherwise it is not present.</td>
</tr>
</tbody>
</table>

---

**SystemInformationBlockType6**

The IE $\text{SystemInformationBlockType6}$ contains information relevant only for inter-RAT cell re-selection i.e. information about UTRA frequencies and UTRA neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency.

**SystemInformationBlockType6 information element**

```apn
-- ASN1START

\text{SystemInformationBlockType6} := SEQUENCE {
  \text{carrierFreqListUTRA-FDD} CarrierFreqListUTRA-FDD OPTIONAL, -- Need OR
  \text{carrierFreqListUTRA-TDD} CarrierFreqListUTRA-TDD OPTIONAL, -- Need OR
  \text{t-ReselectionUTRA} T-Reselection, 
  \text{t-ReselectionUTRA-SF} SpeedStateScaleFactors OPTIONAL, -- Need OP
  ...,
  \text{lateNonCriticalExtension} OCTET STRING(CONTAINING SystemInformationBlockType6-v8h0-IEs) OPTIONAL,
  [ carrierFreqListUTRA-FDD-v1250 SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF
    CarrierFreqInfoUTRA-v1250 OPTIONAL, -- Cond UTRA-FDD
    carrierFreqListUTRA-FDD-v1250 SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF
    CarrierFreqInfoUTRA-v1250 OPTIONAL, -- Cond UTRA-TDD
    carrierFreqListUTRA-FDD-Ext-r12 CarrierFreqListUTRA-FDD-Ext-r12 OPTIONAL, -- Cond UTRA-FDD
  ]
}

-- ASN1END
```
carrierFreqListUTRA-TDD-Ext-r12  CarrierFreqListUTRA-TDD-Ext-r12 OPTIONAL -- Cond UTRA-TDD
]
}

SystemInformationBlockType6-v8h0-IEs ::= SEQUENCE {
  carrierFreqListUTRA-FDD-v8h0 SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF CarrierFreqInfoUTRA-FDD-v8h0 OPTIONAL, -- Cond UTRA-FDD
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

CarrierFreqInfoUTRA-v1250 ::=  SEQUENCE {
  reducedMeasPerformance-r12 ENUMERATED {true} OPTIONAL  -- Need OP
}

CarrierFreqListUTRA-FDD ::=  SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF CarrierFreqUTRA-FDD

CarrierFreqUTRA-FDD ::=    SEQUENCE {
  carrierFreq       ARFCN-ValueUTRA,
  cellReselectionPriority    CellReselectionPriority OPTIONAL,   -- Need OP
  threshX-High      ReselectionThreshold,
  threshX-Low       ReselectionThreshold,
  q-RxLevMin       INTEGER (-60..-13),
  p-MaxUTRA       INTEGER (-50..33),
  q-QualMin       INTEGER (-24..0),
  ...,
  [[ threshX-Q-r9    SEQUENCE {
    threshX-HighQ-r9    ReselectionThresholdQ-r9,
    threshX-LowQ-r9     ReselectionThresholdQ-r9
  } OPTIONAL  -- Cond RSRQ
  ]]               
}

CarrierFreqInfoUTRA-FDD-v8h0 ::=   SEQUENCE {
  multiBandInfoList     SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicator-UTRA-FDD OPTIONAL -- Need OR
CarrierFreqListUTRA-FDD-Ext-r12 ::= SEQUENCE (SIZE (1..maxUTRA-FDD-Carrier)) OF
  CarrierFreqUTRA-FDD-Ext-r12

CarrierFreqUTRA-FDD-Ext-r12 ::= SEQUENCE {
carrierFreq-r12           ARFCN-ValueUTRA,
cellReselectionPriority-r12 CellReselectionPriority OPTIONAL, -- Need OP
threshX-High-r12           ReselectionThreshold,
threshX-Low-r12            ReselectionThreshold,
q-RxLevMin-r12             INTEGER (-60..-13),
p-MaxUTRA-r12              INTEGER (-50..33),
q-QualMin-r12              INTEGER (-24..0),
threshX-Q-r12              SEQUENCE {
threshX-HighQ-r12          ReselectionThresholdQ-r9,
threshX-LowQ-r12           ReselectionThresholdQ-r9
} OPTIONAL, -- Cond RSRQ
multiBandInfoList-r12      SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicator-UTRA-FDD
  OPTIONAL, -- Need OR
reducedMeasPerformance-r12 ENUMERATED {true} OPTIONAL, -- Need OP
... }

CarrierFreqListUTRA-TDD ::= SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF CarrierFreqUTRA-TDD

CarrierFreqUTRA-TDD ::= SEQUENCE {
carrierFreq               ARFCN-ValueUTRA,
cellReselectionPriority    CellReselectionPriority OPTIONAL, -- Need OP
threshX-High               ReselectionThreshold,
threshX-Low                ReselectionThreshold,
q-RxLevMin                 INTEGER (-60..-13),
p-MaxUTRA                  INTEGER (-50..33),
... }

ETSI
CarrierFreqListUTRA-TDD-Ext-r12 ::= SEQUENCE (SIZE (1..maxUTRA-TDD-Carrier)) OF
  CarrierFreqUTRA-TDD-r12

CarrierFreqUTRA-TDD-r12 ::= SEQUENCE {
  carrierFreq-r12           ARFCN-ValueUTRA,
  cellReselectionPriority-r12 CellReselectionPriority OPTIONAL, -- Need OP
  threshX-High-r12          ReselectionThreshold,
  threshX-Low-r12           ReselectionThreshold,
  q-RxLevMin-r12            INTEGER (-60..-13),
  p-MaxUTRA-r12             INTEGER (-50..33),
  reducedMeasPerformance-r12 ENUMERATED {true} OPTIONAL, -- Need OP
  ...                      
}

FreqBandIndicator-UTRA-FDD ::= INTEGER (1..86)

-- ASN1STOP
SystemInformationBlockType6 field descriptions

carrierFreqListUTRA-FDD
List of carrier frequencies of UTRA FDD. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the ARFCN used to indicate this. If E-UTRAN includes carrierFreqListUTRA-FDD-v8h0 and/or carrierFreqListUTRA-FDD-v1250, it includes the same number of entries, and listed in the same order, as in carrierFreqListUTRA-FDD (i.e. without suffix). See Annex D for more descriptions.

carrierFreqListUTRA-FDD-Ext
List of additional carrier frequencies of UTRA FDD. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the ARFCN used to indicate this. E-UTRAN may include carrierFreqListUTRA-FDD-Ext even if carrierFreqListUTRA-FDD (i.e without suffix) does not include maxUTRA-FDD-Carrier entries.

carrierFreqListUTRA-TDD
List of carrier frequencies of UTRA TDD. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the ARFCN used to indicate this. E-UTRAN may include carrierFreqListUTRA-TDD-v1250, it includes the same number of entries, and listed in the same order, as in carrierFreqListUTRA-TDD (i.e. without suffix).

carrierFreqListUTRA-TDD-Ext
List of additional carrier frequencies of UTRA TDD. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the ARFCN used to indicate this. EUTRAN may include carrierFreqListUTRA-TDD-Ext even if carrierFreqListUTRA-TDD (i.e without suffix) does not include maxUTRA-TDD-Carrier entries.

multiBandInfoList
Indicates the list of frequency bands in addition to the band represented by carrierFreq in the CarrierFreqUTRA-FDD for which UTRA cell reselection parameters are common.

p-MaxUTRA
The maximum allowed transmission power on the (uplink) carrier frequency, see TS 25.304 [40]. In dBm

q-QualMin
Parameter ‘Qqualmin’ in TS 25.304 [40]. Actual value = field value [dB].

q-RxLevMin
Parameter ‘Qrxlevmin’ in TS 25.304 [40]. Actual value = field value * 2+1 [dBm].

reducedMeasPerformance
Value TRUE indicates that the UTRA carrier frequency is configured for reduced measurement performance, see TS 36.133 [16]. If the field is not included, the UTRA carrier frequency is configured for normal measurement performance, see TS 36.133 [16].

t-ReselectionUTRA
Parameter ‘TreselectionUTRAN’ in TS 36.304 [4].

t-ReselectionUTRA-SF
Parameter ‘Speed dependent ScalingFactor for TreselectionUTRA’ in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].

threshX-High

threshX-HighQ
Parameter ‘ThreshX,HighQ’ in TS 36.304 [4].

threshX-Low
Parameter ‘ThreshX,LowP’ in TS 36.304 [4].

threshX-LowQ
Parameter ‘ThreshX,LowQ’ in TS 36.304 [4].

Conditional presence | Explanation
--- | ---
RSRQ | The field is mandatory present if the threshServingLowQ is present in SystemInformationBlockType3, otherwise it is not present.
UTRA-FDD | The field is optionally present, need OR, if the carrierFreqListUTRA-FDD is present. Otherwise it is not present.
UTRA-TDD | The field is optionally present, need OR, if the carrierFreqListUTRA-TDD is present. Otherwise it is not present.

SystemInformationBlockType7
The IE SystemInformationBlockType7 contains information relevant only for inter-RAT cell re-selection i.e. information about GERAN frequencies relevant for cell re-selection. The IE includes cell re-selection parameters for each frequency.

SystemInformationBlockType7 information element

-- ASN1START
SystemInformationBlockType7 ::= SEQUENCE {
  t-ReselectionGERAN,  T-Reselection,  OPTIONAL, -- Need OR
  t-ReselectionGERAN-SF, SpeedStateScaleFactors  OPTIONAL, -- Need OR
  carrierFreqsInfoList, CarrierFreqsInfoListGERAN  OPTIONAL, -- Need OR
  ..., 
  lateNonCriticalExtension, OCTET STRING  OPTIONAL
}

CarrierFreqsInfoListGERAN ::= SEQUENCE (SIZE (1..maxGNFG)) OF CarrierFreqsInfoGERAN

CarrierFreqsInfoGERAN ::= SEQUENCE {
  carrierFreqs, CarrierFreqsGERAN,
  commonInfo, SEQUENCE {
    cellReselectionPriority, CellReselectionPriority  OPTIONAL, -- Need OP
    ncc-Permitted, BIT STRING (SIZE (8)),
    q-RxLevMin, INTEGER (0..45),
    p-MaxGERAN, INTEGER (0..39)  OPTIONAL, -- Need OP
    threshX-High, ReselectionThreshold,
    threshX-Low, ReselectionThreshold
  },
  ...
}

-- ASN1STOP
### SystemInformationBlockType7 field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>carrierFreqs</strong></td>
<td>The list of GERAN carrier frequencies organised into one group of GERAN carrier frequencies.</td>
</tr>
<tr>
<td><strong>carrierFreqsInfoList</strong></td>
<td>Provides a list of neighbouring GERAN carrier frequencies, which may be monitored for neighbouring GERAN cells. The GERAN carrier frequencies are organised in groups and the cell reselection parameters are provided per group of GERAN carrier frequencies.</td>
</tr>
<tr>
<td><strong>commonInfo</strong></td>
<td>Defines the set of cell reselection parameters for the group of GERAN carrier frequencies.</td>
</tr>
<tr>
<td><strong>ncc-Permitted</strong></td>
<td>Field encoded as a bit map, where bit N is set to “0” if a BCCH carrier with NCC = N-1 is not permitted for monitoring and set to “1” if the BCCH carrier with NCC = N-1 is permitted for monitoring; N = 1 to 8; bit 1 of the bitmap is the leading bit of the bit string.</td>
</tr>
<tr>
<td><strong>p-MaxGERAN</strong></td>
<td>Maximum allowed transmission power for GERAN on an uplink carrier frequency, see TS 45.008 [28]. Value in dBm. Applicable for the neighbouring GERAN cells on this carrier frequency. If pmaxGERAN is absent, the maximum power according to the UE capability is used.</td>
</tr>
<tr>
<td><strong>q-RxLevMin</strong></td>
<td>Parameter ‘Qrxlevmin’ in TS 36.304 [4], minimum required RX level in the GSM cell. The actual value of Qrxlevmin in dBm = (field value * 2) – 115.</td>
</tr>
<tr>
<td><strong>threshX-High</strong></td>
<td>Parameter ‘ThreshX, HighP’ in TS 36.304 [4].</td>
</tr>
<tr>
<td><strong>threshX-Low</strong></td>
<td>Parameter ‘ThreshX, LowP’ in TS 36.304 [4].</td>
</tr>
<tr>
<td><strong>t-ReselectionGERAN</strong></td>
<td>Parameter ‘TreselectionGERAN’ in TS 36.304 [4].</td>
</tr>
<tr>
<td><strong>t-ReselectionGERAN-SF</strong></td>
<td>Parameter ‘Speed dependent ScalingFactor for TreselectionGERAN’ in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].</td>
</tr>
</tbody>
</table>

---

### SystemInformationBlockType8

The IE `SystemInformationBlockType8` contains information relevant only for inter-RAT cell re-selection i.e. information about CDMA2000 frequencies and CDMA2000 neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency as well as cell specific re-selection parameters.

#### SystemInformationBlockType8 information element

```
-- ASN1START

SystemInformationBlockType8 ::= SEQUENCE {
  systemTimeInfo      SystemTimeInfoCDMA2000   OPTIONAL, -- Need OR
  searchWindowSize     INTEGER (0..15)      OPTIONAL, -- Need OR
  parametersHRPD      SEQUENCE {
    preRegistrationInfoHRPD PreRegistrationInfoHRPD,     
    cellReselectionParametersHRPD CellReselectionParametersCDMA2000 OPTIONAL -- Need OR
  } OPTIONAL, -- Need OR
  parameters1XRTT      SEQUENCE {
    csfb-RegistrationParam1XRTT CSFB-RegistrationParam1XRTT OPTIONAL, -- Need OP
    longCodeState1XRTT BIT STRING (SIZE (42))    OPTIONAL, -- Need OR
    cellReselectionParameters1XRTT CellReselectionParametersCDMA2000 OPTIONAL -- Need OR
  } OPTIONAL, -- Need OR
}
```

---

*ETSI*
lateNonCriticalExtension     OCTET STRING     OPTIONAL,
[[ csfb-SupportForDualRxUEs-r9  BOOLEAN     OPTIONAL,  -- Need OR
  cellReselectionParametersHRPD-v920 CellReselectionParametersCDMA2000-v920 OPTIONAL,  -- Cond
  NCL-HRPD
  cellReselectionParameters1XRTT-v920  CellReselectionParametersCDMA2000-v920 OPTIONAL,  -- Cond
  NCL-1XRTT
  csfb-RegistrationParam1XRTT-v920  CSFB-RegistrationParam1XRTT-v920 OPTIONAL,  -- Cond
  REG-1XRTT
  ac-BarringConfig1XRTT-r9  AC-BarringConfig1XRTT-r9 OPTIONAL  -- Cond REG-1XRTT
]],
[[ csfb-DualRxTxSupport-r10  ENUMERATED {true}     OPTIONAL  -- Cond REG-1XRTT
]],
[[ sib8-PerPLMN-List-r11  SIB8-PerPLMN-List-r11  OPTIONAL  -- Need OR
]]
}

CellReselectionParametersCDMA2000 ::= SEQUENCE {
  bandClassList      BandClassListCDMA2000,
  neighCellList      NeighCellListCDMA2000,
  t-ReselectionCDMA2000   T-Reselection,
  t-ReselectionCDMA2000-SF   SpeedStateScaleFactors OPTIONAL  -- Need OP
}

CellReselectionParametersCDMA2000-r11 ::= SEQUENCE {
  bandClassList      BandClassListCDMA2000,
  neighCellList-r11     SEQUENCE (SIZE (1..16)) OF NeighCellCDMA2000-r11,
  t-ReselectionCDMA2000   T-Reselection,
  t-ReselectionCDMA2000-SF   SpeedStateScaleFactors OPTIONAL  -- Need OP
}

CellReselectionParametersCDMA2000-v920 ::= SEQUENCE {
  neighCellList-v920       NeighCellListCDMA2000-v920
}

NeighCellListCDMA2000 ::= SEQUENCE (SIZE (1..16)) OF NeighCellCDMA2000
NeighCellCDMA2000 ::= SEQUENCE {
    bandClass       BandclassCDMA2000,
    neighCellsPerFreqList    NeighCellsPerBandclassListCDMA2000
}

NeighCellCDMA2000-r11 ::= SEQUENCE {
    bandClass       BandclassCDMA2000,
    neighFreqInfoList-r11    SEQUENCE (SIZE (1..16)) OF NeighCellsPerBandclassCDMA2000-r11
}

NeighCellsPerBandclassListCDMA2000 ::= SEQUENCE (SIZE (1..16)) OF NeighCellsPerBandclassCDMA2000

NeighCellsPerBandclassCDMA2000 ::= SEQUENCE {
    arfcn        ARFCN-ValueCDMA2000,
    physCellIdList      PhysCellIdListCDMA2000
}

NeighCellsPerBandclassCDMA2000-r11 ::= SEQUENCE {
    arfcn        ARFCN-ValueCDMA2000,
    physCellIdList-r11     SEQUENCE (SIZE (1..40)) OF PhysCellIdCDMA2000
}

NeighCellListCDMA2000-v920 ::=  SEQUENCE (SIZE (1..16)) OF NeighCellCDMA2000-v920

NeighCellCDMA2000-v920 ::= SEQUENCE {
    neighCellsPerFreqList-v920    NeighCellsPerBandclassListCDMA2000-v920
}

NeighCellsPerBandclassListCDMA2000-v920 ::= SEQUENCE (SIZE (1..16)) OF NeighCellsPerBandclassCDMA2000-v920

NeighCellsPerBandclassCDMA2000-v920 ::= SEQUENCE {
    physCellIdList-v920     PhysCellIdListCDMA2000-v920
}
PhysCellIdListCDMA2000 ::= SEQUENCE (SIZE (1..16)) OF PhysCellIdCDMA2000

PhysCellIdListCDMA2000-v920 ::= SEQUENCE (SIZE (0..24)) OF PhysCellIdCDMA2000

BandClassListCDMA2000 ::= SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandClassInfoCDMA2000

BandClassInfoCDMA2000 ::= SEQUENCE {
  bandClass           BandclassCDMA2000,
  cellReselectionPriority CellReselectionPriority OPTIONAL, -- Need OP
  threshX-High        INTEGER (0..63),
  threshX-Low         INTEGER (0..63),
  ...}

AC-BarringConfig1XRTT-r9 ::= SEQUENCE {
  ac-Barring0to9-r9     INTEGER (0..63),
  ac-Barring10-r9       INTEGER (0..7),
  ac-Barring11-r9       INTEGER (0..7),
  ac-Barring12-r9       INTEGER (0..7),
  ac-Barring13-r9       INTEGER (0..7),
  ac-Barring14-r9       INTEGER (0..7),
  ac-Barring15-r9       INTEGER (0..7),
  ac-BarringMsg-r9      INTEGER (0..7),
  ac-BarringReg-r9      INTEGER (0..7),
  ac-BarringEmg-r9      INTEGER (0..7),
}

SIB8-PerPLMN-List-r11 ::= SEQUENCE (SIZE (1..maxPLMN-r11)) OF SIB8-PerPLMN-r11

SIB8-PerPLMN-r11 ::= SEQUENCE {
  plmn-Identity-r11        INTEGER (1..maxPLMN-r11),
  parametersCDMA2000-r11   CHOICE {
    explicitValue ParametersCDMA2000-r11,
    defaultValue NULL
}
ParametersCDMA2000-r11 ::= SEQUENCE {
  systemTimeInfo-r11         CHOICE {
    explicitValue SystemTimeInfoCDMA2000,
    defaultValue          NULL
  } OPTIONAL, -- Need OR
  searchWindowSize-r11       INTEGER (0..15),
  parametersHRPD-r11         SEQUENCE {
    preRegistrationInfoHRPD-r11 PreRegistrationInfoHRPD,
    cellReselectionParametersHRPD-r11 CellReselectionParametersCDMA2000-r11 OPTIONAL -- Need OR
  } OPTIONAL, -- Need OR
  parameters1XRTT-r11        SEQUENCE {
    csfb-RegistrationParam1XRTT-r11 CSFB-RegistrationParam1XRTT OPTIONAL, -- Need OP
    csfb-RegistrationParam1XRTT-Ext-r11 CSFB-RegistrationParam1XRTT-v920 OPTIONAL, -- Cond REG-1XRTT-PerPLMN
    longCodeState1XRTT-r11      BIT STRING (SIZE (42)) OPTIONAL, -- Cond PerLMN-LC
    cellReselectionParameters1XRTT-r11 CellReselectionParametersCDMA2000-r11 OPTIONAL, -- Need OR
    ac-BarringConfig1XRTT-r11   AC-BarringConfig1XRTT-r9 OPTIONAL, -- Cond REG-1XRTT-PerPLMN
    csfb-SupportForDualRxUEs-r11 BOOLEAN OPTIONAL, -- Need OR
    csfb-DualRxTxSupport-r11   ENUMERATED {true} OPTIONAL -- Cond REG-1XRTT-PerPLMN
  } OPTIONAL, -- Need OR
  ...
}

-- ASN1STOP
### SystemInformationBlockType8 field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ac-BarringConfig1XRTT</strong></td>
<td>Contains the access class barring parameters the UE uses to calculate the access class barring factor, see C.S0097 [53].</td>
</tr>
<tr>
<td><strong>ac-Barring0to9</strong></td>
<td>Parameter used for calculating the access class barring factor for access overload classes 0 through 9. It is the parameter 'PSIST' in C.S0004 [34] for access overload classes 0 through 9.</td>
</tr>
<tr>
<td><strong>ac-BarringEmg</strong></td>
<td>Parameter used for calculating the access class barring factor for emergency calls and emergency message transmissions for access overload classes 0 through 9. It is the parameter 'PSIST_EMG' in C.S0004 [34].</td>
</tr>
<tr>
<td><strong>ac-BarringMsg</strong></td>
<td>Parameter used for modifying the access class barring factor for message transmissions. It is the parameter 'MSG_PSIST' in C.S0004 [34].</td>
</tr>
<tr>
<td><strong>ac-BarringN</strong></td>
<td>Parameter used for calculating the access class barring factor for access overload class N (N = 10 to 15). It is the parameter 'PSIST' in C.S0004 [34] for access overload class N.</td>
</tr>
<tr>
<td><strong>ac-BarringReg</strong></td>
<td>Parameter used for modifying the access class barring factor for autonomous registrations. It is the parameter 'REG_PSIST' in C.S0004 [34].</td>
</tr>
<tr>
<td><strong>bandClass</strong></td>
<td>Identifies the Frequency Band in which the Carrier can be found. Details can be found in C.S0057 [24, Table 1.5].</td>
</tr>
<tr>
<td><strong>bandClassList</strong></td>
<td>List of CDMA2000 frequency bands.</td>
</tr>
<tr>
<td><strong>cellReselectionParameters1XRTT</strong></td>
<td>Cell reselection parameters applicable only to CDMA2000 1xRTT system.</td>
</tr>
<tr>
<td><strong>cellReselectionParameters1XRTT-Ext</strong></td>
<td>Cell reselection parameters applicable for cell reselection to CDMA2000 1XRTT system.</td>
</tr>
<tr>
<td><strong>cellReselectionParameters1XRTT-v920</strong></td>
<td>Cell reselection parameters applicable for cell reselection to CDMA2000 1XRTT system. The field is not present if cellReselectionParameters1XRTT is not present; otherwise it is optionally present.</td>
</tr>
<tr>
<td><strong>cellReselectionParametersHRPD</strong></td>
<td>Cell reselection parameters applicable for cell reselection to CDMA2000 HRPD system</td>
</tr>
<tr>
<td><strong>cellReselectionParametersHRPD-Ext</strong></td>
<td>Cell reselection parameters applicable for cell reselection to CDMA2000 HRPD system.</td>
</tr>
<tr>
<td><strong>cellReselectionParametersHRPD-v920</strong></td>
<td>Cell reselection parameters applicable for cell reselection to CDMA2000 HRPD system. The field is not present if cellReselectionParametersHRPD is not present; otherwise it is optionally present.</td>
</tr>
<tr>
<td><strong>csfb-DualRxTxSupport</strong></td>
<td>Value TRUE indicates that the network supports dual Rx/Tx enhanced 1xCSFB, which enables UEs capable of dual Rx/Tx enhanced 1xCSFB to switch off their 1xRTT receiver/transmitter while camped in E-UTRAN [51].</td>
</tr>
<tr>
<td><strong>csfb-RegistrationParam1XRTT</strong></td>
<td>Contains the parameters the UE will use to determine if it should perform a CDMA2000 1xRTT Registration/Re-Registration. This field is included if either CSFB or enhanced CS fallback to CDMA2000 1xRTT is supported.</td>
</tr>
<tr>
<td><strong>csfb-SupportForDualRxUEs</strong></td>
<td>Value TRUE indicates that the network supports dual Rx CSFB [51].</td>
</tr>
<tr>
<td><strong>longCodeState1XRTT</strong></td>
<td>The state of long code generation registers in CDMA2000 1XRTT system as defined in C.S0002 [12, Section 1.3] at [\frac{t}{10}\times 10 + 320 \text{ ms}, \text{where } t \text{ equals to the cdma-SystemTime.} ] This field is required for reporting CGI for 1xRTT, SRVCC handover and enhanced CS fallback to CDMA2000 1xRTT operation. Otherwise this IE is not needed. This field is excluded when estimating changes in system information, i.e. changes of longCodeState1XRTT should neither result in system information change notifications nor in a modification of systemInfoValueTag in SIB1.</td>
</tr>
<tr>
<td><strong>neighCellList</strong></td>
<td>List of CDMA2000 neighbouring cells. The total number of neighbouring cells in neighCellList for each RAT (1XRTT or HRPD) is limited to 32.</td>
</tr>
<tr>
<td><strong>neighCellList-v920</strong></td>
<td>Extended List of CDMA2000 neighbouring cells. The combined total number of CDMA2000 neighbouring cells in both neighCellList and neighCellList-v920 is limited to 32 for HRPD and 40 for 1xRTT.</td>
</tr>
</tbody>
</table>
SystemInformationBlockType8 field descriptions

**neighCellsPerFreqList**
List of carrier frequencies and neighbour cell ids in each frequency within a CDMA2000 Band, see C.S0002 [12] or C.S0024 [26].

**neighCellsPerFreqList-v920**
Extended list of neighbour cell ids, in the same CDMA2000 Frequency Band as the corresponding instance in 'NeighCellListCDMA2000'.

**parameters1XRTT**
Parameters applicable for interworking with CDMA2000 1XRTT system.

**parametersCDMA2000**
Provides the corresponding SIB8 parameters for the CDMA2000 network associated with the PLMN indicated in plmn-Identity. A choice is used to indicate whether for this PLMN the parameters are signalled explicitly or set to the (default) values common for all PLMNs i.e. the values not included in sib8-PerPLMN-List.

**parametersHRPD**
Parameters applicable only for interworking with CDMA2000 HRPD systems.

**physCellIdList**
Identifies the list of CDMA2000 cell ids, see C.S0002 [12] or C.S0024 [26].

**physCellIdList-v920**
Extended list of CDMA2000 cell ids, in the same CDMA2000 ARFCN as the corresponding instance in 'NeighCellsPerBandclassCDMA2000'.

**plmn-Identity**
Indicates the PLMN associated with this CDMA2000 network. Value 1 indicates the PLMN listed 1st in plmn-IdentityList included in SIB1, value 2 indicates the PLMN listed 2nd in plmn-IdentityList included in SIB1 and so on. A PLMN which identity is not indicated in the sib8-PerPLMN-List, does not support inter-working with CDMA2000.

**preRegistrationInfoHRPD**
The CDMA2000 HRPD Pre-Registration Information tells the UE if it should pre-register with the CDMA2000 HRPD network and identifies the Pre-registration zone to the UE.

**searchWindowSize**
The search window size is a CDMA2000 parameter to be used to assist in searching for the neighbouring pilots. For values see C.S0005 [25, Table 8.6.6.2.1-1] and C.S0024 [26, Table 8.7.6.2-4]. This field is required for a UE with rx-ConfigHRPD= single and/ or rx-Config1XRTT= single to perform handover, cell re-selection, UE measurement based redirection and enhanced 1xRTT CS fallback from E-UTRAN to CDMA2000 according to this specification and TS 36.304 [4].

**sib8-PerPLMN-List**
This field provides the values for the interworking CDMA2000 networks corresponding, if any, to the UE’s RPLMN.

**systemTimeInfo**
Information on CDMA2000 system time. This field is required for a UE with rx-ConfigHRPD= single and/ or rx-Config1XRTT= single to perform handover, cell re-selection, UE measurement based redirection and enhanced 1xRTT CS fallback from E-UTRAN to CDMA2000 according to this specification and TS 36.304 [4]. This field is excluded when estimating changes in system information, i.e. changes of systemTimeInfo should neither result in system information change notifications nor in a modification of systemInfoValueTag in SIB1. For the field included in ParametersCDMA2000, a choice is used to indicate whether for this PLMN the parameters are signalled explicitly or set to the (default) value common for all PLMNs i.e. the value not included in sib8-PerPLMN-List.

**threshX-High**
Parameter 'ThreshX, HighP' in TS 36.304 [4]. This specifies the high threshold used in reselection towards this CDMA2000 band class expressed as an unsigned binary number equal to FLOOR (-2 x 10 x log10 Ec/Io) in units of 0.5 dB, as defined in C.S0005 [25].

**threshX-Low**
Parameter 'ThreshX, LowP' in TS 36.304 [4]. This specifies the low threshold used in reselection towards this CDMA2000 band class expressed as an unsigned binary number equal to FLOOR (-2 x 10 x log10 Ec/Io) in units of 0.5 dB, as defined in C.S0005 [25].

**t-ReselectionCDMA2000**
Parameter 'TreselectionCDMA_HRPD' or 'TreselectionCDMA_1xRTT' in TS 36.304 [4].

**t-ReselectionCDMA2000-SF**
Parameter ‘Speed dependent ScalingFactor for TreselectionCDMA_HRPD’ or TreselectionCDMA_1xRTT’ in TS 36.304 [4]. If the field is not present, the UE behaviour is specified in TS 36.304 [4].
## Conditional presence

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCL-1XRTT</td>
<td>The field is optional present, need OR, if <code>cellReselectionParameters1xRTT</code> is present; otherwise it is not present.</td>
</tr>
<tr>
<td>NCL-HRPD</td>
<td>The field is optional present, need OR, if <code>cellReselectionParametersHRPD</code> is present; otherwise it is not present.</td>
</tr>
<tr>
<td>PerPLMN-LC</td>
<td>The field is optional present, need OR, if <code>cellReselectionParametersHRPD</code> is present; otherwise it is not present.</td>
</tr>
<tr>
<td>REG-1XRTT</td>
<td>The field is optional present, need OR, if <code>csfb-RegistrationParam1XRTT</code> is present; otherwise it is not present.</td>
</tr>
<tr>
<td>REG-1XRTT-PerPLMN</td>
<td>The field is optional present, need OR, if <code>csfb-RegistrationParam1XRTT</code> is included in <code>SIB8PerPLMN</code> for this CDMA2000 network; otherwise it is not present.</td>
</tr>
</tbody>
</table>

### SystemInformationBlockType9

The IE `SystemInformationBlockType9` contains a home eNB name (HNB Name).

**SystemInformationBlockType9 information element**

```asn1
SystemInformationBlockType9 ::= SEQUENCE {
  hnb-Name       OCTET STRING (SIZE(1..48)) OPTIONAL, -- Need OR
  ...,
  lateNonCriticalExtension    OCTET STRING    OPTIONAL
}
```

**SystemInformationBlockType9 field descriptions**

**hnb-Name**

Carries the name of the home eNB, coded in UTF-8 with variable number of bytes per character, see TS 22.011 [10].

### SystemInformationBlockType10

The IE `SystemInformationBlockType10` contains an ETWS primary notification.

**SystemInformationBlockType10 information element**

```asn1
SystemInformationBlockType10 ::= SEQUENCE {
  messageIdentifier     BIT STRING (SIZE (16)),
  serialNumber      OCTET STRING (SIZE (16)),
  warningType       OCTET STRING (SIZE (2)),
  dummy        OCTET STRING (SIZE (50)) OPTIONAL,  -- Need OP
  ...,
  lateNonCriticalExtension    OCTET STRING    OPTIONAL
}
SystemInformationBlockType10 field descriptions

messageIdentifier
Identifies the source and type of ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.44]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.1], while the trailing bit contains bit 0 of the second octet of the same equivalent IE.

serialNumber
Identifies variations of an ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.45]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.2], while the trailing bit contains bit 0 of the second octet of the same equivalent IE.

dummy
This field is not used in the specification. If received it shall be ignored by the UE.

warningType
Identifies the warning type of the ETWS primary notification and provides information on emergency user alert and UE popup. The first octet (which is equivalent to the first octet of the equivalent IE defined in TS 36.413 [39, 9.2.1.50]) contains the first octet of the equivalent IE defined in and encoded according to TS 23.041 [37, 9.3.24], and so on.

-- SystemInformationBlockType11

The IE SystemInformationBlockType11 contains an ETWS secondary notification.

SystemInformationBlockType11 information element

-- ASN1START

SystemInformationBlockType11 ::= SEQUENCE {
  messageIdentifier     BIT STRING (SIZE (16)),
  serialNumber      BIT STRING (SIZE (16)),
  warningMessageSegmentType   ENUMERATED {notLastSegment, lastSegment},
  warningMessageSegmentNumber   INTEGER (0..63),
  warningMessageSegment    OCTET STRING,
  dataCodingScheme     OCTET STRING (SIZE (1))   OPTIONAL,  -- Cond Segment1
  ...
  lateNonCriticalExtension   OCTET STRING     OPTIONAL
}

-- ASN1STOP
ETSI TS 136 331 V13.3.0 (2016-10)

### SystemInformationBlockType11 field descriptions

<table>
<thead>
<tr>
<th><strong>dataCodingScheme</strong></th>
<th>Identifies the alphabet/coding and the language applied variations of an ETWS notification. The octet (which is equivalent to the octet of the equivalent IE defined in TS 23.041 [37, 9.4.3.2.3] and encoded according to TS 23.038 [38]).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>messageIdentifier</strong></td>
<td>Identifies the source and type of ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 23.041 [37, 9.4.3.2.1], while the trailing bit contains bit 0 of second octet of the same equivalent IE.</td>
</tr>
<tr>
<td><strong>serialNumber</strong></td>
<td>Identifies variations of an ETWS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 23.041 [37, 9.4.3.2.2], while the trailing bit contains bit 0 of second octet of the same equivalent IE.</td>
</tr>
<tr>
<td><strong>warningMessageSegment</strong></td>
<td>Carries a segment of the Warning Message Contents IE defined in TS 23.041 [37, 9.4.2.2.5] and so on.</td>
</tr>
<tr>
<td><strong>warningMessageSegmentNumber</strong></td>
<td>Segment number of the ETWS warning message segment contained in the SIB. A segment number of zero corresponds to the first segment, one corresponds to the second segment, and so on.</td>
</tr>
<tr>
<td><strong>warningMessageSegmentType</strong></td>
<td>Indicates whether the included ETWS warning message segment is the last segment or not.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Conditional presence</strong></th>
<th><strong>Explanation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment1</td>
<td>The field is mandatory present in the first segment of SIB11, otherwise it is not present.</td>
</tr>
</tbody>
</table>

### SystemInformationBlockType12

The IE SystemInformationBlockType12 contains a CMAS notification.

#### SystemInformationBlockType12 information element

```plaintext
-- ASN1START

SystemInformationBlockType12-r9 ::= SEQUENCE {
  messageIdentifier-r9     BIT STRING (SIZE (16)),
  serialNumber-r9      BIT STRING (SIZE (16)),
  warningMessageSegmentType-r9  ENUMERATED {notLastSegment, lastSegment},
  warningMessageSegmentNumber-r9  INTEGER (0..63),
  warningMessageSegment-r9   OCTET STRING,
  dataCodingScheme-r9     OCTET STRING (SIZE (1))   OPTIONAL,  -- Cond Segment1
  lateNonCriticalExtension OCTET STRING     OPTIONAL,
  ...
}

-- ASN1STOP
```
**SystemInformationBlockType12 field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dataCodingScheme</td>
<td>Identifies the alphabet/coding and the language applied variations of a CMAS notification. The octet (which is equivalent to the octet of the equivalent IE defined in TS 36.413 [39, 9.2.1.52]) contains the octet of the equivalent IE defined in TS 23.041 [37, 9.4.3.2.3] and encoded according to TS 23.038 [38].</td>
</tr>
<tr>
<td>messageIdentifier</td>
<td>Identifies the source and type of CMAS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.44]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.1], while the trailing bit contains bit 0 of second octet of the same equivalent IE.</td>
</tr>
<tr>
<td>serialNumber</td>
<td>Identifies variations of a CMAS notification. The leading bit (which is equivalent to the leading bit of the equivalent IE defined in TS 36.413 [39, 9.2.1.45]) contains bit 7 of the first octet of the equivalent IE, defined in and encoded according to TS 23.041 [37, 9.4.3.2.2], while the trailing bit contains bit 0 of second octet of the same equivalent IE.</td>
</tr>
<tr>
<td>warningMessageSegment</td>
<td>Carries a segment of the Warning Message Contents IE defined in TS 36.413 [39]. The first octet of the Warning Message Contents IE is equivalent to the first octet of the CB data IE defined in and encoded according to TS 23.041 [37, 9.4.2.2.5] and so on.</td>
</tr>
<tr>
<td>warningMessageSegmentNumber</td>
<td>Segment number of the CMAS warning message segment contained in the SIB. A segment number of zero corresponds to the first segment, one corresponds to the second segment, and so on.</td>
</tr>
<tr>
<td>warningMessageSegmentType</td>
<td>Indicates whether the included CMAS warning message segment is the last segment or not.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment1</td>
<td>The field is mandatory present in the first segment of SIB12, otherwise it is not present.</td>
</tr>
</tbody>
</table>

---

**SystemInformationBlockType13**

The IE SystemInformationBlockType13 contains the information required to acquire the MBMS control information associated with one or more MBSFN areas.

**SystemInformationBlockType13 information element**

```asn1
SystemInformationBlockType13-r9 ::= SEQUENCE {
  mbsfn-AreaInfoList-r9 MBSFN-AreaInfoList-r9,
  notificationConfig-r9 MBMS-NotificationConfig-r9,
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  ...
}
```

---

**SystemInformationBlockType13 field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>notificationConfig</td>
<td>Indicates the MBMS notification related configuration parameters. The UE shall ignore this field when dl-Bandwidth included in MasterInformationBlock is set to n6.</td>
</tr>
</tbody>
</table>

---

**SystemInformationBlockType14**

The IE SystemInformationBlockType14 contains the EAB parameters.
SystemInformationBlockType14 information element

--- ASN1START

SystemInformationBlockType14-r11 ::= SEQUENCE {
  eab-Param-r11 CHOICE {
    eab-Common-r11 EAB-Config-r11,
    eab-PerPLMN-List-r11 SEQUENCE (SIZE (1..maxPLMN-r11)) OF EAB-ConfigPLMN-r11
  } OPTIONAL, -- Need OR
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  ...
}

EAB-ConfigPLMN-r11 ::= SEQUENCE {
  eab-Config-r11 EAB-Config-r11 OPTIONAL -- Need OR
}

EAB-Config-r11 ::= SEQUENCE {
  eab-Category-r11 ENUMERATED {a, b, c},
  eab-BarringBitmap-r11 BIT STRING (SIZE (10))
}

--- ASN1STOP

SystemInformationBlockType14 field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>eab-BarringBitmap</td>
<td>Extended access class barring for AC 0-9. The first/ leftmost bit is for AC 0, the second bit is for AC 1, and so on.</td>
</tr>
<tr>
<td>eab-Category</td>
<td>Indicates the category of UEs for which EAB applies. Value a corresponds to all UEs, value b corresponds to the UEs that are neither in their HPLMN nor in a PLMN that is equivalent to it, and value c corresponds to the UEs that are neither in the PLMN listed as most preferred PLMN of the country where the UEs are roaming in the operator-defined PLMN selector list on the USIM, nor in their HPLMN nor in a PLMN that is equivalent to their HPLMN, see TS 22.011 [10].</td>
</tr>
<tr>
<td>eab-Common</td>
<td>The EAB parameters applicable for all PLMN(s).</td>
</tr>
<tr>
<td>eab-PerPLMN-List</td>
<td>The EAB parameters per PLMN, listed in the same order as the PLMN(s) occur in plmn-IdentityList in SystemInformationBlockType1.</td>
</tr>
</tbody>
</table>

– SystemInformationBlockType15

The IE SystemInformationBlockType15 contains the MBMS Service Area Identities (SAI) of the current and/ or neighbouring carrier frequencies.
SystemInformationBlockType15 information element

-- ASN1START

SystemInformationBlockType15-r11 ::= SEQUENCE {
  mbms-SAI-IntraFreq-r11     MBMS-SAI-List-r11 OPTIONAL, -- Need OR
  mbms-SAI-InterFreqList-r11    MBMS-SAI-InterFreqList-r11 OPTIONAL, -- Need OR
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  ...
  [[ mbms-SAI-InterFreqList-v1140  MBMS-SAI-InterFreqList-v1140 OPTIONAL -- Cond InterFreq
    ]]
}

MBMS-SAI-List-r11 ::= SEQUENCE (SIZE (1..maxSAI-MBMS-r11)) OF MBMS-SAI-r11

MBMS-SAI-r11 ::= INTEGER (0..65535)

MBMS-SAI-InterFreqList-r11 ::= SEQUENCE (SIZE (1..maxFreq)) OF MBMS-SAI-InterFreq-r11

MBMS-SAI-InterFreqList-v1140 ::= SEQUENCE (SIZE (1..maxFreq)) OF MBMS-SAI-InterFreq-v1140

MBMS-SAI-InterFreq-r11 ::= SEQUENCE {
  dl-CarrierFreq-r11      ARFCN-ValueEUTRA-r9,
  mbms-SAI-List-r11      MBMS-SAI-List-r11
}

MBMS-SAI-InterFreq-v1140 ::= SEQUENCE {
  multiBandInfoList-r11    MultiBandInfoList-r11 OPTIONAL -- Need OR
}

-- ASN1STOP
### SystemInformationBlockType15 field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>mbms-SAI-InterFreqList</td>
<td>Contains a list of neighboring frequencies including additional bands, if any, that provide MBMS services and the corresponding MBMS SAIIs.</td>
</tr>
<tr>
<td>mbms-SAI-IntraFreq</td>
<td>Contains the list of MBMS SAIIs for the current frequency. A duplicate MBMS SAI indicates that this and all following SAIIs are not offered by this cell but only by neighbour cells on the current frequency. For MBMS service continuity, the UE shall use all MBMS SAIIs listed in mbms-SAI-IntraFreq to derive the MBMS frequencies of interest.</td>
</tr>
<tr>
<td>mbms-SAI-List</td>
<td>Contains a list of MBMS SAIIs for a specific frequency.</td>
</tr>
<tr>
<td>multiBandInfoList</td>
<td>A list of additional frequency bands applicable for the cells participating in the MBSFN transmission.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>InterFreq</td>
<td>The field is optionally present, need OR, if the mbms-SAI-InterFreqList-r11 is present. Otherwise it is not present.</td>
</tr>
</tbody>
</table>

### SystemInformationBlockType16

The IE SystemInformationBlockType16 contains information related to GPS time and Coordinated Universal Time (UTC). The UE may use the parameters provided in this system information block to obtain the UTC, the GPS and the local time.

**NOTE:** The UE may use the time information for numerous purposes, possibly involving upper layers e.g. to assist GPS initialisation, to synchronise the UE clock (a.o. to determine MBMS session start/stop).

### SystemInformationBlockType16 information element

```
-- ASN1START

SystemInformationBlockType16-r11 ::= SEQUENCE {
  timeInfo-r11
    SEQUENCE {
      timeInfoUTC-r11            INTEGER (0..549755813887),
      dayLightSavingTime-r11     BIT STRING (SIZE (2)) OPTIONAL, -- Need OR
      leapSeconds-r11            INTEGER (-127..128) OPTIONAL, -- Need OR
      localTimeOffset-r11        INTEGER (-63..64) OPTIONAL, -- Need OR
    } OPTIONAL, -- Need OR
  lateNonCriticalExtension     OCTET STRING OPTIONAL,
  ...
}

-- ASN1STOP
```
### SystemInformationBlockType16 field descriptions

**dayLightSavingTime**
It indicates if and how daylight saving time (DST) is applied to obtain the local time. The semantics is the same as the semantics of the Daylight Saving Time IE in TS 24.301 [35] and TS 24.008 [49]. The first/leftmost bit of the bit string contains the b2 of octet 3, i.e. the value part of the Daylight Saving Time IE, and the second bit of the bit string contains b1 of octet 3.

**leapSeconds**
Number of leap seconds offset between GPS Time and UTC. UTC and GPS time are related i.e. GPS time = UTC time + leapSeconds.

**localTimeOffset**
Offset between UTC and local time in units of 15 minutes. Actual value = field value * 15 minutes. Local time of the day is calculated as UTC time + localTimeOffset.

**timeInfoUTC**
Coordinated Universal Time corresponding to the SFN boundary at or immediately after the ending boundary of the SI-window in which SystemInformationBlockType16 is transmitted. The field counts the number of UTC seconds in 10 ms units since 00:00:00 on Gregorian calendar date 1 January, 1900 (midnight between Sunday, December 31, 1899 and Monday, January 1, 1900), including leap seconds and other additions prior to 1972. NOTE 1. This field is excluded when estimating changes in system information, i.e. changes of timeInfoUTC should neither result in system information change notifications nor in a modification of systemInfoValueTag in SIB1.

**NOTE 1:** For the sake of the field definition, it is assumed UTC existed prior to 1 January 1972. As this field counts total elapsed time, conversion to calendar UTC time needs to allow for leap second and other calendar adjustments since 1 January 1900. For example, time 00:00 on 1 January 1972 UTC corresponds to a timeInfoUTC of 2,272,060,800 seconds.

---

**SystemInformationBlockType17**
The IE SystemInformationBlockType17 contains information relevant for traffic steering between E-UTRAN and WLAN.

### SystemInformationBlockType17 information element

---

---

---

WLAN-Identifiers-r12 ::= SEQUENCE {
    ssid-r12       OCTET STRING (SIZE (1..32))  OPTIONAL, -- Need OR
    bssid-r12      OCTET STRING (SIZE (6))    OPTIONAL, -- Need OR
    hessid-r12     OCTET STRING (SIZE (6))    OPTIONAL, -- Need OR
    ...
}

-- ASN1STOP

<table>
<thead>
<tr>
<th><strong>SystemInformationBlockType17 field descriptions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>bssid</strong></td>
</tr>
<tr>
<td><strong>hessid</strong></td>
</tr>
<tr>
<td><strong>ssid</strong></td>
</tr>
</tbody>
</table>

**wlan-OffloadInfoPerPLMN-List**
The WLAN offload configuration per PLMN includes the same number of entries, listed in the same order as the PLMN(s) in **plmn-IdentityList** in **SystemInformationBlockType1**.

---

**SystemInformationBlockType18**
The IE **SystemInformationBlockType18** indicates E-UTRAN supports the sidelink UE information procedure and may contain sidelink communication related resource configuration information.

<table>
<thead>
<tr>
<th><strong>SystemInformationBlockType18 information element</strong></th>
</tr>
</thead>
</table>

SystemInformationBlockType18-r12 ::= SEQUENCE {
    commConfig-r12         SEQUENCE {
        commRxPool-r12    SL-CommRxPoolList-r12,
        commTxPoolNormalCommon-r12  SL-CommTxPoolList-r12  OPTIONAL, -- Need OR
        commTxPoolExceptional-r12   SL-CommTxPoolList-r12   OPTIONAL, -- Need OR
        commSyncConfig-r12       SL-SyncConfigList-r12  OPTIONAL -- Need OR
    }                  OPTIONAL, -- Need OR
    lateNonCriticalExtension OCTET STRING          OPTIONAL,
    ...
[ [ commTxPoolNormalCommonExt-r13   SL-CommTxPoolListExt-r13 OPTIONAL, -- Need OR
  commTxResourceUC-ReqAllowed-r13 ENUMERATED {true}  OPTIONAL, -- Need OR
  commTxAllowRelayCommon-r13    ENUMERATED {true}   OPTIONAL -- Need OR
]
**SystemInformationBlockType18 field descriptions**

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>commRxPool</code></td>
<td>Indicates the resources by which the UE is allowed to receive sidelink communication while in RRC_IDLE and while in RRC_CONNECTED.</td>
</tr>
<tr>
<td><code>commSyncConfig</code></td>
<td>Indicates the configuration by which the UE is allowed to receive and transmit synchronisation information. E-UTRAN configures <code>commSyncConfig</code> including <code>txParameters</code> when configuring UEs by dedicated signalling to transmit synchronisation information.</td>
</tr>
<tr>
<td><code>commTxAllowRelayCommon</code></td>
<td>Indicates whether the UE is allowed to transmit relay related sidelink communication data using the transmission pools included in <code>SystemInformationBlockType18</code> i.e. either via <code>commTxPoolNormalCommon</code>, <code>commTxPoolNormalCommonExt</code> or via <code>commTxPoolExceptional</code>.</td>
</tr>
<tr>
<td><code>commTxPoolNormalCommon</code></td>
<td>Indicates the resources by which the UE is allowed to transmit sidelink communication in exceptional conditions, as specified in 5.10.4.</td>
</tr>
<tr>
<td><code>commTxPoolNormalCommonExt</code></td>
<td>Indicates the resources by which the UE is allowed to transmit sidelink communication while in RRC_IDLE or when in RRC_CONNECTED while transmitting sidelink via a frequency other than the primary.</td>
</tr>
<tr>
<td><code>commTxPoolExceptional</code></td>
<td>Indicates transmission resource pool(s) in addition to the pool(s) indicated by field <code>commTxPoolNormalCommon</code>, by which the UE is allowed to transmit sidelink communication while in RRC_IDLE or when in RRC_CONNECTED while transmitting sidelink via a frequency other than the primary. E-UTRAN configures <code>commTxPoolNormalCommonExt</code> only when it configures <code>commTxPoolNormalCommon</code>.</td>
</tr>
<tr>
<td><code>commTxResourceUC-ReqAllowed</code></td>
<td>Indicates whether the UE is allowed to request transmission pools for non-relay related one-to-one sidelink communication.</td>
</tr>
</tbody>
</table>

---

**SystemInformationBlockType19**

The IE `SystemInformationBlockType19` indicates E-UTRAN supports the sidelink UE information procedure and may contain sidelink discovery related resource configuration information.

---

**SystemInformationBlockType19 information element**

---

SystemInformationBlockType19-r12 ::= SEQUENCE {  
  discConfig-r12  SEQUENCE {  
    discRxPool-r12  SL-DiscRxPoolList-r12,  
    discTxPoolCommon-r12  SL-DiscTxPoolList-r12 OPTIONAL, -- Need OR  
    discTxPowerInfo-r12  SL-DiscTxPowerInfoList-r12 OPTIONAL, -- Cond Tx  
    discSyncConfig-r12  SL-SyncConfigList-r12 OPTIONAL -- Need OR  
  } OPTIONAL, -- Need OR  
  discInterFreqList-r12  SL-CarrierFreqInfoList-r12 OPTIONAL, -- Need OR  
  lateNonCriticalExtension  OCTET STRING OPTIONAL,  
}
..., [  
  discConfig-v1310  SEQUENCE {  
    discInterFreqList-v1310  SL-CarrierFreqInfoList-v1310  OPTIONAL, -- Need OR  
    gapRequestsAllowedCommon  ENUMERATED {true}  OPTIONAL -- Need OR  
  }  OPTIONAL, -- Need OR  
  discConfigRelay-r13  SEQUENCE {  
    relayUE-Config-r13  SL-DiscConfigRelayUE-r13,  
    remoteUE-Config-r13  SL-DiscConfigRemoteUE-r13  
  }  OPTIONAL, -- Need OR  
  discConfigPS-13  SEQUENCE {  
    discRxPoolPS-r13  SL-DiscRxPoolList-r12,  
    discTxPoolPS-Common-r13  SL-DiscTxPoolList-r12  OPTIONAL -- Need OR  
  }  OPTIONAL -- Need OR  
}  ]

SL-CarrierFreqInfoList-r12 ::= SEQUENCE (SIZE (1..maxFreq)) OF SL-CarrierFreqInfo-r12

SL-CarrierFreqInfoList-v1310 ::= SEQUENCE (SIZE (1..maxFreq)) OF SL-CarrierFreqInfo-v1310

SL-CarrierFreqInfo-r12::=   SEQUENCE {  
    carrierFreq-r12      ARFCN-ValueEUTRA-r9,  
    plmn-IdentityList-r12   PLMN-IdentityList4-r12   OPTIONAL -- Need OP  
  }

SL-DiscConfigRelayUE-r13 ::= SEQUENCE {  
    threshHigh-r13   RSRP-RangeSL4-r13      OPTIONAL, -- Need OR  
    threshLow-r13   RSRP-RangeSL4-r13      OPTIONAL, -- Need OR  
    hystMax-r13    ENUMERATED {dB0, dB3, dB6, dB9, dB12, dBinf} OPTIONAL, -- Cond ThreshHigh  
    hystMin-r13    ENUMERATED {dB0, dB3, dB6, dB9, dB12} OPTIONAL -- Cond ThreshLow  
  }

SL-DiscConfigRemoteUE-r13 ::= SEQUENCE {  
    threshHigh-r13   RSRP-RangeSL4-r13      OPTIONAL, -- Need OR  
    hystMax-r13    ENUMERATED {dB0, dB3, dB6, dB9, dB12} OPTIONAL, -- Cond ThreshHigh  
  }
reselectionInfoIC-r13  ReselectionInfoRelay-r13

ReselectionInfoRelay-r13 ::=  SEQUENCE {
q-RxLevMin-r13     Q-RxLevMin,  -- Note that the mapping of individual values may be different for PC5, but the granularity/
filterCoefficient-r13   FilterCoefficient,  -- number of values is same as for Uu
minHyst-r13     ENUMERATED {dB0, dB3, dB6, dB9, dB12, dBinf} OPTIONAL  -- Need OR
}

SL-CarrierFreqInfo-v1310 ::=  SEQUENCE {
discResourcesNonPS-r13   SL-ResourcesInterFreq-r13  OPTIONAL,  -- Need OR
discResourcesPS-r13    SL-ResourcesInterFreq-r13  OPTIONAL,  -- Need OR
discConfigOther-r13   SL-DiscConfigOtherInterFreq-r13  OPTIONAL,  -- Need OR
...  
}

PLMN-IdentityList4-r12 ::=SEQUENCE (SIZE (1..maxPLMN-r11)) OF PLMN-IdentityInfo2-r12

PLMN-IdentityInfo2-r12 ::=  CHOICE {
plmn-Index-r12     INTEGER (1..maxPLMN-r11),
plmnIdentity-r12    PLMN-Identity
}

SL-DiscTxResourcesInterFreq-r13 ::=  CHOICE {
acquireSI-FromCarrier-r13  NULL,
discTxPoolCommon-r13   SL-DiscTxPoolList-r12,
requestDedicated-r13   NULL,
noTxOnCarrier-r13    NULL
}

SL-DiscConfigOtherInterFreq-r13 ::=  SEQUENCE {
taxPowerInfo-r13     SL-DiscTxPowerInfoList-r12  OPTIONAL,  -- Cond Tx
refCarrierCommon-r13 ENUMERATED {pCell} OPTIONAL, -- Need OR

discSyncConfig-r13 SL-SyncConfigListNFreq-r13 OPTIONAL, -- Need OR

discCellSelectionInfo-r13 CellSelectionInfoNFreq-r13 OPTIONAL -- Need OR

}  

SL-ResourcesInterFreq-r13 ::= SEQUENCE {

discRxResourcesInterFreq-r13 SL-DiscRxPoolList-r12 OPTIONAL, -- Need OR

discTxResourcesInterFreq-r13 SL-DiscTxResourcesInterFreq-r13 OPTIONAL -- Need OR

}

-- ASN1STOP

**SystemInformationBlockType19 field descriptions**

**discCellSelectionInfo**  
Parameters that may be used by the UE to select/ reselect a cell on the concerned non serving frequency. If absent, the UE acquires the information from the target cell on the concerned frequency. See TS 36.304 [4, 11.4].

**discInterFreqList**  
Indicates the neighbouring frequencies on which sidelink discovery announcement is supported. May also provide further information i.e. reception resource pool and/ or transmission resource pool, or an indication how resources could be obtained.

**discRxPool**  
Indicates the resources by which the UE is allowed to receive non-PS related sidelink discovery announcements while in RRC_IDLE and while in RRC_CONNECTED.

**discRxPoolPS**  
Indicates the resources by which the UE is allowed to receive PS related sidelink discovery announcements while in RRC_IDLE and while in RRC_CONNECTED.

**discRxResourcesInterFreq**  
Indicates the resource pool configuration for receiving discovery announcements on a carrier frequency.

**discSyncConfig**  
Indicates the configuration by which the UE is allowed to receive and transmit synchronisation information. E-UTRAN configures discSyncConfig including txParameters when configuring UEs by dedicated signalling to transmit synchronisation information.

**discTxPoolCommon**  
Indicates the resources by which the UE is allowed to transmit non-PS related sidelink discovery announcements while in RRC_IDLE.

**discTxPoolPS-Common**  
Indicates the resources by which the UE is allowed to transmit PS related sidelink discovery announcements while in RRC_IDLE.

**discRxResourcesInterFreq**  
For the concerned frequency, either provides the UE with a pool of sidelink discovery announcement transmission resources the UE is allowed to use while in RRC_IDLE, or indicates whether such transmission is allowed, and if so how the UE may obtain the required resources. Value noTxOnCarrier indicates that the UE is not allowed to transmit sidelink discovery announcements on the concerned frequency. Value acquireSI-FromCarrier indicates that the required resources are to be obtained by autonomously acquiring SIB19 and other relevant SIBs from the concerned frequency. Value requestDedicated indicates, that for the concerned carrier, the required sidelink discovery resources are to be obtained by means of a dedicated resource request using the SidelinkUEInformation message.
SystemInformationBlockType19 field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>plmn-IdentityList</td>
<td>List of PLMN identities for the neighbouring frequency indicated by carrierFreq. Absence of the field indicates the same PLMN identities as listed in plmn-IdentityList (without suffix) in SystemInformationBlockType1.</td>
</tr>
<tr>
<td>plmn-Index</td>
<td>Index of the corresponding entry in field plmn-IdentityList (without suffix) within SystemInformationBlockType1.</td>
</tr>
<tr>
<td>refCarrierCommon</td>
<td>Indicates if the PCell (RRC_CONNECTED)/ serving cell (RRC_IDLE) is to be used as reference for DL measurements and synchronisation, instead of the DL frequency paired with the one used to transmit sidelink discovery announcements on, see TS 36.213 [23, 14.3.1].</td>
</tr>
<tr>
<td>reselectionInfoIC</td>
<td>Includes the parameters used by the UE when selecting/ reselecting a sidelink relay UE.</td>
</tr>
<tr>
<td>SL-CarrierFreqInfoList-v1310</td>
<td>If included, the UE shall include the same number of entries, and listed in the same order, as in SL-CarrierFreqInfoList-r12.</td>
</tr>
<tr>
<td>threshHigh, threshLow (relayUE)</td>
<td>Indicates when a sidelink remote UE or sidelink relay UE that is in network coverage may use the broadcast PS related sidelink discovery Tx resource pool, if broadcast, or request Tx resources by dedicated signalling otherwise. For remote UEs, this parameter is used similarly for relay related sidelink communication.</td>
</tr>
</tbody>
</table>

Conditional presence

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ThreshHigh</td>
<td>The field is mandatory present if threshHigh is included in the corresponding IE. Otherwise the field is not present and UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>ThreshLow</td>
<td>The field is mandatory present if threshLow is included. Otherwise the field is not present. UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>Tx</td>
<td>The field is mandatory present if discTxPoolCommon is included. Otherwise the field is optional present, need OR.</td>
</tr>
</tbody>
</table>

SystemInformationBlockType20

The IE SystemInformationBlockType20 contains the information required to acquire the control information associated transmission of MBMS using SC-PTM.

SystemInformationBlockType20 information element

```
SystemInformationBlockType20-r13 ::= SEQUENCE {
    sc-mcch-RepetitionPeriod-r13 ENUMERATED {rf2, rf4, rf8, rf16, rf32, rf64, rf128, rf256},
    sc-mcch-Offset-r13 INTEGER (0..10),
    sc-mcch-FirstSubframe-r13 INTEGER (0..9),
    sc-mcch-duration-r13 INTEGER (2..9) OPTIONAL,
    sc-mcch-ModificationPeriod-r13 ENUMERATED {rf2, rf4, rf8, rf16, rf32, rf64, rf128, rf256, rf512, rf1024, r2048, rf4096, rf8192, rf16384, rf32768, rf65536},
    lateNonCriticalExtension OCTET STRING OPTIONAL,
    ...
}
```

-- ASN1STOP
### SystemInformationBlockType20 field descriptions

**sc-mcch-ModificationPeriod**
Defines periodically appearing boundaries, i.e. radio frames for which SFN mod \( sc-mcch-ModificationPeriod = 0 \). The contents of different transmissions of SC-MCCH information can only be different if there is at least one such boundary in-between them. Value rf2 corresponds to 2 radio frames, value rf4 corresponds to 4 radio frames and so on.

**sc-mcch-duration**
Indicates, starting from the subframe indicated by \( sc-mcch-FirstSubframe \), the duration in subframes during which SC-MCCH may be scheduled in PDCCH sub-frames, see TS 36.321 [8]. Absence of this IE means that SC-MCCH is only scheduled in the subframe indicated by \( sc-mcch-FirstSubframe \).

**sc-mcch-Offset**
Indicates, together with the \( sc-mcch-RepetitionPeriod \), the radio frames in which SC-MCCH is scheduled i.e. SC-MCCH is scheduled in radio frames for which: SFN mod \( sc-mcch-RepetitionPeriod = sc-mcch-Offset \).

**sc-mcch-FirstSubframe**
Indicates the first subframe in which SC-MCCH is scheduled.

**sc-mcch-RepetitionPeriod**
Defines the interval between transmissions of SC-MCCH information, in radio frames. Value rf2 corresponds to 2 radio frames, rf4 corresponds to 4 radio frames and so on.

### 6.3.2 Radio resource control information elements

#### AntennaInfo

The IE AntennaInfoCommon and the AntennaInfoDedicated are used to specify the common and the UE specific antenna configuration respectively.

#### AntennaInfo information elements

```asn1
AntennaInfoCommon ::= SEQUENCE {
  antennaPortsCount ENUMERATED {an1, an2, an4, spare1}
}

AntennaInfoDedicated ::= SEQUENCE {
  transmissionMode ENUMERATED {
    tm1, tm2, tm3, tm4, tm5, tm6,
    tm7, tm8-v920
  },
  codebookSubsetRestriction CHOICE {
    n2TxAntenna-tm3 BIT STRING (SIZE (2)),
    n4TxAntenna-tm3 BIT STRING (SIZE (4)),
    n2TxAntenna-tm4 BIT STRING (SIZE (6)),
    n4TxAntenna-tm4 BIT STRING (SIZE (64)),
    n2TxAntenna-tm5 BIT STRING (SIZE (4)),
    n4TxAntenna-tm5 BIT STRING (SIZE (16)),
    n2TxAntenna-tm6 BIT STRING (SIZE (4)),
    n4TxAntenna-tm6 BIT STRING (SIZE (16))
  }
```
}  OPTIONAL,  -- Cond TM

ue-TransmitAntennaSelection  CHOICE{
    release       NULL,
    setup        ENUMERATED {closedLoop, openLoop}
}

AntennaInfoDedicated-v920 ::= SEQUENCE {
    codebookSubsetRestriction-v920  CHOICE {
        n2TxAntenna-tm8-r9     BIT STRING (SIZE (6)),
        n4TxAntenna-tm8-r9     BIT STRING (SIZE (32))
    }  OPTIONAL                -- Cond TM8
}

AntennaInfoDedicated-r10 ::= SEQUENCE {
    transmissionMode-r10    ENUMERATED {
        tm1, tm2, tm3, tm4, tm5, tm6, tm7, tm8-v920,
        tm9-v1020, tm10-v1130, spare6, spare5, spare4,
        spare3, spare2, spare1},
    codebookSubsetRestriction-r10  BIT STRING   OPTIONAL,   -- Cond TMX
    ue-TransmitAntennaSelection  CHOICE{
        release       NULL,
        setup        ENUMERATED {closedLoop, openLoop}
    }
}

AntennaInfoDedicated-v10i0 ::= SEQUENCE {
    maxLayersMIMO-r10   ENUMERATED {twoLayers, fourLayers, eightLayers}  OPTIONAL -- Need OR
}

AntennaInfoDedicated-v1250 ::= SEQUENCE {
    alternativeCodebookEnabledFor4TX-r12  BOOLEAN
}
AntennaInfo field descriptions

alternativeCodebookEnabledFor4TX
Indicates whether code book in TS 36.213 [23] Table 7.2.4-0A to Table 7.2.4-0D is being used for deriving CSI feedback and reporting. E-UTRAN only configures the field if the UE is configured with a) tm8 with 4 CRS ports, tm9 or tm10 with 4 CSI-RS ports and b) PMI/RI reporting.

antennaPortsCount
Parameter represents the number of cell specific antenna ports where an1 corresponds to 1, an2 to 2 antenna ports etc. see TS 36.211 [21, 6.2.1].

codebookSubsetRestriction
Parameter: codebookSubsetRestriction, see TS 36.213 [23, 7.2] and TS 36.211 [21, 6.3.4.2.3]. The number of bits in the codebookSubsetRestriction for applicable transmission modes is defined in TS 36.213 [23, Table 7.2-1b]. If the UE is configured with transmissionMode tm8, E-UTRAN configures the field codebookSubsetRestriction if PMI/RI reporting is configured. If the UE is configured with transmissionMode tm9 or tm9. Furthermore, E-UTRAN does not configure the field codebookSubsetRestriction if the UE is configured with eMIMO-Type unless it is set to beamformed, alternativeCodebookEnabledBeamformed is set to FALSE and csi-RS-ConfigNZPIdListExt is not configured.

maxLayersMIMO
Indicates the maximum number of layers for spatial multiplexing used to determine the rank indication bit width and Kc determination of the soft buffer size for the corresponding serving cell according to TS 36.212 [22]. EUTRAN configures this field only when transmissionMode is set to tm3, tm4, tm9 or tm10 for the corresponding serving cell. When configuring the field for a serving cell which transmissionMode is set to tm3 or tm4, EUTRAN only configures value fourLayers: For a serving cell which transmissionMode is set to tm9 or tm10, EUTRAN only configures the field only if intraBandContiguousCC-InfoList is indicated for the band and the band combination of the corresponding serving cell or the UE supports maxLayersMIMO-Indication.

transmissionMode
Points to one of Transmission modes defined in TS 36.213 [23, 7.1] where tm1 refers to transmission mode 1, tm2 to transmission mode 2 etc.

ue-TransmitAntennaSelection
For value setup the field indicates whether UE transmit antenna selection control is closed-loop or open-loop as described in TS 36.213 [23, 8.7]. EUTRAN configures the same value for all serving cells.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM</td>
<td>The field is mandatory present if the transmissionMode is set to tm3, tm4, tm5 or tm6. Otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>TM8</td>
<td>The field is optional present, need OR, if AntennaInfoDedicated is included and transmissionMode is set to tm8. If AntennaInfoDedicated is included and transmissionMode is set to a value other than tm8, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present.</td>
</tr>
<tr>
<td>TMX</td>
<td>The field is mandatory present if the transmissionMode-r10 is set to tm3, tm4, tm5 or tm6. The field is optionally present, need OR, if the transmissionMode-r10 is set to tm8 or tm9. Otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>

-- AntennaInfoUL
The IE AntennaInfoUL is used to specify the UL antenna configuration.

AntennaInfoUL information elements

-- ASN1START

AntennaInfoUL-r10 ::= SEQUENCE {
  transmissionModeUL-r10 ENUMERATED {tm1, tm2, spare6, spare5, spare4, spare3, spare2, spare1} OPTIONAL, -- Need OR
  fourAntennaPortActivated-r10 ENUMERATED {setup} OPTIONAL -- Need OR
}
AntennaInfoUL field descriptions

fourAntennaPortActivated
Parameter indicates if four antenna ports are used. See TS 36.213 [23, 8.2]. E-UTRAN optionally configures fourAntennaPortActivated only if transmissionModeUL is set to tm2.

transmissionModeUL
Points to one of UL Transmission modes defined in TS 36.213 [23, 8.0] where tm1 refers to transmission mode 1, tm2 to transmission mode 2 etc.

-- CQI-ReportConfig

The IE CQI-ReportConfig is used to specify the CQI reporting configuration.

CQI-ReportConfig information elements

-- ASN1START

CQI-ReportConfig ::= SEQUENCE {
    cqi-ReportModeAperiodic  CQI-ReportModeAperiodic OPTIONAL, -- Need OR
    nomPDSCH-RS-EPRE-Offset  INTEGER (-1..6),
    cqi-ReportPeriodic  CQI-ReportPeriodic OPTIONAL -- Need ON
}

CQI-ReportConfig-v920 ::= SEQUENCE {
    cqi-Mask-r9      ENUMERATED {setup}  OPTIONAL, -- Cond cqi-Setup
    pmi-RI-Report-r9  ENUMERATED {setup}  OPTIONAL -- Cond PMIRI
}

CQI-ReportConfig-r10 ::= SEQUENCE {
    cqi-ReportAperiodic-r10  CQI-ReportAperiodic-r10 OPTIONAL, -- Need ON
    nomPDSCH-RS-EPRE-Offset  INTEGER (-1..6),
    cqi-ReportPeriodic-r10  CQI-ReportPeriodic-r10 OPTIONAL, -- Need ON
    pmi-RI-Report-r9  ENUMERATED {setup}  OPTIONAL, -- Cond PMIRIPCell
    csi-SubframePatternConfig-r10  CHOICE {
        release       NULL,
        setup       SEQUENCE {
            csi-MeasSubframeSet1-r10  MeasSubframePattern-r10,
            csi-MeasSubframeSet2-r10  MeasSubframePattern-r10
        }
    }
}
CQI-ReportConfig-v1130 ::= SEQUENCE {
    cqi-ReportPeriodic-v1130 CQI-ReportPeriodic-v1130,
    cqi-ReportBoth-r11 CQI-ReportBoth-r11
}

CQI-ReportConfig-v1250 ::= SEQUENCE {
    csi-SubframePatternConfig-r12 CHOICE {
        release NULL,
        setup SEQUENCE {
            csi-MeasSubframeSets-r12 BIT STRING (SIZE (10))
        }
    }
}

CQI-ReportConfig-v1310 ::= SEQUENCE {
    cqi-ReportBoth-v1310 CQI-ReportBoth-v1310 OPTIONAL, -- Need ON
    cqi-ReportAperiodic-v1310 CQI-ReportAperiodic-v1310 OPTIONAL, -- Need ON
    cqi-ReportPeriodic-v1310 CQI-ReportPeriodic-v1310 OPTIONAL -- Need ON
}

CQI-ReportConfig-v1320 ::= SEQUENCE {
    cqi-ReportPeriodic-v1320 CQI-ReportPeriodic-v1320 OPTIONAL -- Need ON
}

CQI-ReportConfigSCell-r10 ::= SEQUENCE {
    cqi-ReportModeAperiodic-r10 CQI-ReportModeAperiodic OPTIONAL, -- Need OR
}

}
nomPDSCH-RS-EPRE-Offset-r10 INTEGER (-1..6),
cqi-ReportPeriodicSCell-r10 CQI-ReportPeriodic-r10 OPTIONAL, -- Need ON
pmi-RI-Report-r10 ENUMERATED {setup} OPTIONAL -- Cond PMIRISCell

CQI-ReportPeriodic ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    cqi-PUCCH-ResourceIndex INTEGER (0..1185),
    cqi-pmi-ConfigIndex INTEGER (0..1023),
    cqi-FormatIndicatorPeriodic CHOICE {
      widebandCQI NULL,
      subbandCQI SEQUENCE {
        k INTEGER (1..4)
      }
    },
    ri-ConfigIndex INTEGER (0..1023) OPTIONAL, -- Need OR
    simultaneousAckNackAndCQI BOOLEAN
  }
}

CQI-ReportPeriodic-r10 ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    cqi-PUCCH-ResourceIndex-r10 INTEGER (0..1184),
    cqi-PUCCH-ResourceIndexP1-r10 INTEGER (0..1184) OPTIONAL, -- Need OR
    cqi-pmi-ConfigIndex INTEGER (0..1023),
    cqi-FormatIndicatorPeriodic-r10 CHOICE {
      widebandCQI-r10 SEQUENCE {
        csi-ReportMode-r10 ENUMERATED {submode1, submode2} OPTIONAL -- Need OR
      },
      subbandCQI-r10 SEQUENCE {
        k INTEGER (1..4),
        periodicityFactor-r10 ENUMERATED {n2, n4}
      }
    }
  }
}
simultaneousAckNackAndCQI     BOOLEAN,
cqi-Mask-r9     ENUMERATED {setup} OPTIONAL, -- Need OR
csi-ConfigIndex-r10    CHOICE {
    release     NULL,
    setup     SEQUENCE {
        cqi-pmi-ConfigIndex2-r10     INTEGER (0..1023),
        ri-ConfigIndex2-r10     INTEGER (0..1023) OPTIONAL  -- Need OR
    } } OPTIONAL                -- Need ON
}
}

temporaryAssignment ::= SEQUENCE {
    cqi-ReportPeriodic-v1130 ::= SEQUENCE {
        simultaneousAckNackAndCQI-Format3-r11  ENUMERATED {setup} OPTIONAL, -- Need OR
        cqi-ReportPeriodicProcExtToReleaseList-r11 CQI-ReportPeriodicProcExtToReleaseList-r11 OPTIONAL, -- Need ON
        cqi-ReportPeriodicProcExtToAddModList-r11 CQI-ReportPeriodicProcExtToAddModList-r11 OPTIONAL -- Need ON
    } } OPTIONAL                -- Need ON
}

temporaryAssignment ::= SEQUENCE {
    cqi-ReportPeriodic-v1310 ::= SEQUENCE {
        cri-ReportConfig-r13   CRI-ReportConfig-r13    OPTIONAL, -- Need OR
        simultaneousAckNackAndCQI-Format4-Format5-r13  ENUMERATED {setup} OPTIONAL-- Need OR
    } }

temporaryAssignment ::= SEQUENCE {
    cqi-ReportPeriodic-v1320 ::= SEQUENCE {
        periodicityFactorWB-r13     ENUMERATED {n2, n4} OPTIONAL -- Need OR
    } }

temporaryAssignment ::= SEQUENCE {
    CQI-ReportPeriodicProcExtToAddModList-r11 ::= SEQUENCE (SIZE (1..maxCQI-ProcExt-r11)) OF CQI-ReportPeriodicProcExt-r11
}

temporaryAssignment ::= SEQUENCE {
    CQI-ReportPeriodicProcExtToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxCQI-ProcExtId-r11)) OF CQI-ReportPeriodicProcExtId-r11
}
CQI-ReportPeriodicProcExt-r11 ::= SEQUENCE {
  cqi-ReportPeriodicProcExtId-r11    CQI-ReportPeriodicProcExtId-r11,
  cqi-pmi-ConfigIndex-r11    INTEGER (0..1023),
  cqi-FormatIndicatorPeriodic-r11    CHOICE {
    widebandCQI-r11    SEQUENCE {
      csi-ReportMode-r11    ENUMERATED {submode1, submode2} OPTIONAL -- Need OR
    },
    subbandCQI-r11    SEQUENCE {
      k        INTEGER (1..4),
      periodicityFactor-r11    ENUMERATED {n2, n4}
    }
  },
  ri-ConfigIndex-r11    INTEGER (0..1023)     OPTIONAL, -- Need OR
  csi-ConfigIndex-r11    CHOICE {
    release       NULL,
    setup        SEQUENCE {
      cqi-pmi-ConfigIndex2-r11    INTEGER (0..1023),
      ri-ConfigIndex2-r11    INTEGER (0..1023)  OPTIONAL  -- Need OR
    }
  }        OPTIONAL, -- Need ON
...
[[ cri-ReportConfig-r13    CRI-ReportConfig-r13    OPTIONAL -- Need ON ]],
[[ periodicityFactorWB-r13    ENUMERATED {n2, n4}    OPTIONAL -- Need ON ]]
}

CQI-ReportAperiodic-r10 ::= CHOICE {
  release        NULL,
  setup         SEQUENCE {
    cqi-ReportModeAperiodic-r10    CQI-ReportModeAperiodic,
    aperiodicCSI-Trigger-r10    SEQUENCE {
      trigger1-r10     BIT STRING (SIZE (8)),
      trigger2-r10     BIT STRING (SIZE (8))
    }
  }
...

CQI-ReportAperiodic-v1250 ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    aperiodicCSI-Trigger-v1250 SEQUENCE {
      trigger-SubframeSetIndicator-r12 ENUMERATED {s1, s2},
      trigger1-SubframeSetIndicator-r12 BIT STRING (SIZE (8)),
      trigger2-SubframeSetIndicator-r12 BIT STRING (SIZE (8))
    }
  }
}

CQI-ReportAperiodic-v1310 ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    aperiodicCSI-Trigger-v1310 SEQUENCE {
      trigger1-r13 BIT STRING (SIZE (32)),
      trigger2-r13 BIT STRING (SIZE (32)),
      trigger3-r13 BIT STRING (SIZE (32)),
      trigger4-r13 BIT STRING (SIZE (32)),
      trigger5-r13 BIT STRING (SIZE (32)),
      trigger6-r13 BIT STRING (SIZE (32))
    } OPTIONAL -- Need ON
    aperiodicCSI-Trigger2-r13 CHOICE {
      release NULL,
      setup SEQUENCE {
        trigger1-SubframeSetIndicator-r13 BIT STRING (SIZE (32)),
        trigger2-SubframeSetIndicator-r13 BIT STRING (SIZE (32)),
        trigger3-SubframeSetIndicator-r13 BIT STRING (SIZE (32)),
        trigger4-SubframeSetIndicator-r13 BIT STRING (SIZE (32)),
        trigger5-SubframeSetIndicator-r13 BIT STRING (SIZE (32)),
        trigger6-SubframeSetIndicator-r13 BIT STRING (SIZE (32))
      }
    }
  }
}
CQI-ReportAperiodicProc-r11 ::= SEQUENCE {
  cqi-ReportModeAperiodic-r11  CQI-ReportModeAperiodic,
  trigger01-r11      BOOLEAN,
  trigger10-r11      BOOLEAN,
  trigger11-r11      BOOLEAN
}

CQI-ReportAperiodicProc-v1310 ::= SEQUENCE {
  trigger001-r13      BOOLEAN,
  trigger010-r13      BOOLEAN,
  trigger011-r13      BOOLEAN,
  trigger100-r13      BOOLEAN,
  trigger101-r13      BOOLEAN,
  trigger110-r13      BOOLEAN,
  trigger111-r13      BOOLEAN
}

CQI-ReportModeAperiodic ::= ENUMERATED {
  rm12, rm20, rm22, rm30, rm31,
  rm32-v1250, rm10-v1310, rm11-v1310
}

CQI-ReportBoth-r11 ::= SEQUENCE {
  csi-IM-ConfigToReleaseList-r11  CSI-IM-ConfigToReleaseList-r11  OPTIONAL, -- Need ON
  csi-IM-ConfigToAddModList-r11  CSI-IM-ConfigToAddModList-r11  OPTIONAL, -- Need ON
  csi-ProcessToReleaseList-r11   CSI-ProcessToReleaseList-r11 OPTIONAL, -- Need ON
  csi-ProcessToAddModList-r11   CSI-ProcessToAddModList-r11  OPTIONAL -- Need ON
}

CQI-ReportBoth-v1250 ::= SEQUENCE {
  csi-IM-ConfigToReleaseList-r11  CSI-IM-ConfigToReleaseList-r11  OPTIONAL, -- Need ON
  csi-IM-ConfigToAddModList-r11  CSI-IM-ConfigToAddModList-r11  OPTIONAL, -- Need ON
  csi-ProcessToReleaseList-r11   CSI-ProcessToReleaseList-r11 OPTIONAL, -- Need ON
  csi-ProcessToAddModList-r11   CSI-ProcessToAddModList-r11  OPTIONAL -- Need ON
}
CQI-ReportBoth-v1310 ::= SEQUENCE {
csi-IM-ConfigToReleaseList-r13
csi-IM-ConfigToAddModList-r13
}

CSI-IM-ConfigToAddModList-r11 ::= SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF CSI-IM-Config-r11

CSI-IM-ConfigToAddModListExt-r13 ::= SEQUENCE (SIZE (1..maxCSI-IM-v1310)) OF CSI-IM-ConfigExt-r12

CSI-IM-ConfigToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxCSI-IM-r11)) OF CSI-IM-ConfigId-r11

CSI-IM-ConfigToReleaseListExt-r13 ::= SEQUENCE (SIZE (1..maxCSI-IM-v1310)) OF CSI-IM-ConfigId-v1310

CSI-ProcessToAddModList-r11 ::= SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF CSI-Process-r11

CSI-ProcessToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF CSI-ProcessId-r11

CQI-ReportBothProc-r11 ::= SEQUENCE {
ri-Ref-CSI-ProcessId-r11
csi-IM-ConfigToReleaseList-r13
csi-IM-ConfigToAddModList-r13
pmi-RI-Report-r11
}

CRI-ReportConfig-r13 ::= CHOICE {
release
setup
}

cri-ConfigIndex-r13 ::= INTEGER (0..1023)
3GPP TS 36.331 version 13.3.0 Release 13

shall use Table 7.2.3-1 in TS 36.213 [23] for all subframes and CSI processes, if configured.

configured)

to the two CSI subframe sets; otherwise EUTRAN sets the value to allSubframes. If this field is not present, the UE shall use Table 7.2.3-1 in TS 36.213 [23] for all subframes and CSI processes, if configured.

configured). EUTRAN configures the field only if the UE is configured with csi-MeasSubframeSets-r12.

cqi-Mask

Limits CQI/PMI/PTI/RI reports to the on-duration period of the DRX cycle, see TS 36.321 [6]. One value applies for all CSI processes and all serving cells (the associated functionality is common i.e. not performed independently for each cell).

Parameter: PUCCH CQI Feedback Type, see TS 36.213 [23, table 7.2.2-1]. Depending on transmissionMode, reporting mode is implicitly given from the table.

cqi-FormatIndicatorPeriodic

Parameter: CQI/PMI Periodicity and Offset Configuration Index l_{CQI/PMI}, see TS 36.213 [23, tables 7.2.2-1A and 7.2.2-1C]. If subframe patterns for CSI (CQI/PMI/PTI/RI) reporting are configured (i.e. csi-SubframePatternConfig is configured), the parameter applies to the subframe pattern corresponding to csi-SubframeSet1 or corresponding to the CSI subframe set 1 indicated by csi-MeasSubframeSets-r12.

cqi-pmi-ConfigIndex2

Parameter: CQI/PMI Periodicity and Offset Configuration Index l_{CQI/PMI}, see TS 36.213 [23, tables 7.2.2-1A and 7.2.2-1C]. The parameter applies to the subframe pattern corresponding to csi-MeasSubframeSet2 or corresponding to the CSI subframe set 2 indicated by csi-MeasSubframeSets-r12.

cqi-PUCCH-ResourceIndex, cqi-PUCCH-ResourceIndexP1

Parameter \( n_{(2,p)}^{(2,p)} \) for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 7.2]. E-UTRAN does not apply value 1185. One value applies for all CSI processes.

cqi-ReportAperiodic

E-UTRAN does not configure CQI-ReportAperiodic when transmission mode 10 is configured for all serving cells. E-UTRAN configures cqi-ReportAperiodic-v1250 only if cqi-ReportAperiodic-r10 and csi-MeasSubframeSets-r12 are configured. E-UTRAN configures cqi-ReportAperiodic-v1310 only if cqi-ReportAperiodic-r10 is configured.

cqi-ReportModeAperiodic

Parameter: reporting mode. Value rm12 corresponds to Mode 1-2, rm20 corresponds to Mode 2-0, rm22 corresponds to Mode 2-2 etc. PUSCH reporting modes are described in TS 36.213 [23, 7.2.1]. The UE shall ignore cqi-ReportModeAperiodic-r10 when transmission mode 10 is configured for the serving cell on this carrier frequency. The UE shall ignore cqi-ReportModeAperiodic-r10 configured for the PCell/ PSCell when the transmission bandwidth of the PCell/PSCell in downlink is 6 resource blocks.

cqi-ReportPeriodicProcExt

A set of periodic CQI related parameters for which E-UTRAN may configure different values for each CSI process. For a serving frequency E-UTRAN configures one or more CQI-ReportPeriodicProcExt only when transmission mode 10 is configured for the serving cell on this carrier frequency.

cri-ConfigIndex

Parameter: cni-ConfigIndex ICRI, see TS 36.213 [23]. The parameter applies to the subframe pattern corresponding to csi-MeasSubframeSet1. EUTRAN configures the field if subframe patterns for CSI (CQI/PMI/PTI/RI/CRI) reporting are configured (i.e. csi-SubframePatternConfig is configured).

cri-ConfigIndex2

Parameter: cni-ConfigIndex ICRI, see TS 36.213 [23]. The parameter applies to the subframe pattern corresponding to csi-MeasSubframeSet2 or corresponding to the CSI subframe set 2 indicated by csi-MeasSubframeSets-r12. E-UTRAN configures cni-ConfigIndex2 only if cni-ConfigIndex is configured.

cr-ReportConfig

E-UTRAN configures the field only if the UE is configured with eMIMO-Type set to 'beamformed' and if multiple references to RS configuration using non-zero power transmission are configured (i.e. if csi-RS-ConfigNZPIdListExt is configured).
**CSI-ReportConfig field descriptions**

- **csi-ConfigIndex**: E-UTRAN configures csi-ConfigIndex only for PCell and only if csi-SubframePatternConfig is configured. The UE shall release csi-ConfigIndex if csi-SubframePatternConfig is released.

- **csi-IM-ConfigToAddModList**: For a serving frequency E-UTRAN configures one or more CSI-IM-Config only when transmission mode 10 is configured for the serving cell on this carrier frequency.

- **csi-MeasSubframeSets**: Indicates the two CSI subframe sets. Value 0 means the subframe belongs to CSI subframe set 1 and value 1 means the subframe belongs to CSI subframe set 2. CSI subframe set 1 refers to $C_{CSI,0}$ in TS 36.213 [23, 7.2] and CSI subframe set 2 refers to $C_{CSI,1}$ in TS 36.213 [23, 7.2]. E-UTRAN does not configure csi-MeasSubframeSet1-r10 and csi-MeasSubframeSet2-r10 if either csi-MeasSubframeSets-r12 for PCell or eimta-MaintConfPOcell-r12 is configured.

- **csi-MeasSubframeSet1, csi-MeasSubframeSet2**: Indicates the CSI measurement subframe sets. csi-MeasSubframeSet1 refers to $C_{CSI,0}$ in TS 36.213 [23, 7.2] and csi-MeasSubframeSet2 refers to $C_{CSI,1}$ in TS 36.213 [23, 7.2]. E-UTRAN only configures the two CSI measurement subframe sets for the PCell.

- **csi-ProcessToAddModList**: For a serving frequency E-UTRAN configures one or more CSI-Process only when transmission mode 9 or 10 is configured for the serving cell on this carrier frequency.

- **csi-ReportMode**: Parameter: PUCCH_format1-1_CSI_reporting_mode, see TS 36.213 [23, 7.2.2].

  - **K** Parameter: K, see TS 36.213 [23, 7.2.2].

  - **nomPDSCH-RS-EPRE-Offset**: Parameter: $\Delta_{offset}$, see TS 36.213 [23, 7.2.3]. Actual value = field value * 2 [dB].

- **periodicityFactor, periodicityFactorWB**: Parameter: $H'$, see TS 36.213 [23, 7.2.2]. EUTRAN configures field periodicityFactorWB only when the UE is configured with eMIMO-Type set to nonPreceded and with cqi-FormatIndicatorPeriodic set to widebandCQI.

- **pmi-RI-Report**: See TS 36.213 [23, 7.2]. The presence of this field means PMI/RI reporting is configured; otherwise the PMI/RI reporting is not configured. EUTRAN configures this field only when transmissionMode is set to tm8, tm9 or tm10. The UE shall ignore pmi-RI-Report-r9/ pmi-RI-Report-r10 when transmission mode 10 is configured for the serving cell on this carrier frequency.

- **ri-ConfigIndex**: Parameter: RI Config Index $I_{RI}$, see TS 36.213 [23, 7.2.2-1B]. If subframe patterns for CSI (CQI/PMI/PTI/RI/CRI) reporting are configured (i.e. csi-SubframePatternConfig is configured), the parameter applies to the subframe pattern corresponding to csi-MeasSubframeSet1.

- **ri-ConfigIndex2**: Parameter: RI Config Index $I_{RI}$, see TS 36.213 [23, 7.2.2-1B]. The parameter applies to the subframe pattern corresponding to csi-MeasSubframeSet2 or corresponding to the CSI subframe set 2 indicated by csi-MeasSubframeSets-r12. E-UTRAN configures ri-ConfigIndex2 only if ri-ConfigIndex is configured.

- **ri-Ref-CSI-ProcessId**: CSI process whose RI value the UE inherits when reporting RI, in the same subframe, for CSI reporting. E-UTRAN ensures that the CSI process that inherits the RI value is configured in accordance with the conditions specified in TS 36.213 [23, 7.2.1, 7.2.2].

- **simultaneousAckNackAndCQI**: Parameter: Simultaneous-AN-and-CQI, see TS 36.213 [23, 10.1]. TRUE indicates that simultaneous transmission of ACK/NACK and CQI is allowed. One value applies for all CSI processes. For SCells except for the PSCell and PUCCH SCell this field is not applicable and the UE shall ignore the value.

- **trigger01**: Indicates whether or not reporting for this CSI-process or reporting for this CSI-process corresponding to a CSI subframe set is triggered by CSI request field set to 01, for a CSI request applicable for the serving cell on the same frequency as the CSI process, see TS 36.213 [23, table 7.2.1-1D and 7.2.1-1E].
### CQI-ReportConfig field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>trigger10, trigger11</td>
<td>Indicates whether or not reporting for this CSI-process or reporting for this CSI-process corresponding to a CSI subframe set is triggered by CSI request field set to 10 or 11, see TS 36.213 [23, table 7.2.1-1B]. EUTRAN configures at most 5 CSI processes, across all serving frequencies within each CG, to be triggered by a CSI request field set to value 10. The same restriction applies for value 11. In case E-UTRAN simultaneously triggers CSI requests for more than 5 CSI processes some limitations apply, see TS 36.213 [23].</td>
</tr>
<tr>
<td>trigger001</td>
<td>Indicates whether or not reporting for this CSI-process or reporting for this CSI-process corresponding to a CSI subframe set is triggered by CSI request field set to 001, for a CSI request applicable for the serving cell on the same frequency as the CSI process, see TS 36.213 [23, table 7.2.1-1D and 7.2.1-E].</td>
</tr>
<tr>
<td>trigger010, trigger011, trigger100, trigger101, trigger110, Trigger111</td>
<td>Indicates whether or not reporting for this CSI-process or reporting for this CSI-process corresponding to a CSI subframe set is triggered by CSI request field set to 010, 011, 100, 101, 110 or 111, see TS 36.213 [23, table 7.2.1-1D and 7.2.1-E].</td>
</tr>
<tr>
<td>trigger-SubframeSetIndicator</td>
<td>For a serving cell configured with csi-MeasSubframeSets-r12, indicates for which CSI subframe set the aperiodic CSI report is triggered for the serving cell if the aperiodic CSI is triggered by the CSI request field 01 or 001, see TS 36.213 [23, table 7.2.1-1C or table 7.2.1-1E]. Value s1 corresponds to CSI subframe set 1 and value s2 corresponds to CSI subframe set 2.</td>
</tr>
<tr>
<td>trigger1-SubframeSetIndicator</td>
<td>If signalled in the aprioricCSI-Trigger-v1250, indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field 10, see TS 36.213 [23, table 7.2.1-1C] or by the CSI request field 011, see TS 36.213 [23, table 7.2.1-1E]. The leftmost bit, bit 0 in the bit string corresponds to the cell with ServCellIndex=0 and bit 1 in the bit string corresponds to the cell with ServCellIndex=1 etc. Each bit has either value 0 (means that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).</td>
</tr>
<tr>
<td>trigger2-SubframeSetIndicator</td>
<td>If signalled in the aprioricCSI-Trigger-v1250, indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field 11, see TS 36.213 [23, table 7.2.1-1C] or by the CSI request field 011, see TS 36.213 [23, table 7.2.1-1E]. The leftmost bit, bit 0 in the bit string corresponds to the cell with ServCellIndex=0 and bit 1 in the bit string corresponds to the cell with ServCellIndex=1 etc. Each bit has either value 0 (means that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).</td>
</tr>
<tr>
<td>trigger3-SubframeSetIndicator</td>
<td>If signalled in the aprioricCSI-Trigger-v1250, indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field 10, see TS 36.213 [23, table 7.2.1-1E]. The leftmost bit, bit 0 in the bit string corresponds to the cell with ServCellIndex=0 and bit 1 in the bit string corresponds to the cell with ServCellIndex=1 etc. Each bit has either value 0 (means that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).</td>
</tr>
<tr>
<td>trigger4-SubframeSetIndicator</td>
<td>Indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field 101, see TS 36.213 [23, table 7.2.1-1E]. The leftmost bit, bit 0 in the bit string corresponds to the cell with ServCellIndex=0 and bit 1 in the bit string corresponds to the cell with ServCellIndex=1 etc. Each bit has either value 0 (means that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).</td>
</tr>
<tr>
<td>trigger5-SubframeSetIndicator</td>
<td>Indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field 110, see TS 36.213 [23, table 7.2.1-1E]. The leftmost bit, bit 0 in the bit string corresponds to the cell with ServCellIndex=0 and bit 1 in the bit string corresponds to the cell with ServCellIndex=1 etc. Each bit has either value 0 (means that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).</td>
</tr>
<tr>
<td>trigger6-SubframeSetIndicator</td>
<td>Indicates for which CSI subframe set the aperiodic CSI report is triggered when aperiodic CSI is triggered by the CSI request field 111, see TS 36.213 [23, table 7.2.1-1E]. The leftmost bit, bit 0 in the bit string corresponds to the cell with ServCellIndex=0 and bit 1 in the bit string corresponds to the cell with ServCellIndex=1 etc. Each bit has either value 0 (means that aperiodic CSI report is triggered for CSI subframe set 1) or value 1 (means that aperiodic CSI report is triggered for CSI subframe set 2).</td>
</tr>
</tbody>
</table>
### Conditional presence

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>cqi-Setup</td>
<td>This field is not present for an Scell except for the PSCell, while it is conditionally present for the PCell and the PSCell according to the following. The field is optional present, need OR, if the cqi-ReportPeriodic in the cqi-ReportConfig is set to setup. If the field cqi-ReportPeriodic is present and set to release, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present.</td>
</tr>
<tr>
<td>PMIRI</td>
<td>The field is optional present, need OR, if cqi-ReportPeriodic is included and set to setup, or cqi-ReportModeAperiodic is included. If the field cqi-ReportPeriodic is present and set to release and cqi-ReportModeAperiodic is absent, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present.</td>
</tr>
<tr>
<td>PMIRIPCell</td>
<td>The field is optional present, need OR, if cqi-ReportPeriodic is included in the CQI-ReportConfig-r10 and set to setup. If the field cqi-ReportPeriodic is present in the CQI-ReportConfig-r10 and set to release and cqi-ReportAperiodic is included in the CQI-ReportConfig-r10, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present.</td>
</tr>
<tr>
<td>PMIRISCell</td>
<td>The field is optional present, need OR, if cqi-ReportPeriodicSCell is included and set to setup, or cqi-ReportModeAperiodic-r10 is included in the CQI-ReportConfigSCell. If the field cqi-ReportPeriodicSCell is present and set to release and cqi-ReportModeAperiodic-r10 is absent in the CQI-ReportConfigSCell, the field is not present and the UE shall delete any existing value for this field. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

### CQI-ReportPeriodicProcExtId

The IE *CQI-ReportPeriodicProcExtId* is used to identify a periodic CQI reporting configuration that E-UTRAN may configure in addition to the configuration specified by the IE *CQI-ReportPeriodic-r10*. These additional configurations are specified by the IE *CQI-ReportPeriodicProcExt-r11*. The identity is unique within the scope of a carrier frequency.

**CQI-ReportPeriodicProcExtId information elements**

```
-- ASN1START

CQI-ReportPeriodicProcExtId-r11 ::= INTEGER (1..maxCQI-ProcExt-r11)

-- ASN1STOP
```

### CrossCarrierSchedulingConfig

The IE *CrossCarrierSchedulingConfig* is used to specify the configuration when the cross carrier scheduling is used in a cell.

**CrossCarrierSchedulingConfig information elements**

```
-- ASN1START

CrossCarrierSchedulingConfig-r10 ::= SEQUENCE {
    schedulingCellInfo-r10    CHOICE {
        own-r10          SEQUENCE {        -- No cross carrier scheduling
            cif-Presence-r10 BOOLEAN
        },
        other-r10         SEQUENCE {        -- Cross carrier scheduling

-- ASN1STOP
```
CrossCarrierSchedulingConfig field descriptions

\textbf{cif-Presence}

The field is used to indicate whether carrier indicator field is present (value TRUE) or not (value FALSE) in PDCCH/EPDCCH DCI formats, see TS 36.212 \[22, 5.3.3.1\].

\textbf{cif-InSchedulingCell}

The field indicates the CIF value used in the scheduling cell to indicate this cell, see TS 36.212 \[22, 5.3.3.1\]. In case of carrier indicator field is present, the CIF value is 0.

\textbf{pdsch-Start}

The starting OFDM symbol of PDSCH for the concerned SCell, see TS 36.213 \[23, 7.1.6.4\]. Values 1, 2, 3 are applicable when \textit{dl-Bandwidth} for the concerned SCell is greater than 10 resource blocks, values 2, 3, 4 are applicable when \textit{dl-Bandwidth} for the concerned SCell is less than or equal to 10 resource blocks, see TS 36.211 \[21, Table \textbf{6.7-1}\].

\textbf{schedulingCellId}

Indicates which cell signals the downlink allocations and uplink grants, if applicable, for the concerned SCell. In case the UE is configured with DC, the scheduling cell is part of the same cell group (i.e. MCG or SCG) as the scheduled cell.

\textbf{CSI-IM-Config}

The IE \textit{CSI-IM-Config} is the CSI Interference Measurement (IM) configuration that E-UTRAN may configure on a serving frequency, see TS 36.213 \[23, 7.2.6\].
CSI-IM-Config information elements

CSI-IM-Config-r11 ::= SEQUENCE {
    csi-IM-ConfigId-r11   CSI-IM-ConfigId-r11,
    resourceConfig-r11   INTEGER (0..31),
    subframeConfig-r11   INTEGER (0..154),
    ...
    [[ interferenceMeasRestriction-r13  BOOLEAN OPTIONAL -- Need ON
         ]]
}

CSI-IM-ConfigExt-r12 ::= SEQUENCE {
    csi-IM-ConfigId-v1250   CSI-IM-ConfigId-v1250,
    resourceConfig-r12   INTEGER (0..31),
    subframeConfig-r12   INTEGER (0..154),
    ...
    [[ interferenceMeasRestriction-r13 BOOLEAN OPTIONAL, -- Need ON
       csi-IM-ConfigId-v1310  CSI-IM-ConfigId-v1310 OPTIONAL -- Need ON
         ]]
}

--- ASN1STOP

CSI-IM-Config field descriptions

<table>
<thead>
<tr>
<th>resourceConfig</th>
<th>Parameter: CSI reference signal configuration, see TS 36.213 [23, 7.2.6] and TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2] for 4 REs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>subframeConfig</td>
<td>Parameter: $I_{CSI-RS}$, see TS 36.213 [23, 7.2.6] and TS 36.211 [21, table 6.10.5.3-1].</td>
</tr>
</tbody>
</table>

CSI-IM-Configld

The IE CSI-IM-Configld is used to identify a CSI-IM configuration that is configured by the IE CSI-IM-Config. The identity is unique within the scope of a carrier frequency.

CSI-IM-Configld information elements

--- ASN1START
CSI-IM-ConfigId-r11 ::= INTEGER (1..maxCSI-IM-r11)
CSI-IM-ConfigId-r12 ::= INTEGER (1..maxCSI-IM-r12)
CSI-IM-ConfigId-v1250 ::= INTEGER (maxCSI-IM-r12)
CSI-IM-ConfigId-v1310 ::= INTEGER (minCSI-IM-r13..maxCSI-IM-r13)
CSI-IM-ConfigId-r13 ::= INTEGER (1..maxCSI-IM-r13)

CSI-Process

The IE CSI-Process is the CSI process configuration that E-UTRAN may configure on a serving frequency.

CSI-Process information elements

CSI-Process-r11 ::= SEQUENCE {
  csi-ProcessId-r11  CSI-ProcessId-r11,
  csi-RS-ConfigNZPId-r11  CSI-RS-ConfigNZPId-r11,
  csi-IM-ConfigId-r11  CSI-IM-ConfigId-r11,
  p-C-AndCBSRList-r11  P-C-AndCBSR-Pair-r13a,
  cqi-ReportBothProc-r11  CQI-ReportBothProc-r11  OPTIONAL,  -- Need OR
  cqi-ReportPeriodicProcId-r11  INTEGER (0..maxCQI-ProcExt-r11)  OPTIONAL,  -- Need OR
  ...
  [ alternativeCodebookEnabledFor4TXProc-r12 ENUMERATED {true} OPTIONAL, -- Need ON
    csi-IM-ConfigIdList-r12  CHOICE {
      release  NULL,
      setup    SEQUENCE (SIZE (1..2)) OF CSI-IM-ConfigId-r12
    }  OPTIONAL,  -- Need ON
    cqi-ReportAperiodicProc2-r12  CHOICE {
      release  NULL,
      setup    CQI-ReportAperiodicProc-r11
    }  OPTIONAL  -- Need ON
  ]
  [ cqi-ReportAperiodicProc-v1310  CHOICE {
    release  NULL,
  } ]
}
CSI-Process field descriptions

alternativeCodebookEnabledFor4TXProc
Indicates whether code book in TS 36.213 [23] Table 7.2.4-0A to Table 7.2.4-0D is being used for deriving CSI feedback and reporting for a CSI process. EUTRAN may configure the field only if the number of CSI-RS ports for non-zero power transmission CSI-RS configuration is 4.

cqi-ReportAperiodicProc
If csi-MeasSubframeSets-r12 is configured for the same frequency as the CSI process, cqi-ReportAperiodicProc applies for CSI subframe set 1. If csi-MeasSubframeSet1-r10 or csi-MeasSubframeSet2-r10 are configured for the same frequency as the CSI process, cqi-ReportAperiodicProc applies for CSI subframe set 1 or CSI subframe set 2. Otherwise, cqi-ReportAperiodicProc applies for all subframes. E-UTRAN configures cqi-ReportAperiodicProc-v1310 only if cqi-ReportAperiodicProc-r11 is configured.

cqi-ReportAperiodicProc2

cqi-ReportBothProc
Includes CQI configuration parameters applicable for both aperiodic and periodic CSI reporting, for which CSI process specific values may be configured. E-UTRAN configures the field if and only if cqi-ReportPeriodicProcId is included and/or if cqi-ReportAperiodicProc is included.

cqi-ReportPeriodicProcId
Refers to a periodic CQI reporting configuration that is configured for the same frequency as the CSI process. Value 0 refers to the set of parameters defined by the REL-10 CQI reporting configuration fields, while the other values refer to the additional configurations E-UTRAN assigns by CQI-ReportPeriodicProcExtId (and as covered by CQI-ReportPeriodicProcExtId).

csi-IM-ConfigId
Refers to a CSI-IM configuration that is configured for the same frequency as the CSI process.

csi-IM-ConfigIdList
Refers to one or two CSI-IM configurations that are configured for the same frequency as the CSI process. csi-IM-ConfigIdList can include 2 entries only if csi-MeasSubframeSets-r12 is configured for the same frequency as the CSI process. E-UTRAN shall ignore csi-IM-ConfigId-r11 if csi-IM-ConfigIdList-r12 is configured.

csi-RS-ConfigNZPId
Refers to a CSI RS configuration using non-zero power transmission that is configured for the same frequency as the CSI process.

eMIMO-Type
Parameter: eMIMO-Type, see TS 36.213 [23], TS 36.211 [21]. If eMIMO-Type is set to nonPrecoded, the codebooks used for deriving CSI feedback are in TS 36.213 [23], Table 7.2.4-10 to Table 7.2.4-17. Choice values nonPrecoded and beamformed correspond to "CLASS A" and "CLASS B" respectively, see TS 36.212 [22] and TS 36.213 [23].

p-C-AndCBSRLId
The UE shall ignore p-C-AndCBSRLId-r11 if configured with eMIMO-Type unless it is set to beamformed, alternativeCodebookEnabledBeamformed is set to FALSE and csi-RS-ConfigNZPIdListExt is not configured.
CSI-ProcessId

The IE CSI-ProcessId is used to identify a CSI process that is configured by the IE CSI-Process. The identity is unique within the scope of a carrier frequency.

**CSI-ProcessId information elements**

```asn1
CSI-ProcessId-r11 ::= INTEGER (1..maxCSI-Proc-r11)
```

CSI-RS-Config

The IE CSI-RS-Config is used to specify the CSI (Channel-State Information) reference signal configuration.

**CSI-RS-Config information elements**

```asn1
CSI-RS-Config-r10 ::= SEQUENCE {
  csi-RS-r10  CHOICE {
    release      NULL,
    setup      SEQUENCE {
      antennaPortsCount-r10   ENUMERATED {an1, an2, an4, an8},
      resourceConfig-r10    INTEGER (0..31),
      subframeConfig-r10    INTEGER (0..154),
      p-C-r10       INTEGER (-8..15)
    }
  }                OPTIONAL,   -- Need ON
  zeroTxPowerCSI-RS-r10  ZeroTxPowerCSI-RS-Conf-r12   OPTIONAL   -- Need ON
}

CSI-RS-Config-v1250 ::= SEQUENCE {
  zeroTxPowerCSI-RS2-r12  ZeroTxPowerCSI-RS-Conf-r12   OPTIONAL,   -- Need ON
  ds-ZeroTxPowerCSI-RS-r12  CHOICE {
    release      NULL,
    setup      SEQUENCE {
      zeroTxPowerCSI-RS-List-r12  SEQUENCE (SIZE (1..maxDS-ZTP-CSI-RS-r12)) OF ZeroTxPowerCSI-
    }
  }
```
CSI-RS-Config-v1310 ::= SEQUENCE {
  eMIMO-Type-r13    CSI-RS-ConfigEMIMO-r13   OPTIONAL -- Need ON
}

ZeroTxPowerCSI-RS-Conf-r12 ::= CHOICE {
  release       NULL,
  setup         ZeroTxPowerCSI-RS-r12
}

ZeroTxPowerCSI-RS-r12 ::= SEQUENCE {
  zeroTxPowerResourceConfigList-r12  BIT STRING (SIZE (16)),
  zeroTxPowerSubframeConfig-r12   INTEGER (0..154)
}

-- ASN1STOP

### CSI-RS-Config field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ace-For4Tx-PerResourceConfigList</td>
<td>The field indicates the alternativeCodeBookEnabledFor4TX-r12 per CSI-RS resource. E-UTRAN configures the field only if csi-RS-ConfigNZPIdListExt is configured.</td>
</tr>
<tr>
<td>antennaPortsCount</td>
<td>Parameter represents the number of antenna ports used for transmission of CSI reference signals where value an1 corresponds to 1 antenna port, an2 to 2 antenna ports and so on, see TS 36.211 [21, 6.10.5].</td>
</tr>
<tr>
<td>ds-ZeroTxPowerCSI-RS</td>
<td>Parameter for additional zeroTxPowerCSI-RS for a serving cell, concerning the CSI-RS included in discovery signals.</td>
</tr>
<tr>
<td>p-C</td>
<td>Parameter: $P_c$, see TS 36.213 [23, 7.2.5]. The UE shall ignore p-C-r10 if configured with eMIMO-Type unless it is set to beamformed, alternativeCodebookEnabledBeamformed is set to FALSE and csi-RS-ConfigNZPIdListExt is not configured.</td>
</tr>
<tr>
<td>resourceConfig</td>
<td>Parameter: CSI reference signal configuration, see TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2].</td>
</tr>
<tr>
<td>subframeConfig</td>
<td>Parameter: $I_{CSI-RS}$, see TS 36.211 [21, table 6.10.5.3-1].</td>
</tr>
<tr>
<td>zeroTxPowerCSI-RS2</td>
<td>Parameter for additional zeroTxPowerCSI-RS for a serving cell. E-UTRAN configures the field only if csi-MeasSubframeSets-r12 and TM 1 – 9 are configured for the serving cell.</td>
</tr>
<tr>
<td>zeroTxPowerResourceConfigList</td>
<td>Parameter: ZeroPowerCSI-RS, see TS 36.213 [23, 7.2.7].</td>
</tr>
<tr>
<td>zeroTxPowerSubframeConfig</td>
<td>Parameter: $I_{CSI-RS}$, see TS 36.211 [21, table 6.10.5.3-1].</td>
</tr>
</tbody>
</table>
CSI-RS-ConfigEMIMO

The IE CSI-RS-ConfigEMIMO is used to specify the CSI (Channel-State Information) reference signal configuration for EBF FD-MIMO.

**CSI-RS-ConfigEMIMO** information elements

```
CSI-RS-ConfigEMIMO-r13 ::= CHOICE {
    release      NULL,
    setup       CHOICE {
        nonPrecoded-r13   CSI-RS-ConfigNonPrecoded-r13,
        beamformed-r13    CSI-RS-ConfigBeamformed-r13
    }
}

CSI-RS-ConfigNonPrecoded-r13 ::= SEQUENCE {
    p-C-AndCBSRList-r13   P-C-AndCBSR-Pair-r13   OPTIONAL, -- Need OR
    codebookConfigN1-r13  ENUMERATED {n1, n2, n3, n4, n8},
    codebookConfigN2-r13  ENUMERATED {n1, n2, n3, n4, n8},
    codebookOverSamplingRateConfig-O1-r13  ENUMERATED {n4, n8}    OPTIONAL, -- Need OR
    codebookOverSamplingRateConfig-O2-r13  ENUMERATED {n4, n8}    OPTIONAL, -- Need OR
    codebookConfig-r13    INTEGER (1..4),
    csi-IM-ConfigIdList-r13  SEQUENCE (SIZE (1..2)) OF CSI-IM-ConfigId-r13 OPTIONAL, -- Need OR
    csi-RS-ConfigNZP-EMIMO-r13  CSI-RS-ConfigNZP-EMIMO-r13  OPTIONAL -- Need ON
}

CSI-RS-ConfigBeamformed-r13 ::= SEQUENCE {
    csi-RS-ConfigNZPIdListExt-r13  SEQUENCE (SIZE (1..7)) OF CSI-RS-ConfigNZPId-r13 OPTIONAL, -- Need OR
    csi-IM-ConfigIdList-r13     SEQUENCE (SIZE (1..8)) OF CSI-IM-ConfigId-r13 OPTIONAL, -- Need OR
    p-C-AndCBSR-PerResourceConfigList-r13  SEQUENCE (SIZE (1..8)) OF P-C-AndCBSR-Pair-r13 OPTIONAL, -- Need OR
    ace-For4Tx-PerResourceConfigList-r13  SEQUENCE (SIZE (1..7)) OF BOOLEAN OPTIONAL, -- Need OR
    alternativeCodebookEnabledBeamformed-r13  ENUMERATED {true} OPTIONAL, -- Need OR
    channelMeasRestriction-r13    ENUMERATED {on}        OPTIONAL -- Need OR
}```
CSI-RS-ConfigEMIMO field descriptions

<table>
<thead>
<tr>
<th>alternativeCodebookEnabledBeamformed</th>
</tr>
</thead>
<tbody>
<tr>
<td>The field indicates whether code book in TS 36.213 [23, Tab 7.2.4-18 to Tab 7.2.4-20] is being used for deriving CSI feedback and reporting for a CSI process. E-UTRAN configures the field only for a process referring to a single RS configuration using non-zero power transmission (i.e. a process for which csi-RS-ConfigNZPIdListExt is not configured). Field alternativeCodebookEnabledBeamformed corresponds to parameter alternativeCodebookEnabledCLASSB_K1 in TS 36.212 [22] and TS 36.213 [23].</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>codebookConfig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates a sub-set of the codebook entry, see TS 36.213 [23].</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>codebookConfigNx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates the number of antenna ports per polarization in dimension x as used for transmission of CSI reference signals. Value n1 corresponds to 1, n2 to 2 and so on, see TS 36.213 [23].</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>codebookOverSamplingRateConfig-Ox</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates the spatial over-sampling rate in dimension x as used for transmission of CSI reference signals. Value n1 corresponds to 1, n2 to 2 and so on, see TS 36.213 [23].</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>csi-IM-ConfigId(List)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-UTRAN configures the field csi-IM-ConfigIdList only if the IE is included in CSI-Process is configured (i.e. when TM10 is configured for the serving cell).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>csi-RS-ConfigBeamformed</th>
</tr>
</thead>
<tbody>
<tr>
<td>If csi-RS-ConfigNZPIdListExt-r13 is configured, E-UTRAN configures the same total number of entries for NZP, csi-IM-ConfigIdList-r13 and p-C-AndCBSR-PerResourceConfigList-r13.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>csi-RS-ConfigNZP-EMIMO</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-UTRAN configures this field only for CSI processes that include eMIMO-Type set to nonPrecoded.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>p-C-AndCBSR-PerResourceConfigList</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-UTRAN does not configure the field p-C-AndCBSR-PerResourceConfigList if the UE is configured with eMIMO-Type set to beamformed, alternativeCodebookEnabledBeamformed is set to FALSE and csi-RS-ConfigNZPIdListExt is not configured.</td>
</tr>
</tbody>
</table>

CSI-RS-ConfigNZP

The IE CSI-RS-ConfigNZP is the CSI-RS resource configuration using non-zero power transmission that E-UTRAN may configure on a serving frequency.

CSI-RS-ConfigNZP information elements

```asn1
CSI-RS-ConfigNZP-r11 ::= SEQUENCE {
  csi-RS-ConfigNZPId-r11  CSI-RS-ConfigNZPId-r11,
  antennaPortsCount-r11   ENUMERATED {an1, an2, an4, an8},
  resourceConfig-r11      INTEGER (0..31),
  subframeConfig-r11      INTEGER (0..154),
  scramblingIdentity-r11  INTEGER (0..503),
  qcl-CRS-Info-r11        SEQUENCE {
    qcl-ScramblingIdentity-r11  INTEGER (0..503),
    crs-PortsCount-r11         ENUMERATED {n1, n2, n4, spare1},
    mbsfn-SubframeConfigList-r11 CHOICE {
      release                  NULL,
    }
  }
}
```
setup SEQUENCE {
    subframeConfigList MBSFN-SubframeConfigList
    }
    }
OPTIONAL  -- Need ON
}
OPTIONAL,  -- Need OR
...
[[ csi-RS-ConfigNZPId-v1310 CSI-RS-ConfigNZPId-v1310 OPTIONAL  -- Need ON
]]
}

CSI-RS-ConfigNZP-EMIMO-r13 ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    nzp-resourceConfigList-r13 SEQUENCE (SIZE (1..2)) OF NZP-ResourceConfig-r13,
    cdmType-r13 ENUMERATED {cdm2, cdm4} OPTIONAL  -- Need OR
    }
  }

NZP-ResourceConfig-r13 ::= SEQUENCE {
    resourceConfig-r13 ResourceConfig-r13,
    ...
  }

ResourceConfig-r13 ::= INTEGER (0..31)

-- ASN1STOP
CSI-RS-ConfigNZP field descriptions

antennaPortsCount
Parameter represents the number of antenna ports used for transmission of CSI reference signals where an1 corresponds to 1, an2 to 2 antenna ports etc. see TS 36.211 [21, 6.10.5].

rmType
Parameter: CDMType, see TS 36.211 [21, 6.10.5.2].

nzp-resourceConfigList
Indicate a list of non-zero power transmission CSI-RS resources using parameter resourceConfig.

qcl-CRS-Info
Indicates CRS antenna ports that is quasi co-located with the CSI-RS antenna ports, see TS 36.213 [23, 7.2.5]. EUTRAN configures this field if and only if the UE is configured with qcl-Operation set to typeB.

resourceConfig
Parameter: CSI reference signal configuration, see TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2].

subframeConfig
Parameter: $I_{CSI-RS}$, see TS 36.211 [21, table 6.10.5.3-1].

scramblingIdentity
Parameter: Pseudo-random sequence generator parameter, $n_\text{ID}$, see TS 36.213 [23, 7.2.5].

CSI-RS-ConfigNZPId

The IE CSI-RS-ConfigNZPId is used to identify a CSI-RS resource configuration using non-zero transmission power, as configured by the IE CSI-RS-ConfigNZP. The identity is unique within the scope of a carrier frequency.

CSI-RS-ConfigNZPId information elements

-- ASN1START

CSI-RS-ConfigNZPId-r11 ::= INTEGER (1..maxCSI-RS-NZP-r11)
CSI-RS-ConfigNZPId-v1310 ::= INTEGER (minCSI-RS-NZP-r13..maxCSI-RS-NZP-r13)
CSI-RS-ConfigNZPId-r13 ::= INTEGER (1..maxCSI-RS-NZP-r13)

-- ASN1STOP

CSI-RS-ConfigZP

The IE CSI-RS-ConfigZP is the CSI-RS resource configuration, for which UE assumes zero transmission power, that EUTRAN may configure on a serving frequency.

CSI-RS-ConfigZP information elements

-- ASN1START

CSI-RS-ConfigZP-r11 ::= SEQUENCE {
csi-RS-ConfigZPId-r11 CSI-RS-ConfigZPId-r11,
resourceConfigList-r11 BIT STRING (SIZE (16)),
subframeConfig-r11 INTEGER (0..154),
... }

-- ASN1STOP
CSI-RS-ConfigZP field descriptions

<table>
<thead>
<tr>
<th>field</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>resourceConfigList</td>
<td>Parameter: ZeroPowerCSI-RS, see TS 36.213 [23, 7.2.7].</td>
</tr>
<tr>
<td>subframeConfig</td>
<td>Parameter: ICsi-RS, see TS 36.211 [21, table 6.10.5.3-1].</td>
</tr>
</tbody>
</table>

CSI-RS-ConfigZPId

The IE CSI-RS-ConfigZPId is used to identify a CSI-RS resource configuration for which UE assumes zero transmission power, as configured by the IE CSI-RS-ConfigZP. The identity is unique within the scope of a carrier frequency.

CSI-RS-ConfigZPId information elements

-- ASN1START

CSI-RS-ConfigZPId-r11 ::= INTEGER (1..maxCSI-RS-ZP-r11)

-- ASN1STOP

DMRS-Config

The IE DMRS-Config is the DMRS configuration that E-UTRAN may configure on a serving frequency.

DMRS-Config information elements

-- ASN1START

DMRS-Config-r11 ::= CHOICE {
  release          NULL,
  setup            SEQUENCE {
    scramblingIdentity-r11 INTEGER (0..503),
    scramblingIdentity2-r11 INTEGER (0..503)
  }
}

DMRS-Config-v1310 ::= SEQUENCE {
  dmrs-tableAlt-r13  ENUMERATED {true} OPTIONAL  -- Need OR
}

-- ASN1STOP
- **DRB-Identity**

The IE **DRB-Identity** is used to identify a DRB used by a UE.

**DRB-Identity information elements**

```asn1
DRB-Identity ::= INTEGER (1..32)
```

- **EPDCCH-Config**

The IE **EPDCCH-Config** specifies the subframes and resource blocks for EPDCCH monitoring that E-UTRAN may configure for a serving cell.

**EPDCCH-Config information element**

```asn1
EPDCCH-Config-r11 ::= SEQUENCE {
  config-r11  CHOICE {
    release      NULL,
    setup       SEQUENCE {
      subframePatternConfig-r11  CHOICE {
        release      NULL,
        setup       SEQUENCE {
          subframePattern-r11    MeasSubframePattern-r10
        }
      }
    }
  }
  OPTIONAL, -- Need ON

  startSymbol-r11   INTEGER (1..4)  OPTIONAL, -- Need OP

  setConfigToReleaseList-r11 EPDCCH-SetConfigToReleaseList-r11  OPTIONAL, -- Need ON

  setConfigToAddModList-r11 EPDCCH-SetConfigToAddModList-r11 OPTIONAL -- Need ON
}
```
EPDCCH-SetConfigToAddModList-r11 ::=  SEQUENCE (SIZE(1..maxEPDCCH-Set-r11)) OF EPDCCH-SetConfig-r11

EPDCCH-SetConfigToReleaseList-r11 ::=  SEQUENCE (SIZE(1..maxEPDCCH-Set-r11)) OF EPDCCH-SetConfigId-r11

EPDCCH-SetConfig-r11 ::=  SEQUENCE {
  setConfigId-r11     EPDCCH-SetConfigId-r11,
  transmissionType-r11   ENUMERATED {localised, distributed},
  resourceBlockAssignment-r11  SEQUENCE{
    numberPRB-Pairs-r11    ENUMERATED {n2, n4, n8},
    resourceBlockAssignment-r11  BIT STRING (SIZE(4..38))
  },
  dmrs-ScramblingSequenceInt-r11 INTEGER (0..503),
  pucch-ResourceStartOffset-r11 INTEGER (0..2047),
  re-MappingQCL-ConfigId-r11  PDSCH-RE-MappingQCL-ConfigId-r11 OPTIONAL, -- Need OR
  ...,
  [  csi-RS-ConfigZPId2-r12        CHOICE {
    release       NULL,
    setup         CSI-RS-ConfigZPId-r11
  } OPTIONAL  -- Need ON
  ],
  [  numberPRB-Pairs-v1310       CHOICE {
    release       NULL,
    setup         ENUMERATED {n6}
  } OPTIONAL  -- Need ON
  ],
  mmpdcch-config-r13  CHOICE {
    release       NULL,
    setup         SEQUENCE {
      csi-NumRepetitionCE-r13 ENUMERATED {sf1, sf2, sf4, sf8, sf16, sf32},
      mmpdcch-pdsch-HoppingConfig-r13 ENUMERATED {on, off},
      mmpdcch-StartSF-UESS-r13  CHOICE {
        fdd-r13        ENUMERATED {v1, v1dot5, v2, v2dot5, v4,}
v5, v8, v10},
    ENUMERATED {v1, v2, v4, v5, v8, v10,
                   v20, spare1}
},

mpdcch-NumRepetition-r13 ENUMERATED {r1, r2, r4, r8, r16,
                                     r32, r64, r128, r256},

mpdcch-Narrowband-r13 INTEGER (1.. maxAvailNarrowBands-r13)
]
} OPTIONAL  -- Need ON
]]
}

EPDCCH-SetConfigId-r11 ::= INTEGER (0..1)

-- ASN1STOP
### EPDCCH-Config field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>csi-NumRepetitionCE</td>
<td>Number of subframes for CSI reference resource, see TS 36.213 [23]. Value sf1 corresponds to 1 subframe, sf2 corresponds to 2 subframes and so on.</td>
</tr>
<tr>
<td>csi-RS-Config2PId2</td>
<td>Indicates the rate matching parameters in addition to those indicated by re-MappingQCL-ConfigId. E-UTRAN configures this field only when tm10 is configured.</td>
</tr>
<tr>
<td>dmrsc-ScramblingSequenceInt</td>
<td>The DMRS scrambling sequence initialization parameter $n_{EPDCCH}^{(DL)}$ defined in TS 36.211 [21, 6.10.3A.1].</td>
</tr>
<tr>
<td>EPDCCH-SetConfig</td>
<td>Provides EPDCCH configuration set. See TS 36.213 [23, 9.1.4]. E-UTRAN configures at least one EPDCCH-SetConfig when EPDCCH-Config is configured. For BL UEs or UEs in CE, EUTRAN does not configure more than one EPDCCH-SetConfig.</td>
</tr>
<tr>
<td>mpdcch-NarrowbandMax</td>
<td>Maximum numbers of repetitions for UE-SS for MPDCCH, see TS 36.211 [21].</td>
</tr>
<tr>
<td>mpdcch-NarrowbandNumRepetition</td>
<td>Frequency hopping activation/deactivation for unicast MPDCCH/PDSCH, see TS 36.211 [21].</td>
</tr>
<tr>
<td>mpdcch-pdch-HoppingConfig</td>
<td>Starting subframe configuration for an MPDCCH UE-specific search space, see TS 36.211 [21]. Value v1 corresponds to 1, value v1dot5 corresponds to 1.5, and so on.</td>
</tr>
<tr>
<td>numberPRB-Pairs</td>
<td>Indicates the number of physical resource-block pairs used for the EPDCCH set. Value n2 corresponds to 2 physical resource-block pairs; n4 corresponds to 4 physical resource-block pairs and so on. Value n8 is not supported if dl-Bandwidth is set to 6 resource blocks. EUTRAN configures value up to n6 only for BL UEs or UEs in CE. Value n6 is only applicable to BL UEs or UEs in CE.</td>
</tr>
<tr>
<td>pucch-ResourceStartOffset</td>
<td>PUCCH format 1a, 1b and 3 resource starting offset for the EPDCCH set. See TS 36.213 [23, 10.1].</td>
</tr>
<tr>
<td>re-MappingQCL-ConfigId</td>
<td>Indicates the starting OFDM symbol, the related rate matching parameters and quasi co-location assumption for EPDCCH when the UE is configured with tm10. This field provides the identity of a configured PDSCH-RE-MappingQCL-Config. E-UTRAN configures this field only when tm10 is configured.</td>
</tr>
<tr>
<td>resourceBlockAssignment</td>
<td>Indicates the index to a specific combination of physical resource-block pair for EPDCCH set. See TS 36.213 [23, 9.1.4.4]. The size of resourceBlockAssignment is specified in TS 36.213 [23, 9.1.4.4] and based on numberPRB-Pairs and the signalled value of dl-Bandwidth. If numberPRB-Pairs-v1310 field is present, the total number of physical resource-block pairs is 6 and it is composed of one subset of 2 physical resource-block pairs and another subset of 4 physical resource-block pairs, and the resourceBlockAssignment field defines the subset of 2 physical resource-block pairs.</td>
</tr>
<tr>
<td>setConfigId</td>
<td>Indicates the identity of the EPDCCH configuration set.</td>
</tr>
<tr>
<td>startSymbol</td>
<td>Indicates the OFDM starting symbol for any EPDCCH and PDSCH scheduled by EPDCCH on the same cell, see TS 36.213 [23, 9.1.4.1]. If not present, the UE shall release the configuration and shall derive the starting OFDM symbol of EPDCCH and PDSCH scheduled by EPDCCH from PCFICH. Values 1, 2, and 3 are applicable for dl-Bandwidth greater than 10 resource blocks. Values 2, 3, and 4 are applicable otherwise. E-UTRAN does not configure the field for UEs configured with tm10.</td>
</tr>
<tr>
<td>subframePatternConfig</td>
<td>Configures the subframes which the UE shall monitor the UE-specific search space on EPDCCH, except for pre-defined rules in TS 36.213 [23, 9.1.4]. If the field is not configured when EPDCCH is configured, the UE shall monitor the UE-specific search space on EPDCCH in all subframes except for pre-defined rules in TS 36.213 [23, 9.1.4].</td>
</tr>
<tr>
<td>transmissionType</td>
<td>Indicates whether distributed or localized EPDCCH transmission mode is used as defined in TS 36.211 [21, 6.8A.1].</td>
</tr>
</tbody>
</table>

---

**EIMTA-MainConfig**

The IE **EIMTA-MainConfig** is used to specify the eIMTA-RNTI used for eIMTA and the subframes used for monitoring PDCCH with eIMTA-RNTI. The IE **EIMTA-MainConfigServCell** is used to specify the eIMTA related parameters applicable for the concerned serving cell.
**EIMTA-MainConfig** information element

-- ASN1START

EIMTA-MainConfig-r12 ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    eimta-RNTI-r12 C-RNTI,
    eimta-CommandPeriodicity-r12 ENUMERATED {sf10, sf20, sf40, sf80},
    eimta-CommandSubframeSet-r12 BIT STRING (SIZE(10))
  }
}

EIMTA-MainConfigServCell-r12 ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    eimta-UL-DL-ConfigIndex-r12 INTEGER (1..5),
    eimta-HARQ-ReferenceConfig-r12 ENUMERATED {sa2,sa4,sa5},
    mbsfn-SubframeConfigList-v1250 CHOICE {
      release NULL,
      setup SEQUENCE {
        subframeConfigList-r12 MBSFN-SubframeConfigList
      }
    }
  }
}

-- ASN1STOP
**EIMTA-MainConfig** field descriptions

**eimta-CommandPeriodicity**  
Configures the periodicity to monitor PDCCH with eIMTA-RNTI, see TS 36.213 [23, 13.1]. Value sf10 corresponds to 10 subframes, sf20 corresponds to 20 subframes and so on.

**eimta-CommandSubframeSet**  
Configures the subframe(s) to monitor PDCCH with eIMTA-RNTI within the periodicity configured by `eimta-CommandPeriodicity`. The 10 bits correspond to all subframes in the last radio frame within each periodicity. The left most bit is for subframe 0 and so on. Each bit can be of value 0 or 1. The value of 1 means that the corresponding subframe is configured for monitoring PDCCH with eIMTA-RNTI, and the value of 0 means otherwise. In case of TDD as PCell, only the downlink subframes indicated by the UL/ DL configuration in SIB1 can be configured for monitoring PDCCH with eIMTA-RNTI. In case of FDD as PCell, any of the ten subframes can be configured for monitoring PDCCH with eIMTA-RNTI.

**eimta-HARQ-ReferenceConfig**  
Indicates UL/ DL configuration used as the DL HARQ reference configuration for this serving cell. Value sa2 corresponds to Configuration2, sa4 to Configuration4 etc, as specified in TS 36.211 [21, table 4.2-2]. E-UTRAN configures the same value for all serving cells residing on same frequency band.

**eimta-UL-DL-ConfigIndex**  
Index of f, see TS 36.212 [22, 5.3.3.1.4]. E-UTRAN configures the same value for all serving cells residing on same frequency band.

**mbsfn-SubframeConfigList**  
Configure the MBSFN subframes for the UE on this serving cell. An uplink subframe indicated by the DL/UL subframe configuration in SIB1 can be configured as MBSFN subframe.

---

**LogicalChannelConfig**

The IE `LogicalChannelConfig` is used to configure the logical channel parameters.

**LogicalChannelConfig** information element

```
LogicalChannelConfig ::= SEQUENCE {
  ul-SpecificParameters  SEQUENCE {
    priority INTEGER (1..16),
    prioritisedBitRate ENUMERATED {
      kBps0, kBps8, kBps16, kBps32, kBps64, kBps128,
      kBps256, infinity, kBps512-v1020, kBps1024-v1020,
      kBps2048-v1020, spare5, spare4, spare3, spare2,
      spare1},
    bucketSizeDuration ENUMERATED {
      ms50, ms100, ms150, ms300, ms500, ms1000, spare2,
      spare1},
    logicalChannelGroup INTEGER (0..3) OPTIONAL -- Need OR
  } OPTIONAL, -- Cond UL
  ....
  [ [ logicalChannelSR-Mask-r9 ENUMERATED {setup} OPTIONAL -- Cond SRmask ] ]
  [ [ logicalChannelSR-Prohibit-r12 BOOLEAN OPTIONAL -- Need ON
```

---

ETSI
LogicalChannelConfig field descriptions

**bucketSizeDuration**
Bucket Size Duration for logical channel prioritization in TS 36.321 [6]. Value in milliseconds. Value ms50 corresponds to 50 ms, ms100 corresponds to 100 ms and so on.

**logicalChannelGroup**
Mapping of logical channel to logical channel group for BSR reporting in TS 36.321 [6].

**logicalChannelSR-Mask**
Controlling SR triggering on a logical channel basis when an uplink grant is configured. See TS 36.321 [6].

**logicalChannelSR-Prohibit**
Value TRUE indicates that the logicalChannelSR-ProhibitTimer is enabled for the logical channel. E-UTRAN only (optionally) configures the field (i.e. indicates value TRUE) if logicalChannelSR-ProhibitTimer is configured. See TS 36.321 [6].

**prioritisedBitRate**
Prioritized Bit Rate for logical channel prioritization in TS 36.321 [6]. Value in kilobytes/second. Value kBps0 corresponds to 0 kB/second, kBps8 corresponds to 8 kB/second, kBps16 corresponds to 16 kB/second and so on. Infinity is the only applicable value for SRB1 and SRB2.

**priority**
Logical channel priority in TS 36.321 [6]. Value is an integer.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRmask</td>
<td>The field is optionally present if ul-SpecificParameters is present, need OR; otherwise it is not present.</td>
</tr>
<tr>
<td>UL</td>
<td>The field is mandatory present for UL logical channels; otherwise it is not present.</td>
</tr>
</tbody>
</table>

---

**LWA-Configuration**

The IE LWA-Configuration is used to setup/modify/release LTE-WLAN Aggregation.
**LWA-Configuration field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>lwa-MobilityConfig</td>
<td>Indicates the parameters used for WLAN mobility.</td>
</tr>
<tr>
<td>lwa-WT-Counter</td>
<td>Indicates the parameter used by UE for WLAN authentication.</td>
</tr>
</tbody>
</table>

---

**LWIP-Configuration**

The IE `LWIP-Configuration` is used to add, modify or release DRBs that are using LWIP Tunnel.

```asn1
LWIP-Configuration-r13 ::= CHOICE {
  release         NULL,          
  setup          SEQUENCE {
    lwip-Config-r13 LWIP-Config-r13
  }
}
```

```asn1
LWIP-Config-r13 ::= SEQUENCE {
  lwip-MobilityConfig-r13 WLAN-MobilityConfig-r13 OPTIONAL, -- Need ON
  tunnelConfigLWIP-r13 TunnelConfigLWIP-r13 OPTIONAL, -- Need ON
  ...
}
```

---

**LWIP-Configuration field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>lwip-MobilityConfig</td>
<td>Indicates the WLAN mobility set for LWIP.</td>
</tr>
<tr>
<td>tunnelConfigLWIP</td>
<td>Indicates the parameters used for establishing the LWIP tunnel.</td>
</tr>
</tbody>
</table>

---

**MAC-MainConfig**

The IE `MAC-MainConfig` is used to specify the MAC main configuration for signalling and data radio bearers. All MAC main configuration parameters can be configured independently per Cell Group (i.e. MCG or SCG), unless explicitly specified otherwise.
MAC-MainConfig information element

-- ASN1START

MAC-MainConfig ::= SEQUENCE {
  ul-SCH-Config     SEQUENCE {
    maxHARQ-Tx        ENUMERATED {
      n1, n2, n3, n4, n5, n6, n7, n8,
      n10, n12, n16, n20, n24, n28,
      spare2, spare1}   OPTIONAL, -- Need ON
    periodicBSR-Timer PeriodicBSR-Timer-r12 OPTIONAL, -- Need ON
    retxBSR-Timer     RetxBSR-Timer-r12,
   ttiBundling       BOOLEAN
  }                OPTIONAL,  -- Need ON
  drx-Config       DRX-Config     OPTIONAL, -- Need ON
  timeAlignmentTimerDedicated   TimeAlignmentTimer,
  phr-Config       CHOICE {
    release        NULL,
    setup          SEQUENCE {
      periodicPHR-Timer ENUMERATED {sf10, sf20, sf50, sf100, sf200,
                                     sf500, sf1000, infinity},
      prohibitPHR-Timer ENUMERATED {sf0, sf10, sf20, sf50, sf100,
                                     sf200, sf500, sf1000},
      dl-PathlossChange ENUMERATED {dB1, dB3, dB6, infinity}
    }
  }                OPTIONAL, -- Need ON
  ...,
  sr-ProhibitTimer-r9 INTEGER (0..7)   OPTIONAL -- Need ON
}[[ mac-MainConfig-v1020    SEQUENCE {
    sCellDeactivationTimer-r10 ENUMERATED {
      rf2, rf4, rf8, rf16, rf32, rf64, rf128,
      spare}   OPTIONAL, -- Need OP
    extendedBSR-Sizes-r10    ENUMERATED {setup}  OPTIONAL, -- Need OR
    extendedPHR-r10          ENUMERATED {setup}  OPTIONAL -- Need OR
  }]}

-- ASN1END
[[ stag-ToReleaseList-r11 STAG-ToReleaseList-r11 OPTIONAL, -- Need ON
stag-ToAddModList-r11 STAG-ToAddModList-r11 OPTIONAL, -- Need ON
drx-Config-v1130 DRX-Config-v1130 OPTIONAL -- Need ON
]]

[[ e-HARQ-Pattern-r12 BOOLEAN OPTIONAL, -- Need ON
dualConnectivityPHR CHOICE {
    release NULL,
    setup SEQUENCE {
        phr-ModeOtherCG-r12 ENUMERATED {real, virtual}
    }
} OPTIONAL, -- Need ON
]

logicalChannelSR-Config-r12 CHOICE {
    release NULL,
    setup SEQUENCE {
        logicalChannelSR-ProhibitTimer-r12 ENUMERATED {sf20, sf40, sf64, sf128, sf512, sf1024, sf2560, spare1}
    }
} OPTIONAL -- Need ON
]]

[[ drx-Config-v1310 DRX-Config-v1310 OPTIONAL, -- Need ON
extendedPHR2-r13 BOOLEAN OPTIONAL, -- Need ON
eDRX-Config-CycleStartOffset-r13 CHOICE {
    release NULL,
    setup CHOICE {
        sf5120 INTEGER(0..1),
        sf10240 INTEGER(0..3)
    }
} OPTIONAL -- Need ON
]]

[[ drx-Config-r13 CHOICE {
    release NULL,
    setup DRX-Config-r13
} OPTIONAL -- Need ON
]]
MAC-MainConfigSCell-r11 ::= SEQUENCE {
    stag-Id-r11 STAG-Id-r11 OPTIONAL, -- Need OP
    ...
}

DRX-Config ::= CHOICE {
    release NULL,
    setup SEQUENCE {
        onDurationTimer ENUMERATED {
            psf1, psf2, psf3, psf4, psf5, psf6,
            psf8, psf10, psf20, psf30, psf40,
            psf50, psf60, psf80, psf100,
            psf200},
        drx-InactivityTimer ENUMERATED {
            psf1, psf2, psf3, psf4, psf5, psf6,
            psf8, psf10, psf20, psf30, psf40,
            psf50, psf60, psf80, psf100,
            psf200, psf300, psf500, psf750,
            psf1280, psf1920, psf2560, psf0-v1020,
            spare9, spare8, spare7, spare6,
            spare5, spare4, spare3, spare2,
            spare1},
        drx-RetransmissionTimer ENUMERATED {
            psf1, psf2, psf4, psf6, psf8, psf16,
            psf24, psf33},
        longDRX-CycleStartOffset CHOICE {
            sf10 INTEGER(0..9),
            sf20 INTEGER(0..19),
            sf32 INTEGER(0..31),
            sf40 INTEGER(0..39),
            sf64 INTEGER(0..63),
            sf80 INTEGER(0..79),
        }
    }
}
sf128       INTEGER(0..127),
sf160       INTEGER(0..159),
sf256       INTEGER(0..255),
sf320       INTEGER(0..319),
sf512       INTEGER(0..511),
sf640       INTEGER(0..639),
sf1024      INTEGER(0..1023),
sf1280      INTEGER(0..1279),
sf2048      INTEGER(0..2047),
sf2560      INTEGER(0..2559)
}

shortDRX     SEQUENCE {
  shortDRX-Cycle     ENUMERATED {
    sf2, sf5, sf8, sf10, sf16, sf20,
    sf32, sf40, sf64, sf80, sf128, sf160,
    sf256, sf320, sf512, sf640},
  drxShortCycleTimer INTEGER (1..16)
} OPTIONAL -- Need OR

DRX-Config-v1130 ::= SEQUENCE {
  drx-RetransmissionTimer-v1130       ENUMERATED {psf0-v1130} OPTIONAL, --Need OR
  longDRX-CycleStartOffset-v1130      CHOICE {
    sf60-v1130       INTEGER(0..59),
    sf70-v1130       INTEGER(0..69)
  } OPTIONAL, --Need OR
  shortDRX-Cycle-v1130    ENUMERATED {sf4-v1130} OPTIONAL --Need OR
}

DRX-Config-v1310 ::= SEQUENCE {
  longDRX-CycleStartOffset-v1310      SEQUENCE {
    sf60-v1310       INTEGER(0..59)
  } OPTIONAL --Need OR
}
DRX-Config-r13 ::= SEQUENCE {
    onDurationTimer-v1310 ENUMERATED {psf300, psf400, psf500, psf600,
                              psf800, psf1000, psf1200, psf1600}
                              OPTIONAL, --Need OR
    drx-RetransmissionTimer-v1310 ENUMERATED {psf40, psf64, psf80, psf96, psf112,
                                    psf128, psf160, psf320}
                                    OPTIONAL, --Need OR
    drx-ULRetransmissionTimer-r13 ENUMERATED {psf0, psf1, psf2, psf4, psf6, psf8, psf16,
                                    psf24, psf33, psf40, psf64, psf80, psf96,
                                    psf112, psf128, psf160, psf320}
                                    OPTIONAL --Need OR
}

PeriodicBSR-Timer-r12 ::= ENUMERATED {
    sf5, sf10, sf16, sf20, sf32, sf40, sf64, sf80,
    sf128, sf160, sf320, sf640, sf1280, sf2560,
    infinity, spare1}

RetxBSR-Timer-r12 ::= ENUMERATED {
    sf320, sf640, sf1280, sf2560, sf5120,
    sf10240, spare2, spare1}

STAG-ToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxSTAG-r11)) OF STAG-Id-r11

STAG-ToAddModList-r11 ::= SEQUENCE (SIZE (1..maxSTAG-r11)) OF STAG-ToAddMod-r11

STAG-ToAddMod-r11 ::= SEQUENCE {
    stag-Id-r11 STAG-Id-r11,
    timeAlignmentTimerSTAG-r11TimeAlignmentTimer,
    ...
}

STAG-Id-r11::= INTEGER (1..maxSTAG-r11)

-- ASN1STOP
### MAC-MainConfig field descriptions

**dl-PathlossChange**
DL Pathloss Change and the change of the required power backoff due to power management (as allowed by P-MPRc [42]) for PHR reporting in TS 36.321 [6]. Value in dB. Value dB1 corresponds to 1 dB, dB3 corresponds to 3 dB and so on. The same value applies for each serving cell (although the associated functionality is performed independently for each cell).

**drx-Config**
Used to configure DRX as specified in TS 36.321 [6]. E-UTRAN configures the values in DRX-config-v1130 only if the UE indicates support for IDC indication. E-UTRAN configures drx-Config-v1130, drx-Config-v1310 and drx-Config-r13 only if drx-Config (without suffix) is configured. E-UTRAN configures drx-Config-r13 only if UE supports CE.

**drx-InactivityTimer**
Timer for DRX in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf0 corresponds to 0 PDCCH sub-frame and behaviour as specified in 7.3.2 applies, value psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on.

**drx-RetransmissionTimer**
Timer for DRX in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf0 corresponds to 0 PDCCH sub-frame and behaviour as specified in 7.3.2 applies, value psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on. In case drx-RetransmissionTimer-v1130 or drx-RetransmissionTimer-v1310 is signalled, the UE shall ignore drx-RetransmissionTimer (i.e. without suffix).

**drx-ULRetransmissionTimer**
Timer for DRX in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf0 corresponds to 0 PDCCH sub-frame and behaviour as specified in 7.3.2 applies, value psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on.

**drx-ShortCycleTimer**

**dualConnectivityPHR**
Indicates if power headroom shall be reported using Dual Connectivity Power Headroom Report MAC Control Element defined in TS 36.321 [6] (value setup). If PHR functionality and dual connectivity are configured, E-UTRAN always configures the value setup for this field and configures phr-Config and dualConnectivityPHR for both CGs.

**e-HARQ-Pattern**
TRUE indicates that enhanced HARQ pattern for TTI bundling is enabled for FDD. E-UTRAN enables this field only whenttiBundling is set to TRUE.

**eDRX-Config-CycleStartOffset**
Indicates longDRX-Cycle and drxStartOffset in TS 36.321 [6]. The value of longDRX-Cycle is in number of sub-frames. The value of drxStartOffset, in number of subframes, is indicated by the value of eDRX-Config-CycleStartOffset multiplied by 2560 plus the offset value configured in longDRX-CycleStartOffset. E-UTRAN only configures value setup when the value in longDRX-CycleStartOffset is sf2560.

**extendedBSR-Sizes**
If value setup is configured, the BSR index indicates extended BSR size levels as defined in TS 36.321 [6, Table 6.1.3.1-2].

**extendedPHR**
Indicates if power headroom shall be reported using the Extended Power Headroom Report MAC control element defined in TS 36.321 [6] (value setup). E-UTRAN always configures the value setup if more than one and up to eight ServingCell(s) with uplink is configured and none of the serving cells with uplink configured has a servingCellIndex higher than seven and if PUCCH on SCell is not configured and if dual connectivity is not configured. E-UTRAN configures extendedPHR only if phr-Config is configured. The UE shall release extendedPHR if phr-Config is released.

**extendedPHR2**
Indicates if power headroom shall be reported using the Extended Power Headerom Report MAC Control Element defined in TS 36.321 [6] (value setup). E-UTRAN always configures the value setup if any of the serving cells with uplink configured has a servingCellIndex higher than seven and if PUCCH SCell (with any number of serving cells with uplink configured) is configured. E-UTRAN configures extendedPHR2 only if phr-Config is configured. The UE shall release extendedPHR2 if phr-Config is released.

**logicalChannelSR-ProhibitITimer**
Timer used to delay the transmission of an SR for logical channels enabled by logicalChannelSR-Prohibit. Value sf20 corresponds to 20 subframes, sf40 corresponds to 40 subframes, and so on. See TS 36.321 [6].

**longDRX-CycleStartOffset**
longDRX-Cycle and drxStartOffset in TS 36.321 [6] unless eDRX-Config-CycleStartOffset is configured. The value of longDRX-Cycle is in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. If shortDRX-Cycle is configured, the value of longDRX-Cycle shall be a multiple of the shortDRX-Cycle value. The value of drxStartOffset value is in number of sub-frames. In case longDRX-CycleStartOffset-v1130 is signalled, the UE shall ignore longDRX-CycleStartOffset (i.e. without suffix).

**maxHARQ-Tx**
Maximum number of transmissions for UL HARQ in TS 36.321 [6].

---

**Legend:**
- **(i.e. without suffix):** Indicates that the value is in number of sub-frames.
- **psf0:** Value 0.
- **psf1:** Value 1.
- **psf2:** Value 2.
- **sf10:** Value 10.
- **sf20:** Value 20.
- **sf2560:** Value 2560.
- **sf2560:** Value 2560.
- **sf512:** Value 512.
- **sf1024:** Value 1024.
- **sf2048:** Value 2048.
- **sf4096:** Value 4096.
- **sf8192:** Value 8192.
- **sf16384:** Value 16384.
- **sf32768:** Value 32768.
- **sf65536:** Value 65536.
- **sf131072:** Value 131072.
- **sf262144:** Value 262144.
- **sf524288:** Value 524288.
- **sf1048576:** Value 1048576.
- **sf2097152:** Value 2097152.
- **sf4194304:** Value 4194304.

---

**Notes:**
- The value of longDRX-CycleStartOffset is in multiples of shortDRX-Cycle. A value of 1 corresponds to shortDRX-Cycle, a value of 2 corresponds to 2 * shortDRX-Cycle and so on.
- The value of longDRX-Cycle is in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. If shortDRX-Cycle is configured, the value of longDRX-Cycle shall be a multiple of the shortDRX-Cycle value.
- The value of drxStartOffset value is in number of sub-frames. In case longDRX-CycleStartOffset-v1130 is signalled, the UE shall ignore longDRX-CycleStartOffset (i.e. without suffix).
### MAC-MainConfig field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>onDurationTimer</td>
<td>Timer for DRX in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on. In case onDurationTimer-v1310 is signalled, the UE shall ignore onDurationTimer (i.e. without suffix).</td>
</tr>
<tr>
<td>periodicBSR-Timer</td>
<td>Timer for BSR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on.</td>
</tr>
<tr>
<td>periodicPHR-Timer</td>
<td>Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on.</td>
</tr>
<tr>
<td>phr-ModeOtherCG</td>
<td>Indicates the mode (i.e. real or virtual) used for the PHR of the activated cells that are part of the other Cell Group (i.e. MCG or SCG), when DC is configured.</td>
</tr>
<tr>
<td>prohibitPHR-Timer</td>
<td>Timer for PHR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf0 corresponds to 0 subframes and behaviour as specified in 7.3.2 applies, sf100 corresponds to 100 subframes and so on.</td>
</tr>
<tr>
<td>retxBSR-Timer</td>
<td>Timer for BSR reporting in TS 36.321 [6]. Value in number of sub-frames. Value sf640 corresponds to 640 sub-frames, sf1280 corresponds to 1280 sub-frames and so on.</td>
</tr>
<tr>
<td>scCellDeactivationTimer</td>
<td>SCell deactivation timer in TS 36.321 [6]. Value in number of radio frames. Value rf4 corresponds to 4 radio frames, value rf8 corresponds to 8 radio frames and so on. E-UTRAN only configures the field if the UE is configured with one or more SCells other than the PSCell and PUCCH SCell. If the field is absent, the UE shall delete any existing value for this field and assume the value to be set to infinity. The same value applies for each SCell of a Cell Group (i.e. MCG or SCG) (although the associated functionality is performed independently for each SCell). Field scCellDeactivationTimer does not apply for the PUCH SCell.</td>
</tr>
<tr>
<td>shortDRX-Cycle</td>
<td>Short DRX cycle in TS 36.321 [6]. Value in number of sub-frames. Value sf2 corresponds to 2 sub-frames, sf5 corresponds to 5 subframes and so on. In case shortDRX-Cycle-v1130 is signalled, the UE shall ignore shortDRX-Cycle (i.e. without suffix). Short DRX cycle is not configured for UEs in CE.</td>
</tr>
<tr>
<td>sr-ProhibitTimer</td>
<td>Timer for SR transmission on PUCCH in TS 36.321 [6]. Value in number of SR period(s) of shortest SR period of any serving cell with PUCCH. Value 0 means that behaviour as specified in 7.3.2 applies. Value 1 corresponds to one SR period. Value 2 corresponds to 2*SR periods and so on. SR period is defined in TS 36.213 [23, table 10.1.5-1].</td>
</tr>
<tr>
<td>stag-id</td>
<td>Indicates the TAG of an SCell, see TS 36.321 [6]. Uniquely identifies the TAG within the scope of a Cell Group (i.e. MCG or SCG). If the field is not configured for an SCell (e.g. absent in MAC-MainConfigSCell), the SCell is part of the PTAG.</td>
</tr>
<tr>
<td>stag-ToAddModList</td>
<td>Used to configure one or more STAGs. E-UTRAN ensures that a STAG contains at least one SCell with configured uplink. If, due to SCell release a reconfiguration would result in an &quot;empty&quot; TAG, E-UTRAN includes release of the concerned TAG.</td>
</tr>
<tr>
<td>stag-ToReleaseList</td>
<td>Used to release one or more STAGs. E-UTRAN ensures that a STAG contains at least one SCell with configured uplink. If, due to SCell release a reconfiguration would result in an &quot;empty&quot; TAG, E-UTRAN includes release of the concerned TAG.</td>
</tr>
<tr>
<td>timeAlignmentTimerSTAG</td>
<td>Indicates the value of the time alignment timer for an STAG, see TS 36.321 [6].</td>
</tr>
<tr>
<td>ttlBundling</td>
<td>TRUE indicates that TTI bundling TS 36.321 [6] is enabled while FALSE indicates that TTI bundling is disabled. TTI bundling can be enabled for FDD and for TDD only for configurations 0, 1 and 6. The functionality is performed independently per Cell Group (i.e. MCG or SCG), but E-UTRAN does not configure TTI bundling for the SCG. For a TDD PCell, E-UTRAN does not simultaneously enable TTI bundling and semi-persistent scheduling in this release of specification. Furthermore, for a Cell Group, E-UTRAN does not simultaneously configure TTI bundling and SCells with configured uplink, and E-UTRAN does not simultaneously configure TTI bundling and eIMTA.</td>
</tr>
</tbody>
</table>

---

**P-C-AndCBSR**

The IE P-C-AndCBSR is used to specify the power control and codebook subset restriction configuration.

### P-C-AndCBSR information elements

```asn1
P-C-AndCBSR-r11 ::= SEQUENCE {
    p-C-r11       INTEGER (-8..15),
}
```
codebookSubsetRestriction-r11 BIT STRING
}

P-C-AndCBSR-r13 ::= SEQUENCE {
p-C-r13 INTEGER (-8..15),
cbsr-Selection-r13 CHOICE{
    nonPrecoded-r13 SEQUENCE {
        codebookSubsetRestriction1-r13 BIT STRING,
        codebookSubsetRestriction2-r13 BIT STRING
    },
    beamformedK1a-r13 SEQUENCE {
        codebookSubsetRestriction3-r13 BIT STRING
    },
    beamformedKN-r13 SEQUENCE {
        codebookSubsetRestriction-r13 BIT STRING
    }
},
}

P-C-AndCBSR-Pair-r13a ::= SEQUENCE (SIZE (1..2)) OF P-C-AndCBSR-r13

P-C-AndCBSR-Pair-r13 ::= SEQUENCE (SIZE (1..2)) OF P-C-AndCBSR-r13

-- ASN1STOP
**P-C-AndCBSR field descriptions**

**cbsr-Selection**
Indicates which codebook subset restriction parameter(s) are to be used. E-UTRAN applies values nonPrecoded when eMIMO-Type is set to nonPrecoded. E-UTRAN applies value beamformedK1a when eMIMO-Type is set to beamformed. alternativeCodebookEnabledBeamformed is set to TRUE and csi-RS-ConfigNZPIdListExt is not configured. E-UTRAN applies value beamformedKN when csi-RS-ConfigNZPIdListExt is configured. E-UTRAN applies value beamformedKN when eMIMO-Type is set to beamformed, csi-RS-ConfigNZPIdListExt is not configured and alternativeCodebookEnabledBeamformed is set to FALSE.

**codebookSubsetRestriction**
Parameter: codebookSubsetRestriction, see TS 36.213 [23] and TS 36.211 [21]. The number of bits in the codebookSubsetRestriction for applicable transmission modes is defined in TS 36.213 [23].

**codebookSubsetRestriction1**
Parameter: codebookSubsetRestriction1, see TS 36.213 [23, Table 7.2-1d]. The number of bits in the codebookSubsetRestriction1 for applicable transmission modes is defined in TS 36.213 [23].

**codebookSubsetRestriction2**
Parameter: codebookSubsetRestriction2, see TS 36.213 [23, Table 7.2-1e]. The number of bits in the codebookSubsetRestriction2 for applicable transmission modes is defined in TS 36.213 [23].

**codebookSubsetRestriction3**
Parameter: codebookSubsetRestriction3, see TS 36.213 [23, Table 7.2-1f]. The UE shall ignore codebookSubsetRestriction-r11 or codebookSubsetRestriction-r10 if codebookSubsetRestriction3-r13 is configured. The number of bits in the codebookSubsetRestriction3 for applicable transmission modes is defined in TS 36.213 [23].

**p-C**
Parameter: \( P_c \), see TS 36.213 [23, 7.2.5].

**P-C-AndCBSR-Pair**
E-UTRAN includes a single entry if the UE is configured with TM9. If the UE is configured with TM10 and E-UTRAN includes 2 entries, this indicates that the subframe patterns configured for CSI (CQI/PMI/PTI/RI/CRI) reporting (i.e. as defined by field csi-MeasSubframeSet1 and csi-MeasSubframeSet2, or as defined by csi-MeasSubframeSets-r12) are to be used for this CSI process, while including a single entry indicates that the subframe patterns are not to be used for this CSI process. For a UE configured with TM10, E-UTRAN does not include 2 entries with csi-MeasSubframeSet1 and csi-MeasSubframeSet2 for CSI processes concerning a secondary frequency. Furthermore, E-UTRAN includes 2 entries when configuring both cqi-pmi-ConfigIndex and cqi-pmi-ConfigIndex2.

---

**PDCCH-ConfigSCell**
The IE PDCCH-Config specifies PDCCH monitoring parameters that E-UTRAN may configure for a serving cell.

**PDCCH-ConfigSCell information element**

```
-- ASN1START

PDCCH-ConfigSCell-r13 ::= SEQUENCE {
    skipMonitoringDCI-format0-1A-r13 ENUMERATED {true} OPTIONAL -- Need OR
}

PDCCH-CandidateReductionValue-r13 ::= ENUMERATED {n0, n33, n66, n100}

PDCCH-CandidateReductions-r13 ::= CHOICE {
    release NULL,
    setup SEQUENCE {
        pdcc-candidateReductionAL1 PDCCH-CandidateReductionValue-r13,
        pdcc-candidateReductionAL2 PDCCH-CandidateReductionValue-r13,
        pdcc-candidateReductionAL3 PDCCH-CandidateReductionValue-r13,
    }
}

-- ASN1END
```
skipMonitoringDCI-format0-1A
Indicates whether the UE is configured to omit monitoring DCI format 0/1A, see TS 36.213 [23, 9.1.1].

pdcch-candidateReductionALx
Indicates reduced (E)PDCCH monitoring requirements on user specific search space of the x-th aggregation level, see TS 36.213 [23, 9.1.1]. n0 corresponds to value 0%, n33 corresponds to 33% and so on.

-- PDCP-Config

The IE PDCP-Config is used to set the configurable PDCP parameters for data radio bearers.

PDCP-Config information element

-- ASN1START

PDCP-Config ::= SEQUENCE {
  discardTimer ENUMERATED {
    ms50, ms100, ms150, ms300, ms500,
    ms750, ms1500, infinity
  } OPTIONAL, -- Cond Setup
  rlc-AM SEQUENCE {
    statusReportRequired BOOLEAN
  } OPTIONAL, -- Cond Rlc-AM
  rlc-UM SEQUENCE {
    pdcp-SN-Size ENUMERATED {len7bits, len12bits}
  } OPTIONAL, -- Cond Rlc-UM
  headerCompression CHOICE {
    notUsed NULL,
    rohc SEQUENCE {
      maxCID INTEGER (1..16383) DEFAULT 15,
      profiles SEQUENCE {
        profile0x0001 BOOLEAN,
        profile0x0002 BOOLEAN,
      }
    }
  }
}
profile0x0003 BOOLEAN,
profile0x0004 BOOLEAN,
profile0x0006 BOOLEAN,
profile0x0101 BOOLEAN,
profile0x0102 BOOLEAN,
profile0x0103 BOOLEAN,
profile0x0104 BOOLEAN
},
...
}

[...,]
[[ rn-IntegrityProtection-r10 ENUMERATED {enabled} OPTIONAL -- Cond RN]]
[[ pdcp-SN-Size-v1130 ENUMERATED {len15bits} OPTIONAL -- Cond Rlc-AM2]]
[[ ul-DataSplitDRB-ViaSCG-r12 BOOLEAN OPTIONAL, -- Need ON
  t-Reordering-r12 ENUMERATED {
    ms0, ms20, ms40, ms60, ms80, ms100, ms120, ms140,
    ms160, ms180, ms200, ms220, ms240, ms260, ms280, ms300,
    ms500, ms750, spare14, spare13, spare12, spare11, spare10,
    spare9, spare8, spare7, spare6, spare5, spare4, spare3,
    spare2, spare1} OPTIONAL -- Cond SetupS]]
[[ ul-DataSplitThreshold-r13 CHOICE {
    release NULL,
    setup ENUMERATED {
      b0, b100, b200, b400, b800, b1600, b3200, b6400, b12800,
      b25600, b51200, b102400, b204800, b409600, b819200,
      spare1} OPTIONAL, -- Need ON
    pdcp-SN-Size-v1310 ENUMERATED {len18bits} OPTIONAL, -- Cond Rlc-AM3
    statusFeedback-r13 CHOICE {
      release NULL,
      setup SEQUENCE {...}]]
statusPDU-TypeForPolling-r13 ENUMERATED {type1, type2} OPTIONAL, -- Need ON

statusPDU-Periodicity-Type1-r13 ENUMERATED {
    ms5, ms10, ms20, ms30, ms40, ms50, ms60, ms70, ms80, ms90,
    ms100, ms150, ms200, ms300, ms500, ms1000, ms2000, ms5000,
    ms10000, ms20000, ms50000} OPTIONAL, -- Need ON

statusPDU-Periodicity-Type2-r13 ENUMERATED {
    ms5, ms10, ms20, ms30, ms40, ms50, ms60, ms70, ms80, ms90,
    ms100, ms150, ms200, ms300, ms500, ms1000, ms2000, ms5000,
    ms10000, ms20000, ms50000} OPTIONAL, -- Need ON

statusPDU-Periodicity-Offset-r13 ENUMERATED {
    ms1, ms2, ms5, ms10, ms25, ms50, ms100, ms250, ms500,
    ms2500, ms5000, ms25000} OPTIONAL -- Need ON

} }

OPTIONAL -- Need ON
]]

-- ASN1STOP
### PDCP-Config field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>discardTimer</strong></td>
<td>Indicates the discard timer value specified in TS 36.323 [8]. Value in milliseconds. Value ms50 means 50 ms, ms100 means 100 ms and so on.</td>
</tr>
<tr>
<td><strong>headerCompression</strong></td>
<td>E-UTRAN does not reconfigure header compression for an MCG DRB except for upon handover and upon the first reconfiguration after RRC connection re-establishment. E-UTRAN does not reconfigure header compression for a SCG DRB except for upon SCG change involving PDCP re-establishment. For split and LWA DRBs E-UTRAN configures only notUsed.</td>
</tr>
<tr>
<td><strong>maxCID</strong></td>
<td>Indicates the value of the MAX_CID parameter as specified in TS 36.323 [8]. The total value of MAX_CIDs across all bearers for the UE should be less than or equal to the value of maxNumberROHC-ContextSessions parameter as indicated by the UE.</td>
</tr>
<tr>
<td><strong>pdcp-SN-Size</strong></td>
<td>Indicates the PDCP Sequence Number length in bits. For RLC UM: value len7bits means that the 7-bit PDCP SN format is used and len12bits means that the 12-bit PDCP SN format is used. For RLC AM: value len15bits means that the 15-bit PDCP SN format is used, value len18bits means that the 18-bit PDCP SN format is used, otherwise if the field is not included upon setup of the PCDP entity 12-bit PDCP SN format is used, as specified in TS 36.323 [8].</td>
</tr>
<tr>
<td><strong>profiles</strong></td>
<td>The profiles used by both compressor and decompressor in both UE and E-UTRAN. The field indicates which of the ROHC profiles specified in TS 36.323 [8] are supported, i.e. value true indicates that the profile is supported. Profile 0x0000 shall always be supported when the use of ROHC is configured. If support of two ROHC profile identifiers with the same 8 LSB’s is signalled, only the profile corresponding to the highest value shall be applied. E-UTRAN does not configure ROHC while t-Reordering is configured (i.e. for split DRBs, for LWA bearers or upon reconfiguration from split or LWA to MCG DRB).</td>
</tr>
<tr>
<td><strong>statusFeedback</strong></td>
<td>Indicates whether the UE shall send PDCP Status Report periodically or by E-UTRAN polling as specified in TS 36.323 [8]. E-UTRAN configures this field only for LWA DRB.</td>
</tr>
<tr>
<td><strong>statusPDU-TypeForPolling</strong></td>
<td>Indicates the PDCP Control PDU option when it is triggered by E-UTRAN polling. Value type1 indicates using the legacy PDCP Control PDU for PDCP status reporting and value type2 indicates using the LWA specific PDCP Control PDU for LWA status reporting as specified in TS 36.323 [8].</td>
</tr>
<tr>
<td><strong>statusPDU-Periodicity-Type1</strong></td>
<td>Indicates the value of the PDCP Status reporting periodicity for type1 Status PDU, as specified in TS 36.323 [8]. Value in milliseconds. Value ms5 means 5 ms, ms10 means 10 ms and so on.</td>
</tr>
<tr>
<td><strong>statusPDU-Periodicity-Type2</strong></td>
<td>Indicates the value of the PDCP Status reporting periodicity for type2 Status PDU, as specified in TS 36.323 [8]. Value in milliseconds. Value ms5 means 5 ms, ms10 means 10 ms and so on.</td>
</tr>
<tr>
<td><strong>statusPDU-Periodicity-Offset</strong></td>
<td>Indicates the value of the offset for type2 Status PDU periodicity, as specified in TS 36.323 [8]. Value in milliseconds. Value ms1 means 1 ms, ms2 means 2 ms and so on.</td>
</tr>
<tr>
<td><strong>t-Reordering</strong></td>
<td>Indicates the value of the reordering timer, as specified in TS 36.323 [8]. Value in milliseconds. Value ms0 means 0 ms and behaviour as specified in 7.3.2 applies, ms20 means 20 ms and so on.</td>
</tr>
<tr>
<td><strong>rn-IntegrityProtection</strong></td>
<td>Indicates that integrity protection or verification shall be applied for all subsequent packets received and sent by the RN on the DRB.</td>
</tr>
<tr>
<td><strong>statusReportRequired</strong></td>
<td>Indicates whether or not the UE shall send a PDCP Status Report upon re-establishment of the PDCP entity and upon PDCP data recovery as specified in TS 36.323 [8].</td>
</tr>
<tr>
<td><strong>ul-DataSplitDRB-ViaSCG</strong></td>
<td>Indicates whether the UE shall send PDCP PDUs via SCG as specified in TS 36.323 [8]. E-UTRAN only configures the field (i.e. indicates value TRUE) for split DRBs.</td>
</tr>
<tr>
<td><strong>ul-DataSplitThreshold</strong></td>
<td>Indicates the threshold value for uplink data split operation specified in TS 36.323 [8]. Value b100 means 100 Bytes, b200 means 200 Bytes and so on. E-UTRAN only configures this field for split DRBs.</td>
</tr>
<tr>
<td>Conditional presence</td>
<td>Explanation</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Rlc-AM</strong></td>
<td>The field is mandatory present upon setup of a PDCP entity for a radio bearer configured with RLC AM. The field is optional, need ON, in case of reconfiguration of a PDCP entity at handover, at the first reconfiguration after RRC re-establishment or at SCG change involving PDCP re-establishment or PDCP data recovery for a radio bearer configured with RLC AM. Otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>Rlc-AM2</strong></td>
<td>The field is optionally present, need OP, upon setup of a PDCP entity for a radio bearer configured with RLC AM. Otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>Rlc-AM3</strong></td>
<td>The field is optionally present, need OP, upon setup of a PDCP entity for a radio bearer configured with RLC AM, if pdcp-SN-Size-v1130 is absent. Otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>Rlc-UM</strong></td>
<td>The field is mandatory present upon setup of a PDCP entity for a radio bearer configured with RLC UM. It is optionally present, Need ON, upon handover within E-UTRA, upon the first reconfiguration after re-establishment and upon SCG change involving PDCP re-establishment. Otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>RN</strong></td>
<td>The field is optionally present when signalled to the RN, need OR. Otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>Setup</strong></td>
<td>The field is mandatory present in case of radio bearer setup. Otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td><strong>SetupS</strong></td>
<td>The field is mandatory present in case of setup of or reconfiguration to a split DRB or LWA DRB. The field is optionally present upon reconfiguration of a split DRB or LWA DRB or upon DRB type change from split to MCG DRB or from LWA to LTE only, need ON. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

-- PDSCH-Config

The IE `PDSCH-ConfigCommon` and the IE `PDSCH-ConfigDedicated` are used to specify the common and the UE specific PDSCH configuration respectively.

**PDSCH-Config** information element

```
-- ASN1START

PDSCH-ConfigCommon ::= SEQUENCE { ReferenceSignalPower INTEGER (-60..50), p-b INTEGER (0..3) }

PDSCH-ConfigCommon-v1310 ::= SEQUENCE { pdch-maxNumRepetitionCEmodeA-r13 ENUMERATED { r16, r32 } OPTIONAL, -- Need OR pdch-maxNumRepetitionCEmodeB-r13 ENUMERATED { r192, r256, r384, r512, r768, r1024, r1536, r2048 } OPTIONAL -- Need OR }

PDSCH-ConfigDedicated ::= SEQUENCE { p-a ENUMERATED { ...
```
dB-6, dB-4dot77, dB-3, dB-1dot77, dB0, dB1, dB2, dB3
}

PDSCH-ConfigDedicated-v1130 ::= SEQUENCE {
  dmrs-ConfigPDSCH-r11    DMRS-Config-r11     OPTIONAL, -- Need ON
  qcl-Operation      ENUMERATED {typeA, typeB}   OPTIONAL, -- Need OR
  re-MappingQCLConfigToReleaseList-r11 RE-MappingQCLConfigToReleaseList-r11 OPTIONAL, -- Need ON
  re-MappingQCLConfigToAddModList-r11  RE-MappingQCLConfigToAddModList-r11 OPTIONAL -- Need ON
}

PDSCH-ConfigDedicated-v1280 ::=  SEQUENCE {
  tbsIndexAlt-r12      ENUMERATED {a26, a33}    OPTIONAL -- Need OR
}

PDSCH-ConfigDedicated-v1310 ::=  SEQUENCE {
  dmrs-ConfigPDSCH-v1310    DMRS-Config-v1310     OPTIONAL -- Need ON
}

RE-MappingQCLConfigToAddModList-r11 ::=  SEQUENCE (SIZE (1..maxRE-MapQCL-r11)) OF PDSCH-RE-MappingQCL-Config-r11

RE-MappingQCLConfigToReleaseList-r11 ::=  SEQUENCE (SIZE (1..maxRE-MapQCL-r11)) OF PDSCH-RE-MappingQCL-ConfigId-r11

PDSCH-RE-MappingQCL-Config-r11 ::=  SEQUENCE {
  pdsch-RE-MappingQCL-ConfigId-r11 PDSCH-RE-MappingQCL-ConfigId-r11,
  optionalSetOfFields-r11    SEQUENCE {
    crs-PortsCount-r11     ENUMERATED {n1, n2, n4, spare1},
    crs-FreqShift-r11     INTEGER (0..5),
    mbsfn-SubframeConfigList-r11  CHOICE {
      release           NULL,
      setup             SEQUENCE {
        subframeConfigList MBSFN-SubframeConfigList
      }
    }
  }
}
---

**PDSCH-Config field descriptions**

optionalSetOfFields
If absent, the UE releases the configuration provided previously, if any, and applies the values from the serving cell configured on the same frequency.

**p-a**
Parameter: $P_a$, see TS 36.213 [23, 5.2]. Value dB-6 corresponds to -6 dB, dB-4.77 corresponds to -4.77 dB etc.

**p-b**
Parameter: $P_b$, see TS 36.213 [23, Table 5.2-1].

**pdsch-maxNumRepetitionCEmodeA**
Maximum value to indicate the set of PDSCH repetition numbers for CE mode A, see TS 36.211 [21] and TS 36.213 [23].

**pdsch-maxNumRepetitionCEmodeB**
Maximum value to indicate the set of PDSCH repetition numbers for CE mode B, see TS 36.211 [21] and TS 36.213 [23].

**pdsch-Start**
The starting OFDM symbol of PDSCH for the concerned serving cell, see TS 36.213 [23, 7.1.6.4]. Values 1, 2, 3 are applicable when $dl$-Bandwidth for the concerned serving cell is greater than 10 resource blocks, values 2, 3, 4 are applicable when $dl$-Bandwidth for the concerned serving cell is less than or equal to 10 resource blocks, see TS 36.211 [21, Table 6.7-1]. Value $n1$ corresponds to 1, value $n2$ corresponds to 2 and so on.

**qcl-CSI-RS-ConfigNZPId**
Indicates the CSI-RS resource that is quasi co-located with the PDSCH antenna ports, see TS 36.213 [23, 7.1.9]. E-UTRAN configures this field if and only if the UE is configured with qcl-Operation set to typeB.

**qcl-Operation**
Indicates the quasi co-location behaviour to be used by the UE, type A and type B, as described in TS 36.213 [23, 7.1.10].

**referenceSignalPower**
Parameter: Reference-signal power, which provides the downlink reference-signal EPRE, see TS 36.213 [23, 5.2]. The actual value in dBm.

**re-MappingQCLConfigToAddModList, re-MappingQCLConfigToReleaseList**
For a serving frequency E-UTRAN configures at least one PDSCH-RE-MappingQCL-Config when transmission mode 10 is configured for the serving cell on this carrier frequency. Otherwise it does not configure this field.

**tbsIndexAlt**
Indicates the applicability of the alternative TBS index for the $I_{TBS}$ 26 and 33 (see TS 36.213 [23, Table 7.1.7.2.1-1]) to all subframes scheduled by DCI format 2C or 2D. Value a26 refers to the alternative TBS index $I_{TBS}$ 26A, and value a33 refers to the alternative TBS index $I_{TBS}$ 33A. If this field is not configured, the UE shall use $I_{TBS}$ 26 and 33 specified in Table 7.1.7.2.1-1 in TS 36.213 [23] for all subframes instead.

---

**PDSCH-RE-MappingQCL-ConfigId**

The IE PDSCH-RE-MappingQCL-ConfigId is used to identify a set of PDSCH parameters related to resource element mapping and quasi co-location, as configured by the IE PDSCH-RE-MappingQCL-Config. The identity is unique within the scope of a carrier frequency.
PDSCH-RE-MappingQCL-ConfigId information elements

-- ASN1START

PDSCH-RE-MappingQCL-ConfigId-r11 ::= INTEGER (1..maxRE-MapQCL-r11)

-- ASN1STOP

– PHICH-Config

The IE PHICH-Config is used to specify the PHICH configuration.

PHICH-Config information element

-- ASN1START

PHICH-Config ::= SEQUENCE {
  phich-Duration      ENUMERATED {normal, extended},
  phich-Resource      ENUMERATED {oneSixth, half, one, two}
}

-- ASN1STOP

PHICH-Config field descriptions

<table>
<thead>
<tr>
<th>phich-Duration</th>
<th>Parameter: PHICH-Duration, see TS 36.211 [21, Table 6.9.3-1].</th>
</tr>
</thead>
<tbody>
<tr>
<td>phich-Resource</td>
<td>Parameter: Ng, see TS 36.211 [21, 6.9]. Value oneSixth corresponds to 1/6, half corresponds to 1/2 and so on.</td>
</tr>
</tbody>
</table>

– PhysicalConfigDedicated

The IE PhysicalConfigDedicated is used to specify the UE specific physical channel configuration.

PhysicalConfigDedicated information element

-- ASN1START

PhysicalConfigDedicated ::= SEQUENCE {
  pdsch-ConfigDedicated    PDSCH-ConfigDedicated   OPTIONAL,  -- Need ON
  pucch-ConfigDedicated    PUCCH-ConfigDedicated   OPTIONAL,  -- Need ON
  pusch-ConfigDedicated    PUSCH-ConfigDedicated   OPTIONAL,  -- Need ON
  uplinkPowerControlDedicated   UplinkPowerControlDedicated  OPTIONAL,  -- Need ON
  tpc-PDCCH-ConfigPUCH    TPC-PDCCH-Config        OPTIONAL,  -- Need ON
}

-- ASN1STOP
tpc-PDCCH-ConfigPUSCH    TPC-PDCCH-Config OPTIONAL,  -- Need ON

cqi-ReportConfig     CQI-ReportConfig OPTIONAL,  -- Cond CQI-r8

soundingRS-UL-ConfigDedicated     SoundingRS-UL-ConfigDedicated OPTIONAL,  -- Need ON

antennaInfo     CHOICE {
    explicitValue     AntennaInfoDedicated,
    defaultValue     NULL
}                        OPTIONAL, -- Cond AI-r8

schedulingRequestConfig     SchedulingRequestConfig OPTIONAL,  -- Need ON

...

[[ cqi-ReportConfig-v920     CQI-ReportConfig-v920 OPTIONAL,  -- Cond CQI-r8
    antennaInfo-v920     AntennaInfoDedicated-v920 OPTIONAL  -- Cond AI-r8
]];

[[ antennaInfo-r10     CHOICE {
    explicitValue-r10     AntennaInfoDedicated-r10,
    defaultValue     NULL
}                        OPTIONAL, -- Cond AI-r10

antennaInfoUL-r10     AntennaInfoUL-r10 OPTIONAL,  -- Need ON

cif-Presence-r10     BOOLEAN OPTIONAL,  -- Need ON

cqi-ReportConfig-r10     CQI-ReportConfig-r10 OPTIONAL,  -- Cond CQI-r10

csi-RS-Config-r10     CSI-RS-Config-r10 OPTIONAL,  -- Need ON

pucch-ConfigDedicated-v1020     PUCCH-ConfigDedicated-v1020 OPTIONAL,  -- Need ON

pusch-ConfigDedicated-v1020     PUSCH-ConfigDedicated-v1020 OPTIONAL,  -- Need ON

schedulingRequestConfig-v1020     SchedulingRequestConfig-v1020 OPTIONAL,  -- Need ON

soundingRS-UL-ConfigDedicated-v1020
    SoundingRS-UL-ConfigDedicated-v1020 OPTIONAL,  -- Need ON

soundingRS-UL-ConfigDedicatedAperiodic-r10
    SoundingRS-UL-ConfigDedicatedAperiodic-r10 OPTIONAL,  -- Need ON

uplinkPowerControlDedicated-v1020
    UplinkPowerControlDedicated-v1020 OPTIONAL  -- Need ON
]];

[[ additionalSpectrumEmissionCA-r10     CHOICE {
    release     NULL,
    setup     SEQUENCE {
        additionalSpectrumEmissionPCell-r10     AdditionalSpectrumEmission
    }
}]}
CSI-RS-ConfigNZPToReleaseList-r11

CSI-RS-ConfigNZPToAddModList-r11

CSI-RS-ConfigZPToReleaseList-r11

CSI-RS-ConfigZPToAddModList-r11

epdcch-Config-r11

PDSCH-ConfigDedicated-v1130

-- UL configuration

cqi-ReportConfig-v1130

PUCCH-Conf igDedicated-v1130

PUSCH-ConfigDedicated-v1130

UplinkPowerControlDedicated-v1130

-- DL configuration as well as configuration applicable for DL and UL

CSI-RS-ConfigNZPToReleaseList-r11 OPTIONAL, -- Need ON

CSI-RS-ConfigNZPToAddModList-r11 OPTIONAL, -- Need ON

CSI-RS-ConfigZPToReleaseList-r11 OPTIONAL, -- Need ON

CSI-RS-ConfigZPToAddModList-r11 OPTIONAL, -- Need ON

eimta-MainConfig-r12

EIMTA-MainConfig-r12 OPTIONAL, -- Cond AI-r10

eimta-MainConfigPCell-r12

EIMTA-MainConfigServCell-r12 OPTIONAL, -- Need ON

PUCCH-ConfigDedicated-v1250 OPTIONAL, -- Need ON

CQI-ReportConfig-v1250 OPTIONAL, -- Need ON

UplinkPowerControlDedicated-v1250

PUSCH-ConfigDedicated-v1250 OPTIONAL, -- Need ON

PDSCH-ConfigDedicated-v1250 OPTIONAL

CSI-RS-Config-v1250

-- Need ON

csi-RS-Config-v1250

CSI-RS-Config-v1250

PDSCH-ConfigDedicated-v1280 OPTIONAL, -- Need ON

-- Need ON

PDSCH-ConfigDedicated-v1310 OPTIONAL, -- Need ON

PUCCH-ConfigDedicated-r13 OPTIONAL, -- Need ON

PUSCH-ConfigDedicated-r13 OPTIONAL, -- Need ON

PDCCH-CandidateReductions-r13

PDSCH-ConfigDedicated-v1310 OPTIONAL, -- Need ON

PUCCH-ConfigDedicated-r13 OPTIONAL, -- Need ON

PUSCH-ConfigDedicated-r13 OPTIONAL, -- Need ON

PDCCH-CandidateReductions-r13
PDCCH-CandidateReductions-r13 OPTIONAL, -- Need ON

cqi-ReportConfig-v1310 CQI-ReportConfig-v1310 OPTIONAL, -- Need ON

soundingRS-UL-ConfigDedicated-v1310

SoundingRS-UL-ConfigDedicated-v1310 OPTIONAL, -- Need ON

soundingRS-UL-ConfigDedicatedUpPTsExt-r13

SoundingRS-UL-ConfigDedicatedUpPTsExt-r13 OPTIONAL, -- Need ON

soundingRS-UL-ConfigDedicatedAperiodic-v1310

SoundingRS-UL-ConfigDedicatedAperiodic-v1310 OPTIONAL, -- Need ON

soundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13

SoundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13 OPTIONAL, -- Need ON

csi-RS-Config-v1310 CSI-RS-Config-v1310 OPTIONAL, -- Need ON

ce-Mode-r13 CHOICE {

  release NULL,

  setup ENUMERATED {ce-ModeA,ce-ModeB }
}

  OPTIONAL, -- Need ON

csi-RS-ConfigNZPToAddModListExt-r13CSI-RS-ConfigNZPToAddModListExt-r13 OPTIONAL, -- Need ON

csi-RS-ConfigNZPToReleaseListExt-r13 CSI-RS-ConfigNZPToReleaseListExt-r13 OPTIONAL -- Need ON
]

[ [ cqi-ReportConfig-v1320 CQI-ReportConfig-v1320 OPTIONAL -- Need ON

]]

}

PhysicalConfigDedicatedSCell-r10 ::= SEQUENCE {

  -- DL configuration as well as configuration applicable for DL and UL

  nonUL-Configuration-r10 SEQUENCE {

    -- DL configuration as well as configuration applicable for DL and UL

    antennaInfo-r10

      AntennaInfoDedicated-r10 OPTIONAL, -- Need ON

    crossCarrierSchedulingConfig-r10

      CrossCarrierSchedulingConfig-r10 OPTIONAL, -- Need ON

    csi-RS-Config-r10 CSI-RS-Config-r10 OPTIONAL, -- Need ON

    pdsch-ConfigDedicated-r10 PDSCH-ConfigDedicated OPTIONAL -- Need ON

  } OPTIONAL, -- Cond SCellAdd

  -- UL configuration

  ul-Configuration-r10 SEQUENCE {

  }
antennaInfoUL-r10  AntennaInfoUL-r10  OPTIONAL, -- Need ON
pusch-ConfigDedicatedSCell-r10
  PUSCH-ConfigDedicatedSCell-r10  OPTIONAL, -- Cond PUSCH-SCell1
uplinkPowerControlDedicatedSCell-r10
  UplinkPowerControlDedicatedSCell-r10  OPTIONAL, -- Need ON
cqi-ReportConfigSCell-r10  CQI-ReportConfigSCell-r10  OPTIONAL, -- Need ON
soundingRS-UL-ConfigDedicated-r10
  SoundingRS-UL-ConfigDedicated OPTIONAL, -- Need ON
soundingRS-UL-ConfigDedicated-v1020
  SoundingRS-UL-ConfigDedicated-v1020 OPTIONAL, -- Need ON
soundingRS-UL-ConfigDedicatedAperiodic-r10
  SoundingRS-UL-ConfigDedicatedAperiodic-r10 OPTIONAL -- Need ON
}
  OPTIONAL, -- Cond CommonUL
....
[
  -- DL configuration as well as configuration applicable for DL and UL
  csi-RS-ConfigNZPToReleaseList-r11
    CSI-RS-ConfigNZPToReleaseList-r11 OPTIONAL, -- Need ON
  csi-RS-ConfigNZPToAddModList-r11
    CSI-RS-ConfigNZPToAddModList-r11 OPTIONAL, -- Need ON
  csi-RS-ConfigZPToReleaseList-r11
    CSI-RS-ConfigZPToReleaseList-r11 OPTIONAL, -- Need ON
  csi-RS-ConfigZPToAddModList-r11
    CSI-RS-ConfigZPToAddModList-r11 OPTIONAL, -- Need ON
  epdcch-Config-r11
    EPDCCH-Config-r11 OPTIONAL, -- Need ON
  pdsch-ConfigDedicated-v1130
    PDSCH-ConfigDedicated-v1130 OPTIONAL, -- Need ON
  -- UL configuration
  cqi-ReportConfig-v1130
    CQI-ReportConfig-v1130 OPTIONAL, -- Need ON
  pusch-ConfigDedicated-v1130
    PUSCH-ConfigDedicated-v1130 OPTIONAL, -- Cond PUSCH-SCell1
  uplinkPowerControlDedicatedSCell-v1130
    UplinkPowerControlDedicatedSCell-v1130 OPTIONAL -- Need ON
]
]
[
  antennaInfo-v1250
    AntennaInfoDedicated-v1250 OPTIONAL, -- Need ON
eimta-MainConfigSCell-r12
    EIMTA-MainConfigServCell-r12 OPTIONAL, -- Need ON
cqi-ReportConfigSCell-v1250  CQI-ReportConfig-v1250  OPTIONAL,  -- Need ON
uplinkPowerControlDedicatedSCell-v1250
  UplinkPowerControlDedicated-v1250  OPTIONAL,  -- Need ON
csi-RS-Config-v1250  CSI-RS-Config-v1250  OPTIONAL  -- Need ON
]
]
pdsch-ConfigDedicated-v1280  PDSCH-ConfigDedicated-v1280  OPTIONAL  -- Need ON
]
]
pucch-Cell-r13  ENUMERATED {true}  OPTIONAL, -- Cond PUCCH-SCell1
pucch-SCell  CHOICE{
  release  NULL,
  setup  SEQUENCE {
    pucch-ConfigDedicated-r13
      PUCCH-ConfigDedicated-r13  OPTIONAL,  -- Need ON
    schedulingRequestConfig-r13
      SchedulingRequestConfigSCell-r13  OPTIONAL,  -- Need ON
tpc-PDCCH-ConfigPUCCH-SCell-r13
      TPC-PDCCH-ConfigSCell-r13  OPTIONAL,  -- Need ON
    pusch-ConfigDedicated-r13
      PUSCH-ConfigDedicated-r13  OPTIONAL,  -- Cond PUSCH-SCell
    uplinkPowerControlDedicated-r13
      UplinkPowerControlDedicatedSCell-v1310  OPTIONAL  -- Need ON
  }
}
]
]
crossCarrierSchedulingConfig-r13
  CrossCarrierSchedulingConfig-r13  OPTIONAL,  -- Cond Cross-Carrier-Config
pdcch-ConfigSCell-r13  PDCCH-ConfigSCell-r13  OPTIONAL,  -- Need ON
cqi-ReportConfig-v1310  CQI-ReportConfig-v1310  OPTIONAL,  -- Need ON
pdsch-ConfigDedicated-v1310  PDSCH-ConfigDedicated-v1310  OPTIONAL,  -- Need ON
soundingRS-UL-ConfigDedicated-v1310
  SoundingRS-UL-ConfigDedicated-v1310  OPTIONAL,  -- Need ON
soundingRS-UL-ConfigDedicatedUpPTsExt-r13
  SoundingRS-UL-ConfigDedicatedUpPTsExt-r13  OPTIONAL,  -- Need ON
soundingRS-UL-ConfigDedicatedAperiodic-v1310
  SoundingRS-UL-ConfigDedicatedAperiodic-v1310  OPTIONAL,  -- Need ON
soundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13
SoundingRS-UL-ConfigDedicatedAperiodicUpPTsExt-r13 OPTIONAL, -- Need ON

csi-RS-Config-v1310 CSI-RS-Config-v1310 OPTIONAL, -- Need ON

laa-SCellConfiguration-r13 LAA-SCellConfiguration-r13 OPTIONAL, -- Need ON

csi-RS-ConfigNZPToAddModListExt-r13CSI-RS-ConfigNZPToAddModListExt-r13 OPTIONAL, -- Need ON

\[
\text{CSI-RS-ConfigNZPToReleaseListExt-r13CSI-RS-ConfigNZPToReleaseListExt-r13 OPTIONAL} \quad \text{-- Need ON}
\]

\[
\text{cqi-ReportConfig-v1320CQI-ReportConfig-v1320 OPTIONAL} \quad \text{-- Need ON}
\]

LAA-SCellConfiguration-r13 ::= SEQUENCE {
  subframeStartPosition-r13 ENUMERATED {s0, s07},
  laa-SCellSubframeConfig-r13 BIT STRING (SIZE(8))
}

CSI-RS-ConfigNZPToAddModList-r11 ::= SEQUENCE (SIZE (1..maxCSI-RS-NZP-r11)) OF CSI-RS-ConfigNZP-r11

CSI-RS-ConfigNZPToAddModListExt-r13 ::= SEQUENCE (SIZE (1..maxCSI-RS-NZP-v1310)) OF CSI-RS-ConfigNZP-r11

CSI-RS-ConfigNZPToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxCSI-RS-NZP-r11)) OF CSI-RS-ConfigNZPId-r11

CSI-RS-ConfigNZPToReleaseListExt-r13 ::= SEQUENCE (SIZE (1..maxCSI-RS-NZP-v1310)) OF CSI-RS-ConfigNZPId-v1310

CSI-RS-ConfigZPToAddModList-r11 ::= SEQUENCE (SIZE (1..maxCSI-RS-ZP-r11)) OF CSI-RS-ConfigZP-r11

CSI-RS-ConfigZPToReleaseList-r11 ::= SEQUENCE (SIZE (1..maxCSI-RS-ZP-r11)) OF CSI-RS-ConfigZPId-r11

-- ASN1STOP
### PhysicalConfigDedicated field descriptions

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>additionalSpectrumEmissionPCell</td>
<td>E-UTRAN does not configure this field in this release of the specification.</td>
</tr>
<tr>
<td>antennalnfo</td>
<td>A choice is used to indicate whether the antennalnfo is signalled explicitly or set to the default antenna configuration as specified in section 9.2.4.</td>
</tr>
<tr>
<td>ce-Mode</td>
<td>Indicates the CE mode as specified in TS 36.213 [23].</td>
</tr>
<tr>
<td>csi-RS-Config</td>
<td>For a serving frequency E-UTRAN does not configure csi-RS-Config (includes zeroTxPowerCSI-RS) when transmission mode 10 is configured for the serving cell on this carrier frequency.</td>
</tr>
<tr>
<td>csi-RS-ConfigNZPToAddModList</td>
<td>For a serving frequency E-UTRAN configures one or more CSI-RS-ConfigNZP only when transmission mode 10 is configured for the serving cell on this carrier frequency. EUTRAN configures a maximum of one CSI-RS-ConfigNZP for a serving frequency on which the UE supports only one CSI process (i.e. supportedCSI-Proc is indicated as n1).</td>
</tr>
<tr>
<td>csi-RS-ConfigZPToAddModList</td>
<td>For a serving frequency E-UTRAN configures one or more CSI-RS-ConfigZP only when transmission mode 10 is configured for the serving cell on this carrier frequency.</td>
</tr>
<tr>
<td>eimta-MainConfigPCell, eimta-MainConfigSCell</td>
<td>If E-UTRAN configures eimta-MainConfigPCell or eimta-MainConfigSCell for one serving cell in a frequency band, E-UTRAN configures eimta-MainConfigPCell or eimta-MainConfigSCell for all serving cells residing on the frequency band. E-UTRAN configures eimta-MainConfigPCell or eimta-MainConfigSCell only if eimta-MainConfig is configured.</td>
</tr>
<tr>
<td>epdcch-Config</td>
<td>indicates the EPDCCH-Config for the cell. E-UTRAN does not configure EPDCCH-Config for an SCell that is configured with value other for schedulingCellInfo in CrossCarrierSchedulingConfig.</td>
</tr>
<tr>
<td>laa-SCellSubframeConfig</td>
<td>A bit-map indicating LAA SCell subframe configuration, &quot;1&quot; denotes that the corresponding subframe is allocated as MBSFN subframe. The bitmap is interpreted as follows: Starting from the first/leftmost bit in the bitmap, the allocation applies to subframes #1, #2, #3, #4, #6, #7, #8, and #9.</td>
</tr>
<tr>
<td>pdsch-ConfigDedicated-v1130</td>
<td>For a serving frequency E-UTRAN configures pdsch-ConfigDedicated-v1130 only when transmission mode 10 is configured for the serving cell on this carrier frequency.</td>
</tr>
<tr>
<td>pdsch-ConfigDedicated-v1280</td>
<td>For a serving frequency E-UTRAN configures pdsch-ConfigDedicated-v1280 only when transmission mode 9 or 10 is configured for the serving cell on this carrier frequency.</td>
</tr>
<tr>
<td>pucch-Cell</td>
<td>If present, PUCCH feedback of this SCell is sent on the PUCCH SCell. If absent, PUCCH feedback of this SCell is sent on PCell or PSCell, or if the cell concerns the PUCCH SCell, on the concerned cell.</td>
</tr>
<tr>
<td>pucch-ConfigDedicated-r13</td>
<td>E-UTRAN configures pucch-ConfigDedicated-r13 only if pucch-ConfigDedicated is not configured.</td>
</tr>
<tr>
<td>pusch-ConfigDedicated-r13</td>
<td>E-UTRAN configures pusch-ConfigDedicated-r13 only if pusch-ConfigDedicated is not configured.</td>
</tr>
<tr>
<td>pusch-ConfigDedicated-v1250</td>
<td>E-UTRAN configures pusch-ConfigDedicated-v1250 only if tpc-SubframeSet is configured.</td>
</tr>
<tr>
<td>subframeStartPosition</td>
<td>Indicates possible starting positions of transmission in the first subframe of the DL transmission burst, see TS 36.211 [21]. Value s0 means the starting position is subframe boundary, s07 means the starting position is either subframe boundary or slot boundary.</td>
</tr>
<tr>
<td>tpc-PDCCH-ConfigPUCCH</td>
<td>PDCCH configuration for power control of PUCCH using format 3/3A, see TS 36.212 [22].</td>
</tr>
<tr>
<td>tpc-PDCCH-ConfigPUSCH</td>
<td>PDCCH configuration for power control of PUSCH using format 3/3A, see TS 36.212 [22].</td>
</tr>
<tr>
<td>uplinkPowerControlDedicated</td>
<td>E-UTRAN configures uplinkPowerControlDedicated-v1130 only if uplinkPowerControlDedicated (without suffix) is configured.</td>
</tr>
<tr>
<td>uplinkPowerControlDedicatedSCell</td>
<td>E-UTRAN configures uplinkPowerControlDedicatedSCell-v1130 only if uplinkPowerControlDedicatedSCell-r10 is configured for this serving cell.</td>
</tr>
</tbody>
</table>
Conditional presence | Explanation
--- | ---
AI-r8 | The field is optionally present, need ON, if antennaInfoDedicated-r10 is absent. Otherwise the field is not present
AI-r10 | The field is optionally present, need ON, if antennaInfoDedicated is absent. Otherwise the field is not present
CommonUL | The field is mandatory present if ui-Configuration of RadioResourceConfigCommonSCell-r10 is present; otherwise it is optional, need ON.
CQI-r8 | The field is optionally present, need ON, if cqi-ReportConfig-r10 is absent. Otherwise the field is not present
CQI-r10 | The field is optionally present, need ON, if cqi-ReportConfig is absent. Otherwise the field is not present
Cross-Carrier-Config | The field is optionally present, need ON, if crossCarrierSchedulingConfig-r10 is absent. Otherwise the field is not present
PUCCH-SCell | The field is optionally present, need OR, for SCell not configured with pucch-configDedicated-r13. Otherwise it is not present.
PUSCH-SCell | The field is optionally present, need ON, if pusch-ConfigDedicatedSCell-r10 and pusch-ConfigDedicated-v1130 are absent. Otherwise the field is not present
PUSCH-SCell1 | The field is optionally present, need ON, for SCell not configured with pucch-configDedicated-r13. Otherwise it is not present.
SCellAdd | The field is mandatory present if cellIdentification is present; otherwise it is optional, need ON.
UL-Power-SCell | The field is optionally present, need ON, if uplinkPowerControlDedicatedSCell is absent. Otherwise the field is not present

NOTE 1: During handover, the UE performs a MAC reset, which involves reverting to the default CQI/ SRS/ SR configuration in accordance with subclause 5.3.13 and TS 36.321 [6, 5.9 & 5.2]. Hence, for these parts of the dedicated radio resource configuration, the default configuration (rather than the configuration used in the source PCell) is used as the basis for the delta signalling that is included in the message used to perform handover.

NOTE 2: Since delta signalling is not supported for the common SCell configuration, E-UTRAN can only add or release the uplink of an SCell by releasing and adding the concerned SCell.

-- P-Max

The IE P-Max is used to limit the UE’s uplink transmission power on a carrier frequency and is used to calculate the parameter Pcompensation defined in TS 36.304 [4]. Corresponds to parameter P_{E_{MAX}} or P_{E_{MAX},c} in TS 36.101 [42]. The UE transmit power on one serving cell shall not exceed the configured maximum UE output power of the serving cell determined by this value as specified in TS 36.101 [42, 6.2.5 or 6.2.5A] or, when transmitting sidelink discovery announcements within the coverage of the concerned cell, as specified in TS 36.101 [42, 6.2.5D].

P-Max information element

-- ASN1START

P-Max ::= INTEGER (-30..33)

-- ASN1STOP

-- PRACH-Config

The IE PRACH-ConfigSIB and IE PRACH-Config are used to specify the PRACH configuration in the system information and in the mobility control information, respectively.

PRACH-Config information elements

-- ASN1START
PRACH-ConfigSIB ::= SEQUENCE {
    rootSequenceIndex INTEGER (0..837),
    prach-ConfigInfo PRACH-ConfigInfo
}

PRACH-ConfigSIB-v1310 ::= SEQUENCE {
    rsrp-ThresholdsPrachInfoList-r13 RSRP-ThresholdsPrachInfoList-r13,
    mpdcch-startSF-CSS-RA-r13 CHOICE {
        fdd-r13 ENUMERATED {v1, v1dot5, v2, v2dot5, v4, v5, v8, v10},
        tdd-r13 ENUMERATED {v1, v2, v4, v5, v8, v10, v20, spare}
    } OPTIONAL, -- Cond MP
    prach-HoppingOffset-r13 INTEGER (0..94) OPTIONAL, -- Need OR
    prach-ParametersListCE-r13 PRACH-ParametersListCE-r13
}

PRACH-Config ::= SEQUENCE {
    rootSequenceIndex INTEGER (0..837),
    prach-ConfigInfo PRACH-ConfigInfo OPTIONAL -- Need ON
}

PRACH-Config-v1310 ::= SEQUENCE {
    rsrp-ThresholdsPrachInfoList-r13 RSRP-ThresholdsPrachInfoList-r13 OPTIONAL, -- Cond HO
    mpdcch-startSF-CSS-RA-r13 CHOICE {
        fdd-r13 ENUMERATED {v1, v1dot5, v2, v2dot5, v4, v5, v8, v10},
        tdd-r13 ENUMERATED {v1, v2, v4, v5, v8, v10, v20, spare}
    } OPTIONAL, -- Cond MP
    prach-HoppingOffset-r13 INTEGER (0..94) OPTIONAL, -- Need OR
    prach-ParametersListCE-r13 PRACH-ParametersListCE-r13 OPTIONAL, -- Cond MP
    initial-CE-level-r13 INTEGER (0..3) OPTIONAL -- Need OR
}

PRACH-ConfigSCell-r10 ::= SEQUENCE {

}
prach-ConfigIndex-r10 INTEGER (0..63)

}

PRACH-ConfigInfo ::= SEQUENCE {
    prach-ConfigIndex INTEGER (0..63),
    highSpeedFlag BOOLEAN,
    zeroCorrelationZoneConfig INTEGER (0..15),
    prach-FreqOffset INTEGER (0..94)
}

PRACH-ParametersListCE-r13 ::= SEQUENCE (SIZE(1..maxCE-Level-r13)) OF PRACH-ParametersCE-r13

PRACH-ParametersCE-r13 ::= SEQUENCE {
    prach-ConfigIndex-r13 INTEGER (0..63),
    prach-FreqOffset-r13 INTEGER (0..94),
    prach-StartingSubframe-r13 ENUMERATED {sf2, sf4, sf8, sf16, sf32, sf64, sf128, sf256} OPTIONAL, -- Need OP
    maxNumPreambleAttemptCE-r13 ENUMERATED {n3, n4, n5, n6, n7, n8, n10} OPTIONAL, -- Need OP
    numRepetitionPerPreambleAttempt-r13 ENUMERATED {n1,n2,n4,n8,n16,n32,n64,n128},
    mpdcch-NarrowbandsToMonitor-r13 SEQUENCE (SIZE(1..2)) OF INTEGER (1..maxAvailNarrowBands-r13),
    mpdcch-NumRepetition-RA-r13 ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128, r256},
    prach-HoppingConfig-r13 ENUMERATED {on,off}
}

RSRP-ThresholdsPrachInfoList-r13 ::= SEQUENCE (SIZE(1..3)) OF RSRP-Range

-- ASN1STOP
### PRACH-Config field descriptions

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>initial-CE-level</strong></td>
<td>Indicates initial PRACH CE level at random access, see TS 36.321 [6]. If not configured, UE selects PRACH CE level based on measured RSRP level, see TS 36.321 [6].</td>
</tr>
<tr>
<td><strong>highSpeedFlag</strong></td>
<td>Parameter: High-speed-flag, see TS 36.211 [21, 5.7.2]. TRUE corresponds to Restricted set and FALSE to Unrestricted set.</td>
</tr>
<tr>
<td><strong>maxNumPreambleAttemptCE</strong></td>
<td>Maximum number of preamble transmission attempts per CE level. See TS 36.321 [6].</td>
</tr>
<tr>
<td><strong>mpdcch-NarrowbandsToMonitor</strong></td>
<td>Narrowbands to monitor for MPDCCH for RAR, see TS 36.213 [23, 6.2]. Field values (1..maxAvailNarrowBands-r13) correspond to narrowband indices (0..(maxAvailNarrowBands-r13-1)) as specified in TS 36.211 [21].</td>
</tr>
<tr>
<td><strong>mpdcch-NumRepetition-RA</strong></td>
<td>Maximum number of repetitions for MPDCCH common search space (CSS) for RAR, Msg3 and Msg4, see TS 36.211 [21].</td>
</tr>
<tr>
<td><strong>mpdcch-startSF-CSS-RA</strong></td>
<td>Starting subframe configuration for MPDCCH common search space (CSS), including RAR, Msg3 retransmission, PDSCH with contention resolution and PDSCH with RRCConnectionSetup, see TS 36.211 [21] and TS 36.213 [23]. Value v1 corresponds to 1, value v1dot5 corresponds to 1.5, and so on.</td>
</tr>
<tr>
<td><strong>numRepetitionPerPreambleAttempt</strong></td>
<td>Number of PRACH repetitions per attempt for each CE level, See TS 36.211 [21].</td>
</tr>
<tr>
<td><strong>prach-ConfigIndex</strong></td>
<td>Parameter: prach-ConfigurationIndex, see TS 36.211 [21, 5.7.1].</td>
</tr>
<tr>
<td><strong>prach-FreqOffset</strong></td>
<td>Parameter: prach-FrequencyOffset, see TS 36.211 [21, 5.7.1]. For TDD the value range is dependent on the value of prach-ConfigIndex.</td>
</tr>
<tr>
<td><strong>prach-HoppingConfig</strong></td>
<td>Coverage level specific frequency hopping configuration for PRACH.</td>
</tr>
<tr>
<td><strong>prach-HoppingOffset</strong></td>
<td>Parameter: PRACH frequency hopping offset, expressed as a number of resource blocks, see TS 36.211 [21, 5.7.1].</td>
</tr>
<tr>
<td><strong>prach-ParametersListCE</strong></td>
<td>Configures PRACH parameters for each CE level. The first entry in the list is the PRACH parameters of CE level 0, the second entry in the list is the PRACH parameters of CE level 1, and so on.</td>
</tr>
<tr>
<td><strong>prach-StartingSubframe</strong></td>
<td>PRACH starting subframe periodicity, expressed in number of subframes available for preamble transmission (PRACH opportunities), see TS 36.211 [21]. Value sf2 corresponds to 2 subframes, sf4 corresponds to 4 subframes and so on. EUTRAN configures the PRACH starting subframe periodicity larger than or equal to the Number of PRACH repetitions per attempt for each CE level (numRepetitionPerPreambleAttempt).</td>
</tr>
<tr>
<td><strong>rootSequenceIndex</strong></td>
<td>Parameter: RACH_ROOT_SEQUENCE, see TS 36.211 [21, 5.7.1].</td>
</tr>
<tr>
<td><strong>rsrp-ThresholdsPrachInfoList</strong></td>
<td>The criterion for BL UEs and UEs in CE to select PRACH resource set. Up to 3 RSRP threshold values are signalled to determine the CE level for PRACH, see TS 36.213 [23]. The first element corresponds to RSRP threshold 1, the second element corresponds to RSRP threshold 2 and so on, see TS 36.321 [6].</td>
</tr>
<tr>
<td><strong>zeroCorrelationZoneConfig</strong></td>
<td>Parameter: Ncs configuration, see TS 36.211 [21, 5.7.2: table 5.7.2-2] for preamble format 0..3 and TS 36.211 [21, 5.7.2: table 5.7.2-3] for preamble format 4.</td>
</tr>
</tbody>
</table>

#### Conditional presence

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HO</strong></td>
<td>The field is mandatory present if initial-CE-level-r13 is absent; otherwise it is optional, need OR.</td>
</tr>
<tr>
<td><strong>MP</strong></td>
<td>The field is mandatory present.</td>
</tr>
</tbody>
</table>

---

**PresenceAntennaPort1**

The IE PresenceAntennaPort1 is used to indicate whether all the neighbouring cells use Antenna Port 1. When set to TRUE, the UE may assume that at least two cell-specific antenna ports are used in all neighbouring cells.

**PresenceAntennaPort1 information element**

-- ASN1START
PresenceAntennaPort1 ::= BOOLEAN

-- ASN1STOP

– PUCCH-Config

The IE PUCCH-ConfigCommon and IE PUCCH-ConfigDedicated are used to specify the common and the UE specific PUCCH configuration respectively.

PUCCH-Config information elements

-- ASN1START

PUCCH-ConfigCommon ::= SEQUENCE {
    deltaPUCCH-Shift ENUMERATED {ds1, ds2, ds3},
    nRB-CQI INTEGER (0..98),
    nCS-AN INTEGER (0..7),
    n1PUCCH-AN INTEGER (0..2047)
}

PUCCH-ConfigCommon-v1310 ::= SEQUENCE {
    n1PUCCH-AN-InfoList-r13 N1PUCCH-AN-InfoList-r13 OPTIONAL, -- Need OR
    pucch-NumRepetitionCE-Msg4-Level0-r13 ENUMERATED {n1, n2, n4, n8} OPTIONAL, -- Need OR
    pucch-NumRepetitionCE-Msg4-Level1-r13 ENUMERATED {n1, n2, n4, n8} OPTIONAL, -- Need OR
    pucch-NumRepetitionCE-Msg4-Level2-r13 ENUMERATED {n4, n8, n16, n32} OPTIONAL, -- Need OR
    pucch-NumRepetitionCE-Msg4-Level3-r13 ENUMERATED {n4, n8, n16, n32} OPTIONAL -- Need OR
}

PUCCH-ConfigDedicated ::= SEQUENCE {
    ackNackRepetition CHOICE {
        release NULL,
        setup SEQUENCE {
            repetitionFactor ENUMERATED {n2, n4, n6, spare1},
            n1PUCCH-AN-Rep INTEGER (0..2047)
        }
    }
}

tdd-AckNackFeedbackMode ENUMERATED {bundling, multiplexing} OPTIONAL -- Cond TDD
PUCCH-ConfigDedicated-v1020 ::= SEQUENCE {
pucch-Format-r10          CHOICE {
    format3-r10              SEQUENCE {
        n3PUCCH-AN-List-r10   SEQUENCE (SIZE (1..4)) OF INTEGER (0..549) OPTIONAL, -- Need ON
        twoAntennaPortActivatedPUCCH-Format3-r10 CHOICE {
            release           NULL,
            setup              SEQUENCE {
                n3PUCCH-AN-ListP1-r10 SEQUENCE (SIZE (1..4)) OF INTEGER (0..549)
            }
        }
    }
}
}
channelSelection-r10     SEQUENCE {
    n1PUCCH-AN-CS-r10        CHOICE {
        release           NULL,
        setup              SEQUENCE {
            n1PUCCH-AN-CS-List-r10      SEQUENCE (SIZE (1..2)) OF N1PUCCH-AN-CS-r10
        }
    }
}
OPTIONAL               -- Need ON
}
optional, -- Need OR
twoAntennaPortActivatedPUCCH-Format1a1b-r10  ENUMERATED {true}  OPTIONAL, -- Need OR
simultaneousPUCCH-PUSCH-r10  ENUMERATED {true}  OPTIONAL, -- Need OR
n1PUCCH-AN-RepP1-r10       INTEGER (0..2047)  OPTIONAL -- Need OR
}
}
PUCCH-ConfigDedicated-v1130 ::= SEQUENCE {
    n1PUCCH-AN-CS-v1130     CHOICE {
        release           NULL,
        setup              SEQUENCE {
            n1PUCCH-AN-CS-ListP1-r11      SEQUENCE (SIZE (2..4)) OF INTEGER (0..2047)
        }
    }
}
OPTIONAL               -- Need ON
}
nPUCCH-Param-r11        CHOICE {
PUCCH-ConfigDedicated-v1250 ::= SEQUENCE {
  nkaPUCCH-Param-r12                CHOICE {
    release        NULL,
    setup         SEQUENCE {
      nkaPUCCH-AN-r12    INTEGER (0..2047)
    }
  }
}

PUCCH-ConfigDedicated-r13 ::= SEQUENCE {
  --Release 8
  ackNackRepetition-r13        CHOICE{
    release        NULL,
    setup         SEQUENCE {
      repetitionFactor-r13    ENUMERATED {n2, n4, n6, spare1},
      n1PUCCH-AN-Rep-r13    INTEGER (0..2047)
    }
  },
  tdd-AckNackFeedbackMode-r13   ENUMERATED {bundling, multiplexing} OPTIONAL, -- Cond TDD
  --Release 10
  pucch-Format-r13              CHOICE {
    format3-r13                SEQUENCE {
      n3PUCCH-AN-List-r13 SEQUENCE (SIZE (1..4)) OF INTEGER (0..549) OPTIONAL, -- Need ON
      twoAntennaPortActivatedPUCCH-Format3-r13  CHOICE {
        release        NULL,
        setup         SEQUENCE {
          n3PUCCH-AN-ListP1-r13 SEQUENCE (SIZE (1..4)) OF INTEGER (0..549)
        }
      }
    }
  }
}
channelSelection-r13

n1PUCCH-AN-CS-r13

release

setup

n1PUCCH-AN-CS-List-r13

SEQUENCE (SIZE (1..2)) OF N1PUCCH-AN-CS-r10,

n1PUCCH-AN-CS-ListP1-r13

SEQUENCE (SIZE (2..4)) OF INTEGER (0..2047)

format4-r13

format4-resourceConfiguration-r13

SEQUENCE (SIZE (4)) OF Format4-resource-r13,

format4-MultiCSI-resourceConfiguration-r13

SEQUENCE (SIZE (1..2)) OF Format4-resource-r13

OPTIONAL -- Need OR

format5-r13

format5-resourceConfiguration-r13

SEQUENCE (SIZE (4)) OF Format5-resource-r13,

format5-MultiCSI-resourceConfiguration-r13

Format5-resource-r13

OPTIONAL -- Need OR

CONTROL

nPUCCH-Parameter-r13

release

setup

nPUCCH-Identity-r13

INTEGER (0..503),

n1PUCCH-AN-r13

INTEGER (0..2047)

OPTIONAL -- Need OR

nPUCCH-Parameter-r13

release

setup

nPUCCH-Identity-r13

INTEGER (0..503),

n1PUCCH-AN-r13

INTEGER (0..2047)

OPTIONAL -- Need OR

nPUCCH-Parameter-r13

release

setup

nPUCCH-Identity-r13

INTEGER (0..503),

n1PUCCH-AN-r13

INTEGER (0..2047)

OPTIONAL -- Need OR

nPUCCH-Parameter-r13

release

setup

nPUCCH-Identity-r13

INTEGER (0..503),

n1PUCCH-AN-r13

INTEGER (0..2047)

OPTIONAL -- Need OR
release  NULL,
setup    SEQUENCE {
nkaPUCCH-AN-r13    INTEGER (0..2047)
}
OPTIONAL, -- Need ON

--Release 13
spatialBundlingPUCCH-r13  BOOLEAN,
spatialBundlingPUSCH-r13  BOOLEAN,
harq-TimingTDD-r13        BOOLEAN,
codebooksizeDetermination-r13  ENUMERATED {dai,cc} OPTIONAL, -- Need OR
maximumPayloadCoderate-r13  INTEGER (0..7) OPTIONAL, -- Need OR
pucch-NumRepetitionCE-r13  CHOICE {
    release  NULL,
    setup    CHOICE {
        modeA    SEQUENCE {
pucch-NumRepetitionCE-format1-r13    ENUMERATED {r1, r2, r4, r8},
pucch-NumRepetitionCE-format2-r13    ENUMERATED {r1, r2, r4, r8}
        },
        modeB    SEQUENCE {
pucch-NumRepetitionCE-format1-r13    ENUMERATED {r4, r8, r16, r32},
pucch-NumRepetitionCE-format2-r13    ENUMERATED {r4, r8, r16, r32}
        }
    }
}
OPTIONAL, --Need ON

Format4-resource-r13 ::=    SEQUENCE {
    startingPRB-format4-r13    INTEGER (0..109),
    numberOfPRB-format4-r13   INTEGER (0..7)
}

Format5-resource-r13 ::=    SEQUENCE {
    startingPRB-format5-r13    INTEGER (0..109),
cdm-index-format5-r13      INTEGER (0..1)
}
N1PUCCH-AN-CS-r10 ::= SEQUENCE (SIZE (1..4)) OF INTEGER (0..2047)

N1PUCCH-AN-InfoList-r13 ::= SEQUENCE (SIZE(1..maxCE-Level-r13)) OF INTEGER (0..2047)

-- ASN1STOP
**PUCCH-Config** field descriptions

**ackNackRepetition**
Parameter indicates whether ACK/NACK repetition is configured, see TS 36.213 [23, 10.1].

**cdm-index-format5**
Parameter $n_{cs}$ see TS 36.211 [21, 5.4.2c] for determining PUCCH resource(s) of PUCCH format 5.

**codebookSizeDetermination**
Parameter indicates whether HARQ codebook size is determined with downlink assignment indicator based solution or number of configured CCs, see TS 36.212 [22, 5.2.2.6, 5.2.3.1 and 5.3.3.1.2] and TS 36.213 [23, 10.1.2.2.3, 10.1.3.2.3.1, 10.1.3.2.3.2 and 10.1.3.2.4].

**deltaPUCCH-Shift**
Parameter: $\Delta^{\text{PUCCH}}_{\text{shift}}$, see TS 36.211 [21, 5.4.1], where ds1 corresponds to value 1, ds2 corresponds to value 2 etc.

**harq-TimingTDD**
Parameter indicates for a TDD SCell when aggregated with a TDD PCell of different UL/DL configurations whether deriving the HARQ timing for such a cell is done in the same way as the DL HARQ timing of an FDD SCell with a TDD PCell, see TS 36.213 [23, 10.2].

**maximumPayloadCoderate**
Maximum payload or code rate for multi P-CSI on each PUCCH resource, see TS 36.213 [23, 10.1.1].

**n1PUCCH-AN**
Parameter: $N^{(1)}_{\text{PUCCH}}$, see TS 36.213 [23, 10.1].

**n1PUCCH-AN-r11** indicates UE-specific PUCCH AN resource offset, see TS 36.213 [23, 10.1].

**n1PUCCH-AN-CS-List**
Parameter: $n^{(1)}_{\text{PUCCH}, j}$ for antenna port $p_0$ for PUCCH format 1b with channel selection, see TS 36.213 [23, 10.1.2.2.1, 10.1.3.2.1], $n^{(1)}_{\text{PUCCH}, j}$ for antenna port $p_1$ for PUCCH format 1b with channel selection, see TS 36.213 [23, 10.1]. E-UTRAN configures this field only when $\text{pucch-Format}$ is set to $\text{channelSelection}$. For TDD, if the UE is configured with PCell only, the $\text{channelSelection}$ indicates the transmission of HARQ-ACK multiplexing as defined in Tables 10.1.3-5, 10.1.3-6, and 10.1.3-7 in TS 36.213 [23] for PUCCH, and in 7.3 in TS 36.213 [23] for PUSCH.

**n1PUCCH-AN-Rep, n1PUCCH-AN-RepP1**
Parameter: $n^{(1)}_{\text{PUCCH, ANRep}}$ for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1].

**n3PUCCH-AN-List, n3PUCCH-AN-ListP1**
Parameter: $n^{(3)}_{\text{PUCCH}}$ for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1].

**nCS-An**
Parameter: $N^{(1)}_{\text{cs}, j}$ see TS 36.211 [21, 5.4].

**nkaPUCCH-AN**
Parameter: $N^{(3)}_{\text{PUCCH}}$, see TS 36.213 [23, 10.1.3].

**nkaPUCCH-AN-r12** indicates PUCCH format 1a/1b starting offset for the subframe set $K^A$, see TS 36.213 [23, 10.1.3]. E-UTRAN configures $\text{nkaPUCCH-AN}$ only if $\text{eimta-MainConfig}$ is configured.

**nPUCCH-Identity**
Parameter: $n^{(2)}_{\text{PUCCH}}$, see TS 36.211 [21, 5.5.1.5].

**nRB-CQI**
Parameter: $N^{(2)}_{\text{RB}}, K^{(2)}_{\text{RB}}$, see TS 36.211 [21, 5.4].

**numberOfPRB-format4**
Parameter $n^{(4)}_{\text{PUCCH}}$ see TS 36.213 [23, Table 10.1.1-2] for determining PUCCH resource(s) of PUCCH format 4.

**n1PUCCH-AN-InfoList**
Starting offsets of the PUCCH resource(s) indicated by SIB1-BR. The first entry in the list is the starting offset of the PUCCH resource(s) of CE level 0, the second entry in the list is the starting offset of the PUCCH resource(s) of CE level 1, and so on. If E-UTRAN includes $\text{n1PUCCH-AN-InfoList}$, it includes the same number of entries as in $\text{prach-ParametersListCE}$. See TS 36.213 [23].

**pucch-Format**
Parameter indicates one of the PUCCH formats for transmission of HARQ-ACK, see TS 36.213 [23, 10.1]. For TDD, if the UE is configured with PCell only, the $\text{channelSelection}$ indicates the transmission of HARQ-ACK multiplexing as defined in Tables 10.1.3-5, 10.1.3-6, and 10.1.3-7 in TS 36.213 [23] for PUCCH, and in 7.3 in TS 36.213 [23] for PUSCH.

**pucch-NumRepetitionCE**
Number of PUCCH repetitions for PUCCH format 1/1a and for PUCCH format 2/2a/2b for CE modes A and B, see TS 36.211 [21] and TS 36.213 [23]. EUTRAN does not configure $\text{pucch-NumRepetitionCE-format2-r13}$ for CE mode B in this release of specification.
### PUCCH-Config field descriptions

- `pucch-NumRepetitionCE-Msg4-Level0`, `pucch-NumRepetitionCE-Msg4-Level1`, `pucch-NumRepetitionCE-Msg4-Level2`, `pucch-NumRepetitionCE-Msg4-Level3`
  Number of repetitions for PUCCH carrying HARQ response to PDSCH containing Msg4 for PRACH CE levels 0, 1, 2 and 3, see TS 36.211 [21] and TS 36.213 [23]. Value n1 corresponds to 1 repetition, value n2 corresponds to 2 repetitions, and so on.

### PUCCH-Config information element

#### Conditional presence

<table>
<thead>
<tr>
<th>TDD</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDD</td>
<td>The field is mandatory present for TDD if the pucch-Format is not present. If the pucch-Format is present, the field is not present and the UE shall delete any existing value for this field. It is not present for FDD and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>

#### PUSCH-Config

The IE `PUSCH-ConfigCommon` is used to specify the common PUSCH configuration and the reference signal configuration for PUSCH and PUCCH. The IE `PUSCH-ConfigDedicated` is used to specify the UE specific PUSCH configuration.
enable64QAM  BOOLEAN
}

ul-ReferenceSignalsPUSCH  UL-ReferenceSignalsPUSCH

PUSCH-ConfigCommon-v1270 ::=  SEQUENCE {
enable64QAM-v1270  ENUMERATED {true}
}

PUSCH-ConfigCommon-v1310 ::=  SEQUENCE {
pusch-maxNumRepetitionCEmodeA-r13  ENUMERATED {
r8, r16, r32 } OPTIONAL, -- Need OR
pusch-maxNumRepetitionCEmodeB-r13  ENUMERATED {
r192, r256, r384, r512, r768, r1024,
r1536, r2048} OPTIONAL, -- Need OR
pusch-HoppingOffset-v1310  INTEGER (1..maxAvailNarrowBands-r13) OPTIONAL -- Need OR
}

PUSCH-ConfigDedicated ::=  SEQUENCE {
betaOffset-ACK-Index  INTEGER (0..15),
betaOffset-RI-Index  INTEGER (0..15),
betaOffset-CQI-Index  INTEGER (0..15)
}

PUSCH-ConfigDedicated-v1020 ::=  SEQUENCE {
betaOffsetMC-r10  SEQUENCE {
betaOffset-ACK-Index-MC-r10  INTEGER (0..15),
betaOffset-RI-Index-MC-r10  INTEGER (0..15),
betaOffset-CQI-Index-MC-r10  INTEGER (0..15)
} OPTIONAL, -- Need OR
groupHoppingDisabled-r10  ENUMERATED {true} OPTIONAL, -- Need OR
dmrs-WithOCC-Activated-r10  ENUMERATED {true} OPTIONAL -- Need OR
}
PUSCH-ConfigDedicated-v1130 ::= SEQUENCE {
pusch-DMRS-r11       CHOICE {
     release       NULL,
     setup         SEQUENCE {
        nPUSCH-Identity-r11      INTEGER (0..509),
        nDMRS-CSH-Identity-r11    INTEGER (0..509)
    }
}

PUSCH-ConfigDedicated-v1250 ::= SEQUENCE {
    uciOnPUSCH       CHOICE {
        release       NULL,
        setup         SEQUENCE {
            betaOffset-ACK-Index-SubframeSet2-r12   INTEGER (0..15),
            betaOffset-RI-Index-SubframeSet2-r12    INTEGER (0..15),
            betaOffset-CQI-Index-SubframeSet2-r12   INTEGER (0..15),
            betaOffsetMC-r12      SEQUENCE {
                betaOffset-ACK-Index-MC-SubframeSet2-r12 INTEGER (0..15),
                betaOffset-RI-Index-MC-SubframeSet2-r12 INTEGER (0..15),
                betaOffset-CQI-Index-MC-SubframeSet2-r12 INTEGER (0..15)
            }                OPTIONAL -- Need OR
        }
    }
}

PUSCH-ConfigDedicated-r13 ::= SEQUENCE {
    betaOffset-ACK-Index-r13    INTEGER (0..15),
    betaOffset2-ACK-Index-r13    INTEGER (0..15)     OPTIONAL, -- Need OR
    betaOffset-RI-Index-r13     INTEGER (0..15),
    betaOffset-CQI-Index-r13    INTEGER (0..15),
    betaOffsetMC-r13      SEQUENCE {
        betaOffset-ACK-Index-MC-r13   INTEGER (0..15),
        betaOffset2-ACK-Index-MC-r13   INTEGER (0..15)    OPTIONAL, -- Need OR
        betaOffset-RI-Index-MC-r13    INTEGER (0..15),
        betaOffset-CQI-Index-MC-r13    INTEGER (0..15)
    }
}
groupHoppingDisabled-r13                ENUMERATED {true}    OPTIONAL, -- Need OR

dmrs-WithOCC-Activated-r13             ENUMERATED {true}    OPTIONAL, -- Need OR

pusch-DMRS-r11                        CHOICE {
            release                  NULL,
            setup                   SEQUENCE {
                nPUSCH-Identity-r13    INTEGER (0..509),
                nDMRS-CSH-Identity-r13 INTEGER (0..509)
            }
        }

uciOnPUSCH                            CHOICE {
            release                  NULL,
            setup                   SEQUENCE {
                betaOffset-ACK-Index-SubframeSet2-r13 INTEGER (0..15),
                betaOffset2-ACK-Index-SubframeSet2-r13 INTEGER (0..15) OPTIONAL, -- Need OR
                betaOffset-RI-Index-SubframeSet2-r13 INTEGER (0..15),
                betaOffset-CQI-Index-SubframeSet2-r13 INTEGER (0..15),
                betaOffsetMC-r12       SEQUENCE {
                    betaOffset-ACK-Index-MC-SubframeSet2-r13 INTEGER (0..15),
                    betaOffset2-ACK-Index-MC-SubframeSet2-r13 INTEGER (0..15) OPTIONAL, -- Need OR
                    betaOffset-RI-Index-MC-SubframeSet2-r13 INTEGER (0..15),
                    betaOffset-CQI-Index-MC-SubframeSet2-r13INTEGER (0..15)
                } OPTIONAL -- Need OR
            }
        }

pusch-HoppingConfig-r13                ENUMERATED {on}       OPTIONAL  -- Need OR

PUSCH-ConfigDedicatedSCell-r10 ::=  SEQUENCE {
            groupHoppingDisabled-r10 ENUMERATED {true}    OPTIONAL, -- Need OR
            dmrs-WithOCC-Activated-r10 ENUMERATED {true}    OPTIONAL  -- Need OR
        }

UL-ReferenceSignalsPUSCH ::=  SEQUENCE {
            groupHoppingEnabled       BOOLEAN,
groupAssignmentPUSCH INTEGER (0..29),
sequenceHoppingEnabled BOOLEAN,
cyclicShift INTEGER (0..7)
}

-- ASN1STOP
PUSCH-Config field descriptions

**betaOffset-ACK-Index, betaOffset2-ACK-Index, betaOffset-ACK-Index-MC, betaOffset2-ACK-Index-MC**

Parameter: \( I^\text{HARQ-ACK} \_\text{offset}, I^\text{HARQ-ACK} \_\text{offset}, I^\text{HARQ-ACK} \_\text{offset,MC}, I^\text{HARQ-ACK} \_\text{offset,MC} \), for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-1]. betaOffset-ACK-Index and betaOffset2-ACK-Index are used for single-codeword and betaOffset-ACK-Index-MC and betaOffset2-ACK-Index-MC are used for multiple-codeword. If betaOffset2-ACK-Index is configured; betaOffset-ACK-Index is used when up to 22 HARQ-ACK bits are transmitted otherwise betaOffset-ACK2-Index is used. If betaOffset2-ACKIndex-MC is configured; betaOffset-ACK-Index-MC is used when up to 22 HARQ-ACK bits are transmitted otherwise betaOffset2-ACK-Index-MC is used. One value applies for all serving cells with an uplink and not configured with uplink power control subframe sets. The same value also applies for subframe set 1 of all serving cells with an uplink and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell).

**betaOffset-ACK-Index-SubframeSet2, betaOffset2-ACK-Index-SubframeSet2, betaOffset-ACK-Index-MC-SubframeSet2, betaOffset2-ACK-Index-MC-SubframeSet2**

Parameter: \( I^\text{HARQ-ACK} \_\text{offset,}{\text{set2}}, I^\text{HARQ-ACK} \_\text{offset,}{\text{set2}}, I^\text{HARQ-ACK} \_\text{offset,MC,}{\text{set2}}, I^\text{HARQ-ACK} \_\text{offset,MC,}{\text{set2}} \), respectively, see TS 36.213 [23, Table 8.6.3-1]. betaOffset-ACK-Index-SubframeSet2 and betaOffset2-ACK-Index-SubframeSet2 are used for single-codeword, betaOffset-ACK-Index-MC-SubframeSet2, betaOffset2-ACK-Index-MC-SubframeSet2 are used for multiple-codeword. If betaOffset2-ACK-Index-SubframeSet2 is configured; betaOffset-ACK-Index-SubframeSet2 is used when up to 22 HARQ-ACK bits are transmitted otherwise betaOffset2-ACK-Index-SubframeSet2 is used. If betaOffset2-ACK-Index-MC-SubframeSet2 is configured; betaOffset-ACK-Index-MC-SubframeSet2 is used when up to 22 HARQ-ACK bits are transmitted otherwise betaOffset2-ACK-Index-MC-SubframeSet2 is used. One value applies for subframe set 2 of all serving cells with an uplink and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell configured with uplink power control subframe sets).

**betaOffset-ACK-Index-MC**

Parameter: \( I^\text{CQI} \_\text{offset} \), for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-3]. One value applies for all serving cells with an uplink and not configured with uplink power control subframe sets. The same value also applies for subframe set 1 of all serving cells with an uplink and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell).

**betaOffset2-ACK-Index-MC**

Parameter: \( I^\text{CQI} \_\text{offset}, I^\text{CQI} \_\text{offset,}{\text{set2}}, I^\text{CQI} \_\text{offset,MC,}{\text{set2}}, I^\text{CQI} \_\text{offset,MC,}{\text{set2}} \), respectively, see TS 36.213 [23, Table 8.6.3-3]. One value applies for subframe set 2 of all serving cells with an uplink and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell configured with uplink power control subframe sets).

**betaOffset-RI-Index, betaOffset2-RI-Index-MC**

Parameter: \( I^\text{RI} \_\text{offset} \), for single- and multiple-codeword respectively, see TS 36.213 [23, Table 8.6.3-2]. One value applies for all serving cells with an uplink and not configured with uplink power control subframe sets. The same value also applies for subframe set 1 of all serving cells with an uplink and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell).

**betaOffset2-RI-Index-MC**

Parameter: \( I^\text{RI} \_\text{offset}, I^\text{RI} \_\text{offset,}{\text{set2}}, I^\text{RI} \_\text{offset,MC,}{\text{set2}}, I^\text{RI} \_\text{offset,MC,}{\text{set2}} \), respectively, see TS 36.213 [23, Table 8.6.3-2]. One value applies for subframe set 2 of all serving cells with an uplink and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell configured with uplink power control subframe sets).

**cyclicShift**

Parameters: cyclicShift, see TS 36.211 [21, Table 5.5.2.1-1-2].

**dmrs-WithOCC-Activated**

Parameter: Activate-DMRS-with OCC, see TS 36.211 [21, 5.5.2.1].

**enable64QAM**

See TS 36.213 [23, 8.6.1]. If enable64QAM (without suffix) is set to TRUE, it indicates that 64QAM is allowed for UE categories 5 and 8 indicated in ue-Category while FALSE indicates that 64QAM is not allowed. If enable64QAM-v1270 is set to TRUE, it indicates that 64QAM is allowed for UL categories 5, 8, 13 and 14 indicated in ue-CategoryUL. E-UTRAN configures enable64QAM-v1270 only when enable64QAM (without suffix) is set to TRUE.

**groupAssignmentPUSCH**

Parameter: 

**groupHoppingDisabled**

Parameter: Disable-sequence-group-hopping, see TS 36.211 [21, 5.5.1.3].

**groupHoppingEnabled**

Parameter: Group-hopping-enabled, see TS 36.211 [21, 5.5.1.3].

**hoppingMode**

Parameter: Hopping-mode, see TS 36.211 [21, 5.3.4].

**nDMRS-CSH-Identity**

Parameter: \( N^\text{DMRS-CSH} \_\text{identity} \), see TS 36.211 [21, 5.5.2.1].
### PUSCH-Config field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Parameter Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>nPUSCH-Identity</td>
<td>$n_{ID}^{PUSCH}$, see TS 36.211 [21, 5.5.1.5].</td>
</tr>
<tr>
<td>n-SB</td>
<td>$N_{SB}$, see TS 36.211 [21, 5.3.4].</td>
</tr>
<tr>
<td>pushch-HoppingConfig</td>
<td>For BL UEs and UEs in CE, frequency hopping activation/deactivation for unicast PUSCH, see TS 36.211 [21]</td>
</tr>
<tr>
<td>pushch-hoppingOffset</td>
<td>Parameter: $N_{RB}^{HO}$, see TS 36.211 [21, 5.3.4].</td>
</tr>
<tr>
<td>pusch-maxNumRepetitionCEmodeA</td>
<td>Maximum value to indicate the set of PUSCH repetition numbers for CE mode A, see TS 36.211 [21] and TS 36.213 [23]. E-UTRAN does not configure value r8. If the field is not configured, the UE shall apply the default value as defined in TS 36.213 [23, 8.0].</td>
</tr>
<tr>
<td>pusch-maxNumRepetitionCEmodeB</td>
<td>Maximum value to indicate the set of PUSCH repetition numbers for CE mode B, see TS 36.211 [21] and TS 36.213 [23].</td>
</tr>
<tr>
<td>sequenceHoppingEnabled</td>
<td>Parameter: Sequence-hopping-enabled, see TS 36.211 [21, 5.5.1.4].</td>
</tr>
<tr>
<td>ul-ReferenceSignalsPUSCH</td>
<td>Used to specify parameters needed for the transmission on PUSCH (or PUCCH).</td>
</tr>
</tbody>
</table>

#### RACH-ConfigCommon

The IE RACH-ConfigCommon is used to specify the generic random access parameters.

#### RACH-ConfigCommon information element

```asn1
RACH-ConfigCommon ::= SEQUENCE {
preambleInfo  SEQUENCE {
  numberOfRA-Preambles ENUMERATED {
    n4, n8, n12, n16, n20, n24, n28,
    n32, n36, n40, n44, n48, n52, n56,
    n60, n64
  },

  preamblesGroupAConfig SEQUENCE {
    sizeOfRA-PreamblesGroupA ENUMERATED {
      n4, n8, n12, n16, n20, n24, n28,
      n32, n36, n40, n44, n48, n52, n56,
      n60
    },

    messageSizeGroupA ENUMERATED {b56, b144, b208, b256},

    messagePowerOffsetGroupB ENUMERATED {
      minusinfinity, dB0, dB5, dB8, dB10, dB12,
      dB15, dB18
    },

    ...
  }
}
```
},

powerRampingParameters    PowerRampingParameters,
ra-SupervisionInfo    SEQUENCE {
  preambleTransMax    PreambleTransMax,
  ra-ResponseWindowSize    ENUMERATED {
    sf2, sf3, sf4, sf5, sf6, sf7,
    sf8, sf10},
  mac-ContentionResolutionTimer    ENUMERATED {
    sf8, sf16, sf24, sf32, sf40, sf48,
    sf56, sf64}
},
maxHARQ-Msg3Tx    INTEGER (1..8),
...
[[ preambleTransMax-CE-r13    PreambleTransMax    OPTIONAL, -- Need OR
  rach-CE-LevelInfoList-r13    RACH-CE-LevelInfoList-r13    OPTIONAL -- Need OR
]]
}

RACH-ConfigCommon-v1250 ::=  SEQUENCE {
  txFailParams-r12    SEQUENCE {
    connEstFailCount-r12    ENUMERATED {n1, n2, n3, n4},
    connEstFailOffsetValidity-r12    ENUMERATED {s30, s60, s120, s240,
                                             s300, s420, s600, s900},
    connEstFailOffset-r12    INTEGER (0..15)  OPTIONAL -- Need OP
  }
}

RACH-ConfigCommonSCell-r11 ::=  SEQUENCE {
  powerRampingParameters-r11    PowerRampingParameters,
  ra-SupervisionInfo-r11    SEQUENCE {
    preambleTransMax-r11    PreambleTransMax
  },
  ...
}
RACH-CE-LevelInfoList-r13 ::= SEQUENCE (SIZE (1..maxCE-Level-r13)) OF RACH-CE-LevelInfo-r13

RACH-CE-LevelInfo-r13 ::= SEQUENCE {
  preambleMappingInfo-r13    SEQUENCE {
    firstPreamble-r13     INTEGER(0..63),
    lastPreamble-r13     INTEGER(0..63)
  },
  ra-ResponseWindowSize-r13   ENUMERATED {sf20, sf50, sf80, sf120, sf180, sf240, sf320, sf400},
  mac-ContentionResolutionTimer-r13 ENUMERATED {sf80, sf100, sf120, sf160, sf200, sf240, sf480, sf960},
  rar-HoppingConfig-r13    ENUMERATED {on,off},
  ...
}

PowerRampingParameters ::= SEQUENCE {
  powerRampingStep     ENUMERATED {dB0, dB2,dB4, dB6},
  preambleInitialReceivedTargetPower ENUMERATED {
    dBm-120, dBm-118, dBm-116, dBm-114, dBm-112, dBm-110, dBm-108, dBm-106, dBm-104, dBm-102, dBm-100, dBm-98, dBm-96, dBm-94, dBm-92, dBm-90}
}

PreambleTransMax ::= ENUMERATED {
  n3, n4, n5, n6, n7, n8, n10, n20, n50, n100, n200}
RACH-ConfigCommon field descriptions

connEstFailCount
Number of times that the UE detects T300 expiry on the same cell before applying connEstFailOffset.

connEstFailOffset
Parameter ‘Qoffsettemp’ in TS 36.304 [4]. If the field is not present the value of infinity shall be used for ‘Qoffsettemp’.

connEstFailOffsetValidity
Amount of time that the UE applies connEstFailOffset before removing the offset from evaluation of the cell. Value s30 corresponds to 30 seconds, s60 corresponds to 60 seconds, and so on.

mac-ContentionResolutionTimer
Timer for contention resolution in TS 36.321 [6]. Value in subframes. Value sf8 corresponds to 8 subframes, sf16 corresponds to 16 subframes and so on.

maxHARQ-Msg3Tx
Maximum number of Msg3 HARQ transmissions in TS 36.321 [6], used for contention based random access. Value is an integer.

messagePowerOffsetGroupB
Threshold for preamble selection in TS 36.321 [6]. Value in dB. Value minus infinity corresponds to –infinity. Value dB0 corresponds to 0 dB, dB5 corresponds to 5 dB and so on.

messageSizeGroupA
Threshold for preamble selection in TS 36.321 [6]. Value in bits. Value b56 corresponds to 56 bits, b144 corresponds to 144 bits and so on.

numberOfRA-Preambles
Number of non-dedicated random access preambles in TS 36.321 [6]. Value is an integer. Value n4 corresponds to 4, n8 corresponds to 8 and so on.

dbPowerRampingStep
Power ramping factor in TS 36.321 [6]. Value in dB. Value dB0 corresponds to 0 dB, dB2 corresponds to 2 dB and so on.

preambleInitialReceivedTargetPower
Initial preamble power in TS 36.321 [6]. Value in dBm. Value dBm-120 corresponds to -120 dBm, dBm-118 corresponds to -118 dBm and so on.

preambleMappingInfo
Provides the mapping of preambles to groups for each CE level, as specified in TS 36.321 [6].

preamblesGroupAConfig
Provides the configuration for preamble grouping in TS 36.321 [6]. If the field is not signalled, the size of the random access preambles group A [6] is equal to numberOfRA-Preambles.

preambleTransMax, preambleTransMax-CE
Maximum number of preamble transmission in TS 36.321 [6]. Value is an integer. Value n3 corresponds to 3, n4 corresponds to 4 and so on.

ra-ResponseWindowSize
Duration of the RA response window in TS 36.321 [6]. Value in subframes. Value sf2 corresponds to 2 subframes, sf3 corresponds to 3 subframes and so on. The same value applies for each serving cell (although the associated functionality is performed independently for each cell).

rar-HoppingConfig
Frequency hopping activation/deactivation for RAR/Msg3/Msg4 for a CE level, see TS 36.211 [21].

sizeOfRA-PreamblesGroupA
Size of the random access preambles group A in TS 36.321 [6]. Value is an integer. Value n4 corresponds to 4, n8 corresponds to 8 and so on.

RACH-ConfigDedicated
The IE RACH-ConfigDedicated is used to specify the dedicated random access parameters.

RACH-ConfigDedicated information element

-- ASN1START

RACH-ConfigDedicated ::= SEQUENCE {
  ra-PreambleIndex INTEGER (0..63),
  ra-PRACH-MaskIndex INTEGER (0..15)
### RadioResourceConfigCommon

The IE `RadioResourceConfigCommonSIB` and IE `RadioResourceConfigCommon` are used to specify common radio resource configurations in the system information and in the mobility control information, respectively, e.g., the random access parameters and the static physical layer parameters.

#### RadioResourceConfigCommon information element

```asn1
RadioResourceConfigCommonSIB ::= SEQUENCE {
  rach-ConfigCommon    RACH-ConfigCommon,
  bcch-Config         BCCH-Config,
  pcch-Config         PCCH-Config,
  prach-Config        PRACH-ConfigSIB,
  pdsch-ConfigCommon  PDSCH-ConfigCommon,
  pusch-ConfigCommon  PUSCH-ConfigCommon,
  pucch-ConfigCommon  PUCCH-ConfigCommon,
  soundingRS-UL-ConfigCommon SoundingRS-UL-ConfigCommon,
  uplinkPowerControlCommon UplinkPowerControlCommon,
  ul-CyclicPrefixLength UL-CyclicPrefixLength,
  ...
  [ uplinkPowerControlCommon-v1020 UplinkPowerControlCommon-v1020  OPTIONAL  -- Need OR ]
  [ rach-ConfigCommon-v1250  RACH-ConfigCommon-v1250  OPTIONAL  -- Need OR ]
  [ pusch-ConfigCommon-v1270  PUSCH-ConfigCommon-v1270  OPTIONAL  -- Need OR ]
  [ bcch-Config-v1310  BCCH-Config-v1310  OPTIONAL,  -- Need OR ]
  [ pcch-Config-v1310  PCCH-Config-v1310  OPTIONAL,  -- Need OR ]

  } -- ASN1STOP
```
<table>
<thead>
<tr>
<th>freqHoppingParameters-r13</th>
<th>FreqHoppingParameters-r13</th>
<th>OPTIONAL, -- Need OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>pdsch-ConfigCommon-v1310</td>
<td>PDSCH-ConfigCommon-v1310</td>
<td>OPTIONAL, -- Need OR</td>
</tr>
<tr>
<td>pusch-ConfigCommon-v1310</td>
<td>PUSCH-ConfigCommon-v1310</td>
<td>OPTIONAL, -- Need OR</td>
</tr>
<tr>
<td>prach-ConfigCommon-v1310</td>
<td>PRACH-ConfigSIB-v1310</td>
<td>OPTIONAL, -- Need OR</td>
</tr>
<tr>
<td>pucch-ConfigCommon-v1310</td>
<td>PUCCH-ConfigCommon-v1310</td>
<td>OPTIONAL, -- Need OR</td>
</tr>
</tbody>
</table>

```
RadioResourceConfigCommon ::= SEQUENCE {
  rach-ConfigCommon     RACH-ConfigCommon     OPTIONAL, -- Need ON
  prach-Config          PRACH-Config,          OPTIONAL, -- Need ON
  pdsch-ConfigCommon    PDSCH-ConfigCommon    OPTIONAL, -- Need ON
  pusch-ConfigCommon    PUSCH-ConfigCommon,    OPTIONAL, -- Need ON
  phich-Config          PHICH-Config          OPTIONAL, -- Need ON
  pucch-ConfigCommon    PUCCH-ConfigCommon     OPTIONAL, -- Need ON
  soundingRS-UL-ConfigCommon   SoundingRS-UL-ConfigCommon   OPTIONAL, -- Need ON
  uplinkPowerControlCommon   UplinkPowerControlCommon     OPTIONAL, -- Need ON
  antennaInfoCommon     AntennaInfoCommon     OPTIONAL, -- Need ON
  p-Max                  P-Max                   OPTIONAL, -- Need OP
  tdd-Config            TDD-Config            OPTIONAL, -- Cond TDD
  ul-CyclicPrefixLength  UL-CyclicPrefixLength,  ...

[[ uplinkPowerControlCommon-v1020 UplinkPowerControlCommon-v1020 OPTIONAL -- Need ON ]].
[[ tdd-Config-v1130 TDD-Config-v1130 OPTIONAL -- Cond TDD3 ]].
[[ pusch-ConfigCommon-v1270 PUSCH-ConfigCommon-v1270 OPTIONAL -- Need OR ]].
[[ prach-Config-v1310 PRACH-Config-v1310 OPTIONAL, -- Need ON
  freqHoppingParameters-r13 FreqHoppingParameters-r13 OPTIONAL, -- Need ON
  pdsch-ConfigCommon-v1310 PDSCH-ConfigCommon-v1310 OPTIONAL, -- Need ON
  pusch-ConfigCommon-v1310 PUSCH-ConfigCommon-v1310 OPTIONAL, -- Need ON
  pucch-ConfigCommon-v1310 PUCCH-ConfigCommon-v1310 OPTIONAL, -- Need ON
  uplinkPowerControlCommon-v1310 UplinkPowerControlCommon-v1310 OPTIONAL -- Need ON
```
RadioResourceConfigCommonPSCell-r12 ::= SEQUENCE {
  basicFields-r12       RadioResourceConfigCommonSCell-r10,
pucch-ConfigCommon-r12  PUCCH-ConfigCommon,
rach-ConfigCommon-r12   RACH-ConfigCommon,
uplinkPowerControlCommonPSCell-r12 UplinkPowerControlCommonPSCell-r12,
  ...,
  [[ uplinkPowerControlCommonPSCell-v1310
      UplinkPowerControlCommon-v1310  OPTIONAL -- Need ON
  ]] } }

RadioResourceConfigCommonSCell-r10 ::= SEQUENCE {
  -- DL configuration as well as configuration applicable for DL and UL
  nonUL-Configuration-r10  SEQUENCE {
    -- 1: Cell characteristics
dl-Bandwidth-r10        ENUMERATED {n6, n15, n25, n50, n75, n100},
    -- 2: Physical configuration, general
    antennaInfoCommon-r10   AntennaInfoCommon,
mbsfn-SubframeConfigList-r10 MBSFN-SubframeConfigList OPTIONAL, -- Need OR
    -- 3: Physical configuration, control
    phich-Config-r10        PHICH-Config,
    -- 4: Physical configuration, physical channels
    pdsch-ConfigCommon-r10  PDSCH-ConfigCommon,
tdd-Config-r10          TDD-Config OPTIONAL -- Cond TDDSCell
  },
  -- UL configuration
  ul-Configuration-r10    SEQUENCE {
    ul-FreqInfo-r10        SEQUENCE {
      ul-CarrierFreq-r10    ARFCN-ValueEUTRA OPTIONAL, -- Need OP
      ul-Bandwidth-r10      ENUMERATED {n6, n15,
                                      n25, n50, n75, n100}OPTIONAL, -- Need OP
      additionalSpectrumEmissionSCell-r10 AdditionalSpectrumEmission
    }}}}
BCCH-Config ::= SEQUENCE {
    modificationPeriodCoeff ENUMERATED {n2, n4, n8, n16}
}

BCCH-Config-v1310 ::= SEQUENCE {
    modificationPeriodCoeff-v1310 ENUMERATED {n64}
}
FreqHoppingParameters-r13 ::= SEQUENCE {
  mpdcch-pdsch-HoppingNB-r13 ENUMERATED {nb2, nb4} OPTIONAL, -- Cond HO
  interval-DLHoppingConfigCommonModeA-r13 CHOICE {
    interval-FDD-r13 ENUMERATED {int1, int2, int4, int8},
    interval-TDD-r13 ENUMERATED {int1, int5, int10, int20}
  }
  interval-DLHoppingConfigCommonModeB-r13 CHOICE {
    interval-FDD-r13 ENUMERATED {int2, int4, int8, int16},
    interval-TDD-r13 ENUMERATED {int5, int10, int20, int40}
  }
  interval-ULHoppingConfigCommonModeA-r13 CHOICE {
    interval-FDD-r13 ENUMERATED {int1, int2, int4, int8},
    interval-TDD-r13 ENUMERATED {int1, int5, int10, int20}
  }
  interval-ULHoppingConfigCommonModeB-r13 CHOICE {
    interval-FDD-r13 ENUMERATED {int2, int4, int8, int16},
    interval-TDD-r13 ENUMERATED {int5, int10, int20, int40}
  }
  mpdcch-pdsch-HoppingOffset-r13 INTEGER (1..maxAvailNarrowBands-r13) OPTIONAL -- Cond HO
}

PCCH-Config ::= SEQUENCE {
  defaultPagingCycle ENUMERATED {
    rf32, rf64, rf128, rf256},
  nB ENUMERATED {
    fourT, twoT, oneT, halfT, quarterT, oneEighthT,
    oneSixteenthT, oneThirtySecondT}
}

PCCH-Config-v1310 ::= SEQUENCE {
  paging-narrowBands-r13 INTEGER (1..maxAvailNarrowBands-r13),
  mpdcch-NumRepetition-Paging-r13 ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128, r256},
  nB-v1310 ENUMERATED {one64thT, one128thT, one256thT}
}
RadioResourceConfigCommon field descriptions

additionalSpectrumEmissionSCell
The UE requirements related to additionalSpectrumEmissionSCell are defined in TS 36.101 [42]. E-UTRAN configures the same value in additionalSpectrumEmissionSCell for all SCell(s) of the same band with UL configured. The additionalSpectrumEmissionSCell is applicable for all serving cells (including PCell) of the same band with UL configured.

defaultPagingCycle
Default paging cycle, used to derive “T” in TS 36.304 [4]. Value rf32 corresponds to 32 radio frames, rf64 corresponds to 64 radio frames and so on.

interval-DLHoppingConfigCommonModeX
Number of consecutive absolute subframes over which MPDCCH or PDSCH for CE mode X stays at the same narrowband before hopping to another narrowband. For interval-FDD, int1 corresponds to 1 subframe, int2 corresponds to 2 subframes, and so on. For interval-TDD, int1 corresponds to 1 subframe, int5 corresponds to 5 subframes, and so on.

interval-ULHoppingConfigCommonModeX
Number of consecutive absolute subframes over which PUCCH or PUSCH for CE mode X stays at the same narrowband before hopping to another narrowband. For interval-FDD, int1 corresponds to 1 subframe, int2 corresponds to 2 subframes, and so on. For interval-TDD, int1 corresponds to 1 subframe, int5 corresponds to 5 subframes, and so on.

modificationPeriodCoeff
Actual modification period, expressed in number of radio frames = modificationPeriodCoeff * defaultPagingCycle. n2 corresponds to value 2, n4 corresponds to value 4, n8 corresponds to value 8, n16 corresponds to value 16, and n64 corresponds to value 64.

mpdcch-NumRepetition-Paging
Maximum number of repetitions for MPDCCH common search space (CSS) for paging, see TS 36.211 [21].

mpdcch-pdsch-HoppingOffset
Parameter: see TS 36.211 [21], 6.4.1.

mpdcch-pdsch-HoppingNB
The number of narrowbands for MPDCCH/PDSCH frequency hopping. Value nb2 corresponds to 2 narrowbands and value nb4 corresponds to 4 narrowbands.

nB
Parameter: nB is used as one of parameters to derive the Paging Frame and Paging Occasion according to TS 36.304 [4]. Value in multiples of ‘T’ as defined in TS 36.304 [4]. A value of fourT corresponds to 4 * T, a value of twoT corresponds to 2 * T and so on. In case nB-v1310 is signalled, the UE shall ignore nB (i.e. without suffix). EUTRAN does not include nB-v1310 in SystemInformationBlockType2.

paging-narrowBands
Number of narrowbands used for paging, see TS 36.304 [4], TS 36.212 [22] and TS 36.213 [23].

p-Max
Pmax to be used in the target cell. If absent the UE applies the maximum power according to the UE capability.

ul-Bandwidth
Parameter: transmission bandwidth configuration, NRB, in uplink, see TS 36.101 [42, table 5.6-1]. Value n6 corresponds to 6 resource blocks, n15 to 15 resource blocks and so on. If for FDD this parameter is absent, the uplink bandwidth is equal to the downlink bandwidth. For TDD this parameter is absent and it is equal to the downlink bandwidth.

ul-CarrierFreq
For FDD: If absent, the (default) value determined from the default TX-RX frequency separation defined in TS 36.101 [42, table 5.7.3-1] applies. For TDD: This parameter is absent and it is equal to the downlink frequency.

ul-CyclicPrefixLength
Parameter: Uplink cyclic prefix length see TS 36.211 [21, 5.2.1] where len1 corresponds to normal cyclic prefix and len2 corresponds to extended cyclic prefix.
### Conditional presence

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDD</td>
<td>The field is optional for TDD, Need ON; it is not present for FDD and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>TDD2</td>
<td>If <code>tdd-Config-r10</code> is present, the field is optional, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>TDD3</td>
<td>If <code>tdd-Config</code> is present, the field is optional, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>TDD-OR-NoR11</td>
<td>If <code>prach-ConfigSCell-r11</code> is absent, the field is optional for TDD, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>TDDSCell</td>
<td>This field is mandatory present for TDD; it is not present for FDD and LAA SCell, and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>UL</td>
<td>If the SCell is part of the STAG or concerns the PSCell and if <code>ul-Configuration</code> is included, the field is optional, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>ULSCell</td>
<td>For the PSCell (IE is included in <code>RadioResourceConfigCommonPSCell</code>) the field is absent. Otherwise, if the SCell is part of the STAG and if <code>ul-Configuration</code> is included, the field is optional, Need OR. Otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
<tr>
<td>HO</td>
<td>For HO (IE is included in <code>RadioResourceConfigCommon</code>), the field is optional, need OR, otherwise (IE is included in <code>RadioResourceConfigCommonSIB</code>) the field is not present, and the UE shall take no action.</td>
</tr>
</tbody>
</table>

---

**RadioResourceConfigDedicated information element**

The IE `RadioResourceConfigDedicated` is used to setup/modify/release RBs, to modify the MAC main configuration, to modify the SPS configuration and to modify dedicated physical configuration.

```asn1
RadioResourceConfigDedicated ::= SEQUENCE {
  srb-ToAddModList        SRB-ToAddModList OPTIONAL, -- Cond HO-Conn
  drb-ToAddModList        DRB-ToAddModList OPTIONAL, -- Cond HO-toEUTRA
  drb-ToReleaseList       DRB-ToReleaseList OPTIONAL, -- Need ON
  mac-MainConfig          CHOICE {
    explicitValue          MAC-MainConfig,
    defaultValue          NULL
  } OPTIONAL, -- Cond HO-toEUTRA2
  sps-Config              SPS-Config OPTIONAL, -- Need ON
  physicalConfigDedicated  PhysicalConfigDedicated OPTIONAL, -- Need ON
  ...,
  [[ rlf-TimersAndConstants-r9   RLF-TimersAndConstants-r9   OPTIONAL -- Need ON ]],
  [[ measSubframePatternPCell-r10 MeasSubframePatternPCell-r10 OPTIONAL -- Need ON ]],
  [[ neighCellsCRS-Info-r11   NeighCellsCRS-Info-r11 OPTIONAL -- Need ON ]]
}
```
RadioResourceConfigDedicatedPSCell-r12 ::= SEQUENCE {
  -- UE specific configuration extensions applicable for an PSCell
  physicalConfigDedicatedPSCell-r12  PhysicalConfigDedicated  OPTIONAL, -- Need ON
  sps-Config-r12       SPS-Config     OPTIONAL, -- Need ON
  naics-Info-r12       NAICS-AssistanceInfo-r12 OPTIONAL, -- Need ON
  ....
  [[ neighCellsCRS-InfoPSCell-r13  NeighCellsCRS-Info-r13  OPTIONAL -- Need ON
  ]]}

RadioResourceConfigDedicatedSCG-r12 ::= SEQUENCE {
  drb-ToAddModListSCG-r12    DRB-ToAddModListSCG-r12   OPTIONAL, -- Need ON
  mac-MainConfigSCG-r12    MAC-MainConfig     OPTIONAL, -- Need ON
  rlf-TimersAndConstantsSCG-r12  RLF-TimersAndConstantsSCG-r12 OPTIONAL, -- Need ON
  ...
}

RadioResourceConfigDedicatedSCell-r10 ::= SEQUENCE {
  -- UE specific configuration extensions applicable for an SCell
  physicalConfigDedicatedSCell-r10  PhysicalConfigDedicatedSCell-r10OPTIONAL, -- Need ON
  ....
  [[ mac-MainConfigSCell-r11   MAC>MainConfigSCell-r11   OPTIONAL -- Cond SCellAdd
  ]]}

[[   naics-Info-r12       NAICS-AssistanceInfo-r12
  OPTIONAL   -- Need ON
  ]].
[[ neighCellsCRS-InfoSCell-r13   NeighCellsCRS-Info-r13  OPTIONAL -- Need ON
  ]]
SRB-ToAddModList ::= SEQUENCE (SIZE (1..2)) OF SRB-ToAddMod

SRB-ToAddMod ::= SEQUENCE {
    srb-Identity INTEGER (1..2),
    rlc-Config CHOICE {
        explicitValue RLC-Config,
        defaultValue NULL
    } OPTIONAL, -- Cond Setup
    logicalChannelConfig CHOICE {
        explicitValue LogicalChannelConfig,
        defaultValue NULL
    } OPTIONAL, -- Cond Setup
    ... }

DRB-ToAddModList ::= SEQUENCE (SIZE (1..maxDRB)) OF DRB-ToAddMod

DRB-ToAddModListSCG-r12 ::= SEQUENCE (SIZE (1..maxDRB)) OF DRB-ToAddModSCG-r12

DRB-ToAddMod ::= SEQUENCE {
    epsBearerIdentity INTEGER (0..15) OPTIONAL, -- Cond DRB-Setup
    drb-Identity DRB-Identity,
    pdcp-Config PDCP-Config OPTIONAL, -- Cond PDCP
    rlc-Config RLC-Config OPTIONAL, -- Cond SetupM
    logicalChannelIdentity INTEGER (3..10) OPTIONAL, -- Cond DRB-SetupM
    logicalChannelConfig LogicalChannelConfig OPTIONAL, -- Cond SetupM
    ...
    [[ drb-TypeChange-r12 ENUMERATED {toMCG} OPTIONAL, -- Need OP
       rlc-Config-v1250 RLC-Config-v1250 OPTIONAL -- Need ON
    ]],
    [[ rlc-Config-v1310 RLC-Config-v1310 OPTIONAL, -- Need ON
       drb-TypeLWA-r13 BOOLEAN OPTIONAL, -- Need ON
    ]]
drb-TypeLWIP-r13 ENUMERATED {lwip, lwip-DL-only,
lwip-UL-only, eutran} OPTIONAL -- Need ON
]

DRB-ToAddModSCG-r12 ::= SEQUENCE {
drb-Identity-r12 DRB-Identity,
drb-Type-r12 CHOICE {
split-r12 NULL,
scg-r12 SEQUENCE {
  eps-BearerIdentity-r12 INTEGER (0..15) OPTIONAL, -- Cond DRB-Setup
  pdcp-Config-r12 PDCP-Config OPTIONAL -- Cond PDCP-S
  } OPTIONAL, -- Cond SetupS2
rlc-ConfigSCG-r12 RLC-Config OPTIONAL, -- Cond SetupS
rlc-Config-v1250 RLC-Config-v1250 OPTIONAL, -- Need ON
logicalChannelIdentitySCG-r12 INTEGER (3..10) OPTIONAL, -- Cond DRB-SetupS
logicalChannelConfigSCG-r12 LogicalChannelConfig OPTIONAL, -- Cond SetupS
...
}

DRB-ToReleaseList ::= SEQUENCE (SIZE (1..maxDRB)) OF DRB-Identity

MeasSubframePatternPCell-r10 ::= CHOICE {
  release NULL,
  setup MeasSubframePattern-r10
}

NeighCellsCRS-Info-r11 ::= CHOICE {
  release NULL,
  setup CRS-AssistanceInfoList-r11
}

CRS-AssistanceInfoList-r11 ::=SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r11
CRS-AssistanceInfo-r13 ::= SEQUENCE {
    physCellId-r13          PhysCellId, 
    antennaPortsCount-r13   ENUMERATED {an1, an2, an4, spare1},
    mbsfn-SubframeConfigList-r13  MBSFN-SubframeConfigList, 
    ... 
}

NeighCellsCRS-Info-r13 ::= CHOICE {
    release                NULL, 
    setup                  CRS-AssistanceInfoList-r13
}

CRS-AssistanceInfoList-r13 ::= SEQUENCE (SIZE (1..maxCellReport)) OF CRS-AssistanceInfo-r13

CRS-AssistanceInfo-r12 ::= SEQUENCE {
    physCellId-r12         PhysCellId, 
    antennaPortsCount-r12  ENUMERATED {an1, an2, an4, spare1},
    mbsfn-SubframeConfigList-r12  MBSFN-SubframeConfigList OPTIONAL, -- Need ON
    ... 
}

NAICS-AssistanceInfo-r12 ::= CHOICE {
    release               NULL,
    setup                 SEQUENCE {
        neighCellsToReleaseList-r12 NeighCellsToReleaseList-r12 OPTIONAL, -- Need ON
        neighCellsToAddModList-r12 NeighCellsToAddModList-r12 OPTIONAL, -- Need ON
        servCellp-a-r12          P-a OPTIONAL -- Need ON
    }
}

NeighCellsToReleaseList-r12 ::= SEQUENCE (SIZE (1..maxNeighCell-r12)) OF PhysCellId
NeighCellsToAddModList-r12 ::= SEQUENCE (SIZE (1..maxNeighCell-r12)) OF NeighCellsInfo-r12

NeighCellsInfo-r12 ::= SEQUENCE {
  physCellId-r12     PhysCellId,
  p-b-r12      INTEGER (0..3),
  crs-PortsCount-r12    ENUMERATED {n1, n2, n4, spare},
  mbsfn-SubframeConfig-r12  MBSFN-SubframeConfigList OPTIONAL, -- Need ON
  p-aList-r12     SEQUENCE (SIZE (1..maxP-a-PerNeighCell-r12)) OF P-a,
  transmissionModeList-r12  BIT STRING (SIZE(8)),
  resAllocGranularity-r12   INTEGER (1..4),
  ...
}

P-a ::= ENUMERATED {
  dB-6, dB-4dot77, dB-3, dB-1dot77,
  dB0, dB1, dB2, dB3
}

-- ASN1STOP
### RadioResourceConfigDedicated field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>crs-PortsCount</strong></td>
<td>Parameter represents the number of antenna ports for cell-specific reference signal used by the signaled neighboring cell where n1 corresponds to 1 antenna port, n2 to 2 antenna ports etc. see TS 36.211 [21, 6.10.1].</td>
</tr>
<tr>
<td><strong>db-Identity</strong></td>
<td>In case of DC, the DRB identity is unique within the scope of the UE i.e. an SCG DRB can not use the same value as used for an MCG or split DRB. For a split DRB the same identity is used for the MCG- and SCG parts of the configuration.</td>
</tr>
<tr>
<td><strong>db-ToAddModListSCG</strong></td>
<td>When an SCG is configured, E-UTRAN configures at least one SCG or split DRB.</td>
</tr>
<tr>
<td><strong>db-Type</strong></td>
<td>This field indicates whether the DRB is split or SCG DRB. E-UTRAN does not configure split and SCG DRBs simultaneously for the UE.</td>
</tr>
<tr>
<td><strong>db-TypeChange</strong></td>
<td>Indicates that a split/SCG DRB is reconfigured to an MCG DRB (i.e. E-UTRAN only signals the field in case the DRB type changes).</td>
</tr>
<tr>
<td><strong>db-TypeLWA</strong></td>
<td>Indicates whether a DRB is (re)configured as an LWA DRB or an LWA DRB is reconfigured not to use WLAN resources.</td>
</tr>
<tr>
<td><strong>db-TypeLWIP</strong></td>
<td>Indicates whether a DRB is (re)configured to use LWIP Tunnel in UL and DL (value lwip), DL only (value lwip-DL-only), UL only (value lwip-UL-only) or not to use LWIP Tunnel (value eutran).</td>
</tr>
<tr>
<td><strong>logicalChannelConfig</strong></td>
<td>For SRBs a choice is used to indicate whether the logical channel configuration is signalled explicitly or set to the default logical channel configuration for SRB1 as specified in 9.2.1.1 or for SRB2 as specified in 9.2.1.2.</td>
</tr>
<tr>
<td><strong>logicalChannelIdentity</strong></td>
<td>The logical channel identity for both UL and DL.</td>
</tr>
<tr>
<td><strong>mac-MainConfig</strong></td>
<td>Although the ASN.1 includes a choice that is used to indicate whether the mac-MainConfig is signalled explicitly or set to the default MAC main configuration as specified in 9.2.2, EUTRAN does not apply “defaultValue”.</td>
</tr>
<tr>
<td><strong>mbsfn-SubframeConfig</strong></td>
<td>Defines the MBSFN subframe configuration used by the signaled neighboring cell. If absent, UE assumes no MBSFN configuration for the neighboring cell.</td>
</tr>
<tr>
<td><strong>measSubframePatternPCell</strong></td>
<td>Time domain measurement resource restriction pattern for the PCell measurements (RSRP, RSRQ and the radio link monitoring).</td>
</tr>
<tr>
<td><strong>neighCellsCRS-Info, neighCellsCRS-InfoSCell, neighCellsCRS-InfoPSCell</strong></td>
<td>This field contains assistance information used by the UE to mitigate interference from CRS while performing RRM/RLM/CSI measurement or data demodulation or DL control channel demodulation. When the received CRS assistance information is for a cell with CRS non-colliding with that of the CRS of the cell to measure, the UE may use the CRS assistance information to mitigate CRS interference. When the received CRS assistance information is for a cell with CRS colliding with that of the CRS of the cell to measure, the UE may use the CRS assistance information to mitigate CRS interference RRM/RLM (as specified in TS 36.133 [16]) and for CSI (as specified in TS 36.101 [42]) on the subframes indicated by measSubframePatternPCell, measSubframePatternConfigNeigh, csi-MeasSubframeSet1 if configured, and the CSI subframe set 1 if csi-MeasSubframeSets-r12 is configured. The UE may use CRS assistance information to mitigate CRS interference from the cells in the CRS-AssistanceInfoList for the demodulation purpose or DL control channel demodulation as specified in TS 36.101 [42]. EUTRAN does not configure neighCellsCRS-Info-r11 or neighCellsCRS-Info-r13 if eimta-MainConfigPCell-r12 is configured.</td>
</tr>
<tr>
<td><strong>neighCellsToAddModList</strong></td>
<td>This field contains assistance information used by the UE to cancel and suppress interference of a neighbouring cell. If this field is present for a neighbouring cell, the UE assumes that the transmission parameters listed in the sub-fields are used by the neighbouring cell. If this field is present for a neighbouring cell, the UE assumes the neighbour cell is subframe and SFN synchronized to the serving cell, has the same system bandwidth, UL/DL and special subframe configuration, and cyclic prefix length as the serving cell.</td>
</tr>
<tr>
<td><strong>p-aList</strong></td>
<td>Indicates the restricted subset of power offset for QPSK, 16QAM, and 64QAM PDSCH transmissions for the neighbouring cell by using the parameter $P_a$ . see TS 36.213 [23, 5.2]. Value dB-6 corresponds to -6 dB, dB-4.77 corresponds to -4.77 dB etc.</td>
</tr>
<tr>
<td><strong>p-b</strong></td>
<td>Parameter: $P_b$ , indicates the cell-specific ratio used by the signaled neighboring cell, see TS 36.213 [23, Table 5.2-1].</td>
</tr>
<tr>
<td><strong>physicalConfigDedicated</strong></td>
<td>The default dedicated physical configuration is specified in 9.2.4.</td>
</tr>
<tr>
<td><strong>resAllocGranularity</strong></td>
<td>Indicates the resource allocation and precoding granularity in PRB pair level of the signaled neighboring cell, see TS 36.213 [23, 7.1.6].</td>
</tr>
</tbody>
</table>
### RadioResourceConfigDedicated field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>rlc-Config</strong></td>
<td>For SRBs a choice is used to indicate whether the RLC configuration is signalled explicitly or set to the values defined in the default RLC configuration for SRB1 in 9.2.1.1 or for SRB2 in 9.2.1.2. RLC AM is the only applicable RLC mode for SRB1 and SRB2. E-UTRAN does not reconfigure the RLC mode of DRBs except when a full configuration option is used, and may reconfigure the RLC SN field size and the AM RLC LI field size only upon handover within E-UTRA or upon the first reconfiguration after RRC connection re-establishment or upon SCG Change for SCG and split DRBs.</td>
</tr>
<tr>
<td><strong>servCellp-a</strong></td>
<td>Indicates the power offset for QPSK C-RNTI based PDSCH transmissions used by the serving cell, see TS 36.213 [23, 5.2]. Value dB-6 corresponds to -6 dB, dB-4dot77 corresponds to -4.77 dB etc.</td>
</tr>
<tr>
<td><strong>sps-Config</strong></td>
<td>The default SPS configuration is specified in 9.2.3. Except for handover or releasing SPS for MCG, E-UTRAN does not reconfigure sps-Config for MCG when there is a configured downlink assignment or a configured uplink grant for MCG (see TS 36.321 [6]). Except for SCG change or releasing SPS for SCG, E-UTRAN does not reconfigure sps-Config for SCG when there is a configured downlink assignment or a configured uplink grant for SCG (see TS 36.321 [6]).</td>
</tr>
<tr>
<td><strong>srb-Identity</strong></td>
<td>Value 1 is applicable for SRB1 only. Value 2 is applicable for SRB2 only.</td>
</tr>
<tr>
<td><strong>transmissionModeList</strong></td>
<td>Indicates a subset of transmission mode 1, 2, 3, 4, 6, 8, 9, 10, for the signaled neighboring cell for which NeighCellsInfo applies. When TM10 is signaled, other signaled transmission parameters in NeighCellsInfo are not applicable to up to 8 layer transmission scheme of TM10. E-UTRAN may indicate TM9 when TM10 with QCL type A and DMRS scrambling with ( n_{ID}^{(i)} = N_{cell} ) in TS 36.211 [21, 6.10.3.1] is used in the signalled neighbour cell and TM9 or TM10 with QCL type A and DMRS scrambling with ( n_{ID}^{(i)} = N_{cell} ) in TS 36.211 [21, 6.10.3.1] is used in the serving cell. UE behaviour with NAICS when TM10 is used is only defined when QCL type A and DMRS scrambling with ( n_{ID}^{(i)} = N_{cell} ) in TS 36.211 [21, 6.10.3.1] is used for the serving cell and all signalled neighbour cells. The first/ leftmost bit is for transmission mode 1, the second bit is for transmission mode 2, and so on.</td>
</tr>
<tr>
<td>Conditional presence</td>
<td>Explanation</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>CRSIM</td>
<td>The field is optionally present, need ON, if <code>neighCellsCRS-Info-r11</code> is not present; otherwise it is not present.</td>
</tr>
<tr>
<td>DRB-Setup</td>
<td>The field is mandatory present if the corresponding DRB is being set up; otherwise it is not present.</td>
</tr>
<tr>
<td>DRB-SetupM</td>
<td>The field is mandatory present upon setup of MCG or split DRB; The field is optionally present, Need ON, upon change from SCG to MCG DRB; otherwise it is not present.</td>
</tr>
<tr>
<td>DRB-SetupS</td>
<td>The field is mandatory present upon setup of SCG or split DRB, or upon change from MCG to split DRB; The field is optionally present, Need ON, upon change from MCG to SCG DRB; otherwise it is not present.</td>
</tr>
<tr>
<td>HO-Conn</td>
<td>The field is mandatory present in case of handover to E-UTRA or when the <code>fullConfig</code> is included in the <code>RRCConnectionReconfiguration</code> message or in case of RRC connection establishment (excluding <code>RRCConnectionResume</code>); otherwise the field is optionally present, need ON. Upon connection establishment/ re-establishment only SRB1 is applicable (excluding <code>RRCConnectionResume</code>).</td>
</tr>
<tr>
<td>HO-toEUTRA</td>
<td>The field is mandatory present in case of handover to E-UTRA or when the <code>fullConfig</code> is included in the <code>RRCConnectionReconfiguration</code> message; In case of RRC connection establishment (excluding <code>RRCConnectionResume</code>); and RRC connection re-establishment the field is not present; otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td>HO-toEUTRA2</td>
<td>The field is mandatory present in case of handover to E-UTRA or when the <code>fullConfig</code> is included in the <code>RRCConnectionReconfiguration</code> message; otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td>PDCP</td>
<td>The field is mandatory present if the corresponding DRB is being setup; the field is optionally present, need ON, upon reconfiguration of the corresponding split DRB or LWA DRB, upon the corresponding DRB type change from split to MCG bearer, upon the corresponding DRB type change from MCG to split bearer or LWA bearer, upon the corresponding DRB type change from LWA to LTE only bearer, upon handover within E-UTRA and upon the first reconfiguration after re-establishment but in all these cases only when <code>fullConfig</code> is not included in the <code>RRCConnectionReconfiguration</code> message; otherwise it is not present.</td>
</tr>
<tr>
<td>PDCP-S</td>
<td>The field is mandatory present if the corresponding DRB is being setup; the field is optionally present, need ON, upon SCG change; otherwise it is not present.</td>
</tr>
<tr>
<td>RLC-Setup</td>
<td>This field is optionally present if the corresponding DRB is being setup, need ON; otherwise it is not present.</td>
</tr>
<tr>
<td>SCellAdd</td>
<td>The field is optionally present, need ON, upon SCell addition; otherwise it is not present.</td>
</tr>
<tr>
<td>Setup</td>
<td>The field is mandatory present if the corresponding SRB/DRB is being setup; otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td>SetupM</td>
<td>The field is mandatory present upon setup of an MCG or split DRB; otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td>SetupS</td>
<td>The field is mandatory present upon setup of an SCG or split DRB, as well as upon change from MCG to split DRB; otherwise the field is optionally present, need ON.</td>
</tr>
<tr>
<td>SetupS2</td>
<td>The field is mandatory present upon setup of an SCG or split DRB, as well as upon change from MCG to split or SCG DRB. For an SCG DRB the field is optionally present, need ON. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

---

RCLWI-Configuration

The IE `RCLWI-Configuration` is used to add, modify or release the RCLWI configuration.

```asn1
RCLWI-Configuration-r13 ::= CHOICE {
  release             NULL,
  setup               SEQUENCE {
    rclwi-Config-r13   RCLWI-Config-r13
  }
}
```
RCLWI-Config-r13 ::=
  SEQUENCE {
    command
      CHOICE {
        steerToWLAN-r13
          SEQUENCE {
            mobilityConfig-r13
              WLAN-Id-List-r12
          },
        steerToLTE-r13
          NULL
      },
    ...
  }

-- ASN1STOP

-- RLC-Config

The IE RLC-Config is used to specify the RLC configuration of SRBs and DRBs.

RLC-Config information element

-- ASN1START

RLC-Config ::= CHOICE {
  am
    SEQUENCE {
      ul-AM-RLC
        UL-AM-RLC,
      dl-AM-RLC
        DL-AM-RLC
    },
  um-Bi-Directional
    SEQUENCE {
      ul-UM-RLC
        UL-UM-RLC,
      dl-UM-RLC
        DL-UM-RLC
    },
  um-Uni-Directional-UL
    SEQUENCE {
      ul-UM-RLC
        UL-UM-RLC
    },
  um-Uni-Directional-DL
    SEQUENCE {
      dl-UM-RLC
        DL-UM-RLC
    },
  ...
}
RLC-Config-v1250 ::= SEQUENCE {
    ul-extended-RLC-LI-Field-r12 BOOLEAN,
    dl-extended-RLC-LI-Field-r12 BOOLEAN
}

RLC-Config-v1310 ::= SEQUENCE {
    ul-extended-RLC-AM-SN-r13 BOOLEAN,
    dl-extended-RLC-AM-SN-r13 BOOLEAN,
    pollPDU-v1310 PollPDU-v1310 OPTIONAL -- Need OR
}

UL-AM-RLC ::= SEQUENCE {
    t-PollRetransmit T-PollRetransmit,
    pollPDU PollPDU,
    pollByte PollByte,
    maxRetxThreshold ENUMERATED {
        t1, t2, t3, t4, t6, t8, t16, t32
    }
}

DL-AM-RLC ::= SEQUENCE {
    t-Reordering T-Reordering,
    t-StatusProhibit T-StatusProhibit
}

UL-UM-RLC ::= SEQUENCE {
    sn-FieldLength SN-FieldLength
}

DL-UM-RLC ::= SEQUENCE {
    sn-FieldLength SN-FieldLength,
    t-Reordering T-Reordering
}

SN-FieldLength ::= ENUMERATED {size5, size10}
T-PollRetransmit ::= ENUMERATED {
    ms5, ms10, ms15, ms20, ms25, ms30, ms35,
    ms40, ms45, ms50, ms55, ms60, ms65, ms70,
    ms75, ms80, ms85, ms90, ms95, ms100, ms105,
    ms110, ms115, ms120, ms125, ms130, ms135,
    ms140, ms145, ms150, ms155, ms160, ms165,
    ms170, ms175, ms180, ms185, ms190, ms195,
    ms200, ms205, ms210, ms215, ms220, ms225,
    ms230, ms235, ms240, ms245, ms250, ms300,
    ms350, ms400, ms450, ms500, ms800-v1310,
    ms1000-v1310, ms2000-v1310, ms4000-v1310,
    spare5, spare4, spare3, spare2, spare1
}

PollPDU ::= ENUMERATED {
    p4, p8, p16, p32, p64, p128, p256, pInfinity
}

PollPDU-v1310 ::= ENUMERATED {
    p512, p1024, p2048, p4096, p6144, p8192, p12288, p16384
}

PollByte ::= ENUMERATED {
    kB25, kB50, kB75, kB100, kB125, kB250, kB375,
    kB500, kB750, kB1000, kB1250, kB1500, kB2000,
    kB3000, kBInfinity, spare1
}

T-Reordering ::= ENUMERATED {
    ms0, ms5, ms10, ms15, ms20, ms25, ms30, ms35,
    ms40, ms45, ms50, ms55, ms60, ms65, ms70,
    ms75, ms80, ms85, ms90, ms95, ms100, ms110,
    ms120, ms130, ms140, ms150, ms160, ms170,
    ms180, ms190, ms200, ms1600-v1310
}

T-StatusProhibit ::= ENUMERATED {
    ms0, ms5, ms10, ms15, ms20, ms25, ms30, ms35,
    ms40, ms45, ms50, ms55, ms60, ms65, ms70,
ms75, ms80, ms85, ms90, ms95, ms100, ms105,
ms110, ms115, ms120, ms125, ms130, ms135,
ms140, ms145, ms150, ms155, ms160, ms165,
ms170, ms175, ms180, ms185, ms190, ms195,
ms200, ms205, ms210, ms215, ms220, ms225,
ms230, ms235, ms240, ms245, ms250, ms300,
ms350, ms400, ms450, ms500, ms800-v1310,
ms1000-v1310, ms1200-v1310, ms1600-v1310, ms2000-v1310, ms2400-v1310,
spare2,
spare1 }

-- ASN1STOP

### RLC-Config field descriptions

#### dl-extended-RLC-LI-Field, ul-extended-RLC-LI-Field
Indicates the RLC LI field size. Value TRUE means that 15 bit LI length shall be used, otherwise 11 bit LI length shall be used; see TS 36.322 [7]. E-UTRAN enables this field only when RLC-Config (without suffix) is set to am.

#### maxRetxThreshold
Parameter for RLC AM in TS 36.322 [7]. Value t1 corresponds to 1 retransmission, t2 to 2 retransmissions and so on.

#### pollByte
Parameter for RLC AM in TS 36.322 [7]. Value kB25 corresponds to 25 kBytes, kB50 to 50 kBytes and so on. kBInfinity corresponds to an infinite amount of kBytes.

#### pollPDU
Parameter for RLC AM in TS 36.322 [7]. Value p4 corresponds to 4 PDUs, p8 to 8 PDUs and so on. pInfinity corresponds to an infinite number of PDUs. In case pollPDU-r13 is signalled, the UE shall ignore pollPDU (i.e. without suffix). E-UTRAN enables pollPDU-v1310 field only when RLC-Config (without suffix) is set to am.

#### sn-FieldLength
Indicates the UM RLC SN field size, see TS 36.322 [7], in bits. Value size5 means 5 bits, size10 means 10 bits.

#### t-PollRetransmit
Timer for RLC AM in TS 36.322 [7], in milliseconds. Value ms5 means 5ms, ms10 means 10ms and so on. EUTRAN configures values msX-v1310 (with suffix) only if UE supports CE.

#### t-Reordering
Timer for reordering in TS 36.322 [7], in milliseconds. Value ms0 means 0ms and behaviour as specified in 7.3.2 applies, ms5 means 5ms and so on.

#### t-StatusProhibit
Timer for status reporting in TS 36.322 [7], in milliseconds. Value ms0 means 0ms and behaviour as specified in 7.3.2 applies, ms5 means 5ms and so on. EUTRAN configures values msX-v1310 (with suffix) only if UE supports operation in CE.

#### ul-extended-RLC-AM-SN, dl-extended-RLC-AM-SN
Indicates whether or not the UE shall use the extended SN and SO length for AM bearer. Value TRUE means that 16 bit SN length and 16 bit SO length shall be used, otherwise 10 bit SN length and 15 bit SO length shall be used; see TS 36.322 [7].

---

### RLF-TimersAndConstants

The IE RLF-TimersAndConstants contains UE specific timers and constants applicable for UEs in RRC_CONNECTED.

#### RLF-TimersAndConstants information element

-- ASN1START
RLF-TimersAndConstants-r9 ::=   
   CHOICE {
      release    NULL,
      setup     SEQUENCE {
         t301-r9    ENUMERATED {
               ms100, ms200, ms300, ms400, ms600, ms1000, ms1500,
               ms2000},
         t310-r9    ENUMERATED {
               ms0, ms50, ms100, ms200, ms500, ms1000, ms2000},
         n310-r9    ENUMERATED {
               n1, n2, n3, n4, n6, n8, n10},
         t311-r9    ENUMERATED {
               ms1000, ms3000, ms5000, ms10000, ms15000,
               ms20000, ms30000},
         n311-r9    ENUMERATED {
               n1, n2, n3, n4, n5, n6, n8, n10},
         ...
      }
   }

RLF-TimersAndConstants-r13 ::=   
   CHOICE {
      release    NULL,
      setup     SEQUENCE {
         t301-v1310  ENUMERATED {
               ms2500, ms3000, ms3500, ms4000, ms5000,
               ms6000, ms8000, ms10000},
         ...
      }
   }

RLF-TimersAndConstantsSCG-r12 ::=   
   CHOICE {
      release    NULL,
      setup     SEQUENCE {
         t313-r12  ENUMERATED {
               ms10000, ms15000, ms20000}
ms0, ms50, ms100, ms200, ms500, ms1000, ms2000},

n313-r12 ENUMERATED {
   n1, n2, n3, n4, n6, n8, n10, n20},

n314-r12 ENUMERATED {
   n1, n2, n3, n4, n5, n6, n8, n10},
...
}
}
-- ASN1STOP

---

**RLF-TimersAndConstants field descriptions**

**n3xy**

Constants are described in section 7.4. n1 corresponds with 1, n2 corresponds with 2 and so on.

**t3xy**

Timers are described in section 7.3. Value ms0 corresponds with 0 ms, ms50 corresponds with 50 ms and so on. E-UTRAN configures RLF-TimersAndConstants-r13 only if UE supports ce-ModeB. UE shall use the extended values t3xy-v1310 and t3xy-v1330, if present, and ignore the values signaled by t3xy-r9.

---

**– RN-SubframeConfig**

The IE **RN-SubframeConfig** is used to specify the subframe configuration for an RN.

**RN-SubframeConfig information element**

---

**RN-SubframeConfig-r10** ::= SEQUENCE {
   subframeConfigPattern-r10 CHOICE {
      subframeConfigPatternFDD-r10 BIT STRING (SIZE(8)),
      subframeConfigPatternTDD-r10 INTEGER (0..31)
   } OPTIONAL, -- Need ON
   rpdcch-Config-r10 SEQUENCE {
      resourceAllocationType-r10 ENUMERATED {type0, type1, type2Localized, type2Distributed, spare4, spare3, spare2, spare1},
      resourceBlockAssignment-r10 CHOICE {
         type01-r10 CHOICE {
            nrb6-r10 BIT STRING (SIZE(6)),
            nrb15-r10 BIT STRING (SIZE(8)),
            nrb25-r10 BIT STRING (SIZE(13)),
            nrb50-r10 BIT STRING (SIZE(17)),
         }
      }
   }
}
nrb75-r10 BIT STRING (SIZE(19)), nrb100-r10 BIT STRING (SIZE(25))

},
type2-r10 CHOICE {
nrb6-r10 BIT STRING (SIZE(5)),
nrb15-r10 BIT STRING (SIZE(7)),
nrb25-r10 BIT STRING (SIZE(9)),
nrb50-r10 BIT STRING (SIZE(11)),
nrb75-r10 BIT STRING (SIZE(12)),
nrb100-r10 BIT STRING (SIZE(13))
},
...

demodulationRS-r10 CHOICE {
interleaving-r10 ENUMERATED {crs},
nointerleaving-r10 ENUMERATED {crs, dmrs}
},
pdsch-Start-r10 INTEGER (1..3),
pucch-Config-r10 CHOICE {

tdd CHOICE {
channelSelectionMultiplexingBundling SEQUENCE {
n1PUCCH-AN-List-r10 SEQUENCE (SIZE (1..4)) OF INTEGER (0..2047)
},
fallbackForFormat3 SEQUENCE {
n1PUCCH-AN-P0-r10 INTEGER (0..2047),
n1PUCCH-AN-P1-r10 INTEGER (0..2047) OPTIONAL -- Need OR
}
},
ffdd SEQUENCE {
n1PUCCH-AN-P0-r10 INTEGER (0..2047),
n1PUCCH-AN-P1-r10 INTEGER (0..2047) OPTIONAL -- Need OR
}
},
...
} OPTIONAL, -- Need ON
**RN-SubframeConfig field descriptions**

**demodulationRS**
Indicates which reference signals are used for R-PDCCH demodulation according to TS 36.216 [55, 7.4.1]. Value interleaving corresponds to cross-interleaving and value noInterleaving corresponds to no cross-interleaving according to TS 36.216 [55, 7.4.2 and 7.4.3].

**n1PUCCH-AN-List**
Parameter: \( n_{PUCCH}^{(1)} \), see TS 36.216, [55, 7.5.1]. This parameter is only applicable for TDD. Configures PUCCH HARQ-ACK resources if the RN is configured to use HARQ-ACK channel selection, HARQ-ACK multiplexing or HARQ-ACK bundling.

**n1PUCCH-AN-P0, n1PUCCH-AN-P1**
Parameter: \( n_{PUCCH}^{(1)} \) for antenna port P0 and for antenna port P1 respectively, see TS 36.216, [55, 7.5.1] for FDD and [55, 7.5.2] for TDD.

**pdsch-Start**
Parameter: DL-StartSymbol, see TS 36.216 [55, Table 5.4-1].

**resourceAllocationType**
Represents the resource allocation used: type 0, type 1 or type 2 according to TS 36.213 [23, 7.1.6]. Value type0 corresponds to type 0, value type1 corresponds to type 1, value type2Localized corresponds to type 2 with localized virtual resource blocks and type2Distributed corresponds to type 2 with distributed virtual resource blocks.

**resourceBlockAssignment**
Indicates the resource block assignment bits according to TS 36.213 [23, 7.1.6]. Value type01 corresponds to type 0 and type 1, and the value type2 corresponds to type 2. Value nrb6 corresponds to a downlink system bandwidth of 6 resource blocks, value nrb15 corresponds to a downlink system bandwidth of 15 resource blocks, and so on.

**subframeConfigPatternFDD**
Parameter: SubframeConfigurationFDD, see TS 36.216 [55, Table 5.2-1]. Defines the DL subframe configuration for eNB-to-RN transmission, i.e. those subframes in which the eNB may indicate downlink assignments for the RN. The radio frame in which the pattern starts (i.e. the radio frame in which the first bit of the subframeConfigPatternFDD corresponds to subframe #0) occurs when SFN mod 4 = 0.

**subframeConfigPatternTDD**
Parameter: SubframeConfigurationTDD, see TS 36.216 [55, Table 5.2-2]. Defines the DL and UL subframe configuration for eNB-RN transmission.

---

**SchedulingRequestConfig**

The IE SchedulingRequestConfig is used to specify the Scheduling Request related parameters

*SchedulingRequestConfig information element*

```plaintext
-- ASN1START

SchedulingRequestConfig ::= CHOICE {
  release            NULL,
  setup              SEQUENCE {
    sr-PUCCH-ResourceIndex       INTEGER (0..2047),
    sr-ConfigIndex               INTEGER (0..157),
    dsr-TransMax                 ENUMERATED }
}
-- ASN1STOP
```
SchedulingRequestConfig-v1020 ::= SEQUENCE {
  sr-PUCCH-ResourceIndexP1-r10  INTEGER (0..2047)   OPTIONAL   -- Need OR
}

SchedulingRequestConfigSCell-r13 ::=  CHOICE {
  release         NULL,
  setup         SEQUENCE {
    sr-PUCCH-ResourceIndex-r13   INTEGER (0..2047),
    sr-PUCCH-ResourceIndexP1-r13  INTEGER (0..2047)   OPTIONAL,   -- Need OR
    sr-ConfigIndex-r13     INTEGER (0..157),
    dsr-TransMax-r13     ENUMERATED {
      n4, n8, n16, n32, n64, spare3, spare2, spare1}
  }
}

-- ASN1STOP

### SchedulingRequestConfig field descriptions

- **dsr-TransMax**
  Parameter for SR transmission in TS 36.321 [6, 5.4.4]. The value n4 corresponds to 4 transmissions, n8 corresponds to 8 transmissions and so on. EUTRAN configures the same value for all serving cells for which this field is configured.

- **sr-ConfigIndex**
  Parameter $I_{sr}$. See TS 36.213 [23,10.1]. The values 156 and 157 are not applicable for Release 8.

- **sr-PUCCH-ResourceIndex, sr-PUCCH-ResourceIndexP1**
  Parameter: $n_{PUCCH,PRI}^{(1,p)}$ for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1]. E-UTRAN configures sr-PUCCH-ResourceIndexP1 only if sr-PUCCHResourceIndex is configured.

---

### SoundingRS-UL-Config

The IE SoundingRS-UL-Config is used to specify the uplink Sounding RS configuration for periodic and aperiodic sounding.

#### SoundingRS-UL-Config information element

-- ASN1START
SoundingRS-UL-ConfigCommon ::= CHOICE {
    release             NULL,
    setup               SEQUENCE {
        srs-BandwidthConfig       ENUMERATED {bw0, bw1, bw2, bw3, bw4, bw5, bw6, bw7},
        srs-SubframeConfig        ENUMERATED {
            sc0, sc1, sc2, sc3, sc4, sc5, sc6, sc7,
            sc8, sc9, sc10, sc11, sc12, sc13, sc14, sc15},
        ackNackSRS-SimultaneousTransmission BOOLEAN,
        srs-MaxUpPts              ENUMERATED {true} OPTIONAL -- Cond TDD
    }
}

SoundingRS-UL-ConfigDedicated ::= CHOICE {
    release             NULL,
    setup               SEQUENCE {
        srs-Bandwidth     ENUMERATED {bw0, bw1, bw2, bw3},
        srs-HoppingBandwidth    ENUMERATED {hbw0, hbw1, hbw2, hbw3},
        freqDomainPosition    INTEGER (0..23),
        duration             BOOLEAN,
        srs-ConfigIndex      INTEGER (0..1023),
        transmissionComb     INTEGER (0..1),
        cyclicShift          ENUMERATED {cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7}
    }
}

SoundingRS-UL-ConfigDedicated-v1020 ::= SEQUENCE {
    srs-AntennaPort-r10     SRS-AntennaPort
}

SoundingRS-UL-ConfigDedicated-v1310 ::= CHOICE {
    release             NULL,
    setup               SEQUENCE {
        transmissionComb-v1310   INTEGER (2..3) OPTIONAL, -- Need OR
        cyclicShift-v1310        ENUMERATED {cs8, cs9, cs10, cs11} OPTIONAL, -- Need OR
        transmissionCombNum-r13   ENUMERATED {n2, n4} OPTIONAL -- Need OR
SoundingRS-UL-ConfigDedicatedUpPTsExt-r13 ::= CHOICE{
  release NULL,
  setup SEQUENCE {
    srs-UpPtsAdd-r13 ENUMERATED {sym2, sym4},
    srs-Bandwidth-r13 ENUMERATED {bw0, bw1, bw2, bw3},
    srs-HoppingBandwidth-r13 ENUMERATED {hbw0, hbw1, hbw2, hbw3},
    freqDomainPosition-r13 INTEGER (0..23),
    duration-r13 BOOLEAN,
    srs-ConfigIndex-r13 INTEGER (0..1023),
    transmissionComb-r13 INTEGER (0..3),
    cyclicShift-r13 ENUMERATED {cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7, cs8, cs9, cs10, cs11},
    srs-AntennaPort-r13 SRS-AntennaPort,
    transmissionCombNum-r13 ENUMERATED {n2, n4}
  }
}

SoundingRS-UL-ConfigDedicatedAperiodic-r10 ::= CHOICE{
  release NULL,
  setup SEQUENCE {
    srs-ConfigIndexAp-r10 INTEGER (0..31),
    srs-ConfigApDCI-Format4-r10 SEQUENCE (SIZE (1..3)) OF SRS-ConfigAp-r10 OPTIONAL--Need ON
    srs-ActivateAp-r10 CHOICE {
      release NULL,
      setup SEQUENCE {
        srs-ConfigApDCI-Format0-r10 SRS-ConfigAp-r10,
        srs-ConfigApDCI-Format1a2b2c-r10 SRS-ConfigAp-r10,
        ...
      }
    }
  }
}

}
SoundingRS-UL-ConfigDedicatedAperiodic-v1310 ::= CHOICE{
  release           NULL,
  setup              SEQUENCE {
    srs-ConfigApDCI-Format4-v1310  SEQUENCE (SIZE (1..3)) OF SRS-ConfigAp-v1310  OPTIONAL,-- Need ON
    srs-ActivateAp-v1310         CHOICE {
      release               NULL,
      setup                 SEQUENCE {
        srs-ConfigApDCI-Format0-v1310  SRS-ConfigAp-v1310  OPTIONAL, -- Need ON
        srs-ConfigApDCI-Format1a2b2c-v1310 SRS-ConfigAp-v1310  OPTIONAL  -- Need ON
      }
    }
  }
}

SoundingRS-UL-ConfigDedicatedAperiodicUpPtsExt-r13 ::= CHOICE{
  release           NULL,
  setup              SEQUENCE {
    srs-UpPtsAdd-r13   ENUMERATED {sym2, sym4},
    srs-ConfigIndexAp-r13   INTEGER (0..31),
    srs-ConfigApDCI-Format4-r13   SEQUENCE (SIZE (1..3)) OF SRS-ConfigAp-r13  OPTIONAL,-- Need ON
    srs-ActivateAp-r13    CHOICE {
      release               NULL,
      setup                 SEQUENCE {
        srs-ConfigApDCI-Format0-r13  SRS-ConfigAp-r13,
        srs-ConfigApDCI-Format1a2b2c-r13  SRS-ConfigAp-r13
      }
    }
  }
}
srs-BandwidthAp-r10 ENUMERATED {bw0, bw1, bw2, bw3},
freqDomainPositionAp-r10 INTEGER (0..23),
transmissionCombAp-r10 INTEGER (0..1),
cyclicShiftAp-r10 ENUMERATED {cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7}
}

SRS-ConfigAp-v1310 ::= SEQUENCE {
  transmissionCombAp-v1310 INTEGER (2..3) OPTIONAL, -- Need OR
  cyclicShiftAp-v1310 ENUMERATED {cs8, cs9, cs10, cs11} OPTIONAL, -- Need OR
  transmissionCombNum-r13 ENUMERATED {n2, n4} OPTIONAL -- Need OR
}

SRS-ConfigAp-r13 ::= SEQUENCE {
  srs-AntennaPortAp-r13 SRS-AntennaPort,  
  srs-BandwidthAp-r13 ENUMERATED {bw0, bw1, bw2, bw3}, 
  freqDomainPositionAp-r13 INTEGER (0..23), 
  transmissionCombAp-r13 INTEGER (0..3), 
  cyclicShiftAp-r13 ENUMERATED {cs0, cs1, cs2, cs3, cs4, cs5, cs6, cs7, cs8, cs9, cs10, cs11}, 
  transmissionCombNum-r13 ENUMERATED {n2, n4}
}

SRS-AntennaPort ::= ENUMERATED {an1, an2, an4, spare1}

-- ASN1STOP
SoundingRS-UL-Config field descriptions

ackNackSRS-SimultaneousTransmission
Parameter: Simultaneous-AN-and-SRS, see TS 36.213 [23, 8.2]. For SCells this field is not applicable and the UE shall ignore the value.

cyclicShift, cyclicShiftAp
Parameter: n_SRS for periodic and aperiodic sounding reference signal transmission respectively. See TS 36.211 [21, 5.5.3.1], where cs0 corresponds to 0 etc.

duration
Parameter: Duration for periodic sounding reference signal transmission. See TS 36.213 [21, 8.2]. FALSE corresponds to ‘single’ and value TRUE to ‘indefinite’.

freqDomainPosition, freqDomainPositionAp
Parameter: n_RRC for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, 5.5.3.2].

srs-AntennaPort, srs-AntennaPortAp
Indicates the number of antenna ports used for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, 5.5.3]. UE shall release srs-AntennaPort if SoundingRS-UL-ConfigDedicated is released.

srs-Bandwidth, srs-BandwidthAp
Parameter: B_SRS for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, tables 5.5.3.2-1, 5.5.3.2-2, 5.5.3.2-3 and 5.5.3.2-4].

srs-BandwidthConfig
Parameter: SRS Bandwidth Configuration. See TS 36.211, [21, table 5.5.3.2-1, 5.5.3.2-2, 5.5.3.2-3 and 5.5.3.2-4]. Actual configuration depends on UL bandwidth. bw0 corresponds to value 0, bw1 to value 1 and so on.

Parameters indicate the resource configurations for aperiodic sounding reference signal transmissions triggered by DCI formats 0, 1A, 2B, 2C, 4. See TS 36.213 [23, 8.2].

srs-ConfigIndex, srs-ConfigIndexAp

srs-HoppingBandwidth
Parameter: SRS hopping bandwidth $b_{hop} \in \{0,1,2,3\}$ for periodic sounding reference signal transmission, see TS 36.211 [21, 5.5.3.2] where hw0 corresponds to value 0, hw1 to value 1 and so on.

srs-MaxUpPts
Parameter: srsMaxUpPts, see TS 36.211 [21, 5.5.3.2]. If this field is present, reconfiguration of $m_{SRS,0}$ applies for UpPts, otherwise reconfiguration does not apply.

srs-SubframeConfig
Parameter: SRS SubframeConfiguration. See TS 36.211, [21, table 5.5.3.3-1] applies for FDD whereas TS 36.211 [21, table 5.5.3.3-2] applies for TDD. sc0 corresponds to value 0, sc1 corresponds to value 1 and so on.

srs-UpPtsAdd
The field only applies for TDD. If E-UTRAN configures both soundingRS-UL-ConfigDedicatedUpPTsExt and soundingRS-UL-ConfigDedicatedAperiodicUpPTsExt srs-UpPtsAdd in both fields is set to the same value.

transmissionComb, transmissionCombAp
Parameter: $k_{TC} \in \{0..3\}$ for periodic and aperiodic sounding reference signal transmission respectively, see TS 36.211 [21, 5.5.3.2].

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDD</td>
<td>This field is optional present for TDD, need OR; it is not present for FDD and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>

SPS-Config

The IE SPS-Config is used to specify the semi-persistent scheduling configuration.

SPS-Config information element

```
-- ASN1START

SPS-Config ::= SEQUENCE {

```
semiPersistSchedC-RNTI   C-RNTI     OPTIONAL,   -- Need OR
sps-ConfigDL     SPS-ConfigDL   OPTIONAL,   -- Need ON
sps-ConfigUL     SPS-ConfigUL   OPTIONAL   -- Need ON

SPS-ConfigDL ::= CHOICE{
  release       NULL,
  setup        SEQUENCE {
    semiPersistSchedIntervalDL   ENUMERATED {
      sf10, sf20, sf32, sf40, sf64, sf80,
      sf128, sf160, sf320, sf640, spare6,
      spare5, spare4, spare3, spare2,
      spare1},
    numberOfConfSPS-Processes   INTEGER (1..8),
    n1PUCCH-AN-PersistentList   N1PUCCH-AN-PersistentList,
    ...,
    [[ twoAntennaPortActivated-r10  CHOICE {
      release       NULL,
      setup        SEQUENCE {
        n1PUCCH-AN-PersistentListP1-r10  N1PUCCH-AN-PersistentList
      }
    }]
  }
}

SPS-ConfigUL ::= CHOICE {
  release       NULL,
  setup        SEQUENCE {
    semiPersistSchedIntervalUL   ENUMERATED {
      sf10, sf20, sf32, sf40, sf64, sf80,
      sf128, sf160, sf320, sf640, spare6,
      spare5, spare4, spare3, spare2,
      spare1},
    implicitReleaseAfter   ENUMERATED {e2, e3, e4, e8},
  }
}
p0-Persistent  SEQUENCE {
  p0-NominalPUSCH-Persistent  INTEGER (-126..24),
  p0-UE-PUSCH-Persistent     INTEGER (-8..7)
}  OPTIONAL,  -- Need OP

twoIntervalsConfig       ENUMERATED {true}  OPTIONAL,  -- Cond TDD

...,
[[ p0-PersistentSubframeSet2-r12  CHOICE {
  release                     NULL,
  setup                       SEQUENCE {
    p0-NominalPUSCH-PersistentSubframeSet2-r12  INTEGER (-126..24),
    p0-UE-PUSCH-PersistentSubframeSet2-r12     INTEGER (-8..7)
  }
}  OPTIONAL  -- Need ON
]],
[[ numberOfConfUlSPS-Processes-r13  INTEGER (1..8)  OPTIONAL  -- Need OR
]],
}

N1PUCCH-AN-PersistentList ::=  SEQUENCE (SIZE (1..4)) OF INTEGER (0..2047)

-- ASN1STOP
SPS-Config field descriptions

**implicitReleaseAfter**
Number of empty transmissions before implicit release, see TS 36.321 [6, 5.10.2]. Value e2 corresponds to 2 transmissions, e3 corresponds to 3 transmissions and so on.

**n1PUCCH-AN-PersistentList, n1PUCCH-AN-PersistentListP1**
List of parameter: \( n^{(1)}_{\text{PUCCH}} \) for antenna port P0 and for antenna port P1 respectively, see TS 36.213 [23, 10.1]. Field \( n^{(1)}_{\text{PUCCH}} \) is applicable only if the twoAntennaPortActivatedPUCCH-Format1a1b in PUCCH-ConfigDedicated-v1020 is set to true. Otherwise the field is not configured.

**numberOfConfSPS-Processes**
The number of configured HARQ processes for downlink Semi-Persistent Scheduling, see TS 36.321 [6].

**numberOfConfUlSPS-Processes**
The number of configured HARQ processes for uplink Semi-Persistent Scheduling, see TS 36.321 [6]. E-UTRAN always configures this field for asynchronous UL HARQ. Otherwise it does not configure this field.

**p0-NominalPUSCH-Persistent**
Parameter: \( P_{0_{\text{NominalPUSCH}}} \). See TS 36.213 [23, 5.1.1.1], unit dBm step 1. This field is applicable for persistent scheduling, only. If choice setup is used and \( p0_{-}\text{Persistent} \) is absent, apply the value of \( p0_{-}\text{NominalPUSCH-Persistent} \). If uplink power control subframe sets are configured by tpc-SubframeSet, this field applies for uplink power control subframe set 1.

**p0-NominalPUSCH-PersistentSubframeSet2**
Parameter: \( P_{0_{\text{NominalPUSCH}}} \). See TS 36.213 [23, 5.1.1.1], unit dBm step 1. This field is applicable for persistent scheduling, only. If \( p0_{-}\text{PersistentSubframeSet2-r12} \) is not configured, apply the value of \( p0_{-}\text{NominalPUSCH-SubframeSet2-r12} \) for \( p0_{-}\text{NominalPUSCH-PersistentSubframeSet2} \). E-UTRAN configures this field only if uplink power control subframe sets are configured by tpc-SubframeSet, in which case this field applies for uplink power control subframe set 2.

**p0-UE-PUSCH-Persistent**
Parameter: \( P_{0_{\text{UE-PUSCH}}} \). See TS 36.213 [23, 5.1.1.1], unit dB. This field is applicable for persistent scheduling, only. If choice setup is used and \( p0_{-}\text{Persistent} \) is absent, apply the value of \( p0_{-}\text{UE-PUSCH-Persistent} \). If uplink power control subframe sets are configured by tpc-SubframeSet, this field applies for uplink power control subframe set 1.

**p0-UE-PUSCH-PersistentSubframeSet2**
Parameter: \( P_{0_{\text{UE-PUSCH}}} \). See TS 36.213 [23, 5.1.1.1], unit dB. This field is applicable for persistent scheduling, only. If \( p0_{-}\text{PersistentSubframeSet2-r12} \) is not configured, apply the value of \( p0_{-}\text{UE-PUSCH-SubframeSet2-r12} \) for \( p0_{-}\text{UE-PUSCH-PersistentSubframeSet2} \). E-UTRAN configures this field only if uplink power control subframe sets are configured by tpc-SubframeSet, in which case this field applies for uplink power control subframe set 2.

**semiPersistSchedC-RNTI**
Semi-persistent Scheduling C-RNTI, see TS 36.321 [6].

**semiPersistSchedIntervalDL**
Semi-persistent scheduling interval in downlink, see TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. For TDD, the UE shall round this parameter down to the nearest integer (of 10 sub-frames), e.g. sf10 corresponds to 10 sub-frames, sf32 corresponds to 30 sub-frames, sf128 corresponds to 120 sub-frames.

**semiPersistSchedIntervalUL**
Semi-persistent scheduling interval in uplink, see TS 36.321 [6]. Value in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. For TDD, the UE shall round this parameter down to the nearest integer (of 10 sub-frames), e.g. sf10 corresponds to 10 sub-frames, sf32 corresponds to 30 sub-frames, sf128 corresponds to 120 sub-frames.

**twoIntervalsConfig**
Trigger of two-intervals-Semi-Persistent Scheduling in uplink. See TS 36.321 [6, 5.10]. If this field is present, two-intervals-SPS is enabled for uplink. Otherwise, two-intervals-SPS is disabled.

<table>
<thead>
<tr>
<th>Conditional presence</th>
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</tr>
</thead>
<tbody>
<tr>
<td>TDD</td>
<td>This field is optional present for TDD, need OR; it is not present for FDD and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>

---

**TDD-Config**

The IE **TDD-Config** is used to specify the TDD specific physical channel configuration.

**TDD-Config** information element

-- ASN1START
TDD-Config ::= SEQUENCE {
  subframeAssignment ENUMERATED {
    sa0, sa1, sa2, sa3, sa4, sa5, sa6},
  specialSubframePatterns ENUMERATED {
    ssp0, ssp1, ssp2, ssp3, ssp4, ssp5, ssp6, ssp7, ssp8}
}

TDD-Config-v1130 ::= SEQUENCE {
  specialSubframePatterns-v1130 ENUMERATED {ssp7, ssp9}
}

TDD-ConfigSL-r12 ::= SEQUENCE {
  subframeAssignmentSL-r12 ENUMERATED {
    none, sa0, sa1, sa2, sa3, sa4, sa5, sa6}
}

-- ASN1STOP

**TDD-Config field descriptions**

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>specialSubframePatterns</td>
<td>Indicates Configuration as in TS 36.211 [21, table 4.2-1] where <em>ssp0</em> points to Configuration 0, <em>ssp1</em> to Configuration 1 etc. Value <em>ssp7</em> points to Configuration 7 for extended cyclic prefix and value <em>ssp9</em> points to Configuration 9 for normal cyclic prefix. E-UTRAN signals <em>ssp7</em> only when setting <em>specialSubframePatterns</em> (without suffix i.e. the version defined in REL-8) to <em>ssp4</em>. E-UTRAN signals value <em>ssp9</em> only when setting <em>specialSubframePatterns</em> (without suffix) to <em>ssp5</em>. If <em>specialSubframePatterns-v1130</em> is present, the UE shall ignore <em>specialSubframePatterns</em> (without suffix).</td>
</tr>
<tr>
<td>subframeAssignment</td>
<td>Indicates DL/UL subframe configuration where <em>sa0</em> points to Configuration 0, <em>sa1</em> to Configuration 1 etc. as specified in TS 36.211 [21, table 4.2-2]. E-UTRAN configures the same value for serving cells residing on same frequency band.</td>
</tr>
<tr>
<td>subframeAssignmentSL</td>
<td>Indicates UL/ DL subframe configuration where <em>sa0</em> points to Configuration 0, <em>sa1</em> to Configuration 1 etc. as specified in TS 36.211 [21, table 4.2-2]. The value <em>none</em> means that no TDD specific physical channel configuration is applicable (i.e. the carrier on which MasterInformationBlock-SL is transmitted is an FDD UL carrier).</td>
</tr>
</tbody>
</table>

---

**TimeAlignmentTimer**

The IE *TimeAlignmentTimer* is used to control how long the UE considers the serving cells belonging to the associated TAG to be uplink time aligned. Corresponds to the Timer for time alignment in TS 36.321 [6]. Value in number of subframes. Value sf500 corresponds to 500 sub-frames, sf750 corresponds to 750 sub-frames and so on.

**TimeAlignmentTimer information element**

-- ASN1START
The IE \textit{TPC-PDCCH-Config} is used to specify the RNTIs and indexes for PUCCH and PUSCH power control according to TS 36.212 [22]. The power control function can either be setup or released with the IE.

\textbf{TPC-PDCCH-Config information element}

\begin{verbatim}
TPC-PDCCH-Config ::= CHOICE {
  release         NULL,
  setup          SEQUENCE {
    tpc-RNTI       BIT STRING (SIZE (16)),
    tpc-Index       TPC-Index
  }
}

TPC-PDCCH-ConfigSCell-r13 ::= CHOICE {
  release         NULL,
  setup          SEQUENCE {
    tpc-Index-PUCCH-SCell-r13       TPC-Index
  }
}

TPC-Index ::= CHOICE {
  indexOfFormat3       INTEGER (1..15),
  indexOfFormat3A       INTEGER (1..31)
}
\end{verbatim}
### TPC-PDCCH-Config field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>indexOfFormat3</code></td>
<td>Index of N when DCI format 3 is used. See TS 36.212 [22, 5.3.3.1.6].</td>
</tr>
<tr>
<td><code>indexOfFormat3A</code></td>
<td>Index of M when DCI format 3A is used. See TS 36.212 [22, 5.3.3.1.7].</td>
</tr>
<tr>
<td><code>tpc-Index</code></td>
<td>Index of N or M, see TS 36.212 [22, 5.3.3.1.6 and 5.3.3.1.7], where N or M is dependent on the used DCI format (i.e. format 3 or 3a).</td>
</tr>
<tr>
<td><code>tpc-Index-PUCCH-SCell</code></td>
<td>Index of N or M, see TS 36.212 [22, 5.3.3.1.6 and 5.3.3.1.7], where N or M is dependent on the used DCI format (i.e. format 3 or 3a).</td>
</tr>
<tr>
<td><code>tpc-RNTI</code></td>
<td>RNTI for power control using DCI format 3/3A, see TS 36.212 [22].</td>
</tr>
</tbody>
</table>

---

**TunnelConfigLWIP**

The IE `TunnelConfigLWIP` is used to setup/release LWIP Tunnel.

```asn1
TunnelConfigLWIP-r13 ::= SEQUENCE {
  ip-Address-r13   IP-Address-r13,
  ike-Identity-r13   IKE-Identity-r13,
  ....
  [[ lwip-Counter-r13 INTEGER (0..65535)  OPTIONAL -- Cond LWIP-Setup ]
}

IKE-Identity-r13 ::= SEQUENCE {
  idI-r13     OCTET STRING
}

IP-Address-r13 ::= CHOICE {
  ipv4-r13     BIT STRING (SIZE (32)),
  ipv6-r13     BIT STRING (SIZE (128))
}
```

---

`-- ASN1START`

`-- ASN1STOP`
**TunnelConfigLWIP field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ip-Address</td>
<td>Parameter indicates the LWIP-SeGW IP Address to be used by the UE for initiating LWIP Tunnel establishment [32].</td>
</tr>
<tr>
<td>ike-Identity</td>
<td>Parameter indicates the IKE Identity elements (IDi) to be used in IKE Authentication Procedures [32].</td>
</tr>
<tr>
<td>lwip-Counter</td>
<td>Indicates the parameter used by UE for computing the security keys used in LWIP tunnel establishment, as specified in TS 33.401 [32].</td>
</tr>
</tbody>
</table>

### Conditional presence

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>LWIP-Setup</td>
<td>The field is mandatory present upon setup of LWIP tunnel. Otherwise the field is optional, Need ON.</td>
</tr>
</tbody>
</table>

---

**UplinkPowerControl**

The IE *UplinkPowerControlCommon* and IE *UplinkPowerControlDedicated* are used to specify parameters for uplink power control in the system information and in the dedicated signalling, respectively.

#### UplinkPowerControl information elements

```asn1
UplinkPowerControlCommon ::= SEQUENCE {
  p0-NominalPUSCH INTEGER (-126..24),
  alpha Alpha-r12,
  p0-NominalPUCCH INTEGER (-127..-96),
  deltaFList-PUCCH DeltaFList-PUCCH,
  deltaPreambleMsg3 INTEGER (-1..6)
}

UplinkPowerControlCommon-v1020 ::= SEQUENCE {
  deltaF-PUCCH-Format3-r10 ENUMERATED {deltaF-1, deltaF0, deltaF1, deltaF2,
                                       deltaF3, deltaF4, deltaF5, deltaF6},
  deltaF-PUCCH-Format1bCS-r10 ENUMERATED {deltaF1, deltaF2, spare2, spare1}
}

UplinkPowerControlCommon-v1310 ::= SEQUENCE {
  deltaF-PUCCH-Format4-r13 ENUMERATED {deltaF16, deltaF15, deltaF14, deltaF13, deltaF12,
                                       deltaF11, deltaF10, spare1}
}
```
UplinkPowerControlCommonPSCell-r12 ::= SEQUENCE {
   -- For uplink power control the additional/missing fields are signalled (compared to SCell)
   deltaF-PUCCH-Format3-r12    ENUMERATED {deltaF-1, deltaF0, deltaF1, deltaF2, deltaF3, deltaF4, deltaF5, deltaF6},
   deltaF-PUCCH-Format1bCS-r12    ENUMERATED {deltaF1, deltaF2, spare2, spare1},
   p0-NominalPUCCH-r12      INTEGER (-127..-96),
   deltaFList-PUCCH-r12     DeltaFList-PUCCH
}

UplinkPowerControlCommonSCell-r10 ::= SEQUENCE {
   p0-NominalPUSCH-r10     INTEGER (-126..24),
   alpha-r10       Alpha-r12
}

UplinkPowerControlCommonSCell-v1130 ::= SEQUENCE {
   deltaPreambleMsg3-r11    INTEGER (-1..6)
}

UplinkPowerControlCommonSCell-v1310 ::= SEQUENCE {
   -- For uplink power control the additional/missing fields are signalled (compared to SCell)
   p0-NominalPUCCH       INTEGER (-127..-96),
   deltaFList-PUCCH      DeltaFList-PUCCH,
   deltaF-PUCCH-Format3-r12    ENUMERATED {deltaF-1, deltaF0, deltaF1, deltaF2, deltaF3, deltaF4, deltaF5, deltaF6},
   attainable {deltaF16, deltaF15, deltaF14, deltaF13, deltaF12, deltaF11, deltaF10, deltaF8, deltaF7, spare1} }
OPTIONAL, -- Need OR

deltaF-PUCCH-Format5-13  ENUMERATED {
  deltaF13, deltaF12, deltaF11,
  deltaF7,

  OPTIONAL -- Need OR

UplinkPowerControlDedicated ::= SEQUENCE {
  p0-UE-PUSCH       INTEGER (-8..7),
  deltaMCS-Enabled     ENUMERATED {en0, en1},
  accumulationEnabled     BOOLEAN,
  p0-UE-PUCCH       INTEGER (-8..7),
  pSRS-Offset       INTEGER (0..15),
  filterCoefficient     FilterCoefficient     DEFAULT fc4

UplinkPowerControlDedicated-v1020 ::= SEQUENCE {
  deltaTxD-OffsetListPUCCH-r10  DeltaTxD-OffsetListPUCCH-r10  OPTIONAL, -- Need OR
  pSRS-OffsetAp-r10     INTEGER (0..15)      OPTIONAL -- Need OR

UplinkPowerControlDedicated-v1130 ::= SEQUENCE {
  pSRS-Offset-v1130      INTEGER (16..31)    OPTIONAL, -- Need OR
  pSRS-OffsetAp-v1130      INTEGER (16..31)    OPTIONAL, -- Need OR
  deltaTxD-OffsetListPUCCH-v1130   DeltaTxD-OffsetListPUCCH-v1130 OPTIONAL -- Need OR

UplinkPowerControlDedicated-v1250 ::= SEQUENCE {
  set2PowerControlParameter  CHOICE {
    release       NULL,
    setup        SEQUENCE {
      tpc-SubframeSet-r12     BIT STRING (SIZE(10)),
      p0-NominalPUSCH-SubframeSet2-r12     INTEGER (-126..24),
      alpha-SubframeSet2-r12     Alpha-r12,

E
p0-UE-PUSCH-SubframeSet2-r12 INTEGER (-8..7)
}
]
]

UplinkPowerControlDedicatedSCell-r10 ::= SEQUENCE {
p0-UE-PUSCH-r10 INTEGER (-8..7),
deltaMCS-Enabled-r10 ENUMERATED {en0, en1},
accumulationEnabled-r10 BOOLEAN,
pSRS-Offset-r10 INTEGER (0..15),
pSRS-OffsetAp-r10 INTEGER (0..15) OPTIONAL, -- Need OR
filterCoefficient-r10 FilterCoefficient DEFAULT fc4,
pathlossReferenceLinking-r10 ENUMERATED {pCell, sCell}
}

UplinkPowerControlDedicatedSCell-v1310 ::= SEQUENCE {
--Release 8
p0-UE-PUCCH INTEGER (-8..7),
--Release 10
deltaTxD-OffsetListPUCCH-r10 DeltaTxD-OffsetListPUCCH-r10 OPTIONAL -- Need OR
}

Alpha-r12 ::= ENUMERATED {al0, al04, al05, al06, al07, al08, al09, al1}

DeltaFList-PUCCH ::= SEQUENCE {
deltaF-PUCCH-Format1 ENUMERATED {deltaF-2, deltaF0, deltaF2},
deltaF-PUCCH-Format1b ENUMERATED {deltaF1, deltaF3, deltaF5},
deltaF-PUCCH-Format2 ENUMERATED {deltaF-2, deltaF0, deltaF1, deltaF2},
deltaF-PUCCH-Format2a ENUMERATED {deltaF-2, deltaF0, deltaF2},
deltaF-PUCCH-Format2b ENUMERATED {deltaF-2, deltaF0, deltaF2}
}

DeltaTxD-OffsetListPUCCH-r10 ::= SEQUENCE {
deltaTxD-OffsetPUCCH-Format1-r10 ENUMERATED {dB0, dB-2},
deltaTxD-OffsetPUCCH-Format1a1b-r10 ENUMERATED {dB0, dB-2},
deltaTxD-OffsetPUCCH-Format22a2b-r10  ENUMERATED {dB0, dB-2},
deltaTxD-OffsetPUCCH-Format3-r10  ENUMERATED {dB0, dB-2},
...
}

DeltaTxD-OffsetListPUCCH-v1130 ::= SEQUENCE {
  deltaTxD-OffsetPUCCH-Format1bCS-r11  ENUMERATED {dB0, dB-1}
}

-- ASN1STOP
## UplinkPowerControl field descriptions

### accumulationEnabled
Parameter: Accumulation-enabled, see TS 36.213 [23, 5.1.1.1]. TRUE corresponds to 'enabled' whereas FALSE corresponds to 'disabled'.

### alpha
Parameter: $\alpha$ See TS 36.213 [23, 5.1.1.1] where $\alpha=0$, $\alpha=0.4$, $\alpha=0.5$, $\alpha=0.6$, $\alpha=0.7$, $\alpha=0.8$, $\alpha=0.9$ and $\alpha=1$ corresponds to 1. This field applies for uplink power control subframe set 1 if uplink power control subframe sets are configured by tpc-SubframeSet.

### alpha-SubframeSet2
Parameter: $\alpha$. See TS 36.213 [23, 5.1.1.1] where $\alpha=0$, $\alpha=0.4$, $\alpha=0.5$, $\alpha=0.6$, $\alpha=0.7$, $\alpha=0.8$, $\alpha=0.9$ and $\alpha=1$ corresponds to 1. This field applies for uplink power control subframe set 1 if uplink power control subframe sets are configured by tpc-SubframeSet.

### deltaF-PUCCH-FormatX
Parameter: $F_{PUCCH}(\Delta)$ for the PUCCH formats 1, 1b, 2, 2a, 2b, 3, 4, 5 and 1b with channel selection. See TS 36.213 [23, 5.1.2] where deltaF-2 corresponds to -2 dB, deltaF0 corresponds to 0 dB and so on.

### deltaMCS-Enabled
Parameter: $K_s$ See TS 36.213 [23, 5.1.1.1]. $K_s=0$ corresponds to value 0 corresponding to state 'disabled'. $K_s=1.25$ corresponds to 'enabled'.

### deltaPreambleMsg3
Parameter: $\Delta_{PREAMBLE_{...}} \text{see TS 36.213 [23, 5.1.1.1]. Actual value = field value } \times 2 \text{ [dB].}$

### deltaTxD-OffsetPUCCH-FormatX
Parameter: $\Delta_{TxD}(\Delta)$ for the PUCCH formats 1, 1a/1b, 1b with channel selection, 2/2a/2b and 3 when two antenna ports are configured for PUCCH transmission. See TS 36.213 [23, 5.1.2.1] where $dB=0$ corresponds to 0 dB, $dB=1$ corresponds to -1 dB, $dB=2$ corresponds to -2 dB. EUTRAN configures the field deltaTxD-OffsetPUCCH-Format1bCS-r11 for the PCell and/or the PSCell only.

### filterCoefficient
Specifies the filtering coefficient for RSRP measurements used to calculate path loss, as specified in TS 36.213 [23, 5.1.1.1]. The same filtering mechanism applies as for quantityConfig described in 5.5.3.2.

### p0-NominalPUCCH
Parameter: $P_{O_{...}PUCCH}$ See TS 36.213 [23, 5.1.2.1], unit dBm.

### p0-NominalPUSCH
Parameter: $P_{O_{...}PUSCH}$ (1) See TS 36.213 [23, 5.1.1.1], unit dBm. This field is applicable for non-persistent scheduling only. This field applies for uplink power control subframe set 1 if uplink power control subframe sets are configured by tpc-SubframeSet.

### p0-NominalPUSCH-SubframeSet2
Parameter: $P_{O_{...}PUSCH}$ (1). See TS 36.213 [23, 5.1.1.1], unit dBm. This field is applicable for non-persistent scheduling only. This field applies for uplink power control subframe set 2 if uplink power control subframe sets are configured by tpc-SubframeSet.

### p0-UE-PUCCH
Parameter: $P_{O_{...}PUCCH}$ See TS 36.213 [23, 5.1.2.1]. Unit dB

### p0-UE-PUSCH
Parameter: $P_{O_{...}PUSCH}$ (1) See TS 36.213 [23, 5.1.1.1], unit dB. This field is applicable for non-persistent scheduling, only. This field applies for uplink power control subframe set 1 if uplink power control subframe sets are configured by tpc-SubframeSet.

### pathlossReferenceLinking
Indicates whether the UE shall apply as pathloss reference either the downlink of the PCell or of the SCell that corresponds with this uplink (i.e. according to the cellIdentification within the field sCellToAddMod). For SCells part of an STAG E-UTRAN sets the value to sCell.

### pSRS-Offset, pSRS-OffsetAp
Parameter: $p_{SRS-Offset}$ for periodic and aperiodic sounding reference signal transmission respectively. See TS 36.213 [23, 5.1.3.1]. For $K_s=1.25$, the actual parameter value is $p_{SRS-Offset}$ value – 3. For $K_s=0$, the actual parameter value is $-10.5 + 1.5 \times p_{SRS-Offset}$ value.

If $p_{SRS-Offset-v1130}$ is included, the UE ignores $p_{SRS-Offset}$ (i.e., without suffix). Likewise, if $p_{SRS-OffsetAp-v1130}$ is included, the UE ignores $p_{SRS-OffsetAp-r10}$. For $K_s=0$, E-UTRAN does not set values larger than 26.
**UplinkPowerControl field descriptions**

**tpc-SubframeSet**
Indicates the uplink subframes (including UpPTS in special subframes) of the uplink power control subframe sets. Value 0 means the subframe belongs to uplink power control subframe set 1, and value 1 means the subframe belongs to uplink power control subframe set 2.

---

**WLAN-Id-List**
The IE *WLAN-Id-List* is used to list WLAN(s) for configuration of WLAN measurements and WLAN mobility set.

---

**WLAN-MobilityConfig**
The IE *WLAN-MobilityConfig* is used for configuration of WLAN mobility set and WLAN Status Reporting. E-UTRAN should ensure at least one WLAN identifier is configured when LWA or LWIP is configured.

---

**WLAN-MobilityConfig field descriptions**

**associationTimer**
Indicates the maximum time for connection to WLAN before connection failure reporting is initiated. Value s10 means 10 seconds, value s30 means 30 seconds and so on. E-UTRAN includes *associationTimer* only upon change in WLAN mobility set or *lwa-WT-Counter*.

**successReportRequested**
Indicates whether the UE shall report successful connection to WLAN. Applicable to LWA and LWIP.

**wlan-ToAddList**
Indicates the WLAN identifiers to be added to the WLAN mobility set.

**wlan-ToReleaseList**
Indicates the WLAN identifiers to be removed from the WLAN mobility set.
6.3.3 Security control information elements

– NextHopChainingCount

The IE *NextHopChainingCount* is used to update the $K_{SNB}$ key and corresponds to parameter NCC: See TS 33.401 [32, 7.2.8.4].

*NextHopChainingCount* information element

---

NextHopChainingCount ::= INTEGER (0..7)
---

– SecurityAlgorithmConfig

The IE *SecurityAlgorithmConfig* is used to configure AS integrity protection algorithm (SRBs) and AS ciphering algorithm (SRBs and DRBs). For RNs, the IE *SecurityAlgorithmConfig* is also used to configure AS integrity protection algorithm for DRBs between the RN and the E-UTRAN.

*SecurityAlgorithmConfig* information element

---

SecurityAlgorithmConfig ::= SEQUENCE {
  cipheringAlgorithm CipheringAlgorithm-r12,
  integrityProtAlgorithm ENUMERATED {
    eia0-v920, eia1, eia2, eia3-v1130, spare4, spare3,
    spare2, spare1, ...
  }
}

CipheringAlgorithm-r12 ::= ENUMERATED {
  eea0, eea1, eea2, eea3-v1130, spare4, spare3,
  spare2, spare1, ...
}
---

<table>
<thead>
<tr>
<th>SecurityAlgorithmConfig field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>cipheringAlgorithm</strong></td>
</tr>
<tr>
<td>Indicates the ciphering algorithm to be used for SRBs and DRBs, as specified in TS 33.401 [32, 5.1.3.2].</td>
</tr>
<tr>
<td><strong>integrityProtAlgorithm</strong></td>
</tr>
<tr>
<td>Indicates the integrity protection algorithm to be used for SRBs, as specified in TS 33.401 [32, 5.1.4.2]. For RNs, also indicates the integrity protection algorithm to be used for integrity protection-enabled DRB(s).</td>
</tr>
</tbody>
</table>
ShortMAC-I information element

--- ASN1START

ShortMAC-I ::= BIT STRING (SIZE (16))

--- ASN1STOP

6.3.4 Mobility control information elements

– AdditionalSpectrumEmission

AdditionalSpectrumEmission information element

--- ASN1START

AdditionalSpectrumEmission ::= INTEGER (1..32)

--- ASN1STOP

– ARFCN-ValueCDMA2000

The IE ARFCN-ValueCDMA2000 used to indicate the CDMA2000 carrier frequency within a CDMA2000 band, see C.S0002 [12].

ARFCN-ValueCDMA2000 information element

--- ASN1START

ARFCN-ValueCDMA2000 ::= INTEGER (0..2047)

--- ASN1STOP

– ARFCN-ValueEUTRA

The IE ARFCN-ValueEUTRA is used to indicate the ARFCN applicable for a downlink, uplink or bi-directional (TDD) E-UTRA carrier frequency, as defined in TS 36.101 [42]. If an extension is signalled using the extended value range (as defined by IE ARFCN-ValueEUTRA-v9e0), the UE shall only consider this extension (and hence ignore the corresponding original field, using the value range as defined by IE ARFCN-ValueEUTRA i.e. without suffix, if signalled). In dedicated signalling, E-UTRAN only provides an EARFCN corresponding to an E-UTRA band supported by the UE.
**ARFCN-ValueEUTRA information element**

```plaintext
    ARFCN-ValueEUTRA ::= INTEGER (0..maxEARFCN)
    ARFCN-ValueEUTRA-v9e0 ::= INTEGER (maxEARFCN-Plus1..maxEARFCN2)
    ARFCN-ValueEUTRA-r9 ::= INTEGER (0..maxEARFCN2)
```

**NOTE:** For fields using the original value range, as defined by IE *ARFCN-ValueEUTRA* i.e. without suffix, value *maxEARFCN* indicates that the E-UTRA carrier frequency is indicated by means of an extension. In such a case, UEs not supporting the extension consider the field to be set to a not supported value.

-- ARFCN-ValueGERAN

The IE *ARFCN-ValueGERAN* is used to specify the ARFCN value applicable for a GERAN BCCH carrier frequency, see TS 45.005 [20].

**ARFCN-ValueGERAN information element**

```plaintext
    ARFCN-ValueGERAN ::= INTEGER (0..1023)
```

-- ARFCN-ValueUTRA

The IE *ARFCN-ValueUTRA* is used to indicate the ARFCN applicable for a downlink (Nd, FDD) or bi-directional (Nt, TDD) UTRA carrier frequency, as defined in TS 25.331 [19].

**ARFCN-ValueUTRA information element**

```plaintext
    ARFCN-ValueUTRA ::= INTEGER (0..16383)
```

--
– BandclassCDMA2000

The IE `BandclassCDMA2000` is used to define the CDMA2000 band in which the CDMA2000 carrier frequency can be found, as defined in C.S0057 [24, table 1.5-1].

**BandclassCDMA2000 information element**

```asn1
BandclassCDMA2000 ::= ENUMERATED {
    bc0, bc1, bc2, bc3, bc4, bc5, bc6, bc7, bc8,
    bc9, bc10, bc11, bc12, bc13, bc14, bc15, bc16,
    bc17, bc18-v9a0, bc19-v9a0, bc20-v9a0, bc21-v9a0,
    spare10, spare9, spare8, spare7, spare6, spare5, spare4,
    spare3, spare2, spare1, ...}
```

– BandIndicatorGERAN

The IE `BandIndicatorGERAN` indicates how to interpret an associated GERAN carrier ARFCN, see TS 45.005 [20]. More specifically, the IE indicates the GERAN frequency band in case the ARFCN value can concern either a DCS 1800 or a PCS 1900 carrier frequency. For ARFCN values not associated with one of these bands, the indicator has no meaning.

**BandIndicatorGERAN information element**

```asn1
BandIndicatorGERAN ::= ENUMERATED {dcs1800, pcs1900}
```

– CarrierFreqCDMA2000

The IE `CarrierFreqCDMA2000` used to provide the CDMA2000 carrier information.

**CarrierFreqCDMA2000 information element**

```asn1
CarrierFreqCDMA2000 ::= SEQUENCE {
    bandClass        BandclassCDMA2000,
    arfcn            ARFCN-ValueCDMA2000
}
```
--- CarrierFreqGERAN

The IE *CarrierFreqGERAN* is used to provide an unambiguous carrier frequency description of a GERAN cell.

**CarrierFreqGERAN information element**

--- ASN1START

```asn1
CarrierFreqGERAN ::= SEQUENCE {
  arfcn       ARFCN-ValueGERAN,
  bandIndicator     BandIndicatorGERAN
}
```

--- ASN1STOP

--- CarrierFreqGERAN field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>arfcn</td>
<td>GERAN ARFCN of BCCH carrier.</td>
</tr>
<tr>
<td>bandIndicator</td>
<td>Indicates how to interpret the ARFCN of the BCCH carrier.</td>
</tr>
</tbody>
</table>

--- CarrierFreqsGERAN

The IE *CarrierFreqListGERAN* is used to provide one or more GERAN ARFCN values, as defined in TS 44.005 [43], which represents a list of GERAN BCCH carrier frequencies.

**CarrierFreqsGERAN information element**

--- ASN1START

```asn1
CarrierFreqsGERAN ::= SEQUENCE {
  startingARFCN      ARFCN-ValueGERAN,
  bandIndicator      BandIndicatorGERAN,
  followingARFCNs      CHOICE {
    explicitListOfARFCNs    ExplicitListOfARFCNs,
    equallySpacedARFCNs     SEQUENCE {
      arfcn-Spacing      INTEGER (1..8),
      numberOfFollowingARFCNs    INTEGER (0..31)
    }.
```
variableBitMapOfARFCNs OCTET STRING (SIZE (1..16))

ExplicitListOfARFCNs ::= SEQUENCE (SIZE (0..31)) OF ARFCN-ValueGERAN

-- ASN1STOP

### CarrierFreqsGERAN field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>arfcn-Spacing</td>
<td>Space, d, between a set of equally spaced ARFCN values.</td>
</tr>
<tr>
<td>bandIndicator</td>
<td>Indicates how to interpret the ARFCN of the BCCH carrier.</td>
</tr>
<tr>
<td>explicitListOfARFCNs</td>
<td>The remaining ARFCN values in the set are explicitly listed one by one.</td>
</tr>
<tr>
<td>followingARFCNs</td>
<td>Field containing a representation of the remaining ARFCN values in the set.</td>
</tr>
<tr>
<td>numberOfFollowingARFCNs</td>
<td>The number, n, of the remaining equally spaced ARFCN values in the set.</td>
</tr>
<tr>
<td>startingARFCN</td>
<td>The first ARFCN value, s, in the set.</td>
</tr>
<tr>
<td>variableBitMapOfARFCNs</td>
<td>Bitmap field representing the remaining ARFCN values in the set. The leading bit of the first octet in the bitmap corresponds to the ARFCN = ((s + 1) mod 1024), the next bit to the ARFCN = ((s + 2) mod 1024), and so on. If the bitmap consist of N octets, the trailing bit of octet N corresponds to ARFCN = ((s + 8*N) mod 1024). The complete set of ARFCN values consists of ARFCN = s and the ARFCN values, where the corresponding bit in the bitmap is set to &quot;1&quot;.</td>
</tr>
</tbody>
</table>

-- CarrierFreqListMBMS

The IE CarrierFreqListMBMS is used to indicate the E-UTRA ARFCN values of the one or more MBMS frequencies the UE is interested to receive.

### CarrierFreqListMBMS information element

-- ASN1START

CarrierFreqListMBMS-r11 ::= SEQUENCE (SIZE (1..maxFreqMBMS-r11)) OF ARFCN-ValueEUTRA-r9

-- ASN1STOP

-- CDMA2000-Type

The IE CDMA2000-Type is used to describe the type of CDMA2000 network.

### CDMA2000-Type information element

-- ASN1START
CDMA2000-Type ::= ENUMERATED {type1XRTT, typeHRPD}

-- ASN1STOP

– CellIdentity

The IE CellIdentity is used to unambiguously identify a cell within a PLMN.

**CellIdentity information element**

-- ASN1START

CellIdentity ::= BIT STRING (SIZE (28))

-- ASN1STOP

– CellIndexList

The IE CellIndexList concerns a list of cell indices, which may be used for different purposes.

**CellIndexList information element**

-- ASN1START

CellIndexList ::= SEQUENCE (SIZE (1..maxCellMeas)) OF CellIndex

CellIndex ::= INTEGER (1..maxCellMeas)

-- ASN1STOP

– CellReselectionPriority

The IE CellReselectionPriority concerns the absolute priority of the concerned carrier frequency/ set of frequencies (GERAN)/ bandclass (CDMA2000), as used by the cell reselection procedure. Corresponds with parameter "priority" in TS 36.304 [4]. Value 0 means: lowest priority. The UE behaviour for the case the field is absent, if applicable, is specified in TS 36.304 [4].

**CellReselectionPriority information element**

-- ASN1START

CellReselectionPriority ::= INTEGER (0..7)
— **CellSelectionInfoCE**

The IE `CellSelectionInfoCE` contains cell selection information for CE. The `q-RxLevMinCE` corresponds to parameter `Qrxlevmin_CE` in TS 36.304 [4]. The `q-QualMinRSRQ-CE` corresponds to parameter `Qqualmin_CE` in TS 36.304 [4]. If `q-QualMinRSRQ-CE` is not present, the UE applies the (default) value of negative infinity for `Qqualmin`.

**CellSelectionInfoCE** information element

```
CellSelectionInfoCE-r13 ::= SEQUENCE {
    q-RxLevMinCE-r13    Q-RxLevMin,
    q-QualMinRSRQ-CE-r13   Q-QualMin-r9      OPTIONAL -- Need OR
}
```

— **CellReselectionSubPriority**

The IE `CellReselectionSubPriority` indicates a fractional value to be added to the value of `cellReselectionPriority` to obtain the absolute priority of the concerned carrier frequency for E-UTRA. Value oDot2 corresponds to 0.2, oDot4 corresponds to 0.4 and so on.

**CellReselectionSubPriority** information element

```
CellReselectionSubPriority-r13 ::= ENUMERATED {oDot2, oDot4, oDot6, oDot8}
```

— **CSFB-RegistrationParam1XRTT**

The IE `CSFB-RegistrationParam1XRTT` is used to indicate whether or not the UE shall perform a CDMA2000 1xRTT pre-registration if the UE does not have a valid / current pre-registration.

```
CSFB-RegistrationParam1XRTT ::= SEQUENCE {
    sid         BIT STRING (SIZE (15)),
    nid         BIT STRING (SIZE (16)),
    multipleSID       BOOLEAN,
    multipleNID       BOOLEAN,
}```
homeReg              BOOLEAN,
foreignSIDReg        BOOLEAN,
foreignNIDReg        BOOLEAN,
parameterReg         BOOLEAN,
powerUpReg           BOOLEAN,
registrationPeriod   BIT STRING (SIZE (7)),
registrationZone     BIT STRING (SIZE (12)),
totalZone            BIT STRING (SIZE (3)),
zoneTimer             BIT STRING (SIZE (3))
}

CSFB-RegistrationParam1XRTT-v920 ::= SEQUENCE {
   powerDownReg-r9     ENUMERATED {true}
}

-- ASN1STOP
CSFB-RegistrationParam1xRTT field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>foreignNIDReg</td>
<td>The CDMA2000 1xRTT NID roamer registration indicator.</td>
</tr>
<tr>
<td>foreignSIDReg</td>
<td>The CDMA2000 1xRTT SID roamer registration indicator.</td>
</tr>
<tr>
<td>homeReg</td>
<td>The CDMA2000 1xRTT Home registration indicator.</td>
</tr>
<tr>
<td>multipleNID</td>
<td>The CDMA2000 1xRTT Multiple NID storage indicator.</td>
</tr>
<tr>
<td>multipleSID</td>
<td>The CDMA2000 1xRTT Multiple SID storage indicator.</td>
</tr>
<tr>
<td>nid</td>
<td>Used along with the sid as a pair to control when the UE should Register or Re-Register with the CDMA2000 1xRTT network.</td>
</tr>
<tr>
<td>parameterReg</td>
<td>The CDMA2000 1xRTT Parameter-change registration indicator.</td>
</tr>
<tr>
<td>powerDownReg</td>
<td>The CDMA2000 1xRTT Power-down registration indicator. If set to TRUE, the UE that has a valid / current CDMA2000 1xRTT pre-registration will perform a CDMA2000 1xRTT power down registration when it is switched off.</td>
</tr>
<tr>
<td>powerUpReg</td>
<td>The CDMA2000 1xRTT Power-up registration indicator.</td>
</tr>
<tr>
<td>registrationPeriod</td>
<td>The CDMA2000 1xRTT Registration period.</td>
</tr>
<tr>
<td>registrationZone</td>
<td>The CDMA2000 1xRTT Registration zone.</td>
</tr>
<tr>
<td>sid</td>
<td>Used along with the nid as a pair to control when the UE should Register or Re-Register with the CDMA2000 1xRTT network.</td>
</tr>
<tr>
<td>totalZone</td>
<td>The CDMA2000 1xRTT Number of registration zones to be retained.</td>
</tr>
<tr>
<td>zoneTimer</td>
<td>The CDMA2000 1xRTT Zone timer length.</td>
</tr>
</tbody>
</table>

CellGlobalIdEUTRA

The IE CellGlobalIdEUTRA specifies the Evolved Cell Global Identifier (ECGI), the globally unique identity of a cell in E-UTRA.

CellGlobalIdEUTRA information element

-- ASN1START

CellGlobalIdEUTRA ::= SEQUENCE {
  plmn-Identity        PLMN-Identity,
  cellIdentity         CellIdentity
}

-- ASN1STOP

CellGlobalIdEUTRA field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cellIdentity</td>
<td>Identity of the cell within the context of the PLMN.</td>
</tr>
<tr>
<td>plmn-Identity</td>
<td>Identifies the PLMN of the cell as given by the first PLMN entry in the plmn-IdentityList in SystemInformationBlockType1.</td>
</tr>
</tbody>
</table>
CellGlobalIdUTRA

The IE CellGlobalIdUTRA specifies the global UTRAN Cell Identifier, the globally unique identity of a cell in UTRA.

**CellGlobalIdUTRA information element**

```
CellGlobalIdUTRA ::= SEQUENCE {
  plmn-Identity       PLMN-Identity,
  cellIdentity       BIT STRING (SIZE (28))
}
```

**CellGlobalIdUTRA field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cellIdentity</td>
<td>UTRA Cell Identifier which is unique within the context of the identified PLMN as defined in TS 25.331 [19].</td>
</tr>
<tr>
<td>plmn-Identity</td>
<td>Identifies the PLMN of the cell as given by the common PLMN broadcast in the MIB, as defined in TS 25.331 [19].</td>
</tr>
</tbody>
</table>

CellGlobalIdGERAN

The IE CellGlobalIdGERAN specifies the Cell Global Identification (CGI), the globally unique identity of a cell in GERAN.

**CellGlobalIdGERAN information element**

```
CellGlobalIdGERAN ::= SEQUENCE {
  plmn-Identity       PLMN-Identity,
  locationAreaCode      BIT STRING (SIZE (16)),
  cellIdentity       BIT STRING (SIZE (16))
}
```

**CellGlobalIdGERAN field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cellIdentity</td>
<td>Cell Identifier which is unique within the context of the GERAN location area as defined in TS 23.003 [27].</td>
</tr>
<tr>
<td>locationAreaCode</td>
<td>A fixed length code identifying the location area within a PLMN as defined in TS 23.003 [27].</td>
</tr>
<tr>
<td>plmn-Identity</td>
<td>Identifies the PLMN of the cell, as defined in TS 23.003 [27].</td>
</tr>
</tbody>
</table>
CellGlobalIdCDMA2000

The IE *CellGlobalIdCDMA2000* specifies the Cell Global Identification (CGI), the globally unique identity of a cell in CDMA2000.

**CellGlobalIdCDMA2000 information element**

```
CellGlobalIdCDMA2000 ::= CHOICE {
  cellGlobalId1XRTT      BIT STRING (SIZE (47)),
  cellGlobalIdHRPD      BIT STRING (SIZE (128))
}
```

CellGlobalIdCDMA2000 field descriptions

- **cellGlobalId1XRTT**
  Unique identifier for a CDMA2000 1xRTT cell, corresponds to BASEID, SID and NID parameters (in that order) defined in C.S0005 [25].

- **cellGlobalIdHRPD**
  Unique identifier for a CDMA2000 HRPD cell, corresponds to SECTOR ID parameter defined in C.S0024 [26, 14.9].

CellSelectionInfoNFreq

The IE *CellSelectionInfoNFreq* includes the parameters used for cell selection on a neighbouring frequency, see TS 36.304 [4].

**CellSelectionInfoNFreq information element**

```
CellSelectionInfoNFreq-r13 ::= SEQUENCE {
  q-RxLevMin-r13     Q-RxLevMin,
  q-RxLevMinOffset     INTEGER (1..8)   OPTIONAL, -- Need OP
  q-Hyst-r13       ENUMERATED {
    dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,
    dB12, dB14, dB16, dB18, dB20, dB22, dB24},
  q-RxLevMinReselection-r13   Q-RxLevMin,
  t-ReselectionEUTRA-r13    T-Reselection
}
```
-- ASN1STOP

– CSG-Identity

The IE *CSG-Identity* is used to identify a Closed Subscriber Group.

**CSG-Identity information element**

```
CSG-Identity ::= BIT STRING (SIZE (27))
```

-- ASN1STOP

– FreqBandIndicator

The IE *FreqBandIndicator* indicates the E-UTRA operating band as defined in TS 36.101 [42, table 5.5-1]. If an extension is signalled using the extended value range (as defined by IE *FreqBandIndicator-v9e0*), the UE shall only consider this extension (and hence ignore the corresponding original field, using the value range as defined by IE *FreqBandIndicator* i.e. without suffix, if signalled).

**FreqBandIndicator information element**

```
FreqBandIndicator ::= INTEGER (1..maxFBI)
FreqBandIndicator-v9e0 ::= INTEGER (maxFBI-Plus1..maxFBI2)
FreqBandIndicator-r11 ::= INTEGER (1..maxFBI2)
```

-- ASN1STOP

**NOTE:** For fields using the original value range, as defined by IE *FreqBandIndicator* i.e. without suffix, value *maxFBI* indicates that the frequency band is indicated by means of an extension. In such a case, UEs not supporting the extension consider the field to be set to a not supported value.

– MobilityControlInfo

The IE *MobilityControlInfo* includes parameters relevant for network controlled mobility to/within E-UTRA.
MobilityControlInfo information element

MobilityControlInfo ::= SEQUENCE {
    targetPhysCellId             PhysCellId,  -- Cond HO-toEUTRA2
    carrierFreq                  CarrierFreqEUTRA OPTIONAL,  -- Cond HO-toEUTRA2
    carrierBandwidth             CarrierBandwidthEUTRA OPTIONAL,  -- Cond HO-toEUTRA
    additionalSpectrumEmission   AdditionalSpectrumEmission OPTIONAL,  -- Cond HO-toEUTRA
    t304                         ENUMERATED {
        ms50, ms100, ms150, ms200, ms500, ms1000,  
        ms2000, ms10000-v1310},
    newUE-Identity               C-RNTI,  
    radioResourceConfigCommon    RadioResourceConfigCommon,  
    rach-ConfigDedicated         RACH-ConfigDedicated OPTIONAL,  -- Need OP
    ...,
    [[ carrierFreq-v9e0          CarrierFreqEUTRA-v9e0 OPTIONAL -- Need ON
      ]],
    [[ drb-ContinueROHC-r11      ENUMERATED {true} OPTIONAL -- Cond HO
      ]]
}

MobilityControlInfoSCG-r12 ::= SEQUENCE {
    t307-r12                    ENUMERATED {
        ms50, ms100, ms150, ms200, ms500, ms1000,  
        ms2000, spare1},
    ue-IdentitySCG-r12          C-RNTI OPTIONAL,  -- Cond SCGEst,
    rach-ConfigDedicated-r12    RACH-ConfigDedicated OPTIONAL,  -- Need OP
    cipheringAlgorithmSCG-r12   CipheringAlgorithm-r12 OPTIONAL,  -- Need ON
    ...
}

CarrierBandwidthEUTRA ::= SEQUENCE {
    dl-Bandwidth                ENUMERATED {
        n6, n15, n25, n50, n75, n100, spare10,  
        spare9, spare8, spare7, spare6, spare5,
ul-Bandwidth ENUMERATED {
    n6, n15, n25, n50, n75, n100, spare10,
    spare9, spare8, spare7, spare6, spare5,
    spare4, spare3, spare2, spare1} OPTIONAL -- Need OP
}

CarrierFreqEUTRA ::= SEQUENCE {
    dl-CarrierFreq ARFCN-ValueEUTRA,
    ul-CarrierFreq ARFCN-ValueEUTRA OPTIONAL -- Cond FDD
}

CarrierFreqEUTRA-v9e0 ::= SEQUENCE {
    dl-CarrierFreq-v9e0 ARFCN-ValueEUTRA-r9,
    ul-CarrierFreq-v9e0 ARFCN-ValueEUTRA-r9 OPTIONAL -- Cond FDD
}

-- ASN1STOP
**MobilityControlInfo field descriptions**

<table>
<thead>
<tr>
<th>additionalSpectrumEmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>For a UE with no SCells configured for UL in the same band as the PCell, the UE shall apply the value for the PCell instead of the corresponding value from SystemInformationBlockType2 or SystemInformationBlockType1. For a UE with SCell(s) configured for UL in the same band as the PCell, the UE shall, in case all SCells configured for UL in that band are released after handover completion, apply the value for the PCell instead of the corresponding value from SystemInformationBlockType2 or SystemInformationBlockType1. The UE requirements related to IE AdditionalSpectrumEmission are defined in TS 36.101 [42, table 6.2.4-1].</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>carrierBandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides the parameters Downlink bandwidth, and Uplink bandwidth, see TS 36.101 [42].</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>cipheringAlgorithmSCG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates the ciphering algorithm to be used for SCG DRBs. E-UTRAN includes the field upon SCG change when one or more SCG DRBs are configured. Otherwise E-UTRAN does not include the field.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>dl-Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter: Downlink bandwidth, see TS 36.101 [42].</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>drb-ContinueROHC</th>
</tr>
</thead>
<tbody>
<tr>
<td>This field indicates whether to continue or reset, for this handover, the header compression protocol context for the RLC UM bearers configured with the header compression protocol. Presence of the field indicates that the header compression protocol context continues while absence indicates that the header compression protocol context is reset. E-UTRAN includes the field only in case of a handover within the same eNB.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>rach-ConfigDedicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>The dedicated random access parameters. If absent the UE applies contention based random access as specified in TS 36.321 [6].</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1304</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timer T304 as described in section 7.3. ms50 corresponds with 50 ms, ms100 corresponds with 100 ms and so on. EUTRAN includes extended value ms10000-v1310 only when UE supports CE.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1307</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timer T307 as described in section 7.3. ms50 corresponds with 50 ms, ms100 corresponds with 100 ms and so on.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ul-Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter: Uplink bandwidth, see TS 36.101 [42, table 5.6-1]. For TDD, the parameter is absent and it is equal to downlink bandwidth. If absent for FDD, apply the same value as applies for the downlink bandwidth.</td>
</tr>
</tbody>
</table>

---

**MobilityParametersCDMA2000 (1xRTT)**

The MobilityParametersCDMA2000 contains the parameters provided to the UE for handover and (enhanced) CSFB to 1xRTT support, as defined in C.S0097 [53].

**MobilityParametersCDMA2000 information element**

```
-- ASN1START

MobilityParametersCDMA2000 ::= OCTET STRING

-- ASN1STOP
```
– MobilityStateParameters

The IE MobilityStateParameters contains parameters to determine UE mobility state.

**MobilityStateParameters information element**

```
-- ASN1START

MobilityStateParameters ::= SEQUENCE {
  t-Evaluation          ENUMERATED {
                            s30, s60, s120, s180, s240, spare3, spare2, spare1},
  t-HystNormal          ENUMERATED {
                            s30, s60, s120, s180, s240, spare3, spare2, spare1},
  n-CellChangeMedium    INTEGER (1..16),
  n-CellChangeHigh      INTEGER (1..16)
}

-- ASN1STOP
```

**MobilityStateParameters field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>n-CellChangeHigh</td>
<td>The number of cell changes to enter high mobility state. Corresponds to $N_{CR,H}$ in TS 36.304 [4].</td>
</tr>
<tr>
<td>n-CellChangeMedium</td>
<td>The number of cell changes to enter medium mobility state. Corresponds to $N_{CR,M}$ in TS 36.304 [4].</td>
</tr>
<tr>
<td>t-Evaluation</td>
<td>The duration for evaluating criteria to enter mobility states. Corresponds to $T_{CRmax}$ in TS 36.304 [4]. Value in seconds, s30 corresponds to 30 s and so on.</td>
</tr>
<tr>
<td>t-HystNormal</td>
<td>The additional duration for evaluating criteria to enter normal mobility state. Corresponds to $T_{CRmaxHyst}$ in TS 36.304 [4]. Value in seconds, s30 corresponds to 30 s and so on.</td>
</tr>
</tbody>
</table>

– MultiBandInfoList

**MultiBandInfoList information element**

```
MultiBandInfoList ::= SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicator

MultiBandInfoList-v9e0 ::= SEQUENCE (SIZE (1..maxMultiBands)) OF MultiBandInfo-v9e0

MultiBandInfoList-v10j0 ::= SEQUENCE (SIZE (1..maxMultiBands)) OF NS-PmaxList-r10
```
MultiBandInfoList-r11 ::= SEQUENCE (SIZE (1..maxMultiBands)) OF FreqBandIndicator-r11

MultiBandInfo-v9e0 ::= SEQUENCE {
  freqBandIndicator-v9e0    FreqBandIndicator-v9e0  OPTIONAL  -- Need OP
}

-- ASN1STOP

– NS-PmaxList

The IE NS-PmaxList concerns a list of additionalPmax and additionalSpectrumEmission as defined in TS 36.101 [42, table 6.2.4-1] for a given frequency band. E-UTRAN does not include the same value of additionalSpectrumEmission in SystemInformationBlockType2 within this list.

**NS-PmaxList information element**

-- ASN1START

NS-PmaxList-r10 ::= SEQUENCE (SIZE (1..maxNS-Pmax-r10)) OF NS-PmaxValue-r10

NS-PmaxValue-r10 ::= SEQUENCE {
  additionalPmax-r10     P-Max       OPTIONAL, -- Need OP
  additionalSpectrumEmission   AdditionalSpectrumEmission
}

-- ASN1STOP

– PhysCellId

The IE PhysCellId is used to indicate the physical layer identity of the cell, as defined in TS 36.211 [21].

**PhysCellId information element**

-- ASN1START

PhysCellId ::= INTEGER (0..503)

-- ASN1STOP
PhysCellIdRange

The IE *PhysCellIdRange* is used to encode either a single or a range of physical cell identities. The range is encoded by using a *start* value and by indicating the number of consecutive physical cell identities (including *start*) in the range. For fields comprising multiple occurrences of *PhysCellIdRange*, E-UTRAN may configure overlapping ranges of physical cell identities.

**PhysCellIdRange** information element

```
PhysCellIdRange ::= SEQUENCE {
  start        PhysCellId,
  range        ENUMERATED {
    n4, n8, n12, n16, n24, n32, n48, n64, n84,
    n96, n128, n168, n252, n504, spare2,
    spare1 } OPTIONAL -- Need OP
}
```

**PhysCellIdRange** field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>range</td>
<td>Indicates the number of physical cell identities in the range (including <em>start</em>). Value n4 corresponds with 4, n8 corresponds with 8 and so on. The UE shall apply value 1 in case the field is absent, in which case only the physical cell identity value indicated by <em>start</em> applies.</td>
</tr>
<tr>
<td>start</td>
<td>Indicates the lowest physical cell identity in the range.</td>
</tr>
</tbody>
</table>

PhysCellIdRangeUTRA-FDDList

The IE *PhysCellIdRangeUTRA-FDDList* is used to encode one or more of *PhysCellIdRangeUTRA-FDD*. While the IE *PhysCellIdRangeUTRA-FDD* is used to encode either a single physical layer identity or a range of physical layer identities, i.e. primary scrambling codes. Each range is encoded by using a *start* value and by indicating the number of consecutive physical cell identities (including *start*) in the range.

**PhysCellIdRangeUTRA-FDDList** information element

```
PhysCellIdRangeUTRA-FDDList-r9 ::= SEQUENCE (SIZE (1..maxPhysCellIdRange-r9)) OF PhysCellIdRangeUTRA-FDD-r9
```
```
PhysCellIdRangeUTRA-FDD-r9 ::= SEQUENCE {
  start-r9        PhysCellIdUTRA-FDD,
  range-r9        INTEGER (2..512) OPTIONAL -- Need OP
}
```
PhysCellIdRangeUTRA-FDDList field descriptions

| **range** | Indicates the number of primary scrambling codes in the range (including start). The UE shall apply value 1 in case the field is absent, in which case only the primary scrambling code value indicated by start applies. |
| **start** | Indicates the lowest primary scrambling code in the range. |

– PhysCellIdCDMA2000

The IE PhysCellIdCDMA2000 identifies the PNOffset that represents the "Physical cell identity" in CDMA2000.

**PhysCellIdCDMA2000 information element**

-- ASN1START

PhysCellIdCDMA2000 ::= INTEGER (0..maxPNOffset)

-- ASN1STOP

– PhysCellIdGERAN

The IE PhysCellIdGERAN contains the Base Station Identity Code (BSIC).

**PhysCellIdGERAN information element**

-- ASN1START

PhysCellIdGERAN ::= SEQUENCE {
  networkColourCode BIT STRING (SIZE (3)),
  baseStationColourCode BIT STRING (SIZE (3))
}

-- ASN1STOP

**PhysCellIdGERAN field descriptions**

| **baseStationColourCode** | Base station Colour Code as defined in TS 23.003 [27]. |
| **networkColourCode** | Network Colour Code as defined in TS 23.003 [27]. |
-- PhysCellIdUTRA-FDD

The IE *PhysCellIdUTRA-FDD* is used to indicate the physical layer identity of the cell, i.e. the primary scrambling code, as defined in TS 25.331 [19].

*PhysCellIdUTRA-FDD information element*

```
-- ASN1START

PhysCellIdUTRA-FDD ::= INTEGER (0..511)

-- ASN1STOP
```

-- PhysCellIdUTRA-TDD

The IE *PhysCellIdUTRA-TDD* is used to indicate the physical layer identity of the cell, i.e. the cell parameters ID (TDD), as specified in TS 25.331 [19]. Also corresponds to the Initial Cell Parameter Assignment in TS 25.223 [46].

*PhysCellIdUTRA-TDD information element*

```
-- ASN1START

PhysCellIdUTRA-TDD ::= INTEGER (0..127)

-- ASN1STOP
```

-- PLMN-Identity

The IE *PLMN-Identity* identifies a Public Land Mobile Network. Further information regarding how to set the IE are specified in TS 23.003 [27].

*PLMN-Identity information element*

```
-- ASN1START

PLMN-Identity ::= SEQUENCE {
    mcc         MCC     OPTIONAL,  -- Cond MCC
    mnc          MNC
}

MCC ::= SEQUENCE (SIZE (3)) OF MCC-MNC-Digit

MNC ::= SEQUENCE (SIZE (2..3)) OF
```
**MCC-MNC-Digit**

MCC-MNC-Digit ::= INTEGER (0..9)

---

### PLMN-Identity field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>mcc</strong></td>
<td>The first element contains the first MCC digit, the second element the second MCC digit and so on. If the field is absent, it takes the same value as the mcc of the immediately preceding IE PLMN-Identity. See TS 23.003 [27].</td>
</tr>
<tr>
<td><strong>mnc</strong></td>
<td>The first element contains the first MNC digit, the second element the second MNC digit and so on. See TS 23.003 [27].</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MCC</strong></td>
<td>This IE is mandatory when PLMN-Identity is included in CellGlobalIdEUTRA, in CellGlobalIdUTRA, in CellGlobalIdGERAN or in RegisteredMME. This IE is also mandatory in the first occurrence of the IE PLMN-Identity within the IE PLMN-IdentityList. Otherwise it is optional, need OP.</td>
</tr>
</tbody>
</table>

---

**PLMN-IdentityList3**

Includes a list of PLMN identities.

### PLMN-IdentityList3 information element

---

PLMN-IdentityList3-r11 ::= SEQUENCE (SIZE (1..16)) OF PLMN-Identity

---

**PreRegistrationInfoHRPD**

---

PreRegistrationInfoHRPD ::= SEQUENCE {
  preRegistrationAllowed BOOLEAN,
  preRegistrationZoneId PreRegistrationZoneIdHRPD OPTIONAL, -- cond PreRegAllowed
  secondaryPreRegistrationZoneIdList SecondaryPreRegistrationZoneIdListHRPD OPTIONAL -- Need OR
}

SecondaryPreRegistrationZoneIdListHRPD ::= SEQUENCE (SIZE (1..2)) OF PreRegistrationZoneIdHRPD
PreRegistrationZoneIdHRPD ::= INTEGER (0..255)

-- ASN1STOP

**PreRegistrationInfoHRPD field descriptions**

- **preRegistrationAllowed**
  TRUE indicates that a UE shall perform a CDMA2000 HRPD pre-registration if the UE does not have a valid / current pre-registration. FALSE indicates that the UE is not allowed to perform CDMA2000 HRPD pre-registration in the current cell.

- **preRegistrationZoneID**
  ColorCode (see C.S0024 [26], C.S0087 [44]) of the CDMA2000 Reference Cell corresponding to the HRPD sector under the HRPD AN that is configured for this LTE cell. It is used to control when the UE should register or re-register.

- **secondaryPreRegistrationZoneIdList**
  List of SecondaryColorCodes (see C.S0024 [26], C.S0087 [44]) of the CDMA2000 Reference Cell corresponding to the HRPD sector under the HRPD AN that is configured for this LTE cell. They are used to control when the UE should re-register.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>PreRegAllowed</td>
<td>The field is mandatory if the preRegistrationAllowed is set to true. Otherwise, the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>

-- Q-QualMin

The IE Q-QualMin is used to indicate for cell selection/ re-selection the required minimum received RSRQ level in the (E-UTRA) cell. Corresponds to parameter Q\textsubscript{qualmin} in TS 36.304 [4]. Actual value $Q_{\text{qualmin}} = \text{field value} \ [\text{dB}]$.

**Q-QualMin information element**

-- ASN1START

Q-QualMin-r9 ::= INTEGER (-34..-3)

-- ASN1STOP

-- Q-RxLevMin

The IE Q-RxLevMin is used to indicate for cell selection/ re-selection the required minimum received RSRP level in the (E-UTRA) cell. Corresponds to parameter $Q_{\text{rxlevmin}}$ in TS 36.304 [4]. Actual value $Q_{\text{rxlevmin}} = \text{field value} \times 2 \ [\text{dBm}]$.

**Q-RxLevMin information element**

-- ASN1START

Q-RxLevMin ::= INTEGER (-70..-22)

-- ASN1STOP
Q-OffsetRange

The IE *Q-OffsetRange* is used to indicate a cell, CSI-RS resource or frequency specific offset to be applied when evaluating candidates for cell re-selection or when evaluating triggering conditions for measurement reporting. The value in dB. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.

### Q-OffsetRange information element

```plaintext
Q-OffsetRange ::= ENUMERATED {
  dB-24, dB-22, dB-20, dB-18, dB-16, dB-14,
  dB-12, dB-10, dB-8, dB-6, dB-5, dB-4, dB-3,
  dB-2, dB-1, dB0, dB1, dB2, dB3, dB4, dB5,
  dB6, dB8, dB10, dB12, dB14, dB16, dB18,
  dB20, dB22, dB24
}
```

Q-OffsetRangeInterRAT

The IE *Q-OffsetRangeInterRAT* is used to indicate a frequency specific offset to be applied when evaluating triggering conditions for measurement reporting. The value in dB.

### Q-OffsetRangeInterRAT information element

```plaintext
Q-OffsetRangeInterRAT ::= INTEGER (-15..15)
```

ReselectionThreshold

The IE *ReselectionThreshold* is used to indicate an Rx level threshold for cell reselection. Actual value of threshold = field value * 2 [dB].

### ReselectionThreshold information element

```plaintext
ReselectionThreshold ::= INTEGER (0..31)
```
- **ReselectionThresholdQ**

The IE *ReselectionThresholdQ* is used to indicate a quality level threshold for cell reselection. Actual value of threshold = field value [dB].

**ReselectionThresholdQ information element**

```
-- ASN1START

ReselectionThresholdQ-r9 ::= INTEGER (0..31)

-- ASN1STOP
```

- **SCellIndex**

The IE *SCellIndex* concerns a short identity, used to identify an SCell.

**SCellIndex information element**

```
-- ASN1START

SCellIndex-r10 ::= INTEGER (1..7)
SCellIndex-r13 ::= INTEGER (1..31)

-- ASN1STOP
```

- **ServCellIndex**

The IE *ServCellIndex* concerns a short identity, used to identify a serving cell (i.e. the PCell or an SCell). Value 0 applies for the PCell, while the *SCellIndex* that has previously been assigned applies for SCells.

**ServCellIndex information element**

```
-- ASN1START

ServCellIndex-r10 ::= INTEGER (0..7)
ServCellIndex-r13 ::= INTEGER (0..31)

-- ASN1STOP
```
SpeedStateScaleFactors
The IE *SpeedStateScaleFactors* concerns factors, to be applied when the UE is in medium or high speed state, used for scaling a mobility control related parameter.

**SpeedStateScaleFactors** information element

```
ASNISTART

SpeedStateScaleFactors ::= SEQUENCE {
  sf-Medium       ENUMERATED {oDot25, oDot5, oDot75, lDot0},
  sf-High         ENUMERATED {oDot25, oDot5, oDot75, lDot0}
}
ASNISTOP
```

**SpeedStateScaleFactors** field descriptions

- **sf-High**
The concerned mobility control related parameter is multiplied with this factor if the UE is in High Mobility state as defined in TS 36.304 [4]. Value oDot25 corresponds to 0.25, oDot5 corresponds to 0.5, oDot75 corresponds to 0.75 and so on.

- **sf-Medium**
The concerned mobility control related parameter is multiplied with this factor if the UE is in Medium Mobility state as defined in TS 36.304 [4]. Value oDot25 corresponds to 0.25, oDot5 corresponds to 0.5, oDot75 corresponds to 0.75 and so on.

SystemInfoListGERAN
The IE *SystemInfoListGERAN* contains system information of a GERAN cell.

**SystemInfoListGERAN** information element

```
ASNISTART

SystemInfoListGERAN ::= SEQUENCE (SIZE (1..maxGERAN-SI)) OF
  OCTET STRING (SIZE (1..23))
ASNISTOP
```

**SystemInfoListGERAN** field descriptions

*SystemInfoListGERAN*
Each OCTET STRING contains one System Information (SI) message as defined in TS 44.018 [45, table 9.1.1] excluding the L2 Pseudo Length, the RR management Protocol Discriminator and the Skip Indicator or a complete Packet System Information (PSI) message as defined in TS 44.060 [36, table 11.2.1].

SystemTimeInfoCDMA2000
The IE *SystemTimeInfoCDMA2000* informs the UE about the absolute time in the current cell. The UE uses this absolute time knowledge to derive the CDMA2000 Physical cell identity, expressed as PNOffset, of neighbour CDMA2000 cells.
NOTE: The UE needs the CDMA2000 system time with a certain level of accuracy for performing measurements as well as for communicating with the CDMA2000 network (HRPD or 1xRTT).

SystemTimeInfoCDMA2000 information element

-- ASN1START

SystemTimeInfoCDMA2000 ::= SEQUENCE {
cdma-EUTRA-Synchronisation BOOLEAN,
cdma-SystemTime CHOICE {
synchronousSystemTime BIT STRING (SIZE (39)),
asynchronousSystemTime BIT STRING (SIZE (49))
}
}

-- ASN1STOP

SystemTimeInfoCDMA2000 field descriptions

asynchronousSystemTime
The CDMA2000 system time corresponding to the SFN boundary at or after the ending boundary of the SI-Window in which SystemInformationBlockType8 is transmitted. E-UTRAN includes this field if the E-UTRA frame boundary is not aligned to the start of CDMA2000 system time. This field size is 49 bits and the unit is 8 CDMA chips based on 1.2288 Mcps.

cdma-EUTRA-Synchronisation
TRUE indicates that there is no drift in the timing between E-UTRA and CDMA2000. FALSE indicates that the timing between E-UTRA and CDMA2000 can drift. NOTE 1

NOTE 1: The following table shows the recommended combinations of the cdma-EUTRA-Synchronisation field and the choice of cdma-SystemTime included by E-UTRAN for FDD and TDD:

<table>
<thead>
<tr>
<th>FDD/TDD</th>
<th>cdma-EUTRA-Synchronisation</th>
<th>synchronousSystemTime</th>
<th>asynchronousSystemTime</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDD</td>
<td>FALSE</td>
<td>Not Recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>FDD</td>
<td>TRUE</td>
<td>Recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>TDD</td>
<td>FALSE</td>
<td>Not Recommended</td>
<td>Recommended</td>
</tr>
<tr>
<td>TDD</td>
<td>TRUE</td>
<td>Recommended</td>
<td>Recommended</td>
</tr>
</tbody>
</table>

TrackingAreaCode

The IE TrackingAreaCode is used to identify a tracking area within the scope of a PLMN, see TS 24.301 [35].

TrackingAreaCode information element

-- ASN1START
TrackingAreaCode ::= BIT STRING (SIZE (16))

-- ASN1STOP

– T-Reselection

The IE T-Reselection concerns the cell reselection timer Treselection\textsubscript{RAT} for E-UTRA, UTRA, GERAN or CDMA2000. Value in seconds. For value 0, behaviour as specified in 7.3.2 applies.

\textit{T-Reselection} information element

-- ASN1START

T-Reselection ::= INTEGER (0..7)

-- ASN1STOP

– T-Reselection\textsubscript{EUTRA-CE}

The IE T-Reselection\textsubscript{EUTRA-CE} concerns the cell reselection timer Treselection\textsubscript{EUTRA-CE} as specified in TS 36.304 [4]. Value in seconds. For value 0, behaviour as specified in 7.3.2 applies.

\textit{T-Reselection\textsubscript{EUTRA-CE}} information element

-- ASN1START

T-Reselection\textsubscript{EUTRA-CE-r13} ::= INTEGER (0..15)

-- ASN1STOP

6.3.5 Measurement information elements

– AllowedMeasBandwidth

The IE AllowedMeasBandwidth is used to indicate the maximum allowed measurement bandwidth on a carrier frequency as defined by the parameter Transmission Bandwidth Configuration "N_{RB}" TS 36.104 [47]. The values mbw6, mbw15, mbw25, mbw50, mbw75, mbw100 indicate 6, 15, 25, 50, 75 and 100 resource blocks respectively.

\textit{AllowedMeasBandwidth} information element

-- ASN1START

AllowedMeasBandwidth ::= ENUMERATED {mbw6, mbw15, mbw25, mbw50, mbw75, mbw100}
CSI-RSRP-Range

The IE CSI-RSRP-Range specifies the value range used in CSI-RSRP measurements and thresholds. Integer value for CSI-RSRP measurements according to mapping table in TS 36.133 [16].

**CSI-RSRP-Range information element**

```asn1
CSI-RSRP-Range-r12 ::= INTEGER(0..97)
```

Hysteresis

The IE Hysteresis is a parameter used within the entry and leave condition of an event triggered reporting condition. The actual value is field value * 0.5 dB.

**Hysteresis information element**

```asn1
Hysteresis ::= INTEGER (0..30)
```

LocationInfo

The IE LocationInfo is used to transfer detailed location information available at the UE to correlate measurements and UE position information.

**LocationInfo information element**

```asn1
LocationInfo-r10 ::= SEQUENCE {
  locationCoordinates-r10 CHOICE {
    ellipsoid-Point-r10 OCTET STRING,
    ellipsoidPointWithAltitude-r10 OCTET STRING,
    ...
  }
}
```
ellipsoidPointWithUncertaintyCircle-r11  OCTET STRING,
ellipsoidPointWithUncertaintyEllipse-r11 OCTET STRING,
ellipsoidPointWithAltitudeAndUncertaintyEllipsoid-r11 OCTET STRING,
ellipsoidArc-r11          OCTET STRING,
polygon-r11            OCTET STRING
},
horizontalVelocity-r10  OCTET STRING OPTIONAL,
gnss-TOD-msec-r10      OCTET STRING OPTIONAL,
...

-- ASN1STOP

<table>
<thead>
<tr>
<th><strong>LocationInfo field descriptions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ellipsoidArc</strong></td>
</tr>
<tr>
<td>Parameter EllipsoidArc defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.</td>
</tr>
<tr>
<td><strong>ellipsoid-Point</strong></td>
</tr>
<tr>
<td>Parameter Ellipsoid-Point defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.</td>
</tr>
<tr>
<td><strong>ellipsoidPointWithAltitude</strong></td>
</tr>
<tr>
<td>Parameter EllipsoidPointWithAltitude defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.</td>
</tr>
<tr>
<td><strong>ellipsoidPointWithAltitudeAndUncertaintyEllipsoid</strong></td>
</tr>
<tr>
<td>Parameter EllipsoidPointWithAltitudeAndUncertaintyEllipsoid defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.</td>
</tr>
<tr>
<td><strong>ellipsoidPointWithUncertaintyCircle</strong></td>
</tr>
<tr>
<td>Parameter EllipsoidPointWithUncertaintyCircle defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.</td>
</tr>
<tr>
<td><strong>ellipsoidPointWithUncertaintyEllipse</strong></td>
</tr>
<tr>
<td>Parameter EllipsoidPointWithUncertaintyEllipse defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.</td>
</tr>
<tr>
<td><strong>gnss-TOD-msec</strong></td>
</tr>
<tr>
<td>Parameter Gnss-TOD-msec defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.</td>
</tr>
<tr>
<td><strong>horizontalVelocity</strong></td>
</tr>
<tr>
<td>Parameter HorizontalVelocity defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.</td>
</tr>
<tr>
<td><strong>polygon</strong></td>
</tr>
<tr>
<td>Parameter Polygon defined in TS36.355 [54]. The first/leftmost bit of the first octet contains the most significant bit.</td>
</tr>
</tbody>
</table>

---

**MBSFN-RSRQ-Range**

The IE **MBSFN-RSRQ-Range** specifies the value range used in MBSFN RSRQ measurements. Integer value for MBSFN RSRQ measurements according to mapping table in TS 36.133 [16].

**MBSFN-RSRQ-Range** information element

---

MBSFN-RSRQ-Range-r12 ::= INTEGER(0..31)
The IE *MeasConfig* specifies measurements to be performed by the UE, and covers intra-frequency, inter-frequency and inter-RAT mobility as well as configuration of measurement gaps.

**MeasConfig information element**

```
MeasConfig ::= SEQUENCE {
  -- Measurement objects
  measObjectToRemoveList   MeasObjectToRemoveList   OPTIONAL, -- Need ON
  measObjectToAddModList   MeasObjectToAddModList   OPTIONAL, -- Need ON
  -- Reporting configurations
  reportConfigToRemoveList  ReportConfigToRemoveList  OPTIONAL, -- Need ON
  reportConfigToAddModList  ReportConfigToAddModList  OPTIONAL, -- Need ON
  -- Measurement identities
  measIdToRemoveList      MeasIdToRemoveList      OPTIONAL, -- Need ON
  measIdToAddModList      MeasIdToAddModList      OPTIONAL, -- Need ON
  -- Other parameters
  quantityConfig          QuantityConfig          OPTIONAL, -- Need ON
  measGapConfig           MeasGapConfig           OPTIONAL, -- Need ON
  s-Measure               RSRP-Range              OPTIONAL, -- Need ON
  preRegistrationInfoHRPD PreRegistrationInfoHRPD OPTIONAL, -- Need OP
  speedStatePars          CHOICE {
    release    NULL,
    setup      SEQUENCE {
      mobilityStateParameters MobilityStateParameters,
      timeToTrigger-SF      SpeedStateScaleFactors
    }
  },
  ....
  [[ measObjectToAddModList-v9e0 MeasObjectToAddModList-v9e0 OPTIONAL -- Need ON ]],
  [[ allowInterruptions-r11 BOOLEAN OPTIONAL -- Need ON ]],
}
```
measScaleFactor-r12  CHOICE {
  release NULL,
  setup MeasScaleFactor-r12
}

measIdToRemoveListExt-r12  MeasIdToRemoveListExt-r12  OPTIONAL, -- Need ON
measIdToAddModListExt-r12  MeasIdToAddModListExt-r12  OPTIONAL, -- Need ON
measRSRQ-OnAllSymbols-r12  BOOLEAN  OPTIONAL -- Need ON

measObjectToRemoveListExt-r13  MeasObjectToRemoveListExt-r13 OPTIONAL, -- Need ON
measObjectToAddModListExt-r13  MeasObjectToAddModListExt-r13 OPTIONAL, -- Need ON
measIdToAddModList-v1310  MeasIdToAddModList-v1310  OPTIONAL, -- Need ON
measIdToAddModListExt-v1310  MeasIdToAddModListExt-v1310  OPTIONAL -- Need ON

MeasIdToRemoveList :=  SEQUENCE (SIZE (1..maxMeasId)) OF MeasId

MeasIdToRemoveListExt-r12 :=  SEQUENCE (SIZE (1..maxMeasId)) OF MeasId-v1250

MeasObjectToRemoveList :=  SEQUENCE (SIZE (1..maxObjectId)) OF MeasObjectId

MeasObjectToRemoveListExt-r13 :=  SEQUENCE (SIZE (1..maxObjectId)) OF MeasObjectId-v1310

ReportConfigToRemoveList :=  SEQUENCE (SIZE (1..maxReportConfigId)) OF ReportConfigId

-- ASN1STOP
**MeasConfig field descriptions**

**allowInterruptions**
Value TRUE indicates that the UE is allowed to cause interruptions to serving cells when performing measurements of deactivated SCell carriers for `measCycleSCell` of less than 640ms, as specified in TS 36.133 [16]. E-UTRAN enables this field only when an SCell is configured.

**measGapConfig**
Used to setup and release measurement gaps.

**measIdToAddModList**
List of measurement identities. Field `measIdToAddModListExt` includes additional measurement identities i.e. extends the size of the measurement identity list using the general principles specified in 5.1.2. If E-UTRAN includes `measIdToAddModList-v1310` it includes the same number of entries, and listed in the same order, as in `measIdToAddModList` (i.e. without suffix). If E-UTRAN includes `measIdToAddModListExt-v1310`, it includes the same number of entries, and listed in the same order, as in `measIdToAddModListExt-r12`.

**measIdToRemoveList**
List of measurement identities to remove. Field `measIdToRemoveListExt` includes additional measurement identities i.e. extends the size of the measurement identity list using the general principles specified in 5.1.2.

**measObjectToAddModList**
If E-UTRAN includes `measObjectToAddModList-v9e0` it includes the same number of entries, and listed in the same order, as in `measObjectToAddModList` (i.e. without suffix). Field `measObjectToAddModListExt` includes additional measurement object identities i.e. extends the size of the measurement object identity list using the general principles specified in 5.1.2.

**measObjectToRemoveList**
List of measurement objects to remove. Field `measObjectToRemoveListExt` includes additional measurement object identities i.e. extends the size of the measurement object identity list using the general principles specified in 5.1.2.

**measRSRQ-OnAllSymbols**
Value TRUE indicates that the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols in accordance with TS 36.214 [48]. If `widebandRSRQ-Meas` is enabled for the frequency in `MeasObjectEUTRA`, the UE shall, when performing RSRQ measurements, perform RSRQ measurement on all OFDM symbols with wider bandwidth for concerned frequency in accordance with TS 36.214 [48].

**measScaleFactor**
Even if `reducedMeasPerformance` is not included in any `measObjectEUTRA` or `measObjectUTRA`, E-UTRAN may configure this field. The UE behavior is specified in TS 36.133 [16].

**preRegistrationInfoHRPD**
The CDMA2000 HRPD Pre-Registration Information tells the UE if it should pre-register with the CDMA2000 HRPD network and identifies the Pre-registration zone to the UE.

**reportConfigToRemoveList**
List of measurement reporting configurations to remove.

**s-Measure**
PCell quality threshold controlling whether or not the UE is required to perform measurements of intra-frequency, inter-frequency and inter-RAT neighbouring cells. Value '0' indicates to disable s-Measure.

**timeToTrigger-SF**
The `timeToTrigger` in `ReportConfigEUTRA` and in `ReportConfigInterRAT` are multiplied with the scaling factor applicable for the UE's speed state.

---

**MeasDS-Config**

The IE `MeasDS-Config` specifies information applicable for discovery signals measurement.

**MeasDS-Config information elements**

---

`-- ASN1START`

MeasDS-Config-r12 ::= CHOICE {
    release NULL,
    setup SEQUENCE {
        dmtc-PeriodOffset-r12 CHOICE {
            ms40-r12 INTEGER(0..39),
            ms80-r12 INTEGER(0..79),
        }
    }
}`

`-- ASN1END`
ms160-r12 INTEGER(0..159),
...
},
ds-OccasionDuration-r12 CHOICE {
durationFDD-r12 INTEGER(1..maxDS-Duration-r12),
durationTDD-r12 INTEGER(2..maxDS-Duration-r12)
},
measCSI-RS-ToRemoveList-r12 MeasCSI-RS-ToRemoveList-r12 OPTIONAL, -- Need ON
measCSI-RS-ToAddModList-r12 MeasCSI-RS-ToAddModList-r12 OPTIONAL, -- Need ON
...
}

MeasCSI-RS-ToRemoveList-r12 ::= SEQUENCE (SIZE (1..maxCSI-RS-Meas-r12)) OF MeasCSI-RS-Id-r12

MeasCSI-RS-ToAddModList-r12 ::= SEQUENCE (SIZE (1..maxCSI-RS-Meas-r12)) OF MeasCSI-RS-Config-r12

MeasCSI-RS-Id-r12 ::= INTEGER (1..maxCSI-RS-Meas-r12)

MeasCSI-RS-Config-r12 ::= SEQUENCE {
  measCSI-RS-Id-r12 MeasCSI-RS-Id-r12,
  physCellId-r12 INTEGER (0..503),
  scramblingIdentity-r12 INTEGER (0..503),
  resourceConfig-r12 INTEGER (0..31),
  subframeOffset-r12 INTEGER (0..4),
  csi-RS-IndividualOffset-r12 Q-OffsetRange,
  ...
}

-- ASN1STOP
<table>
<thead>
<tr>
<th><strong>MeasDS-Config field descriptions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>csi-RS-IndividualOffset</strong></td>
</tr>
<tr>
<td>CSI-RS individual offset applicable to a specific CSI-RS resource. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.</td>
</tr>
<tr>
<td><strong>dmtc-PeriodOffset</strong></td>
</tr>
<tr>
<td>Indicates the discovery signals measurement timing configuration (DMTC) periodicity (dmtc-Periodicity) and offset (dmtc-Offset) for this frequency. For DMTC periodicity, value ms40 corresponds to 40ms, ms80 corresponds to 80ms and so on. The value of DMTC offset is in number of subframe(s). The duration of a DMTC occasion is 6ms.</td>
</tr>
<tr>
<td><strong>ds-OccasionDuration</strong></td>
</tr>
<tr>
<td>Indicates the duration of discovery signal occasion for this frequency. Discovery signal occasion duration is common for all cells transmitting discovery signals on one frequency. The UE shall ignore the field ds-OccasionDuration for a carrier frequency with a configured LAA SCell and apply a value 1 instead.</td>
</tr>
<tr>
<td><strong>measCSI-RS-ToAddModList</strong></td>
</tr>
<tr>
<td>List of CSI-RS resources to add/modify in the CSI-RS resource list for discovery signals measurement.</td>
</tr>
<tr>
<td><strong>measCSI-RS-ToRemoveList</strong></td>
</tr>
<tr>
<td>List of CSI-RS resources to remove from the CSI-RS resource list for discovery signals measurement.</td>
</tr>
<tr>
<td><strong>physCellId</strong></td>
</tr>
<tr>
<td>Indicates the physical cell identity where UE may assume that the CSI-RS and the PSS/SSS/CRS corresponding to the indicated physical cell identity are quasi co-located with respect to average delay and doppler shift.</td>
</tr>
<tr>
<td><strong>resourceConfig</strong></td>
</tr>
<tr>
<td>Parameter: CSI reference signal configuration, see TS 36.211 [21, table 6.10.5.2-1 and 6.10.5.2-2]. For a carrier frequency with a configured LAA SCell, E-UTRAN does not configure the values {0, 4, 5, 9, 10, 11, 18, 19}.</td>
</tr>
<tr>
<td><strong>scramblingIdentity</strong></td>
</tr>
<tr>
<td>Parameter: Pseudo-random sequence generator parameter, $h_{ID}$, see TS 36.213 [23, 7.2.5].</td>
</tr>
<tr>
<td><strong>subframeOffset</strong></td>
</tr>
<tr>
<td>Indicates the subframe offset between SSS of the cell indicated by physCellId and the CSI-RS resource in a discovery signal occasion. The field subframeOffset is set to values 0 for a carrier frequency with a configured LAA SCell.</td>
</tr>
</tbody>
</table>

---

**MeasGapConfig**

The IE MeasGapConfig specifies the measurement gap configuration and controls setup/release of measurement gaps.

**MeasGapConfig information element**

```asn1
MeasGapConfig ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    gapOffset CHOICE {
      gp0 INTEGER (0..39),
      gp1 INTEGER (0..79),
      ...
    }
  }
}
```

---
### MeasGapConfig field descriptions

**gapOffset**

Value `gapOffset` of `gp0` corresponds to gap offset of Gap Pattern Id ‘0’ with MGRP = 40ms, `gapOffset` of `gp1` corresponds to gap offset of Gap Pattern Id ‘1’ with MGRP = 80ms. Also used to specify the measurement gap pattern to be applied, as defined in TS 36.133 [16].

---

**MeasId**

The IE *MeasId* is used to identify a measurement configuration, i.e., linking of a measurement object and a reporting configuration.

#### MeasId information element

```asn
MeasId ::= INTEGER (1..maxMeasId)
MeasId-v1250 ::= INTEGER (maxMeasId-Plus1..maxMeasId-r12)
```

---

**MeasIdToAddModList**

The IE *MeasIdToAddModList* concerns a list of measurement identities to add or modify, with for each entry the *measId*, the associated *measObjectId* and the associated *reportConfigId*. Field *MeasIdToAddModListExt* includes additional measurement identities i.e. extends the size of the measurement identity list using the general principles specified in 5.1.2.

#### MeasIdToAddModList information element

```asn
MeasIdToAddModList ::= SEQUENCE (SIZE (1..maxMeasId)) OF MeasIdToAddMod
MeasIdToAddModList-v1310 ::= SEQUENCE (SIZE (1..maxMeasId)) OF MeasIdToAddMod-v1310
MeasIdToAddModListExt-r12 ::= SEQUENCE (SIZE (1..maxMeasId)) OF MeasIdToAddModExt-r12
MeasIdToAddModListExt-v1310 ::= SEQUENCE (SIZE (1..maxMeasId)) OF MeasIdToAddMod-v1310

MeasIdToAddMod ::= SEQUENCE {
    measId        MeasId,
    measObjectId      MeasObjectId,
    reportConfigId      ReportConfigId
}
MeasIdToAddModExt-r12 ::= SEQUENCE {
 _measId-v1250       MeasId-v1250,
  measObjectId-r12    MeasObjectId,
  reportConfigId-r12  ReportConfigId
}

MeasIdToAddMod-v1310 ::= SEQUENCE {
  measObjectId-v1310  MeasObjectId-v1310  OPTIONAL
}

MeasIdToAddModList field descriptions

measObjectId

If the measObjectId-v1310 is included, the measObjectId or measObjectId-r12 is ignored by the UE.

MeasObjectCDMA2000

The IE MeasObjectCDMA2000 specifies information applicable for inter-RAT CDMA2000 neighbouring cells.

MeasObjectCDMA2000 information element

MeasObjectCDMA2000 ::= SEQUENCE {
  cdma2000-Type         CDMA2000-Type,
  carrierFreq           CarrierFreqCDMA2000,
  searchWindowSize      INTEGER (0..15) OPTIONAL, -- Need ON
  offsetFreq            Q-OffsetRangeInterRAT DEFAULT 0,
  cellsToRemoveList     CellIndexList OPTIONAL, -- Need ON
  cellsToAddModList     CellsToAddModListCDMA2000 OPTIONAL, -- Need ON
  cellForWhichToReportCGI PhysCellIdCDMA2000 OPTIONAL, -- Need ON
  ...
}

CellsToAddModListCDMA2000 ::= SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddModCDMA2000
CellsToAddModCDMA2000 ::= SEQUENCE {
    cellIndex       INTEGER (1..maxCellMeas),
    physCellId       PhysCellIdCDMA2000
}

-- ASN1STOP

MeasObjectCDMA2000 field descriptions

**carrierInfo**
Identifies CDMA2000 carrier frequency for which this configuration is valid.

**cdma2000-Type**
The type of CDMA2000 network: CDMA2000 1xRTT or CDMA2000 HRPD.

**cellIndex**
Enter index in the neighbouring cell list.

**cellsToAddModList**
List of cells to add/modify in the neighbouring cell list.

**cellsToRemoveList**
List of cells to remove from the neighbouring cell list.

**physCellId**
CDMA2000 Physical cell identity of a cell in neighbouring cell list expressed as PNOffset.

**searchWindowSize**
Provides the search window size to be used by the UE for the neighbouring pilot, see C.S0005 [25].

---

MeasObjectEUTRA

The IE MeasObjectEUTRA specifies information applicable for intra-frequency or inter-frequency E-UTRA cells.

MeasObjectEUTRA information element

-- ASN1START

MeasObjectEUTRA ::= SEQUENCE {
    carrierFreq       ARFCN-ValueEUTRA,
    allowedMeasBandwidth    AllowedMeasBandwidth,
    presenceAntennaPort1    PresenceAntennaPort1,
    neighCellConfig       NeighCellConfig,
    offsetFreq       Q-OffsetRange    DEFAULT dB0,
-- Cell list
    cellsToRemoveList     CellIndexList    OPTIONAL,  -- Need ON
    cellsToAddModList     CellsToAddModList   OPTIONAL,  -- Need ON

-- Black list
    blackCellsToRemoveList    CellIndexList       OPTIONAL,  -- Need ON
    blackCellsToAddModList    BlackCellsToAddModList  OPTIONAL,  -- Need ON
    cellForWhichToReportCGI    PhysCellId     OPTIONAL,  -- Need ON

   -- ASN1STOP
MeasCycleSCell-r10 MeasCycleSCell-r10 OPTIONAL, -- Need ON
measSubframePatternConfigNeigh-r10 MeasSubframePatternConfigNeigh-r10 OPTIONAL
-- Need ON
]
[[widebandRSRQ-Meas-r11 BOOLEAN OPTIONAL -- Cond WB-RSRQ
]
[[altTTT-CellsToRemoveList-r12 CellIndexList OPTIONAL, -- Need ON
altTTT-CellsToAddModList-r12 AltTTT-CellsToAddModList-r12 OPTIONAL, -- Need ON
t312-r12 CHOICE {
    release NULL,
    setup ENUMERATED {ms0, ms50, ms100, ms200,
    ms300, ms400, ms500, ms1000}
} OPTIONAL, -- Need ON
reducedMeasPerformance-r12 BOOLEAN OPTIONAL, -- Need ON
measDS-Config-r12 MeasDS-Config-r12 OPTIONAL -- Need ON
]
[[
    whiteCellsToRemoveList-r13 CellIndexList OPTIONAL, -- Need ON
    whiteCellsToAddModList-r13 WhiteCellsToAddModList-r13 OPTIONAL, -- Need ON
    rmtc-Config-r13 RMTC-Config-r13 OPTIONAL, -- Need ON
    carrierFreq-r13 ARFCN-ValueEUTRA-v9e0 OPTIONAL -- Need ON
]
}
MeasObjectEUTRA-v9e0 ::= SEQUENCE {
carrierFreq-v9e0 ARFCN-ValueEUTRA-v9e0
}
CellsToAddModList ::= SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddMod

CellsToAddMod ::= SEQUENCE {
cellIndex INTEGER (1..maxCellMeas),
physCellId PhysCellId,
cellIndividualOffset Q-OffsetRange
BlackCellsToAddModList ::= SEQUENCE (SIZE (1..maxCellMeas)) OF BlackCellsToAddMod

BlackCellsToAddMod ::= SEQUENCE {
  cellIndex       INTEGER (1..maxCellMeas),
  physCellIdRange      PhysCellIdRange
}

MeasCycleSCell-r10 ::= ENUMERATED {sf160, sf256, sf320, sf512, sf640, sf1024, sf1280, spare1}

MeasSubframePatternConfigNeigh-r10 ::= CHOICE {
  release          NULL,
  setup          SEQUENCE {
    measSubframePatternNeigh-r10   MeasSubframePattern-r10,
    measSubframeCellList-r10    MeasSubframeCellList-r10 OPTIONAL -- Cond always
  }
}

MeasSubframeCellList-r10 ::= SEQUENCE (SIZE (1..maxCellMeas)) OF PhysCellIdRange

AltTTT-CellsToAddModList-r12 ::= SEQUENCE (SIZE (1..maxCellMeas)) OF AltTTT-CellsToAddMod-r12

AltTTT-CellsToAddMod-r12 ::= SEQUENCE {
  cellIndex-r12       INTEGER (1..maxCellMeas),
  physCellIdRange-r12      PhysCellIdRange
}

WhiteCellsToAddModList-r13 ::= SEQUENCE (SIZE (1..maxCellMeas)) OF WhiteCellsToAddMod-r13

WhiteCellsToAddMod-r13 ::= SEQUENCE {
  cellIndex-r13       INTEGER (1..maxCellMeas),
  physCellIdRange-r13      PhysCellIdRange
}
RMTC-Config-r13 ::= CHOICE {
  release NULL,
  setup SEQUENCE {
    rmtc-Period-r13 ENUMERATED {ms40, ms80, ms160, ms320, ms640},
    rmtc-SubframeOffset-r13 INTEGER(0..639) OPTIONAL, -- Need ON
    measDuration-r13 ENUMERATED {sym1, sym14, sym28, sym42, sym70},
    ...
  }
}

-- ASN1STOP
### MeasObjectEUTRA field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>altTTT-CellsToAddModList</strong></td>
<td>List of cells to add/modify in the cell list for which the alternative time to trigger specified by alternativeTimeToTrigger in reportConfigEUTRA, if configured, applies.</td>
</tr>
<tr>
<td><strong>altTTT-CellsToRemoveList</strong></td>
<td>List of cells to remove from the list of cells for alternative time to trigger.</td>
</tr>
<tr>
<td><strong>blackCellsToAddModList</strong></td>
<td>List of cells to add/modify in the black list of cells.</td>
</tr>
<tr>
<td><strong>blackCellsToRemoveList</strong></td>
<td>List of cells to remove from the black list of cells.</td>
</tr>
<tr>
<td><strong>carrierFreq</strong></td>
<td>Identifies E-UTRA carrier frequency for which this configuration is valid. E-UTRAN does not configure more than one measurement object for the same physical frequency regardless of the E-ARFCN used to indicate this. CarrierFreq-r13 is included only when the extension list measObjectToAddModListExt-r13 is used. If carrierFreq-r13 is present, carrierFreq (i.e., without suffix) shall be set to value maxEARFCN.</td>
</tr>
<tr>
<td><strong>cellIndex</strong></td>
<td>Entry index in the cell list. An entry may concern a range of cells, in which case this value applies to the entire range.</td>
</tr>
<tr>
<td><strong>cellIndividualOffset</strong></td>
<td>Cell individual offset applicable to a specific cell. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.</td>
</tr>
<tr>
<td><strong>cellsToAddModList</strong></td>
<td>List of cells to add/modify in the cell list.</td>
</tr>
<tr>
<td><strong>cellsToRemoveList</strong></td>
<td>List of cells to remove from the cell list.</td>
</tr>
<tr>
<td><strong>measCycleSCell</strong></td>
<td>The parameter is used only when an SCell is configured on the frequency indicated by the measObject and is in deactivated state, see TS 36.133 [16, 8.3.3]. E-UTRAN configures the parameter whenever an SCell is configured on the frequency indicated by the measObject, but the field may also be signalled when an SCell is not configured. Value sf160 corresponds to 160 sub-frames, sf256 corresponds to 256 sub-frames and so on.</td>
</tr>
<tr>
<td><strong>measDS-Config</strong></td>
<td>Parameters applicable to discovery signals measurement on the carrier frequency indicated by carrierFreq.</td>
</tr>
<tr>
<td><strong>measDuration</strong></td>
<td>Number of consecutive symbols for which the Physical Layer reports samples of RSSI, see TS 36.214 [48]. Value sym1 corresponds to one symbol, sym14 corresponds to 14 symbols, and so on.</td>
</tr>
<tr>
<td><strong>measSubframeCellList</strong></td>
<td>List of cells for which measSubframePatternNeigh is applied.</td>
</tr>
<tr>
<td><strong>measSubframePatternNeigh</strong></td>
<td>Time domain measurement resource restriction pattern applicable to neighbour cell RSRP and RSRQ measurements on the carrier frequency indicated by carrierFreq. For cells in measSubframeCellList the UE shall assume that the subframes indicated by measSubframePatternNeigh are non-MBSFN subframes, and have the same special subframe configuration as PCell.</td>
</tr>
<tr>
<td><strong>offsetFreq</strong></td>
<td>Offset value applicable to the carrier frequency. Value dB-24 corresponds to -24 dB, dB-22 corresponds to -22 dB and so on.</td>
</tr>
<tr>
<td><strong>physCellId</strong></td>
<td>Physical cell identity of a cell in the cell list.</td>
</tr>
<tr>
<td><strong>physCellIdRange</strong></td>
<td>Physical cell identity or a range of physical cell identities.</td>
</tr>
<tr>
<td><strong>reducedMeasPerformance</strong></td>
<td>If set to TRUE, the EUTRA carrier frequency is configured for reduced measurement performance, otherwise it is configured for normal measurement performance, see TS 36.133 [16].</td>
</tr>
<tr>
<td><strong>rmtc-Config</strong></td>
<td>Parameters applicable to RSSI and channel occupancy measurement on the carrier frequency indicated by carrierFreq.</td>
</tr>
<tr>
<td><strong>rmtc-Period</strong></td>
<td>Indicates the RSSI measurement timing configuration (RMT) periodicity for this frequency. Value ms40 corresponds to 40 ms periodicity, ms80 corresponds to 80 ms periodicity and so on, see TS 36.214 [48].</td>
</tr>
<tr>
<td><strong>rmtc-SubframeOffset</strong></td>
<td>Indicates the RSSI measurement timing configuration (RMT) subframe offset for this frequency. The value of rmtc-SubframeOffset should be smaller than the value of rmtc-Period, see TS 36.214 [48]. For inter-frequency measurements, this field is optional present and if it is not configured, the UE chooses a random value as rmtc-SubframeOffset for measDuration which shall be selected to be between 0 and the configured rmtc-Period with equal probability.</td>
</tr>
<tr>
<td><strong>t312</strong></td>
<td>The value of timer T312. Value ms0 represents 0 ms, ms50 represents 50 ms and so on.</td>
</tr>
</tbody>
</table>
MeasObjectEUTRA field descriptions

widebandRSRQ-Meas
If this field is set to TRUE, the UE shall, when performing RSRQ measurements, use a wider bandwidth in accordance with TS 36.133 [16].

whiteCellsToAddModList
List of cells to add/modify in the white list of cells.

whiteCellsToRemoveList
List of cells to remove from the white list of cells.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>always</td>
<td>The field is mandatory present.</td>
</tr>
<tr>
<td>WB-RSRQ</td>
<td>The field is optionally present, need ON, if the measurement bandwidth indicated by allowedMeasBandwidth is 50 resource blocks or larger; otherwise it is not present and the UE shall delete any existing value for this field, if configured.</td>
</tr>
</tbody>
</table>

– MeasObjectGERAN

The IE MeasObjectGERAN specifies information applicable for inter-RAT GERAN neighbouring frequencies.

MeasObjectGERAN information element

MeasObjectGERAN ::= SEQUENCE {
  carrierFreqs      CarrierFreqsGERAN,
  offsetFreq       Q-OffsetRangeInterRAT  DEFAULT 0,
  ncc-Permitted      BIT STRING(SIZE (8))  DEFAULT '11111111'B,
  cellForWhichToReportCGI    PhysCellIdGERAN    OPTIONAL,  -- Need ON
  ...
}

MeasObjectGERAN field descriptions

ncc-Permitted
Field encoded as a bit map, where bit N is set to "0" if a BCCH carrier with NCC = N-1 is not permitted for monitoring and set to "1" if a BCCH carrier with NCC = N-1 is permitted for monitoring; N = 1 to 8; bit 1 of the bitmap is the leading bit of the bit string.

carrierFreqs
If E-UTRAN includes cellForWhichToReportCGI, it includes only one GERAN ARFCN value in carrierFreqs.

– MeasObjectId

The IE MeasObjectId used to identify a measurement object configuration.

MeasObjectId information element

-- ASN1START
MeasObjectId ::= INTEGER (1..maxObjectId)

MeasObjectId-v1310 ::= INTEGER (maxObjectId-Plus1-r13..maxObjectId-r13)

MeasObjectId-r13 ::= INTEGER (1..maxObjectId-r13)

-- ASN1STOP

MeasObjectToAddModList

The IE MeasObjectToAddModList concerns a list of measurement objects to add or modify

MeasObjectToAddModList information element

-- ASN1START

MeasObjectToAddModList ::= SEQUENCE (SIZE (1..maxObjectId)) OF MeasObjectToAddMod

MeasObjectToAddModListExt-r13 ::= SEQUENCE (SIZE (1..maxObjectId)) OF MeasObjectToAddModExt-r13

MeasObjectToAddModList-v9e0 ::= SEQUENCE (SIZE (1..maxObjectId)) OF MeasObjectToAddMod-v9e0

MeasObjectToAddMod ::= SEQUENCE {
  measObjectId       MeasObjectId,
  measObject         CHOICE {
    measObjectEUTRA   MeasObjectEUTRA,
    measObjectUTRA    MeasObjectUTRA,
    measObjectGERAN   MeasObjectGERAN,
    measObjectCDMA2000 MeasObjectCDMA2000,
    ...
    measObjectWLAN-r13 MeasObjectWLAN-r13
  }
}

MeasObjectToAddModExt-r13 ::= SEQUENCE {
  measObjectId-r13  MeasObjectId-v1310,
  measObject-r13    CHOICE {
    measObjectEUTRA-v1310 MeasObjectEUTRA-v1310,
    measObjectUTRA-v1310  MeasObjectUTRA-v1310,
    measObjectGERAN-v1310 MeasObjectGERAN-v1310,
    measObjectCDMA2000-v1310 MeasObjectCDMA2000-v1310,
    ...
  }
}

-- ASN1STOP
measObjectEUTRA-r13 MeasObjectEUTRA,
measObjectUTRA-r13 MeasObjectUTRA,
measObjectGERAN-r13 MeasObjectGERAN,
measObjectCDMA2000-r13 MeasObjectCDMA2000,
...,
measObjectWLAN-v1320 MeasObjectWLAN-r13
}
}  
MeasObjectToAddMod-v9e0 ::= SEQUENCE {
  measObjectEUTRA-v9e0 MeasObjectEUTRA-v9e0 OPTIONAL -- Cond eutra
}  
-- ASN1STOP

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>eutra</td>
<td>The field is optional present, need OR, if for the corresponding entry in MeasObjectToAddModList or MeasObjectToAddModListExt-r13 field measObject is set to measObjectEUTRA and its sub-field carrierFreq is set to maxEARFCN. Otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>

— MeasObjectUTRA

The IE MeasObjectUTRA specifies information applicable for inter-RAT UTRA neighbouring cells.

*MeasObjectUTRA* information element

-- ASN1START

MeasObjectUTRA ::= SEQUENCE {
  carrierFreq ARFCN-ValueUTRA,
  offsetFreq Q-OffsetRangeInterRAT DEFAULT 0,
  cellsToRemoveList CellIndexList OPTIONAL, -- Need ON
  cellsToAddModList CHOICE {
    cellsToAddModListUTRA-FDD CellsToAddModListUTRA-FDD,
    cellsToAddModListUTRA-TDD CellsToAddModListUTRA-TDD
  } OPTIONAL, -- Need ON
  cellForWhichToReportCGI CHOICE {
    utra-FDD PhysCellIdUTRA-FDD,
    utra-TDD PhysCellIdUTRA-TDD
  } OPTIONAL, -- Need ON
}
CellsToAddModListUTRA-FDD ::= SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddModUTRA-FDD

CellsToAddModUTRA-FDD ::= SEQUENCE {
  cellIndex       INTEGER (1..maxCellMeas),
  physCellId       PhysCellIdUTRA-FDD
}

CellsToAddModListUTRA-TDD ::= SEQUENCE (SIZE (1..maxCellMeas)) OF CellsToAddModUTRA-TDD

CellsToAddModUTRA-TDD ::= SEQUENCE {
  cellIndex       INTEGER (1..maxCellMeas),
  physCellId       PhysCellIdUTRA-TDD
}

CSG-AllowedReportingCells-r9 ::= SEQUENCE {
  physCellIdRangeUTRA-FDDList-r9       PhysCellIdRangeUTRA-FDDList-r9 OPTIONAL -- Need OR
}

-- ASN1STOP
MeasObjectUTRA field descriptions

carrierFreq
Identifies UTRA carrier frequency for which this configuration is valid. E-UTRAN does not configure more than one measurement object for the same physical frequency regardless of the ARFCN used to indicate this.

cellIndex
Entry index in the neighbouring cell list.
cellsToAddModListUTRA-FDD
List of UTRA FDD cells to add/modify in the neighbouring cell list.
cellsToAddModListUTRA-TDD
List of UTRA TDD cells to add/modify in the neighbouring cell list.
cellsToRemoveList
List of cells to remove from the neighbouring cell list.
csg-allowedReportingCells
One or more ranges of physical cell identities for which UTRA-FDD reporting is allowed.
reducedMeasPerformance
If set to TRUE the UTRA carrier frequency is configured for reduced measurement performance, otherwise it is configured for normal measurement performance, see TS 36.133 [16].

MeasObjectWLAN

The IE MeasObjectWLAN specifies information applicable for inter-RAT WLAN measurements.

-- ASN1START

MeasObjectWLAN-r13 ::= SEQUENCE {
carrierFreq-r13 CHOICE {
  bandIndicatorListWLAN-r13 SEQUENCE (SIZE (1..maxWLAN-Bands-r13)) OF WLAN-BandIndicator-r13,
carrierInfoListWLAN-r13 SEQUENCE (SIZE (1..maxWLAN-CarrierInfo-r13)) OF WLAN-CarrierInfo-r13
} OPTIONAL, -- Need ON
wlan-ToAddModList-r13 WLAN-Id-List-r13 OPTIONAL, -- Need ON
wlan-ToRemoveList-r13 WLAN-Id-List-r13 OPTIONAL, -- Need ON
...}

WLAN-BandIndicator-r13 ::= ENUMERATED {band2dot4, band5, spare6, spare5, spare4, spare3, spare2, spare1, ...}

-- ASN1STOP
MeasObjectWLAN field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bandIndicatorListWLAN</td>
<td>Includes the list of WLAN bands where the value band2dot4 indicates the 2.4Ghz band; the value band5 indicates the 5Ghz band.</td>
</tr>
<tr>
<td>carrierInfoListWLAN</td>
<td>Includes the list of WLAN carrier information for the measurement object.</td>
</tr>
<tr>
<td>wlan-ToAddModList</td>
<td>Includes the list of WLAN identifiers to be added to the measurement configuration.</td>
</tr>
<tr>
<td>wlan-ToRemoveList</td>
<td>Includes the list of WLAN identifiers to be removed from the measurement configuration.</td>
</tr>
</tbody>
</table>

MeasResults

The IE MeasResults covers measured results for intra-frequency, inter-frequency and inter-RAT mobility.

MeasResults information element

```asn1
MeasResults ::= SEQUENCE {
  measId        MeasId,
  measResultPCell     SEQUENCE {
    rsrpResult       RSRP-Range,
    rsrqResult       RSRQ-Range
  },
  measResultNeighCells CHOICE {
    measResultListEUTRA     MeasResultListEUTRA,
    measResultListUTRA     MeasResultListUTRA,
    measResultListGERAN     MeasResultListGERAN,
    measResultsCDMA2000     MeasResultsCDMA2000,
    ...
  } OPTIONAL,
  ...
  ...
  ...
  ...  
  [[ measResultForECID-r9    MeasResultForECID-r9   OPTIONAL ],
  ...  
  [[ locationInfo-r10     LocationInfo-r10    OPTIONAL,  
    measResultServFreqList-r10   MeasResultServFreqList-r10  OPTIONAL ],
  ...
  [[ measId-v1250      MeasId-v1250     OPTIONAL,  
    measResultPCell-v1250   RSRQ-Range-v1250 OPTIONAL,  
    measResultCSI-RS-List-r12 MeasResultCSI-RS-List-r12  OPTIONAL ],
  ...  
  [[ measResultForRSSI-r13    MeasResultForRSSI-r13   OPTIONAL,  
    ...
```

---

ETSI TS 136 331 V13.3.0 (2016-10)

3GPP TS 36.331 version 13.3.0 Release 13

532

ETSI
MeasResultServFreqListExt-r13 MeasResultServFreqListExt-r13 OPTIONAL,
measResultSSTD-r13 MeasResultSSTD-r13 OPTIONAL,
measResultPCell-v1310 SEQUENCE {
    rs-sinr-Result-r13 RS-SINR-Range-r13 OPTIONAL,
}
ul-PDCP-DelayResultList-r13 UL-PDCP-DelayResultList-r13 OPTIONAL,
measResultListWLAN-r13 MeasResultListWLAN-r13 OPTIONAL
]]}

MeasResultListEUTRA ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultEUTRA

MeasResultEUTRA ::= SEQUENCE {
    physCellId PhysCellId,
    cgi-Info SEQUENCE {
        cellGlobalId CellGlobalIdEUTRA,
        trackingAreaCode TrackingAreaCode,
        plmn-IdentityList PLMN-IdentityList2 OPTIONAL
    } OPTIONAL,
    measResult SEQUENCE {
        rsrpResult RSRP-Range OPTIONAL,
        rsrqResult RSRQ-Range OPTIONAL,
        ....
        [[ additionalSI-Info-r9 AdditionalSI-Info-r9 OPTIONAL ]],
        [[ primaryPLMN-Suitable-r12 ENUMERATED {true} OPTIONAL,
            measResult-v1250 RSRQ-Range-v1250 OPTIONAL ]],
        [[ rs-sinr-Result-r13 RS-SINR-Range-r13 OPTIONAL,
            cgi-Info-v1310 SEQUENCE {
                freqBandIndicator-r13 FreqBandIndicator-r11 OPTIONAL,
                multiBandInfoList-r13 MultiBandInfoList-r11 OPTIONAL,
                freqBandIndicatorPriority-r13 ENUMERATED {true} OPTIONAL
            } OPTIONAL
        ]]
    }
}
MeasResultServFreqList-r10 ::= SEQUENCE (SIZE (1..maxServCell-r10)) OF MeasResultServFreq-r10

MeasResultServFreqListExt-r13 ::= SEQUENCE (SIZE (1..maxServCell-r13)) OF MeasResultServFreq-r13

MeasResultServFreq-r10 ::= SEQUENCE {
  servFreqId-r10 ServCellIndex-r10,
  measResultSCell-r10 SEQUENCE {
    rsrpResultSCell-r10 RSRP-Range,
    rsrqResultSCell-r10 RSRQ-Range
  } OPTIONAL,
  measResultBestNeighCell-r10 SEQUENCE {
    physCellId-r10 PhysCellId,
    rsrpResultNCell-r10 RSRP-Range,
    rsrqResultNCell-r10 RSRQ-Range
  } OPTIONAL,
  ...
  [[ measResultSCell-v1250 RSRQ-Range-v1250 OPTIONAL,
    measResultBestNeighCell-v1250 RSRQ-Range-v1250 OPTIONAL
  ]],
  [[ measResultSCell-v1310 RSRQ-Range-v1310 OPTIONAL,
    rs-sinr-Result-r13 RS-SINR-Range-r13
  ] OPTIONAL,
  measResultBestNeighCell-v1310 SEQUENCE {
    rs-sinr-Result-r13 RS-SINR-Range-r13
  } OPTIONAL
}]

MeasResultServFreq-r13 ::= SEQUENCE {
  servFreqId-r13 ServCellIndex-r13,
  measResultSCell-r13 SEQUENCE {
    ...
  }
}
MeasResultCSI-RS-List-r12 ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultCSI-RS-r12

MeasResultCSI-RS-r12 ::= SEQUENCE {
  measCSI-RS-Id-r12     MeasCSI-RS-Id-r12,
  csi-RSRP-Result-r12    CSI-RSRP-Range-r12,
  ...
}

MeasResultListUTRA ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultUTRA

MeasResultUTRA ::= SEQUENCE {
  physCellId        CHOICE {
    fdd          PhysCellIdUTRA-FDD,
    tdd          PhysCellIdUTRA-TDD
  },
  cgi-Info         SEQUENCE {
    cellGlobalId      CellGlobalIdUTRA,
    locationAreaCode   BIT STRING (SIZE (16))   OPTIONAL,
    routingAreaCode   BIT STRING (SIZE (8))   OPTIONAL,
    plmn-IdentityList  PLMN-IdentityList2     OPTIONAL
  }               OPTIONAL,
  measResult       SEQUENCE {
  }
utra-RSCP INTEGER (-5..91) OPTIONAL,
utra-EcN0 INTEGER (0..49) OPTIONAL,
...
[[ additionalSI-Info-r9 AdditionalSI-Info-r9 OPTIONAL ]],
[[ primaryPLMN-Suitable-r12 ENUMERATED {true} OPTIONAL ]]
}
}

MeasResultListGERAN ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultGERAN

MeasResultGERAN ::= SEQUENCE {
carrierFreq CarrierFreqGERAN,
physCellId PhysCellIdGERAN,
cgi-Info SEQUENCE {
cellGlobalId CellGlobalIdGERAN,
routingAreaCode BIT STRING (SIZE (8)) OPTIONAL
} OPTIONAL,
measResult SEQUENCE {
rssi INTEGER (0..63),
...
}
}

MeasResultsCDMA2000 ::= SEQUENCE {
preRegistrationStatusHRPD BOOLEAN,
measResultListCDMA2000 MeasResultListCDMA2000
}

MeasResultListCDMA2000 ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultCDMA2000

MeasResultCDMA2000 ::= SEQUENCE {
physCellId PhysCellIdCDMA2000,
cgi-Info CellGlobalIdCDMA2000 OPTIONAL,
measResult

    SEQUENCE {
      pilotPnPhase           INTEGER (0..32767)  OPTIONAL,
      pilotStrength          INTEGER (0..63),
      ...
    }

MeasResultListWLAN-r13 ::= SEQUENCE (SIZE (1..maxCellReport)) OF MeasResultWLAN-r13

MeasResultWLAN-r13 ::= SEQUENCE {
    wlan-Identifiers-r13     WLAN-Identifiers-r12,
    carrierInfoWLAN-r13      WLAN-CarrierInfo-r13 OPTIONAL,
    bandWLAN-r13        WLAN-BandIndicator-r13 OPTIONAL,
    rssiWLAN-r13        WLAN-RSSI-Range-r13,
    availableAdmissionCapacityWLAN-r13 INTEGER (0..31250)  OPTIONAL,
    backhaulDL-BandwidthWLAN-r13 WLAN-backhaulRate-r12 OPTIONAL,
    backhaulUL-BandwidthWLAN-r13 WLAN-backhaulRate-r12 OPTIONAL,
    channelUtilizationWLAN-r13 INTEGER (0..255)  OPTIONAL,
    stationCountWLAN-r13     INTEGER (0..65535)  OPTIONAL,
    connectedWLAN-r13      ENUMERATED {true}  OPTIONAL,
    ...
  }

MeasResultForECID-r9 ::= SEQUENCE {
    ue-RxTxTimeDiffResult-r9    INTEGER (0..4095),
    currentSFN-r9       BIT STRING (SIZE (10))
  }

PLMN-IdentityList2 ::= SEQUENCE (SIZE (1..5)) OF PLMN-Identity

AdditionalSI-Info-r9 ::= SEQUENCE {
    csg-MemberStatus-r9  ENUMERATED {member} OPTIONAL,
    csg-Identity-r9      CSG-Identity OPTIONAL
  }

MeasResultForRSSI-r13 ::= SEQUENCE {

rssi-Result-r13       RSSI-Range-r13,
channelOccupancy-r13       INTEGER (0..100),
...
}

UL-PDCP-DelayResultList-r13 ::= SEQUENCE (SIZE (1..maxQCI-r13)) OF UL-PDCP-DelayResult-r13

UL-PDCP-DelayResult-r13 ::= SEQUENCE {
  qci-Id-r13       ENUMERATED {qci1, qci2, qci3, qci4, spare4, spare3, spare2, spare1},
  excessDelay-r13       INTEGER (0..31),
...
}

-- ASN1STOP
### MeasResults field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MeasResults</td>
<td>Indicates the available admission capacity of WLAN as defined in IEEE 802.11-2012 [67].</td>
</tr>
<tr>
<td>availableCapacityWLAN</td>
<td>Indicates the backhaul available downlink bandwidth of WLAN, equal to Downlink Speed times Downlink Load defined in Wi-Fi Alliance Hotspot 2.0 [76].</td>
</tr>
<tr>
<td>backhaulDL-BandwidthWLAN</td>
<td>Indicates the backhaul available uplink bandwidth of WLAN, equal to Uplink Speed times Uplink Load defined in Wi-Fi Alliance Hotspot 2.0 [76].</td>
</tr>
<tr>
<td>backhaulUL-BandwidthWLAN</td>
<td>Indicates the backhaul available downlink bandwidth of WLAN as defined in IEEE 802.11-2012 [67].</td>
</tr>
<tr>
<td>backhaulUL-BandwidthWLAN</td>
<td>Indicates the backhaul available uplink bandwidth of WLAN as defined in IEEE 802.11-2012 [67].</td>
</tr>
<tr>
<td>bandWLAN</td>
<td>Indicates the WLAN band.</td>
</tr>
<tr>
<td>carrierInfoWLAN</td>
<td>Indicates the WLAN channel information.</td>
</tr>
<tr>
<td>channelOccupancy</td>
<td>Indicates the percentage of samples when the RSSI was above the configured channelOccupancyThreshold for the associated reportConfig.</td>
</tr>
<tr>
<td>channelUtilizationWLAN</td>
<td>Indicates WLAN channel utilization as defined in IEEE 802.11-2012 [67].</td>
</tr>
<tr>
<td>connectedWLAN</td>
<td>Indicates whether the UE is connected to the WLAN for which the measurement results are applicable.</td>
</tr>
<tr>
<td>csg-MemberStatus</td>
<td>Indicates whether or not the UE is a member of the CSG of the neighbour cell.</td>
</tr>
<tr>
<td>currentSFN</td>
<td>Indicates the current system frame number when receiving the UE Rx-Tx time difference measurement results from lower layer.</td>
</tr>
<tr>
<td>excessDelay</td>
<td>Indicates excess queueing delay ratio in UL, according to excess delay ratio measurement report mapping table, as defined in TS 36.314 [71, Table 4.2.1.1.1-1]</td>
</tr>
<tr>
<td>locationAreaCode</td>
<td>A fixed length code identifying the location area within a PLMN, as defined in TS 23.003 [27].</td>
</tr>
<tr>
<td>measId</td>
<td>Identifies the measurement identity for which the reporting is being performed. If the measId-v1250 is included, the measId (i.e. without a suffix) is ignored by eNB.</td>
</tr>
<tr>
<td>measResult</td>
<td>Measured result of an E-UTRA cell; Measured result of a UTRA cell; Measured result of a GERAN cell or frequency; Measured result of a CDMA2000 cell; Measured result of a WLAN; Measured result of UE Rx–Tx time difference; Measured result of UE SFN, radio frame and subframe timing difference; or Measured result of RSSI and channel occupancy.</td>
</tr>
<tr>
<td>measResultCSI-RS-List</td>
<td>Measured results of the CSI-RS resources in discovery signals measurement.</td>
</tr>
<tr>
<td>measResultListCDMA2000</td>
<td>List of measured results for the maximum number of reported best cells for a CDMA2000 measurement identity.</td>
</tr>
<tr>
<td>measResultListEUTRA</td>
<td>List of measured results for the maximum number of reported best cells for an E-UTRA measurement identity.</td>
</tr>
<tr>
<td>measResultListGERAN</td>
<td>List of measured results for the maximum number of reported best cells or frequencies for a GERAN measurement identity.</td>
</tr>
<tr>
<td>measResultListUTRA</td>
<td>List of measured results for the maximum number of reported best cells for a UTRA measurement identity.</td>
</tr>
<tr>
<td>measResultListWLAN</td>
<td>List of measured results for the maximum number of reported best WLAN outside the WLAN mobility set and connected WLAN, if any, for a WLAN measurement identity.</td>
</tr>
<tr>
<td>measResultPCell</td>
<td>Measured result of the PCell.</td>
</tr>
<tr>
<td>measResultsCDMA2000</td>
<td>Contains the CDMA2000 HRPD pre-registration status and the list of CDMA2000 measurements.</td>
</tr>
</tbody>
</table>
**MeasResults field descriptions**

**MeasResultServFreqList**
Measured results of the serving frequencies: the measurement result of each SCell, if any, and of the best neighbouring cell on each serving frequency.

**pilotPnPhase**
Indicates the arrival time of a CDMA2000 pilot, measured relative to the UE’s time reference in units of PN chips, see C.S0005 [25]. This information is used in either SRVCC handover or enhanced 1xRTT CS fallback procedure to CDMA2000 1xRTT.

**pilotStrength**

**plmn-IdentityList**
The list of PLMN Identity read from broadcast information when the multiple PLMN Identities are broadcast.

**preRegistrationStatusHRPD**
Set to TRUE if the UE is currently pre-registered with CDMA2000 HRPD. Otherwise set to FALSE. This can be ignored by the eNB for CDMA2000 1xRTT.

**qci-id**
Indicates QCI value for which excessDelay is provided, according to TS 36.314 [71].

**routAreaCode**
The RAC identity read from broadcast information, as defined in TS 23.003 [27].

**rsrpResult**
Measured RSRP result of an E-UTRA cell.
The rsrpResult is only reported if configured by the eNB.

**rsrqResult**
Measured RSRQ result of an E-UTRA cell.
The rsrqResult is only reported if configured by the eNB.

**rsi**
GERAN Carrier RSSI. RXLEV is mapped to a value between 0 and 63. TS 45.008 [28]. When mapping the RXLEV value to the RSI bit string, the first/leftmost bit of the bit string contains the most significant bit.

**rssi-Result**
Measured RSSI result in dBm.

**rs-sinr-Result**
Measured RS-SINR result of an E-UTRA cell.
The rs-sinr-Result is only reported if configured by the eNB.

**rssiWLAN**
Measured WLAN RSSI result in dBm.

**stationCountWLAN**
Indicates the total number stations currently associated with this WLAN as defined in IEEE 802.11-2012 [67].

**utra-EcN0**
According to CPICH_Ec/No in TS 25.133 [29] for FDD. Fourteen spare values. The field is not present for TDD.

**utra-RSCP**

**wlan-Identifiers**
Indicates the WLAN parameters used for identification of the WLAN for which the measurement results are applicable.

---

### MeasResultSSTD

The IE MeasResultSSTD consists of SFN, radio frame and subframe boundary difference between the PCell and the PSCell as specified in TS 36.214 [48] and TS 36.133 [16].

**MeasResultSSTD information element**

```
-- ASN1START

MeasResultSSTD-r13 ::= SEQUENCE {
  sfn-OffsetResult-r13 INTEGER (0..1023),
}

-- ASN1END
```
MeasResultSSTD field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sfn-OffsetResult</td>
<td>Indicates the SFN difference between the PCell and the PSCell as an integer value according to TS 36.214 [48].</td>
</tr>
<tr>
<td>frameBoundaryOffsetResult</td>
<td>Indicates the frame boundary difference between the PCell and the PSCell as an integer value according to TS 36.214 [48].</td>
</tr>
<tr>
<td>subframeBoundaryOffsetResult</td>
<td>Indicates the subframe boundary difference between the PCell and the PSCell as an integer value according to the mapping table in TS 36.133 [16].</td>
</tr>
</tbody>
</table>

-- MeasScaleFactor

The IE *MeasScaleFactor* specifies the factor for scaling the measurement performance requirements in TS 36.133 [16].

*MeasScaleFactor* information element

-- ASN1START

MeasScaleFactor-r12 ::= ENUMERATED {sf-EUTRA-cf1, sf-EUTRA-cf2}

-- ASN1STOP

NOTE: If the *reducedMeasPerformance* is not included in any *measObjectEUTRA* or *measObjectUTRA* and the *measScaleFactor* is included in the *measConfig*, E-UTRAN can configure any of the values for the *measScaleFactor* as specified in TS 36.133 [16].

-- QuantityConfig

The IE *QuantityConfig* specifies the measurement quantities and layer 3 filtering coefficients for E-UTRA and inter-RAT measurements.

*QuantityConfig* information element

-- ASN1START

QuantityConfig ::= SEQUENCE {
  quantityConfigEUTRA     QuantityConfigEUTRA     OPTIONAL, -- Need ON
  quantityConfigUTRA     QuantityConfigUTRA     OPTIONAL, -- Need ON
  quantityConfigGERAN     QuantityConfigGERAN     OPTIONAL, -- Need ON
}
quantityConfigCDMA2000          QuantityConfigCDMA2000          OPTIONAL, -- Need ON
....
[[ quantityConfigUTRA-v1020     QuantityConfigUTRA-v1020     OPTIONAL -- Need ON
  ]],
[[ quantityConfigEUTRA-v1250    QuantityConfigEUTRA-v1250    OPTIONAL -- Need ON
  ]],
[[ quantityConfigEUTRA-v1310    QuantityConfigEUTRA-v1310    OPTIONAL, -- Need ON
  ]],
quantityConfigWLAN-r13          QuantityConfigWLAN-r13          OPTIONAL -- Need ON
}]

QuantityConfigEUTRA ::=        SEQUENCE {
  filterCoefficientRSRP        FilterCoefficient     DEFAULT fc4,
  filterCoefficientRSRQ        FilterCoefficient     DEFAULT fc4
}

QuantityConfigEUTRA-v1250 ::=   SEQUENCE {
  r12                           FilterCoefficient
  OPTIONAL  -- Need
  OR
}

QuantityConfigEUTRA-v1310 ::=   SEQUENCE {
  r13                           FilterCoefficient
  DEFAULT fc4
}

QuantityConfigUTRA ::=         SEQUENCE {
  measQuantityUTRA-FDD          ENUMERATED {cpich-RSCP, cpich-EcN0},
  measQuantityUTRA-TDD          ENUMERATED {pcpch-RSCP},
  filterCoefficient             FilterCoefficient     DEFAULT fc4
}

QuantityConfigUTRA-v1020 ::=    SEQUENCE {
  filterCoefficient2-FDD-r10    FilterCoefficient     DEFAULT fc4
QuantityConfigGERAN ::= SEQUENCE {
    measQuantityGERAN ENUMERATED {rssi},
    filterCoefficient FilterCoefficient DEFAULT fc2
}

QuantityConfigCDMA2000 ::= SEQUENCE {
    measQuantityCDMA2000 ENUMERATED {pilotStrength, pilotPnPhaseAndPilotStrength}
}

QuantityConfigWLAN-r13 ::= SEQUENCE {
    measQuantityWLAN-r13 ENUMERATED {rssiWLAN},
    filterCoefficient-r13 FilterCoefficient DEFAULT fc4
}
<table>
<thead>
<tr>
<th><strong>QuantityConfig field descriptions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>filterCoefficient2-FDD</strong></td>
</tr>
<tr>
<td>Specifies the filtering coefficient used for the UTRAN FDD measurement quantity, which is not included in measQuantityUTRA-FDD, when reportQuantityUTRA-FDD is present in ReportConfigInterRAT.</td>
</tr>
<tr>
<td><strong>filterCoefficientCSI-RSRP</strong></td>
</tr>
<tr>
<td>Specifies the filtering coefficient used for CSI-RSRP.</td>
</tr>
<tr>
<td><strong>filterCoefficientRSRP</strong></td>
</tr>
<tr>
<td>Specifies the filtering coefficient used for RSRP.</td>
</tr>
<tr>
<td><strong>filterCoefficientRSRQ</strong></td>
</tr>
<tr>
<td>Specifies the filtering coefficient used for RSRQ.</td>
</tr>
<tr>
<td><strong>filterCoefficientRS-SINR</strong></td>
</tr>
<tr>
<td>Specifies the filtering coefficient used for RS-SINR.</td>
</tr>
<tr>
<td><strong>measQuantityCDMA2000</strong></td>
</tr>
<tr>
<td>Measurement quantity used for CDMA2000 measurements. pilotPnPhaseAndPilotStrength is only applicable for MeasObjectCDMA2000 of cdma2000-Type = type1XRTT.</td>
</tr>
<tr>
<td><strong>measQuantityGERAN</strong></td>
</tr>
<tr>
<td>Measurement quantity used for GERAN measurements.</td>
</tr>
<tr>
<td><strong>measQuantityUTRA</strong></td>
</tr>
<tr>
<td>Measurement quantity used for UTRA measurements.</td>
</tr>
<tr>
<td><strong>measQuantityWLAN</strong></td>
</tr>
<tr>
<td>Measurement quantity used for WLAN measurements.</td>
</tr>
<tr>
<td><strong>quantityConfigCDMA2000</strong></td>
</tr>
<tr>
<td>Specifies quantity configurations for CDMA2000 measurements.</td>
</tr>
<tr>
<td><strong>quantityConfigEUTRA</strong></td>
</tr>
<tr>
<td>Specifies filter configurations for E-UTRA measurements.</td>
</tr>
<tr>
<td><strong>quantityConfigGERAN</strong></td>
</tr>
<tr>
<td>Specifies quantity and filter configurations for GERAN measurements.</td>
</tr>
<tr>
<td><strong>quantityConfigUTRA</strong></td>
</tr>
<tr>
<td>Specifies quantity and filter configurations for UTRA measurements. Field quantityConfigUTRA-v1020 is applicable only when reportQuantityUTRA-FDD is configured.</td>
</tr>
<tr>
<td><strong>quantityConfigWLAN</strong></td>
</tr>
<tr>
<td>Specifies quantity and filter configurations for WLAN measurements.</td>
</tr>
</tbody>
</table>

---

**ReportConfigEUTRA**

The IE ReportConfigEUTRA specifies criteria for triggering of an E-UTRA measurement reporting event. The E-UTRA measurement reporting events concerning CRS are labelled AN with N equal to 1, 2 and so on.

- **Event A1**: Serving becomes better than absolute threshold;
- **Event A2**: Serving becomes worse than absolute threshold;
- **Event A3**: Neighbour becomes amount of offset better than PCell/ PSCell;
- **Event A4**: Neighbour becomes better than absolute threshold;
- **Event A5**: PCell/ PSCell becomes worse than absolute threshold1 AND Neighbour becomes better than another absolute threshold2.
- **Event A6**: Neighbour becomes amount of offset better than SCell.

The E-UTRA measurement reporting events concerning CSI-RS are labelled CN with N equal to 1 and 2.

- **Event C1**: CSI-RS resource becomes better than absolute threshold;
- **Event C2**: CSI-RS resource becomes amount of offset better than reference CSI-RS resource.

**ReportConfigEUTRA information element**

```asn1
-- ASN1START

ReportConfigEUTRA ::= SEQUENCE {
  triggerType CHOICE {

-- ASN1END
```
event SEQUENCE {
  eventId CHOICE {
    eventA1 SEQUENCE {
      a1-Threshold ThresholdEUTRA
    },
    eventA2 SEQUENCE {
      a2-Threshold ThresholdEUTRA
    },
    eventA3 SEQUENCE {
      a3-Offset INTEGER (-30..30),
      reportOnLeave BOOLEAN
    },
    eventA4 SEQUENCE {
      a4-Threshold ThresholdEUTRA
    },
    eventA5 SEQUENCE {
      a5-Threshold1 ThresholdEUTRA,
      a5-Threshold2 ThresholdEUTRA
    },
    ...
    eventA6-r10 SEQUENCE {
      a6-Offset-r10 INTEGER (-30..30),
      a6-ReportOnLeave-r10 BOOLEAN
    },
    eventC1-r12 SEQUENCE {
      c1-Threshold-r12 ThresholdEUTRA-v1250,
      c1-ReportOnLeave-r12 BOOLEAN
    },
    eventC2-r12 SEQUENCE {
      c2-RefCSI-RS-r12 MeasCSI-RS-Id-r12,
      c2-Offset-r12 INTEGER (-30..30),
      c2-ReportOnLeave-r12 BOOLEAN
    }
  }
}
}
hysteresis Hysteresis,
timeToTrigger
  TimeToTrigger

  }
periodical
    SEQUENCE {
      purpose
        ENUMERATED {
          reportStrongestCells, reportCGI
        }
    }

triggerQuantity
  ENUMERATED {rsrp, rsrq},

reportQuantity
  ENUMERATED {sameAsTriggerQuantity, both},

maxReportCells
  INTEGER (1..maxCellReport),

reportInterval
  ReportInterval,

reportAmount
  ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},

...

[[ si-RequestForHO-r9
      ENUMERATED {setup}  OPTIONAL, -- Cond reportCGI
    ue-RxTxTimeDiffPeriodical-r9
      ENUMERATED {setup}  OPTIONAL -- Need OR
  ]],

[[ includeLocationInfo-r10
      ENUMERATED {true}  OPTIONAL, -- Need OR
    reportAddNeighMeas-r10
      ENUMERATED {setup}  OPTIONAL -- Need OR
  ]],

[[ alternativeTimeToTrigger-r12
      CHOICE {
        release
          NULL,
        setup
          TimeToTrigger
      } OPTIONAL, -- Need ON
    useT312-r12
      BOOLEAN  OPTIONAL, -- Need ON
    usePSCell-r12
      BOOLEAN  OPTIONAL, -- Need ON
    aN-Threshold1-v1250
      RSRQ-RangeConfig-r12  OPTIONAL, -- Need ON
    a5-Threshold2-v1250
      RSRQ-RangeConfig-r12  OPTIONAL, -- Need ON
    reportStrongestCSI-RSs-r12
      BOOLEAN  OPTIONAL, -- Need ON
    reportCRS-Meas-r12
      BOOLEAN  OPTIONAL, -- Need ON
    triggerQuantityCSI-RS-r12
      BOOLEAN  OPTIONAL -- Need ON
  ]],

[[ reportSSTD-Meas-r13
      BOOLEAN  OPTIONAL, -- Need ON
    rs-sinr-Config-r13
      CHOICE {
        release
          NULL,
        setup
          SEQUENCE {
            triggerQuantity-v1310
              ENUMERATED {sinr}  OPTIONAL, -- Need ON
            aN-Threshold1-r13
              RS-SINR-Range-r13  OPTIONAL, -- Need ON
            a5-Threshold2-r13
              RS-SINR-Range-r13  OPTIONAL, -- Need ON
          }
      }
  ]]
reportQuantity-v1310 ENUMERATED {rsrpAndSINR, rsrqAndSINR, all} OPTIONAL, -- Need ON
useWhiteCellList-r13 BOOLEAN OPTIONAL, -- Need ON
measRSSI-ReportConfig-r13 MeasRSSI-ReportConfig-r13 OPTIONAL, -- Need ON
includeMultiBandInfo-r13 ENUMERATED {true} OPTIONAL, -- Cond reportCGI
ul-DelayConfig-r13 UL-DelayConfig-r13 OPTIONAL -- Need ON
]]
[[ ue-RxTxTimeDiffPeriodicalTDD-r13 BOOLEAN OPTIONAL -- Need ON
]]
}

RSRQ-RangeConfig-r12 ::= CHOICE {
  release NULL,
  setup RSRQ-Range-v1250
}

ThresholdEUTRA ::= CHOICE{
  threshold-RSRP RSRP-Range,
  threshold-RSRQ RSRQ-Range
}

ThresholdEUTRA-v1250 ::= CSI-RSRP-Range-r12

MeasRSSI-ReportConfig-r13 ::= SEQUENCE {
  channelOccupancyThreshold-r13 RSSI-Range-r13 OPTIONAL -- Need OR
}

-- ASN1STOP
**ReportConfigEUTRA field descriptions**

**a3-Offset/ a6-Offset/ c2-Offset**
Offset value to be used in EUTRA measurement report triggering condition for event a3/ a6/ c2. The actual value is field value * 0.5 dB.

**alternativeTimeToTrigger**
Indicates the time to trigger applicable for cells specified in aiTTT-CellsToAddModList of the associated measurement object, if configured

**aN-ThresholdM/ cN-ThresholdM**
Threshold to be used in EUTRA measurement report triggering condition for event number aN/ cN. If multiple thresholds are defined for event number aN/ cN, the thresholds are differentiated by M. E-UTRAN configures aN-Threshold1 only for events A1, A2, A4, A5 and a5-Threshold2 only for event A5.

**c1-ReportOnLeave/ c2-ReportOnLeave**
Indicates whether or not the UE shall initiate the measurement reporting procedure when the leaving condition is met for a CSI-RS resource in csi-RS-TriggeredList, as specified in 5.5.4.1.

**c2-RefCSI-RS**
Identity of the CSI-RS resource from the measCSI-RS-ToAddModList of the associated measObject, to be used as the reference CSI-RS resource in EUTRA measurement report triggering condition for event c2.

**channelOccupancyThreshold**
RSSI threshold which is used for channel occupancy evaluation.

**eventId**
Choice of E-UTRA event triggered reporting criteria. EUTRAN may set this field to eventC1 or eventC2 only if measDS-Config is configured in the associated measObject with one or more CSI-RS resources. The eventC1 and eventC2 are not applicable for the eventId if RS-SINR is configured as triggerQuantity or reportQuantity.

**includeMultiBandInfo**
If this field is present, the UE shall acquire and include multi band information in the measurement report.

**maxReportCells**
Max number of cells, excluding the serving cell, to include in the measurement report concerning CRS, and max number of CSI-RS resources to include in the measurement report concerning CSI-RS.

**measRSSI-ReportConfig**
If this field is present, the UE shall perform measurement reporting for RSSI and channel occupancy. E-UTRAN only sets this field to true when setting triggerType to periodical and purpose to reportStrongestCells.

**reportAmount**
Number of measurement reports applicable for triggerType event as well as for triggerType periodical. In case purpose is set to reportCGI or reportSSTD-Meas is set to true, only value 1 applies.

**reportCRS-Meas**
Indicates that UE shall include rsrp, rsrq together with csi-rsrp in the measurement report, if possible.

**reportOnLeave/ a6-ReportOnLeave**
Indicates whether or not the UE shall initiate the measurement reporting procedure when the leaving condition is met for a cell in cellsTriggeredList, as specified in 5.5.4.1.

**reportQuantity**
The quantities to be included in the measurement report. The value both means that both the rsrp and rsrq quantities are to be included respectively in the measurement report. The value rsrpANDsinr and rsrqANDsinr mean that both rsrp and rs-sinr quantities, and both rsrq and rs-sinr quantities are to be included respectively in the measurement report. The value all means that rsrp, rsrq and rs-sinr are to be included in the measurement report. In case triggerQuantityCSI-RS is included, only value sameAsTriggerQuantity applies. If reportQuantity-v1310 is configured, the UE only considers this extension (and ignores reportQuantity i.e. without suffix).

**reportSSTD-Meas**
If this field is set to true, the UE shall measure SSTD between the PCell and the PSCell as specified in TS 36.214 [48] and ignore the triggerQuantity, reportQuantity and maxReportCells fields. E-UTRAN only sets this field to true when setting triggerType to periodical and purpose to reportStrongestCells.

**reportStrongestCSI-RSs**
Indicates that periodical CSI-RS measurement report is performed. EUTRAN configures value TRUE only if measDS-Config is configured in the associated measObject with one or more CSI-RS resources.

**si-RequestForHO**
The field applies to the reportCGI functionality, and when the field is included, the UE is allowed to use autonomous gaps in acquiring system information from the neighbour cell, applies a different value for T321, and includes different fields in the measurement report.

**ThresholdEUTRA**
For RSRP: RSRP based threshold for event evaluation. The actual value is field value – 140 dBm.
For RSQ: RSRQ based threshold for event evaluation. The actual value is (field value – 40)/2 dB.
For RS-SINR: RS-SINR based threshold for event evaluation. The actual value is (field value -46)/2 dB.
For CSI-RSRP: CSI-RSRP based threshold for event evaluation. The actual value is field value – 140 dBm.
EUTRAN configures the same threshold quantity for all the thresholds of an event.

**timeToTrigger**
Time during which specific criteria for the event needs to be met in order to trigger a measurement report.
ReportConfigEUTRA field descriptions

**triggerQuantity**
The quantity used to evaluate the triggering condition for the event concerning CRS. EUTRAN sets the value according to the quantity of the ThresholdEUTRA for this event. The values rsrp, rsrq and sinr correspond to Reference Signal Received Power (RSRP), Reference Signal Received Quality (RSRQ) and Reference Signal to Noise and Interference Ratio (RS-SINR), see TS 36.214 [48]. If triggerQuantity-v1310 is configured, the UE only considers this extension (and ignores triggerQuantity i.e. without suffix).

**triggerQuantityCSI-RS**
The quantity used to evaluate the triggering condition for the event concerning CSI-RS. The value TRUE corresponds to CSI Reference Signal Received Power (CSI-RSRP), see TS 36.214 [48]. E-UTRAN configures value TRUE if and only if the measurement reporting event concerns CSI-RS.

**ue-RxTxTimeDiffPeriodical**
If this field is present, the UE shall perform UE Rx-Tx time difference measurement reporting and ignore the fields triggerQuantity, reportQuantity and maxReportCells. If the field is present, the only applicable values for the corresponding triggerType and purpose are periodical and reportStrongestCells respectively.

**ue-RxTxTimeDiffPeriodicalTDD**
If this field is present, the UE shall report UE Rx-Tx time difference measurement reporting according to EUTRAN TDD UE Rx-Tx time difference report mapping in TS 36.133 [16]. If the field is configured, the ue-RxTxTimeDiffPeriodical shall be configured. The filed is applicable for TDD only.

**usePSCell**
If this field is set to TRUE the UE shall use the PSCell instead of the PCell. E-UTRAN configures value TRUE only TRUE events A3 and A5, see 5.5.4.4 and 5.5.4.6.

**useT312**
If value TRUE is configured, the UE shall use the timer T312 with the value t312 as specified in the corresponding measObject. If the corresponding measObject does not include the timer T312 then the timer T312 is considered as not configured. E-UTRAN configures value TRUE only if triggerType is set to event.

**useWhiteCellList**
Indicates whether only the cells included in the white-list of the associated measObject are applicable as specified in 5.5.4.1. E-UTRAN does not configure the field for events A1, A2, C1 and C2.

**ul-DelayConfig**
If the field is present, E-UTRAN configures UL PDCP Packet Delay per QCI measurement and the UE shall ignore the fields triggerQuantity and maxReportCells. The applicable values for the corresponding triggerType and reportInterval are periodical and (one of the) ms1024, ms2048, ms5120 or ms10240 respectively. The reportInterval indicates the periodicity for performing and reporting of UL PDCP Delay per QCI measurement as specified in TS 36.314 [71].

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>reportCGI</td>
<td>The field is optional, need OR, in case purpose is included and set to reportCGI; otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>

---

ReportConfigld

The IE ReportConfigld is used to identify a measurement reporting configuration.

ReportConfigld information element

-- ASN1START

ReportConfigld ::= INTEGER (1..maxReportConfigId)

-- ASN1STOP

---

ReportConfigInterRAT

The IE ReportConfigInterRAT specifies criteria for triggering of an inter-RAT measurement reporting event. The inter-RAT measurement reporting events for UTRAN, GERAN and CDMA2000 are labelled BN with N equal to 1, 2 and so on. The inter-RAT measurement reporting events for WLAN are labelled WN with N equal to 1, 2 and so on.
Event B1: Neighbour becomes better than absolute threshold;
Event B2: PCell becomes worse than absolute threshold1 AND Neighbour becomes better than another absolute threshold2.
Event W1: WLAN becomes better than a threshold;
Event W2: All WLAN inside WLAN mobility set become worse than a threshold1 and a WLAN outside WLAN mobility set becomes better than a threshold2;
Event W3: All WLAN inside WLAN mobility set become worse than a threshold.

The b1 and b2 event thresholds for CDMA2000 are the CDMA2000 pilot detection thresholds are expressed as an unsigned binary number equal to \([-2 \times 10 \log_{10} \frac{E_c}{I_0}\] in units of 0.5dB, see C.S0005 [25] for details.

**ReportConfigInterRAT information element**

```plaintext
ReportConfigInterRAT ::= SEQUENCE {
  triggerType          CHOICE {
    event              SEQUENCE {
      eventId         CHOICE {
        eventB1             SEQUENCE {
          b1-Threshold    CHOICE {
            b1-ThresholdUTRA    ThresholdUTRA,
            b1-ThresholdGERAN    ThresholdGERAN,
            b1-ThresholdCDMA2000    ThresholdCDMA2000
          }
        },
        eventB2             SEQUENCE {
          b2-Threshold1    ThresholdEUTRA,
          b2-Threshold2    CHOICE {
            b2-Threshold2UTRA    ThresholdUTRA,
            b2-Threshold2GERAN    ThresholdGERAN,
            b2-Threshold2CDMA2000    ThresholdCDMA2000
          }
        },
        ...,
        eventW1-r13       SEQUENCE {
          w1-Threshold-r13    WLAN-RSSI-Range-r13
        }
      }
    } ,
    eventW2-r13       SEQUENCE {
    }
  }
}
```
w2-Threshold1-r13   WLAN-RSSI-Range-r13,
w2-Threshold2-r13   WLAN-RSSI-Range-r13
},
eventW3-r13   SEQUENCE {
w3-Threshold-r13   WLAN-RSSI-Range-r13
}
},
hysteresis   Hysteresis,
timeToTrigger   TimeToTrigger
},
periodical   SEQUENCE {
  purpose   ENUMERATED {
    reportStrongestCells,
    reportStrongestCellsForSON,
    reportCGI
  }
}
},
maxReportCells   INTEGER (1..maxCellReport),
reportInterval   ReportInterval,
reportAmount   ENUMERATED {r1, r2, r4, r8, r16, r32, r64, infinity},
...,[[ si-RequestForHO-r9   ENUMERATED {setup}   OPTIONAL -- Cond reportCGI ]].
[[ reportQuantityUTRA-FDD-r10   ENUMERATED {both}   OPTIONAL -- Need OR ]].
[[ includeLocationInfo-r11   BOOLEAN   OPTIONAL -- Need ON ]].
[[ b2-Threshold1-v1250   CHOICE {
  release   NULL,
  setup   RSRQ-Range-v1250
}   OPTIONAL -- Need ON ]].
[[ reportQuantityWLAN-r13   ReportQuantityWLAN-r13   OPTIONAL -- Need ON ]].
ThresholdUTRA ::= CHOICE{
  utra-RSCP INTEGER {-5..91},
  utra-EcN0 INTEGER (0..49)
}

ThresholdGERAN ::= INTEGER (0..63)

ThresholdCDMA2000 ::= INTEGER (0..63)

ReportQuantityWLAN-r13 ::= SEQUENCE {
  bandRequestWLAN-r13 ENUMERATED {true} OPTIONAL, -- Need OR
  carrierInfoRequestWLAN-r13 ENUMERATED {true} OPTIONAL, -- Need OR
  availableAdmissionCapacityRequestWLAN-r13 ENUMERATED {true} OPTIONAL, -- Need ON
  backhaulDL-BandwidthRequestWLAN-r13 ENUMERATED {true} OPTIONAL, -- Need OR
  backhaulUL-BandwidthRequestWLAN-r13 ENUMERATED {true} OPTIONAL, -- Need OR
  channelUtilizationRequestWLAN-r13 ENUMERATED {true} OPTIONAL, -- Need OR
  stationCountRequestWLAN-r13 ENUMERATED {true} OPTIONAL, -- Need OR
  ...
}

-- ASN1STOP
ReportConfigInterRAT field descriptions

<table>
<thead>
<tr>
<th>availableAdmissionCapacityRequestWLAN</th>
<th>The value true indicates that the UE shall include, if available, WLAN Available Admission Capacity in measurement reports.</th>
</tr>
</thead>
<tbody>
<tr>
<td>backhaulDL-BandwidthRequestWLAN</td>
<td>The value true indicates that the UE shall include, if available, WLAN Backhaul Downlink Bandwidth in measurement reports.</td>
</tr>
<tr>
<td>backhaulUL-BandwidthRequestWLAN</td>
<td>The value true indicates that the UE shall include, if available, WLAN Backhaul Uplink Bandwidth in measurement reports.</td>
</tr>
<tr>
<td>bandRequestWLAN</td>
<td>The value true indicates that the UE shall include WLAN band in measurement reports.</td>
</tr>
<tr>
<td>bN-ThresholdM</td>
<td>Threshold to be used in inter RAT measurement report triggering condition for event number bN. If multiple thresholds are defined for event number bn, the thresholds are differentiated by M.</td>
</tr>
<tr>
<td>carrierInfoRequestWLAN</td>
<td>The value true indicates that the UE shall include, if available, WLAN Carrier Information in measurement reports.</td>
</tr>
<tr>
<td>channelUtilizationRequest-WLAN</td>
<td>The value true indicates that the UE shall include, if available, WLAN Channel Utilization in measurement reports.</td>
</tr>
<tr>
<td>eventId</td>
<td>Choice of inter-RAT event triggered reporting criteria.</td>
</tr>
<tr>
<td>maxReportCells</td>
<td>Max number of cells, excluding the serving cell, to include in the measurement report. In case purpose is set to reportStrongestCellsForSON only value 1 applies. For inter-RAT WLAN, it is the maximum number of WLANs to include in the measurement report.</td>
</tr>
<tr>
<td>Purpose</td>
<td>reportStrongestCellsForSON applies only in case reportConfig is linked to a measObject set to measObjectUTRA or measObjectCDMA2000.</td>
</tr>
<tr>
<td>reportAmount</td>
<td>Number of measurement reports applicable for triggerType event as well as for triggerType periodical. In case purpose is set to reportCGI or reportStrongestCellsForSON only value 1 applies.</td>
</tr>
<tr>
<td>reportQuantityUTRA-FDD</td>
<td>The quantities to be included in the UTRA measurement report. The value both means that both the cpich RSCP and cpich EcN0 quantities are to be included in the measurement report.</td>
</tr>
<tr>
<td>si-RequestForHO</td>
<td>The field applies to the reportCGI functionality, and when the field is included, the UE is allowed to use autonomous gaps in acquiring system information from the neighbour cell, applies a different value for T321, and includes different fields in the measurement report.</td>
</tr>
<tr>
<td>stationCountRequestWLAN</td>
<td>The value true indicates that the UE shall include, if available, WLAN Station Count in measurement reports.</td>
</tr>
<tr>
<td>b1-ThresholdGERAN, b2-Threshold2GERAN</td>
<td>The actual value is field value – 110 dBm.</td>
</tr>
<tr>
<td>b1-ThresholdUTRA, b2-Threshold2UTRA</td>
<td>The actual value is field value – 115 dBm.</td>
</tr>
<tr>
<td></td>
<td>utra-EcN0 corresponds to CPICH_Ec/No in TS 25.133 [29] for FDD, and is not applicable for TDD.</td>
</tr>
<tr>
<td></td>
<td>For utra-RSCP: The actual value is field value – 115 dBm.</td>
</tr>
<tr>
<td></td>
<td>For utra-EcN0: The actual value is (field value – 49)/2 dB.</td>
</tr>
<tr>
<td>timeToTrigger</td>
<td>Time during which specific criteria for the event needs to be met in order to trigger a measurement report.</td>
</tr>
</tbody>
</table>

Conditional presence | Explanation
--- | ---
reportCGI | The field is optional, need OR, in case purpose is included and set to reportCGI; otherwise the field is not present and the UE shall delete any existing value for this field.

ReportConfigToAddModList

The IE ReportConfigToAddModList concerns a list of reporting configurations to add or modify

ReportConfigToAddModList information element

-- ASN1START
ReportConfigToAddModList ::= SEQUENCE (SIZE (1..maxReportConfigId)) OF ReportConfigToAddMod

ReportConfigToAddMod ::= SEQUENCE {
  reportConfigId ReportConfigId,
  reportConfig CHOICE {
    reportConfigEUTRA ReportConfigEUTRA,
    reportConfigInterRAT ReportConfigInterRAT
  }
}

-- ASN1STOP

-- ReportInterval

The ReportInterval indicates the interval between periodical reports. The ReportInterval is applicable if the UE performs periodical reporting (i.e. when reportAmount exceeds 1), for triggerType event as well as for triggerType periodical. Value ms120 corresponds with 120 ms, ms240 corresponds with 240 ms and so on, while value min1 corresponds with 1 min, min6 corresponds with 6 min and so on.

ReportInterval information element

-- ASN1START

ReportInterval ::= ENumerated {
  ms120, ms240, ms480, ms640, ms1024, ms2048, ms5120, ms10240,
  min1, min6, min12, min30, min60, spare3, spare2, spare1
}

-- ASN1STOP

-- RSRP-Range

The IE RSRP-Range specifies the value range used in RSRP measurements and thresholds. Integer value for RSRP measurements according to mapping table in TS 36.133 [16].

RSRP-Range information element

-- ASN1START

RSRP-Range ::= INTEGER(0..97)
RSRP-RangeSL-r12 ::= INTEGER(0..13)

RSRP-RangeSL2-r12 ::= INTEGER(0..7)

RSRP-RangeSL3-r12 ::= INTEGER(0..11)

RSRP-RangeSL4-r13 ::= INTEGER(0..49)

--- ASN1STOP

**RSRP-Range field descriptions**

| **RSRP-RangeSL** | Value 0 corresponds to -infinity, value 1 to -115dBm, value 2 to -110dBm, and so on (i.e. in steps of 5dBm) until value 12, which corresponds to -60dBm, while value 13 corresponds to +infinity. |
| **RSRP-RangeSL2** | Value 0 corresponds to -infinity, value 1 to -110dBm, value 2 to -100dBm, and so on (i.e. in steps of 10dBm) until value 6, which corresponds to -60dBm, while value 7 corresponds to +infinity. |
| **RSRP-RangeSL3** | Value 0 corresponds to -110dBm, value 1 to -105dBm, value 2 to -100dBm, and so on (i.e. in steps of 5dBm) until value 10, which corresponds to -60dBm, while value 11 corresponds to +infinity. |
| **RSRP-RangeSL4** | Indicates the range for SD-RSRP. Value 0 corresponds to -130dBm, value 1 to -128dBm, value 2 to -126dBm, and so on (i.e. in steps of 2dBm) until value 48, which corresponds to -34dBm, while value 49 corresponds to +infinity. |

---

**RSRQ-Range**

The IE **RSRQ-Range** specifies the value range used in RSRQ measurements and thresholds. Integer value for RSRQ measurements is according to mapping table in TS 36.133 [16]. A given field using **RSRQ-Range-v1250** shall only be signalled if the corresponding original field (using **RSRQ-Range** i.e. without suffix) is set to value 0 or 34. Only a UE indicating support of **extendedRSRQ-LowerRange-r12** or **rsrq-OnAllSymbols-r12** may report **RSRQ-Range-v1250**, and this may be done without explicit configuration from the E-UTRAN. If received, the UE shall use the value indicated by the **RSRQ-Range-v1250** and ignore the value signalled by **RSRQ-Range** (without the suffix). **RSRQ-Range-r13** covers the original range and extended **RSRQ-Range-v1250**. **RSRQ-Range-r13** may be signalled without the corresponding original field and without any requirements for indicated support of **extendedRSRQ-LowerRange-r12** or **rsrq-OnAllSymbols-r12**.

---

**RSRQ-Range information element**

--- ASN1START

RSRQ-Range ::= INTEGER(0..34)

RSRQ-Range-v1250 ::= INTEGER(-30..46)

RSRQ-Range-r13 ::= INTEGER(-30..46)
RSRQ-Type
The IE RSRQ-Type specifies the RSRQ value type used in RSRQ measurements, see TS 36.214 [48].

RSRQ-Type information element

RSRQ-Type-r12 ::= SEQUENCE {
  allSymbols-r12       BOOLEAN,
  wideBand-r12       BOOLEAN
}

-- ASN1STOP

<table>
<thead>
<tr>
<th>RSRQ-Type field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>allSymbols</strong></td>
</tr>
<tr>
<td>Value TRUE indicates use of all OFDM symbols when performing RSRQ measurements.</td>
</tr>
<tr>
<td><strong>wideBand</strong></td>
</tr>
<tr>
<td>Value TRUE indicates use of a wider bandwidth when performing RSRQ measurements.</td>
</tr>
</tbody>
</table>

RS-SINR-Range
The IE RS-SINR-Range specifies the value range used in RS-SINR measurements and thresholds. Integer value for RS-SINR measurements is according to mapping table in TS 36.133 [16].

RS-SINR-Range information element

RS-SINR-Range-r13 ::= INTEGER(0..127)

-- ASN1STOP

RSSI-Range-r13
The IE RSSI-Range specifies the value range used in RSSI measurements and thresholds. Integer value for RSSI measurements is according to mapping table in TS 36.133 [16].

RSSI-Range information element

-- ASN1START
RSSI-Range-r13 ::= INTEGER(0..76)

-- ASN1STOP

– TimeToTrigger

The IE `TimeToTrigger` specifies the value range used for time to trigger parameter, which concerns the time during which specific criteria for the event needs to be met in order to trigger a measurement report. Value ms0 corresponds to 0 ms and behaviour as specified in 7.3.2 applies, ms40 corresponds to 40 ms, and so on.

**TimeToTrigger information element**

-- ASN1START

TimeToTrigger ::= ENUMERATED {
                          ms0, ms40, ms64, ms80, ms100, ms128, ms160, ms256,
                          ms320, ms480, ms512, ms640, ms1024, ms1280, ms2560,
                          ms5120} 

-- ASN1STOP

– UL-DelayConfig

The IE `UL-DelayConfig` IE specifies the configuration of the UL PDCP Packet Delay per QCI measurement specified in TS36.314 [71].

**UL-DelayConfig information element**

-- ASN1START

UL-DelayConfig-r13 ::= CHOICE {
                          release NULL,
                          setup SEQUENCE {
                          delayThreshold-r13 ENUMERATED {
                          ms30, ms40, ms50, ms60, ms70, ms80,
                          ms90, ms100, ms150, ms300, ms500, ms750, spare4,
                          spare3, spare2, spare1}
                          }
                          }

UL-DelayConfig field descriptions

delayThreshold
Indicates the delay threshold value used by UE to provide results of UL PDCP Packet Delay per QCI measurement as specified in TS 36.314 [71]. Value in milliseconds. Value ms30 means 30 ms and so on.

-- WLAN-CarrierInfo

The IE WLAN-CarrierInfo is used to identify the WLAN frequency band information, as specified in Annex E in [67].

WLAN-CarrierInfo information element

-- ASN1START

WLAN-CarrierInfo-r13 ::= SEQUENCE {
otherClass-r13 INTEGER (0..255) OPTIONAL, -- Need ON
countryCode-r13 ENUMERATED {unitedStates, europe, japan, global, ...} OPTIONAL, -- Need ON
channelNumbers-r13 WLAN-ChannelList-r13 OPTIONAL, -- Need ON
...}

WLAN-ChannelList-r13 ::= SEQUENCE (SIZE (1..maxWLAN-Channels-r13)) OF WLAN-Channel-r13

WLAN-Channel-r13 ::= INTEGER(0..255)

-- ASN1STOP

WLAN-CarrierInfo field descriptions

channelNumbers
Indicates the WLAN channels as defined in IEEE 802.11-2012 [67]. Value 0 is not used.
countryCode
Indicates the country code of WLAN as defined in IEEE 802.11-2012 [67].
operatingClass
Indicates the Operating Class of WLAN as defined in IEEE 802.11-2012 [67].

-- WLAN-RSSI-Range

The IE WLAN-RSSI-Range specifies the value range used in WLAN RSSI measurements and thresholds. Integer value for WLAN RSSI measurements is according to mapping table in TS 36.133 [16]. Value 0 corresponds to -infinity, value 1 to -100dBm, value 2 to -99dBm, and so on (i.e. in steps of 1dBm) until value 140, which corresponds to 39dBm, while value 141 corresponds to +infinity.

WLAN-RSSI-Range information element

-- ASN1START
The IE `WLAN-Status` indicates the current status of WLAN connection. The values are set as described in Sections 5.6.15.2 and 5.6.15.4.

**WLAN-Status information element**

```asn1
WLAN-Status-r13 ::= ENUMERATED {successfulAssociation, failureWlanRadioLink, failureWlanUnavailable, failureTimeout}
```

### 6.3.6 Other information elements

#### AbsoluteTimeInfo

The IE `AbsoluteTimeInfo` indicates an absolute time in a format YY-MM-DD HH:MM:SS and using BCD encoding. The first/ leftmost bit of the bit string contains the most significant bit of the most significant digit of the year and so on.

**AbsoluteTimeInfo information element**

```asn1
AbsoluteTimeInfo-r10 ::= BIT STRING (SIZE (48))
```

#### AreaConfiguration

The `AreaConfiguration` indicates area for which UE is requested to perform measurement logging. If not configured, measurement logging is not restricted to specific cells or tracking areas but applies as long as the RPLMN is contained in `plmn-IdentityList` stored in `VarLogMeasReport`.

**AreaConfiguration information element**

```asn1
AreaConfiguration-r10 ::= CHOICE {
cellGlobalIdList-r10  CellGlobalIdList-r10,
trackingAreaCodeList-r10  TrackingAreaCodeList-r10
}

AreaConfiguration-v1130 ::= SEQUENCE {
  trackingAreaCodeList-v1130  TrackingAreaCodeList-v1130
}

CellGlobalIdList-r10 ::= SEQUENCE (SIZE (1..32)) OF CellGlobalIdEUTRA

TrackingAreaCodeList-r10 ::= SEQUENCE (SIZE (1..8)) OF TrackingAreaCode

TrackingAreaCodeList-v1130 ::= SEQUENCE {
  plmn-Identity-perTAC-List-r11   SEQUENCE (SIZE (1..8)) OF PLMN-Identity
}

-- ASN1STOP

<table>
<thead>
<tr>
<th>AreaConfiguration field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>plmn-Identity-perTAC-List</td>
</tr>
<tr>
<td>Includes the PLMN identity for each of the TA codes included in trackingAreaCodeList. The PLMN identity listed first in plmn-Identity-perTAC-List corresponds with the TA code listed first in trackingAreaCodeList and so on.</td>
</tr>
</tbody>
</table>

– C-RNTI

The IE C-RNTI identifies a UE having a RRC connection within a cell.

**C-RNTI information element**

-- ASN1START

C-RNTI ::= BIT STRING (SIZE (16))

-- ASN1STOP

– DedicatedInfoCDMA2000

The DedicatedInfoCDMA2000 is used to transfer UE specific CDMA2000 information between the network and the UE. The RRC layer is transparent for this information.
DedicatedInfoCDMA2000 information element

DedicatedInfoCDMA2000 ::= OCTET STRING

-- ASN1STOP

– DedicatedInfoNAS

The IE DedicatedInfoNAS is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is transparent for this information.

DedicatedInfoNAS information element

DedicatedInfoNAS ::= OCTET STRING

-- ASN1STOP

– FilterCoefficient

The IE FilterCoefficient specifies the measurement filtering coefficient. Value fc0 corresponds to k = 0, fc1 corresponds to k = 1, and so on.

FilterCoefficient information element

FilterCoefficient ::= ENUMERATED {
  fc0, fc1, fc2, fc3, fc4, fc5,
  fc6, fc7, fc8, fc9, fc11, fc13,
  fc15, fc17, fc19, spare1, ...}
– LoggingDuration

The **LoggingDuration** indicates the duration for which UE is requested to perform measurement logging. Value `min10` corresponds to 10 minutes, value `min20` corresponds to 20 minutes and so on.

**LoggingDuration information element**

```
-- ASN1START

LoggingDuration-r10 ::= ENUMERATED {
    min10, min20, min40, min60, min90, min120, spare2, spare1}

-- ASN1STOP
```

– LoggingInterval

The **LoggingInterval** indicates the periodicity for logging measurement results. Value `ms1280` corresponds to 1.28s, value `ms2560` corresponds to 2.56s and so on.

**LoggingInterval information element**

```
-- ASN1START

LoggingInterval-r10 ::= ENUMERATED {
    ms1280, ms2560, ms5120, ms10240, ms20480,
    ms30720, ms40960, ms61440}

-- ASN1STOP
```

– MeasSubframePattern

The IE **MeasSubframePattern** is used to specify a subframe pattern. The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where SFN is that of PCell and x is the size of the bit string divided by 10. "1" denotes that the corresponding subframe is used.

**MeasSubframePattern information element**

```
-- ASN1START

MeasSubframePattern-r10 ::= CHOICE {
    subframePatternFDD-r10 BIT STRING (SIZE (40)),
    subframePatternTDD-r10 CHOICE {
        subframeConfig1-5-r10 BIT STRING (SIZE (20)),
        subframeConfig0-r10 BIT STRING (SIZE (70)),
    }}

-- ASN1STOP
```
subframeConfig6-r10 BIT STRING (SIZE (60)),

...,

...,

}

-- ASN1STOP

– MMEC

The IE MMEC identifies an MME within the scope of an MME Group within a PLMN, see TS 23.003 [27].

**MMEC information element**

-- ASN1START

MMEC ::= BIT STRING (SIZE (8))

-- ASN1STOP

– NeighCellConfig

The IE NeighCellConfig is used to provide the information related to MBSFN and TDD UL/DL configuration of neighbour cells.

**NeighCellConfig information element**

-- ASN1START

NeighCellConfig ::= BIT STRING (SIZE (2))

-- ASN1STOP
### NeighCellConfig field descriptions

**neighCellConfig**

Provides information related to MBSFN and TDD UL/DL configuration of neighbour cells of this frequency

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>Not all neighbour cells have the same MBSFN subframe allocation as the serving cell on this frequency, if configured, and as the PCell otherwise.</td>
</tr>
<tr>
<td>10</td>
<td>The MBSFN subframe allocations of all neighbour cells are identical to or subsets of that in the serving cell on this frequency, if configured, and of that in the PCell otherwise.</td>
</tr>
<tr>
<td>01</td>
<td>No MBSFN subframes are present in all neighbour cells.</td>
</tr>
<tr>
<td>11</td>
<td>Different UL/DL allocation in neighbouring cells for TDD compared to the serving cell on this frequency, if configured, and compared to the PCell otherwise.</td>
</tr>
</tbody>
</table>

For TDD, 00, 10 and 01 are only used for same UL/DL allocation in neighbouring cells compared to the serving cell on this frequency, if configured, and compared to the PCell otherwise.

---

**OtherConfig**

The IE *OtherConfig* contains configuration related to other configuration

**OtherConfig information element**

```asn1
OtherConfig-r9 ::= SEQUENCE {
  reportProximityConfig-r9   ReportProximityConfig-r9  OPTIONAL, -- Need ON
  ...,
  [[ idc-Config-r11     IDC-Config-r11     OPTIONAL, -- Need ON
    powerPrefIndicationConfig-r11 PowerPrefIndicationConfig-r11 OPTIONAL, -- Need ON
    obtainLocationConfig-r11  ObtainLocationConfig-r11  OPTIONAL -- Need ON
  ]]
}
```

```asn1
IDC-Config-r11 ::=     SEQUENCE {
  idc-Indication-r11     ENUMERATED {setup}  OPTIONAL,  -- Need OR
  autonomousDenialParameters-r11  SEQUENCE {
    autonomousDenialSubframes-r11   ENUMERATED {n2, n5, n10, n15,
                         n20, n30, spare2, spare1},
    autonomousDenialValidity-r11   ENUMERATED {
                              sf200, sf500, sf1000, sf2000,
                              spare4, spare3, spare2, spare1}
  }  OPTIONAL,   -- Need OR
  ...,
  [[ idc-Indication-UL-CA-r11  ENUMERATED {setup}  OPTIONAL  -- Cond idc-Ind
  ]]
}```
ObtainLocationConfig-r11 ::= SEQUENCE {
    obtainLocation-r11 ENUMERATED {setup} OPTIONAL -- Need OR
}

PowerPrefIndicationConfig-r11 ::= CHOICE{
    release NULL,
    setup SEQUENCE{
        powerPrefIndicationTimer-r11 ENUMERATED {s0, s0dot5, s1, s2, s5, s10, s20,
                                s30, s60, s90, s120, s300, s600, spare3,
                                spare2, spare1 }
    }
}

ReportProximityConfig-r9 ::= SEQUENCE {
    proximityIndicationEUTRA-r9 ENUMERATED {enabled} OPTIONAL, -- Need OR
    proximityIndicationUTRA-r9 ENUMERATED {enabled} OPTIONAL -- Need OR
}

--- ASN1STOP

<table>
<thead>
<tr>
<th><strong>OtherConfig field descriptions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>autonomousDenialSubframes</strong></td>
</tr>
<tr>
<td>Indicates the maximum number of the UL subframes for which the UE is allowed to deny any UL transmission. Value n2 corresponds to 2 subframes, n5 to 5 subframes and so on. E-UTRAN does not configure autonomous denial for frequencies on which SCG cells are configured.</td>
</tr>
<tr>
<td><strong>autonomousDenialValidity</strong></td>
</tr>
<tr>
<td>Indicates the validity period over which the UL autonomous denial subframes shall be counted. Value sf200 corresponds to 200 subframes, sf500 corresponds to 500 subframes and so on.</td>
</tr>
<tr>
<td><strong>idc-Indication</strong></td>
</tr>
<tr>
<td>The field is used to indicate whether the UE is configured to initiate transmission of the InDeviceCoexIndication message to the network.</td>
</tr>
<tr>
<td><strong>idc-Indication-UL-CA</strong></td>
</tr>
<tr>
<td>The field is used to indicate whether the UE is configured to provide IDC indications for UL CA using the InDeviceCoexIndication message.</td>
</tr>
<tr>
<td><strong>obtainLocation</strong></td>
</tr>
<tr>
<td>Requests the UE to attempt to have detailed location information available using GNSS. E-UTRAN configures the field only if includeLocationInfo is configured for one or more measurements.</td>
</tr>
<tr>
<td><strong>powerPrefIndicationTimer</strong></td>
</tr>
<tr>
<td>Prohibit timer for Power Preference Indication reporting. Value in seconds. Value s0 means prohibit timer is set to 0 second, value s0dot5 means prohibit timer is set to 0.5 second, value s1 means prohibit timer is set to 1 second and so on.</td>
</tr>
<tr>
<td><strong>reportProximityConfig</strong></td>
</tr>
<tr>
<td>Indicates, for each of the applicable RATs (EUTRA, UTRA), whether or not proximity indication is enabled for CSG member cell(s) of the concerned RAT. Note.</td>
</tr>
</tbody>
</table>
NOTE: Enabling/ disabling of proximity indication includes enabling/ disabling of the related functionality e.g. autonomous search in connected mode.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>idc-Ind</td>
<td>The field is optionally present if idc-Indication is present, need OR. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

The **RAND-CDMA2000** concerns a random value, generated by the eNB, to be passed to the CDMA2000 upper layers.

**RAND-CDMA2000 information element**

```plaintext
-- ASN1START

RAND-CDMA2000 ::= BIT STRING (SIZE (32))

-- ASN1STOP
```

**RAT-Type**

The IE **RAT-Type** is used to indicate the radio access technology (RAT), including E-UTRA, of the requested/ transferred UE capabilities.

**RAT-Type information element**

```plaintext
-- ASN1START

RAT-Type ::= ENUMERATED {
    eutra, utra, geran-cs, geran-ps, cdma2000-1XRTT,
    spare3, spare2, spare1, ...}

-- ASN1STOP
```

**ResumeIdentity**

The IE **ResumeIdentity** is used to identify the suspended UE context

**ResumeIdentity information element**

```plaintext
-- ASN1START

ResumeIdentity-r13 ::= BIT STRING (SIZE(40))

-- ASN1STOP
```
- **RRC-TransactionIdentifier**

  The IE *RRC-TransactionIdentifier* is used, together with the message type, for the identification of an RRC procedure (transaction).

  **RRC-TransactionIdentifier information element**

  ```
  RRC-TransactionIdentifier ::= INTEGER (0..3)
  ```

- **S-TMSI**

  The IE *S-TMSI* contains an S-Temporary Mobile Subscriber Identity, a temporary UE identity provided by the EPC which uniquely identifies the UE within the tracking area, see TS 23.003 [27].

  **S-TMSI information element**

  ```
  S-TMSI ::= SEQUENCE {
    mmec           MMEC,
    m-TMSI         BIT STRING (SIZE (32))
  }
  ```

  **S-TMSI field descriptions**

  **m-TMSI**
  The first/leftmost bit of the bit string contains the most significant bit of the M-TMSI.

- **TraceReference**

  The *TraceReference* contains parameter Trace Reference as defined in TS 32.422 [58].

  **TraceReference information element**

  ```
  TraceReference-r10 ::= SEQUENCE {
    plmn-Identity-r10 PLMN-Identity,
  }
  ```
The IE **UE-CapabilityRAT-ContainerList** contains list of containers, one for each RAT for which UE capabilities are transferred, if any.

**UE-CapabilityRAT-ContainerList** information element

```
-- ASN1START

UE-CapabilityRAT-ContainerList ::= SEQUENCE (SIZE (0..maxRAT-Capabilities)) OF UE-CapabilityRAT-Container

UE-CapabilityRAT-Container ::= SEQUENCE {
  rat-Type       RAT-Type,
  ueCapabilityRAT-Container   OCTET STRING
}

-- ASN1STOP
```

**UECapabilityRAT-ContainerList field descriptions**

**ueCapabilityRAT-Container**

Container for the UE capabilities of the indicated RAT. The encoding is defined in the specification of each RAT:

- For E-UTRA: the encoding of UE capabilities is defined in IE **UE-EUTRA-Capability**.
- For UTRA: the octet string contains the INTER RAT HANDOVER INFO message defined in TS 25.331 [19]. For GERAN CS: the octet string contains the concatenated string of the Mobile Station Classmark 2 and Mobile Station Classmark 3. The first 5 octets correspond to Mobile Station Classmark 2 and the following octets correspond to Mobile Station Classmark 3. The Mobile Station Classmark 2 is formatted as 'TLV' and is coded in the same way as the Mobile Station Classmark 2 information element in TS 24.008 [49]. The first octet is the Mobile station classmark 2 IE and its value shall be set to 33H. The second octet is the Length of mobile station classmark 2 and its value shall be set to 3. The octet 3 contains the first octet of the value part of the Mobile Station Classmark 2 information element, the octet 4 contains the second octet of the value part of the Mobile Station Classmark 2 information element and so on. For each of these octets, the first/ leftmost/ most significant bit of the octet contains b8 of the corresponding octet of the Mobile Station Classmark 2. The Mobile Station Classmark 3 is formatted as 'V' and is coded in the same way as the value part in the Mobile station classmark 3 information element in TS 24.008 [49]. The sixth octet of this octet string contains octet 1 of the value part of Mobile station classmark 3, the seventh octet of this octet string contains octet 2 of the value part of Mobile station classmark 3 and so on. Note.

- For GERAN PS: the encoding of UE capabilities is formatted as 'V' and is coded in the same way as the value part in the MS Radio Access Capability information element in TS 24.008 [49].
- For CDMA2000-1XRTT: the octet string contains the A21 Mobile Subscription Information and the encoding of this is defined in A.50008 [33]. The A21 Mobile Subscription Information contains the supported CDMA2000 1xRTT band class and band sub-class information.

NOTE: The value part is specified by means of CSN.1, which encoding results in a bit string, to which final padding may be appended up to the next octet boundary TS 24.008 [49]. The first/ leftmost bit of the CSN.1 bit string is placed in the first/ leftmost/ most significant bit of the first octet. This continues until the last bit of the CSN.1 bit string, which is placed in the last/ rightmost/ least significant bit of the last octet.
The IE **UE-EUTRA-Capability** is used to convey the E-UTRA UE Radio Access Capability Parameters, see TS 36.306 [5], and the Feature Group Indicators for mandatory features (defined in Annexes B.1 and C.1) to the network. The IE **UE-EUTRA-Capability** is transferred in E-UTRA or in another RAT.

NOTE 0: For (UE capability specific) guidelines on the use of keyword OPTIONAL, see Annex A.3.5.

**UE-EUTRA-Capability information element**

```asn1
UE-EUTRA-Capability ::= SEQUENCE {
    accessStratumRelease    AccessStratumRelease,
    ue-Category       INTEGER (1..5),
    pdcp-Parameters      PDCP-Parameters,
    phyLayerParameters     PhyLayerParameters,
    rf-Parameters      RF-Parameters,
    measParameters      MeasParameters,
    featureGroupIndicators    BIT STRING (SIZE (32))    OPTIONAL,
    interRAT-Parameters    SEQUENCE {
        utraFDD        IRAT-ParametersUTRA-FDD    OPTIONAL,
        utraTDD128       IRAT-ParametersUTRA-TDD128    OPTIONAL,
        utraTDD384       IRAT-ParametersUTRA-TDD384    OPTIONAL,
        utraTDD768       IRAT-ParametersUTRA-TDD768    OPTIONAL,
        geran        IRAT-ParametersGERAN     OPTIONAL,
        cdma2000-HRPD      IRAT-ParametersCDMA2000-HRPD   OPTIONAL,
        cdma2000-1XRTT      IRAT-ParametersCDMA2000-1XRTT   OPTIONAL
    },
    nonCriticalExtension    UE-EUTRA-Capability-v920-IEs  OPTIONAL
}
```

**-- Late non critical extensions**

```asn1
UE-EUTRA-Capability-v9a0-IEs ::= SEQUENCE {
    featureGroupIndRel9Add-r9   BIT STRING (SIZE (32))    OPTIONAL,
    fdd-Add-UE-EUTRA-Capabilities-r9  UE-EUTRA-CapabilityAddXDD-Mode-r9    OPTIONAL,
    tdd-Add-UE-EUTRA-Capabilities-r9  UE-EUTRA-CapabilityAddXDD-Mode-r9    OPTIONAL,
    nonCriticalExtension    UE-EUTRA-Capability-v9c0-IEs  OPTIONAL
}
```

**-- Late non critical extensions**

```asn1
UE-EUTRA-Capability-v9c0-IEs ::= SEQUENCE {
    fdd-Add-UE-EUTRA-Capabilities-r9  UE-EUTRA-CapabilityAddXDD-Mode-r9    OPTIONAL,
    nonCriticalExtension    UE-EUTRA-Capability-v9c0-IEs  OPTIONAL
}
```
UE-EUTRA-Capability-v9c0-IEs ::= SEQUENCE {
  interRAT-ParametersUTRA-v9c0 IRAT-ParametersUTRA-v9c0 OPTIONAL,
  nonCriticalExtension    UE-EUTRA-Capability-v9d0-IEs OPTIONAL
}

UE-EUTRA-Capability-v9d0-IEs ::= SEQUENCE {
  phyLayerParameters-v9d0    PhyLayerParameters-v9d0   OPTIONAL,
  nonCriticalExtension    UE-EUTRA-Capability-v9e0-IEs OPTIONAL
}

UE-EUTRA-Capability-v9e0-IEs ::= SEQUENCE {
  rf-Parameters-v9e0         RF-Parameters-v9e0   OPTIONAL,
  nonCriticalExtension    UE-EUTRA-Capability-v9h0-IEs OPTIONAL
}

UE-EUTRA-Capability-v9h0-IEs ::= SEQUENCE {
  interRAT-ParametersUTRA-v9h0   IRAT-ParametersUTRA-v9h0   OPTIONAL,
  -- Following field is only to be used for late REL-9 extensions
  lateNonCriticalExtension   OCTET STRING       OPTIONAL,
  nonCriticalExtension    UE-EUTRA-Capability-v10c0-IEs   OPTIONAL
}

UE-EUTRA-Capability-v10c0-IEs ::= SEQUENCE {
  otdoa-PositioningCapabilities-r10 OTDOA-PositioningCapabilities-r10 OPTIONAL,
  nonCriticalExtension    UE-EUTRA-Capability-v10f0-IEs   OPTIONAL
}

UE-EUTRA-Capability-v10f0-IEs ::= SEQUENCE {
  rf-Parameters-v10f0         RF-Parameters-v10f0   OPTIONAL,
  nonCriticalExtension    UE-EUTRA-Capability-v10i0-IEs   OPTIONAL
}

UE-EUTRA-Capability-v10i0-IEs ::= SEQUENCE {
  rf-Parameters-v10i0         RF-Parameters-v10i0   OPTIONAL,
lateNonCriticalExtension OCTET STRING (CONTAINING UE-EUTRA-Capability-v10j0-IEs) OPTIONAL,
nonCriticalExtension UE-EUTRA-Capability-v11d0-IEs OPTIONAL
}

UE-EUTRA-Capability-v11d0-IEs ::= SEQUENCE {
rf-Parameters-v11d0 RF-Parameters-v11d0 OPTIONAL,
oncriticalExtension SEQUENCE {} OPTIONAL
}

UE-EUTRA-Capability-v11x0-IEs ::= SEQUENCE {
-- Following field is only to be used for late REL-11 extensions
lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension UE-EUTRA-Capability-v12b0-IEs OPTIONAL
}

UE-EUTRA-Capability-v12b0-IEs ::= SEQUENCE {
rf-Parameters-v12b0 RF-Parameters-v12b0 OPTIONAL,
-- Following field is only to be used for late REL-12 extensions
nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- Regular non critical extensions
UE-EUTRA-Capability-v920-IEs ::= SEQUENCE {
phyLayerParameters-v920 PhyLayerParameters-v920,
interRAT-ParametersGERAN-v920 IRAT-ParametersGERAN-v920,
interRAT-ParametersUTRA-v920 IRAT-ParametersUTRA-v920 OPTIONAL,
interRAT-ParametersCDMA2000-v920 IRAT-ParametersCDMA2000-1XRTT-v920 OPTIONAL,
deviceType-r9 ENUMERATED {noBenFromBatConsumpOpt] OPTIONAL,
csg-ProximityIndicationParameters-r9 CSG-ProximityIndicationParameters-r9,
neighCellSI-AcquisitionParameters-r9 NeighCellSI-AcquisitionParameters-r9,
son-Parameters-r9 SON-Parameters-r9,
nonCriticalExtension UE-EUTRA-Capability-v940-IEs OPTIONAL
}

UE-EUTRA-Capability-v940-IEs ::= SEQUENCE {
lateNonCriticalExtension OCTET STRING (CONTAINING UE-EUTRA-Capability-v9a0-IEs) OPTIONAL,
nonCriticalExtension UE-EUTRA-Capability-v1020-IEs OPTIONAL
}

UE-EUTRA-Capability-v1020-IEs ::= SEQUENCE {
ue-Category-v1020 INTEGER (6..8) OPTIONAL,
phyLayerParameters-v1020 PhyLayerParameters-v1020 OPTIONAL,
rf-Parameters-v1020 RF-Parameters-v1020 OPTIONAL,
measParameters-v1020 MeasParameters-v1020 OPTIONAL,
featureGroupIndRel10-r10 BIT STRING (SIZE (32)) OPTIONAL,
interRAT-ParametersCDMA2000-v1020 IRAT-ParametersCDMA2000-1XRTT-v1020 OPTIONAL,
ue-BasedNetwPerfMeasParameters-r10 UE-BasedNetwPerfMeasParameters-r10 OPTIONAL,
interRAT-ParametersUTRA-TDD-v1020 IRAT-ParametersUTRA-TDD-v1020 OPTIONAL,
nonCriticalExtension UE-EUTRA-Capability-v1060-IEs OPTIONAL
}

UE-EUTRA-Capability-v1060-IEs ::= SEQUENCE {
fdd-Add-UE-EUTRA-Capabilities-v1060 UE-EUTRA-CapabilityAddXDD-Mode-v1060 OPTIONAL,
tdd-Add-UE-EUTRA-Capabilities-v1060 UE-EUTRA-CapabilityAddXDD-Mode-v1060 OPTIONAL,
rf-Parameters-v1060 RF-Parameters-v1060 OPTIONAL,
nonCriticalExtension UE-EUTRA-Capability-v1090-IEs OPTIONAL
}

UE-EUTRA-Capability-v1090-IEs ::= SEQUENCE {
rf-Parameters-v1090 RF-Parameters-v1090 OPTIONAL,
nonCriticalExtension UE-EUTRA-Capability-v1130-IEs OPTIONAL
}
UE-EUTRA-Capability-v1130-IEs ::= SEQUENCE {
    pdcp-Parameters-v1130 PDCP-Parameters-v1130,
    phyLayerParameters-v1130 PhyLayerParameters-v1130 OPTIONAL,
    rf-Parameters-v1130 RF-Parameters-v1130,
    measParameters-v1130 MeasParameters-v1130,
    interRAT-ParametersCDMA2000-v1130 IRAT-ParametersCDMA2000-v1130,
    otherParameters-r11 Other-Parameters-r11,
    fdd-Add-UE-EUTRA-Capabilities-v1130 UE-EUTRA-CapabilityAddXDD-Mode-v1130 OPTIONAL,
    tdd-Add-UE-EUTRA-Capabilities-v1130 UE-EUTRA-CapabilityAddXDD-Mode-v1130 OPTIONAL,
    nonCriticalExtension UE-EUTRA-Capability-v1170-IEs OPTIONAL
}

UE-EUTRA-Capability-v1170-IEs ::= SEQUENCE {
    phyLayerParameters-v1170 PhyLayerParameters-v1170 OPTIONAL,
    ue-Category-v1170 INTEGER (9..10) OPTIONAL,
    nonCriticalExtension UE-EUTRA-Capability-v1180-IEs OPTIONAL
}

UE-EUTRA-Capability-v1180-IEs ::= SEQUENCE {
    rf-Parameters-v1180 RF-Parameters-v1180 OPTIONAL,
    mbms-Parameters-r11 MBMS-Parameters-r11 OPTIONAL,
    fdd-Add-UE-EUTRA-Capabilities-v1180 UE-EUTRA-CapabilityAddXDD-Mode-v1180 OPTIONAL,
    tdd-Add-UE-EUTRA-Capabilities-v1180 UE-EUTRA-CapabilityAddXDD-Mode-v1180 OPTIONAL,
    nonCriticalExtension UE-EUTRA-Capability-v11a0-IEs OPTIONAL
}

UE-EUTRA-Capability-v11a0-IEs ::= SEQUENCE {
    ue-Category-v11a0 INTEGER (11..12) OPTIONAL,
    measParameters-v11a0 MeasParameters-v11a0 OPTIONAL,
    nonCriticalExtension UE-EUTRA-Capability-v1250-IEs OPTIONAL
}

UE-EUTRA-Capability-v1250-IEs ::= SEQUENCE {
    ...)
physLayerParameters-v1250     PhyLayerParameters-v1250     OPTIONAL,
rf-Parameters-v1250          RF-Parameters-v1250           OPTIONAL,
rlc-Parameters-r12           RLC-Parameters-r12            OPTIONAL,
ue-BasedNetwPerfMeasParameters-v1250UE-BasedNetwPerfMeasParameters-v1250 OPTIONAL,
uo-CategoryDL-r12           INTEGER (0..14)             OPTIONAL,
uo-CategoryUL-r12           INTEGER (0..13)             OPTIONAL,
wlan-IW-Parameters-r12       WLAN-IW-Parameters-r12        OPTIONAL,
measParameters-v1250         MeasParameters-v1250          OPTIONAL,
dc-Parameters-r12            DC-Parameters-r12             OPTIONAL,
mbms-Parameters-v1250        MBMS-Parameters-v1250         OPTIONAL,
mac-Parameters-r12           MAC-Parameters-r12             OPTIONAL,
ue-CategoryDL-r12           INTEGER (0..14)             OPTIONAL,
uo-CategoryUL-r12           INTEGER (0..13)             OPTIONAL,

UE-EUTRA-Capability-v1260-IEs ::= SEQUENCE {
  ue-CategoryDL-v1260     INTEGER (15..16)      OPTIONAL,
  nonCriticalExtension    UE-EUTRA-Capability-v1270-IEs OPTIONAL
}

UE-EUTRA-Capability-v1270-IEs ::= SEQUENCE {
  rf-Parameters-v1270     RF-Parameters-v1270           OPTIONAL,
  nonCriticalExtension    UE-EUTRA-Capability-v1280-IEs OPTIONAL
}

UE-EUTRA-Capability-v1280-IEs ::= SEQUENCE {
  phyLayerParameters-v1280   PhyLayerParameters-v1280    OPTIONAL,
  nonCriticalExtension    UE-EUTRA-Capability-v1310-IEs    OPTIONAL
}

UE-EUTRA-Capability-v1310-IEs ::= SEQUENCE {
  ue-CategoryDL-v1310    ENUMERATED {n17, m1}     OPTIONAL,
  ue-CategoryUL-v1310    ENUMERATED {n14, m1}     OPTIONAL,

pdcp-Parameters-v1310 PDCP-Parameters-v1310,
rlc-Parameters-v1310 RLC-Parameters-v1310,
mac-Parameters-v1310 MAC-Parameters-v1310 OPTIONAL,
phyLayerParameters-v1310 PhyLayerParameters-v1310 OPTIONAL,
rf-Parameters-v1310 RF-Parameters-v1310 OPTIONAL,
measParameters-v1310 MeasParameters-v1310 OPTIONAL,
dc-Parameters-v1310 DC-Parameters-v1310 OPTIONAL,
sl-Parameters-v1310 SL-Parameters-v1310 OPTIONAL,
scptm-Parameters-r13 SCPTM-Parameters-r13 OPTIONAL,
ce-Parameters-r13 CE-Parameters-r13 OPTIONAL,
interRAT-ParametersWLAN-r13 IRAT-ParametersWLAN-r13,
laa-Parameters-r13 LAA-Parameters-r13 OPTIONAL,
lwa-Parameters-r13 LWA-Parameters-r13 OPTIONAL,
wlan-IW-Parameters-v1310 WLAN-IW-Parameters-v1310,
lwip-Parameters-r13 LWIP-Parameters-r13,

def-Add-UE-EUTRA-Capabilities-v1310 UE-EUTRA-CapabilityAddXDD-Mode-v1310 OPTIONAL,
tdd-Add-UE-EUTRA-Capabilities-v1310 UE-EUTRA-CapabilityAddXDD-Mode-v1310 OPTIONAL,
nonCriticalExtension UE-EUTRA-Capability-v1320-IEs OPTIONAL
}

UE-EUTRA-Capability-v1320-IEs ::= SEQUENCE {
ce-Parameters-v1320 CE-Parameters-v1320 OPTIONAL,
phyLayerParameters-v1320 PhyLayerParameters-v1320 OPTIONAL,
rf-Parameters-v1320 RF-Parameters-v1320 OPTIONAL,

def-Add-UE-EUTRA-Capabilities-v1320 UE-EUTRA-CapabilityAddXDD-Mode-v1320 OPTIONAL,
tdd-Add-UE-EUTRA-Capabilities-v1320 UE-EUTRA-CapabilityAddXDD-Mode-v1320 OPTIONAL,
nonCriticalExtension UE-EUTRA-Capability-v1330-IEs OPTIONAL
}

UE-EUTRA-Capability-v1330-IEs ::= SEQUENCE {
ue-CategoryDL-v13xy INTEGER (18..19) OPTIONAL,
phyLayerParameters-v1330 PhyLayerParameters-v1330 OPTIONAL,
ue-CE-NeedULGaps-r13 ENUMERATED {true} OPTIONAL,
nonCriticalExtension SEQUENCE {} OPTIONAL
}
UE-EUTRA-CapabilityAddXDD-Mode-r9 ::= SEQUENCE {
    phyLayerParameters-r9     PhyLayerParameters OPTIONAL,
    featureGroupIndicators-r9 BIT STRING (SIZE (32)) OPTIONAL,
    featureGroupIndRel9Add-r9 BIT STRING (SIZE (32)) OPTIONAL,
    interRAT-ParametersGERAN-r9 IRAT-ParametersGERAN OPTIONAL,
    interRAT-ParametersUTRA-r9 IRAT-ParametersUTRA-v920 OPTIONAL,
    interRAT-ParametersCDMA2000-r9 IRAT-ParametersCDMA2000-1XRTT-v920 OPTIONAL,
    neighCellSI-AcquisitionParameters-r9 NeighCellSI-AcquisitionParameters-r9 OPTIONAL,
    ...
}

UE-EUTRA-CapabilityAddXDD-Mode-v1060 ::= SEQUENCE {
    phyLayerParameters-v1060     PhyLayerParameters-v1020 OPTIONAL,
    featureGroupIndRel10-v1060   BIT STRING (SIZE (32)) OPTIONAL,
    interRAT-ParametersCDMA2000-v1060 IRAT-ParametersCDMA2000-1XRTT-v1020 OPTIONAL,
    interRAT-ParametersUTRA-TDD-v1060 IRAT-ParametersUTRA-TDD-v1020 OPTIONAL,
    ...
    \[ otdoa-PositioningCapabilities-r10 OTDOA-PositioningCapabilities-r10 OPTIONAL \]
}

UE-EUTRA-CapabilityAddXDD-Mode-v1130 ::= SEQUENCE {
    phyLayerParameters-v1130     PhyLayerParameters-v1130 OPTIONAL,
    measParameters-v1130         MeasParameters-v1130 OPTIONAL,
    otherParameters-r11         Other-Parameters-r11 OPTIONAL,
    ...
}

UE-EUTRA-CapabilityAddXDD-Mode-v1180 ::= SEQUENCE {
    mbms-Parameters-r11         MBMS-Parameters-r11
}

UE-EUTRA-CapabilityAddXDD-Mode-v1250 ::= SEQUENCE {
    phyLayerParameters-v1250     PhyLayerParameters-v1250 OPTIONAL,
measParameters-v1250    MeasParameters-v1250    OPTIONAL

UE-EUTRA-CapabilityAddXDD-Mode-v1310 ::= SEQUENCE {
  phyLayerParameters-v1310    PhyLayerParameters-v1310    OPTIONAL
}

UE-EUTRA-CapabilityAddXDD-Mode-v1320 ::= SEQUENCE {
  phyLayerParameters-v1320    PhyLayerParameters-v1320    OPTIONAL,
  scptm-Parameters-r13    SCPTM-Parameters-r13    OPTIONAL
}

AccessStratumRelease ::= ENUMERATED {
  rel8, rel9, rel10, rel11, rel12, rel13,
  spare2, spare1, ...
}

DC-Parameters-r12 ::= SEQUENCE {
  drb-TypeSplit-r12    ENUMERATED {supported}    OPTIONAL,
  drb-TypeSCG-r12    ENUMERATED {supported}    OPTIONAL
}

DC-Parameters-v1310 ::= SEQUENCE {
  pdcp-TransferSplitUL-r13    ENUMERATED {supported}    OPTIONAL,
  ue-SSTD-Meas-r13    ENUMERATED {supported}    OPTIONAL
}

MAC-Parameters-r12 ::= SEQUENCE {
  logicalChannelSR-ProhibitTimer-r12    ENUMERATED {supported}    OPTIONAL,
  longDRX-Command-r12    ENUMERATED {supported}    OPTIONAL
}

MAC-Parameters-v1310 ::= SEQUENCE {
  extendedMAC-LengthField-r13    ENUMERATED {supported}    OPTIONAL,
  extendedLongDRX-r13    ENUMERATED {supported}    OPTIONAL
}
RLC-Parameters-r12 ::= SEQUENCE {
  extended-RLC-LI-Field-r12 ENUMERATED {supported}
}

RLC-Parameters-v1310 ::= SEQUENCE {
  extendedRLC-SN-SO-Field-r13 ENUMERATED {supported} OPTIONAL
}

PDCP-Parameters ::= SEQUENCE {
  supportedROHC-Profiles SEQUENCE {
    profile0x0001 BOOLEAN,
    profile0x0002 BOOLEAN,
    profile0x0003 BOOLEAN,
    profile0x0004 BOOLEAN,
    profile0x0006 BOOLEAN,
    profile0x0101 BOOLEAN,
    profile0x0102 BOOLEAN,
    profile0x0103 BOOLEAN,
    profile0x0104 BOOLEAN
  },
  maxNumberROHC-ContextSessions ENUMERATED {
    cs2, cs4, cs8, cs12, cs16, cs24, cs32,
    cs48, cs64, cs128, cs256, cs512, cs1024,
    cs16384, spare2, spare1} DEFAULT cs16,
  ...}

PDCP-Parameters-v1310 ::= SEQUENCE {
  pdcp-SN-Extension-r13 ENUMERATED {supported} OPTIONAL,
  supportRohcContextContinue-r13 ENUMERATED {supported} OPTIONAL
}

PDCP-Parameters-v1130 ::= SEQUENCE {
  pdcp-SN-Extension-r11 ENUMERATED {supported} OPTIONAL,
  supportRohcContextContinue-r11 ENUMERATED {supported} OPTIONAL
}

PDCP-Parameters-v1310 ::= SEQUENCE {
  pdcp-SN-Extension-18bits-r13 ENUMERATED {supported} OPTIONAL
}
PhyLayerParameters ::= SEQUENCE {
  ue-TxAntennaSelectionSupported BOOLEAN,
  ue-SpecificRefSigsSupported BOOLEAN
}

PhyLayerParameters-v920 ::= SEQUENCE {
  enhancedDualLayerFDD-r9 ENUMERATED {supported} OPTIONAL,
  enhancedDualLayerTDD-r9 ENUMERATED {supported} OPTIONAL
}

PhyLayerParameters-v9d0 ::= SEQUENCE {
  tm5-FDD-r9 ENUMERATED {supported} OPTIONAL,
  tm5-TDD-r9 ENUMERATED {supported} OPTIONAL
}

PhyLayerParameters-v1020 ::= SEQUENCE {
  twoAntennaPortsForPUCCH-r10 ENUMERATED {supported} OPTIONAL,
  tm9-With-8Tx-FDD-r10 ENUMERATED {supported} OPTIONAL,
  pmi-Disabling-r10 ENUMERATED {supported} OPTIONAL,
  crossCarrierScheduling-r10 ENUMERATED {supported} OPTIONAL,
  simultaneousPUCCH-PUSCH-r10 ENUMERATED {supported} OPTIONAL,
  multiClusterPUSCH-WithinCC-r10 ENUMERATED {supported} OPTIONAL,
  nonContiguousUL-RA-WithinCC-List-r10 NonContiguousUL-RA-WithinCC-List-r10 OPTIONAL
}

PhyLayerParameters-v1130 ::= SEQUENCE {
  crs-InterfHandl-r11 ENUMERATED {supported} OPTIONAL,
  ePDCCH-r11 ENUMERATED {supported} OPTIONAL,
  multiACK-CSI-Reporting-r11 ENUMERATED {supported} OPTIONAL,
  ss-CCH-InterfHandl-r11 ENUMERATED {supported} OPTIONAL,
  tdd-SpecialSubframe-r11 ENUMERATED {supported} OPTIONAL,
  txDiv-PUCCH1b-ChSelect-r11 ENUMERATED {supported} OPTIONAL,
  ul-CoMP-r11 ENUMERATED {supported} OPTIONAL
}
PhyLayerParameters-v1170 ::= SEQUENCE {
    interBandTDD-CA-WithDifferentConfig-r11 BIT STRING (SIZE (2)) OPTIONAL
}

PhyLayerParameters-v1250 ::= SEQUENCE {
    e-HARQ-Pattern-FDD-r12 ENUMERATED {supported} OPTIONAL,
    enhanced-4TxCodebook-r12 ENUMERATED {supported} OPTIONAL,
    tdd-FDD-CA-PCellDuplex-r12 BIT STRING (SIZE (2)) OPTIONAL,
    phy-TDD-Reconfig-TDD-PCell-r12 ENUMERATED {supported} OPTIONAL,
    phy-TDD-Reconfig-FDD-PCell-r12 ENUMERATED {supported} OPTIONAL,
    pusch-FeedbackMode-r12 ENUMERATED {supported} OPTIONAL,
    pusch-SRS-PowerControl-SubframeSet-r12 ENUMERATED {supported} OPTIONAL,
    csi-SubframeSet-r12 ENUMERATED {supported} OPTIONAL,
    noResourceRestrictionForTTIBundling-r12 ENUMERATED {supported} OPTIONAL,
    discoverySignalsInDeactSCell-r12 ENUMERATED {supported} OPTIONAL,
    naics-Capability-List-r12 NAICS-Capability-List-r12 OPTIONAL
}

PhyLayerParameters-v1280 ::= SEQUENCE {
    alternativeTBS-Indices-r12 ENUMERATED {supported} OPTIONAL
}

PhyLayerParameters-v1310 ::= SEQUENCE {
    aperiodicCSI-Reporting-r13 BIT STRING (SIZE (2)) OPTIONAL,
    codebook-HARQ-ACK-r13 BIT STRING (SIZE (2)) OPTIONAL,
    crossCarrierScheduling-B5C-r13 ENUMERATED {supported} OPTIONAL,
    fdd-HARQ-TimingTDD-r13 ENUMERATED {supported} OPTIONAL,
    maxNumberUpdatedCSI-Proc-r13 INTEGER(5..32) OPTIONAL,
    pusch-Format4-r13 ENUMERATED {supported} OPTIONAL,
    pusch-Format5-r13 ENUMERATED {supported} OPTIONAL,
    pusch-SCell-r13 ENUMERATED {supported} OPTIONAL,
    spatialBundling-HARQ-ACK-r13 ENUMERATED {supported} OPTIONAL,
    supportedBlindDecoding-r13 SEQUENCE {
    
}
maxNumberDecoding-r13 INTEGER(1..32) OPTIONAL,
pdcch-CandidateReductions-r13 ENUMERATED {supported} OPTIONAL,
skipMonitoringDCI-Format0-1A-r13 ENUMERATED {supported} OPTIONAL,
  }
uci-PUSCH-Ext-r13 ENUMERATED {supported} OPTIONAL,
crs-InterfMitigationTM10-r13 ENUMERATED {supported} OPTIONAL,
pdsch-CollisionHandling-r13 ENUMERATED {supported} OPTIONAL
}

PhyLayerParameters-v1320 ::= SEQUENCE {
mimo-UE-Parameters-r13 MIMO-UE-Parameters-r13 OPTIONAL
}

PhyLayerParameters-v1330 ::= SEQUENCE {
cch-InterfMitigation-RefRecTypeA-r13 ENUMERATED {supported} OPTIONAL,
cch-InterfMitigation-RefRecTypeB-r13 ENUMERATED {supported} OPTIONAL,
cch-InterfMitigation-MaxNumCCs-r13 INTEGER (1..maxServCell-r13) OPTIONAL,
crs-InterfMitigationTM1toTM9-r13 INTEGER (1..maxServCell-r13) OPTIONAL
}

MIMO-UE-Parameters-r13 ::= SEQUENCE {
parametersTM9-r13 MIMO-UE-ParametersPerTM-r13 OPTIONAL,
parametersTM10-r13 MIMO-UE-ParametersPerTM-r13 OPTIONAL,
srs-EnhancementsTDD-r13 ENUMERATED {supported} OPTIONAL,
srs-Enhancements-r13 ENUMERATED {supported} OPTIONAL,
interferenceMeasRestriction-r13 ENUMERATED {supported} OPTIONAL
}

MIMO-UE-ParametersPerTM-r13 ::= SEQUENCE {
nonPrecoded-r13 MIMO-NonPrecodedCapabilities-r13 OPTIONAL,
beamformed-r13 MIMO-UE-BeamformedCapabilities-r13 OPTIONAL,
channelMeasRestriction-r13 ENUMERATED {supported} OPTIONAL,
dmrs-Enhancements-r13 ENUMERATED {supported} OPTIONAL,
csi-RS-EnhancementsTDD-r13 ENUMERATED {supported} OPTIONAL
}

MIMO-CA-ParametersPerBoBC-r13 ::= SEQUENCE {
parametersTM9-r13 MIMO-CA-ParametersPerBoBCPerTM-r13 OPTIONAL,
parametersTM10-r13 MIMO-CA-ParametersPerBoBCPerTM-r13 OPTIONAL
}
MIMO-CA-ParametersPerBoBCPerTM-r13 ::= SEQUENCE {
  nonPrecoded-r13             MIMO-NonPrecodedCapabilities-r13 OPTIONAL,
  beamformed-r13              MIMO-BeamformedCapabilityList-r13 OPTIONAL,
  dmrs-Enhancements-r13       ENUMERATED {different} OPTIONAL
}

MIMO-NonPrecodedCapabilities-r13 ::= SEQUENCE {
  config1-r13                ENUMERATED {supported} OPTIONAL,
  config2-r13                ENUMERATED {supported} OPTIONAL,
  config3-r13                ENUMERATED {supported} OPTIONAL,
  config4-r13                ENUMERATED {supported} OPTIONAL
}

MIMO-UE-BeamformedCapabilities-r13 ::= SEQUENCE {
  altCodebook-r13            ENUMERATED {supported} OPTIONAL,
  mimo-BeamformedCapabilities-r13 MIMO-BeamformedCapabilityList-r13
}

MIMO-BeamformedCapabilityList-r13 ::= SEQUENCE (SIZE (1..maxCSI-Proc-r11)) OF MIMO-BeamformedCapabilities-r13

MIMO-BeamformedCapabilities-r13 ::= SEQUENCE {
  k-Max-r13                  INTEGER (1..8),
  n-MaxList-r13              BIT STRING (SIZE (1..7)) OPTIONAL
}

NonContiguousUL-RA-WithinCC-List-r10 ::= SEQUENCE (SIZE (1..maxBands)) OF NonContiguousUL-RA-WithinCC-r10

NonContiguousUL-RA-WithinCC-r10 ::= SEQUENCE {
  nonContiguousUL-RA-WithinCC-Info-r10 ENUMERATED {supported} OPTIONAL
}

RF-Parameters ::= SEQUENCE {
}
supportedBandListEUTRA SupportedBandListEUTRA
}

RF-Parameters-v9e0 ::= SEQUENCE {
    supportedBandListEUTRA-v9e0 SupportedBandListEUTRA-v9e0 OPTIONAL
}

RF-Parameters-v1020 ::= SEQUENCE {
    supportedBandCombination-r10 SupportedBandCombination-r10
}

RF-Parameters-v1060 ::= SEQUENCE {
    supportedBandCombinationExt-r10 SupportedBandCombinationExt-r10
}

RF-Parameters-v1090 ::= SEQUENCE {
    supportedBandCombination-v1090 SupportedBandCombination-v1090 OPTIONAL
}

RF-Parameters-v10f0 ::= SEQUENCE {
    modifiedMPR-Behavior-r10 BIT STRING (SIZE (32)) OPTIONAL
}

RF-Parameters-v10i0 ::= SEQUENCE {
    supportedBandCombination-v10i0 SupportedBandCombination-v10i0 OPTIONAL
}

RF-Parameters-v10j0 ::= SEQUENCE {
    multiNS-Pmax-r10 ENUMERATED {supported} OPTIONAL
}

RF-Parameters-v1130 ::= SEQUENCE {
    supportedBandCombination-v1130 SupportedBandCombination-v1130 OPTIONAL
}
RF-Parameters-v1180 ::= SEQUENCE {
  freqBandRetrieval-r11 ENUMERATED {supported} OPTIONAL,
  requestedBands-r11 SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicator-r11 OPTIONAL,
  supportedBandCombinationAdd-r11 SupportedBandCombinationAdd-r11 OPTIONAL
}

RF-Parameters-v11d0 ::= SEQUENCE {
  supportedBandCombinationAdd-v11d0 SupportedBandCombinationAdd-v11d0 OPTIONAL
}

RF-Parameters-v1250 ::= SEQUENCE {
  supportedBandCombinationAdd-v1250 SupportedBandCombinationAdd-v1250 OPTIONAL,
  freqBandPriorityAdjustment-r12 ENUMERATED {supported} OPTIONAL
}

RF-Parameters-v1270 ::= SEQUENCE {
  supportedBandCombination-v1270 SupportedBandCombination-v1270 OPTIONAL,
  supportedBandCombinationAdd-v1270 SupportedBandCombinationAdd-v1270 OPTIONAL
}

RF-Parameters-v1310 ::= SEQUENCE {
  eNB-RequestedParameters-r13 SEQUENCE {
    reducedIntNonContCombRequested-r13 ENUMERATED {true} OPTIONAL,
    requestedCCsDL-r13 INTEGER (2..32) OPTIONAL,
    requestedCCsUL-r13 INTEGER (2..32) OPTIONAL,
    skipFallbackCombRequested-r13 ENUMERATED {true} OPTIONAL
  } OPTIONAL,
  maximumCCsRetrieval-r13 ENUMERATED {supported} OPTIONAL,
  skipFallbackCombinations-r13 ENUMERATED {supported} OPTIONAL,
  reducedIntNonContComb-r13 ENUMERATED {supported} OPTIONAL,
  supportedBandListEUTRA-v1310 SupportedBandListEUTRA-v1310 OPTIONAL
}
RF-Parameters-v1320 ::= SEQUENCE {
  supportedBandListEUTRA-v1320 SupportedBandListEUTRA-v1320 OPTIONAL,
  supportedBandCombination-v1320 SupportedBandCombination-v1320 OPTIONAL,
  supportedBandCombinationAdd-v1320 SupportedBandCombinationAdd-v1320 OPTIONAL,
  supportedBandCombinationReduced-v1320 SupportedBandCombinationReduced-v1320 OPTIONAL
}

RF-Parameters-v12b0 ::= SEQUENCE {
  maxLayersMIMO-Indication-r12 ENUMERATED {supported} OPTIONAL
}

SupportedBandCombination-r10 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-r10

SupportedBandCombinationExt-r10 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParametersExt-r10

SupportedBandCombination-v1090 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1090

SupportedBandCombination-v10i0 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v10i0

SupportedBandCombination-v1130 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1130

SupportedBandCombination-v1250 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1250

SupportedBandCombination-v1270 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1270

SupportedBandCombination-v1320 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandCombinationParameters-v1320
SupportedBandCombinationAdd-r11 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-r11

SupportedBandCombinationAdd-v11d0 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v10i0

SupportedBandCombinationAdd-v1250 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1250

SupportedBandCombinationAdd-v1270 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1270

SupportedBandCombinationAdd-v1320 ::= SEQUENCE (SIZE (1..maxBandComb-r11)) OF BandCombinationParameters-v1320

SupportedBandCombinationReduced-r13 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF BandCombinationParameters-r13

SupportedBandCombinationReduced-v1320 ::= SEQUENCE (SIZE (1..maxBandComb-r13)) OF BandCombinationParameters-v1320

BandCombinationParameters-r10 ::= SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-r10

BandCombinationParametersExt-r10 ::= SEQUENCE {
    supportedBandwidthCombinationSet-r10  SupportedBandwidthCombinationSet-r10 OPTIONAL
}

BandCombinationParameters-v1090 ::= SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-v1090

BandCombinationParameters-v10i0 ::= SEQUENCE {
    bandParameterList-v10i0   SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-v10i0  OPTIONAL
}

BandCombinationParameters-v1130 ::= SEQUENCE {
    multipleTimingAdvance-r11  ENUMERATED {supported} OPTIONAL,
    simultaneousRx-Tx-r11   ENUMERATED {supported} OPTIONAL,
}
BandCombinationParameters-r11 ::= SEQUENCE {
  bandParameterList-r11  SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-v1130  OPTIONAL, 
  ...  
}

BandCombinationParameters-v1250 ::= SEQUENCE {
  dc-Support-r12     SEQUENCE {
    asynchronous-r12    ENUMERATED {supported}   OPTIONAL, 
    supportedCellGrouping-r12  CHOICE {
      threeEntries-r12    BIT STRING (SIZE(3)), 
      fourEntries-r12     BIT STRING (SIZE(7)), 
      fiveEntries-r12     BIT STRING (SIZE(15))  
    }        OPTIONAL 
  }  OPTIONAL, 
  supportedNAICS-2CRS-AP-r12  BIT STRING (SIZE (1..maxNAICS-Entries-r12))  OPTIONAL, 
  commSupportedBandsPerBC-r12  BIT STRING (SIZE (1.. maxBands))  OPTIONAL, 
  ...  
}

BandCombinationParameters-v1270 ::= SEQUENCE {
  bandParameterList-v1270   SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF 
                     BandParameters-v1270  OPTIONAL 
}

BandCombinationParameters-r13 ::= SEQUENCE {
  ...  
}
differentFallbackSupported-r13 ENUMERATED {true} OPTIONAL,
bandParameterList-r13 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-r13,
supportedBandwidthCombinationSet-r13 SupportedBandwidthCombinationSet-r10 OPTIONAL,
multipleTimingAdvance-r13 ENUMERATED {supported} OPTIONAL,
simultaneousRx-Tx-r13 ENUMERATED {supported} OPTIONAL,
bandInfoEUTRA-r13 BandInfoEUTRA,
dc-Support-r13 SEQUENCE {
  asynchronous-r13 ENUMERATED {supported} OPTIONAL,
  supportedCellGrouping-r13 CHOICE {
    threeEntries-r13 BIT STRING (SIZE(3)),
    fourEntries-r13 BIT STRING (SIZE(7)),
    fiveEntries-r13 BIT STRING (SIZE(15))
  } OPTIONAL,
} OPTIONAL,
supportedNAICS-2CRS-AP-r13 BIT STRING (SIZE (1..maxNAICS-Entries-r12)) OPTIONAL,
commSupportedBandsPerBC-r13 BIT STRING (SIZE (1..maxBands)) OPTIONAL
}

BandCombinationParameters-v1320 ::= SEQUENCE {
  bandParameterList-v1320 SEQUENCE (SIZE (1..maxSimultaneousBands-r10)) OF BandParameters-v1320 OPTIONAL,
  additionalRx-Tx-PerformanceReq-r13 ENUMERATED {supported} OPTIONAL
}

SupportedBandwidthCombinationSet-r10 ::= BIT STRING (SIZE (1..maxBandwidthCombSet-r10))

BandParameters-r10 ::= SEQUENCE {
  bandEUTRA-r10 FreqBandIndicator,
  bandParametersUL-r10 BandParametersUL-r10 OPTIONAL,
  bandParametersDL-r10 BandParametersDL-r10 OPTIONAL
}

BandParameters-v1090 ::= SEQUENCE {
  bandEUTRA-v1090 FreqBandIndicator-v9e0 OPTIONAL,
  ...
BandParameters-v10i0 ::= SEQUENCE {
  bandParametersDL-v10i0  SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF CA-MIMO-ParametersDL-v10i0
}

BandParameters-v1130 ::= SEQUENCE {
  supportedCSI-Proc-r11   ENUMERATED {n1, n3, n4}
}

BandParameters-r11 ::= SEQUENCE {
  bandEUTRA-r11  FreqBandIndicator-r11,
  bandParametersUL-r11   BandParametersUL-r10     OPTIONAL,
  bandParametersDL-r11   BandParametersDL-r10     OPTIONAL,
  supportedCSI-Proc-r11   ENUMERATED {n1, n3, n4}     OPTIONAL
}

BandParameters-v1270 ::= SEQUENCE {
  bandParametersDL-v1270   SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF CA-MIMO-ParametersDL-v1270
}

BandParameters-r13 ::= SEQUENCE {
  bandEUTRA-r13  FreqBandIndicator-r11,
  bandParametersUL-r13    BandParametersUL-r13    OPTIONAL,
  bandParametersDL-r13    BandParametersDL-r13    OPTIONAL,
  supportedCSI-Proc-r13   ENUMERATED {n1, n3, n4}   OPTIONAL
}

BandParameters-v1320 ::= SEQUENCE {
  bandParametersDL-v1320   MIMO-CA-ParametersPerBoBC-r13
}

BandParametersUL-r10 ::= SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF CA-MIMO-ParametersUL-r10
BandParametersUL-r13 ::= CA-MIMO-ParametersUL-r10

CA-MIMO-ParametersUL-r10 ::= SEQUENCE {
    ca-BandwidthClassUL-r10    CA-BandwidthClass-r10,
    supportedMIMO-CapabilityUL-r10   MIMO-CapabilityUL-r10   OPTIONAL
}

BandParametersDL-r10 ::= SEQUENCE (SIZE (1..maxBandwidthClass-r10)) OF CA-MIMO-ParametersDL-r10

BandParametersDL-r13 ::= CA-MIMO-ParametersDL-r13

CA-MIMO-ParametersDL-r10 ::= SEQUENCE {
    ca-BandwidthClassDL-r10    CA-BandwidthClass-r10,
    supportedMIMO-CapabilityDL-r10   MIMO-CapabilityDL-r10   OPTIONAL
}

CA-MIMO-ParametersDL-v10i0 ::= SEQUENCE {
    fourLayerTM3-TM4-r10    ENUMERATED {supported}    OPTIONAL
}

CA-MIMO-ParametersDL-v1270 ::= SEQUENCE {
    intraBandContiguousCC-InfoList-r12   SEQUENCE (SIZE (1..maxServCell-r10)) OF IntraBandContiguousCC-Info-r12
}

CA-MIMO-ParametersDL-r13 ::= SEQUENCE {
    ca-BandwidthClassDL-r13    CA-BandwidthClass-r10,
    supportedMIMO-CapabilityDL-r13   MIMO-CapabilityDL-r10   OPTIONAL,
    fourLayerTM3-TM4-r13    ENUMERATED {supported}    OPTIONAL,
    intraBandContiguousCC-InfoList-r13  SEQUENCE (SIZE (1..maxServCell-r13)) OF IntraBandContiguousCC-Info-r12
}

IntraBandContiguousCC-Info-r12 ::= SEQUENCE {
    fourLayerTM3-TM4-perCC-r12    ENUMERATED {supported}    OPTIONAL,
supportedMIMO-CapabilityDL-r12  MIMO-CapabilityDL-r10  OPTIONAL,
supportedCSI-Proc-r12  ENUMERATED {n1, n3, n4}  OPTIONAL
}

CA-BandwidthClass-r10 ::= ENUMERATED {a, b, c, d, e, f, ...}

MIMO-CapabilityUL-r10 ::= ENUMERATED {twoLayers, fourLayers}

MIMO-CapabilityDL-r10 ::= ENUMERATED {twoLayers, fourLayers, eightLayers}

SupportedBandListEUTRA ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA

SupportedBandListEUTRA-v9e0 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA-v9e0

SupportedBandListEUTRA-v1250 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA-v1250

SupportedBandListEUTRA-v1310 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA-v1310

SupportedBandListEUTRA-v1320 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandEUTRA-v1320

SupportedBandEUTRA ::= SEQUENCE {
  bandEUTRA       FreqBandIndicator,
  halfDuplex      BOOLEAN
}

SupportedBandEUTRA-v9e0 ::= SEQUENCE {
  bandEUTRA-v9e0      FreqBandIndicator-v9e0  OPTIONAL
}

SupportedBandEUTRA-v1250 ::= SEQUENCE {
  dl-256QAM-r12      ENUMERATED {supported}  OPTIONAL,
  ul-64QAM-r12       ENUMERATED {supported}  OPTIONAL
}

SupportedBandEUTRA-v1310 ::= SEQUENCE {

ue-PowerClass-5-r13  ENUMERATED {supported}  OPTIONAL
)

SupportedBandEUTRA-v1320 ::=  SEQUENCE {
  intraFreq-CE-NeedForGaps-r13     ENUMERATED {supported}  OPTIONAL,
  ue-PowerClass-N-r13  ENUMERATED {class1, class2, class4}  OPTIONAL
}

MeasParameters ::=  SEQUENCE {
  bandListEUTRA       BandListEUTRA
}

MeasParameters-v1020 ::=  SEQUENCE {
  bandCombinationListEUTRA-r10   BandCombinationListEUTRA-r10
}

MeasParameters-v1130 ::=  SEQUENCE {
  rsrqMeasWideband-r11  ENUMERATED {supported}     OPTIONAL
}

MeasParameters-v11a0 ::=  SEQUENCE {
  benefitsFromInterruption-r11   ENUMERATED {true}    OPTIONAL
}

MeasParameters-v1250 ::=  SEQUENCE {
  timerT312-r12      ENUMERATED {supported}  OPTIONAL,
  alternativeTimeToTrigger-r12  ENUMERATED {supported}  OPTIONAL,
  incMonEUTRA-r12     ENUMERATED {supported}  OPTIONAL,
  incMonUTRA-r12      ENUMERATED {supported}  OPTIONAL,
  extendedMaxMeasId-r12    ENUMERATED {supported}  OPTIONAL,
  extendedRSRQ-LowerRange-r12   ENUMERATED {supported}  OPTIONAL,
  rsrq-OnAllSymbols-r12  ENUMERATED {supported}  OPTIONAL,
  crs-DiscoverySignalsMeas-r12  ENUMERATED {supported}  OPTIONAL,
  csi-RS-DiscoverySignalsMeas-r12  ENUMERATED {supported}  OPTIONAL
}
MeasParameters-v1310 ::= SEQUENCE {
    rs-SINR-Meas-r13 ENUMERATED {supported} OPTIONAL,
    whiteCellList-r13 ENUMERATED {supported} OPTIONAL,
    extendedMaxObjectId-r13 ENUMERATED {supported} OPTIONAL,
    ul-PDCP-Delay-r13 ENUMERATED {supported} OPTIONAL,
    extendedFreqPriorities-r13 ENUMERATED {supported} OPTIONAL,
    multiBandInfoReport-r13 ENUMERATED {supported} OPTIONAL,
    rssi-AndChannelOccupancyReporting-r13 ENUMERATED {supported} OPTIONAL
}

BandListEUTRA ::= SEQUENCE (SIZE (1..maxBands)) OF BandInfoEUTRA

BandCombinationListEUTRA-r10 ::= SEQUENCE (SIZE (1..maxBandComb-r10)) OF BandInfoEUTRA

BandInfoEUTRA ::= SEQUENCE {
    interFreqBandList InterFreqBandList,
    interRAT-BandList InterRAT-BandList OPTIONAL
}

InterFreqBandList ::= SEQUENCE (SIZE (1..maxBands)) OF InterFreqBandInfo

InterFreqBandInfo ::= SEQUENCE {
    interFreqNeedForGaps BOOLEAN
}

InterRAT-BandList ::= SEQUENCE (SIZE (1..maxBands)) OF InterRAT-BandInfo

InterRAT-BandInfo ::= SEQUENCE {
    interRAT-NeedForGaps BOOLEAN
}

IRAT-ParametersUTRA-FDD ::= SEQUENCE {
    supportedBandListUTRA-FDD SupportedBandListUTRA-FDD
}
IRAT-ParametersUTRA-v920 ::= SEQUENCE {
e-RedirectionUTRA-r9 ENUMERATED {supported}
}

IRAT-ParametersUTRA-v9c0 ::= SEQUENCE {
voiceOverPS-HS-UTRA-FDD-r9 ENUMERATED {supported} OPTIONAL,
voiceOverPS-HS-UTRA-TDD128-r9 ENUMERATED {supported} OPTIONAL,
srvcc-FromUTRA-FDD-ToUTRA-FDD-r9 ENUMERATED {supported} OPTIONAL,
srvcc-FromUTRA-FDD-ToGERAN-r9 ENUMERATED {supported} OPTIONAL,
srvcc-FromUTRA-TDD128-ToUTRA-TDD128-r9 ENUMERATED {supported} OPTIONAL,
srvcc-FromUTRA-TDD128-ToGERAN-r9 ENUMERATED {supported} OPTIONAL
}

IRAT-ParametersUTRA-v9h0 ::= SEQUENCE {
mfbi-UTRA-r9 ENUMERATED {supported}
}

SupportedBandListUTRA-FDD ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-FDD

SupportedBandUTRA-FDD ::= ENUMERATED {
bandI, bandII, bandIII, bandIV, bandV, bandVI,
bandVII, bandVIII, bandIX, bandX, bandXI,
bandXII, bandXIII, bandXIV, bandXV, bandXVI, ..., 
bandXVII-8a0, bandXVIII-8a0, bandXIX-8a0, bandXX-8a0,
bandXXI-8a0, bandXXII-8a0, bandXXIII-8a0, bandXXIV-8a0,
bandXXV-8a0, bandXXVI-8a0, bandXXVII-8a0, bandXXVIII-8a0,
bandXXIX-8a0, bandXXX-8a0, bandXXXI-8a0, bandXXXII-8a0
}

SupportedBandUTRA-TDD128 ::= ENUMERATED {
bandI, bandII, bandIII, bandIV, bandV, bandVI,
bandVII, bandVIII, bandIX, bandX, bandXI,
bandXII, bandXIII, bandXIV, bandXV, bandXVI, ..., 
bandXVII-8a0, bandXVIII-8a0, bandXIX-8a0, bandXX-8a0,
bandXXI-8a0, bandXXII-8a0, bandXXIII-8a0, bandXXIV-8a0,
bandXXV-8a0, bandXXVI-8a0, bandXXVII-8a0, bandXXVIII-8a0,
bandXXIX-8a0, bandXXX-8a0, bandXXXI-8a0, bandXXXII-8a0
}

IRAT-ParametersUTRA-TDD128 ::= SEQUENCE {
supportedBandListUTRA-TDD128 SupportedBandListUTRA-TDD128
}

SupportedBandListUTRA-TDD128 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-TDD128

SupportedBandUTRA-TDD128 ::= ENUMERATED {
IRAT-ParametersUTRA-TDD384 ::= SEQUENCE {
supportedBandListUTRA-TDD384  SupportedBandListUTRA-TDD384
}

SupportedBandListUTRA-TDD384 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-TDD384

SupportedBandUTRA-TDD384 ::= ENUMERATED {
a, b, c, d, e, f, g, h, i, j, k, l, m, n,
o, p, ...
}

IRAT-ParametersUTRA-TDD768 ::= SEQUENCE {
supportedBandListUTRA-TDD768  SupportedBandListUTRA-TDD768
}

SupportedBandListUTRA-TDD768 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandUTRA-TDD768

SupportedBandUTRA-TDD768 ::= ENUMERATED {
a, b, c, d, e, f, g, h, i, j, k, l, m, n,
o, p, ...
}

IRAT-ParametersUTRA-TDD-v1020 ::= SEQUENCE {
e-RedirectionUTRA-TDD-r10    ENUMERATED {supported}
}

IRAT-ParametersGERAN ::=   SEQUENCE {
supportedBandListGERAN    SupportedBandListGERAN,
interRAT-PS-HO-ToGERAN    BOOLEAN
}

IRAT-ParametersGERAN-v920 ::=  SEQUENCE {
dtm-r9        ENUMERATED {supported}   OPTIONAL,
e-RedirectionGERAN-r9    ENUMERATED {supported}   OPTIONAL
}
SupportedBandListGERAN ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandGERAN

SupportedBandGERAN ::= ENUMERATED {
gsm450, gsm480, gsm710, gsm750, gsm810, gsm850,
gsm900P, gsm900E, gsm900R, gsm1800, gsm1900,
spare5, spare4, spare3, spare2, spare1, ...
}

IRAT-ParametersCDMA2000-HRPD ::= SEQUENCE {
supportedBandListHRPD SupportedBandListHRPD,
tx-ConfigHRPD ENUMERATED {single, dual},
rx-ConfigHRPD ENUMERATED {single, dual}
}

SupportedBandListHRPD ::= SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandclassCDMA2000

IRAT-ParametersCDMA2000-1XRTT ::= SEQUENCE {
supportedBandList1XRTT SupportedBandList1XRTT,
tx-Config1XRTT ENUMERATED {single, dual},
rx-Config1XRTT ENUMERATED {single, dual}
}

IRAT-ParametersCDMA2000-1XRTT-v920 ::= SEQUENCE {
e-CSFB-1XRTT-r9 ENUMERATED {supported},
e-CSFB-ConcPS-Mob1XRTT-r9 ENUMERATED {supported} OPTIONAL
}

IRAT-ParametersCDMA2000-1XRTT-v1020 ::= SEQUENCE {
e-CSFB-dual-1XRTT-r10 ENUMERATED {supported}
}

IRAT-ParametersCDMA2000-v1130 ::= SEQUENCE {
cdma2000-NW-Sharing-r11 ENUMERATED {supported} OPTIONAL
}
SupportedBandList1XRTT ::= SEQUENCE (SIZE (1..maxCDMA-BandClass)) OF BandclassCDMA2000

IRAT-ParametersWLAN-r13 ::= SEQUENCE {
supportedBandListWLAN-r13 SEQUENCE (SIZE (1..maxWLAN-Bands-r13)) OF WLAN-BandIndicator-r13 OPTIONAL
}

CSG-ProximityIndicationParameters-r9 ::= SEQUENCE {
intraFreqProximityIndication-r9 ENUMERATED {supported} OPTIONAL,
interFreqProximityIndication-r9 ENUMERATED {supported} OPTIONAL,
utra-ProximityIndication-r9 ENUMERATED {supported} OPTIONAL
}

NeighCellSI-AcquisitionParameters-r9 ::= SEQUENCE {
intraFreqSI-AcquisitionForHO-r9 ENUMERATED {supported} OPTIONAL,
interFreqSI-AcquisitionForHO-r9 ENUMERATED {supported} OPTIONAL,
utra-SI-AcquisitionForHO-r9 ENUMERATED {supported} OPTIONAL
}

SON-Parameters-r9 ::= SEQUENCE {
rach-Report-r9 ENUMERATED {supported} OPTIONAL
}

UE-BasedNetwPerfMeasParameters-r10 ::= SEQUENCE {
loggedMeasurementsIdle-r10 ENUMERATED {supported} OPTIONAL,
standaloneGNSS-Location-r10 ENUMERATED {supported} OPTIONAL
}

UE-BasedNetwPerfMeasParameters-v1250 ::= SEQUENCE {
loggedMBSFNMeasurements-r12 ENUMERATED {supported}
}

OTDOA-PositioningCapabilities-r10 ::= SEQUENCE {
otdoa-UE-Assisted-r10 ENUMERATED {supported}.

interFreqRSTD-Measurement-r10  ENUMERATED {supported}  OPTIONAL

Other-Parameters-r11 ::=    SEQUENCE {
inDeviceCoexInd-r11  ENUMERATED {supported}  OPTIONAL,
powerPrefInd-r11  ENUMERATED {supported}  OPTIONAL,
ue-Rx-TxTimeDiffMeasurements-r11  ENUMERATED {supported}  OPTIONAL
}

Other-Parameters-v11d0 ::=    SEQUENCE {
inDeviceCoexInd-UL-CA-r11  ENUMERATED {supported}  OPTIONAL
}

MBMS-Parameters-r11 ::=    SEQUENCE {
mbms-SCell-r11  ENUMERATED {supported}  OPTIONAL,
mbms-NonServingCell-r11  ENUMERATED {supported}  OPTIONAL
}

MBMS-Parameters-v1250 ::=    SEQUENCE {
mbms-AsyncDC-r12  ENUMERATED {supported}  OPTIONAL
}

SCPTM-Parameters-r13 ::=    SEQUENCE {
scptm-ParallelReception-r13  ENUMERATED {supported}  OPTIONAL,
scptm-SCell-r13  ENUMERATED {supported}  OPTIONAL,
scptm-NonServingCell-r13  ENUMERATED {supported}  OPTIONAL,
scptm-AsyncDC-r13  ENUMERATED {supported}  OPTIONAL
}

CE-Parameters-r13 ::=    SEQUENCE {
ce-ModeA-r13  ENUMERATED {supported}  OPTIONAL,
ce-ModeB-r13  ENUMERATED {supported}  OPTIONAL
}

CE-Parameters-v1320 ::=    SEQUENCE {

intraFreqA3-CE-ModeA-r13   ENUMERATED {supported}   OPTIONAL,
intraFreqA3-CE-ModeB-r13   ENUMERATED {supported}   OPTIONAL,
intraFreqHO-CE-ModeA-r13   ENUMERATED {supported}   OPTIONAL,
intraFreqHO-CE-ModeB-r13   ENUMERATED {supported}   OPTIONAL
}

LAA-Parameters-r13 ::=    SEQUENCE {
crossCarrierSchedulingLAA-DL-r13   ENUMERATED {supported}  OPTIONAL,
csi-RS-DRS-RRM-MeasurementsLAA-r13   ENUMERATED {supported}  OPTIONAL,
downlinkLAA-r13   ENUMERATED {supported}  OPTIONAL,
endingDwPTS-r13   ENUMERATED {supported}  OPTIONAL,
secondSlotStartingPosition-r13    ENUMERATED {supported}  OPTIONAL,
tm9-LAA-r13         ENUMERATED {supported}  OPTIONAL,
tm10-LAA-r13        ENUMERATED {supported}  OPTIONAL
}

WLAN-IW-Parameters-r12 ::= SEQUENCE {
wlan-IW-RAN-Rules-r12     ENUMERATED {supported}  OPTIONAL,
wlan-IW-ANDSF-Policies-r12      ENUMERATED {supported}  OPTIONAL
}

LWA-Parameters-r13 ::=  SEQUENCE {
lwa-r13      ENUMERATED {supported}  OPTIONAL,
lwa-SplitBearer-r13   ENUMERATED {supported}  OPTIONAL,
wlan-MAC-Address-r13  OCTET STRING (SIZE (6))  OPTIONAL,
lwa-BufferSize-r13   ENUMERATED {supported}  OPTIONAL
}

WLAN-IW-Parameters-v1310 ::= SEQUENCE {
rcIwI-r13          ENUMERATED {supported}  OPTIONAL
}

LWIP-Parameters-r13 ::=  SEQUENCE {
lwip-r13     ENUMERATED {supported}    OPTIONAL
}
NAICS-Capability-List-r12 ::= SEQUENCE (SIZE (1..maxNAICS-Entries-r12)) OF NAICS-Capability-Entry-r12

NAICS-Capability-Entry-r12 ::= SEQUENCE {
    numberOfNAICS-CapableCC-r12 INTEGER(1..5),
    numberOfAggregatedPRB-r12 ENUMERATED {
        n50, n75, n100, n125, n150, n175,
        n200, n225, n250, n275, n300, n350,
        n400, n450, n500, spare},
    ...
}

SL-Parameters-r12 ::= SEQUENCE {
    commSimultaneousTx-r12 ENUMERATED {supported} OPTIONAL,
    commSupportedBands-r12 FreqBandIndicatorListEUTRA-r12 OPTIONAL,
    discSupportedBands-r12 SupportedBandInfoList-r12 OPTIONAL,
    discScheduledResourceAlloc-r12 ENUMERATED {supported} OPTIONAL,
    disc-UE-SelectedResourceAlloc-r12 ENUMERATED {supported} OPTIONAL,
    disc-SLSS-r12 ENUMERATED {supported} OPTIONAL,
    discSupportedProc-r12 ENUMERATED {n50, n400} OPTIONAL
}

SL-Parameters-v1310 ::= SEQUENCE {
    discSysInfoReporting-r13 ENUMERATED {supported} OPTIONAL,
    commMultipleTx-r13 ENUMERATED {supported} OPTIONAL,
    discInterFreqTx-r13 ENUMERATED {supported} OPTIONAL,
    discPeriodicSLSS-r13 ENUMERATED {supported} OPTIONAL
}

SupportedBandInfoList-r12 ::= SEQUENCE (SIZE (1..maxBands)) OF SupportedBandInfo-r12

SupportedBandInfo-r12 ::= SEQUENCE {
    support-r12 ENUMERATED {supported} OPTIONAL
FreqBandIndicatorListEUTRA-r12 ::= SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicator-r11
<table>
<thead>
<tr>
<th>Field Description</th>
<th>FDD/TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>accessStratumRelease</strong></td>
<td></td>
</tr>
<tr>
<td>Set to rel13 in this version of the specification.</td>
<td></td>
</tr>
<tr>
<td><strong>additionalRx-Tx-PerformanceReq</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports the additional Rx and Tx performance requirement for a given band combination as specified in TS 36.101 [42].</td>
<td></td>
</tr>
<tr>
<td><strong>alternativeTBS-Indices</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports alternative TBS indices for $h_{RB}$ 26 and 33 as specified in TS 36.213 [23].</td>
<td></td>
</tr>
<tr>
<td><strong>alternativeTimeToTrigger</strong></td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports alternativeTimeToTrigger.</td>
<td></td>
</tr>
<tr>
<td><strong>aperiodicCSI-Reporting</strong></td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports aperiodic CSI reporting with 3 bits of the CSI request field size as specified in TS 36.213 [23, 7.2.1] and/or aperiodic CSI reporting mode 1-0 and mode 1-1 as specified in TS 36.213 [23, 7.2.1]. The first bit is set to “1” if the UE supports the aperiodic CSI reporting with 3 bits of the CSI request field size. The second bit is set to “1” if the UE supports the aperiodic CSI reporting mode 1-0 and mode 1-1.</td>
<td></td>
</tr>
<tr>
<td><strong>bandCombinationListEUTRA</strong></td>
<td></td>
</tr>
<tr>
<td>One entry corresponding to each supported band combination listed in the same order as in supportedBandCombination.</td>
<td></td>
</tr>
<tr>
<td><strong>BandCombinationParameters-v1090</strong></td>
<td></td>
</tr>
<tr>
<td><strong>BandCombinationParameters-v10i0</strong></td>
<td></td>
</tr>
<tr>
<td><strong>BandCombinationParameters-v1270</strong></td>
<td></td>
</tr>
<tr>
<td>If included, the UE shall include the same number of entries, and listed in the same order, as in BandCombinationParameters-r10.</td>
<td></td>
</tr>
<tr>
<td><strong>BandCombinationParameters-v1130</strong></td>
<td></td>
</tr>
<tr>
<td>The field is applicable to each supported CA bandwidth class combination (i.e. CA configuration in TS 36.101 [42, Section 5.6A.1]) indicated in the corresponding band combination. If included, the UE shall include the same number of entries, and listed in the same order, as in BandCombinationParameters-r10.</td>
<td></td>
</tr>
<tr>
<td><strong>bandEUTRA</strong></td>
<td></td>
</tr>
<tr>
<td>E-UTRA band as defined in TS 36.101 [42]. In case the UE includes bandEUTRA-v9e0 or bandEUTRA-v1090, the UE shall set the corresponding entry of bandEUTRA (i.e. without suffix) or bandEUTRA-r10 respectively to maxFBI.</td>
<td></td>
</tr>
<tr>
<td><strong>bandListEUTRA</strong></td>
<td></td>
</tr>
<tr>
<td>One entry corresponding to each supported E-UTRA band listed in the same order as in supportedBandListEUTRA.</td>
<td></td>
</tr>
<tr>
<td><strong>bandParametersUL, bandParametersDL</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates the supported parameters for the band. UE shall indicate parameters for only one CA uplink or downlink bandwidth class in a single band entry for one band combination entry.</td>
<td></td>
</tr>
<tr>
<td><strong>beamformed (in MIMO-CA-ParametersPerBoBCPerTM)</strong></td>
<td></td>
</tr>
<tr>
<td>If signalled, the field indicates for a particular transmission mode, the UE capabilities concerning beamformed EBF/ FD-MIMO operation (class B) applicable for the concerned band combination.</td>
<td></td>
</tr>
<tr>
<td><strong>beamformed (in MIMO-UE-ParametersPerTM)</strong></td>
<td>TBD</td>
</tr>
<tr>
<td>Indicates for a particular transmission mode, the UE capabilities concerning beamformed EBF/ FD-MIMO operation (class B) applicable for band combinations for which the concerned capabilities are not signalled.</td>
<td></td>
</tr>
<tr>
<td><strong>benefitsFromInterruption</strong></td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE power consumption would benefit from being allowed to cause interruptions to serving cells when performing measurements of deactivated SCell carriers for measCycleSCell of less than 640ms, as specified in TS 36.133 [16].</td>
<td></td>
</tr>
<tr>
<td><strong>ce-ModeA, ce-ModeB</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports operation in CE mode A and/or B, as specified in TS 36.211 [21] and TS 36.213 [23].</td>
<td></td>
</tr>
<tr>
<td><strong>CA-BandwidthClass</strong></td>
<td></td>
</tr>
<tr>
<td>The CA bandwidth class supported by the UE as defined in TS 36.101 [42, Table 5.6A-1]. The UE explicitly includes all the supported CA bandwidth class combinations in the band combination signalling. Support for one CA bandwidth class does not implicitly indicate support for another CA bandwidth class.</td>
<td></td>
</tr>
<tr>
<td>Field Description</td>
<td>FDD/TDD diff</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>UE-EUTRA-Capability field descriptions</strong></td>
<td></td>
</tr>
<tr>
<td><strong>cch-InterMitigation-RefRecTypeA, cch-InterMitigation-RefRecTypeB</strong></td>
<td></td>
</tr>
<tr>
<td>The field <em>cch-InterMitigation-RefRecTypeA</em> defines whether the UE supports Type A downlink control channel interference mitigation receiver 'LMMSE-IRC + CRS-IC' for PDCCH/PCFICH/PHICH/EPDCCH receive processing (Enhanced downlink control channel performance requirements Type A in the TS 36.101 [6]). The field <em>cch-InterMitigation-RefRecTypeB</em> defines whether the UE supports Type B downlink control channel interference mitigation receiver 'E-LMMSE-IRC + CRS-IC' for PDCCH/PCFICH/PHICH receive processing in synchronous networks (Enhanced downlink control channel performance requirements Type B in the TS 36.101 [6]). The UE supporting the capability defined by <em>cch-InterMitigation-RefRecTypeB-r13</em> shall also support the capability defined by <em>cch-InterMitigation-RefRecTypeA-r13</em>.</td>
<td></td>
</tr>
</tbody>
</table>

If the UE sets one or more of the fields *cch-InterMitigation-RefRecTypeA* and *cch-InterMitigation-RefRecTypeB* to 'supported', the UE shall include the parameter *cch-InterMitigation-MaxNumCCs* to indicate that the UE supports CCH-IM on at least one arbitrary downlink CC with up to *cch-InterMitigation-MaxNumCCs* number of downlink CCs. The UE shall not include the parameter *cch-InterMitigation-MaxNumCCs* if neither *cch-InterMitigation-RefRecTypeA* nor *cch-InterMitigation-RefRecTypeB* is present. The UE may not perform CCH-IM on more than 1 DL CCs. For example, the UE sets 'cch-InterMitigation-MaxNumCCs = 3' to indicate that UE supports CCH-IM on at least one DL CC for supported non-CA, 2DL CA and 3DL CA configurations. For CA scenarios, the CCH-IM is guaranteed to be supported on at least one arbitrary component carrier. |
| **cdma2000-NW-Sharing** | |
| Indicates whether the UE supports network sharing for CDMA2000. | |
| **channelMeasRestriction** | |
| Indicates for a particular transmission mode whether the UE supports channel measurement restriction. | TBD |
| **codebook-HARQ-ACK** | |
| Indicates whether the UE supports determining HARQ ACK codebook size based on the DAI-based solution and/or the number of configured CCs. The first bit is set to '1' if the UE supports the DAI-based codebook size determination. The second bit is set to '1' if the UE supports the codebook determination based on the number of configured CCs. | No |
| **commMultipleTx** | |
| Indicates whether the UE supports multiple transmissions of sidelink communication to different destinations in one SC period. If *commMultipleTx-r13* is set to supported then the UE support 8 transmitting sidelink processes. | |
| **commSimultaneousTx** | |
| Indicates whether the UE supports simultaneous transmission of EUTRA and sidelink communication (on different carriers) in all bands for which the UE indicated sidelink support in a band combination (using *commSupportedBandsPerBC*). | |
| **commSupportedBands** | |
| Indicates the bands on which the UE supports sidelink communication, by an independent list of bands i.e. separate from the list of supported EUTRA band, as indicated in *supportedBandListEUTRA*. | |
| **commSupportedBandsPerBC** | |
| Indicates, for a particular band combination, the bands on which the UE supports simultaneous reception of EUTRA and sidelink communication. If the UE indicates support simultaneous transmission (using *commSimultaneousTx*), it also indicates, for a particular band combination, the bands on which the UE supports simultaneous transmission of EUTRA and sidelink communication. The first bit refers to the first band included in *commSupportedBands*, with value 1 indicating sidelink is supported. | |
| **configN (in MIMO-CA-ParametersPerBoBCPerTM)** | |
| If signalled, the field indicates for a particular transmission mode whether the UE supports non-precoded EBF/FD-MIMO (class A) related configuration N for the concerned band combination. | |

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**ETSI**
<table>
<thead>
<tr>
<th><strong>UE-EUTRA-Capability field descriptions</strong></th>
<th><strong>FDD/TDD diff</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>configN (in MIMO-UE-ParametersPerTM)</strong></td>
<td>Indicates for a particular transmission mode whether the UE supports non-precoded EBF/FD-MIMO (class A) related configuration N for band combinations for which the concerned capabilities are not signalled.</td>
</tr>
<tr>
<td><strong>crossCarrierScheduling</strong></td>
<td>Indicates whether the UE supports cross carrier scheduling beyond 5 DL CCs.</td>
</tr>
<tr>
<td><strong>crossCarrierScheduling-B5C</strong></td>
<td>Indicates whether the UE supports cross-carrier scheduling from a licensed carrier for LAA cell(s) for downlink. This field can be included only if downlinkLAA is included.</td>
</tr>
<tr>
<td><strong>crossCarrierSchedulingLAA-DL</strong></td>
<td>Indicates whether the UE supports CRS based discovery signals measurement, and PDSCH/EPDCCH RE mapping with zero power CSI-RS configured for discovery signals.</td>
</tr>
<tr>
<td><strong>crs-DiscoverySignalsMeas</strong></td>
<td>Indicates whether the UE supports CRS interference handling.</td>
</tr>
<tr>
<td><strong>crs-InterfHandl</strong></td>
<td>Indicates whether the UE supports CRS interference mitigation in transmission mode 10. The UE supporting the crs-InterfMitigationTM10 capability shall also support the crs-InterfHandl capability.</td>
</tr>
<tr>
<td><strong>crs-InterfMitigationTM10</strong></td>
<td>Indicates whether the UE supports CRS interference mitigation (IM) while operating in the following transmission modes (TM): TM 1, TM 2, ..., TM 8 and TM 9. The UE shall not include this field if it does not support CRS IM in TMs 1-9. If the field is present, the UE supports CRS IM on at least one arbitrary downlink CC for up to crs-InterfMitigationTM10toTM9-r13 downlink CC CA configuration. The UE signals crs-InterfMitigationTM10toTM9-r13 value to indicate the maximum crs-InterfMitigationTM10toTM9-r13 downlink CC CA configuration where UE may apply CRS IM. For example, the UE sets 'crs-InterfMitigationTM10toTM9-r13 = 3' to indicate that the UE supports CRS IM on at least one DL CC for supported non-CA, 2DL CA and 3DL CA configurations. The UE supporting the crs-InterfMitigationTM10toTM9-r13 capability shall also support the crs-InterfHandl-r11 capability.</td>
</tr>
<tr>
<td><strong>crs-InterfMitigationTM1toTM9</strong></td>
<td>Indicates whether the UE supports performing RRM measurements on LAA cell(s) based on CSI-RS based DRS. This field can be included only if downlinkLAA is included.</td>
</tr>
<tr>
<td><strong>csi-RS-DiscoverySignalsMeas</strong></td>
<td>Indicates whether the UE supports CSI-RS based discovery signals measurement. If this field is included, the UE shall also include csi-RS-DiscoverySignalsMeas.</td>
</tr>
<tr>
<td><strong>csi-RS-DRS-RRM-MeasurementsLAA</strong></td>
<td>Indicates whether the UE supports CSI-RS based discovery signals measurement. If this field is included, the UE shall also include csi-RS-DiscoverySignalsMeas.</td>
</tr>
<tr>
<td><strong>csi-RS-EnhancementsTDD</strong></td>
<td>Indicates for a particular transmission mode whether the UE supports CSI-RS enhancements applicable for TDD.</td>
</tr>
<tr>
<td><strong>csi-SubframeSet</strong></td>
<td>Indicates whether the UE supports CSI-IM resources for a CSI process with no more than 4 CSI-IM resources for all CSI processes of one frequency if the UE supports tm10, configuration of up to 2 CSI-IM configurations, and EPDCCH RE mapping with two ZP-CSI-RS configurations, and EPDCCH RE mapping with two ZP-CSI-RS configurations if the UE supports EPDCCH. This field is only applicable for UEs supporting TDD.</td>
</tr>
<tr>
<td><strong>dc-Support</strong></td>
<td>Indicates whether the UE supports synchronous DC and power control mode 1. Including this field for a band combination entry comprising of single band entry indicates that the UE supports intra-band contiguous DC. Including this field for a band combination entry comprising of two or more band entries, indicates that the UE supports DC for these bands and that the serving cells corresponding to a band entry shall belong to one cell group (i.e. MCG or SCG). Including field asynchronous indicates that the UE supports asynchronous DC and power control mode 2. Including this field for a TDD/FDD band combination indicates that the UE supports EPDCCH. This field is only applicable for UEs supporting TDD.</td>
</tr>
<tr>
<td><strong>deviceType</strong></td>
<td>UE may set the value to 'noBenFromBatConsumpOpt' when it does not foresee to particularly benefit from NW-based battery consumption optimisation. Absence of this value means that the device does benefit from NW-based battery consumption optimisation.</td>
</tr>
<tr>
<td><strong>differentFallbackSupported</strong></td>
<td>Indicates that the UE supports different capabilities for at least one fallback case of this band combination.</td>
</tr>
<tr>
<td><strong>disInterFreqTx</strong></td>
<td>Indicates whether the UE supports sideband discovery announcements either a) on the primary frequency only or b) on other frequencies also, regardless of the UE configuration (e.g. CA,</td>
</tr>
<tr>
<td>UE-EUTRA-Capability field descriptions</td>
<td>FDD/ TDD diff</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>discInterFreqTx</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE may set discInterFreqTx to supported when having a separate transmitter or if it can request sidelink discovery transmission gaps.</td>
<td></td>
</tr>
<tr>
<td>discoverySignalsInDeactSCell</td>
<td>FFS</td>
</tr>
<tr>
<td>Indicates whether the UE supports the behaviour on DL signals and physical channels when SCell is deactivated and discovery signals measurement is configured as specified in TS 36.211 [21, 6.11A]. This field is included only if UE supports carrier aggregation and includes crs-DiscoverySignalsMeas.</td>
<td></td>
</tr>
<tr>
<td>discPeriodicSLSS</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports periodic (i.e. not just one time before sidelink discovery announcement) Sidelink Synchronization Signal (SLSS) transmission and reception for sidelink discovery.</td>
<td></td>
</tr>
<tr>
<td>discScheduledResourceAlloc</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports transmission of discovery announcements based on network scheduled resource allocation.</td>
<td></td>
</tr>
<tr>
<td>disc-UE-SelectedResourceAlloc</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports transmission of discovery announcements based on UE autonomous resource selection.</td>
<td></td>
</tr>
<tr>
<td>disc-SLSS</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports Sidelink Synchronization Signal (SLSS) transmission and reception for sidelink discovery.</td>
<td></td>
</tr>
<tr>
<td>discSupportedBands</td>
<td></td>
</tr>
<tr>
<td>Indicates the bands on which the UE supports sidelink discovery. One entry corresponding to each supported E-UTRA band, listed in the same order as in supportedBandListEUTRA.</td>
<td></td>
</tr>
<tr>
<td>discSupportedProc</td>
<td></td>
</tr>
<tr>
<td>Indicates the number of processes supported by the UE for sidelink discovery.</td>
<td></td>
</tr>
<tr>
<td>discSysInfoReporting</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports reporting of system information for inter-frequency/PLMN sidelink discovery.</td>
<td></td>
</tr>
<tr>
<td>dl-256QAM</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports 256QAM in DL on the band.</td>
<td></td>
</tr>
<tr>
<td>dmrs-Enhancements (in MIMO-CA-ParametersPerBoBCPerTM)</td>
<td></td>
</tr>
<tr>
<td>If signalled, the field indicates for a particular transmission mode, that for the concerned band combination the DMRS enhancements are different than the value indicated by field dmrs-Enhancements in MIMO-UE-ParametersPerTM.</td>
<td></td>
</tr>
<tr>
<td><strong>UE-EUTRA-Capability field descriptions</strong></td>
<td><strong>FDD/ TDD diff</strong></td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td><strong>dmrs-Enhancements (in MIMO-UE-ParametersPerTM)</strong></td>
<td>Indicates for a particular transmission mode whether the UE supports DMRS enhancements for the indicated transmission mode.</td>
</tr>
<tr>
<td><strong>downlinkLAA</strong></td>
<td>Presence of the field indicates that the UE supports downlink LAA operation including identification of downlink transmissions on LAA cell(s) for full downlink subframes, decoding of common downlink control signalling on LAA cell(s), CSI feedback for LAA cell(s), RRM measurements on LAA cell(s) based on CRS-based DRS.</td>
</tr>
<tr>
<td><strong>drb-TypeSCG</strong></td>
<td>Indicates whether the UE supports SCG bearer.</td>
</tr>
<tr>
<td><strong>drb-TypeSplit</strong></td>
<td>Indicates whether the UE supports split bearer except for PDCP data transfer in UL.</td>
</tr>
<tr>
<td><strong>dtm</strong></td>
<td>Indicates whether the UE supports DTM in GERAN.</td>
</tr>
<tr>
<td><strong>e-CSFB-1XRTT</strong></td>
<td>Indicates whether the UE supports enhanced CS fallback to CDMA2000 1xRTT or not.</td>
</tr>
<tr>
<td><strong>e-CSFB-ConcPS-Mob1XRTT</strong></td>
<td>Indicates whether the UE supports concurrent enhanced CS fallback to CDMA2000 1xRTT and PS handover/ redirection to CDMA2000 HRPD.</td>
</tr>
<tr>
<td><strong>e-CSFB-dual-1XRTT</strong></td>
<td>Indicates whether the UE supports enhanced CS fallback to CDMA2000 1xRTT for dual Rx/Tx configuration. This bit can only be set to supported if tx-Config1XRTT and rx-Config1XRTT are both set to dual.</td>
</tr>
<tr>
<td><strong>e-HARQ-Pattern-FDD</strong></td>
<td>Indicates whether the UE supports enhanced HARQ pattern for TTI bundling operation for FDD.</td>
</tr>
<tr>
<td><strong>endingDwPTS</strong></td>
<td>Indicates whether the UE supports reception ending with a subframe occupied for a DwPTS duration as described in TS 36.211 [21] and TS 36.213 [23]. This field can be included only if downlinkLAA is included.</td>
</tr>
<tr>
<td><strong>Enhanced-4TxCodebook</strong></td>
<td>Indicates whether the UE supports enhanced 4Tx codebook.</td>
</tr>
<tr>
<td><strong>enhancedDualLayerTDD</strong></td>
<td>Indicates whether the UE supports enhanced dual layer (PDSCH transmission mode 8) for TDD or not.</td>
</tr>
<tr>
<td><strong>ePDCCH</strong></td>
<td>Indicates whether the UE can receive DCI on UE specific search space on Enhanced PDCCH.</td>
</tr>
<tr>
<td><strong>e-RedirectionUTRA</strong></td>
<td>Indicates whether the UE supports enhanced redirection to UTRA TDD to multiple carrier frequencies both with and without using related SIB provided by RRCConnectionRelease or not.</td>
</tr>
<tr>
<td><strong>e-RedirectionUTRA-TDD</strong></td>
<td>Indicates whether the UE supports enhanced redirection to UTRA TDD.</td>
</tr>
<tr>
<td><strong>e-RLC-LI-Field</strong></td>
<td>Indicates whether the UE supports extended E-UTRA frequency priorities indicated by cellReselectionSubPriority field.</td>
</tr>
<tr>
<td><strong>e-RLC-SN-SO-Field</strong></td>
<td>Indicates whether the UE supports extended long DRX cycle values of 5.12s and 10.24s in RRC_CONNECTED.</td>
</tr>
<tr>
<td><strong>extendedMaxMeasId</strong></td>
<td>Indicates whether the UE supports extended number of measurement identities as defined by maxMeasId-r12.</td>
</tr>
<tr>
<td><strong>extendedMaxObjectId</strong></td>
<td>Indicates whether the UE supports extended number of measurement object identities as defined by maxObjectId-r13.</td>
</tr>
<tr>
<td><strong>extended-RLC-LI-Field</strong></td>
<td>Indicates whether the UE supports 15 bit RLC length indicator.</td>
</tr>
<tr>
<td><strong>extendedRLC-SN-SO-Field</strong></td>
<td>Indicates whether the UE supports 16 bits of RLC sequence number and segmentation offset.</td>
</tr>
<tr>
<td><strong>extendedRSRQ-LowerRange</strong></td>
<td>Indicates whether the UE supports the extended RSRQ lower value range from -34dB to -19.5dB in measurement configuration and reporting as specified in TS 36.133 [16].</td>
</tr>
<tr>
<td><strong>fdd-HARQ-TimingTDD</strong></td>
<td>Indicates whether UE supports FDD HARQ timing for TDD SCell when configured with TDD PCell.</td>
</tr>
</tbody>
</table>

**featureGroupIndicators, featureGroupIndRel9Add, featureGroupIndRel10** Yes
<table>
<thead>
<tr>
<th><strong>UE-EUTRA-Capability field descriptions</strong></th>
<th><strong>FDD/TDD diff</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>The definitions of the bits in the bit string are described in Annex B.1 (for featureGroupIndicators and featureGroupIndRel9Add) and in Annex C.1. (for featureGroupIndRel10).</td>
<td>-</td>
</tr>
<tr>
<td>fourLayerTM3-TM4 Indicates whether the UE supports 4-layer spatial multiplexing for TM3 and TM4.</td>
<td>-</td>
</tr>
<tr>
<td>fourLayerTM3-TM4-perCC Indicates whether the UE supports 4-layer spatial multiplexing for TM3 and TM4 for the component carrier.</td>
<td>-</td>
</tr>
<tr>
<td>freqBandPriorityAdjustment Indicates whether the UE supports the prioritization of frequency bands in multiBandInfoList over the band in freqBandIndicator as defined by freqBandIndicatorPriority-r12.</td>
<td>-</td>
</tr>
<tr>
<td>freqBandRetrieval Indicates whether the UE supports reception of requestedFrequencyBands.</td>
<td>-</td>
</tr>
<tr>
<td>halfDuplex If halfDuplex is set to true, only half duplex operation is supported for the band, otherwise full duplex operation is supported.</td>
<td>-</td>
</tr>
<tr>
<td>incMonEUTRA Indicates whether the UE supports increased number of E-UTRA carrier monitoring in RRC_IDLE and RRC_CONNECTED, as specified in TS 36.133 [16].</td>
<td>No</td>
</tr>
<tr>
<td>incMonUTRA Indicates whether the UE supports increased number of UTRA carrier monitoring in RRC_IDLE and RRC_CONNECTED, as specified in TS 36.133 [16].</td>
<td>No</td>
</tr>
<tr>
<td>inDeviceCoexInd Indicates whether the UE supports in-device coexistence indication as well as autonomous denial functionality.</td>
<td>Yes</td>
</tr>
<tr>
<td>inDeviceCoexInd-UL-CA Indicates whether the UE supports UL CA related in-device coexistence indication. This field can be included only if inDeviceCoexInd is included. The UE supports inDeviceCoexInd-UL-CA in the same duplexing modes as it supports inDeviceCoexInd.</td>
<td>-</td>
</tr>
<tr>
<td>interBandTDD-CA-WithDifferentConfig Indicates whether the UE supports inter-band TDD carrier aggregation with different UL/DL configuration combinations. The first bit indicates UE supports the configuration combination of SCell DL subframes are a subset of PCell and PSCell by SIB1 configuration and the configuration combination of SCell DL subframes are a superset of PCell and PSCell by SIB1 configuration; the second bit indicates UE supports the configuration combination of SCell DL subframes are neither superset nor subset of PCell and PSCell by SIB1 configuration. This field is included only if UE supports inter-band TDD carrier aggregation.</td>
<td>-</td>
</tr>
<tr>
<td>interferenceMeasRestriction Indicates whether the UE supports interference measurement restriction.</td>
<td>TBD</td>
</tr>
<tr>
<td>interFreqBandList One entry corresponding to each supported E-UTRA band listed in the same order as in supportedBandListEUTRA.</td>
<td>-</td>
</tr>
<tr>
<td>interFreqNeedForGaps Indicates need for measurement gaps when operating on the E-UTRA band given by the entry in bandListEUTRA or on the E-UTRA band combination given by the entry in bandCombinationListEUTRA and measuring on the E-UTRA band given by the entry in interFreqBandList.</td>
<td>-</td>
</tr>
<tr>
<td>interFreqProximityIndication Indicates whether the UE supports proximity indication for inter-frequency E-UTRAN CSG member cells.</td>
<td>-</td>
</tr>
<tr>
<td>interFreqRSTD-Measurement Indicates whether the UE supports inter-frequency RSTD measurements for OTDOA positioning [54].</td>
<td>Yes</td>
</tr>
<tr>
<td>interFreqSI-AcquisitionForHO Indicates whether the UE supports, upon configuration of si-RequestForHO by the network, acquisition and reporting of relevant information using autonomous gaps by reading the SI from a neighbouring inter-frequency cell.</td>
<td>Yes</td>
</tr>
<tr>
<td>interRAT-BandList One entry corresponding to each supported band of another RAT listed in the same order as in the interRAT-Parameters.</td>
<td>-</td>
</tr>
<tr>
<td>interRAT-NeedForGaps Indicates need for DL measurement gaps when operating on the E-UTRA band given by the entry in bandListEUTRA or on the E-UTRA band combination given by the entry in bandCombinationListEUTRA and measuring on the inter-RAT band given by the entry in the interRAT-BandList.</td>
<td>-</td>
</tr>
</tbody>
</table>
### UE-EUTRA-Capability field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>FDD/TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>interRAT-ParametersWLAN</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports WLAN measurements</td>
<td></td>
</tr>
<tr>
<td>configured by <code>MeasObjectWLAN</code> with corresponding</td>
<td></td>
</tr>
<tr>
<td>quantity and report configuration in the supported</td>
<td></td>
</tr>
<tr>
<td>WLAN bands.</td>
<td></td>
</tr>
<tr>
<td><strong>interRAT-PS-HO-ToGERAN</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports inter-RAT PS</td>
<td></td>
</tr>
<tr>
<td>handover to GERAN or not.</td>
<td></td>
</tr>
<tr>
<td><strong>intraBandContiguousCC-InfoList</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates, per serving carrier of which the</td>
<td></td>
</tr>
<tr>
<td>corresponding bandwidth class includes multiple</td>
<td></td>
</tr>
<tr>
<td>serving carriers (i.e. bandwidth class B, C, D and</td>
<td></td>
</tr>
<tr>
<td>so on), the maximum number of supported layers for</td>
<td></td>
</tr>
<tr>
<td>spatial multiplexing in DL and the maximum number of</td>
<td></td>
</tr>
<tr>
<td>CSI processes supported. The number of entries is</td>
<td></td>
</tr>
<tr>
<td>equal to the number of component carriers in the</td>
<td></td>
</tr>
<tr>
<td>corresponding bandwidth class. The UE shall support</td>
<td></td>
</tr>
<tr>
<td>the setting indicated in each entry of the list</td>
<td></td>
</tr>
<tr>
<td>regardless of the order of entries in the list. The</td>
<td></td>
</tr>
<tr>
<td>UE shall include the field only if it supports 4-layer</td>
<td></td>
</tr>
<tr>
<td>spatial multiplexing in transmission mode3/4 for a</td>
<td></td>
</tr>
<tr>
<td>subset of component carriers in the corresponding</td>
<td></td>
</tr>
<tr>
<td>bandwidth class, or if the maximum number of</td>
<td></td>
</tr>
<tr>
<td>supported layers for at least one component carrier</td>
<td></td>
</tr>
<tr>
<td>is higher than <code>supportedMIMO-CapabilityDL-r10</code> in the</td>
<td></td>
</tr>
<tr>
<td>corresponding bandwidth class, or if the number of</td>
<td></td>
</tr>
<tr>
<td>CSI processes for at least one component carrier is</td>
<td></td>
</tr>
<tr>
<td>higher than <code>supportedCSI-Proc-r11</code> in the</td>
<td></td>
</tr>
<tr>
<td>corresponding band. This field may also be included</td>
<td></td>
</tr>
<tr>
<td>for bandwidth class A but in such a case without</td>
<td></td>
</tr>
<tr>
<td>including any sub-fields in <code>IntraBandContiguousCC-Info-r12</code> (see NOTE 6).</td>
<td></td>
</tr>
<tr>
<td><strong>intraFreqA3-CE-ModeA</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE when operating in CE Mode A</td>
<td></td>
</tr>
<tr>
<td>supports eventA3 for intra-frequency neighbouring</td>
<td></td>
</tr>
<tr>
<td>cells.</td>
<td></td>
</tr>
<tr>
<td><strong>intraFreqA3-CE-ModeB</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE when operating in CE Mode B</td>
<td></td>
</tr>
<tr>
<td>supports eventA3 for intra-frequency neighbouring</td>
<td></td>
</tr>
<tr>
<td>cells.</td>
<td></td>
</tr>
<tr>
<td><strong>intraFreq-CE-NeedForGaps</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates need for measurement gaps when operating in</td>
<td></td>
</tr>
<tr>
<td>CE on the E-UTRA band given by the entry in</td>
<td></td>
</tr>
<tr>
<td><code>supportedBandListEUTRA</code>.</td>
<td></td>
</tr>
<tr>
<td><strong>intraFreqHO-CE-ModeA</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE when operating in CE Mode A</td>
<td></td>
</tr>
<tr>
<td>supports intra-frequency handover.</td>
<td></td>
</tr>
<tr>
<td><strong>intraFreqHO-CE-ModeB</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE when operating in CE Mode B</td>
<td></td>
</tr>
<tr>
<td>supports intra-frequency handover.</td>
<td></td>
</tr>
<tr>
<td><strong>intraFreqProximityIndication</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports proximity</td>
<td></td>
</tr>
<tr>
<td>indication for intra-frequency E-UTRAN CSG member</td>
<td></td>
</tr>
<tr>
<td>cells.</td>
<td></td>
</tr>
<tr>
<td><strong>intraFreqSI-AcquisitionForHO</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports, upon</td>
<td></td>
</tr>
<tr>
<td>configuration of si-RequestForHO by the network,</td>
<td></td>
</tr>
<tr>
<td>acquisition and reporting of relevant information</td>
<td></td>
</tr>
<tr>
<td>using autonomous gaps by reading the SI from</td>
<td></td>
</tr>
<tr>
<td>a neighbouring intra-frequency cell.</td>
<td></td>
</tr>
<tr>
<td><strong>k-Max (in MIMO-CA-ParametersPerBoBCPerTM)</strong></td>
<td>TBD</td>
</tr>
<tr>
<td>If signalled, the field indicates for a particular</td>
<td></td>
</tr>
<tr>
<td>transmission mode the maximum number of NZP</td>
<td></td>
</tr>
<tr>
<td>CSI RS resource configurations supported within a CSI</td>
<td></td>
</tr>
<tr>
<td>process applicable for the concerned band combination.</td>
<td></td>
</tr>
<tr>
<td><strong>k-Max (in MIMO-UE-ParametersPerTM)</strong></td>
<td>TBD</td>
</tr>
<tr>
<td>Indicates for a particular transmission mode the</td>
<td></td>
</tr>
<tr>
<td>maximum number of NZP CSI RS resource</td>
<td></td>
</tr>
<tr>
<td>configurations supported within a CSI process</td>
<td></td>
</tr>
<tr>
<td>applicable for band combinations for which the</td>
<td></td>
</tr>
<tr>
<td>concerned capabilities are not signalled.</td>
<td></td>
</tr>
</tbody>
</table>
### UE-UTRA-Capability field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>FDD/TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>loggedMBSFNMesurements</strong></td>
<td>Indicates whether the UE supports logged measurements for MBSFN. A UE indicating support for logged measurements for MBSFN shall also indicate support for logged measurements in Idle mode.</td>
</tr>
<tr>
<td><strong>loggedMeasurementsIdle</strong></td>
<td>Indicates whether the UE supports logged measurements in Idle mode.</td>
</tr>
<tr>
<td><strong>logicalChannelSR-ProhibitTimer</strong></td>
<td>Indicates whether the UE supports the logicalChannelSR-ProhibitTimer as defined in TS 36.321 [6].</td>
</tr>
<tr>
<td><strong>longDRX-Command</strong></td>
<td>Indicates whether the UE supports Long DRX Command MAC Control Element.</td>
</tr>
<tr>
<td><strong>lwa</strong></td>
<td>Indicates whether the UE supports LTE-WLAN Aggregation (LWA). The UE which supports LWA shall also indicate support of interRAT-ParametersWLAN-r13.</td>
</tr>
<tr>
<td><strong>lwa-BufferSize</strong></td>
<td>Indicates whether the UE supports the layer 2 buffer sizes for ‘with support for split bearers’ as defined in Table 4.1-3 and 4.1A-3 of TS 36.306 [5] for LWA.</td>
</tr>
<tr>
<td><strong>lwa-SplitBearer</strong></td>
<td>Indicates whether the UE supports the split LWA bearer (as defined in TS 36.300 [9]).</td>
</tr>
<tr>
<td><strong>lwip</strong></td>
<td>Indicates whether the UE supports LTE/WLAN Radio Level Integration with IPsec Tunnel (LWIP), The UE which supports LWIP shall also indicate support of interRAT-ParametersWLAN-r13.</td>
</tr>
<tr>
<td><strong>maximumCCsRetrieval</strong></td>
<td>Indicates whether UE supports reception of requestedMaxCCsDL and requestedMaxCCsUL.</td>
</tr>
<tr>
<td><strong>maxLayersMIMO-Indication</strong></td>
<td>Indicates whether the UE supports the network configuration of maxLayersMIMO. If the UE supports fourLayerTM3-TM4 or intraBandContiguousCC-InfoList, UE supports the configuration of maxLayersMIMO for these two cases regardless of indicating maxLayer-MIMO-Indication.</td>
</tr>
<tr>
<td><strong>maxNumberDecoding</strong></td>
<td>Indicates the maximum number of blind decodes in UE-specific search space per UE in one subframe for CA with more than 5 CCs as defined in TS 36.213 [23] which is supported by the UE. The number of blind decodes supported by the UE is the field value * 32. Only values 5 to 32 can be used in this version of the specification.</td>
</tr>
<tr>
<td><strong>maxNumberROHC-ContextSessions</strong></td>
<td>Set to the maximum number of concurrently active ROHC contexts supported by the UE, excluding context sessions that leave all headers uncompressed. cs2 corresponds with 2 (context sessions), cs4 corresponds with 4 and so on. The network ignores this field if the UE supports none of the ROHC profiles in supportedROHC-Profiles.</td>
</tr>
<tr>
<td><strong>maxNumberUpdatedCSI-Proc</strong></td>
<td>Indicates the maximum number of CSI processes to be updated across CCs.</td>
</tr>
<tr>
<td><strong>mbms-AsyncDC</strong></td>
<td>Indicates whether the UE in RRC_CONNECTED supports MBMS reception via MRB on a frequency indicated in an MBMSInterestIndication message, where (according to supportedBandCombination) the carriers that are or can be configured as serving cells in the MCG and the SCG are not synchronized. If this field is included, the UE shall also include mbms-SCell and mbms-NonServingCell.</td>
</tr>
<tr>
<td><strong>mbms-NonServingCell</strong></td>
<td>Indicates whether the UE in RRC_CONNECTED supports MBMS reception via MRB on a frequency indicated in an MBMSInterestIndication message, where (according to supportedBandCombination and to network synchronization properties) a serving cell may be additionally configured. If this field is included, the UE shall also include the mbms-SCell field.</td>
</tr>
<tr>
<td><strong>mbms-SCell</strong></td>
<td>Indicates whether the UE in RRC_CONNECTED supports MBMS reception via MRB on a frequency indicated in an MBMSInterestIndication message, when an SCell is configured on that frequency (regardless of whether the SCell is activated or deactivated).</td>
</tr>
<tr>
<td><strong>mfbi-UTRA</strong></td>
<td>It indicates if the UE supports the signalling requirements of multiple radio frequency bands in a UTRA FDD cell, as defined in TS 25.307 [65].</td>
</tr>
<tr>
<td><strong>MIMO-BeamformedCapabilityList</strong></td>
<td>A list of pairs of (k-Max, n-MaxList) values with the n’th entry indicating the values that the UE supports for each CSI process in case n CSI processes would be configured.</td>
</tr>
<tr>
<td><strong>MIMO-CapabilityDL</strong></td>
<td>The number of supported layers for spatial multiplexing in DL. The field may be absent for category 0 and category 1 UE in which case the number of supported layers is 1.</td>
</tr>
</tbody>
</table>
### UE-EUTRA-Capability field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>FDD/TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MIMO-CapabilityUL</strong></td>
<td></td>
</tr>
<tr>
<td>The number of supported layers for spatial multiplexing in UL. Absence of the field means that the number of supported layers is 1.</td>
<td></td>
</tr>
<tr>
<td><strong>MIMO-CA-ParametersPerBoBC</strong></td>
<td></td>
</tr>
<tr>
<td>A set of MIMO parameters provided per band of a band combination. In case a subfield is absent, the concerned capabilities are the same as indicated at the per UE level (i.e. by MIMO-UE-ParametersPerTM).</td>
<td></td>
</tr>
<tr>
<td><strong>modifiedMPR-Behavior</strong></td>
<td></td>
</tr>
<tr>
<td>Field encoded as a bit map, where at least one bit N is set to &quot;1&quot; if UE supports modified MPR/A-MPR behaviour N, see TS 36.101 [42]. All remaining bits of the field are set to '0'. The leading / leftmost bit (bit 0) corresponds to modified MPR/A-MPR behaviour 0, the next bit corresponds to modified MPR/A-MPR behaviour 1 and so on. Absence of this field means that UE does not support any modified MPR/A-MPR behaviour.</td>
<td></td>
</tr>
<tr>
<td><strong>multiACK-CSIreporting</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports multi-cell HARQ ACK and periodic CSI reporting and SR on PUCCH format 3.</td>
<td></td>
</tr>
<tr>
<td><strong>multiBandInfoReport</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports the acquisition and reporting of multi band information for reportCGI.</td>
<td></td>
</tr>
<tr>
<td><strong>multiClusterPUSCH-WithinCC</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports the mechanisms defined for cells broadcasting NS-PmaxList.</td>
<td></td>
</tr>
<tr>
<td><strong>multipleTimingAdvance</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports multiple timing advances for each band combination listed in supportedBandCombination. If the band combination comprised of more than one band entry (i.e., inter-band or intra-band non-contiguous band combination), the field indicates that the same or different timing advances on different band entries are supported. If the band combination comprised of one band entry (i.e., intra-band contiguous band combination), the field indicates that the same or different timing advances across component carriers of the band entry are supported.</td>
<td></td>
</tr>
<tr>
<td><strong>naics-Capability-List</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates that UE supports NAICS, i.e. receiving assistance information from serving cell and using it to cancel or suppress interference of neighbouring cell(s) for at least one band combination. If not present, UE does not support NAICS for any band combination. The field numberOfNAICS-CapableCC indicates the number of component carriers where the NAICS processing is supported and the field numberOfAggregatedPRB indicates the maximum aggregated bandwidth across these of component carriers (expressed as a number of PRBs) with the restriction that NAICS is only supported over the full carrier bandwidth. The UE shall indicate the combination of {numberOfNAICS-CapableCC, numberOfAggregatedPRB} for every supported numberOfNAICS-CapableCC, e.g. if a UE supports {x CC, y PRBs} and {x-n CC, y-m PRBs} where n&gt;=1 and m&gt;=0, the UE shall indicate both.</td>
<td></td>
</tr>
<tr>
<td>- For numberOfNAICS-CapableCC = 1, UE signals one value for numberOfAggregatedPRB from the range (50, 75, 100);</td>
<td></td>
</tr>
<tr>
<td>- For numberOfNAICS-CapableCC = 2, UE signals one value for numberOfAggregatedPRB from the range (50, 75, 100, 125, 150, 175, 200);</td>
<td></td>
</tr>
<tr>
<td>- For numberOfNAICS-CapableCC = 3, UE signals one value for numberOfAggregatedPRB from the range (50, 75, 100, 125, 150, 175, 200, 225, 250, 275, 300);</td>
<td></td>
</tr>
<tr>
<td>- For numberOfNAICS-CapableCC = 4, UE signals one value for numberOfAggregatedPRB from the range (50, 100, 150, 200, 250, 300, 350, 400);</td>
<td></td>
</tr>
<tr>
<td>- For numberOfNAICS-CapableCC = 5, UE signals one value for numberOfAggregatedPRB from the range (50, 100, 150, 200, 250, 300, 350, 400, 450, 500);</td>
<td></td>
</tr>
<tr>
<td><strong>n-MaxList (in MIMO-UE-ParametersPerTM)</strong></td>
<td>TBD</td>
</tr>
<tr>
<td>Indicates for a particular transmission mode the maximum number of NZP CSI RS ports supported within a CSI process applicable for band combinations for which the concerned capabilities are not signalled. For k-Max values exceeding 1, the UE shall include the field and signal k-Max minus 1 bits. The first bit indicates n-Max2, with value 0 indicating 8 and value 1 indicating 16. The second bit indicates n-Max3, with value 0 indicating 8 and value 1 indicating 16. The third bit indicates n-Max4, with value 0 indicating 8 and value 1 indicating 32. The fourth bit indicates n-Max5, with value 0 indicating 16 and value 1 indicating 32. The fifth bit indicates n-Max6, with value 0 indicating 16 and value 1 indicating 32. The sixth bit indicates n-Max7, with value 0 indicating 16 and value 1 indicating 32. The seventh bit indicates n-Max8, with value 0 indicating 16 and value 1 indicating 64.</td>
<td></td>
</tr>
</tbody>
</table>
### UE-EUTRA-Capability field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>FDD/ TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>n-MaxList (in MIMO-CA-ParametersPerBoBCPerTM)</strong></td>
<td>-</td>
</tr>
<tr>
<td>If signalled, the field indicates for a particular transmission mode the maximum number of NZP CSI RS ports supported within a CSI process applicable for band the concerned combination. Further details are as indicated for ( n)-MaxList in MIMO-UE-ParametersPerTM.</td>
<td>-</td>
</tr>
<tr>
<td><strong>NonContiguousUL-RA-WithinCC-List</strong></td>
<td>No</td>
</tr>
<tr>
<td>One entry corresponding to each supported E-UTRA band listed in the same order as in supportedBandListEUTRA.</td>
<td>-</td>
</tr>
<tr>
<td><strong>nonPrecoded (in MIMO-UE-ParametersPerTM)</strong></td>
<td>TBD</td>
</tr>
<tr>
<td>Indicates for a particular transmission mode the UE capabilities concerning non-precoded EBF/ FD-MIMO operation (class A) for band combinations for which the concerned capabilities are not signalled.</td>
<td>-</td>
</tr>
<tr>
<td><strong>nonPrecoded (in MIMO-CA-ParametersPerBoBCPerTM)</strong></td>
<td>-</td>
</tr>
<tr>
<td>If signalled, the field indicates for a particular transmission mode, the UE capabilities concerning non-precoded EBF/ FD-MIMO operation (class A) applicable for the concerned band combination.</td>
<td>-</td>
</tr>
<tr>
<td><strong>UE-EUTRA-Capability field descriptions</strong></td>
<td><strong>FDD/TDD diff</strong></td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td><strong>noResourceRestrictionForTTIBundling</strong></td>
<td></td>
</tr>
<tr>
<td>Indicate whether the UE supports TTI bundling operation without resource allocation restriction.</td>
<td></td>
</tr>
<tr>
<td><strong>otdoa-UE-Assisted</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports UE-assisted OTDOA positioning [54].</td>
<td></td>
</tr>
<tr>
<td><strong>pdccch-CandidateReductions</strong></td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports PDCH candidate reduction on Ue specific search space as specified in TS 36.213 [23, 9.1.1].</td>
<td></td>
</tr>
<tr>
<td><strong>pdcp-SN-Extension</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports 15 bit length of PDCP sequence number.</td>
<td></td>
</tr>
<tr>
<td><strong>pdcp-SN-Extension-18bits</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports 18 bit length of PDCP sequence number.</td>
<td></td>
</tr>
<tr>
<td><strong>pdcp-TransferSplitUL</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports PDCP data transfer split in UL for the <em>drb-TypeSplit</em> as specified in TS 36.323 [8].</td>
<td></td>
</tr>
<tr>
<td><strong>pdcch-CollisionHandling</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports PDSCH collision handling as specified in TS 36.213 [23].</td>
<td></td>
</tr>
<tr>
<td><strong>phy-TDD-ReConfig-FDD-PCell</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports TDD UL/DL reconfiguration for TDD serving cell(s) via monitoring PDCH with eIMTA-RNTI on a FDD PCell, and HARQ feedback according to UL and DL HARQ reference configurations. This bit can only be set to supported only if the UE supports FDD PCell and phy-TDD-ReConfig-TDD-PCell is set to supported.</td>
<td></td>
</tr>
<tr>
<td><strong>phy-TDD-Config-TDD-PCell</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports TDD UL/DL reconfiguration for TDD serving cell(s) via monitoring PDCH with eIMTA-RNTI on a TDD PCell, and HARQ feedback according to UL and DL HARQ reference configurations, and PUCCH format 3.</td>
<td></td>
</tr>
<tr>
<td><strong>pmi-Disabling</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports power preference indication.</td>
<td></td>
</tr>
<tr>
<td><strong>powerPrefInd</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>pucch-Format4</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports PUCCH format 4.</td>
<td></td>
</tr>
<tr>
<td><strong>pucch-Format5</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE supports PUCCH format 5.</td>
<td></td>
</tr>
<tr>
<td><strong>pucch-SCell</strong></td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports PUCCH on SCell.</td>
<td></td>
</tr>
<tr>
<td><strong>pusch-FeedbackMode</strong></td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports PUSCH feedback mode 3-2.</td>
<td></td>
</tr>
<tr>
<td><strong>pusch-SRS-PowerControl-SubframeSet</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports subframe set dependent UL power control for PUSCH and SRS. This field is only applicable for UEs supporting TDD.</td>
<td></td>
</tr>
<tr>
<td><strong>rach-Report</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports delivery of rachReport.</td>
<td></td>
</tr>
<tr>
<td><strong>rcwi</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports RCLWI, i.e. reception of rclwi-Configuration. The UE which supports RCLWI shall also indicate support of <em>interRAT-ParametersWLAN-r13</em>. The UE which supports RCLWI and <em>wlan-IW-RAN-Rules</em> shall also support applying WLAN identifiers received in rclwi-Configuration for the access network selection and traffic steering rules when in RRC_IDLE.</td>
<td></td>
</tr>
<tr>
<td><strong>reducedIntNonContComb</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports receiving <em>requestReducedIntNonContComb</em> that requests the UE to exclude supported intra-band non-contiguous CA band combinations other than included in capability signalling as specified in TS 36.306 [5, 4.3.5.21].</td>
<td></td>
</tr>
<tr>
<td><strong>reducedIntNonContCombRequested</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates that the UE excluded supported intra-band non-contiguous CA band combinations other than included in capability signalling as specified in TS 36.306 [5, 4.3.5.21].</td>
<td></td>
</tr>
<tr>
<td><strong>requestedBands</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates the frequency bands requested by E-UTRAN.</td>
<td></td>
</tr>
<tr>
<td><strong>requestedCCsDL</strong>, <strong>requestedCCsUL</strong></td>
<td></td>
</tr>
<tr>
<td>Indicates the maximum number of CCs requested by E-UTRAN.</td>
<td></td>
</tr>
<tr>
<td><strong>rsrqMeasWideband</strong></td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE can perform RSRQ measurements with wider bandwidth.</td>
<td></td>
</tr>
<tr>
<td><strong>rsrq-OnAllSymbols</strong></td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE can perform RSRQ measurement on all OFDM symbols and also support the extended RSRQ upper value range from -3dB to 2.5dB in measurement configuration and reporting as specified in TS 36.133 [16].</td>
<td></td>
</tr>
<tr>
<td>UE-EUTRA-Capability field descriptions</td>
<td>FDD/TDD diff</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>rs-SINR-Meas</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE can perform</td>
<td></td>
</tr>
<tr>
<td>RS-SINR measurements in RRC_CONNECTED</td>
<td></td>
</tr>
<tr>
<td>as specified in TS 36.214 [48].</td>
<td></td>
</tr>
<tr>
<td>rs-AndChannelOccupancyReporting</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports</td>
<td></td>
</tr>
<tr>
<td>performing measurements and reporting</td>
<td></td>
</tr>
<tr>
<td>of RSSI and channel occupancy. This</td>
<td></td>
</tr>
<tr>
<td>field can be included only if</td>
<td></td>
</tr>
<tr>
<td>downlinkLAA is included.</td>
<td></td>
</tr>
<tr>
<td>scptm-AsyncDC</td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE in RRC</td>
<td></td>
</tr>
<tr>
<td>CONNECTED supports MBMS reception via</td>
<td></td>
</tr>
<tr>
<td>SC-MRB on a frequency indicated in an</td>
<td></td>
</tr>
<tr>
<td>MBMSInterestIndication message, where</td>
<td></td>
</tr>
<tr>
<td>(according to supportedBandCombination)</td>
<td></td>
</tr>
<tr>
<td>the carriers that are or can be</td>
<td></td>
</tr>
<tr>
<td>configured as serving cells in the</td>
<td></td>
</tr>
<tr>
<td>MCG and the SCG are not synchronized.</td>
<td></td>
</tr>
<tr>
<td>If this field is included, the UE</td>
<td></td>
</tr>
<tr>
<td>shall also include scptm-SCell and</td>
<td></td>
</tr>
<tr>
<td>scptm-NonServingCell.</td>
<td></td>
</tr>
<tr>
<td>scptm-NonServingCell</td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE in RRC</td>
<td></td>
</tr>
<tr>
<td>CONNECTED supports MBMS reception via</td>
<td></td>
</tr>
<tr>
<td>SC-MRB on a frequency indicated in an</td>
<td></td>
</tr>
<tr>
<td>MBMSInterestIndication message, where</td>
<td></td>
</tr>
<tr>
<td>(according to supportedBandCombination)</td>
<td></td>
</tr>
<tr>
<td>and to network synchronization</td>
<td></td>
</tr>
<tr>
<td>properties) a serving cell may be</td>
<td></td>
</tr>
<tr>
<td>additionally configured. If this field</td>
<td></td>
</tr>
<tr>
<td>is included, the UE shall also include</td>
<td></td>
</tr>
<tr>
<td>the scptm-SCell field.</td>
<td></td>
</tr>
<tr>
<td>scptm-Parameters</td>
<td>Yes</td>
</tr>
<tr>
<td>Presence of the field indicates that</td>
<td></td>
</tr>
<tr>
<td>the UE supports SC-PTM reception as</td>
<td></td>
</tr>
<tr>
<td>specified in TS 36.306 [5].</td>
<td></td>
</tr>
<tr>
<td>scptm-SCell</td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE in RRC</td>
<td></td>
</tr>
<tr>
<td>CONNECTED supports MBMS reception via</td>
<td></td>
</tr>
<tr>
<td>SC-MRB on a frequency indicated in an</td>
<td></td>
</tr>
<tr>
<td>MBMSInterestIndication message, when</td>
<td></td>
</tr>
<tr>
<td>an SCCell is configured on that</td>
<td></td>
</tr>
<tr>
<td>frequency (regardless of whether the</td>
<td></td>
</tr>
<tr>
<td>SCCell is activated or deactivated).</td>
<td></td>
</tr>
<tr>
<td>scptm-ParallelReception</td>
<td>Yes</td>
</tr>
<tr>
<td>Indicates whether the UE in RRC</td>
<td></td>
</tr>
<tr>
<td>CONNECTED supports parallel reception</td>
<td></td>
</tr>
<tr>
<td>in the same subframe of DL-SCH</td>
<td></td>
</tr>
<tr>
<td>transport blocks transmitted using</td>
<td></td>
</tr>
<tr>
<td>C-RNTI/Semi-Persistent Scheduling</td>
<td></td>
</tr>
<tr>
<td>C-RNTI and using SC-RNTI/G-RNTI as</td>
<td></td>
</tr>
<tr>
<td>specified in TS 36.306 [5].</td>
<td></td>
</tr>
<tr>
<td>secondSlotStartingPosition</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports</td>
<td></td>
</tr>
<tr>
<td>reception of subframes with second</td>
<td></td>
</tr>
<tr>
<td>slot starting position as described in</td>
<td></td>
</tr>
<tr>
<td>TS 36.211 [21] and TS 36.213 [23].</td>
<td></td>
</tr>
<tr>
<td>This field can be included only if</td>
<td></td>
</tr>
<tr>
<td>downlinkLAA is included.</td>
<td></td>
</tr>
<tr>
<td>simultaneousPUCCH-PUSCH</td>
<td>Yes</td>
</tr>
<tr>
<td>simultaneousRx-Tx</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports</td>
<td></td>
</tr>
<tr>
<td>simultaneous reception and transmission</td>
<td></td>
</tr>
<tr>
<td>on different bands for each band</td>
<td></td>
</tr>
<tr>
<td>combination listed in supportedBand</td>
<td></td>
</tr>
<tr>
<td>Combination. This field is only</td>
<td></td>
</tr>
<tr>
<td>applicable for inter-band TDD band</td>
<td></td>
</tr>
<tr>
<td>combinations. A UE indicating support</td>
<td></td>
</tr>
<tr>
<td>of simultaneousRx-Tx and dc-</td>
<td></td>
</tr>
<tr>
<td>Support-r12 shall support different</td>
<td></td>
</tr>
<tr>
<td>UL/DL configurations between PCell and</td>
<td></td>
</tr>
</tbody>
</table>
PSCell.                                  |             |
<p>| skipFallbackCombinations               |             |
| Indicates whether UE supports          |             |
| receiving reception of skipFallback    |             |
| Combinations that requests UE          |             |
| to exclude fallback band combinations  |             |
| from capability signalling.            |             |
| skipFallbackCombRequested              |             |
| Indicates whether requestSkipFallback  |             |
| Combinations is requested by E-UTRAN.  |             |
| skipMonitoringDCI-Format0-1A            | No          |
| Indicates whether UE supports blind     |             |
| decoding reduction on UE specific      |             |
| search space by not monitoring DCI     |             |
| Format 0 and 1A as specified in TS      |             |
| 36.213 [23, 9.1.1].                    |             |
| spatialBundling-HARQ-ACK               | No          |
| Indicates whether UE supports          |             |
| HARQ-ACK spatial bundling on PUCCH or  |             |
| PUSCH as specified in TS 36.213 [23,   |             |
| 7.3.1 and 7.3.2.                       |             |
| srs-Enhancements                       | TBD         |
| Indicates whether the UE supports SRS  |             |
| enhancements.                          |             |
| srs-EnhancementsTDD                    | No          |
| Indicates whether the UE supports TDD  |             |
| specific SRS enhancements.             |             |
| srvcc-FromUTRA-FDD-ToGERAN             |             |
| Indicates whether UE supports SRVCC     |             |
| handover from UTRA FDD PS HS to         |             |
| GERAN CS.                              |             |
| srvcc-FromUTRA-FDD-ToUTRA-FDD          |             |
| Indicates whether UE supports SRVCC     |             |
| handover from UTRA FDD PS HS to         |             |
| UTRA FDD CS.                           |             |
| srvcc-FromUTRA-TDD128-ToGERAN          |             |
| Indicates whether UE supports SRVCC     |             |
| handover from UTRA TDD 1.28Mcps PS HS  |             |
| to GERAN CS.                           |             |
| srvcc-FromUTRA-TDD128-ToUTRA-TDD128    |             |
| Indicates whether UE supports SRVCC     |             |
| handover from UTRA TDD 1.28Mcps PS HS  |             |
| to UTRA TDD 1.28Mcps CS.               |             |
| ss-CCH-InterHandl                       | Yes         |
| Indicates whether the UE supports      |             |
| synchronisation signal and common      |             |
| channel interference.                  |             |</p>
<table>
<thead>
<tr>
<th>UE-EUTRA-Capability field descriptions</th>
<th>FDD/TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>handling.</td>
<td></td>
</tr>
<tr>
<td>standaloneGNSS-Location</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE is equipped</td>
<td></td>
</tr>
<tr>
<td>with a standalone GNSS receiver that</td>
<td></td>
</tr>
<tr>
<td>may be used to provide detailed</td>
<td></td>
</tr>
<tr>
<td>location information in RRC</td>
<td></td>
</tr>
<tr>
<td>measurement report and logged</td>
<td></td>
</tr>
<tr>
<td>measurements.</td>
<td></td>
</tr>
<tr>
<td>supportedBandCombination</td>
<td></td>
</tr>
<tr>
<td>Includes the supported CA band</td>
<td></td>
</tr>
<tr>
<td>combinations, if any, and may include</td>
<td></td>
</tr>
<tr>
<td>all the supported non-CA bands.</td>
<td></td>
</tr>
<tr>
<td>supportedBandCombinationAdd-r11</td>
<td></td>
</tr>
<tr>
<td>Includes additional supported CA band</td>
<td></td>
</tr>
<tr>
<td>combinations in case maximum number</td>
<td></td>
</tr>
<tr>
<td>of CA band combinations of</td>
<td></td>
</tr>
<tr>
<td>supportedBandCombination is exceeded.</td>
<td></td>
</tr>
<tr>
<td>SupportedBandCombinationAdd-v11d0,</td>
<td></td>
</tr>
<tr>
<td>SupportedBandCombinationAdd-v1250,</td>
<td></td>
</tr>
<tr>
<td>SupportedBandCombinationAdd-v1270,</td>
<td></td>
</tr>
<tr>
<td>SupportedBandCombinationAdd-v1320</td>
<td></td>
</tr>
<tr>
<td>If included, the UE shall include the</td>
<td></td>
</tr>
<tr>
<td>same number of entries, and listed in</td>
<td></td>
</tr>
<tr>
<td>the same order, as in</td>
<td></td>
</tr>
<tr>
<td>supportedBandCombinationAdd-r11.</td>
<td></td>
</tr>
<tr>
<td>SupportedBandCombinationExt,</td>
<td></td>
</tr>
<tr>
<td>SupportedBandCombination-v1090,</td>
<td></td>
</tr>
<tr>
<td>SupportedBandCombination-v1010,</td>
<td></td>
</tr>
<tr>
<td>SupportedBandCombination-v1130,</td>
<td></td>
</tr>
<tr>
<td>SupportedBandCombination-v1250,</td>
<td></td>
</tr>
<tr>
<td>SupportedBandCombination-v1270,</td>
<td></td>
</tr>
<tr>
<td>SupportedBandCombination-v1320</td>
<td></td>
</tr>
<tr>
<td>If included, the UE shall include the</td>
<td></td>
</tr>
<tr>
<td>same number of entries, and listed in</td>
<td></td>
</tr>
<tr>
<td>the same order, as in</td>
<td></td>
</tr>
<tr>
<td>supportedBandCombinationAdd-r10.</td>
<td></td>
</tr>
<tr>
<td>supportedBandCombinationReduced</td>
<td></td>
</tr>
<tr>
<td>Includes the supported CA band</td>
<td></td>
</tr>
<tr>
<td>combinations, and may include the</td>
<td></td>
</tr>
<tr>
<td>fallback CA combinations specified</td>
<td></td>
</tr>
<tr>
<td>in TS 36.101 [42, 4.3A]. This field</td>
<td></td>
</tr>
<tr>
<td>also indicates whether the UE supports</td>
<td></td>
</tr>
<tr>
<td>requestReducedFormat.</td>
<td></td>
</tr>
<tr>
<td>SupportedBandCombinationReduced-v1320</td>
<td></td>
</tr>
<tr>
<td>If included, the UE shall include the</td>
<td></td>
</tr>
<tr>
<td>same number of entries, and listed in</td>
<td></td>
</tr>
<tr>
<td>the same order, as in</td>
<td></td>
</tr>
<tr>
<td>supportedBandCombinationReduced-r13.</td>
<td></td>
</tr>
<tr>
<td>SupportedBandGERAN</td>
<td>No</td>
</tr>
<tr>
<td>GERAN band as defined in TS 45.005</td>
<td></td>
</tr>
<tr>
<td>[20].</td>
<td></td>
</tr>
<tr>
<td>SupportedBandList1XRTT</td>
<td></td>
</tr>
<tr>
<td>One entry corresponding to each</td>
<td></td>
</tr>
<tr>
<td>supported CDMA2000 1XRTT band class.</td>
<td></td>
</tr>
<tr>
<td>SupportedBandListEUTRA</td>
<td></td>
</tr>
<tr>
<td>Includes the supported E-UTRA bands.</td>
<td></td>
</tr>
<tr>
<td>This field shall include all bands</td>
<td></td>
</tr>
<tr>
<td>which are indicated in</td>
<td></td>
</tr>
<tr>
<td>BandCombinationParameters.</td>
<td></td>
</tr>
<tr>
<td>SupportedBandListEUTRA-v9e0,</td>
<td></td>
</tr>
<tr>
<td>SupportedBandListEUTRA-v1250,</td>
<td></td>
</tr>
<tr>
<td>SupportedBandListEUTRA-v1310,</td>
<td></td>
</tr>
<tr>
<td>SupportedBandListEUTRA-v1320</td>
<td></td>
</tr>
<tr>
<td>If included, the UE shall include the</td>
<td></td>
</tr>
<tr>
<td>same number of entries, and listed in</td>
<td></td>
</tr>
<tr>
<td>the same order, as in</td>
<td></td>
</tr>
<tr>
<td>supportedBandListEUTRA (i.e. without</td>
<td></td>
</tr>
<tr>
<td>suffix).</td>
<td></td>
</tr>
<tr>
<td>SupportedBandListGERAN</td>
<td>No</td>
</tr>
<tr>
<td>GERAN band as defined in TS 45.005</td>
<td></td>
</tr>
<tr>
<td>[20].</td>
<td></td>
</tr>
<tr>
<td>SupportedBandListHRPD</td>
<td></td>
</tr>
<tr>
<td>One entry corresponding to each</td>
<td></td>
</tr>
<tr>
<td>supported CDMA2000 HRPD band class.</td>
<td></td>
</tr>
<tr>
<td>supportedBandListWLAN</td>
<td></td>
</tr>
<tr>
<td>Indicates the supported WLAN bands by</td>
<td></td>
</tr>
<tr>
<td>the UE.</td>
<td></td>
</tr>
<tr>
<td>SupportedBandUTRA-FDD</td>
<td></td>
</tr>
<tr>
<td>UTRA band as defined in TS 25.101</td>
<td></td>
</tr>
<tr>
<td>[17].</td>
<td></td>
</tr>
<tr>
<td>SupportedBandUTRA-TDD128</td>
<td></td>
</tr>
<tr>
<td>UTRA band as defined in TS 25.102</td>
<td></td>
</tr>
<tr>
<td>[18].</td>
<td></td>
</tr>
<tr>
<td>SupportedBandUTRA-TDD0384</td>
<td></td>
</tr>
<tr>
<td>UTRA band as defined in TS 25.102</td>
<td></td>
</tr>
<tr>
<td>[18].</td>
<td></td>
</tr>
<tr>
<td>SupportedBandUTRA-TDD0768</td>
<td></td>
</tr>
<tr>
<td>UTRA band as defined in TS 25.102</td>
<td></td>
</tr>
<tr>
<td>[18].</td>
<td></td>
</tr>
<tr>
<td>supportedBandwidthCombinationSet</td>
<td></td>
</tr>
<tr>
<td>The supportedBandwidthCombinationSet</td>
<td></td>
</tr>
<tr>
<td>indicated for a band combination</td>
<td></td>
</tr>
<tr>
<td>is applicable to all bandwidth</td>
<td></td>
</tr>
<tr>
<td>classes indicated by the UE in this</td>
<td></td>
</tr>
<tr>
<td>band combination. Field encoded as</td>
<td></td>
</tr>
<tr>
<td>a bit map, where bit N is set to &quot;1&quot;</td>
<td></td>
</tr>
<tr>
<td>if UE support Bandwidth Combination</td>
<td></td>
</tr>
<tr>
<td>Set N for this band combination, see</td>
<td></td>
</tr>
<tr>
<td>36.101 [42]. The leading / leftmost</td>
<td></td>
</tr>
<tr>
<td>bit (bit 0) corresponds to the</td>
<td></td>
</tr>
<tr>
<td>Bandwidth Combination Set 0, the</td>
<td></td>
</tr>
<tr>
<td>next bit corresponds to the</td>
<td></td>
</tr>
<tr>
<td>Bandwidth Combination Set 1 and so on.</td>
<td></td>
</tr>
<tr>
<td>The UE shall neither include the</td>
<td></td>
</tr>
<tr>
<td>field for a non-CA band combination,</td>
<td></td>
</tr>
<tr>
<td>nor for a CA band combination for</td>
<td></td>
</tr>
<tr>
<td>which the UE only supports</td>
<td></td>
</tr>
<tr>
<td>Bandwidth Combination Set 0.</td>
<td></td>
</tr>
<tr>
<td>supportedCellGrouping</td>
<td></td>
</tr>
<tr>
<td>This field indicates for which</td>
<td></td>
</tr>
<tr>
<td>mapping of serving cells to cell</td>
<td></td>
</tr>
<tr>
<td>groups (i.e. MCG or SCG) the UE</td>
<td></td>
</tr>
<tr>
<td>supports asynchronous DC. This field</td>
<td></td>
</tr>
<tr>
<td>is only present for a band</td>
<td></td>
</tr>
<tr>
<td>combination with more than two but</td>
<td></td>
</tr>
<tr>
<td>less than six UTRA bands, where the</td>
<td></td>
</tr>
<tr>
<td>UE supports asynchronous DC. If this</td>
<td></td>
</tr>
<tr>
<td>field is not present but asynchronous</td>
<td></td>
</tr>
<tr>
<td>operation is supported, the UE</td>
<td></td>
</tr>
<tr>
<td>supports all possible mappings of</td>
<td></td>
</tr>
<tr>
<td>serving cells to cell groups for the</td>
<td></td>
</tr>
<tr>
<td>band combination. The bitmap size is</td>
<td></td>
</tr>
</tbody>
</table>
| selected based on the
<table>
<thead>
<tr>
<th>Field Description</th>
<th>FDD/TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>number of entries in the combinations, i.e., in case of three entries, the bitmap corresponding to threeEntries is selected and so on.</td>
<td></td>
</tr>
<tr>
<td>A bit in the bit string set to 1 indicates that the UE supports asynchronous DC for the cell grouping option represented by the concerned bit position. Each bit position represents a different cell grouping option, as illustrated by a table, see NOTE 5. A cell grouping option is represented by a number of bits, each representing a particular band entry in the band combination with the left-most bit referring to the band listed first in the band combination, etc. Value 0 indicates that the carriers of the corresponding band entry are mapped to a first cell group, while value 1 indicates that the carriers of the corresponding band entry are mapped to a second cell group. It is noted that the mapping table does not include entries with all bits set to the same value (0 or 1) as this does not represent a DC scenario (i.e. indicating that the UE supports that all carriers of the corresponding band entry are in one cell group).</td>
<td></td>
</tr>
<tr>
<td>supportedCSI-Proc</td>
<td></td>
</tr>
<tr>
<td>Indicates the maximum number of CSI processes supported on a component carrier within a band. Value n1 corresponds to 1 CSI process, value n3 corresponds to 3 CSI processes, and value n4 corresponds to 4 CSI processes. If this field is included, the UE shall include the same number of entries listed in the same order as in BandParameters. If the UE supports at least 1 CSI process on any component carrier, then the UE shall include this field in all bands in all band combinations.</td>
<td></td>
</tr>
<tr>
<td>supportedNAICS-2CRS-AP</td>
<td></td>
</tr>
<tr>
<td>If included, the UE supports NAICS for the band combination. The UE shall include a bitmap of the same length, and in the same order, as in naics-Capability-List, to indicate 2 CRS AP NAICS capability of the band combination. The first/ leftmost bit points to the first entry of naics-Capability-List, the second bit points to the second entry of naics-Capability-List, and so on. For band combinations with a single component carrier, UE is only allowed to indicate ( \text{numberOfNAICS-CapableCC, numberOfAggregatedPRB} = (1, 100) ) if NAICS is supported.</td>
<td></td>
</tr>
<tr>
<td>supportRohcContextContinue</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports ROHC context continuation operation where the UE does not reset the current ROHC context upon handover.</td>
<td></td>
</tr>
<tr>
<td>tdd-SpecialSubframe</td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports TDD special subframe defined in TS 36.211 [21].</td>
<td></td>
</tr>
<tr>
<td>tdd-FDD-CA-PCellDuplex</td>
<td></td>
</tr>
<tr>
<td>The presence of this field indicates that the UE supports TDD/FDD CA in any supported band combination including at least one FDD band with bandParametersUL and at least one TDD band with bandParametersUL. The first bit is set to ‘1’ if UE supports the TDD PCell. The second bit is set to ‘1’ if UE supports FDD PCell. This field is included only if the UE supports band combination including at least one FDD band with bandParametersUL and at least one TDD band with bandParametersUL. If this field is included, the UE shall set at least one of the bits as ‘1’. If this field is included with DC, then it is applicable within a CG, and the presence of this field indicates the capability of the UE to support TDD/FDD CA with at least one FDD band and at least one TDD band in the same CG, with the value indicating the support for TDD/FDD PCell (PSCell).</td>
<td></td>
</tr>
<tr>
<td>timerT312</td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports T312.</td>
<td></td>
</tr>
<tr>
<td>tm5-FDD</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports the PDSCH transmission mode 5 in FDD.</td>
<td></td>
</tr>
<tr>
<td>tm5-TDD</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports the PDSCH transmission mode 5 in TDD.</td>
<td></td>
</tr>
<tr>
<td>tm9-LAA</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports tm9 operation on LAA cell(s). This field can be included only if downlinkLAA is included.</td>
<td></td>
</tr>
<tr>
<td>tm9-With-8Tx-FDD</td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports tm9 operation on LAA cell(s). This field can be included only if downlinkLAA is included.</td>
<td></td>
</tr>
<tr>
<td>tm10-LAA</td>
<td></td>
</tr>
<tr>
<td>Indicates whether the UE supports tm10 operation on LAA cell(s). This field can be included only if downlinkLAA is included.</td>
<td></td>
</tr>
<tr>
<td>twoAntennaPortsForPUCCH</td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports transmit diversity for PUCCH format 1b with channel selection.</td>
<td>Yes</td>
</tr>
<tr>
<td>txDiv-PUCCH1b-ChSelect</td>
<td></td>
</tr>
<tr>
<td>uci-PUSCH-Ext</td>
<td>No</td>
</tr>
<tr>
<td>Indicates whether the UE supports an extension of UCI delivering more than 22 HARQ-ACK bits on PUSCH as specified in TS 36.212 [22, 5.2.2.6] and TS 36.213 [23, 8.6.3].</td>
<td></td>
</tr>
</tbody>
</table>
### UE-EUTRA-Capability field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>FDD/TDD diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>ue-Category</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>UE category as defined in TS 36.306 [5]. Set to values 1 to 12 in this version of the specification.</td>
</tr>
<tr>
<td>ue-CategoryDL</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>UE DL category as defined in TS 36.306 [5]. For ASN.1 compatibility, a UE indicating DL category 0 or m1 shall also indicate any of the categories (1..5) in ue-Category (without suffix), which is ignored by the eNB. The field ue-CategoryDL is set to values m1, 0, 6, 7, 9 to 19 in this version of the specification.</td>
</tr>
<tr>
<td>ue-CategoryUL</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>UE UL category as defined in TS 36.306 [5]. The field ue-CategoryUL is set to values m1, 0, 3, 5, 7, 8, 13 or 14 in this version of the specification.</td>
</tr>
<tr>
<td>ue-CE-NeedULGaps</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Indicates that the UE needs uplink gaps during continuous uplink transmission in FDD as specified in TS 36.211 [21] and TS 36.306 [5].</td>
</tr>
<tr>
<td>ue-PowerClass-N, ue-PowerClass-5</td>
<td>Indicates whether the UE supports UE power class 1, 2, 4 or 5 in the E-UTRA band, see TS 36.101 [42]. UE includes either ue-PowerClass-N or ue-PowerClass-5. If neither ue-PowerClass-N nor ue-PowerClass-5 is included, UE supports the default UE power class in the E-UTRA band, see TS 36.101 [42].</td>
</tr>
<tr>
<td>ue-Rx-TxTimeDiffMeasurements</td>
<td>No</td>
</tr>
<tr>
<td>Description</td>
<td>Indicates whether the UE supports Rx - Tx time difference measurements.</td>
</tr>
<tr>
<td>ue-SpecificRefSigsSupported</td>
<td>No</td>
</tr>
<tr>
<td>Description</td>
<td>Indicates whether the UE supports specific reference signals.</td>
</tr>
<tr>
<td>ue-SSTD-Meas</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Indicates whether the UE supports SSTD measurements between the PCell and the PSCell as specified in TS 36.214 [48] and TS 36.133 [16].</td>
</tr>
<tr>
<td>ue-TxAntennaSelectionSupported</td>
<td>Yes</td>
</tr>
<tr>
<td>Description</td>
<td>TRUE indicates that the UE is capable of supporting UE transmit antenna selection as described in TS 36.213 [23, 8.7].</td>
</tr>
<tr>
<td>ul-CoMP</td>
<td>No</td>
</tr>
<tr>
<td>Description</td>
<td>Indicates whether the UE supports UL Coordinated Multi-Point operation.</td>
</tr>
<tr>
<td>utran-ProximityIndication</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Indicates whether the UE supports proximity indication for UTRAN CSG member cells.</td>
</tr>
<tr>
<td>ul-64QAM</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Indicates whether the UE supports 64QAM in UL on the band. This field is only present when the field ue-CategoryUL is set to 5, 6, 13 or 14. If the field is present for one band, the field shall be present for all bands including downlink only bands.</td>
</tr>
<tr>
<td>ul-PDCP-Delay</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Indicates whether the UE supports UL PDCP Packet Delay per QCI measurement as specified in TS 36.314 [71].</td>
</tr>
<tr>
<td>utran-SI-AcquisitionForHO</td>
<td>Yes</td>
</tr>
<tr>
<td>Description</td>
<td>Indicates whether the UE supports, upon configuration of si-RequestForHO by the network, acquisition and reporting of relevant information using autonomous gaps by reading the SI from a neighbouring UMTS cell.</td>
</tr>
<tr>
<td>voiceOverPS-UTRA-FDD</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Indicates whether the UE supports IMS voice according to GSMA IR.58 profile in UTRA FDD.</td>
</tr>
<tr>
<td>voiceOverPS-UTRA-TDD128</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Indicates whether the UE supports IMS voice in UTRA TDD 1.28Mcps.</td>
</tr>
<tr>
<td>whiteCellList</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Indicates whether the UE supports EUTRA white cell listing to limit the set of cells applicable for measurements.</td>
</tr>
<tr>
<td>wlan-IW-RAN-Rules</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Indicates whether the UE supports RAN-assisted WLAN interworking based on access network selection and traffic steering rules.</td>
</tr>
<tr>
<td>wlan-IW-ANDSF-Policies</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Indicates whether the UE supports RAN-assisted WLAN interworking based on ANDSF policies.</td>
</tr>
<tr>
<td>wlan-MAC-Address</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Indicates the WLAN MAC address of this UE.</td>
</tr>
</tbody>
</table>

**NOTE 1:** The IE **UE-EUTRA-Capability** does not include AS security capability information, since these are the same as the security capabilities that are signalled by NAS. Consequently AS need not provide "man-in-the-middle" protection for the security capabilities.
NOTE 2: The column FDD/ TDD diff indicates if the UE is allowed to signal, as part of the additional capabilities for an XDD mode i.e. within `UE-EUTRA-CapabilityAddXDD-Mode-xNM`, a different value compared to the value signalled elsewhere within `UE-EUTRA-Capability` (i.e. the common value, supported for both XDD modes). A '-' is used to indicate that it is not possible to signal different values (used for fields for which the field description is provided for other reasons). Annex E specifies for which TDD and FDD serving cells a UE supporting TDD/FDD CA shall support a capability for which it indicates support within the capability signalling.

NOTE 3: All the combinations of `CA-MIMO-ParametersUL` and `CA-MIMO-ParametersDL` for one band and across all the bands in each `BandCombinationParameters` are supported by the UE and have the same measurement gap requirement (i.e. the same `BandInfoEUTRA` applies). The `BandCombinationParameters` for the same band combination can be included more than once.

NOTE 4: UE CA and measurement capabilities indicate the combinations of frequencies that can be configured as serving frequencies.

NOTE 5: The grouping of the cells to the first and second cell group, as indicated by `supportedCellGrouping`, is shown in the table below. The leading / leftmost bit of `supportedCellGrouping` corresponds to the Bit String Position 1.

<table>
<thead>
<tr>
<th>Nr of Band Entries:</th>
<th>5</th>
<th>4</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Bit-String:</td>
<td>15</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Bit String Position</td>
<td>Cell grouping option (0= first cell group, 1= second cell group)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>00001</td>
<td>0001</td>
<td>001</td>
</tr>
<tr>
<td>2</td>
<td>00010</td>
<td>0010</td>
<td>010</td>
</tr>
<tr>
<td>3</td>
<td>00011</td>
<td>0011</td>
<td>011</td>
</tr>
<tr>
<td>4</td>
<td>00100</td>
<td>0100</td>
<td>010</td>
</tr>
<tr>
<td>5</td>
<td>00101</td>
<td>0101</td>
<td>010</td>
</tr>
<tr>
<td>6</td>
<td>00110</td>
<td>0110</td>
<td>010</td>
</tr>
<tr>
<td>7</td>
<td>00111</td>
<td>0111</td>
<td>010</td>
</tr>
<tr>
<td>8</td>
<td>01000</td>
<td>0100</td>
<td>010</td>
</tr>
<tr>
<td>9</td>
<td>01001</td>
<td>0101</td>
<td>010</td>
</tr>
<tr>
<td>10</td>
<td>01010</td>
<td>0110</td>
<td>010</td>
</tr>
<tr>
<td>11</td>
<td>01011</td>
<td>0111</td>
<td>010</td>
</tr>
<tr>
<td>12</td>
<td>01100</td>
<td>0110</td>
<td>010</td>
</tr>
<tr>
<td>13</td>
<td>01101</td>
<td>0111</td>
<td>010</td>
</tr>
<tr>
<td>14</td>
<td>01110</td>
<td>0111</td>
<td>010</td>
</tr>
<tr>
<td>15</td>
<td>01111</td>
<td>0111</td>
<td>010</td>
</tr>
</tbody>
</table>

NOTE 6: UE includes the `intraBandContiguousCC-InfoList-r12` also for bandwidth class A because of the presence conditions in `BandCombinationParameters-v1270`. For example, if UE supports CA_1A_41D band combination, if UE includes the field `intraBandContiguousCC-InfoList-r12` for band 41, the UE includes `intraBandContiguousCC-InfoList-r12` also for band 1.

-- UE-RadioPagingInfo

The `UE-RadioPagingInfo` IE contains UE capability information needed for paging.

`UE-RadioPagingInfo information element`

-- ASN1START
UE-RadioPagingInfo-r12 ::= SEQUENCE {
  ue-Category-v1250 INTEGER (0) OPTIONAL,
  ...,
  [  
    ue-CategoryDL-v1310 ENUMERATED {m1} OPTIONAL,
    ce-ModeA-r13 ENUMERATED {true} OPTIONAL,
    ce-ModeB-r13 ENUMERATED {true} OPTIONAL
  ]
}

-- ASN1STOP

<table>
<thead>
<tr>
<th><strong>UE-RadioPagingInfo field descriptions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ce-ModeA, ce-ModeB</strong></td>
</tr>
<tr>
<td>Indicates whether the UE supports operation in CE mode A and/or B, as specified in TS 36.211 [21] and TS 36.213 [23].</td>
</tr>
<tr>
<td><strong>ue-Category, ue-CategoryDL</strong></td>
</tr>
<tr>
<td>UE category as defined in TS 36.306 [5].</td>
</tr>
</tbody>
</table>

-- UE-TimersAndConstants

The IE **UE-TimersAndConstants** contains timers and constants used by the UE in either RRC_CONNECTED or RRC_IDLE.

**UE-TimersAndConstants information element**

-- ASN1START

UE-TimersAndConstants ::= SEQUENCE {
  t300 ENUMERATED {
    ms100, ms200, ms300, ms400, ms600, ms1000, ms1500,
    ms2000},
  t301 ENUMERATED {
    ms100, ms200, ms300, ms400, ms600, ms1000, ms1500,
    ms2000},
  t310 ENUMERATED {
    ms0, ms50, ms100, ms200, ms500, ms1000, ms2000},
  n310 ENUMERATED {
    n1, n2, n3, n4, n6, n8, n10, n20},
  t311 ENUMERATED {  

**UE-TimersAndConstants field descriptions**

<table>
<thead>
<tr>
<th><code>n3xy</code></th>
<th>Constants are described in section 7.4. <code>n1</code> corresponds with 1, <code>n2</code> corresponds with 2 and so on.</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>t3xy</code></td>
<td>Timers are described in section 7.3. Value <code>ms0</code> corresponds with 0 ms, <code>ms50</code> corresponds with 50 ms and so on. EUTRAN includes an extended value <code>t3xy-v1310</code> and <code>t3xy-v1330</code> only in the Bandwidth Reduced (BR) version of the SIB. UEs that support Coverage Enhancement (CE) mode B shall use the extended values <code>t3xy-v1310</code> and <code>t3xy-v1330</code>, if present, and ignore the value signaled by <code>t3xy</code> (without the suffix).</td>
</tr>
</tbody>
</table>

---

### VisitedCellInfoList

The IE *VisitedCellInfoList* includes the mobility history information of maximum of 16 most recently visited cells or time spent outside E-UTRA. The most recently visited cell is stored first in the list. The list includes cells visited in RRC_IDLE and RRC_CONNECTED states.

**VisitedCellInfoList information element**

```
-- ASN1START

VisitedCellInfoList-r12 ::= SEQUENCE (SIZE (1..maxCellHistory-r12)) OF VisitedCellInfo-r12

VisitedCellInfo-r12 ::= SEQUENCE {
    visitedCellId-r12   CHOICE {
        ...,
    }
}

-- ASN1STOP
```
cellGlobalId-r12 CellGlobalIdEUTRA,
pci-arfcn-r12 SEQUENCE {
  physCellId-r12 PhysCellId,
  carrierFreq-r12 ARFCN-ValueEUTRA-r9
}
} OPTIONAL,
timeSpent-r12 INTEGER (0..4095),
...

-- ASN1STOP

<table>
<thead>
<tr>
<th>VisitedCellInfoList field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>timeSpent</td>
</tr>
<tr>
<td>This field indicates the duration of stay in the cell or outside E-UTRA approximated to the closest second. If the duration of stay exceeds 4095s, the UE shall set it to 4095s.</td>
</tr>
</tbody>
</table>

-- WLAN-OffloadConfig

The IE WLAN-OffloadConfig includes information for traffic steering between E-UTRAN and WLAN. The fields are applicable to both RAN-assisted WLAN interworking based on access network selection and traffic steering rules and RAN-assisted WLAN interworking based on ANDSF policies unless stated otherwise in the field description.

<table>
<thead>
<tr>
<th>WLAN-OffloadConfig information element</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLAN-OffloadConfig-r12 ::= SEQUENCE {</td>
</tr>
<tr>
<td>thresholdRSRP-r12 SEQUENCE {</td>
</tr>
<tr>
<td>thresholdRSRP-Low-r12 RSRP-Range,</td>
</tr>
<tr>
<td>thresholdRSRP-High-r12 RSRP-Range</td>
</tr>
<tr>
<td>} OPTIONAL, -- Need OR</td>
</tr>
<tr>
<td>thresholdRSRQ-r12 SEQUENCE {</td>
</tr>
<tr>
<td>thresholdRSRQ-Low-r12 RSRQ-Range,</td>
</tr>
<tr>
<td>thresholdRSRQ-High-r12 RSRQ-Range</td>
</tr>
<tr>
<td>} OPTIONAL, -- Need OR</td>
</tr>
<tr>
<td>thresholdRSRQ-OnAllSymbolsWithWB-r12 SEQUENCE {</td>
</tr>
<tr>
<td>thresholdRSRQ-OnAllSymbolsWithWB-Low-r12 RSRQ-Range,</td>
</tr>
<tr>
<td>thresholdRSRQ-OnAllSymbolsWithWB-High-r12 RSRQ-Range</td>
</tr>
<tr>
<td>}</td>
</tr>
</tbody>
</table>

| ETSI |
thresholdRSRQ-OnAllSymbols-r12 SEQUENCE {
  thresholdRSRQ-OnAllSymbolsLow-r12 RSRQ-Range,
  thresholdRSRQ-OnAllSymbolsHigh-r12 RSRQ-Range
} OPTIONAL, -- Need OP

thresholdRSRQ-WB-r12 SEQUENCE {
  thresholdRSRQ-WB-Low-r12 RSRQ-Range,
  thresholdRSRQ-WB-High-r12 RSRQ-Range
} OPTIONAL, -- Need OP

thresholdChannelUtilization-r12 SEQUENCE {
  thresholdChannelUtilizationLow-r12 INTEGER (0..255),
  thresholdChannelUtilizationHigh-r12 INTEGER (0..255)
} OPTIONAL, -- Need OR

thresholdBackhaul-Bandwidth-r12 SEQUENCE {
  thresholdBackhaulDL-BandwidthLow-r12 WLAN-backhaulRate-r12,
  thresholdBackhaulDL-BandwidthHigh-r12 WLAN-backhaulRate-r12,
  thresholdBackhaulUL-BandwidthLow-r12 WLAN-backhaulRate-r12,
  thresholdBackhaulUL-BandwidthHigh-r12 WLAN-backhaulRate-r12
} OPTIONAL, -- Need OR

thresholdWLAN-RSSI-r12 SEQUENCE {
  thresholdWLAN-RSSI-Low-r12 INTEGER (0..255),
  thresholdWLAN-RSSI-High-r12 INTEGER (0..255)
} OPTIONAL, -- Need OR

offloadPreferenceIndicator-r12 BIT STRING (SIZE (16)) OPTIONAL, -- Need OR

t-SteeringWLAN-r12 T-Reselection OPTIONAL, -- Need OR

...}

WLAN-backhaulRate-r12 ::= ENUMERATED
{r0, r4, r8, r16, r32, r64, r128, r256, r512,
  r1024, r2048, r4096, r8192, r16384, r32768, r65536, r131072,
  r262144, r524288, r1048576, r2097152, r4194304, r8388608,}
### WLAN-OffloadConfig field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>offloadPreferenceIndicator</td>
<td>Indicates the offload preference indicator. Parameter: OPI in TS 24.312 [66]. Only applicable to RAN-assisted WLAN interworking based on ANDSF policies.</td>
</tr>
<tr>
<td>thresholdBackhaulDLBandwidth-High</td>
<td>Indicates the backhaul available downlink bandwidth threshold used by the UE for traffic steering to WLAN. Parameter: Thresh_BackhRate_DL_WLAN, High in TS 36.304 [4]. Value in kilobits/second. Value rN corresponds to N kbps.</td>
</tr>
<tr>
<td>thresholdBackhaulDLBandwidth-Low</td>
<td>Indicates the backhaul available downlink bandwidth threshold used by the UE for traffic steering to E-UTRAN. Parameter: Thresh_BackhRate_DL_WLAN, Low in TS 36.304 [4]. Value in kilobits/second. Value rN corresponds to N kbps.</td>
</tr>
<tr>
<td>thresholdBackhaulULBandwidth-High</td>
<td>Indicates the backhaul available uplink bandwidth threshold used by the UE for traffic steering to WLAN. Parameter: Thresh_BackhRate_UL_WLAN, High in TS 36.304 [4]. Value in kilobits/second. Value rN corresponds to N kbps.</td>
</tr>
<tr>
<td>thresholdBackhaulULBandwidth-Low</td>
<td>Indicates the backhaul available uplink bandwidth threshold used by the UE for traffic steering to E-UTRAN. Parameter: Thresh_BackhRate_UL_WLAN, Low in TS 36.304 [4]. Value in kilobits/second. Value rN corresponds to N kbps.</td>
</tr>
<tr>
<td>thresholdChannelUtilization-High</td>
<td>Indicates the WLAN channel utilization (BSS load) threshold used by the UE for traffic steering to E-UTRAN. Parameter: Thresh_ChUtil_WLAN, High in TS 36.304 [4].</td>
</tr>
<tr>
<td>thresholdChannelUtilization-Low</td>
<td>Indicates the WLAN channel utilization (BSS load) threshold used by the UE for traffic steering to WLAN. Parameter: Thresh_ChUtil_WLAN, Low in TS 36.304 [4].</td>
</tr>
<tr>
<td>thresholdRSRP-High</td>
<td>Indicates the RSRP threshold (in dBm) used by the UE for traffic steering to E-UTRAN. Parameter: Thresh_Serving_Offload_WLAN, HighQ in TS 36.304 [4].</td>
</tr>
<tr>
<td>thresholdRSRP-Low</td>
<td>Indicates the RSRP threshold (in dBm) used by the UE for traffic steering to WLAN. Parameter: Thresh_Serving_Offload_WLAN, LowQ in TS 36.304 [4].</td>
</tr>
<tr>
<td>thresholdRSRQ-High, thresholdRSRQ-OnAllSymbolsHigh, thresholdRSRQ-WB-High, thresholdRSRQ-OnAllSymbolsWithWB-High</td>
<td>Indicates the RSRQ threshold (in dB) used by the UE for traffic steering to E-UTRAN. Parameter: Thresh_Serving_Offload_WLAN, HighQ in TS 36.304 [4]. The UE shall only apply one of threshold values of thresholdRSRQ-OnAllSymbolsWithWBHigh, thresholdRSRQ-OnAllSymbolsHigh, thresholdRSRQ-WB-High and thresholdRSRQ-High as present in wlan-OffloadConfigCommon and forward this to upper layer. NOTE 1.</td>
</tr>
<tr>
<td>thresholdRSRQ-Low, thresholdRSRQ-OnAllSymbolsLow, thresholdRSRQ-WB-Low, thresholdRSRQ-OnAllSymbolsWithWB-Low</td>
<td>Indicates the RSRQ threshold (in dB) used by the UE for traffic steering to WLAN. Parameter: Thresh_Serving_Offload_WLAN, LowQ in TS 36.304 [4]. The UE shall only apply one of threshold values of thresholdRSRQ-OnAllSymbolsWithWB-Low, thresholdRSRQ-OnAllSymbolsLow, thresholdRSRQ-WB-Low and thresholdRSRQ-Low as present in wlan-OffloadConfigCommon and forward this to upper layer. NOTE 1.</td>
</tr>
<tr>
<td>thresholdWLAN-RSSI-High</td>
<td>Indicates the WLAN RSSI threshold used by the UE for traffic steering to WLAN. Parameter: Thresh_WLAN_RSSI, High in TS 36.304 [4]. Value 0 corresponds to -128dBm, 1 corresponds to -127dBm and so on.</td>
</tr>
<tr>
<td>thresholdWLAN-RSSI-Low</td>
<td>Indicates the WLAN RSSI threshold used by the UE for traffic steering to E-UTRAN. Parameter: Thresh_WLAN_RSSI, Low in TS 36.304 [4]. Value 0 corresponds to -128dBm, 1 corresponds to -127dBm and so on.</td>
</tr>
<tr>
<td>t-SteeringWLAN</td>
<td>Indicates the timer value during which the rules should be fulfilled before starting traffic steering between E-UTRAN and WLAN. Parameter: Tsteering_WLAN in TS 36.304 [4]. Only applicable to RAN-assisted WLAN interworking based on access network selection and traffic steering rules.</td>
</tr>
</tbody>
</table>
NOTE 1: Within SIB17, E-UTRAN includes the fields corresponding to same RSRQ types as included in SIB1. E.g. if E-UTRAN includes $q_{\text{QualMinRSRQ-OnAllSymbols}}$ in SIB1 it also includes $\text{thresholdRSRQ-OnAllSymbols}$ in SIB17. Within the RRCConnectionReconfiguration message E-UTRAN only includes $\text{thresholdRSRQ}$, setting the value according to the RSRQ type used for E-UTRAN. The UE shall apply the RSRQ fields (RSRQ threshold, high and low) corresponding to one RSRQ type i.e. the same as it applies for E-UTRAN.

6.3.7 MBMS information elements

– MBMS-NotificationConfig

The IE MBMS-NotificationConfig specifies the MBMS notification related configuration parameters, that are applicable for all MBSFN areas.

**MBMS-NotificationConfig information element**

```plaintext
-- ASN1START

MBMS-NotificationConfig-r9 ::= SEQUENCE {
  notificationRepetitionCoeff-r9 ENUMERATED {n2, n4},
  notificationOffset-r9 INTEGER (0..10),
  notificationSF-Index-r9 INTEGER (1..6)
}

-- ASN1STOP
```

**MBMS-NotificationConfig field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>notificationOffset</td>
<td>Indicates, together with the notificationRepetitionCoeff, the radio frames in which the MCCH information change notification is scheduled i.e. the MCCH information change notification is scheduled in radio frames for which: SFN mod notification repetition period = notificationOffset.</td>
</tr>
<tr>
<td>notificationRepetitionCoeff</td>
<td>Actual change notification repetition period common for all MCCHs that are configured= shortest modification period/ notificationRepetitionCoeff. The &quot;shortest modification period&quot; corresponds with the lowest value of mcch-ModificationPeriod of all MCCHs that are configured. Value n2 corresponds to coefficient 2, and so on.</td>
</tr>
<tr>
<td>notificationSF-Index</td>
<td>Indicates the subframe used to transmit MCCH change notifications on PDCCH. FDD: Value 1, 2, 3, 4, 5 and 6 correspond with subframe #1, #2, #3, #6, #7, and #8 respectively. TDD: Value 1, 2, 3, 4, and 5 correspond with subframe #3, #4, #7, #8, and #9 respectively.</td>
</tr>
</tbody>
</table>

– MBMS-ServiceList

The IE MBMS-ServiceList provides the list of MBMS services which the UE is receiving or interested to receive.

**MBMS-ServiceList information element**

```plaintext
-- ASN1START
```
MBMS-ServiceList-r13 ::= SEQUENCE (SIZE (0..maxMBMS-ServiceListPerUE-r13)) OF MBMS-ServiceInfo-r13

MBMS-ServiceInfo-r13 ::= SEQUENCE {
    tmgi-r13          TMGI-r9
}

-- ASN1STOP

-- MBSFN-AreaId

The IE $MBSFN$-AreaId identifies an MBSFN area by means of a locally unique value at lower layers i.e. it concerns parameter $N_{\text{ID}}^{\text{MBSFN}}$ in TS 36.211 [21, 6.10.2.1].

$MBSFN$-AreaId information element

-- ASN1START

MBSFN-AreaId-r12 ::= INTEGER (0..255)

-- ASN1STOP

-- MBSFN-AreaInfoList

The IE $MBSFN$-AreaInfoList contains the information required to acquire the MBMS control information associated with one or more MBSFN areas.

$MBSFN$-AreaInfoList information element

-- ASN1START

MBSFN-AreaInfoList-r9 ::= SEQUENCE (SIZE(1..maxMBSFN-Area)) OF MBSFN-AreaInfo-r9

MBSFN-AreaInfo-r9 ::= SEQUENCE {
    mbsfn-AreaId-r9           MBSFN-AreaId-r12,
    non-MBSFNregionLength     ENUMERATED {s1, s2},
    notificationIndicator-r9  INTEGER (0..7),
    mcch-Config-r9            SEQUENCE {
        mcch-RepetitionPeriod-r9  ENUMERATED {rf32, rf64, rf128, rf256},
        mcch-Offset-r9            INTEGER (0..10),}
### MBSFN-ArealInfoList field descriptions

**mcch-ModificationPeriod**
Defines periodically appearing boundaries, i.e. radio frames for which SFN mod mcch-ModificationPeriod = 0. The contents of different transmissions of MCCH information can only be different if there is at least one such boundary in-between them.

**mcch-Offset**
Indicates, together with the mcch-RepetitionPeriod, the radio frames in which MCCH is scheduled i.e. MCCH is scheduled in radio frames for which: SFN mod mcch-RepetitionPeriod = mcch-Offset.

**mcch-RepetitionPeriod**
Defines the interval between transmissions of MCCH information, in radio frames, Value rf32 corresponds to 32 radio frames, rf64 corresponds to 64 radio frames and so on.

**non-MBSFNRegionLength**
Indicates how many symbols from the beginning of the subframe constitute the non-MBSFN region. This value applies in all subframes of the MBSFN area used for PMCH transmissions as indicated in the MSI. The values s1 and s2 correspond with 1 and 2 symbols, respectively: see TS 36.211 [21, Table 6.7-1].

**notificationIndicator**
Indicates which PDCCH bit is used to notify the UE about change of the MCCH applicable for this MBSFN area. Value 0 corresponds with the least significant bit as defined in TS 36.212 [22, 5.3.3.1] and so on.

**sf-AllocInfo**
Indicates the subframes of the radio frames indicated by the mcch-RepetitionPeriod and the mcch-Offset, that may carry MCCH. Value ‘1’ indicates that the corresponding subframe is allocated. The following mapping applies:
- FDD: The first/ leftmost bit defines the allocation for subframe #1 of the radio frame indicated by mcch-RepetitionPeriod and mcch-Offset, the second bit for #2, the third bit for #3, the fourth bit for #6, the fifth bit for #7 and the sixth bit for #8.
- TDD: The first/leftmost bit defines the allocation for subframe #3 of the radio frame indicated by mcch-RepetitionPeriod and mcch-Offset, the second bit for #4, third bit for #7, fourth bit for #8, fifth bit for #9. Uplink subframes are not allocated. The last bit is not used.

**signallingMCS**
Indicates the MCS applicable for the subframes indicated by the field sf-AllocInfo and for each (P)MCH that is configured for this MBSFN area, for the first subframe allocated to the (P)MCH within each MCH scheduling period (which may contain the MCH scheduling information provided by MAC). Value n2 corresponds with the value 2 for parameter $I_{MCS}$ in TS 36.213 [23, Table 7.1.7.1-1], and so on.

---

### MBSFN-SubframeConfig

The IE MBSFN-SubframeConfig defines subframes that are reserved for MBSFN in downlink.

**MBSFN-SubframeConfig information element**

```asn1
MBSFN-SubframeConfig ::= SEQUENCE {
  radioframeAllocationPeriod ENUMERATED {n1, n2, n4, n8, n16, n32},
  radioframeAllocationOffset INTEGER (0..7),
}
```
MBSFN-SubframeConfig field descriptions

**fourFrames**
A bit-map indicating MBSFN subframe allocation in four consecutive radio frames, '1' denotes that the corresponding subframe is allocated for MBSFN. The bitmap is interpreted as follows:
- FDD: Starting from the first radioframe and from the first/leftmost bit in the bitmap, the allocation applies to subframes #1, #2, #3, #6, #7, and #8 in the sequence of the four radio-frames.
- TDD: Starting from the first radioframe and from the first/leftmost bit in the bitmap, the allocation applies to subframes #3, #4, #7, #8, and #9 in the sequence of the four radio-frames. The last four bits are not used. E-UTRAN allocates uplink subframes only if `eimta-MainConfig` is configured.

**oneFrame**
'1' denotes that the corresponding subframe is allocated for MBSFN. The following mapping applies:
- FDD: The first/leftmost bit defines the MBSFN allocation for subframe #1, the second bit for #2, third bit for #3, fourth bit for #6, fifth bit for #7, sixth bit for #8.
- TDD: The first/leftmost bit defines the allocation for subframe #3, the second bit for #4, third bit for #7, fourth bit for #8, fifth bit for #9. E-UTRAN allocates uplink subframes only if `eimta-MainConfig` is configured. The last bit is not used.

**radioFrameAllocationPeriod, radioFrameAllocationOffset**
Radio-frames that contain MBSFN subframes occur when equation $\text{SFN} \mod \text{radioFrameAllocationPeriod} = \text{radioFrameAllocationOffset}$ is satisfied. Value $n1$ for `radioframeAllocationPeriod` denotes value 1, $n2$ denotes value 2, and so on. When `fourFrames` is used for `subframeAllocation`, the equation defines the first radio frame referred to in the description below. Values $n1$ and $n2$ are not applicable when `fourFrames` is used.

**subframeAllocation**
Defines the subframes that are allocated for MBSFN within the radio frame allocation period defined by the `radioFrameAllocationPeriod` and the `radioFrameAllocationOffset`.

---

**PMCH-InfoList**
The IE `PMCH-InfoList` specifies configuration of all PMCHs of an MBSFN area, while IE `PMCH-InfoListExt` includes additional PMCHs, i.e. extends the PMCH list using the general principles specified in 5.1.2. The information provided for an individual PMCH includes the configuration parameters of the sessions that are carried by the concerned PMCH. For all PMCH that E-UTRAN includes in `PMCH-InfoList`, the list of ongoing sessions has at least one entry.

**PMCH-InfoList information element**

```plaintext
-- ASN1START

PMCH-InfoList-r9 ::= SEQUENCE (SIZE (0..maxPMCH-PerMBSFN)) OF PMCH-Info-r9

PMCH-InfoListExt-r12 ::= SEQUENCE (SIZE (0..maxPMCH-PerMBSFN)) OF PMCH-InfoExt-r12

PMCH-Info-r9 ::= SEQUENCE {
    pmch-Config-r9      PMCH-Config-r9,
    mbms-SessionInfoList-r9   MBMS-SessionInfoList-r9,
    ...}

-- ASN1STOP
```
PMCH-InfoExt-r12 ::= SEQUENCE {
    pmch-Config-r12             PMCH-Config-r12,
    mbms-SessionInfoList-r12   MBMS-SessionInfoList-r9,
    ...
}

MBMS-SessionInfoList-r9 ::= SEQUENCE (SIZE (0..maxSessionPerPMCH)) OF MBMS-SessionInfo-r9

MBMS-SessionInfo-r9 ::= SEQUENCE {
    tmgi-r9                   TMGI-r9,
    sessionId-r9            OCTET STRING (SIZE (1)) OPTIONAL, -- Need OR
    logicalChannelIdentity-r9 INTEGER (0..maxSessionPerPMCH-1),
    ...
}

PMCH-Config-r9 ::= SEQUENCE {
    sf-AllocEnd-r9         INTEGER (0..1535),
    dataMCS-r9            INTEGER (0..28),
    mch-SchedulingPeriod-r9 ENUMERATED {
        rf8, rf16, rf32, rf64, rf128, rf256, rf512, rf1024},
    ...
}

PMCH-Config-r12 ::= SEQUENCE {
    sf-AllocEnd-r12       INTEGER (0..1535),
    dataMCS-r12          CHOICE {
        normal-r12      INTEGER (0..28),
        higherOrder-r12 INTEGER (0..27)
    },
    mch-SchedulingPeriod-r12 ENUMERATED {
        rf4, rf8, rf16, rf32, rf64, rf128, rf256, rf512, rf1024},
    ...
}
TMGI-r9 ::= SEQUENCE {
    plmn-Id-r9  CHOICE {
        plmn-Index-r9  INTEGER (1..maxPLMN-r11),
        explicitValue-r9  PLMN-Identity
    },
    serviceId-r9  OCTET STRING (SIZE (3))
}

-- ASN1STOP

**PMCH-InfoList field descriptions**

| **dataMCS** | Indicates the value for parameter $I_{MCS}$ in TS 36.213 [23], which defines the MCS applicable for the subframes of this (P)MCH as indicated by the field commonSF-Allo. Value normal corresponds to Table 7.1.7.1.1 and value higherOrder corresponds to Table 7.1.7.1.1A. The MCS does however neither apply to the subframes that may carry MCCH i.e. the subframes indicated by the field sf-AllocInfo within SystemInformationBlockType13 nor for the first subframe allocated to this (P)MCH within each MCH scheduling period (which may contain the MCH scheduling information provided by MAC). |
| **mch-SchedulingPeriod** | Indicates the MCH scheduling period i.e. the periodicity used for providing MCH scheduling information at lower layers (MAC) applicable for an MCH. Value rf8 corresponds to 8 radio frames, rf16 corresponds to 16 radio frames and so on. The mch-SchedulingPeriod starts in the radio frames for which: SFN mod mch-SchedulingPeriod = 0. E-UTRAN configures mch-SchedulingPeriod of the (P)MCH listed first in PMCH-InfoList to be smaller than or equal to mch-RepetitionPeriod. |
| **plmn-Index** | Index of the entry in field plmn-IdentityList within SystemInformationBlockType1. |
| **sessionId** | Indicates the optional MBMS Session Identity, which together with TMGI identifies a transmission or a possible retransmission of a specific MBMS session: see TS 29.061 [51, Sections 20.5, 17.7.11, 17.7.15]. The field is included whenever upper layers have assigned a session identity i.e. one is available for the MBMS session in E-UTRAN. |
| **serviceId** | Uniquely identifies the identity of an MBMS service within a PLMN. The field contains octet 3- 5 of the IE Temporary Mobile Group Identity (TMGI) as defined in TS 24.008 [49]. The first octet contains the third octet of the TMGI, the second octet contains the fourth octet of the TMGI and so on. |
| **sf-AllocEnd** | Indicates the last subframe allocated to this (P)MCH within a period identified by field commonSF-AlloPeriod. The subframes allocated to (P)MCH corresponding with the $n^{th}$ entry in pmch-InfoList are the subsequent subframes starting from either the next subframe after the subframe identified by sf-AllocEnd of the $(n-1)^{th}$ listed (P)MCH or, for $n=1$, the first subframe defined by field commonSF-Allo, through the subframe identified by sf-AllocEnd of the $n^{th}$ listed (P)MCH. Value 0 corresponds with the first subframe defined by field commonSF-Allo. |
6.3.7a SC-PTM information elements
– SC-MTCH-InfoList

The IE SC-MTCH-InfoList provides the list of ongoing MBMS sessions transmitted via SC-MRB and for each MBMS session, the associated G-RNTI and scheduling information.

**SC-MTCH-InfoList information element**

```asn1
SC-MTCH-InfoList-r13 ::= SEQUENCE (SIZE (0..maxSC-MTCH-r13)) OF SC-MTCH-Info-r13

SC-MTCH-Info-r13 ::= SEQUENCE {
  mbmsSessionInfo-r13       MBMSSessionInfo-r13,
  g-RNTI-r13                BIT STRING(SIZE(16)),
  sc-mtch-schedulingInfo-r13 SC-MTCH-SchedulingInfo-r13   OPTIONAL, -- Need OP
  sc-mtch-neighbourCell-r13 BIT STRING (SIZE(maxNeighCell-SCPTM-r13)) OPTIONAL, -- Need OP
  ...
}

MBMSSessionInfo-r13 ::= SEQUENCE {
  tmgi-r13                  TMGI-r9,
  sessionId-r13             OCTET STRING (SIZE (1)) OPTIONAL  -- Need OR
}

SC-MTCH-SchedulingInfo-r13 ::= SEQUENCE {
  onDurationTimerSCPTM-r13   ENUMERATED {
    psf1, psf2, psf3, psf4, psf5, psf6,
    psf8, psf10, psf20, psf30, psf40,
    psf50, psf60, psf80, psf100,
    psf200},
  drx-InactivityTimerSCPTM-r13 ENUMERATED {
    psf0, psf1, psf2, psf4, psf8,
    psf10, psf20, psf40,
    psf80, psf160, psf320,
    psf640, psf960,
    psf1280, psf1920, psf2560},
```
schedulingPeriodStartOffsetSCPM-r13  CHOICE {
    sf10       INTEGER(0..9),
    sf20       INTEGER(0..19),
    sf32       INTEGER(0..31),
    sf40       INTEGER(0..39),
    sf64       INTEGER(0..63),
    sf80       INTEGER(0..79),
    sf128      INTEGER(0..127),
    sf160      INTEGER(0..159),
    sf256      INTEGER(0..255),
    sf320      INTEGER(0..319),
    sf512      INTEGER(0..511),
    sf640      INTEGER(0..639),
    sf1024     INTEGER(0..1023),
    sf2048     INTEGER(0..2048),
    sf4096     INTEGER(0..4096),
    sf8192     INTEGER(0..8192)
},
...
}
<table>
<thead>
<tr>
<th><strong>SC-MTCH-InfoList</strong> field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>mbmsSessionInfo</strong></td>
</tr>
<tr>
<td>Indicates the ongoing MBMS session in a SC-MTCH.</td>
</tr>
<tr>
<td><strong>g-RNTI</strong></td>
</tr>
<tr>
<td>G-RNTI used to scramble the scheduling and transmission of a SC-MTCH.</td>
</tr>
<tr>
<td><strong>sc-mtch-schedulingInfo</strong></td>
</tr>
<tr>
<td>DRX information for the SC-MTCH. If this field is absent, the SC-MTCH may be scheduled in any subframe.</td>
</tr>
<tr>
<td><strong>onDurationTimerSCPTM</strong></td>
</tr>
<tr>
<td>Timer for SC-MTCH reception in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on.</td>
</tr>
<tr>
<td><strong>drx-InactivityTimerSCPTM</strong></td>
</tr>
<tr>
<td>Timer for SC-MTCH in TS 36.321 [6]. Value in number of PDCCH sub-frames. Value psf0 corresponds to 0 PDCCH sub-frame and behaviour as specified in 7.3.2 applies, psf1 corresponds to 1 PDCCH sub-frame, psf2 corresponds to 2 PDCCH sub-frames and so on.</td>
</tr>
<tr>
<td><strong>schedulingPeriodStartOffsetSCPTM</strong></td>
</tr>
<tr>
<td>SC-MTCH-SchedulingCycle and SC-MTCH-SchedulingOffset in TS 36.321 [6]. The value of SC-MTCH-SchedulingCycle is in number of sub-frames. Value sf10 corresponds to 10 sub-frames, sf20 corresponds to 20 sub-frames and so on. The value of SC-MTCH-SchedulingOffset is in number of sub-frames.</td>
</tr>
<tr>
<td><strong>sc-mtch-neighbourCell</strong></td>
</tr>
<tr>
<td>Indicates neighbour cells which also provide this service on SC-MTCH. The first bit is set to 1 if the service is provided on SC-MTCH in the first cell in scptmNeighbourCellList, otherwise it is set to 0. The second bit is set to 1 if the service is provided on SC-MTCH in the second cell in scptmNeighbourCellList, and so on. If this field is absent, the UE shall assume that this service is not available on SC-MTCH in any neighbour cell.</td>
</tr>
</tbody>
</table>

---

**SCPTM-NeighbourCellList**

The IE **SCPTM-NeighbourCellList** indicates a list of neighbour cells where ongoing MBMS sessions provided via SC-MRBC in the current cells are also provided.

-- ASN1START

```plaintext
SCPTM-NeighbourCellList-r13 ::= SEQUENCE (SIZE (1..maxNeighCell-SCPTM-r13)) OF PCI-ARFCN-r13

PCI-ARFCN-r13 ::= SEQUENCE {
  physCellId-r13     PhysCellId,
  carrierFreq-r13    ARFCN-ValueEUTRA-r9  OPTIONAL
}
```

-- ASN1STOP

---

**SCPTM-NeighbourCellList** field description

**carrierFreq**

Indicates the frequency of the neighbour cell indicated by **physCellId**. Absence of the IE means that the neighbour cell is on the same frequency as the current cell.
6.3.8 Sidelink information elements

SL-CommConfig

The IE SL-CommConfig specifies the dedicated configuration information for sidelink communication. In particular it concerns the transmission resource configuration for sidelink communication on the primary frequency.

**SL-CommConfig information element**

```asn1
SL-CommConfig-r12 ::= SEQUENCE {
    commTxResources-r12     CHOICE {
        release        NULL,
        setup         CHOICE {
            scheduled-r12     SEQUENCE {
                sl-RNTI-r12       C-RNTI,
                mac-MainConfig-r12       MAC-MainConfigSL-r12,
                sc-CommTxConfig-r12    SL-CommResourcePool-r12,
                mcs-r12       INTEGER (0..28)     OPTIONAL -- Need OP
            },
            ue-Selected-r12     SEQUENCE {
                -- Pool for normal usage
                commTxPoolNormalDedicated-r12    SEQUENCE {
                    poolToReleaseList-r12   SL-TxPoolToReleaseList-r12 OPTIONAL, -- Need ON
                    poolToAddModList-r12   SL-CommTxPoolToAddModList-r12 OPTIONAL, -- Need ON
                }
            },
        }
    }
}
```

---

[[ commTxResources-v1310 CHOICE {
    release        NULL,
    setup         CHOICE {
        scheduled-v1310     SEQUENCE {
            logicalChGroupInfoList-r13   LogicalChGroupInfoList-r13,
            multipleTx-r13       BOOLEAN
        }
    }
}]]
ue-Selected-v1310  SEQUENCE {
  commTxPoolNormalDedicatedExt-r13 SEQUENCE {
    poolToReleaseListExt-r13  SL-TxPoolToReleaseListExt-r13 OPTIONAL, -- Need ON
    poolToAddModListExt-r13   SL-CommTxPoolToAddModListExt-r13 OPTIONAL -- Need ON
  }
  commTxAllowRelayDedicated-r13  BOOLEAN OPTIONAL -- Need ON
}]

LogicalChGroupInfoList-r13 ::=  SEQUENCE (SIZE (1..maxLCG-r13)) OF SL-PriorityList-r13

SL-CommTxPoolToAddModList-r12 ::=  SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-CommTxPoolToAddMod-r12

SL-CommTxPoolToAddModListExt-r13 ::= SEQUENCE (SIZE (1..maxSL-TxPool-v1310)) OF SL-CommTxPoolToAddModExt-r13

SL-CommTxPoolToAddMod-r12 ::=  SEQUENCE {
  poolIdentity-r12     SL-TxPoolIdentity-r12,
  pool-r12       SL-CommResourcePool-r12
}

SL-CommTxPoolToAddModExt-r13 ::=  SEQUENCE {
  poolIdentity-v1310     SL-TxPoolIdentity-v1310,
  pool-r13       SL-CommResourcePool-r12
}

MAC-MainConfigSL-r12 ::=  SEQUENCE {
  periodic-BSR-TimerSL     PeriodicBSR-Timer-r12 OPTIONAL, -- Need ON
  retx-BSR-TimerSL         RetxBSR-Timer-r12
}
**SL-CommConfig field descriptions**

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>commTxAllowRelayDedicated</td>
<td>Indicates whether the UE is allowed to transmit relay related sidelink communication using the configured dedicated transmission resources i.e. either via scheduled or via UE selected resources.</td>
</tr>
<tr>
<td>commTxPoolNormalDedicated</td>
<td>Indicates a pool of transmission resources the UE is allowed to use while in RRC_CONNECTED.</td>
</tr>
<tr>
<td>logicalChGroupInfoList</td>
<td>Indicates for each logical channel group the list of associated priorities, used as specified in TS 36.321 [6], in order of increasing logical channel group identity.</td>
</tr>
<tr>
<td>mcs</td>
<td>Indicates the MCS as defined in TS 36.212 [23, 14.2.1]. If not configured, the selection of MCS is up to UE implementation.</td>
</tr>
<tr>
<td>multipleTx</td>
<td>Indicates whether the UE should perform multiple transmissions to different destinations in one SC period in accordance with TS 36.321 [6, 5.14.1.1]. Value TRUE indicates that multiple transmissions should be performed.</td>
</tr>
<tr>
<td>sc-CommTxConfig</td>
<td>Indicates a pool of resources for SC when E-UTRAN schedules Tx resources (i.e. when indices included in DCI format 5 indicate the actual data resources to be used as specified in TS 36.212 [22, 5.3.3.1.9]).</td>
</tr>
<tr>
<td>scheduled</td>
<td>Indicates the configuration for the case E-UTRAN schedules the transmission resources based on sidelink specific BSR from the UE.</td>
</tr>
<tr>
<td>ue-Selected</td>
<td>Indicates the configuration for the case the UE selects the transmission resources from a pool of resources configured by E-UTRAN.</td>
</tr>
</tbody>
</table>

---

**SL-CommResourcePool**

The IE `SL-CommResourcePool` specifies the configuration information for an individual pool of resources for sidelink communication. The IE covers the configuration of both the sidelink control information and the data.

**SL-CommResourcePool information element**

---

```asn1
SL-CommTxPoolList-r12 ::= SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-CommResourcePool-r12

SL-CommTxPoolListExt-r13 ::= SEQUENCE (SIZE (1..maxSL-TxPool-v1310)) OF SL-CommResourcePool-r12

SL-CommRxPoolList-r12 ::= SEQUENCE (SIZE (1..maxSL-RxPool-r12)) OF SL-CommResourcePool-r12

SL-CommResourcePool-r12 ::= SEQUENCE {
  sc-CP-Len-r12                      SL-CP-Len-r12,
  sc-Period-r12                      SL-PeriodComm-r12,
  sc-TF-ResourceConfig-r12           SL-TF-ResourceConfig-r12,
  data-CP-Len-r12                    SL-CP-Len-r12,
  dataHoppingConfig-r12              SL-HoppingConfigComm-r12,
  ue-SelectedResourceConfig-r12      SEQUENCE {
```
data-TF-ResourceConfig-r12       SL-TF-ResourceConfig-r12,
trpt-Subset-r12              SL-TRPT-Subset-r12 OPTIONAL   -- Need OP
}
OPTIONAL,  -- Need OR
rxParametersNCell-r12        SEQUENCE {
tdd-Config-r12               TDD-Config    OPTIONAL,  -- Need OP
syncConfigIndex-r12          INTEGER (0..15)
}
OPTIONAL,  -- Need OR
txParameters-r12            SEQUENCE {
sc-TxParameters-r12         SL-TxParameters-r12,
dataTxParameters-r12        SL-TxParameters-r12
}
OPTIONAL,  -- Cond Tx
....
[ priorityList-r13         SL-PriorityList-r13 OPTIONAL -- Cond Tx
]
}"

SL-TRPT-Subset-r12 ::=   BIT STRING (SIZE (3..5))

-- ASN1STOP

**SL-CommResourcePool field descriptions**

**sc-Period**
Indicates the period over which resources are allocated in a cell for SC and over which scheduled and UE selected data transmissions occur, see PSCCH period in TS 36.213 [23]. Value in number of subframes. Value sf40 corresponds to 40 subframes, sf80 corresponds to 80 subframes and so on. E-UTRAN configures values sf40, sf80, sf160 and sf320 for FDD and for TDD config 1 to 5, values sf70, sf140 and sf280 for TDD config 0, and finally values sf60, sf120 and sf240 for TDD config 6.

**syncConfigIndex**
Indicates the synchronisation configuration that is associated with a reception pool, by means of an index to the corresponding entry of commSyncConfig in SystemInformationBlockType18.

**tdd-Config**
TDD configuration associated with the reception pool of the cell indicated by syncConfigIndex. Absence of the field indicates the same duplex mode as the cell providing this field and the same UL/DL configuration as indicated by subframeAssignment in SystemInformationBlockType1 in case of TDD.

**trpt-Subset**
Indicates the subset of T-RPT available (see TS 36.213 [23, 14.1.1.1.1]). Consists of a bitmap which is used to indicate the set of available "k" values to be used for sidelink communication (see TS 36.213 [23, 14.1.1.3]). If T-RPT subset configuration is not signaled/ preconfigured then UE assumes the whole T-RPT set is available.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tx</td>
<td>The field is mandatory present when included in commTxPoolNormalDedicated, commTxPoolNormalDedicatedExt, commTxPoolNormalCommon, commTxPoolNormalCommonExt, commTxPoolExceptional or sc-CommTxConfig. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>
-- SL-CP-Len

The IE SL-CP-Len indicates the cyclic prefix length, see TS 36.211 [21].

**SL-CP-Len information element**

```asciidoc
-- ASN1START

SL-CP-Len-r12 ::= ENUMERATED {normal, extended}

-- ASN1STOP
```

-- SL-DiscConfig

The IE SL-DiscConfig specifies the dedicated configuration information for sidelink discovery.

**SL-DiscConfig information element**

```asciidoc
-- ASN1START

SL-DiscConfig-r12 ::= SEQUENCE {
    discTxResources-r12            CHOICE {
        release               NULL,
        setup                 CHOICE {
            scheduled-r12      SEQUENCE {
                discTxConfig-r12       SL-DiscResourcePool-r12 OPTIONAL, -- Need ON
                discTF-IndexList-r12   SL-TF-IndexPairList-r12 OPTIONAL, -- Need ON
                discHoppingConfig-r12  SL-HoppingConfigDisc-r12 OPTIONAL -- Need ON
            },
            ue-Selected-r12       SEQUENCE {
                discTxPoolDedicated-r12  SEQUENCE {
                    poolToReleaseList-r12  SL-TxPoolToReleaseList-r12 OPTIONAL, -- Need ON
                    poolToAddModList-r12   SL-DiscTxPoolToAddModList-r12 OPTIONAL -- Need ON
                },
                ...,
                [[ discTF-IndexList-v1260   CHOICE {
```

release NULL,
setup SEQUENCE {
discTF-IndexList-r12b SL-TF-IndexPairList-r12b
}
] OPTIONAL -- Need ON
]
][
discTxResourcesPS-r13 CHOICE {
release NULL,
setup CHOICE {
scheduled-r13 SL-DiscTxConfigScheduled-r13,
ue-Selected-r13 SEQUENCE {
discTxPoolPS-Dedicated-r13 SL-DiscTxPoolDedicated-r13
}
}
] OPTIONAL, -- Need ON
discTxInterFreqInfo-r13 CHOICE {
release NULL,
setup SEQUENCE {
discTxCarrierFreq-r13 ARFCN-ValueEUTRA-r9 OPTIONAL, -- Need OR
discTxRefCarrierDedicated-r13 SL-DiscTxRefCarrierDedicated-r13 OPTIONAL, -- Need OR
discTxInfoInterFreqListAdd-r13 SL-DiscTxInfoInterFreqListAdd-r13 OPTIONAL -- Need ON
}
] OPTIONAL, -- Need ON
gapRequestsAllowedDedicated-r13 BOOLEAN OPTIONAL, -- Need ON
discRxGapConfig-r13 CHOICE {
release NULL,
setup SL-GapConfig-r13
} OPTIONAL, -- Need ON
discTxGapConfig-r13 CHOICE {
release NULL,
setup SL-GapConfig-r13
} OPTIONAL, -- Need ON
discSysInfoToReportConfig-r13 CHOICE {
release NULL,
SL-DiscSysInfoToReportFreqList-r13 ::= SEQUENCE (SIZE (1..maxFreq)) OF ARFCN-ValueEUTRA-r9

SL-DiscTxInfoInterFreqListAdd-r13 ::= SEQUENCE {    
discTxFreqToAddModList-r13               SEQUENCE (SIZE (1..maxFreq)) OF SL-DiscTxResourceInfoPerFreq-
r13 OPTIONAL, -- Need ON

discTxFreqToReleaseList-r13               SEQUENCE (SIZE (1..maxFreq)) OF ARFCN-ValueEUTRA-r9

... }    

SL-DiscTxResourceInfoPerFreq-r13 ::= SEQUENCE {    
discTxCarrierFreq-r13     ARFCN-ValueEUTRA-r9, 
discTxResources-r13       SL-DiscTxResource-r13 OPTIONAL, -- Need OR 
discTxResourcesPS-r13     SL-DiscTxResource-r13 OPTIONAL, -- Need OR 
discTxRefCarrierDedicated-r13   SL-DiscTxRefCarrierDedicated-r13 OPTIONAL, -- Need OR 
discCellSelectionInfo-r13     CellSelectionInfoNFreq-r13   OPTIONAL, -- Need OR 

... }    

SL-DiscTxResource-r13 ::=    CHOICE {    
release                     NULL, 

setup                      CHOICE {    
scheduled-r13               SL-DiscTxConfigScheduled-r13,    
ue-Selected-r13             SL-DiscTxPoolDedicated-r13

}    

SL-DiscTxPoolToAddModList-r12 ::=    SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-DiscTxPoolToAddMod-
r12

SL-DiscTxPoolToAddMod-r12 ::=    SEQUENCE {    

... }
poolIdentity-r12          SL-TxPoolIdentity-r12,
pool-r12                  SL-DiscResourcePool-r12

SL-DiscTxConfigScheduled-r13 ::=  SEQUENCE {
discTxConfig-r13          SL-DiscResourcePool-r12 OPTIONAL, -- Need ON
discTF-IndexList-r13      SL-TF-IndexPairList-r12b OPTIONAL, -- Need ON
discHoppingConfig-r13     SL-HoppingConfigDisc-r12 OPTIONAL, -- Need ON
...
}

SL-DiscTxPoolDedicated-r13 ::=  SEQUENCE {
  poolToReleaseList-r13    SL-TxPoolToReleaseList-r12 OPTIONAL, -- Need ON
  poolToAddModList-r13     SL-DiscTxPoolToAddModList-r12 OPTIONAL -- Need ON
}

SL-TF-IndexPairList-r12 ::=  SEQUENCE (SIZE (1..maxSL-TF-IndexPair-r12)) OF SL-TF-IndexPair-r12

SL-TF-IndexPair-r12 ::=  SEQUENCE {
discSF-Index-r12          INTEGER (1..200)  OPTIONAL, -- Need ON
discPRB-Index-r12         INTEGER (1..50)   OPTIONAL -- Need ON
}

SL-TF-IndexPairList-r12b ::=  SEQUENCE (SIZE (1..maxSL-TF-IndexPair-r12)) OF SL-TF-IndexPair-r12b

SL-TF-IndexPair-r12b ::=  SEQUENCE {
discSF-Index-r12b         INTEGER (0..209)  OPTIONAL, -- Need ON
discPRB-Index-r12b        INTEGER (0..49)    OPTIONAL -- Need ON
}

SL-DiscTxRefCarrierDedicated-r13 ::=  CHOICE {
pCell                        NULL,
sCell                    SCellIndex-r10
SL-DiscConfig field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>discCellSelectionInfo</strong></td>
</tr>
<tr>
<td>Parameters that may be used by the UE to select/reselect a cell on the concerned non-serving frequency. If absent, the UE acquires the information from the target cell on the concerned frequency. See TS 36.304 [4, 11.4].</td>
</tr>
<tr>
<td><strong>discSysInfoToReportConfig</strong></td>
</tr>
<tr>
<td>Indicates the request to start a SidelinkUEInformation procedure for reporting system information acquired during an inter-frequency discovery procedure.</td>
</tr>
<tr>
<td><strong>discTF-IndexList</strong></td>
</tr>
<tr>
<td>Indicates a list of time-frequency resource indices pair where each pair of indices corresponds to one discovery message. E-UTRAN only configures discTF-IndexList-r12b when configuring the UE with scheduled SL discovery Tx resources. When receiving discTF-IndexList-r12b, the UE shall only consider this field (and hence ignore discTF-IndexList-r12, if included or previously configured).</td>
</tr>
<tr>
<td><strong>discTxConfig</strong></td>
</tr>
<tr>
<td>Indicates the resources configuration used when E-UTRAN schedules Tx resources (i.e. the fields discSF-Index and discPRB-Index indicate the actual resources to be used).</td>
</tr>
<tr>
<td><strong>discTxInterFreqInfo</strong></td>
</tr>
<tr>
<td>Indicates frequency applicable for the resources indicated by discTxResources-r12 (i.e. original resource field may cover first inter-frequency), and possibly resource allocations on additional frequencies as may be indicated by field discTxInfoInterFreqListAdd.</td>
</tr>
<tr>
<td><strong>discTxRefCarrierDedicated</strong></td>
</tr>
<tr>
<td>Indicates if the PCell or an SCell is to be used as reference for DL measurements and synchronization, instead of the DL frequency paired with the one used to transmit sidelink discovery announcements on, see TS 36.213 [23, 14.3.1].</td>
</tr>
<tr>
<td><strong>discTxResources</strong></td>
</tr>
<tr>
<td>Indicates the resources assigned to the UE for discovery announcements, which can either be a pool from which the UE may select or a set of resources specifically assigned for use by the UE.</td>
</tr>
<tr>
<td><strong>discTxResourcesPS</strong></td>
</tr>
<tr>
<td>Indicates the resources assigned to the UE for PS discovery announcements, which can either be a pool from which the UE may select or a set of resources specifically assigned for use by the UE.</td>
</tr>
<tr>
<td><strong>SL-TF-IndexPair</strong></td>
</tr>
<tr>
<td>A pair of indices, one for the time domain and one for the frequency domain, indicating the start of resources within the pool covered by discTxConfig, see TS 36.211 [21, 9.5.6] for one discovery message. The upper limits of discSF-Index and discPRB-Index are defined in TS 36.213 [23, 14.3.1].</td>
</tr>
</tbody>
</table>

---

**SL-DiscResourcePool**

The IE `SL-DiscResourcePool` specifies the configuration information for an individual pool of resources for sidelink discovery.

**SL-DiscResourcePool information element**

```plaintext
-- ASN1START

SL-DiscTxPoolList-r12 ::= SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-DiscResourcePool-r12

SL-DiscRxPoolList-r12 ::= SEQUENCE (SIZE (1..maxSL-RxPool-r12)) OF SL-DiscResourcePool-r12

SL-DiscResourcePool-r12 ::= SEQUENCE {
     cp-Len-r12             SL-CP-Len-r12,
     discPeriod-r12         ENUMERATED {rf32, rf64, rf128,
                                      rf256, rf512, rf1024, rf16-v1310, spare},
     numRetx-r12            INTEGER (0..3),
}

-- ASN1STOP
```
numRepetition-r12 INTEGER (1..50),

tf-ResourceConfig-r12 SL-TF-ResourceConfig-r12,

txParameters-r12 SEQUENCE {
  txParametersGeneral-r12 SL-TxParameters-r12,
  ue-SelectedResourceConfig-r12 SEQUENCE {
    poolSelection-r12 CHOICE {
      rsrpBased-r12 SL-PoolSelectionConfig-r12,
      random-r12 NULL
    },
    txProbability-r12 ENUMERATED {p25, p50, p75, p100}
  } OPTIONAL -- Need OR
  } OPTIONAL, -- Cond Tx

rxParameters-r12 SEQUENCE {
  tdd-Config-r12 TDD-Config OPTIONAL, -- Need OR
  syncConfigIndex-r12 INTEGER (0..15)
} OPTIONAL, -- Need OR

....

[[ discPeriod-v1310 CHOICE {
  release NULL,
  setup ENUMERATED {rf4, rf6, rf7, rf8,
                     rf12, rf14, rf24, rf28}
} OPTIONAL, -- Need ON

rxParamsAddNeighFreq-r13 CHOICE {
  release NULL,
  setup SEQUENCE {
    physCellId-r13 PhysCellIdList-r13
  }
} OPTIONAL, -- Need ON

txParamsAddNeighFreq-r13 CHOICE {
  release NULL,
  setup SEQUENCE {
    physCellId-r13 PhysCellIdList-r13,
    p-Max P-Max OPTIONAL, -- Need OP
    tdd-Config-r13 TDD-Config OPTIONAL, -- Cond TDD-OR
    tdd-Config-v1130 TDD-Config-v1130 OPTIONAL, -- Cond TDD-OR
}}
freqInfo SEQUENCE {
    ul-CarrierFreq ARFCN-ValueEUTRA OPTIONAL, -- Need OP
    ul-Bandwidth ENUMERATED {n6, n15, n25, n50, n75, n100} OPTIONAL, -- Need OP
    additionalSpectrumEmission AdditionalSpectrumEmission
},
    referenceSignalPower INTEGER (-60..50),
    syncConfigIndex-r13 INTEGER (0..15) OPTIONAL -- Need OR
} OPTIONAL -- Need ON
]]
}

PhysCellIdList-r13 ::= SEQUENCE (SIZE (1.. maxSL-DiscCells-r13)) OF PhysCellId

SL-PoolSelectionConfig-r12 ::= SEQUENCE {
    threshLow-r12 RSRP-RangeSL2-r12,
    threshHigh-r12 RSRP-RangeSL2-r12
}

-- ASN1STOP
SL-DiscResourcePool field descriptions

**discPeriod**
Indicates the period over which resources are allocated in a cell for discovery message transmission/reception, see PSDCH period in TS 36.213 [23]. Value in number of radio frames. Value rf32 corresponds to 32 radio frames, rf64 corresponds to 64 radio frames and so on. The extended values apply for PS discovery (not only for sidelink relaying). When broadcasting an extended value, E-UTRAN sets the original field to spare to ensure legacy UEs ignore the concerned pool entry.

**numRepetition**
Indicates the number of times subframeBitmap is repeated for mapping to subframes that occurs within a discPeriod. The highest value E-UTRAN uses is value 5 for FDD and TDD configuration 0, value 13 for TDD configuration 1, value 25 for TDD configuration 2, value 17 for TDD configuration 3, value 25 for TDD configuration 4, value 50 for TDD configuration 5 and value 7 for TDD configuration 6. E-UTRAN configures numRepetition and subframeBitmap such that the mapped subframes do not exceed the discPeriod.

**poolSelection**
Indicates the mechanism for selecting a (transmission) pool when multiple candidates are provided. E-UTRAN configures the same value (i.e. a pool selection method) for all candidate pools within one pool list (discTxPoolCommon or discTxPoolDedicated) but the pool selection method in different pool lists may or may not be the same.

**syncConfigIndex**
Indicates the synchronisation configuration that is associated with a reception or transmission pool, by means of an index to the corresponding entry of discSyncConfig in SystemInformationBlockType19.

**threshLow, threshHigh**
Specifies the thresholds used to select a resource pool in RSRP based pool selection. The E-UTRAN should configure threshLow and threshHigh such that the UE selects only one resource pool upon RSRP based pool selection.

**txProbability**
Indicates the probability of transmitting announcement in a discovery period when configured with a pool of resources, see TS 36.321 [6].

---

### Conditional presence

| TDD-OR | The field is optional present for TDD, need OR; it is not present for FDD. |
| Tx     | The field is mandatory present when included in discTxPoolDedicated or discTxPoolCommon. Otherwise the field is not present. |

---

**SL-DiscTxPowerInfo**

The IE **SL-DiscTxPowerInfo** specifies power control parameters for one or more power classes.

---

**SL-DiscTxPowerInfo** information element

---

```
-- ASN1START

SL-DiscTxPowerInfoList-r12 ::=  SEQUENCE (SIZE (maxSL-DiscPowerClass-r12)) OF SL-DiscTxPowerInfo-r12

SL-DiscTxPowerInfo-r12 ::=     SEQUENCE {
     discMaxTxPower-r12       P-Max,
     ...
    }

-- ASN1STOP
```
**SL-DiscTxPowerInfo field descriptions**

<table>
<thead>
<tr>
<th>discMaxTxPower</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates the P-Max parameter used to calculate the maximum transmit power a UE configured with the concerned range class, see TS 24.333 [70, 4.2.11]. The first entry in <strong>SL-DiscTxPowerInfoList</strong> corresponds to UE range class &quot;short&quot;, the second entry corresponds to &quot;medium&quot; and the third entry corresponds to &quot;long&quot;.</td>
</tr>
</tbody>
</table>

---

**– SL-GapConfig**

The IE **SL-GapConfig** indicates the gaps, requested or assigned, to enable the UE to receive or transmit sidelink discovery, intra or inter frequency (including inter-PLMN).

**SL-GapConfig information element**

-- ASN1START

```
SL-GapConfig-r13 ::= SEQUENCE {
  gapPatternList-r13    SL-GapPatternList-r13
}

SL-GapPatternList-r13 ::= SEQUENCE (SIZE (1..maxSL-GP-r13)) OF SL-GapPattern-r13

SL-GapPattern-r13 ::= SEQUENCE {
  gapPeriod-r13      ENUMERATED {sf40, sf60, sf70, sf80, sf120, sf140, sf160,
                                sf240, sf280, sf320, sf640, sf1280, sf2560, sf5120,
                                sf10240},
  gapOffset-r12      SL-OffsetIndicator-r12,
  gapSubframeBitmap-r13     BIT STRING (SIZE (1..10240)),
  ...
}
```

-- ASN1STOP

**SL-GapConfig field descriptions**

<table>
<thead>
<tr>
<th>gapOffset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates the offset from the start of SFN 0 to the start of the first gapPeriod. If the SFN period is not an integer multiple of gapPeriod, no subframes within this period (i.e. from SFN 0 to offset) are considered part of the gap.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>gapPeriod</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates the period by which gapSubframeBitmap is repeated.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>gapSubframeBitmap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates the subframes of one or more individual gaps, not only covering the subframes of the associated discovery resources but also including e.g. re-tuning and synchronisation delays. The UE and E-UTRAN signal bit strings of valid sizes only i.e. sizes equal to or less than gapPeriod. Value 1 indicates that the UE is allowed to use the subframe for sidelink discovery.</td>
</tr>
</tbody>
</table>
– SL-GapRequest

The IE *SL-GapRequest* indicates the gaps requested by the UE to receive or transmit sidelink discovery, intra or inter frequency (induding inter-PLMN).

**SL-GapRequest information element**

```asn1
SL-GapRequest-r13 ::= SEQUENCE (SIZE (1..maxFreq)) OF SL-GapFreqInfo-r13

SL-GapFreqInfo-r13 ::= SEQUENCE {
  carrierFreq-r13     ARFCN-ValueEUTRA-r9     OPTIONAL,
  gapPatternList-r13    SL-GapPatternList-r13
}
```

-- ASN1STOP

– SL-HoppingConfig

The IE *SL-HoppingConfig* indicates the hopping configuration used for sidelink.

**SL-HoppingConfig information element**

```asn1
SL-HoppingConfigComm-r12 ::= SEQUENCE {
  hoppingParameter-r12    INTEGER (0..504),
  numSubbands-r12      ENUMERATED {ns1, ns2, ns4},
  rb-Offset-r12      INTEGER (0..110)
}

SL-HoppingConfigDisc-r12 ::= SEQUENCE {
  a-r12         INTEGER (1..200),
  b-r12         INTEGER (1..10),
  c - r 1 2          E N U M E R A T E D  { n 1 , n 5 }
}
```

-- ASN1STOP
### SL-HoppingConfig field descriptions

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a</strong></td>
<td>Per cell parameter: $N_{PSDCH}^{(1)}$ see TS 36.213 [23, 14.3.1].</td>
</tr>
<tr>
<td><strong>b</strong></td>
<td>Per UE parameter: $N_{PSDCH}^{(2)}$ see TS 36.213 [23, 14.3.1].</td>
</tr>
<tr>
<td><strong>c</strong></td>
<td>Per cell parameter: $N_{PSDCH}^{(3)}$ see TS 36.213 [23, 14.3.1].</td>
</tr>
</tbody>
</table>

#### hoppingParameter
Affects the hopping performed as specified in TS 36.213 [23, 14.1.1.2 and 14.1.1.4]. In case value 504 is received, the value used by the UE is 510.

#### numSubbands
Parameter: $N_{bb}$ see TS 36.211 [21, 9.3.6].

#### rb-Offset
Parameter: $N_{RI}^{HO}$, see TS 36.211 [21, 9.3.6].

---

### SL-OffsetIndicator

The IE **SL-OffsetIndicator** indicates the offset of the pool of resources relative to SFN 0 of the cell from which it was obtained or, when out of coverage, relative to DFN 0.

**SL-OffsetIndicator** information element

-- ASN1START

```plaintext
SL-OffsetIndicator-r12 ::= CHOICE {
  small-r12        INTEGER (0..319),
  large-r12        INTEGER (0..10239)
}

SL-OffsetIndicatorSync-r12 ::= INTEGER (0..39)
```

-- ASN1STOP

**SL-OffsetIndicator** field descriptions

**SL-OffsetIndicator**
In **sc-TF-ResourceConfig**, it indicates the offset of the first period of pool of resources within a SFN cycle. For **data-TF-ResourceConfig**, it corresponds to the **offsetIndicator** as defined in TS 36.213 [23, 14.1.3].

**SL-OffsetIndicatorSync**
Synchronisation resources are present in those SFN and subframes which satisfy the relation: $(SFN \times 10 + \text{Subframe Number}) \mod 40 = SL-OffsetIndicatorSync$.

---

### SL-PeriodComm

The IE **SL-PeriodComm** indicates the period over which resources allocated in a cell for sidelink communication.

**SL-PeriodComm** information element

-- ASN1START
SL-PeriodComm-r12 ::= ENUMERATED {sf40, sf60, sf70, sf80, sf120, sf140, sf160, sf240, sf280, sf320, spare6, spare5, spare4, spare3, spare2, spare}

-- ASN1STOP

– SL-Priority
The IE SL-Priority indicates the one or more priorities of resource pool used for sidelink communication, or of a logical channel group used in case of scheduled sidelink communication resources, see TS 36.321 [6].

**SL-Priority information element**

-- ASN1START

SL-PriorityList-r13 ::= SEQUENCE (SIZE (1..maxSL-Prio-r13)) OF SL-Priority-r13

SL-Priority-r13 ::= INTEGER (1..8)

-- ASN1STOP

– SLSSID
The IE SLSSID identifies a cell and is used by the receiving UE to detect asynchronous neighbouring cells, and by transmitting UEs to extend the synchronisation signals beyond the cell’s coverage area.

**SLSSID information element**

-- ASN1START

SLSSID-r12 ::= INTEGER (0..167)

-- ASN1STOP

– SL-SyncConfig
The IE SL-SyncConfig specifies the configuration information concerning reception of synchronisation signals from neighbouring cells as well as concerning the transmission of synchronisation signals for sidelink communication and sidelink discovery.

**SL-SyncConfig information element**

-- ASN1START
SL-SyncConfigList-r12 ::= SEQUENCE (SIZE (1..maxSL-SyncConfig-r12)) OF SL-SyncConfig-r12

SL-SyncConfig-r12 ::= SEQUENCE {
    syncCP-Len-r12             SL-CP-Len-r12,
    syncOffsetIndicator-r12    SL-OffsetIndicatorSync-r12,
    slssid-r12                 SLSSID-r12,
    txParameters-r12           SEQUENCE {
        syncTxParameters-r12    SL-TxParameters-r12,
        syncTxThreshIC-r12      RSRP-RangeSL-r12,
        syncInfoReserved-r12    BIT STRING (SIZE (19))
    } OPTIONAL -- Need OR
    rxParamsNCell-r12          SEQUENCE {
        physCellId-r12         PhysCellId,
        discSyncWindow-r12     ENUMERATED {w1, w2}
    } OPTIONAL, -- Need OR
    ...
    [ syncTxPeriodic-r13       ENUMERATED {true} OPTIONAL -- Need OR
    ]
}

SL-SyncConfigListNFreq-r13 ::= SEQUENCE (SIZE (1..maxSL-SyncConfig-r12)) OF SL-SyncConfigNFreq-r13

SL-SyncConfigNFreq-r13 ::= SEQUENCE {
    asyncParameters-r13        SEQUENCE {
        syncCP-Len-r13           SL-CP-Len-r12,
        syncOffsetIndicator-r13  SL-OffsetIndicatorSync-r12,
        slssid-r13               SLSSID-r12
    } OPTIONAL, -- Need OR
    txParameters-r13           SEQUENCE {
        syncTxParameters-r13    SL-TxParameters-r12,
        syncTxThreshIC-r13      RSRP-RangeSL-r12,
        syncInfoReserved-r13    BIT STRING (SIZE (19))
    } OPTIONAL, -- Need OR
    syncTxPeriodic-r13         ENUMERATED {true} OPTIONAL -- Need OR
rxParameters-r13  SEQUENCE {
  discSyncWindow-r13  ENUMERATED {w1, w2}
}

}  OPTIONAL, -- Need OR

-- ASN1STOP
### SL-SyncConfig field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>discSyncWindow</td>
<td>Indicates the synchronization window over which the UE expects that SLSS or discovery resources indicated by the pool configuration (see TS 36.213 [23, 14.4]). The value ( w_1 ) denotes 5 milliseconds. The value ( w_2 ) denotes the length corresponding to normal cyclic prefix divided by 2.</td>
</tr>
<tr>
<td>syncInfoReserved</td>
<td>Reserved for future use.</td>
</tr>
<tr>
<td>syncOffsetIndicator</td>
<td>E-UTRAN should ensure ( \text{syncOffsetIndicator} ) is set to the same value as ( \text{syncOffsetIndicator1} ) or ( \text{syncOffsetIndicator2} ) in preconfigSync within SL-Preconfiguration, if configured.</td>
</tr>
<tr>
<td>syncTxPeriodic</td>
<td>Indicates whether in each discovery period in which UE transmits discovery, the UE transmits SLSS once or periodically (i.e. every 40ms). In the latter case (periodic) the UE also transmits the MasterInformationBlock-SL message alongside. E-UTRAN configures this field only for synchronisation configurations applicable for PS discovery.</td>
</tr>
<tr>
<td>syncTxThreshold</td>
<td>Indicates the threshold used while in coverage. In case the RSRP measurement of the cell chosen for transmission of sidelink communication/ discovery announcements, or of the cell used as reference for DL measurements and synchronization, is below the level indicated by this field, the UE may transmit SLSS (i.e. become synchronisation reference) when performing the corresponding sidelink transmission.</td>
</tr>
<tr>
<td>txParameters</td>
<td>Includes parameters relevant only for transmission. E-UTRAN includes the field in one entry per list, as included in ( \text{commSyncConfig} ) or ( \text{discSyncConfig} ).</td>
</tr>
</tbody>
</table>

## SL-DiscSysInfoReport

The IE \( \text{SL-DiscSysInfoReport} \) contains the parameters related to sidelink discovery acquired from system information of inter-frequency cells (including inter-PLMN).

### SL-DiscSysInfoReport information element

```
-- ASN1START

SL-DiscSysInfoReport-r13 ::= SEQUENCE {
    plmn-IdentityList-r13              PLMN-IdentityList               OPTIONAL,
    cellIdentity-r13                   CellIdentity                      OPTIONAL,
    carrierFreqInfo-r13                ARFCN-ValueEUTRA-r9              OPTIONAL,
    discRxResources-r13                SL-DiscRxPoolList-r12            OPTIONAL,
    discTxPoolCommon-r13               SL-DiscTxPoolList-r12            OPTIONAL,
    discTxPowerInfo-r13                SL-DiscTxPowerInfoList-r12       OPTIONAL,
    discSyncConfig-r13                 SL-SyncConfigNFreq-r13            OPTIONAL,
    discCellSelectionInfo-r13          SEQUENCE {
        q-RxLevMin-r13                 Q-RxLevMin,
        q-RxLevMinOffset-r13           INTEGER (1..8)                     OPTIONAL
    }                                 OPTIONAL,
    cellReselectionInfo-r13            SEQUENCE {
        q-Hyst-r13                    ENUMERATED {dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,
                                                    dB12, dB14, dB16, dB18, dB20, dB22, dB24},
    }
}
```

-- ASN1END


q-RxLevMin-r13  Q-RxLevMin,
t-ReselectionEUTRA-r13  T-Reselection
}  OPTIONAL,
tdd-Config-r13  TDD-Config  OPTIONAL,
freqInfo-r13  SEQUENCE {
  ul-CarrierFreq-r13  ARFCN-ValueEUTRA  OPTIONAL,
  ul-Bandwidth-r13  ENUMERATED {n6, n15, n25, n50, n75, n100}  OPTIONAL,
  additionalSpectrumEmission-r13  AdditionalSpectrumEmission  OPTIONAL
}  OPTIONAL,
p-Max-r13  P-Max  OPTIONAL,
referenceSignalPower-r13  INTEGER (-60..50)  OPTIONAL,
...
}
-- ASN1STOP

---

**SL-DiscSysInfoReport field descriptions**

- **carrierFreqInfo**
  Indicates the frequency of the cell from which the UE acquired the system information relevant for discovery

- **cellIdentity**
  Indicated the identity of the cell from which the UE acquired the system information relevant for discovery

- **plmn-IdentityList**
  Indicates the list of PLMN identity of the cell from which the UE acquired the system information relevant for discovery

---

**SL-TF-ResourceConfig**

The IE **SL-TF-ResourceConfig** specifies a set of time/ frequency resources used for sidelink.

---

**SL-TF-ResourceConfig information element**

---

```
SL-TF-ResourceConfig-r12 ::=  SEQUENCE {
  prb-Num-r12       INTEGER (1..100),
  prb-Start-r12        INTEGER (0..99),
  prb-End-r12        INTEGER (0..99),
  offsetIndicator-r12     SL-OffsetIndicator-r12,
  subframeBitmap-r12 SubframeBitmapSL-r12
}
```
SL-TF-ResourceConfig field descriptions

prb-Start, prb-End, prb-Num
Sidelink transmissions on a sub-frame can occur on PRB with index greater than or equal to prb-Start and less than prb-Start + prb-Num, and on PRB with index greater than prb-End - prb-Num and less than or equal to prb-End. Even for neighbouring cells, prb-Start and prb-End are relative to PRB #0 of the cell from which it was obtained. See TS 36.213 [23, 14.1.3, 14.2.3, 14.3.3].

subframeBitmap
Indicates the subframe bitmap indicating resources used for sidelink. E-UTRAN configures value bs40 for FDD and the following values for TDD: value bs42 for configuration0, value bs16 for configuration1, value bs8 for configuration2, value bs12 for configuration3, value bs8 for configuration4, value bs4 for configuration5 and value bs30 for configuration6.

-- SL-TxParameters

The IE SL-TxParameters identifies a set of parameters configured for sidelink transmission, used for communication, discovery and synchronisation.

SL-TxParameters information element

-- ASN1START

SL-TxParameters-r12 ::= SEQUENCE {
  alpha-r12          Alpha-r12,
  p0-r12             P0-SL-r12
}

P0-SL-r12 ::= INTEGER (-126..31)

-- ASN1STOP
**SL-TxParameters** field descriptions

<table>
<thead>
<tr>
<th>alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter(s): $\alpha_{\text{PSSCH}<em>1}, \alpha</em>{\text{PSSCH}<em>2}, \alpha</em>{\text{PSCCH}<em>1}, \alpha</em>{\text{PSCCH}<em>2}, \alpha</em>{\text{PSDCH}<em>1}, \alpha</em>{\text{PSSS}}$ See TS 36.213 [23, 14.1.1.5, 14.2.1.2, 14.3.1, 14.4] where $a_0$ corresponds to 0, $a_{04}$ corresponds to value 0.4, $a_{05}$ to 0.5, $a_{06}$ to 0.6, $a_{07}$ to 0.7, $a_{08}$ to 0.8, $a_{09}$ to 0.9 and $a_1$ corresponds to 1. This field applies for sidelink power control.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$p_0$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameter: $P_{O_{\text{PSSCH}<em>1}}, P</em>{O_{\text{PSSCH}<em>2}}, P</em>{O_{\text{PSCCH}<em>1}}, P</em>{O_{\text{PSCCH}<em>2}}, P</em>{O_{\text{PSDCH}<em>1}}, P</em>{O_{\text{PSSS}}}$ see TS 36.213 [23, 14.1.1.5, 14.2.1.2, 14.3.1, 14.4], unit dBm.</td>
</tr>
</tbody>
</table>

-- SL-TxPoolIdentity

The IE **SL-TxPoolIdentity** identifies an individual pool entry configured for sidelink transmission, used for communication and discovery.

**SL-TxPoolIdentity information element**

```asn1
-- ASN1START

SL-TxPoolIdentity-r12 ::= INTEGER (1..maxSL-TxPool-r12)

SL-TxPoolIdentity-v1310 ::= INTEGER (maxSL-TxPool-r12Plus1-r13.. maxSL-TxPool-r13)

SL-TxPoolIdentity-r13 ::= INTEGER (1.. maxSL-TxPool-r13)

-- ASN1STOP
```

-- SL-TxPoolToReleaseList

The IE **SL-TxPoolToReleaseList** is used to release one or more individual pool entries used for sidelink transmission, for communication and discovery.

**SL-TxPoolToReleaseList information element**

```asn1
-- ASN1START

SL-TxPoolToReleaseList-r12 ::= SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-TxPoolIdentity-r12

SL-TxPoolToReleaseListExt-r13 ::= SEQUENCE (SIZE (1..maxSL-TxPool-v1310)) OF SL-TxPoolIdentity-v1310

-- ASN1STOP
```
6.4 RRC multiplicity and type constraint values

– Multiplicity and type constraint definitions

-- ASN1START

maxACDC-Cat-r13 INTEGER ::= 16 -- Maximum number of ACDC categories (per PLMN)
maxAvailNarrowBands-r13 INTEGER ::= 16 -- Maximum number of narrowbands
maxBandComb-r10 INTEGER ::= 128 -- Maximum number of band combinations.
maxBandComb-r11 INTEGER ::= 256 -- Maximum number of additional band combinations.
maxBandComb-r13 INTEGER ::= 384 -- Maximum number of band combinations in Rel-13
maxBands INTEGER ::= 64 -- Maximum number of bands listed in EUTRA UE caps
maxBandwidthClass-r10 INTEGER ::= 16 -- Maximum number of supported CA BW classes per band
maxBandwidthCombSet-r10 INTEGER ::= 32 -- Maximum number of bandwidth combination sets per
-- supported band combination
maxCDMA-BandClass INTEGER ::= 32 -- Maximum value of the CDMA band classes
maxCE-Level-r13 INTEGER ::= 4 -- Maximum number of CE levels
maxCellBlack INTEGER ::= 16 -- Maximum number of blacklisted physical cell identity
-- ranges listed in SIB type 4 and 5
maxCellHistory-r12 INTEGER ::= 16 -- Maximum number of visited EUTRA cells reported
maxCellInfoGERAN-r9 INTEGER ::= 32 -- Maximum number of GERAN cells for which system in-
-- formation can be provided as redirection assistance
maxCellInfoUTRA-r9 INTEGER ::= 16 -- Maximum number of UTRA cells for which system
-- information can be provided as redirection
-- assistance
maxCombIDC-r11 INTEGER ::= 128 -- Maximum number of reported UL CA combinations
maxCSI-IM-r11 INTEGER ::= 3 -- Maximum number of CSI-IM configurations
-- (per carrier frequency)
maxCSI-IM-r12 INTEGER ::= 4 -- Maximum number of CSI-IM configurations
-- (per carrier frequency)
minCSI-IM-r13 INTEGER ::= 5 -- Minimum number of CSI IM configurations from which
-- REL-13 extension is used
maxCSI-IM-r13 INTEGER ::= 24 -- Maximum number of CSI-IM configurations
-- (per carrier frequency)
maxCSI-IM-v1310 INTEGER ::= 20 -- Maximum number of additional CSI-IM configurations
-- (per carrier frequency)

-- ASN1END
maxCSI-Proc-r11 INTEGER ::= 4 -- Maximum number of CSI processes (per carrier
   -- frequency)
maxCSI-RS-NZP-r11 INTEGER ::= 3 -- Maximum number of CSI RS resource
   -- configurations using non-zero Tx power
   -- (per carrier frequency)
minCSI-RS-NZP-r13 INTEGER ::= 4 -- Minimum number of CSI RS resource from which
   -- REL-13 extension is used
maxCSI-RS-NZP-r13 INTEGER ::= 24 -- Maximum number of CSI RS resource
   -- configurations using non-zero Tx power
   -- (per carrier frequency)
maxCSI-RS-NZP-v1310 INTEGER ::= 21 -- Maximum number of additional CSI RS resource
   -- configurations using non-zero Tx power
   -- (per carrier frequency)
maxCSI-RS-ZP-r11 INTEGER ::= 4 -- Maximum number of CSI RS resource
   -- configurations using zero Tx power (per carrier
   -- frequency)
maxCQI-ProcExt-r11 INTEGER ::= 3 -- Maximum number of additional periodic CQI
   -- configurations (per carrier frequency)
maxFreqUTRA-TDD-r10 INTEGER ::= 6 -- Maximum number of UTRA TDD carrier frequencies for
   -- which system information can be provided as
   -- redirection assistance
maxCellInter INTEGER ::= 16 -- Maximum number of neighbouring inter-frequency
   -- cells listed in SIB type 5
maxCellIntra INTEGER ::= 16 -- Maximum number of neighbouring intra-frequency
   -- cells listed in SIB type 4
maxCellListGERAN INTEGER ::= 3 -- Maximum number of lists of GERAN cells
maxCellMeas INTEGER ::= 32 -- Maximum number of entries in each of the
   -- cell lists in a measurement object
maxCellReport INTEGER ::= 8 -- Maximum number of reported cells/CSI-RS resources
maxCSI-RS-Meas-r12 INTEGER ::= 96 -- Maximum number of entries in the CSI-RS list
   -- in a measurement object
maxDRB INTEGER ::= 11 -- Maximum number of Data Radio Bearers
maxDS-Duration-r12 INTEGER ::= 5 -- Maximum number of subframes in a discovery signals
   -- occasion
maxDS-ZTP-CSI-RS-r12 INTEGER ::= 5 -- Maximum number of zero transmission power CSI-RS for
-- a serving cell concerning discovery signals

maxEARFCN INTEGER ::= 65535 -- Maximum value of EUTRA carrier frequency
maxEARFCN-Plus1 INTEGER ::= 65536 -- Lowest value extended EARFCN range
maxEARFCN2 INTEGER ::= 262143 -- Highest value extended EARFCN range
maxEPDCCH-Set-r11 INTEGER ::= 2 -- Maximum number of EPDCCH sets
maxFBI INTEGER ::= 64 -- Maximum value of frequency band indicator
maxFBI-Plus1 INTEGER ::= 65 -- Lowest value extended FBI range
maxFBI2 INTEGER ::= 256 -- Highest value extended FBI range
maxFreq INTEGER ::= 8 -- Maximum number of carrier frequencies
maxFreqIDC-r11 INTEGER ::= 32 -- Maximum number of carrier frequencies that are
-- affected by the IDC problems
maxFreqMBMS-r11 INTEGER ::= 5 -- Maximum number of carrier frequencies for which an
-- MBMS capable UE may indicate an interest
maxGERAN-SI INTEGER ::= 10 -- Maximum number of GERAN SI blocks that can be
-- provided as part of NACC information
maxGNFG INTEGER ::= 16 -- Maximum number of GERAN neighbour freq groups
maxLCG-r13 INTEGER ::= 4 -- Maximum number of logical channel groups
maxLogMeasReport-r10 INTEGER ::= 520 -- Maximum number of logged measurement entries
-- that can be reported by the UE in one message
maxMBSFN-Allocations INTEGER ::= 8 -- Maximum number of MBSFN frame allocations with
-- different offset
maxMBSFN-Area INTEGER ::= 8
maxMBSFN-Area-1 INTEGER ::= 7
maxMBMS-ServiceListPerUE-r13 INTEGER ::= 15 -- Maximum number of services which the UE can
-- include in the MBMS interest indication
maxMeasId INTEGER ::= 32
maxMeasId-Plus1 INTEGER ::= 33
maxMeasId-r12 INTEGER ::= 64
maxMultiBands INTEGER ::= 8 -- Maximum number of additional frequency bands
-- that a cell belongs to
maxNS-Pmax-r10 INTEGER ::= 8 -- Maximum number of NS and P-Max values per band
maxNAICS-Entries-r12 INTEGER ::= 8 -- Maximum number of supported NAICS combination(s)
maxNeighCell-r12 INTEGER ::= 8 -- Maximum number of neighbouring cells in NAICS
-- configuration (per carrier frequency)
maxNeighCell-SCPTM-r13 INTEGER ::= 8 -- Maximum number of SCPTM neighbour cells
maxObjectId INTEGER ::= 32
maxObjectId-Plus1-r13 INTEGER ::= 33
maxObjectId-r13 INTEGER ::= 64
maxP-a-PerNeighCell-r12 INTEGER ::= 3 -- Maximum number of power offsets for a neighbour cell
                                          -- in NAICS configuration
maxPageRec INTEGER ::= 16--
maxPhysCellIdRange-r9 INTEGER ::= 4 -- Maximum number of physical cell identity ranges
maxPLMN-r11 INTEGER ::=6 -- Maximum number of PLMNs
maxPNOffset INTEGER ::=511 -- Maximum number of CDMA2000 PNOffsets
maxPMCH-PerMBSFN INTEGER ::= 15
maxQCI-r13 INTEGER ::= 6 -- Maximum number of QCIs
maxRAT-Capabilities INTEGER ::= 8 -- Maximum number of interworking RATs (incl EUTRA)
maxRE-MapQCL-r11 INTEGER ::= 4 -- Maximum number of PDSCH RE Mapping configurations
                                          -- (per carrier frequency)
maxReportConfigId INTEGER ::= 32
maxRSTD-Freq-r10 INTEGER ::= 3 -- Maximum number of frequency layers for RSTD
                                          -- measurement
maxSAI-MBMS-r11 INTEGER ::= 64 -- Maximum number of MBMS service area identities
                                          -- broadcast per carrier frequency
maxSCell-r10 INTEGER ::= 4 -- Maximum number of SCells
maxSCell-r13 INTEGER ::= 31 -- Highest value of extended number range of SCells
maxSC-MTCH-r13 INTEGER ::= 1023 -- Maximum number of SC-MTCHs in one cell
maxSL-CommRxPoolNFreq-r13 INTEGER ::= 32 -- Maximum number of individual sidelink communication
                                          -- Rx resource pools on neighbouring freq
maxSL-CommRxPoolPreconf-v1310 INTEGER ::= 12 -- Maximum number of additional preconfigured
                                          -- sidelink communication Rx resource pool entries
maxSL-TxPool-r12Plus1-r13 INTEGER ::= 5 -- First additional individual sidelink
                                          -- Tx resource pool
maxSL-TxPool-v1310 INTEGER ::= 4 -- Maximum number of additional sidelink
                                          -- Tx resource pool entries
maxSL-TxPool-r13 INTEGER ::= 8 -- Maximum number of individual sidelink
                                          -- Tx resource pools
maxSL-CommTxBxPoolPreconf-v1310 INTEGER ::= 7 -- Maximum number of additional preconfigured
                                          -- sidelink Tx resource pool entries
maxSL-Dest-r12  INTEGER ::= 16  -- Maximum number of sidelink destinations
maxSL-DiscCells-r13 INTEGER ::= 16  -- Maximum number of cells with similar sidelink
-- configurations
maxSL-DiscPowerClass-r12 INTEGER ::= 3  -- Maximum number of sidelink power classes
maxSL-DiscRxPoolPreconf-r13 INTEGER ::= 16 -- Maximum number of preconfigured sidelink
-- discovery Rx resource pool entries
maxSL-DiscSysInfoReportFreq-r13 INTEGER ::= 8  -- Maximum number of frequencies to include in a
-- SidelinkUEInformation for SI reporting
maxSL-DiscTxPoolPreconf-r13 INTEGER ::= 4 -- Maximum number of preconfigured sidelink
-- discovery Tx resource pool entries
maxSL-GP-r13 INTEGER ::= 8  -- Maximum number of gap patterns that can be requested
-- for a frequency or assigned
maxSL-Prio-r13 INTEGER ::= 8  -- Maximum number of entries in sidelink priority list
maxSL-RxPool-r12 INTEGER ::= 16 -- Maximum number of individual sidelink Rx resource pools
maxSL-SyncConfig-r12 INTEGER ::= 16 -- Maximum number of sidelink Sync configurations
maxSL-TF-IndexPair-r12 INTEGER ::= 64 -- Maximum number of sidelink Time Freq resource index
-- pairs
maxSL-TxPool-r12 INTEGER ::= 4  -- Maximum number of individual sidelink Tx resource pools
maxSTAG-r11 INTEGER ::= 3  -- Maximum number of STAGs
maxServCell-r10 INTEGER ::= 5  -- Maximum number of Serving cells
maxServCell-r13 INTEGER ::= 32 -- Highest value of extended number range of Serving cells
maxServiceCount INTEGER ::= 16 -- Maximum number of MBMS services that can be included
-- in an MBMS counting request and response
maxServiceCount-1 INTEGER ::= 15
maxSessionPerPMCH INTEGER ::= 29
maxSessionPerPMCH-1 INTEGER ::= 28
maxSIB INTEGER ::= 32 -- Maximum number of SIBs
maxSIB-1 INTEGER ::= 31
maxSI-Message INTEGER ::= 32 -- Maximum number of SI messages
maxSimultaneousBands-r10 INTEGER ::= 64 -- Maximum number of simultaneously aggregated bands
maxSubframePatternIDC-r11 INTEGER ::= 8  -- Maximum number of subframe reservation patterns
-- that the UE can simultaneously recommend to the
-- E-UTRAN for use.
maxUTRA-FDD-Carrier INTEGER ::= 16 -- Maximum number of UTRA FDD carrier frequencies
maxUTRA-TDD-Carrier INTEGER ::= 16 -- Maximum number of UTRA TDD carrier frequencies
maxWLAN-Id-r12    INTEGER ::= 16 -- Maximum number of WLAN identifiers
maxWLAN-Bands-r13 INTEGER ::= 8  -- Maximum number of WLAN bands
maxWLAN-Id-r13    INTEGER ::= 32 -- Maximum number of WLAN identifiers
maxWLAN-Channels-r13 INTEGER ::= 16 -- maximum number of WLAN channels used in
       -- WLAN-CarrierInfo
maxWLAN-CarrierInfo-r13 INTEGER ::= 8  -- Maximum number of WLAN Carrier Information

-- ASN1STOP

NOTE: The value of maxDRB aligns with SA2.

6.5 PC5 RRC messages

NOTE: The messages included in this section reflect the current status of the discussions. Additional messages
may be included at a later stage.

6.5.1 General message structure

– PC5-RRC-Definitions

This ASN.1 segment is the start of the PC5 RRC PDU definitions.

-- ASN1START

PC5-RRC-Definitions DEFINITIONS AUTOMATIC TAGS ::= BEGIN

IMPORTS

   TDD-ConfigSL-r12

FROM EUTRA-RRC-Definitions;

-- ASN1STOP
The **SBCCH-SL-BCH-Message** class is the set of RRC messages that may be sent from the UE to the UE via SL-BCH on the SBCCH logical channel.

```asn1
SBCCH-SL-BCH-Message ::= SEQUENCE {
    message SBCCH-SL-BCH-MessageType
}

SBCCH-SL-BCH-MessageType ::= MasterInformationBlock-SL
```

### 6.5.2 Message definitions

---

**MasterInformationBlock-SL**

The **MasterInformationBlock-SL** includes the information transmitted by a UE transmitting SLSS, i.e. acting as synchronisation reference, via SL-BCH.

- Signalling radio bearer: N/A
- RLC-SAP: TM
- Logical channel: SBCCH
- Direction: UE to UE

```asn1
MasterInformationBlock-SL ::= SEQUENCE {
    sl-Bandwidth-r12 ENUMERATED {
        n6, n15, n25, n50, n75, n100
    },
    tdd-ConfigSL-r12 TDD-ConfigSL-r12,
    directFrameNumber-r12 BIT STRING (SIZE (10)),
    directSubframeNumber-r12 INTEGER (0..9),
    inCoverage-r12 BOOLEAN,
    reserved-r12 BIT STRING (SIZE (19))
}
```
6.6 Direct Indication Information

Direct Indication information is transmitted on MPDCCH using P-RNTI but without associated Paging message. Table 6.6-1 defines the Direct Indication information, see TS 36.212 [22, 5.3.3.1.14].

When bit n is set to 1, UE shall behave as if the corresponding field is set in the Paging message, see 5.3.2.3. Bit 1 is the least significant bit.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Direct Indication information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>systemInfoModification</td>
</tr>
<tr>
<td>2</td>
<td>etws-Indication</td>
</tr>
<tr>
<td>3</td>
<td>cmas-Indication</td>
</tr>
<tr>
<td>4</td>
<td>eab-ParamModification</td>
</tr>
<tr>
<td>5</td>
<td>systemInfoModification-eDRX</td>
</tr>
<tr>
<td>6, 7, 8</td>
<td>Not used, and shall be ignored by UE if received.</td>
</tr>
</tbody>
</table>

6.7 NB-IoT RRC messages

6.7.1 General NB-IoT message structure

---
IMPORTS

RRConnectionReestablishmentReject,
SecurityModeCommand,
SecurityModeComplete,
SecurityModeFailure,
AdditionalSpectrumEmission,
ARFCN-ValueEUTRA-r9,
CellIdentity,
DedicatedInfoNAS,
DRB-Identity,
InitialUE-Identity,
IntraFreqBlackCellList,
IntraFreqNeighCellList,
maxBands,
maxCellBlack,
maxCellInter,
maxFBI2,
maxFreq,
maxMultiBands,
maxPageRec,
maxPLMN-r11,
maxSIB,
maxSIB-1,
NextHopChainingCount,
PagingUE-Identity,
PLMN-Identity,
P-Max,
PowerRampingParameters,
PreambleTransMax,
PhysCellId,
Q-OffsetRange,
Q-QualMin-r9,
Q-RxLevMin,
ReestabUE-Identity,
RegisteredMME,
ReselectionThreshold,
ResumeIdentity-r13,
RRC-TransactionIdentifier,
RSRP-Range,
ShortMAC-I,
S-TMSI,
SystemInformationBlockType16-r11,
SystemInfoValueTagSI-r13,
TimeAlignmentTimer,
TrackingAreaCode
FROM EUTRA-RRC-Definitions;

-- ASN1STOP

– BCCH-BCH-Message-NB

The \textit{BCCH-BCH-Message-NB} class is the set of RRC messages that may be sent from the E-UTRAN to the UE via BCH on the BCCH logical channel.

-- ASN1START

BCCH-BCH-Message-NB ::= SEQUENCE {
    message      BCCH-BCH-MessageType-NB
}

BCCH-BCH-MessageType-NB ::= MasterInformationBlock-NB

-- ASN1STOP

– BCCH-DL-SCH-Message-NB

The \textit{BCCH-DL-SCH-Message-NB} class is the set of RRC messages that may be sent from the E-UTRAN to the UE via DL-SCH on the BCCH logical channel.

-- ASN1START
BCCH-DL-SCH-Message-NB ::= SEQUENCE {
    message     BCCH-DL-SCH-MessageType-NB
}

BCCH-DL-SCH-MessageType-NB ::= CHOICE {
    c 1       CHOICE {
        systemInformation-r13    SystemInformation-NB,
        systemInformationBlockType1-r13  SystemInformationBlockType1-NB
    },
    messageClassExtension SEQUENCE {}
}

-- ASN1STOP

– PCCH-Message-NB

The PCCH-Message-NB class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the PCCH logical channel.

-- ASN1START

PCCH-Message-NB ::= SEQUENCE {
    message     PCCH-MessageType-NB
}

PCCH-MessageType-NB ::= CHOICE {
    c 1       CHOICE {
        paging-r13        Paging-NB
    },
    messageClassExtension SEQUENCE {}
}

-- ASN1STOP

– DL-CCCH-Message-NB

The DL-CCCH-Message-NB class is the set of RRC messages that may be sent from the E-UTRAN to the UE on the downlink CCCH logical channel.
DL-CCCH-Message-NB ::= SEQUENCE {
    message     DL-CCCH-MessageType-NB
}

DL-CCCH-MessageType-NB ::= CHOICE {
    c 1       CHOICE {
        
        rrcConnectionReestablishment-r13    RRCConnectionReestablishment-NB,
        rrcConnectionReestablishmentReject-r13 RRCConnectionReestablishmentReject,
        rrcConnectionReject-r13             RRCConnectionReject-NB,
        rrcConnectionSetup-r13              RRCConnectionSetup-NB,
        spare4 NULL, spare3 NULL, spare2 NULL, spare1 NULL
    },
    messageClassExtension SEQUENCE {}
}

DL-DCCH-Message-NB ::= SEQUENCE {
    message     DL-DCCH-MessageType-NB
}

DL-DCCH-MessageType-NB ::= CHOICE {
    c 1       CHOICE {
        dlInformationTransfer-r13    DLInformationTransfer-NB,
        rrcConnectionReconfiguration-r13  RRCConnectionReconfiguration-NB,
        rrcConnectionRelease-r13    RRCConnectionRelease-NB,
        securityModeCommand-r13     SecurityModeCommand,
        ueCapabilityEnquiry-r13     UECapabilityEnquiry-NB,
    },
    messageClassExtension SEQUENCE {}
}
The **UL-CCCH-Message-NB** class is the set of RRC messages that may be sent from the UE to the E-UTRAN on the uplink CCCH logical channel.

**ASN1START**

UL-CCCH-Message-NB ::= SEQUENCE {
  message     UL-CCCH-MessageType-NB
}

UL-CCCH-MessageType-NB ::= CHOICE {
  c 1       CHOICE {
    rrcConnectionReestablishmentRequest-r13  RRCConnectionReestablishmentRequest-NB,
    rrcConnectionRequest-r13    RRCConnectionRequest-NB,
    rrcConnectionResumeRequest-r13   RRCConnectionResumeRequest-NB,
    spare1 NULL
  },
  messageClassExtension SEQUENCE {}
}

**ASN1STOP**

The **UL-DCCH-Message-NB** class is the set of RRC messages that may be sent from the UE to the E-UTRAN on the uplink DCCH logical channel.

**ASN1START**

UL-DCCH-Message-NB ::= SEQUENCE {
  message     UL-DCCH-MessageType-NB
}

UL-DCCH-MessageType-NB ::= CHOICE {
  c 1       CHOICE {
    rrcConnectionReestablishmentRequest-r13  RRCConnectionReestablishmentRequest-NB,
    rrcConnectionRequest-r13    RRCConnectionRequest-NB,
    rrcConnectionResumeRequest-r13   RRCConnectionResumeRequest-NB,
    spare1 NULL
  },
  messageClassExtension SEQUENCE {}
}

**ASN1STOP**
UL-DCCH-Message-NB ::= SEQUENCE {
  message                UL-DCCH-MessageType-NB
}

UL-DCCH-MessageType-NB ::= CHOICE {
  c1                    CHOICE {
    rrcConnectionReconfigurationComplete-r13    RRCConnectionReconfigurationComplete-NB,
    rrcConnectionReestablishmentComplete-r13   RRCConnectionReestablishmentComplete-NB,
    rrcConnectionSetupComplete-r13             RRCConnectionSetupComplete-NB,
    securityModeComplete-r13                   SecurityModeComplete,
    securityModeFailure-r13                    SecurityModeFailure,
    ueCapabilityInformation-r13                UECapabilityInformation-NB,
    ulInformationTransfer-r13                  ULInformationTransfer-NB,
    rrcConnectionResumeComplete-r13             RRCConnectionResumeComplete-NB,
    spare8 NULL, spare7 NULL,
    spare6 NULL, spare5 NULL, spare4 NULL,
    spare3 NULL, spare2 NULL, spare1 NULL
  },
  messageClassExtension  SEQUENCE {}
}

-- ASN1STOP

6.7.2 NB-IoT Message definitions

-- DLInformationTransfer-NB

The DLInformationTransfer-NB message is used for the downlink transfer of NAS dedicated information.

  Signalling radio bearer: SRB1 or SRB1bis
  RLC-SAP: AM
  Logical channel: DCCH
  Direction: E-UTRAN to UE

DLInformationTransfer-NB message

-- ASN1START
DLInformationTransfer-NB ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1     CHOICE {
      dlInformationTransfer-r13  DLInformationTransfer-NB-r13-IEs,
      spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
}

DLInformationTransfer-NB-r13-IEs ::= SEQUENCE {
  dedicatedInfoNAS-r13     DedicatedInfoNAS,
  lateNonCriticalExtension    OCTET STRING     OPTIONAL,
  nonCriticalExtension     SEQUENCE {}      OPTIONAL
}

-- ASN1STOP

-- MasterInformationBlock-NB

The MasterInformationBlock-NB includes the system information transmitted on BCH.

Signalling radio bearer: N/A

RLC-SAP: TM

Logical channel: BCCH

Direction: E-UTRAN to UE

-- ASN1START

MasterInformationBlock-NB ::= SEQUENCE {
  systemFrameNumber-MSB-r13  BIT STRING (SIZE (4)),
  hyperSFN-LSB-r13    BIT STRING (SIZE (2)),
  schedulingInfoSIB1-r13 INTEGER (0..15),

-- ASN1STOP
systemInfoValueTag-r13     INTEGER (0..31),
ab-Enabled-r13             BOOLEAN,
operationModelInfo-r13    CHOICE {
    inband-SamePCI-r13     Inband-SamePCI-NB-r13,
    inband-DifferentPCI-r13 Inband-DifferentPCI-NB-r13,
    guardband-r13          Guardband-NB-r13,
    standalone-r13         Standalone-NB-r13
},
spare                    BIT STRING (SIZE (11))
}

ChannelRasterOffset-NB-r13 ::= ENUMERATED {khz-7dot5, khz-2dot5, khz2dot5, khz7dot5}

Guardband-NB-r13 ::=   SEQUENCE {
    rasterOffset-r13    ChannelRasterOffset-NB-r13,
    spare       BIT STRING (SIZE (3))
}

Inband-SamePCI-NB-r13 ::=  SEQUENCE {
    eutra-CRS-SequenceInfo-r13  INTEGER (0..31)
}

Inband-DifferentPCI-NB-r13 ::= SEQUENCE {
    eutra-NumCRS-Ports-r13   ENUMERATED {same, four},
    rasterOffset-r13    ChannelRasterOffset-NB-r13,
    spare       BIT STRING (SIZE (2))
}

Standalone-NB-r13 ::=   SEQUENCE {
    spare       BIT STRING (SIZE (5))
}

-- ASN1STOP
### MasterInformationBlock-NB field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ab-Enabled</td>
<td>Value TRUE indicates that access barring is enabled and that the UE shall acquire SystemInformationBlockType14-NB before initiating RRC connection establishment or resume.</td>
</tr>
<tr>
<td>eutra-CRS-SequenceInfo</td>
<td>Information of the carrier containing NPSS/NSSS/NPBCH. Each value is associated with an E-UTRA PRB index as an offset from the middle of the LTE system sorted out by channel raster offset. See TS 36.211[21] and TS 36.213 [23].</td>
</tr>
<tr>
<td>eutra-NumCRS-Ports</td>
<td>Number of E-UTRA CRS antenna ports, either the same number of ports as NRS or 4 antenna ports. See TS 36.211 [21], TS 36.212 [22], and TS 36.213 [23].</td>
</tr>
<tr>
<td>hyperSFN-LSB</td>
<td>Indicates the 2 least significant bits of hyper SFN. The remaining bits are present in SystemInformationBlockType1-NB.</td>
</tr>
<tr>
<td>operationModeInfo</td>
<td>Deployment scenario (in-band/guard-band/standalone) and related information. See TS 36.211 [21] and TS 36.213 [23]. Inband-SamePCI indicates an in-band deployment and that the NB-IoT and LTE cell share the same physical cell id and have the same number of NRS and CRS ports. Inband-DifferentPCI indicates an in-band deployment and that the NB-IoT and LTE cell have different physical cell id. standalone indicates a standalone deployment.</td>
</tr>
<tr>
<td>rasterOffset</td>
<td>NB-IoT offset from LTE channel raster. Unit in kHz in set {-7.5, -2.5, 2.5, 7.5} See TS 36.211[21] and TS 36.213 [23].</td>
</tr>
<tr>
<td>schedulingInfoSIB1</td>
<td>This field contains an index to a table specified in TS 36.213 [23, Table 16.4.1.3-3] that defines SystemInformationBlockType1-NB scheduling information.</td>
</tr>
<tr>
<td>systemFrameNumber-MSB</td>
<td>Defines the 4 most significant bits of the SFN. As indicated in TS 36.211 [21], the 6 least significant bits of the SFN are acquired implicitly by decoding the NPBCH.</td>
</tr>
<tr>
<td>systemInfoValueTag</td>
<td>Common for all SIBs other than MIB-NB, SIB14-NB and SIB16-NB.</td>
</tr>
</tbody>
</table>

---

### Paging-NB

The Paging-NB message is used for the notification of one or more UEs.

- Signalling radio bearer: N/A
- RLC-SAP: TM
- Logical channel: PCCH
- Direction: E-UTRAN to UE

### Paging-NB message

```
Paging-NB ::= SEQUENCE {  pagingRecordList-r13 PagingRecordList-NB-r13 OPTIONAL, -- Need ON  systemInfoModification-r13 ENUMERATED {true} OPTIONAL, -- Need ON  systemInfoModification-eDRX-r13 ENUMERATED {true} OPTIONAL, -- Need ON  nonCriticalExtension SEQUENCE {} OPTIONAL }

PagingRecordList-NB-r13 ::= SEQUENCE (SIZE (1..maxPageRec)) OF PagingRecord-NB-r13
```

---

ETS1
PagingRecord-NB-r13 ::= SEQUENCE {
  ue-Identity-r13 PagingUE-Identity,
  ...
}

-- ASN1STOP

**Paging-NB field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>systemInfoModification</td>
<td>If present: indication of a BCCH modification other than for SystemInformationBlockType14-NB (SIB14-NB) and SystemInformationBlockType16-NB (SIB16-NB). This indication does not apply to UEs using eDRX cycle longer than the BCCH modification period.</td>
</tr>
<tr>
<td>systemInfoModification-eDRX</td>
<td>If present: indication of a BCCH modification other than for SystemInformationBlockType14-NB (SIB14-NB) and SystemInformationBlockType16-NB (SIB16-NB). This indication applies only to UEs using eDRX cycle longer than the BCCH modification period.</td>
</tr>
<tr>
<td>ue-Identity</td>
<td>Provides the NAS identity of the UE that is being paged.</td>
</tr>
</tbody>
</table>

**RRConnectionReconfiguration-NB**

The RRConnectionReconfiguration-NB message is the command to modify an RRC connection. It may convey information for resource configuration (including RBs, MAC main configuration and physical channel configuration) including any associated dedicated NAS information.

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: E-UTRAN to UE

**RRConnectionReconfiguration-NB message**

-- ASN1START

RRConnectionReconfiguration-NB ::= SEQUENCE {
  rrc-TransactionIdentifier RRC-TransactionIdentifier,
  criticalExtensions CHOICE {
    c1 CHOICE {
      rrcConnectionReconfiguration-r13 RRConnectionReconfiguration-NB-r13-IEs,
      spare1 NULL
    },
    criticalExtensionsFuture SEQUENCE {}
  }
}

-- ASN1STOP
RRCConnectionReconfiguration-NB-r13-IEs ::= SEQUENCE {
  dedicatedInfoNASList-r13   SEQUENCE (SIZE(1..maxDRB-NB-r13)) OF
    DedicatedInfoNAS OPTIONAL, -- Need ON
  radioResourceConfigDedicated-r13 RadioResourceConfigDedicated-NB-r13 OPTIONAL, -- Need ON
  fullConfig-r13      ENUMERATED {true}     OPTIONAL, -- Cond Reestab
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  nonCriticalExtension    SEQUENCE {} OPTIONAL
}

-- ASN1STOP

RRCConnectionReconfiguration-NB field descriptions

dedicatedInfoNASList
This field is used to transfer UE specific NAS layer information between the network and the UE. The RRC layer is
transparent for each PDU in the list.

fullConfig
Indicates the full configuration option is applicable for the RRC Connection Reconfiguration message.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reestab</td>
<td>This field is optionally present, need ON upon the first reconfiguration after RRC connection re-establishment; otherwise the field is not present.</td>
</tr>
</tbody>
</table>

-- RRCConnectionReconfigurationComplete-NB

The RRCConnectionReconfigurationComplete-NB message is used to confirm the successful completion of an RRC
connection reconfiguration.

Signalling radio bearer: SRB1
RLC-SAP: AM
Logical channel: DCCH
Direction: UE to E-UTRAN

RRCConnectionReconfigurationComplete-NB message

-- ASN1START

RRCConnectionReconfigurationComplete-NB ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions CHOICE {
    rrcConnectionReconfigurationComplete-r13 RRCConnectionReconfigurationComplete-NB-r13-IEs,
    criticalExtensionsFuture SEQUENCE {}
  }

-- ASN1STOP
RRCConnectionReconfigurationComplete-NB-r13-IEs ::= SEQUENCE {
    lateNonCriticalExtension          OCTET STRING     OPTIONAL,
    nonCriticalExtension             SEQUENCE {}      OPTIONAL
}

-- ASN1STOP

-- RRCConnectionReestablishment-NB

The RRCConnectionReestablishment-NB message is used to re-establish SRB1.

Signalling radio bearer: SRB0
RLC-SAP: TM
Logical channel: CCCH
Direction: E-UTRAN to UE

RRCConnectionReestablishment-NB message

-- ASN1START

RRCConnectionReestablishment-NB ::= SEQUENCE {
    rrc-TransactionIdentifier   RRC-TransactionIdentifier, criticalExtensions   CHOICE {
        c1          CHOICE {
            rrcConnectionReestablishment-r13  RRCConnectionReestablishment-NB-r13-IEs,
            spare1     NULL
        },
        criticalExtensionsFuture   SEQUENCE {}
    }
}

RRCConnectionReestablishment-NB-r13-IEs ::= SEQUENCE {
    radioResourceConfigDedicated-r13   RadioResourceConfigDedicated-NB-r13, nextHopChainingCount-r13     NextHopChainingCount,
}
lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension SEQUENCE {} OPTIONAL

-- ASN1STOP

– **RRCConnectionReestablishmentComplete-NB**

The *RRCConnectionReestablishmentComplete-NB* message is used to confirm the successful completion of an RRC connection reestablishment.

  Signalling radio bearer: SRB1
  RLC-SAP: AM
  Logical channel: DCCH
  Direction: UE to E-UTRAN

**RRCConnectionReestablishmentComplete-NB message**

-- ASN1START

RRCConnectionReestablishmentComplete-NB ::= SEQUENCE {
  rrC-TransactionIdentifier RRC-TransactionIdentifier,
  criticalExtensions CHOICE {
    rrCConnectionReestablishmentComplete-r13 RRCCconnectionReestablishmentComplete-NB-r13-IEs,
    criticalExtensionsFuture SEQUENCE {}
  }
}

RRCConnectionReestablishmentComplete-NB-r13-IEs ::= SEQUENCE {
  lateNonCriticalExtension OCTET STRING OPTIONAL,
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- ASN1STOP

– **RRCConnectionReestablishmentRequest-NB**

The *RRCConnectionReestablishmentRequest-NB* message is used to request the reestablishment of an RRC connection.
Signalling radio bearer: SRB0
RLC-SAP: TM
Logical channel: CCCH
Direction: UE to E-UTRAN

**RRCConnectionReestablishmentRequest-NB message**

```asn1
RRCConnectionReestablishmentRequest-NB ::= SEQUENCE {
    criticalExtensions     CHOICE {
        rrcConnectionReestablishmentRequest-r13
            RRCConnectionReestablishmentRequest-NB-r13-IEs,
        criticalExtensionsFuture   SEQUENCE { }
    }
}
```

```asn1
RRCConnectionReestablishmentRequest-NB-r13-IEs ::= SEQUENCE {
    ue-Identity-r13      ReestabUE-Identity,
    reestablishmentCause-r13   ReestablishmentCause-NB-r13,
    spare         BIT STRING (SIZE (25))
}
```

```asn1
ReestablishmentCause-NB-r13 ::=   ENUMERATED {
    reconfigurationFailure, other Failure,
    spare2, spare1
}
```

**RRCConnectionReestablishmentRequest-NB field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>reestablishmentCause</td>
<td>Indicates the failure cause that triggered the re-establishment procedure.</td>
</tr>
<tr>
<td>eNB is not expected to</td>
<td>reject a <strong>RRCConnectionReestablishmentRequest</strong> due to unknown cause value</td>
</tr>
<tr>
<td>used by the UE.</td>
<td>being used by the UE.</td>
</tr>
<tr>
<td>ue-Identity</td>
<td>UE identity included to retrieve UE context and to facilitate contention</td>
</tr>
<tr>
<td>resolution by lower layers.</td>
<td></td>
</tr>
</tbody>
</table>

**RRCConnectionReject-NB**

The **RRCConnectionReject-NB** message is used to reject the RRC connection establishment or RRC connection resume.
Signalling radio bearer: SRB0
RLC-SAP: TM
Logical channel: CCCH
Direction: E-UTRAN to UE

**RRCConnectionReject-NB message**

```asn1
RRCConnectionReject-NB ::= SEQUENCE {
criticalExtensions     CHOICE {
c1                  CHOICE {
rrcConnectionReject-r13    RRCConnectionReject-NB-r13-IEs,
spare1 NULL
},
criticalExtensionsFuture   SEQUENCE {}
n}
}

RRCConnectionReject-NB-r13-IEs ::=  SEQUENCE {
extendedWaitTime-r13     INTEGER (1..1800),
rrc-SuspendIndication-r13    ENUMERATED {true}   OPTIONAL,  -- Need ON
lateNonCriticalExtension    OCTET STRING    OPTIONAL,
nonCriticalExtension     SEQUENCE {}     OPTIONAL
}
```

**RRCConnectionReject-NB field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>extendedWaitTime</code></td>
<td>Value in seconds.</td>
</tr>
<tr>
<td><code>rrc-SuspendIndication</code></td>
<td>If present, this field indicates that the UE should remain suspended and not release its stored context.</td>
</tr>
</tbody>
</table>

--

**RRCConnectionRelease-NB**

The `RRCConnectionRelease-NB` message is used to command the release of an RRC connection.
Signalling radio bearer: SRB1 or SRB1bis
RLC-SAP: AM
Logical channel: DCCH
Direction: E-UTRAN to UE

**RRConnectionRelease-NB message**

```--- ASN1START

RRConnectionRelease-NB ::= SEQUENCE {
    rrc-TransactionIdentifier   RRC-TransactionIdentifier,
    criticalExtensions     CHOICE {
        c1          CHOICE {
            rrcConnectionRelease-r13   RRCConnectionRelease-NB-r13-IEs,
            spare1 NULL
        },
        criticalExtensionsFuture   SEQUENCE {}
    }
}

RRCConnectionRelease-NB-r13-IEs ::= SEQUENCE {
    releaseCause-r13     ReleaseCause-NB-r13,
    resumeIdentity-r13     ResumeIdentity-r13 OPTIONAL, -- Need OR
    extendedWaitTime-r13     INTEGER (1..1800) OPTIONAL, -- Need ON
    redirectedCarrierInfo-r13   RedirectedCarrierInfo-NB-r13 OPTIONAL, -- Need ON
    lateNonCriticalExtension   OCTET STRING OPTIONAL,
    nonCriticalExtension    SEQUENCE {} OPTIONAL
}

ReleaseCause-NB-r13 ::= ENUMERATED {
    loadBalancingTAUrequired, other,
    rrc-Suspend, spare1
}

RedirectedCarrierInfo-NB-r13::=

--- ASN1STOP
```
### RRConnectionRelease-NB field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>extendedWaitTime</td>
<td>Value in seconds.</td>
</tr>
<tr>
<td>redirectedCarrierInfo</td>
<td>The redirectedCarrierInfo indicates a carrier frequency (downlink for FDD) and is used to redirect the UE to a NB-IoT carrier frequency, by means of the cell selection upon leaving RRC_CONNECTED as specified in TS 36.304 [4].</td>
</tr>
<tr>
<td>releaseCause</td>
<td>The releaseCause is used to indicate the reason for releasing the RRC Connection. E-UTRAN should not set the releaseCause to loadBalancingTAURequired if the extendedWaitTime is present.</td>
</tr>
</tbody>
</table>

---

**RRConnectionRequest-NB**

The **RRConnectionRequest-NB** message is used to request the establishment of an RRC connection.

- Signalling radio bearer: SRB0
- RLC-SAP: TM
- Logical channel: CCCH
- Direction: UE to E-UTRAN

#### RRConnectionRequest-NB message

```asn1
RRConnectionRequest-NB ::= SEQUENCE {
  criticalExtensions     CHOICE {
    rrcConnectionRequest-r13   RRCConnectionRequest-NB-r13-IEs,
    criticalExtensionsFuture   SEQUENCE {}  
  }
}

RRConnectionRequest-NB-r13-IEs ::= SEQUENCE {
  ue-Identity-r13       InitialUE-Identity,
  establishmentCause-r13 EstablishmentCause-NB-r13,
  multiToneSupport-r13   ENUMERATED {true}    OPTIONAL,
  multiCarrierSupport-r13 ENUMERATED {true}    OPTIONAL,
  spare         BIT STRING (SIZE (22))  
}  
```

---

ETSI
### RRCConectionRequest-NB field descriptions

<table>
<thead>
<tr>
<th>establishmentCause</th>
<th>Provides the establishment cause for the RRC connection request as provided by the upper layers. eNB is not expected to reject a <strong>RRCConectionRequest</strong> due to unknown cause value being used by the UE.</th>
</tr>
</thead>
<tbody>
<tr>
<td>multiCarrierSupport</td>
<td>If present, this field indicates that the UE supports multi-carrier operation.</td>
</tr>
<tr>
<td>multiToneSupport</td>
<td>If present, this field indicates that the UE supports UL multi-tone transmissions on NPUSCH.</td>
</tr>
<tr>
<td>ue-Identity</td>
<td>UE identity included to facilitate contention resolution by lower layers.</td>
</tr>
</tbody>
</table>

---

**RRCConectionResume-NB**

The **RRCConectionResume-NB** message is used to resume the suspended RRC connection.

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: E-UTRAN to UE

### RRCConectionResume-NB message

```asn1
RRCConectionResume-NB ::= SEQUENCE {
    rrc-TransactionIdentifier   RRC-TransactionIdentifier,
    criticalExtensions     CHOICE {
        c 1          CHOICE {        
            rrcConnectionResume-r13    RRCConnectionResume-NB-r13-IEs,
            spare1          NULL        
        },
        criticalExtensionsFuture   SEQUENCE {}      
    }
}

RRCConectionResume-NB-r13-IEs ::= SEQUENCE {
    radioResourceConfigDedicated-r13  RadioResourceConfigDedicated-NB-r13 OPTIONAL, -- Need ON
    nextHopChainingCount-r13        NextHopChainingCount,
    drb-ContinueROHC-r13          ENUMERATED {true} OPTIONAL, -- Need OP
    lateNonCriticalExtension     OCTET STRING OPTIONAL,
    nonCriticalExtension     SEQUENCE {} OPTIONAL
}
```
### RRCConnectionResume-NB field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>drb-ContinueROHC</strong></td>
<td>This field indicates whether to continue or reset the header compression protocol context for the DRBs configured with the header compression protocol. Presence of the field indicates that the header compression protocol context continues while absence indicates that the header compression protocol context is reset.</td>
</tr>
</tbody>
</table>

---

## RRCConnectionResumeComplete-NB

The **RRCConnectionResumeComplete-NB** message is used to confirm the successful completion of an RRC connection resumption.

- Signalling radio bearer: SRB1
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: UE to E-UTRAN

### RRCConnectionResumeComplete-NB message

```asn1
RRCConnectionResumeComplete-NB ::= SEQUENCE {
  rrc-TransactionIdentifier    RRC-TransactionIdentifier,
  criticalExtensions       CHOICE {
    rrcConnectionResumeComplete-r13    RRCConnectionResumeComplete-NB-r13-IEs,
    criticalExtensionsFuture     SEQUENCE {}  
  }
}

RRCConnectionResumeComplete-NB-r13-IEs ::= SEQUENCE {
  selectedPLMN-Identity-r13     INTEGER (1..maxPLMN-r11) OPTIONAL,
  dedicatedInfoNAS-r13      DedicatedInfoNAS OPTIONAL,
  lateNonCriticalExtension     OCTET STRING     OPTIONAL,
  nonCriticalExtension      SEQUENCE {}      OPTIONAL
}
```

---

---
RRCConnectionResumeComplete-NB field descriptions

<table>
<thead>
<tr>
<th>selectedPLMN-Identity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index of the PLMN selected by the UE from the plmn-IdentityList included in SystemInformationBlockType1-NB. 1 if the 1st PLMN is selected from the plmn-IdentityList included in SIB1-NB, 2 if the 2nd PLMN is selected from the plmn-IdentityList included in SIB1-NB and so on.</td>
</tr>
</tbody>
</table>

RRCConnectionResumeRequest-NB

The RRCConnectionResumeRequest-NB message is used to request the resumption of a suspended RRC connection.

- Signalling radio bearer: SRB0
- RLC-SAP: TM
- Logical channel: CCCH
- Direction: UE to E-UTRAN

RRCConnectionResumeRequest-NB message

--- ASN1START

RRCConnectionResumeRequest-NB ::= SEQUENCE {
  criticalExtensions             CHOICE {
    rrcConnectionResumeRequest-r13 RRCConnectionResumeRequest-NB-r13-IEs,
    criticalExtensionsFuture      SEQUENCE {}  
  },
}

RRCConnectionResumeRequest-NB-r13-IEs ::= SEQUENCE {
  resumeID-r13        ResumeIdentity-r13,
  shortResumeMAC-I-r13       ShortMAC-I,
  resumeCause-r13        EstablishmentCause-NB-r13,
  spare          BIT STRING (SIZE (9))
}

--- ASN1STOP

RRCConnectionResumeRequest-NB field descriptions

<table>
<thead>
<tr>
<th>resumeCause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides the resume cause for the RRC connection resume request as provided by the upper layers. eNB is not expected to reject a RRCConnectionResumeRequest due to unknown cause value being used by the UE.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>resumeID</th>
</tr>
</thead>
<tbody>
<tr>
<td>UE identity to facilitate UE context retrieval at eNB.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>shortResumeMAC-I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authentication token to facilitate UE authentication at eNB.</td>
</tr>
</tbody>
</table>
The **RRCConnectionSetup-NB** message is used to establish SRB1 and SRB1bis.

- **Signalling radio bearer:** SRB0
- **RLC-SAP:** TM
- **Logical channel:** CCCH
- **Direction:** E-UTRAN to UE

### RRCConnectionSetup-NB message

```asn1
RRCConnectionSetup-NB ::= SEQUENCE {
    rrc-TransactionIdentifier   RRC-TransactionIdentifier,
    criticalExtensions     CHOICE {
        c1          CHOICE {
            rrcConnectionSetup-r13    RRCConnectionSetup-NB-r13-IEs,
            spare1 NULL
        },
        criticalExtensionsFuture   SEQUENCE {}
    }
}

RRCConnectionSetup-NB-r13-IEs ::= SEQUENCE {
    radioResourceConfigDedicated-r13  RadioResourceConfigDedicated-NB-r13,
    lateNonCriticalExtension    OCTET STRING      OPTIONAL,
    nonCriticalExtension     SEQUENCE {}       OPTIONAL
}
```

### RRCConnectionSetupComplete-NB

The **RRCConnectionSetupComplete-NB** message is used to confirm the successful completion of an RRC connection establishment.
Signalling radio bearer: SRB1bis
RLC-SAP: AM
Logical channel: DCCH
Direction: UE to E-UTRAN

**RRCConnectionSetupComplete-NB message**

```asn1
RRCConnectionSetupComplete-NB ::= SEQUENCE {
  rrc-TransactionIdentifier     RRC-TransactionIdentifier,
  criticalExtensions      CHOICE{
    rrcConnectionSetupComplete-r13  RRCConnectionSetupComplete-NB-r13-IEs,
    criticalExtensionsFuture   SEQUENCE { }
  }
}

RRCConnectionSetupComplete-NB-r13-IEs ::= SEQUENCE {
  selectedPLMN-Identity-r13    INTEGER (1..maxPLMN-r11),
  s-TMSI-r13        S-TMSI       OPTIONAL,
  registeredMME-r13      RegisteredMME     OPTIONAL,
  dedicatedInfoNAS-r13     DedicatedInfoNAS,
  attachWithoutPDN-Connectivity-r13  ENUMERATED {true}    OPTIONAL,
  up-CIoT-EPS-Optimisation-r13    ENUMERATED {true}     OPTIONAL,
  lateNonCriticalExtension    OCTET STRING     OPTIONAL,
  nonCriticalExtension     SEQUENCE { }      OPTIONAL
}
```

---

**ASN1STOP**
**attachWithoutPDN-Connectivity**
This field is used to indicate that the UE performs an Attach without PDN connectivity procedure, as indicated by the upper layers, TS 24.301 [35].

**registeredMME**
This field is used to transfer the GUMMEI of the MME where the UE is registered, as provided by upper layers.

**selectedPLMN-Identity**
Index of the PLMN selected by the UE from the plmn-IdentityList included in SystemInformationBlockType1-NB. 1 if the 1st PLMN is selected from the plmn-IdentityList included in SIB1, 2 if the 2nd PLMN is selected from the plmn-IdentityList included in SIB1 and so on.

**up-CIoT-EPS-Optimisation**
This field is included when the UE establishes the connection with cause mo-signalling and the UE supports the User plane CIoT EPS Optimisation, see TS 24.301 [35].

---

**SystemInformation-NB**

The `SystemInformation-NB` message is used to convey one or more System Information Blocks. All the SIBs included are transmitted with the same periodicity.

- Signalling radio bearer: N/A
- RLC-SAP: TM
- Logical channel: BCCH
- Direction: E-UTRAN to UE

**SystemInformation-NB message**

```asn1
SystemInformation-NB ::= SEQUENCE {
    criticalExtensions CHOICE {
        systemInformation-r13 SystemInformation-NB-r13-IEs,
        criticalExtensionsFuture SEQUENCE {}
    }
    lateNonCriticalExtension OCTET STRING OPTIONAL,
}

SystemInformation-NB-r13-IEs ::= SEQUENCE {
    sib-TypeAndInfo-r13 SEQUENCE (SIZE (1..maxSIB)) OF CHOICE {
        sib2-r13 SystemInformationBlockType2-NB-r13,
        sib3-r13 SystemInformationBlockType3-NB-r13,
        sib4-r13 SystemInformationBlockType4-NB-r13,
        sib5-r13 SystemInformationBlockType5-NB-r13,
        sib14-r13 SystemInformationBlockType14-NB-r13,
        sib16-r13 SystemInformationBlockType16-NB-r13,
        ...
    },
    lateNonCriticalExtension OCTET STRING OPTIONAL,
}
```
nonCriticalExtension  SEQUENCE {}  OPTIONAL

SystemInformationBlockType1-NB

The SystemInformationBlockType1-NB message contains information relevant when evaluating if a UE is allowed to access a cell and defines the scheduling of other system information.

Signalling radio bearer: N/A
RLC-SAP: TM
Logical channel: BCCH
Direction: E-UTRAN to UE

SystemInformationBlockType1-NB message

SystemInformationBlockType1-NB ::= SEQUENCE {
  hyperSFN-MSB-r13  BIT STRING (SIZE (8)),
  cellAccessRelatedInfo-r13  SEQUENCE {
    plmn-IdentityList-r13  PLMN-IdentityList-NB-r13,
    trackingAreaCode-r13  TrackingAreaCode,
    cellIdentity-r13  CellIdentity,
    cellBarred-r13  ENUMERATED {barred, notBarred},
    intraFreqReselection-r13  ENUMERATED {allowed, notAllowed}
  },
  cellSelectionInfo-r13  SEQUENCE {
    q-RxLevMin-r13  Q-RxLevMin,
    q-QualMin-r13  Q-QualMin-r9
  },
  p-Max-r13  P-Max  OPTIONAL, -- Need OP
  freqBandIndicator-r13  FreqBandIndicator-NB-r13,
  freqBandInfo-r13  NS-PmaxList-NB-r13  OPTIONAL, -- Need OR
  multiBandInfoList-r13  MultiBandInfoList-NB-r13  OPTIONAL, -- Need OR
  downlinkBitmap-r13  DL-Bitmap-NB-r13  OPTIONAL, -- Need OP,
  eutraControlRegionSize-r13  ENUMERATED {n1, n2, n3}  OPTIONAL, -- Cond inband
  nrs-CRS-PowerOffset-r13  ENUMERATED {dB-6, dB-4.77, dB-3,}
dB-1.77, dB0, dB1,
dB1.23, dB2, dB3,
dB4, dB4.23, dB5,
dB6, dB7, dB8,
dB9} OPTIONAL, -- Cond inband-SamePCI

schedulingInfoList-r13 SchedulingInfoList-NB-r13,
si-WindowLength-r13 ENUMERATED {ms160, ms320, ms480, ms640,
ms960, ms1280, ms1600, spare1},
si-RadioFrameOffset-r13 INTEGER (1..15)
OPTIONAL, -- Need OP

systemInfoValueTagList-r13 SystemInfoValueTagList-NB-r13 OPTIONAL, -- Need OR

lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension SEQUENCE {} OPTIONAL

}

PLMN-IdentityList-NB-r13 ::= SEQUENCE (SIZE (1..maxPLMN-r11)) OF PLMN-IdentityInfo-NB-r13

PLMN-IdentityInfo-NB-r13 ::= SEQUENCE {

plmn-Identity-r13 PLMN-Identity,
cellReservedForOperatorUse-r13 ENUMERATED {reserved, notReserved},
attachWithoutPDN-Connectivity-r13 ENUMERATED {true} OPTIONAL -- Need OP

}

SchedulingInfoList-NB-r13 ::= SEQUENCE (SIZE (1..maxSI-Message-NB-r13)) OF SchedulingInfo-NB-r13

SchedulingInfo-NB-r13::= SEQUENCE {

si-Periodicity-r13 ENUMERATED {rf64, rf128, rf256, rf512,
rf1024, rf2048, rf4096, spare},

si-RepetitionPattern-r13 ENUMERATED {every2ndRF,
every4thRF,
every8thRF, every16thRF},
sib-MappingInfo-r13 SIB-MappingInfo-NB-r13,

si-TB-r13 ENUMERATED {b56, b120, b208, b256, b328, b440, b552, b680}

}

SystemInfoValueTagList-NB-r13 ::= SEQUENCE (SIZE (1.. maxSI-Message-NB-r13)) OF
SystemInfoValueTagSI-r13

SIB-MappingInfo-NB-r13 ::= SEQUENCE (SIZE (0..maxSIB-1)) OF SIB-Type-NB-r13

SIB-Type-NB-r13 ::= ENUMERATED {
  sibType3-NB-r13, sibType4-NB-r13, sibType5-NB-r13,
  sibType14-NB-r13, sibType16-NB-r13, spare3, spare2, spare1
}

-- ASN1STOP
<table>
<thead>
<tr>
<th><strong>SystemInformationBlockType1-NB field descriptions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>attachWithoutPDN-Connectivity</strong></td>
</tr>
<tr>
<td>If present, the field indicates that attach without PDN connectivity as specified in TS 24.301 [35] is supported for this PLMN.</td>
</tr>
<tr>
<td><strong>cellBarred</strong></td>
</tr>
<tr>
<td>Barred means the cell is barred, as defined in TS 36.304 [4].</td>
</tr>
<tr>
<td><strong>cellIdentity</strong></td>
</tr>
<tr>
<td>Indicates the cell identity.</td>
</tr>
<tr>
<td><strong>cellReservedForOperatorUse</strong></td>
</tr>
<tr>
<td>As defined in TS 36.304 [4].</td>
</tr>
<tr>
<td><strong>cellSelectionInfo</strong></td>
</tr>
<tr>
<td>Cell selection information as specified in TS 36.304 [4].</td>
</tr>
<tr>
<td><strong>downlinkBitmap</strong></td>
</tr>
<tr>
<td>NB-IoT downlink subframe configuration for downlink transmission. If the bitmap is not present, the UE shall assume that all subframes are valid (except for subframes carrying NPSS/NSSS/NPBCH/SIB1-NB) as specified in TS 36.213 [23, 16.4].</td>
</tr>
<tr>
<td><strong>eutraControlRegionSize</strong></td>
</tr>
<tr>
<td>Indicates the control region size of the E-UTRA cell for the in-band operation mode, see TS 36.213 [23]. Unit is in number of OFDM symbols.</td>
</tr>
<tr>
<td><strong>freqBandIndicator</strong></td>
</tr>
<tr>
<td>A list of as defined in TS 36.101 [42, table 6.2.4-1] for the frequency band in freqBandIndicator.</td>
</tr>
<tr>
<td><strong>freqBandInfo</strong></td>
</tr>
<tr>
<td>A list of additionalPmax and additionalSpectrumEmission values as defined in TS 36.101 [42, table 6.2.4-1] for the frequency band in freqBandIndicator.</td>
</tr>
<tr>
<td><strong>hyperSFN-MSB</strong></td>
</tr>
<tr>
<td>Indicates the 8 most significant bits of hyper-SFN. Together with hyperSFN-LSB in MIB-NB, the complete hyper-SFN is built up. hyper-SFN is incremented by one when the SFN wraps around.</td>
</tr>
<tr>
<td><strong>intraFreqReselection</strong></td>
</tr>
<tr>
<td>Used to control cell reselection to intra-frequency cells when the highest ranked cell is barred, or treated as barred by the UE, as specified in TS 36.304 [4].</td>
</tr>
<tr>
<td><strong>multiBandInfoList</strong></td>
</tr>
<tr>
<td>A list of additional frequency band indicators, additionalPmax and additionalSpectrumEmission values, as defined in TS 36.101 [42, table 5.5-1]. If the UE supports the frequency band in the freqBandIndicator IE it shall apply that frequency band. Otherwise, the UE shall apply the first listed band which it supports in the multiBandInfoList IE.</td>
</tr>
<tr>
<td><strong>nrs-CRS-PowerOffset</strong></td>
</tr>
<tr>
<td>NRS power offset between NRS and E-UTRA CRS, see TS 36.213 [23, 16.2.2]. Unit in dB. Default value of 0.</td>
</tr>
<tr>
<td><strong>plmn-IdentityList</strong></td>
</tr>
<tr>
<td>List of PLMN identities. The first listed PLMN-Identity is the primary PLMN.</td>
</tr>
<tr>
<td><strong>p-Max</strong></td>
</tr>
<tr>
<td>Value applicable for the cell. If absent the UE applies the maximum power according to the UE capability.</td>
</tr>
<tr>
<td><strong>q-QualMin</strong></td>
</tr>
<tr>
<td>Parameter 'Qqualmin' in TS 36.304 [4].</td>
</tr>
<tr>
<td><strong>q-RxLevMin</strong></td>
</tr>
<tr>
<td>Parameter Qrxlevmin in TS 36.304 [4]. Actual value Qrxlevmin = IE value * 2 [dB].</td>
</tr>
<tr>
<td><strong>schedulingInfoList</strong></td>
</tr>
<tr>
<td>Indicates additional scheduling information of SI messages.</td>
</tr>
<tr>
<td><strong>si-Periodicity</strong></td>
</tr>
<tr>
<td>Periodicity of the SI-message in radio frames, such that rf256 denotes 256 radio frames, rf512 denotes 512 radio frames, and so on.</td>
</tr>
<tr>
<td><strong>si-RadiusFrameOffset</strong></td>
</tr>
<tr>
<td>Offset in number of radio frames to calculate the start of the SI window. If the field is absent, no offset is applied.</td>
</tr>
<tr>
<td><strong>si-RepetitionPattern</strong></td>
</tr>
<tr>
<td>Indicates the starting radio frames within the SI window used for SI message transmission. Value every2ndRF corresponds to every second radio frame, value every4thRF corresponds to every fourth radio frame and so on starting from the first radio frame of the SI window used for SI transmission.</td>
</tr>
<tr>
<td><strong>si-TB</strong></td>
</tr>
<tr>
<td>This field indicates the transport block size in number of bits and the corresponding number of consecutive NB-IoT downlink subframes that are used to broadcast the SI message. Value b56 corresponds to 56 bits, b120 corresponds to 120 bits and so on. TBS of 56 bits and 120 bits are transmitted over 2 sub-frames, other TBS are transmitted over 8 sub-frames, see TS 36.213 [23, Table 16.4.1.5.1-1].</td>
</tr>
<tr>
<td><strong>si-WindowLength</strong></td>
</tr>
<tr>
<td>Common SI scheduling window for all SIs. Unit in milliseconds, where ms160 denotes 160 milliseconds, ms320 denotes 320 milliseconds and so on.</td>
</tr>
<tr>
<td><strong>sib-MappingInfo</strong></td>
</tr>
<tr>
<td>List of the SIBs mapped to this SystemInformation message. There is no mapping information of SIB2-NB; it is always present in the first SystemInformation message listed in the schedulingInfoList list.</td>
</tr>
</tbody>
</table>
**SystemInformationBlockType1-NB field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>systemInfoValueTagList</td>
<td>Indicates SI message specific value tags. It includes the same number of entries, and listed in the same order, as in SchedulingInfoList.</td>
</tr>
<tr>
<td>systemInfoValueTagSI</td>
<td>SI message specific value tag as specified in Clause 5.2.1.3. Common for all SIBs within the SI message other than SIB14-NB.</td>
</tr>
<tr>
<td>trackingAreaCode</td>
<td>A trackingAreaCode that is common for all the PLMNs listed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>inband</td>
<td>The field is mandatory present if IE operationModeInfo in MIB-NB is set to inband-SamePCI or inband-DifferentPCI. Otherwise the field is not present.</td>
</tr>
<tr>
<td>inband-SamePCI</td>
<td>The field is mandatory present, if IE operationModeInfo in MIB-NB is set to inband-SamePCI. Otherwise the field is not present.</td>
</tr>
</tbody>
</table>

---

**UECapabilityEnquiry-NB**

The *UECapabilityEnquiry-NB* message is used to request the transfer of UE radio access capabilities for NB-IoT.

- Signalling radio bearer: SRB1 or SRB1bis
- RLC-SAP: AM
- Logical channel: DCCH
- Direction: E-UTRAN to UE

**UECapabilityEnquiry-NB message**

```asn1
UECapabilityEnquiry-NB ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c 1          C H O I C E  {
      ueCapabilityEnquiry-r13    UECapabilityEnquiry-NB-r13-IEs,
      spare1          NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }.
}

UECapabilityEnquiry-NB-r13-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING      OPTIONAL,
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}
```
The UECapabilityInformation-NB message is used to transfer of UE radio access capabilities requested by the E-UTRAN.

Signalling radio bearer: SRB1 or SRB1bis
RLC-SAP: AM
Logical channel: DCCH
Direction: UE to E-UTRAN

**UECapabilityInformation-NB message**

```asn1
UECapabilityInformation-NB ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE{
    ueCapabilityInformation-r13  UECapabilityInformation-NB-r13-IEs,
    criticalExtensionsFuture  SEQUENCE {} 
  }
}

UECapabilityInformation-NB-r13-IEs ::= SEQUENCE {
  ue-Capability-Container-r13    UE-Capability-NB-r13,
  ue-RadioPagingInfo-r13     UE-RadioPagingInfo-NB-r13,
  lateNonCriticalExtension    OCTET STRING      OPTIONAL,
  nonCriticalExtension     SEQUENCE {}       OPTIONAL
}
```

**UECapabilityInformation-NB field descriptions**

CAUTION

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ue-RadioPagingInfo</strong></td>
<td>This field contains UE capability information used for paging.</td>
</tr>
</tbody>
</table>

The ULInformationTransfer-NB message is used for the uplink transfer of NAS information.
Signalling radio bearer: SRB1 or SRB1bis
RLC-SAP: AM
Logical channel: DCCH
Direction: UE to E-UTRAN

**ULInformationTransfer-NB message**

```asn1
ULInformationTransfer-NB ::= SEQUENCE {
criticalExtensions CHOICE {
  ulInformationTransfer-r13 ULInformationTransfer-NB-r13-IEs,
  criticalExtensionsFuture SEQUENCE {}
}
}

ULInformationTransfer-NB-r13-IEs ::= SEQUENCE {
dedicatedInfoNAS-r13 DedicatedInfoNAS,
lateNonCriticalExtension OCTET STRING OPTIONAL,
nonCriticalExtension SEQUENCE {} OPTIONAL
}
```

---

### 6.7.3 NB-IoT information elements

#### 6.7.3.1 NB-IoT System information blocks

- **SystemInformationBlockType2-NB**

The IE `SystemInformationBlockType2-NB` contains radio resource configuration information that is common for all UEs.

**NOTE:** UE timers and constants related to functionality for which parameters are provided in another SIB are included in the corresponding SIB.

**SystemInformationBlockType2-NB information element**

```asn1
SystemInformationBlockType2-NB-r13 ::= SEQUENCE {
  radioResourceConfigCommon-r13 RadioResourceConfigCommonSIB-NB-r13,
}
SystemInformationBlockType2-NB field descriptions

**additionalSpectrumEmission**
The UE requirements related to IE `AdditionalSpectrumEmission` are defined in TS 36.101 [42, table 6.2.4.1].

**multiBandInfoList**
A list of `additionalSpectrumEmission` i.e. one for each additional frequency band included in `multiBandInfoList` in `SystemInformationBlockType1-NB`, listed in the same order.

**ul-CarrierFreq**
If absent, the (default) value determined from the default TX-RX frequency separation defined in TS 36.101 [42, table 5.7.3-1] applies.

---

**SystemInformationBlockType3-NB**
The IE `SystemInformationBlockType3-NB` contains cell re-selection information common for intra-frequency, and inter-frequency cell re-selection as well as intra-frequency cell re-selection information other than neighbouring cell related.

**SystemInformationBlockType3-NB information element**

-- ASN1START

```asn1
SystemInformationBlockType3-NB-r13 ::= SEQUENCE {
  cellReselectionInfoCommon-r13  SEQUENCE {
    q-Hyst-r13  ENUMERATED {
      dB0, dB1, dB2, dB3, dB4, dB5, dB6, dB8, dB10,
      dB12, dB14, dB16, dB18, dB20, dB22, dB24
    }
  },
  cellReselectionServingFreqInfo-r13  SEQUENCE {
    s-NonIntraSearch-r13 ReselectionThreshold
  }
}
```

-- ASN1STOP
SystemInformationBlockType3-NB field descriptions

<table>
<thead>
<tr>
<th>Field name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>multiBandInfoList</td>
<td>A list of additionalPmax and additionalSpectrumEmission values as defined in TS 36.101 [42, table 6.2.4-1] applicable for the intra-frequency neighbouring NB-IoT cells if the UE selects the frequency band from freqBandIndicator in SystemInformationBlockType1-NB.</td>
</tr>
<tr>
<td>p-Max</td>
<td>Value applicable for the intra-frequency neighbouring E-UTRA cells. If absent the UE applies the maximum power according to the UE capability.</td>
</tr>
<tr>
<td>q-Hyst</td>
<td>Parameter Q_hyst in 36.304 [4], Value in dB. Value dB1 corresponds to 1 dB, dB2 corresponds to 2 dB and so on.</td>
</tr>
<tr>
<td>q-QualMin</td>
<td>Parameter 'Qqualmin' in TS 36.304 [4], applicable for intra-frequency neighbour cells. If the field is not present, the UE applies the (default) value of negative infinity for Qqualmin.</td>
</tr>
<tr>
<td>q-RxLevMin</td>
<td>Parameter 'Qrxlevmin' in TS 36.304 [4], applicable for intra-frequency neighbour cells.</td>
</tr>
<tr>
<td>s-IntraSearchP</td>
<td>Parameter 'sIntraSearchP' in TS 36.304 [4].</td>
</tr>
<tr>
<td>s-NonIntraSearch</td>
<td>Parameter 'sNonIntraSearch' in TS 36.304 [4].</td>
</tr>
<tr>
<td>t-Reselection</td>
<td>Parameter 'tReselectionNB-IoT_Intra' in TS 36.304 [4].</td>
</tr>
</tbody>
</table>

---

SystemInformationBlockType4-NB

The IE SystemInformationBlockType4-NB contains neighbouring cell related information relevant only for intra-frequency cell re-selection. The IE includes cells with specific re-selection parameters.

SystemInformationBlockType4-NB information element

---

ASN1START
SystemInformationBlockType4-NB-r13 ::= SEQUENCE {
  intraFreqNeighCellList-r13   IntraFreqNeighCellList OPTIONAL, -- Need OR
  intraFreqBlackCellList-r13   IntraFreqBlackCellList OPTIONAL, -- Need OR
  lateNonCriticalExtension     OCTET STRING     OPTIONAL,
  ...
}

-- ASN1STOP

<table>
<thead>
<tr>
<th><strong>SystemInformationBlockType4-NB field descriptions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>intraFreqBlackCellList</strong></td>
</tr>
<tr>
<td><strong>intraFreqNeighCellList</strong></td>
</tr>
</tbody>
</table>

SystemInformationBlockType5-NB

The IE SystemInformationBlockType5-NB contains information relevant only for inter-frequency cell re-selection i.e. information about other NB-IoT frequencies and inter-frequency neighbouring cells relevant for cell re-selection. The IE includes cell re-selection parameters common for a frequency.

**SystemInformationBlockType5-NB information element**

SystemInformationBlockType5-NB-r13 ::= SEQUENCE {
  interFreqCarrierFreqList-r13   InterFreqCarrierFreqList-NB-r13,
  t-Reselection-r13      T-Reselection-NB-r13,
  lateNonCriticalExtension    OCTET STRING     OPTIONAL,
  ...
}

InterFreqCarrierFreqList-NB-r13 ::= SEQUENCE (SIZE (1..maxFreq)) OF InterFreqCarrierFreqInfo-NB-r13

InterFreqCarrierFreqInfo-NB-r13 ::= SEQUENCE {
  dl-CarrierFreq-r13     CarrierFreq-NB-r13,
  q-RxLevMin-r13       Q-RxLevMin,
}
SystemInformationBlockType5-NB field descriptions

**p-Max**  
Value applicable for the neighbouring NB-IoT cells on this carrier frequency. If absent the UE applies the maximum power according to the UE capability.

**interFreqBlackCellList**  
List of blacklisted inter-frequency neighbouring cells.

**interFreqCarrierFreqList**  
List of neighbouring inter-frequencies. E-UTRAN does not configure more than one entry for the same physical frequency regardless of the E-ARFCN used to indicate this.

**interFreqNeighCellList**  
List of inter-frequency neighbouring cells.

**multiBandInfoList**  
Indicates the list of frequency bands, with the associated additionalPmax and additionalSpectrumEmission values as defined in TS 36.101 [42, table 6.2.4-1], in addition to the band represented by dl-CarrierFreq for which cell reselection parameters are common.

**q-OffsetFreq**  
Parameter ‘Qoffsetfrequency’ in TS 36.304 [4].

**q-QualMin**  
Parameter ‘Qqualmin’ in TS 36.304 [4]. If the field is not present, the UE applies the (default) value of negative infinity for Qqualmin.

**q-RxlevMin**  
Parameter ‘QRxLevmin’ in TS 36.304 [4].

**t-Reselection**  
Parameter ‘TreselectionNB_IoT_Inter’ in TS 36.304 [4].

-- SystemInformationBlockType14-NB

The IE SystemInformationBlockType14-NB contains the AB parameters.

**SystemInformationBlockType14-NB information element**

-- ASN1START
SystemInformationBlockType14-NB-r13 ::= SEQUENCE {
  ab-Param-r13  CHOICE {
    ab-Common-r13     AB-Config-NB-r13,
    ab-PerPLMN-List-r13    SEQUENCE (SIZE (1..maxPLMN-r11)) OF AB-ConfigPLMN-NB-r13
  } OPTIONAL, -- Need OR
  lateNonCriticalExtension  OCTET STRING    OPTIONAL,
  ...
}

AB-ConfigPLMN-NB-r13 ::= SEQUENCE {
  ab-Config-r13     AB-Config-NB-r13   OPTIONAL -- Need OR
}

AB-Config-NB-r13 ::=  SEQUENCE {
  ab-Category-r13     ENUMERATED {a, b, c},
  ab-BarringBitmap-r13   BIT STRING (SIZE(10)),
  ab-BarringExceptionData-r13  ENUMERATED {true}   OPTIONAL, -- Need OP
  ab-BarringForSpecialAC-r13  BIT STRING (SIZE(5))
}

-- ASN1STOP

<table>
<thead>
<tr>
<th><strong>SystemInformationBlockType14-NB field descriptions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ab-BarringBitmap</strong></td>
</tr>
<tr>
<td><strong>ab-BarringExceptionData</strong></td>
</tr>
<tr>
<td><strong>ab-BarringForSpecialAC</strong></td>
</tr>
<tr>
<td><strong>ab-Category</strong></td>
</tr>
<tr>
<td><strong>ab-Common</strong></td>
</tr>
<tr>
<td><strong>ab-PerPLMN-List</strong></td>
</tr>
</tbody>
</table>
– SystemInformationBlockType16-NB

The IE SystemInformationBlockType16-NB contains information related to GPS time and Coordinated Universal Time (UTC). The UE may use the parameters provided in this system information block to obtain the UTC, the GPS and the local time.

-- ASN1START

SystemInformationBlockType16-NB-r13 ::= SystemInformationBlockType16-r11

-- ASN1STOP

6.7.3.2 NB-IoT Radio resource control information elements

– CarrierConfigDedicated-NB

The IE CarrierConfigDedicated-NB is used to specify a non-anchor carrier in NB-IoT.

CarrierConfigDedicated-NB information elements

-- ASN1START

CarrierConfigDedicated-NB-r13 ::= SEQUENCE {
  dl-CarrierConfig-r13  DL-CarrierConfigDedicated-NB-r13,
  ul-CarrierConfig-r13  UL-CarrierConfigDedicated-NB-r13
}

DL-CarrierConfigDedicated-NB-r13 ::= SEQUENCE {
  dl-CarrierFreq-r13      CarrierFreq-NB-r13,
  downlinkBitmapNonAnchor-r13    CHOICE {
    useNoBitmap-r13       NULL,
    useAnchorBitmap-r13      NULL,
    explicitBitmapConfiguration-r13   DL-Bitmap-NB-r13,
    spare          NULL
  }  OPTIONAL,  -- Need ON
  dl-GapNonAnchor-r13      CHOICE {
    useNoGap-r13       NULL,
    useAnchorGapConfig-r13     NULL,
    explicitGapConfiguration-r13   DL-GapConfig-NB-r13,
    spare          NULL
  }  OPTIONAL,  -- Need ON
}

ETSI
inbandCarrierInfo-r13  SEQUENCE {
  samePCI-Indicator-r13  CHOICE {
    samePCI-r13  SEQUENCE {
      indexToMidPRB-r13  INTEGER (-55..54)
    },
    differentPCI-r13  SEQUENCE {
      eutra-NumCRS-Ports-r13  ENUMERATED {same, four}
    }
  }
  OPTIONAL,  -- Cond anchor-guardband
  eutraControlRegionSize-r13  ENUMERATED {n1, n2, n3}
}  OPTIONAL,  -- Cond non-anchor-inband
...
[[ nrs-PowerOffsetNonAnchor-v1330  ENUMERATED {dB-12, dB-10, dB-8, dB-6,
                                           dB-4, dB-2, dB0, dB3}
  OPTIONAL  -- Need ON
]]
}

UL-CarrierConfigDedicated-NB-r13 ::= SEQUENCE {
  ul-CarrierFreq-r13  CarrierFreq-NB-r13  OPTIONAL,  -- Need OP
  ...
}

-- ASN1STOP
**CarrierConfigDedicated-NB field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>dl-CarrierConfig</strong></td>
<td>Downlink non-anchor carrier used for all unicast transmissions.</td>
</tr>
<tr>
<td><strong>dl-CarrierFreq</strong></td>
<td>DL carrier frequency. The downlink carrier is not in a E-UTRA PRB which contains E-UTRA PSS/SSS/PBCH.</td>
</tr>
<tr>
<td><strong>dl-GapNonAnchor</strong></td>
<td>Downlink transmission gap configuration for the non-anchor carrier, see TS 36.211 [21, 10.2.3.4].</td>
</tr>
<tr>
<td><strong>downlinkBitmapNonAnchor</strong></td>
<td>NB-IoT downlink subframe configuration for downlink transmission on the non-anchor carrier. See TS 36.213 [23, 16.4].</td>
</tr>
</tbody>
</table>

**eutraControlRegionSize**
Indicates the control region size of the E-UTRA cell for the in-band operation mode, see TS 36.213 [23]. Unit is in number of OFDM symbols. If operationModeInfo in MIB-NB is set to inband-SamePCI or inband-DifferentPCI, it should be set to the value broadcast in SIB1-NB.

**eutra-NumCRS-Ports**
Number of E-UTRA CRS antenna ports, either the same number of ports as NRS or 4 antenna ports. See TS 36.211 [21], TS 36.212 [22], and TS 36.213 [23].

**inbandCarrierInfo**
Provides the configuration of a non-anchor inband carrier. If absent, the configuration of the anchor carrier applies.

**indexToMidPRB**
The PRB index is signaled by offset from the middle of the EUTRA system.

**nrs-PowerOffsetNonAnchor**
Provides the downlink narrowband reference-signal EPRE offset of the non-anchor carrier relative to the downlink narrowband reference-signal EPRE of the anchor carrier, unit in dB. Value dB-12 corresponds to -12 dB, dB-10 corresponds to -10 dB and so on. See TS 36.213 [23, 16.2.2].

**samePCI-Indicator**
This parameter specifies whether the non-anchor carrier reuses the same PCI as the EUTRA carrier.

**ul-CarrierConfig**
Uplink non-anchor carrier used for all unicast transmissions.

**ul-CarrierFreq**
UL carrier frequency if absent, the same TX-RX frequency separation as for the anchor carrier applies.

### Conditional presence

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>non-anchor-inband</td>
<td>The field is optionally present, need OP, if the non-anchor carrier is an inband carrier; otherwise it is not present.</td>
</tr>
<tr>
<td>anchor-guardband</td>
<td>The field is mandatory present, if operationModeInfo is set to guardband in the MIB; otherwise it is not present.</td>
</tr>
</tbody>
</table>

---

**CarrierFreq-NB**

The IE CarrierFreq-NB is used to provide the NB-IoT carrier frequency, as defined in TS 36.101 [42]

**CarrierFreq-NB information elements**

```asn1
CarrierFreq-NB-r13 ::= SEQUENCE {
  carrierFreq-r13 ARFCN-ValueEUTRA-r9,
  carrierFreqOffset-r13 ENUMERATED {
    v-10, v-9, v-8, v-7, v-6, v-5, v-4, v-3, v-2, v-1, v-0dot5,
    v0, v1, v2, v3, v4, v5, v6, v7, v8, v9
  } OPTIONAL -- Need ON
}
```

---

ETSI
CarrierFreq-NB field descriptions

<table>
<thead>
<tr>
<th>carrierFreq</th>
<th>provides the ARFCN applicable for the NB-IoT carrier frequency as defined in TS 36.101 [42, Table 5.7.3-1].</th>
</tr>
</thead>
<tbody>
<tr>
<td>carrierFreqOffset</td>
<td>Offset of the NB-IoT channel number to EARFCN as defined in TS 36.101 [42]. Value v-10 means -10, v-9 means -9, and so on.</td>
</tr>
</tbody>
</table>

-- DL-Bitmap-NB

The IE DL-Bitmap-NB is used to specify the set of NB-IoT downlink subframes for downlink transmission.

**DL-Bitmap-NB information element**

-- ASN1START

DL-Bitmap-NB-r13 ::= CHOICE {
  subframePattern10-r13   BIT STRING (SIZE (10)),
  subframePattern40-r13   BIT STRING (SIZE (40))
}

-- ASN1STOP

**DL-Bitmap-NB field descriptions**

subframePattern10, subframePattern40

NB-IoT downlink subframe configuration over 10ms or 40ms for inband and 10ms for standalone/guardband. The first/leftmost bit corresponds to the subframe #0 of the radio frame satisfying SFN mod x = 0, where x is the size of the bit string divided by 10. Value 0 in the bitmap indicates that the corresponding subframe is invalid for downlink transmission. Value 1 in the bitmap indicates that the corresponding subframe is valid for downlink transmission.

-- DL-GapConfig-NB

The IE DL-GapConfig-NB is used to specify the downlink gap configuration for NPDCCH and NPDSCH. Downlink gaps apply to all NPDCCH/NPDSCH transmissions except for BCCH.

**DL-GapConfig-NB information element**

-- ASN1START

DL-GapConfig-NB-r13 ::= SEQUENCE {
  dl-GapThreshold-r13   ENUMERATED {n32, n64, n128, n256},
  dl-GapPeriodicity-r13  ENUMERATED {sf64, sf128, sf256, sf512},
  dl-GapDurationCoeff-r13 ENUMERATED {oneEighth, oneFourth, threeEighth, oneHalf}
}

-- ASN1STOP
DL-GapConfig-NB field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dl-GapDurationCoeff</td>
<td>Coefficient to calculate the gap duration of a DL transmission: dl-GapDurationCoeff * dl-GapPeriodicity. Duration in number of subframes. See TS 36.211 [21, 10.2.3.4].</td>
</tr>
<tr>
<td>dl-GapPeriodicity</td>
<td>Periodicity of a DL transmission gap in number of subframes. See TS 36.211 [21, 10.2.3.4].</td>
</tr>
<tr>
<td>dl-GapThreshold</td>
<td>Threshold on the maximum number of repetitions configured for NPDCCH before application of DL transmission gap configuration. See TS 36.211 [21, 10.2.3.4].</td>
</tr>
</tbody>
</table>

LogicalChannelConfig-NB

The IE LogicalChannelConfig-NB is used to configure the logical channel parameters.

LogicalChannelConfig-NB information element

```asn1
LogicalChannelConfig-NB-r13 ::= SEQUENCE {
  priority-r13      INTEGER (1..16)   OPTIONAL,  -- Cond UL
  logicalChannelSR-Prohibit-r13  BOOLEAN     OPTIONAL,  -- Need ON
  ...
}
```

MAC-MainConfig-NB

The IE MAC-MainConfig-NB is used to specify the MAC main configuration for signalling and data radio bearers.

MAC-MainConfig-NB information element

```asn1
LogicalChannelConfig-NB field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>logicalChannelSR-Prohibit</td>
<td>Value TRUE indicates that the logicalChannelSR-ProhibitTimer is enabled for the logical channel. E-UTRAN only (optionally) configures the field (i.e. indicates value TRUE) if logicalChannelSR-ProhibitTimer is configured. See TS 36.321 [6].</td>
</tr>
<tr>
<td>priority</td>
<td>Logical channel priority in TS 36.321 [6]. Value is an integer.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL</td>
<td>The field is mandatory present for UL logical channels; otherwise it is not present.</td>
</tr>
</tbody>
</table>
MAC-MainConfig-NB-r13 ::= SEQUENCE {
  ul-SCH-Config-r13  SEQUENCE {
    periodicBSR-Timer-r13  PeriodicBSR-Timer-NB-r13  OPTIONAL, -- Need ON
    retxBSR-Timer-r13  RetxBSR-Timer-NB-r13
  }                 OPTIONAL, -- Need ON
  drx-Config-r13  DRX-Config-NB-r13  OPTIONAL, -- Need ON
  timeAlignmentTimerDedicated-r13  TimeAlignmentTimer,
  logicalChannelSR-Config-r13  CHOICE {
    release        NULL,
    setup         SEQUENCE {
      logicalChannelSR-ProhibitTimer-r13  ENUMERATED {
        pp2, pp8, pp32, pp128, pp512,
        pp1024, pp2048, spare
      }
    }
  }                 OPTIONAL, -- Need ON
...
}

PeriodicBSR-Timer-NB-r13 ::= ENUMERATED {
  pp2, pp4, pp8, pp16, pp64, pp128, infinity, spare
}

RetxBSR-Timer-NB-r13 ::= ENUMERATED {
  pp4, pp16, pp64, pp128, pp256, pp512, infinity, spare
}

DRX-Config-NB-r13 ::= CHOICE {
  release        NULL,
  setup         SEQUENCE {
    onDurationTimer-r13  ENUMERATED {
      pp1, pp2, pp3, pp4, pp8, pp16, pp32, spare},
    drx-InactivityTimer-r13  ENUMERATED {
      pp0, pp1, pp2, pp3, pp4, pp8, pp16, pp32},
    drx-RetransmissionTimer-r13  ENUMERATED {
      pp0, pp1, pp2, pp4, pp6, pp8, pp16, pp24,
      pp33, spare7, spare6, spare5,
drx-Cycle-r13

<table>
<thead>
<tr>
<th>ENUMERATED</th>
</tr>
</thead>
<tbody>
<tr>
<td>sf256, sf512, sf1024, sf1536, sf2048, sf3072, sf4096, sf4608, sf6144, sf7680, sf8192, sf9216, spare4, spare3, spare2, spare1</td>
</tr>
</tbody>
</table>

drx-StartOffset-r13

INTEGER (0..255),

drx-ULRetransmissionTimer-r13

ENUMERATED {
  pp0, pp1, pp2, pp4, pp6, pp8, pp16, pp24,
  pp33, pp40, pp64, pp80, pp96,
  pp112, pp128, pp160, pp320
}

-- ASN1STOP

### MAC-MainConfig-NB field descriptions

<table>
<thead>
<tr>
<th><strong>drx-Config</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Used to configure DRX as specified in TS 36.321 [6].</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>drx-Cycle</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>longDRX-Cycle in TS 36.321 [6]. The value of longDRX-Cycle is in number of sub-frames. Value sf256 corresponds to 256 sub-frames, sf512 corresponds to 512 sub-frames and so on.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>drx-StartOffset</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>drxStartOffset in TS 36.321 [6]. Value is in number of sub-frames by step of (drx-cycle / 256).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>drx-InactivityTimer</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Timer for DRX in TS 36.321 [6]. Value in number of PDCCH periods. Value pp0 corresponds to 0 PDCCH period and behaviour as specified in 7.3.2 applies, pp1 corresponds to 1 PDCCH period, pp2 corresponds to 2 PDCCH periods and so on.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>drx-RetransmissionTimer</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Timer for DRX in TS 36.321 [6]. Value in number of PDCCH periods. Value pp0 corresponds to 0 PDCCH period and behaviour as specified in 7.3.2 applies, pp1 corresponds to 1 PDCCH period, pp2 corresponds to 2 PDCCH periods and so on.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>drx-ULRetransmissionTimer</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Timer for DRX in TS 36.321 [6]. Value in number of PDCCH periods. Value pp0 corresponds to 0 PDCCH period and behaviour as specified in 7.3.2 applies, value pp1 corresponds to 1 PDCCH period, pp2 corresponds to 2 PDCCH periods and so on.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>logicalChannelSR-ProhibitTimer</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Timer used to delay the transmission of an SR. See TS 36.321 [6]. Value in number of PDCCH periods. Value pp2 corresponds to 2 PDCCH periods, pp8 corresponds to 8 PDCCH periods and so on.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>periodicBSR-Timer</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Timer for BSR reporting in TS 36.321 [6]. Value in number of PDCCH periods. Value pp2 corresponds to 2 PDCCH periods, pp4 corresponds to 4 PDCCH periods and so on.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>retxBSR-Timer</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Timer for BSR reporting in TS 36.321 [6]. Value in number of PDCCH periods. Value pp4 corresponds to 4 PDCCH periods, pp16 corresponds to 16 PDCCH periods and so on.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>onDurationTimer</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Timer for DRX in TS 36.321 [6]. Value in number of PDCCH periods. Value pp1 corresponds to 1 PDCCH period, pp2 corresponds to 2 PDCCH periods and so on.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>timeAlignmentTimer</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates the value of the time alignment timer, see TS 36.321 [6].</td>
</tr>
</tbody>
</table>
– **NPDCCH-ConfigDedicated-NB**

The IE **NPDCCH-ConfigDedicated-NB** specifies the subframes and resource blocks for NPDCCH monitoring.

**NPDCCH-ConfigDedicated-NB information element**

```asn1
NPDCCH-ConfigDedicated-NB-r13 ::= SEQUENCE {
  npdcch-NumRepetitions-r13    ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128,
                                     r256, r512, r1024, r2048,
                                     spare4, spare3, spare2, spare1},
  npdcch-StartSF-USS-r13    ENUMERATED {v1dot5, v2, v4, v8, v16, v32, v48, v64},
  npdcch-Offset-USS-r13    ENUMERATED {zero, oneEighth, oneFourth, threeEighth}
}
```

**NPDCCH-ConfigDedicated-NB field descriptions**

- **npdcch-NumRepetitions**
  Maximum number of repetitions for NPDCCH UE specific search space (USS), see TS 36.213 [23, 16.6]. UE monitors one set of values (consisting of aggregation level, number of repetitions and number of blind decodes) according to the configured maximum number of repetitions.

- **npdcch-Offset-USS**
  Fractional period offset of starting subframe for NPDCCH UE specific search space (USS), see TS 36.213 [23, 16.6].

- **npdcch-StartSF-USS**
  Starting subframe configuration for an NPDCCH UE-specific search space, see TS 36.213 [23, 16.6]. Value v1dot5 corresponds to 1.5, value 2 corresponds to 2 and so on.

– **NPDSCH-ConfigCommon-NB**

The IE **NPDSCH-ConfigCommon-NB** is used to specify the common NPDSCH configuration.

**NPDSCH-ConfigCommon-NB information element**

```asn1
NPDSCH-ConfigCommon-NB-r13 ::= SEQUENCE {
  nrs-Power-r13     INTEGER (-60..50)
}
```

**NPDSCH-ConfigCommon-NB field descriptions**

- **nrs-Power**
  Maximum transmit power level for NPDSCH, see TS 36.213 [23, 16.6].
**NPDSCH-ConfigCommon-NB field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>nrs-Power</strong></td>
<td>Provides the downlink narrowband reference-signal EPRE, see TS 36.213 [23, 16.2]. The actual value in dBm.</td>
</tr>
</tbody>
</table>

---

**NPRACH-ConfigSIB-NB**

The IE *NPRACH-ConfigSIB-NB* is used to specify the NPRACH configuration in the system information.

**NPRACH-ConfigSIB-NB information elements**

```asn1
NPRACH-ConfigSIB-NB-r13 ::= SEQUENCE {
  nprach-CP-Length-r13 ENUMERATED {us66dot7, us266dot7},
  rsrp-ThresholdsPrachInfoList-r13 RSRP-ThresholdsNPRACH-InfoList-NB-r13 OPTIONAL, -- need OR
  nprach-ParametersList-r13 NPRACH-ParametersList-NB-r13
}

NPRACH-ConfigSIB-NB-v1330 ::= SEQUENCE {
  nprach-ParametersList-v1330 NPRACH-ParametersList-NB-v1330
}

NPRACH-ParametersList-NB-r13 ::= SEQUENCE (SIZE (1.. maxNPRACH-Resources-NB-r13)) OF NPRACH-Parameters-NB-r13

NPRACH-ParametersList-NB-v1330 ::= SEQUENCE (SIZE (1.. maxNPRACH-Resources-NB-r13)) OF NPRACH-Parameters-NB-v1330

NPRACH-Parameters-NB-r13 ::= SEQUENCE {
  nprach-Periodicity-r13 ENUMERATED {ms40, ms80, ms160, ms240, ms320, ms640, ms1280, ms2560},
  nprach-StartTime-r13 ENUMERATED {ms8, ms16, ms32, ms64, ms128, ms256, ms512, ms1024},
  nprach-SubcarrierOffset-r13 ENUMERATED {n0, n12, n24, n36, n2, n18, n34, spare1},
  nprach-NumSubcarriers-r13 ENUMERATED {n12, n24, n36, n48},
  nprach-SubcarrierMsg3-RangeStart-r13 ENUMERATED {zero, oneThird, twoThird, one},
  maxNumPreambleAttemptCE-r13 ENUMERATED {n3, n4, n5, n6, n7, n8, n10, spare1},
  numRepetitionsPerPreambleAttempt-r13 ENUMERATED {n1, n2, n4, n8, n16, n32, n64, n128},
  npdcch-NumRepetitions-RA-r13 ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128, r256, r512, r1024, r2048},
```
spare4, spare3, spare2, spare1),

npdcch-StartSF-CSS-RA-r13 ENUMERATED \{v1dot5, v2, v4, v8, v16, v32, v48, v64\},

npdcch-Offset-RA-r13 ENUMERATED \{zero, oneEighth, oneFourth, threeEighth\}

NPRACH-Parameters-NB-v1330 ::= SEQUENCE {
  nprrach-NumCBRA-StartSubcarriers-r13 ENUMERATED \{n8, n10, n11, n12, n20, n22, n23, n24, n32, n34, n35, n36, n40, n44, n46, n48\}
}

RSRP-ThresholdsNPRACH-InfoList-NB-r13 ::= SEQUENCE (SIZE(1..2)) OF RSRP-Range

-- ASN1STOP
### NPRACH-ConfigSIB-NB field descriptions

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>maxNumPreambleAttemptCE</code></td>
<td>Maximum number of preamble transmission attempts per NPRACH resource. See TS 36.321 [6].</td>
</tr>
<tr>
<td><code>npdcch-NumRepetitions-RA</code></td>
<td>Maximum number of repetitions for NPDCCH common search space (CSS) for RAR, Msg3 retransmission and Msg4, see TS 36.213 [23, 16.6].</td>
</tr>
<tr>
<td><code>npdcch-Offset-RA</code></td>
<td>Fractional period offset of starting subframe for NPDCCH common search space (CSS Type 2), see TS 36.213 [23, 16.6].</td>
</tr>
<tr>
<td><code>npdcch-StartSF-CSS-RA</code></td>
<td>Starting subframe configuration for NPDCCH common search space (CSS), including RAR, Msg3 retransmission, and Msg4, see TS 36.213 [23, 16.6].</td>
</tr>
<tr>
<td><code>nprach-CP-Length</code></td>
<td>Cyclic prefix length for NPRACH transmission ((T_{CP})), see TS 36.211 [21, 10.1.6]. Value us66dot7 corresponds to 66.7 microseconds and value us266dot7 corresponds to 266.7 microseconds.</td>
</tr>
<tr>
<td><code>nprach-NumCBRA-StartSubcarriers</code></td>
<td>The number of start subcarriers for contention based random access. The UE shall select one of these start subcarriers when randomly selecting a start subcarrier in the preamble selection in 36.321 [6]. The start subcarrier indexes that the UE is allowed to randomly select from are according to the following:</td>
</tr>
<tr>
<td><code>nprach-SubcarrierOffset + [0, nprach-NumCBRA-StartSubcarriers - 1]</code></td>
<td></td>
</tr>
<tr>
<td><code>nprach-NumSubcarriers</code></td>
<td>Number of sub-carriers in a NPRACH resource, see TS 36.211 [21, 10.1.6]. In number of subcarriers.</td>
</tr>
<tr>
<td><code>nprach-ParametersList</code></td>
<td>Configures NPRACH parameters for each NPRACH resource. Up to three PRACH resources can be configured in a cell. Each NPRACH resource is associated with a different number of NPRACH repetitions.</td>
</tr>
<tr>
<td><code>nprach-Periodicity</code></td>
<td>Periodicity of a NPRACH resource, see TS 36.211 [21, 10.1.6]. Unit in millisecond.</td>
</tr>
<tr>
<td><code>nprach-StartTime</code></td>
<td>Start time of the NPRACH resource in one period, see TS 36.211 [21, 10.1.6]. Unit in millisecond.</td>
</tr>
<tr>
<td><code>nprach-SubcarrierOffset</code></td>
<td>Frequency location of the NPRACH resource, see TS 36.211 [21, 10.1.6]. In number of subcarriers, offset from sub-carrier 0.</td>
</tr>
<tr>
<td><code>nprach-SubcarrierMSG3-RangeStart</code></td>
<td>Fraction for calculating the starting subcarrier index of the range reserved for indication of UE support for multi-tone Msg3 transmission, within the NPRACH resource, see TS 36.211 [21, 10.1.6]. Multi-tone Msg3 transmission is not supported for ([32, 64, 128]) repetitions of NPRACH. For at least one of the NPRACH resources with the number of NPRACH repetitions other than ([32, 64, 128]), the value of nprach-SubcarrierMSG3-RangeStart should not be 0. If nprach-SubcarrierMSG3-RangeStart is equal to ([\text{oneThird} \text{ or } \text{twoThird}]) the start subcarrier indexes for the two partitions are given by:</td>
</tr>
<tr>
<td><code>nprach-SubcarrierOffset + \lfloor nprach-NumCBRA-StartSubcarriers * nprach-SubcarrierMSG3-RangeStart \rfloor - 1</code> for the single-tone Msg3 NPRACH partition;</td>
<td></td>
</tr>
<tr>
<td><code>nprach-SubcarrierOffset + \lfloor \text{floor}(nprach-NumCBRA-StartSubcarriers * nprach-SubcarrierMSG3-RangeStart), nprach-NumCBRA-StartSubcarriers - 1 \rfloor</code> for the multi-tone Msg3 NPRACH partition;</td>
<td></td>
</tr>
<tr>
<td><code>numRepetitionsPerPreambleAttempt</code></td>
<td>Number of NPRACH repetitions per attempt for each NPRACH resource, See TS 36.211 [21, 10.1.6].</td>
</tr>
<tr>
<td><code>rsrp-ThresholdsPrachInfoList</code></td>
<td>The criterion for UEs to select a NPRACH resource. Up to 2 RSRP threshold values can be signalled. The first element corresponds to RSRP threshold 1, the second element corresponds to RSRP threshold 2. See TS 36.321 [6]. If absent, there is only one NPRACH resource.</td>
</tr>
</tbody>
</table>

---

**NPUSCH-Config-NB**

The IE `NPUSCH-ConfigCommon-NB` is used to specify the common NPUSCH configuration. The IE `NPUSCH-ConfigDedicated-NB` is used to specify the UE specific NPUSCH configuration.

### NPUSCH-Config-NB information element

```plaintext
-- ASN1START

NPUSCH-ConfigCommon-NB-r13 ::= SEQUENCE {
  ack-NACK-NumRepetitions-Msg4-r13 SEQUENCE (SIZE(1.. maxNPRACH-Resources-NB-r13)) OF
```
ACK-NACK-NumRepetitions-NB-r13,
srs-SubframeConfig-r13 ENUMERATED {
    sc0, sc1, sc2, sc3, sc4, sc5, sc6, sc7,
    sc8, sc9, sc10, sc11, sc12, sc13, sc14, sc15
} OPTIONAL, -- Need OR
dmrs-Config-r13 SEQUENCE {
    threeTone-BaseSequence-r13 INTEGER (0..12) OPTIONAL, -- Need OP
    threeTone-CyclicShift-r13 INTEGER (0..2),
    sixTone-BaseSequence-r13 INTEGER (0..14) OPTIONAL, -- Need OP
    sixTone-CyclicShift-r13 INTEGER (0..3),
    twelveTone-BaseSequence-r13 INTEGER (0..30) OPTIONAL -- Need OP
} OPTIONAL, -- Need OR
ul-ReferenceSignalsNPUSCH-r13 UL-ReferenceSignalsNPUSCH-NB-r13
}

UL-ReferenceSignalsNPUSCH-NB-r13 ::= SEQUENCE {
    groupHoppingEnabled-r13 BOOLEAN,  
    groupAssignmentNPUSCH-r13 INTEGER (0..29)
}

NPUSCH-ConfigDedicated-NB-r13 ::= SEQUENCE {
    ack-NACK-NumRepetitions-r13 ACK-NACK-NumRepetitions-NB-r13 OPTIONAL, -- Need ON
    npusch-AllSymbols-r13 BOOLEAN OPTIONAL, -- Cond SRS
    groupHoppingDisabled-r13 ENUMERATED {true} OPTIONAL -- Need OR
}

ACK-NACK-NumRepetitions-NB-r13 ::= ENUMERATED {r1, r2, r4, r8, r16, r32, r64, r128}

-- ASN1STOP
NPUSCH-Config-NB field descriptions

- **ack-NACK-NumRepetitions**
  Number of repetitions for the ACK/NACK resource unit carrying HARQ response to NPDSCH, see TS 36.213 [23, 16.4.2]. If absent, the value of *ack-NACK-NumRepetitions-Msg4* signalled in SIB2 is used.

- **ack-NACK-NumRepetitions-Msg4**
  Number of repetitions for ACK/NACK HARQ response to NPDSCH containing Msg4 per NPRACH resource, see TS 36.213 [23, 16.4.2].

- **groupAssignmentNPUSCH**
  See TS 36.211 [21, 10.1.4.1.3].

- **groupHoppingDisabled**
  See TS 36.211 [21, 10.1.4.1.3].

- **groupHoppingEnabled**
  See TS 36.211 [21, 10.1.4.1.3].

- **npusch-AllSymbols**
  If set to TRUE, the UE shall use all NB-IoT symbols for NPUSCH transmission. If set to FALSE, the UE punctures the NPUSCH transmissions in the symbols that collides with SRS. If the field is not present, the UE uses all NB-IoT symbols for NPUSCH transmission. See TS 36.211 [21, 10.1.3.6].

- **sixTone-BaseSequence**
  The base sequence of DMRS sequence in a cell for 6 tones transmission; see TS 36.211 [21, 10.1.4.1.2]. If absent, it is given by NB-IoT CellID mod 14. Value 14 is not used.

- **sixTone-CyclicShift**
  Define 4 cyclic shifts for the 6-tone case, see TS 36.211 [21, 10.1.4.1.2].

- **srs-SubframeConfig**
  SRS SubframeConfiguration. See TS 36.211 [21, table 5.5.3.3-1]. Value sc0 corresponds to value 0, sc1 to value 1 and so on.

- **threeTone-BaseSequence**
  The base sequence of DMRS sequence in a cell for 3 tones transmission; see TS 36.211 [21, 10.1.4.1.2]. If absent, it is given by NB-IoT CellID mod 12. Value 12 is not used.

- **threeTone-CyclicShift**
  Define 3 cyclic shifts for the 3-tone case, see TS 36.211 [21, 10.1.4.1.2].

- **twelveTone-BaseSequence**
  The base sequence of DMRS sequence in a cell for 12 tones transmission; see TS 36.211 [21, 10.1.4.1.2]. If absent, it is given by NB-IoT CellID mod 30. Value 30 is not used.

- **ul-ReferenceSignalsNPUSCH**
  Used to specify parameters needed for the transmission on NPUSCH.

### Conditional presence

<table>
<thead>
<tr>
<th>Field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRS</td>
<td>This field is optionally present, need OP, if srs-SubframeConfig is broadcasted. Otherwise, the IE is not present.</td>
</tr>
</tbody>
</table>

---

**PDCP-Config-NB**

The IE *PDCP-Config-NB* is used to set the configurable PDCP parameters for data radio bearers.

**PDCP-Config-NB information element**

---

---

---

---
maxCID-r13 INTEGER (1..16383) DEFAULT 15,
profiles-r13 SEQUENCE {
  profile0x0002 BOOLEAN,
  profile0x0003 BOOLEAN,
  profile0x0004 BOOLEAN,
  profile0x0006 BOOLEAN,
  profile0x0102 BOOLEAN,
  profile0x0103 BOOLEAN,
  profile0x0104 BOOLEAN
},
...
}
---

**PDCP-Config-NB field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>discardTimer</td>
<td>Indicates the discard timer value specified in TS 36.323 [8]. Value in milliseconds. Value ms5120 means 5120 ms, ms10240 means 10240 ms and so on.</td>
</tr>
<tr>
<td>headerCompression</td>
<td>E-UTRAN does not reconfigure header compression except optionally upon RRC Connection Resumption.</td>
</tr>
<tr>
<td>maxCID</td>
<td>Indicates the value of the MAX_CID parameter as specified in TS 36.323 [8]. The total value of MAX_CIDs across all bearers for the UE should be less than or equal to the value of maxNumberROHC-ContextSessions parameter as indicated by the UE.</td>
</tr>
<tr>
<td>profiles</td>
<td>The profiles used by both compressor and decompressor in both UE and E-UTRAN. The field indicates which of the ROHC profiles specified in TS 36.323 [8] are supported, i.e. value true indicates that the profile is supported. Profile 0x0000 shall always be supported when the use of ROHC is configured. If support of two ROHC profile identifiers with the same 8 LSB's is signalled, only the profile corresponding to the highest value shall be applied.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setup</td>
<td>The field is mandatory present in case of radio bearer setup. Otherwise the field is optionally present, need ON.</td>
</tr>
</tbody>
</table>

---

**PhysicalConfigDedicated-NB**

The IE *PhysicalConfigDedicated-NB* is used to specify the UE specific physical channel configuration.

**PhysicalConfigDedicated-NB information element**
PhysicalConfigDedicated-NB-r13 ::= SEQUENCE {
  carrierConfigDedicated-r13 CarrierConfigDedicated-NB-r13 OPTIONAL, -- Need ON
  npdcch-ConfigDedicated-r13 NPDCCH-ConfigDedicated-NB-r13 OPTIONAL, -- Need ON
  npusch-ConfigDedicated-r13 NPUSCH-ConfigDedicated-NB-r13 OPTIONAL, -- Need ON
  uplinkPowerControlDedicated-r13 UplinkPowerControlDedicated-NB-r13 OPTIONAL, -- Need ON
  ...
}

-- ASN1STOP

<table>
<thead>
<tr>
<th>PhysicalConfigDedicated-NB field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>carrierConfigDedicated</td>
</tr>
<tr>
<td>npdcch-ConfigDedicated</td>
</tr>
<tr>
<td>npusch-ConfigDedicated</td>
</tr>
<tr>
<td>uplink-PowerControlDedicated</td>
</tr>
</tbody>
</table>

-- RACH-ConfigCommon-NB

The IE RACH-ConfigCommon-NB is used to specify the generic random access parameters.

RACH-ConfigCommon-NB information element

-- ASN1START

RACH-ConfigCommon-NB-r13 ::= SEQUENCE {
  preambleTransMax-CE-r13 PreambleTransMax,
  powerRampingParameters-r13 PowerRampingParameters,
  rach-InfoList-r13 RACH-InfoList-NB-r13,
  connEstFailOffset-r13 INTEGER (0..15) OPTIONAL, -- Need OP
  ...
}

RACH-InfoList-NB-r13 ::= SEQUENCE (SIZE (1.. maxNPRACH-Resources-NB-r13)) OF RACH-Info-NB-r13

RACH-ConfigCommon-NB-r13 ::= SEQUENCE {
  ra-ResponseWindowSize-r13 ENUMERATED {
RACH-ConfigCommon-NB field descriptions

**connEstFailOffset**
Parameter ‘Offsettemp’ in TS 36.304 [4]. If the field is not present the value of infinity shall be used for ‘Offsettemp’.

**mac-ContentionResolutionTimer**
Timer for contention resolution in TS 36.321 [6]. Value in PDCCH periods. Value pp1 corresponds to 1 PDCCH period, pp2 corresponds to 2 PDCCH periods and so on. The value considered by the UE is: mac-ContentionResolutionTimer = Min (signaled value x PDCCH period, 10.24s).

**powerRampingParameters**
Power ramping step and preamble initial received target power – same as TS 36.213 [23] and TS 36.321 [6]. If more than one repetition level is configured in the cell, then the UE transmits NPRACH with max power except for the lowest repetition level. Otherwise, the UE uses NPRACH power ramping.

**preambleTransMax-CE**
Maximum number of preamble transmission in TS 36.321 [6]. Value is an integer.

**ra-ResponseWindowSize**
Duration of the RA response window in TS 36.321 [6]. Value in PDCCH periods. Value pp2 corresponds to 2 PDCCH periods, pp3 corresponds to 3 PDCCH periods and so on. The value considered by the UE is: ra-ResponseWindowSize = Min (signaled value x PDCCH period, 10.24s).

RadioResourceConfigCommonSIB-NB

The IE RadioResourceConfigCommonSIB-NB is used to specify common radio resource configurations in the system information, e.g., the random access parameters and the static physical layer parameters.

RadioResourceConfigCommonSIB-NB information element

-- ASN1START

RadioResourceConfigCommonSIB-NB-r13 ::= SEQUENCE {
rach-ConfigCommon-r13 RACH-ConfigCommon-NB-r13,
bcch-Config-r13 BCCH-Config-NB-r13,
pcch-Config-r13 PCCH-Config-NB-r13,
nprach-Config-r13 NPRACH-ConfigSIB-NB-r13,
npdsch-ConfigCommon-r13 NPDSCH-ConfigCommon-NB-r13,
npusch-ConfigCommon-r13 NPUSCH-ConfigCommon-NB-r13,
dl-Gap-r13 DL-GapConfig-NB-r13 OPTIONAL, -- Need OP
uplinkPowerControlCommon-r13 UplinkPowerControlCommon-NB-r13,
...,
[[ nprach-Config-v1330 NPRACH-ConfigSIB-NB-v1330 OPTIONAL -- Need OR ]]}
BCCH-Config-NB-r13 ::= SEQUENCE {
  modificationPeriodCoeff-r13 ENUMERATED {n16, n32, n64, n128}
}

PCCH-Config-NB-r13 ::= SEQUENCE {
  defaultPagingCycle-r13   ENUMERATED {rf128, rf256, rf512, rf1024},
  nB-r13   ENUMERATED {
    fourT, twoT, oneT, halfT, quarterT, one8thT,
    one16thT, one32ndT, one64thT,
    one128thT, one256thT, one512thT, one1024thT,
    spare3, spare2, spare1},
  npdcch-NumRepetitionPaging-r13 ENUMERATED {
    r1, r2, r4, r8, r16, r32, r64, r128,
    r256, r512, r1024, r2048,
    spare4, spare3, spare2, spare1}
}

-- ASN1STOP

RadioResourceConfigCommonSIB-NB field descriptions

defaultPagingCycle
Default paging cycle, used to derive "T" in TS 36.304 [4]. Value rf128 corresponds to 128 radio frames, rf256 corresponds to 256 radio frames and so on.

dl-Gap
Downlink transmission gap configuration for the anchor carrier. See TS 36.211 [21, 10.2.3.4]. If the field is absent, there is no gap.

modificationPeriodCoeff
Actual modification period, expressed in number of radio frames= modificationPeriodCoeff * defaultPagingCycle. n16 corresponds to value 16, n32 corresponds to value 32, and so on. The BCCH modification period should be larger or equal to 40.96s.

nB
Parameter: nB is used as one of parameters to derive the Paging Frame and Paging Occasion according to TS 36.304 [4]. Value in multiples of 'T' as defined in TS 36.304 [4]. A value of fourT corresponds to 4 * T, a value of twoT corresponds to 2 * T and so on.

npdcch-NumRepetitionPaging
Maximum number of repetitions for NPDCCH common search space (CSS) for paging, see TS 36.213 [23, 16.6].

RadioResourceConfigDedicated-NB

The IE RadioResourceConfigDedicated-NB is used to setup/modify/release RBs, to modify the MAC main configuration, and to modify dedicated physical configuration.
RadioResourceConfigDedicated-NB information element

-- ASN1START

RadioResourceConfigDedicated-NB-r13 ::= SEQUENCE {
  srb-ToAddModList-r13          SRB-ToAddModList-NB-r13    OPTIONAL, -- Need ON
  drb-ToAddModList-r13          DRB-ToAddModList-NB-r13    OPTIONAL, -- Need ON
  drb-ToReleaseList-r13         DRB-ToReleaseList-NB-r13    OPTIONAL, -- Need ON
  mac-MainConfig-r13            CHOICE {
    explicitValue-r13            MAC-MainConfig-NB-r13,
    defaultValue-r13             NULL
  }                  OPTIONAL, -- Need ON
  physicalConfigDedicated-r13   PhysicalConfigDedicated-NB-r13 OPTIONAL, -- Need ON
  rlf-TimersAndConstants-r13    RLF-TimersAndConstants-NB-r13 OPTIONAL, -- Need ON
  ...
}

SRB-ToAddModList-NB-r13 ::= SEQUENCE (SIZE (1)) OF SRB-ToAddMod-NB-r13

SRB-ToAddMod-NB-r13 ::= SEQUENCE {
  rlc-Config-r13                CHOICE {
    explicitValue                 RLC-Config-NB-r13,
    defaultValue                 NULL
  } OPTIONAL, -- Cond Setup
  logicalChannelConfig-r13      CHOICE {
    explicitValue                 LogicalChannelConfig-NB-r13,
    defaultValue                 NULL
  } OPTIONAL, -- Cond Setup
  ...
}

DRB-ToAddModList-NB-r13 ::= SEQUENCE (SIZE (1..maxDRB-NB-r13)) OF DRB-ToAddMod-NB-r13

DRB-ToAddMod-NB-r13 ::= SEQUENCE {
  eps-BearerIdentity-r13        INTEGER (0..15)             OPTIONAL, -- Cond DRB-Setup
  drb-Identity-r13              DRB-Identity,
  ...
}
RadioResourceConfigDedicated-NB field descriptions

**logicalChannelConfig**
For SRB a choice is used to indicate whether the logical channel configuration is signalled explicitly or set to the default logical channel configuration for SRB1 as specified in 9.2.1.1.

**logicalChannelIdentity**
The logical channel identity for both UL and DL for a DRB. Value 3 is not used.

**mac-MainConfig**
The default MAC MAIN configuration is specified in 9.2.2.

**physicalConfigDedicated**
The default dedicated physical configuration is specified in 9.2.4.

**rlc-Config**
For SRBs a choice is used to indicate whether the RLC configuration is signalled explicitly or set to the values defined in the default RLC configuration for SRB1 in 9.2.1.1. RLC AM is the only applicable RLC mode.

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DRB-Setup</strong></td>
<td>The field is mandatory present if the corresponding DRB is being set up; otherwise it is not present.</td>
</tr>
<tr>
<td><strong>Setup</strong></td>
<td>The field is mandatory present if the corresponding SRB/DRB is being setup; otherwise the field is optionally present, need ON.</td>
</tr>
</tbody>
</table>

---

RLC-Config-NB

The IE *RLC-Config-NB* is used to specify the RLC configuration of SRBs and DRBs.

**RLC-Config-NB information element**

```
RLC-Config-NB-r13 ::= CHOICE {
  am   SEQUENCE {
    ul-AM-RLC-r13    UL-AM-RLC-NB-r13,
    dl-AM-RLC-r13    DL-AM-RLC-NB-r13
  }
}
```
UL-AM-RLC-NB-r13 ::= SEQUENCE {
  t-PollRetransmit-r13  T-PollRetransmit-NB-r13,
  maxRetxThreshold-r13 ENUMERATED {t1, t2, t3, t4, t6, t8, t16, t32}
}

DL-AM-RLC-NB-r13 ::= SEQUENCE {
  enableStatusReportSN-Gap-r13 ENUMERATED {true} OPTIONAL
}

T-PollRetransmit-NB-r13 ::= ENUMERATED {
  ms250,  ms500,  ms1000,  ms2000,  ms3000,  ms4000,
  ms6000,  ms10000,  ms15000,  ms25000,  ms40000,  ms60000,
  ms90000,  ms120000,  ms180000,  spare1
}

--- ASN1STOP

**RLC-Config-NB field descriptions**

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>enableStatusReportSN-Gap</td>
<td>Indicates that status reporting due to detection of reception failure is enabled, as specified in TS 36.322 [7].</td>
</tr>
<tr>
<td>maxRetxThreshold</td>
<td>Parameter for RLC AM in TS 36.322 [7]. Value t1 corresponds to 1 retransmission, t2 to 2 retransmissions and so on.</td>
</tr>
<tr>
<td>t-PollRetransmit</td>
<td>Timer for RLC AM in TS 36.322 [7], in milliseconds. Value msX means X ms, msY means Y ms and so on.</td>
</tr>
</tbody>
</table>

--- RLF-TimersAndConstants-NB

The IE **RLF-TimersAndConstants-NB** contains UE specific timers and constants applicable for UEs in RRC_CONNECTED.

**RLF-TimersAndConstants-NB information element**

--- ASN1START

RLF-TimersAndConstants-NB-r13 ::= CHOICE {
  release NULL,
  setup SEQUENCE {

  **RLF-TimersAndConstants-NB** information element

--- ASN1END
t301-r13       ENUMERATED {
               ms2500, ms4000, ms6000, ms10000,
               ms15000, ms25000, ms40000, ms60000},

t310-r13       ENUMERATED {
               ms0, ms200, ms500, ms1000, ms2000, ms4000, ms8000},

n310-r13       ENUMERATED {
               n1, n2, n3, n4, n6, n8, n10, n20},

t311-r13       ENUMERATED {
               ms1000, ms3000, ms5000, ms10000, ms15000,
               ms20000, ms30000},

n311-r13       ENUMERATED {
               n1, n2, n3, n4, n5, n6, n8, n10},

... 
}
}

-- ASN1STOP

---

**RLF-TimersAndConstants-NB field descriptions**

<table>
<thead>
<tr>
<th>n3xy</th>
<th>Constants are described in section 7.4. n1 corresponds with 1, n2 corresponds with 2 and so on.</th>
</tr>
</thead>
<tbody>
<tr>
<td>t3xy</td>
<td>Timers are described in section 7.3. Value ms0 corresponds with 0 ms, ms200 corresponds with 200 ms and so on.</td>
</tr>
</tbody>
</table>

---

**UplinkPowerControl-NB**

The IE *UplinkPowerControlCommon-NB* and IE *UplinkPowerControlDedicated-NB* are used to specify parameters for uplink power control in the system information and in the dedicated signalling, respectively.

---

**UplinkPowerControl-NB information elements**

---

```
UplinkPowerControlCommon-NB-r13 ::= SEQUENCE {
  p0-NominalNPUSCH-r13           INTEGER (-126..24),
  alpha-r13                     ENUMERATED {a0, a04, a05, a06, a07, a08, a09, a11},
  deltaPreambleMsg3-r13          INTEGER (-1..6)
}
```
UplinkPowerControlDedicated-NB-r13 ::= SEQUENCE {
p0-UE-NPUSCH-r13 INTEGER (-8..7)
}

-- ASN1STOP

<table>
<thead>
<tr>
<th>UplinkPowerControl-NB field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>alpha</strong></td>
</tr>
<tr>
<td>Parameter: $a_0 \ (1)$, See TS 36.213 [23, 16.2.1.1] where $a_0$ corresponds to 0, $a_{04}$ corresponds to value 0.4, $a_{05}$ to 0.5, $a_{06}$ to 0.6, $a_{07}$ to 0.7, $a_{08}$ to 0.8, $a_{09}$ to 0.9 and $a_{1}$ corresponds to 1.</td>
</tr>
<tr>
<td><strong>deltaPreambleMsg3</strong></td>
</tr>
<tr>
<td>Parameter: $\Delta_{\text{PREAMBLE}} \ (\beta_3) \ \text{See TS 36.213 [23, 16.2.1.1]}. \ \text{Actual value = IE value * 2 [dB].}$</td>
</tr>
<tr>
<td><strong>p0-NominalNPUSCH</strong></td>
</tr>
<tr>
<td>Parameter: $P_{O_{\text{NOMINAL,NPUSCH},c}} \ (1)$, See TS 36.213 [23, 16.2.1.1], unit dBm.</td>
</tr>
<tr>
<td><strong>p0-UE-NPUSCH</strong></td>
</tr>
<tr>
<td>Parameter: $P_{O_{\text{UE,NPUSCH},c}} \ (1)$, See TS 36.213 [23, 16.2.1.1], unit dB.</td>
</tr>
</tbody>
</table>

### 6.7.3.3 NB-IoT Security control information elements

Void

### 6.7.3.4 NB-IoT Mobility control information elements

– **FreqBandIndicator-NB**

The IE *FreqBandIndicator-NB* indicates the E-UTRA operating band as defined in TS 36.101 [42, table 5.5-1].

**FreqBandIndicator-NB information element**

-- ASN1START

FreqBandIndicator-NB-r13 ::= INTEGER (1..maxFB12)

-- ASN1STOP

– **MultiBandInfoList-NB**

**MultiBandInfoList-NB information element**

-- ASN1START

MultiBandInfoList-NB-r13 ::= SEQUENCE (SIZE (1..maxMultiBands)) OF MultiBandInfo-NB-r13
MultiBandInfo-NB-r13 ::= SEQUENCE {
  freqBandIndicator-r13  FreqBandIndicator-NB-r13  OPTIONAL, -- Need OR
  freqBandInfo-r13    NS-PmaxList-NB-r13    OPTIONAL  -- Need OR
}

NS-PmaxList-NB
The IE NS-PmaxList-NB concerns a list of additionalPmax and additionalSpectrumEmission as defined in TS 36.101 [42, table xxxx] for a given frequency band. E-UTRAN does not include the same value of additionalSpectrumEmission in SystemInformationType2-NB within this list.

NS-PmaxList-NB information element

T-Reselection-NB
The IE T-Reselection-NB concerns the cell reselection timer TreselectionRAT for NB-IoT.
Value in seconds. s0 means 0 second and behaviour as specified in 7.3.2 applies, s3 3 seconds and so on.

T-Reselection-NB information element
6.7.3.5 NB-IoT Measurement information elements

Void

6.7.3.6 NB-IoT Other information elements

– EstablishmentCause-NB

The IE EstablishmentCause provides the establishment cause for the RRC connection request or the RRC connection resume request as provided by the upper layers.

**EstablishmentCause-NB information element**

```
-- ASN1START

EstablishmentCause-NB-r13 ::=   ENUMERATED {
    mt-Access, mo-Signalling, mo-Data, mo-ExceptionData,
    delayTolerantAccess-v1330, spare3, spare2, spare1
}

-- ASN1STOP
```

– UE-Capability-NB

The IE UE-Capability-NB is used to convey the NB-IoT UE Radio Access Capability Parameters, see TS 36.306 [5]. The IE UE-Capability-NB is transferred in NB-IoT only.

**UE-Capability-NB information element**

```
-- ASN1START

UE-Capability-NB-r13 ::=  SEQUENCE {
    accessStratumRelease-r13  AccessStratumRelease-NB-r13,  OPTIONAL,
    ue-Category-Nb-r13       ENUMERATED {nb1}     OPTIONAL,
    multipleDRB-r13          ENUMERATED {supported}    OPTIONAL,
    pdcp-Parameters-r13      PDCP-Parameters-NB-r13    OPTIONAL,
    phyLayerParameters-r13   PhyLayerParameters-NB-r13,
    rf-Parameters-r13        RF-Parameters-NB-r13,
    nonCriticalExtension     SEQUENCE {}       OPTIONAL
}

AccessStratumRelease-NB-r13 ::=   ENUMERATED {rel13, spare7, spare6, spare5, spare4, spare3, spare2, spare1, ...
```


PDPC-Parameters-NB-r13 ::= SEQUENCE {
  supportedROHC-Profiles-r13  SEQUENCE {
    profile0x0002    BOOLEAN,
    profile0x0003    BOOLEAN,
    profile0x0004    BOOLEAN,
    profile0x0006    BOOLEAN,
    profile0x0102    BOOLEAN,
    profile0x0103    BOOLEAN,
    profile0x0104    BOOLEAN
  },
  maxNumberROHC-ContextSessions-r13 ENUMERATED {cs2, cs4, cs8, cs12} DEFAULT cs2,
  ...
}

PhyLayerParameters-NB-r13 ::=  SEQUENCE {
  multiTone-r13      ENUMERATED {supported}   OPTIONAL,
  multiCarrier-r13      ENUMERATED {supported}   OPTIONAL
}

RF-Parameters-NB-r13 ::= SEQUENCE {
  supportedBandList-r13 SupportedBandList-NB-r13,
  multiNS-Pmax-r13     ENUMERATED {supported}  OPTIONAL
}

SupportedBandList-NB-r13 ::=  SEQUENCE (SIZE (1..maxBands)) OF SupportedBand-NB-r13

SupportedBand-NB-r13 ::=   SEQUENCE {
  band-r13       FreqBandIndicator-NB-r13,
  powerClassNB-20dBm-r13    ENUMERATED {supported}  OPTIONAL
}

-- ASN1STOP
**UE-Capability-NB field descriptions**

<table>
<thead>
<tr>
<th>Field Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>accessStratumRelease</td>
</tr>
<tr>
<td>Set to rel13 in this version of the specification.</td>
</tr>
<tr>
<td>maxNumberROHC-ContextSessions</td>
</tr>
<tr>
<td>Set to the maximum number of concurrently active ROHC contexts supported by the UE, excluding context sessions that leave all headers uncompressed. cs2 corresponds with 2 (context sessions), cs4 corresponds with 4 and so on. The network ignores this field if the UE supports none of the ROHC profiles in supportedROHC-Profiles.</td>
</tr>
<tr>
<td>multiCarrier</td>
</tr>
<tr>
<td>Defines whether the UE supports multi-carrier operation.</td>
</tr>
<tr>
<td>multipleDRB</td>
</tr>
<tr>
<td>Defines whether the UE supports multiple DRBs.</td>
</tr>
<tr>
<td>multiNS-Pmax</td>
</tr>
<tr>
<td>Defines whether the UE supports the mechanisms defined for NB-IoT cells broadcasting NS-PmaxList.</td>
</tr>
<tr>
<td>multiTone</td>
</tr>
<tr>
<td>Defines whether the UE supports UL multi-tone transmissions on NPUSCH.</td>
</tr>
<tr>
<td>powerClassNB-20dBm</td>
</tr>
<tr>
<td>Defines whether the UE supports power class 20dBm in NB-IoT for the band, as specified in TS 36.101 [42]. If powerClassNB-20dBm is not included, UE supports power class 23 dBm in the NB-IoT band.</td>
</tr>
<tr>
<td>supportedBandList</td>
</tr>
<tr>
<td>Includes the supported NB-IoT bands as defined in TS 36.101 [42].</td>
</tr>
<tr>
<td>supportedROHC-Profiles</td>
</tr>
<tr>
<td>List of supported ROHC profiles as defined in TS 36.323 [8].</td>
</tr>
<tr>
<td>ue-Category-NB</td>
</tr>
<tr>
<td>UE category as defined in TS 36.306 [5]. The field is always included in this version of the specification.</td>
</tr>
</tbody>
</table>

**NOTE 1:** The IE UE-Capability-NB does not include AS security capability information, since these are the same as the security capabilities that are signalled by NAS. Consequently AS need not provide "man-in-the-middle" protection for the security capabilities.

– **UE-RadioPagingInfo-NB**

The UE-RadioPagingInfo-NB IE contains UE NB-IoT capability information needed for paging.

**UE-RadioPagingInfo-NB information element**

```asn1
-- ASN1START

UE-RadioPagingInfo-NB-r13 ::= SEQUENCE {
  ue-Category-NB-r13 ENUMERATED {nb1} OPTIONAL,
  ...
}

-- ASN1STOP
```

**UE-RadioPagingInfo-NB field descriptions**

<table>
<thead>
<tr>
<th>Field Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ue-Category-NB</td>
</tr>
<tr>
<td>UE NB-IoT category as defined in TS 36.306 [5].</td>
</tr>
</tbody>
</table>

– **UE-TimersAndConstants-NB**

The IE UE-TimersAndConstants-NB contains timers and constants used by the UE in either RRC_CONNECTED or RRC_IDLE.
UE-TimersAndConstants-NB information element

-- ASN1START

UE-TimersAndConstants-NB-r13 ::= SEQUENCE {
    t300-r13       ENUMERATED {
        ms2500, ms4000, ms6000, ms10000,
        ms15000, ms25000, ms40000, ms60000},
    t301-r13       ENUMERATED {
        ms2500, ms4000, ms6000, ms10000,
        ms15000, ms25000, ms40000, ms60000},
    t310-r13       ENUMERATED {
        ms0, ms200, ms500, ms1000, ms2000, ms4000, ms8000},
    n310-r13       ENUMERATED {
        n1, n2, n3, n4, n6, n8, n10, n20},
    t311-r13       ENUMERATED {
        ms1000, ms3000, ms5000, ms10000, ms15000,
        ms20000, ms30000},
    n311-r13       ENUMERATED {
        n1, n2, n3, n4, n5, n6, n8, n10},
    ... }

-- ASN1STOP

| n3xy | Constants are described in section 7.4. n1 corresponds with 1, n2 corresponds with 2 and so on. |
| t3xy | Timers are described in section 7.3. Value ms0 corresponds with 0 ms, ms200 corresponds with 200 ms and so on. |

6.7.4  NB-IoT RRC multiplicity and type constraint values

-- Multiplicity and type constraint definitions

-- ASN1START

maxNPRACH-Resources-NB-r13 INTEGER ::= 3  -- Maximum number of NPRACH resources for NB-IoT
maxDRB-NB-r13 INTEGER ::= 2  -- Maximum number of Data Radio Bearers for NB-IoT
maxNS-Pmax-NB-r13 INTEGER ::= 4  -- Maximum number of NS and P-Max values per band
maxSI-Message-NB-r13 INTEGER ::= 8  -- Maximum number of SI messages for NB-IoT

-- ASN1STOP

— End of NB-IOT-RRC-Definitions

-- ASN1START

6.7.5 Direct Indication Information

Direct Indication information is transmitted on NPDCCH using P-RNTI but without associated Paging-NB message. Table 6.7.5-1 defines the Direct Indication information, see TS 36.212 [22, 6.4.3.3].

When bit n is set to 1, the UE shall behave as if the corresponding field is set in the Paging-NB message, see 5.3.2.3. Bit 1 is the least significant bit.

<table>
<thead>
<tr>
<th>Bit</th>
<th>Field in Direct Indication information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>systemInfoModification</td>
</tr>
<tr>
<td>2</td>
<td>systemInfoModification-eDRX</td>
</tr>
<tr>
<td>3, 4, 5, 6, 7, 8</td>
<td>Not used, and shall be ignored by UE if received</td>
</tr>
</tbody>
</table>

7 Variables and constants

7.1 UE variables

NOTE: To facilitate the specification of the UE behavioural requirements, UE variables are represented using ASN.1. Unless explicitly specified otherwise, it is however up to UE implementation how to store the variables. The optionality of the IEs in ASN.1 is used only to indicate that the values may not always be available.

— EUTRA-UE-Variables

This ASN.1 segment is the start of the E-UTRA UE variable definitions.

-- ASN1START

EUTRA-UE-Variables DEFINITIONS AUTOMATIC TAGS ::=
BEGIN

IMPORTS
  AbsoluteTimeInfo-r10,
  AreaConfiguration-r10,
  AreaConfiguration-v1130,
  CarrierFreqGERAN,
  CellIdentity,
  ConnEstFailReport-r11,
  SpeedStateScaleFactors,
  C-RNTI,
  LoggingDuration-r10,
  LoggingInterval-r10,
  LogMeasInfo-r10,
  MeasCSI-RS-Id-r12,
  MeasId,
  MeasId-v1250,
  MeasIdToAddModList,
  MeasIdToAddModListExt-r12,
  MeasIdToAddModList-v1310,
  MeasIdToAddModListExt-v1310,
  MeasObjectToAddModList,
  MeasObjectToAddModListExt-r13,
  MeasScaleFactor-r12,
  MobilityStateParameters,
  NeighCellConfig,
  PhysCellId,
  PhysCellIdCDMA2000,
  PhysCellIdGERAN,
  PhysCellIdUTRA-FDD,
  PhysCellIdUTRA-TDD,
  PLMN-Identity,
  PLMN-IdentityList3-r11,
  QuantityConfig,
VarConnEstFailReport

The UE variable `VarConnEstFailReport` includes the connection establishment failure information.

---

FROM EUTRA-RRC-Definitions;

VarConnEstFailReport UE variable

---

– VarLogMeasConfig

The UE variable VarLogMeasConfig includes the configuration of the logging of measurements to be performed by the UE while in RRC_IDLE, covering intra-frequency, inter-frequency, inter-RAT mobility and MBSFN related measurements. If MBSFN logging is configured, the UE performs logging of measurements while in both RRC_IDLE and RRC_CONNECTED. Otherwise, the UE performs logging of measurements only while in RRC_IDLE.

\textit{VarLogMeasConfig UE variable}

---

\begin{verbatim}
VarLogMeasConfig-r10 ::= SEQUENCE {
  areaConfiguration-r10   AreaConfiguration-r10  OPTIONAL,
  loggingDuration-r10    LoggingDuration-r10,
  loggingInterval-r10    LoggingInterval-r10
}

VarLogMeasConfig-r11 ::= SEQUENCE {
  areaConfiguration-r10   AreaConfiguration-r10  OPTIONAL,
  areaConfiguration-v1130   AreaConfiguration-v1130  OPTIONAL,
  loggingDuration-r10    LoggingDuration-r10,
  loggingInterval-r10    LoggingInterval-r10
}

VarLogMeasConfig-r12 ::= SEQUENCE {
  areaConfiguration-r10   AreaConfiguration-r10  OPTIONAL,
  areaConfiguration-v1130   AreaConfiguration-v1130  OPTIONAL,
  loggingDuration-r10    LoggingDuration-r10,
  loggingInterval-r10    LoggingInterval-r10,
  targetMBSFN-AreaList-r12  TargetMBSFN-AreaList-r12 OPTIONAL
}
---

VarLogMeasReport

The UE variable VarLogMeasReport includes the logged measurements information.

\textit{VarLogMeasReport UE variable}

---
VarLogMeasReport-r10 ::= SEQUENCE {
  traceReference-r10            TraceReference-r10,
  traceRecordingSessionRef-r10  OCTET STRING (SIZE (2)),
  tce-Id-r10                   OCTET STRING (SIZE (1)),
  plmn-Identity-r10            PLMN-Identity,
  absoluteTimeInfo-r10         AbsoluteTimeInfo-r10,
  logMeasInfoList-r10          LogMeasInfoList2-r10
}

VarLogMeasReport-r11 ::= SEQUENCE {
  traceReference-r10            TraceReference-r10,
  traceRecordingSessionRef-r10  OCTET STRING (SIZE (2)),
  tce-Id-r10                   OCTET STRING (SIZE (1)),
  plmn-IdentityList-r11        PLMN-IdentityList3-r11,
  absoluteTimeInfo-r10         AbsoluteTimeInfo-r10,
  logMeasInfoList-r10          LogMeasInfoList2-r10
}

LogMeasInfoList2-r10 ::= SEQUENCE (SIZE (1..maxLogMeas-r10)) OF LogMeasInfo-r10

-- ASN1STOP

VarMeasConfig

The UE variable VarMeasConfig includes the accumulated configuration of the measurements to be performed by the UE, covering intra-frequency, inter-frequency and inter-RAT mobility related measurements.

NOTE: The amount of measurement configuration information, which a UE is required to store, is specified in subclause 11.1. If the number of frequencies configured for a particular RAT exceeds the minimum performance requirements specified in [16], it is up to UE implementation which frequencies of that RAT are measured. If the total number of frequencies for all RATs provided to the UE in the measurement configuration exceeds the minimum performance requirements specified in [16], it is up to UE implementation which frequencies/RATs are measured.

VarMeasConfig UE variable

-- ASN1START

VarMeasConfig ::= SEQUENCE {
  -- Measurement identities
The UE variable \textit{VarMeasReportList} includes information about the measurements for which the triggering conditions have been met.

\textit{VarMeasReportList} UE variable

\begin{verbatim}
-- ASN1START
VarMeasReportList ::= SEQUENCE (SIZE (1..maxMeasId)) OF VarMeasReport
VarMeasReportList-r12 ::= SEQUENCE (SIZE (1..maxMeasId-r12)) OF VarMeasReport
-- ASN1STOP
\end{verbatim}
VarMeasReport ::= SEQUENCE {
    -- List of measurement that have been triggered
   _measId        MeasId,             
    measId-v1250  MeasId-v1250         OPTIONAL, 
    cellsTriggeredList    CellsTriggeredList   OPTIONAL, 
    csi-RS-TriggeredList-r12   CSI-RS-TriggeredList-r12       OPTIONAL, 
    numberOfReportsSent  INTEGER 
}

CellsTriggeredList ::= SEQUENCE (SIZE (1..maxCellMeas)) OF CHOICE {
    physCellIdEUTRA       PhysCellId,             
    physCellIdUTRA       CHOICE {
        fdd           PhysCellIdUTRA-FDD,         
        tdd           PhysCellIdUTRA-TDD
    },
    physCellIdGERAN       SEQUENCE {
        carrierFreq        CarrierFreqGERAN,   
        physCellId         PhysCellIdGERAN
    },
    physCellIdCDMA2000    PhysCellIdCDMA2000,   
    wlan-Identifiers-r13  WLAN-Identifiers-r12
}

CSI-RS-TriggeredList-r12 ::= SEQUENCE (SIZE (1..maxCSI-RS-Meas-r12)) OF MeasCSI-RS-Id-r12

-- ASN1STOP

VarMobilityHistoryReport

The UE variable VarMobilityHistoryReport includes the mobility history information.

-- ASN1START

VarMobilityHistoryReport-r12 ::= VisitedCellInfoList-r12

-- ASN1STOP
The UE variable `VarRLF-Report` includes the radio link failure information or handover failure information.

**VarRLF-Report UE variable**

```asn1
VarRLF-Report-r10 ::= SEQUENCE {
  rlf-Report-r10   RLF-Report-r9,
  plmn-Identity-r10  PLMN-Identity
}

VarRLF-Report-r11 ::= SEQUENCE {
  rlf-Report-r10   RLF-Report-r9,
  plmn-IdentityList-r11  PLMN-IdentityList3-r11
}
```

The UE variable `VarShortMAC-Input` specifies the input used to generate the shortMAC-I.

**VarShortMAC-Input UE variable**

```asn1
VarShortMAC-Input ::= SEQUENCE {
  cellIdentity       CellIdentity,
  physCellId         PhysCellId,
  c-RNTI             C-RNTI
}
```
VarShortMAC-Input field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cellIdentity</td>
<td>Set to CellIdentity of the current cell.</td>
</tr>
<tr>
<td>c-RNTI</td>
<td>Set to C-RNTI that the UE had in the PCell it was connected to prior to the failure.</td>
</tr>
<tr>
<td>physCellId</td>
<td>Set to the physical cell identity of the PCell the UE was connected to prior to the failure.</td>
</tr>
</tbody>
</table>

VarShortResumeMAC-Input

The UE variable VarShortResumeMAC-Input specifies the input used to generate the shortResumeMAC-I during RRC Connection Resume procedure.

VarShortResumeMAC-Input UE variable

```asn1
VarShortResumeMAC-Input-r13 ::= SEQUENCE {
  cellIdentity-r13      CellIdentity,
  physCellId-r13       PhysCellId,
  c-RNTI-r13           C-RNTI,
  resumeDiscriminator-r13     BIT STRING(SIZE(1))
}
```

VarWLAN-MobilityConfig

The UE variable VarWLAN-MobilityConfig includes information about WLAN for access selection and mobility.

VarWLAN-MobilityConfig UE variable

```asn1
VarWLAN-MobilityConfig ::=     SEQUENCE {
  wlan-MobilitySet-r13     WLAN-Id-List-r13   OPTIONAL,
  successReportRequested     ENUMERATED {true}   OPTIONAL
```
---

**VarWLAN-MobilityConfig field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>wlan-MobilitySet</strong></td>
<td>Indicates the WLAN mobility set configured.</td>
</tr>
<tr>
<td><strong>successReportRequested</strong></td>
<td>Indicates whether the UE shall report successful connection to WLAN. Applicable to LWA and LWIP.</td>
</tr>
</tbody>
</table>

---

**VarWLAN-Status**

The UE variable *VarWLAN-Status* includes information about the status of WLAN connection for LWA, RCLWI or LWIP.

**VarWLAN-Status UE variable**

---

```asn1
VarWLAN-Status-r13 ::= SEQUENCE {
    status-r13        WLAN-Status-r13
}
```

---

**VarWLAN-Status field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>status</strong></td>
<td>Indicates the connection status to WLAN and causes for connection failures.</td>
</tr>
</tbody>
</table>

---

**Multiplicity and type constraint definitions**

This section includes multiplicity and type constraints applicable (only) for UE variables.

---

```asn1
maxLogMeas-r10    INTEGER ::= 4060-- Maximum number of logged measurement entries

    -- that can be stored by the UE
```

---

**End of EUTRA-UE-Variables**

---

---
7.1a NB-IoT UE variables

NOTE: To facilitate the specification of the UE behavioural requirements, UE variables are represented using ASN.1. Unless explicitly specified otherwise, it is however up to UE implementation how to store the variables. The optionality of the IEs in ASN.1 is used only to indicate that the values may not always be available.

– NBIOT-UE-Variables

This ASN.1 segment is the start of the NB-IoT UE variable definitions.

-- ASN1START

NBIOT-UE-Variables DEFINITIONS AUTOMATIC TAGS ::=  

BEGIN  

IMPORTS  

VarShortMAC-Input,  

VarShortResumeMAC-Input-r13  

FROM EUTRA-UE-Variables;  

VarShortMAC-Input-NB-r13 ::= VarShortMAC-Input  

VarShortResumeMAC-Input-NB-r13 ::= VarShortResumeMAC-Input-r13  

-- ASN1STOP

– End of NBIOT-UE-Variables

-- ASN1START

END
7.2 Counters

<table>
<thead>
<tr>
<th>Counter</th>
<th>Reset</th>
<th>Incremented</th>
<th>When reaching max value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>
### 7.3 Timers

#### 7.3.1 Timers (Informative)

<table>
<thead>
<tr>
<th>Timer</th>
<th>Start</th>
<th>Stop</th>
<th>At expiry</th>
</tr>
</thead>
<tbody>
<tr>
<td>T300</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Note1</td>
<td>Transmission of RRCConnectionRequest or RRCConnectionResume Request</td>
<td>Reception of RRCConnectionSetup, RRCConnectionReject or RRCConnectionResume message, cell re-selection and upon abortion of connection establishment by upper layers</td>
<td>Perform the actions as specified in 5.3.3.6</td>
</tr>
<tr>
<td>T301</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Note1</td>
<td>Transmission of RRCConnectionReestablishmentRequest</td>
<td>Reception of RRCConnectionReestablishmentRequest or RRCConnectionReestablishmentReject message as well as when the selected cell becomes unsuitable</td>
<td>Go to RRC_IDLE</td>
</tr>
<tr>
<td>T302</td>
<td>Reception of RRCConnectionReject while performing RRC connection establishment</td>
<td>Upon entering RRC_CONNECTED and upon cell re-selection</td>
<td>Inform upper layers about barring alleviation as specified in 5.3.3.7</td>
</tr>
<tr>
<td>T303</td>
<td>Access barred while performing RRC connection establishment for mobile originating calls</td>
<td>Upon entering RRC_CONNECTED and upon cell re-selection</td>
<td>Inform upper layers about barring alleviation as specified in 5.3.3.7</td>
</tr>
<tr>
<td>T304</td>
<td>Reception of RRCConnectionReconfiguration message including the MobilityControl Info or reception of MobilityFromEUTRACommand message including CellChangeOrder</td>
<td>Criterion for successful completion of handover within E-UTRA, handover to E-UTRA or cell change order is met (the criterion is specified in the target RAT in case of inter-RAT)</td>
<td>In case of cell change order from E-UTRA or intra E-UTRA handover, initiate the RRC connection re-establishment procedure; In case of handover to E-UTRA, perform the actions defined in the specifications applicable for the source RAT.</td>
</tr>
<tr>
<td>T305</td>
<td>Access barred while performing RRC connection establishment for mobile originating signalling</td>
<td>Upon entering RRC_CONNECTED and upon cell re-selection</td>
<td>Inform upper layers about barring alleviation as specified in 5.3.3.7</td>
</tr>
<tr>
<td>T306</td>
<td>Access barred while performing RRC connection establishment for mobile originating CS fallback.</td>
<td>Upon entering RRC_CONNECTED and upon cell re-selection</td>
<td>Inform upper layers about barring alleviation as specified in 5.3.3.7</td>
</tr>
<tr>
<td>T307</td>
<td>Reception of RRCConnectionReconfiguration message including MobilityControlInfoSGC</td>
<td>Successful completion of random access on the PSCell, upon initiating re-establishment and upon SCG release</td>
<td>Inform E-UTRAN about the SCG change failure by initiating the SCG failure information procedure as specified in 5.6.13.</td>
</tr>
<tr>
<td>T308</td>
<td>Access barred due to ACDC while performing RRC connection establishment subject to ACDC</td>
<td>Upon entering RRC_CONNECTED and upon cell re-selection</td>
<td>Inform upper layers about barring alleviation for ACDC as specified in 5.3.3.7</td>
</tr>
<tr>
<td>T310</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Note1</td>
<td>Note2</td>
<td>Upon detecting physical layer problems for the PCell i.e. upon receiving N310 consecutive out-of-sync indications from lower layers</td>
<td>Upon receiving N311 consecutive in-sync indications from lower layers for the PCell, upon triggering the handover procedure and upon initiating the connection re-establishment procedure</td>
</tr>
<tr>
<td>Timer</td>
<td>Start</td>
<td>Stop</td>
<td>At expiry</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>T311</td>
<td>Upon initiating the RRC connection re-establishment procedure</td>
<td>Selection of a suitable E-UTRA cell or a cell using another RAT.</td>
<td>Enter RRC_IDLE</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T312</td>
<td>Upon triggering a measurement report for a measurement identity for</td>
<td>Upon receiving N311 consecutive in-sync indications from lower layers, upon triggering the handover procedure, upon initiating the connection re-establishment procedure, and upon the expiry of T310</td>
<td>If security is not activated: go to RRC_IDLE else: initiate the connection re-establishment procedure</td>
</tr>
<tr>
<td></td>
<td>which T312 has been configured, while T310 is running</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>NOTE2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T313</td>
<td>Upon detecting physical layer problems for the PSCell i.e. upon</td>
<td>Upon receiving N314 consecutive in-sync indications from lower layers for the PSCell, upon initiating the connection re-establishment procedure, upon SCG release and upon receiving RRConnectionReconfiguration including MobilityControlInfoSCG</td>
<td>Inform E-UTRAN about the SCG radio link failure by initiating the SCG failure information procedure as specified in 5.6.13.</td>
</tr>
<tr>
<td></td>
<td>which T313 has been configured, while T310 is running</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>NOTE2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T320</td>
<td>Upon receiving t320 or upon cell (re)selection to E-UTRA from another</td>
<td>Upon entering RRC_CONNECTED, when PLMN selection is performed on request by NAS, or upon cell (re)selection to another RAT (in which case the timer is carried on to the other RAT).</td>
<td>Discard the cell reselection priority information provided by dedicated signalling.</td>
</tr>
<tr>
<td></td>
<td>RAT with validity time configured for dedicated priorities (in which</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>case the remaining validity time is applied).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>NOTE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T321</td>
<td>Upon receiving measConfig including a reportConfig with the</td>
<td>Upon acquiring the information needed to set all fields of cellGlobalId for the requested cell, upon receiving measConfig that includes removal of the reportConfig with the purpose set to reportCGI</td>
<td>Initiate the measurement reporting procedure, stop performing the related measurements and remove the corresponding measId</td>
</tr>
<tr>
<td></td>
<td>purpose set to reportCGI</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>NOTE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T325</td>
<td>Timer (re)started upon receiving RRConnectionReject message with</td>
<td>Upon log volume exceeding the suitable UE memory, upon initiating the release of LoggedMeasurementConfiguration procedure</td>
<td>Perform the actions specified in 5.6.6.4</td>
</tr>
<tr>
<td></td>
<td>deprioritisationTimer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>NOTE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T330</td>
<td>Upon receiving LoggedMeasurementConfiguration message</td>
<td>Upon initiating the connection re-establishment procedure</td>
<td>No action.</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T340</td>
<td>Upon transmitting UEAssistanceInformation message with</td>
<td>Upon initiating the connection re-establishment procedure</td>
<td>Perform the actions specified in 5.6.12.4</td>
</tr>
<tr>
<td></td>
<td>powerPrefIndication set to normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>NOTE2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T350</td>
<td>Upon entering RRC_IDLE if t350 has been received in wlan-OffloadInfo.</td>
<td>Upon entering RRC_CONNECTED, or upon cell reselection.</td>
<td>Perform the actions specified in 5.6.15.2</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T351</td>
<td>Reception of RRConnectionReconfiguration message including the</td>
<td>Upon successful connection to WLAN, upon WLAN connection failure, upon leaving RRC_CONNECTED, upon triggering the handover procedure, or upon initiating the connection re-establishment procedure</td>
<td>Perform WLAN Connection Status Reporting specified in 5.6.15.2</td>
</tr>
<tr>
<td></td>
<td>association Timer in WLAN-MobilityConfig.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7.3.2  Timer handling

When the UE applies zero value for a timer, the timer shall be started and immediately expire unless explicitly stated otherwise.

7.4  Constants

<table>
<thead>
<tr>
<th>Constant</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>N310</td>
<td>Maximum number of consecutive &quot;out-of-sync&quot; indications for the PCell received from lower layers</td>
</tr>
<tr>
<td>N311</td>
<td>Maximum number of consecutive &quot;in-sync&quot; indications for the PCell received from lower layers</td>
</tr>
<tr>
<td>N313</td>
<td>Maximum number of consecutive &quot;out-of-sync&quot; indications for the PSCell received from lower layers</td>
</tr>
<tr>
<td>N314</td>
<td>Maximum number of consecutive &quot;in-sync&quot; indications for the PSCell received from lower layers</td>
</tr>
</tbody>
</table>

8  Protocol data unit abstract syntax

8.1  General

The RRC PDU contents in clause 6 and clause 10 are described using abstract syntax notation one (ASN.1) as specified in ITU-T Rec. X.680 [13] and X.681 [14]. Transfer syntax for RRC PDUs is derived from their ASN.1 definitions by use of Packed Encoding Rules, unaligned as specified in ITU-T Rec. X.691 [15].

The following encoding rules apply in addition to what has been specified in X.691:

- When a bit string value is placed in a bit-field as specified in 15.6 to 15.11 in X.691, the leading bit of the bit string value shall be placed in the leading bit of the bit-field, and the trailing bit of the bit string value shall be placed in the trailing bit of the bit-field.

  NOTE: The terms 'leading bit' and 'trailing bit' are defined in ITU-T Rec. X.680. When using the 'bstring' notation, the leading bit of the bit string value is on the left, and the trailing bit of the bit string value is on the right.

- When decoding types constrained with the ASN.1 Contents Constraint ("CONTAINING"), automatic decoding of the contained type should not be performed because errors in the decoding of the contained type should not cause the decoding of the entire RRC message PDU to fail. It is recommended that the decoder first decodes the
outer PDU type that contains the OCTET STRING or BIT STRING with the Contents Constraint, and then
decodes the contained type that is nested within the OCTET STRING or BIT STRING as a separate step.

- When decoding a) RRC message PDUs, b) BIT STRING constrained with a Contents Constraint, or c) OCTET
STRING constrained with a Contents Constraint, PER decoders are required to never report an error if there are
extraneous zero or non-zero bits at the end of the encoded RRC message PDU, BIT STRING or OCTET
STRING.

8.2 Structure of encoded RRC messages

An RRC PDU, which is the bit string that is exchanged between peer entities/ across the radio interface contains the
basic production as defined in X.691.

RRC PDUs shall be mapped to and from PDCP SDUs (in case of DCCH) or RLC SDUs (in case of PCCH, BCCH, BR-
BCCH, CCCH or MCCH) upon transmission and reception as follows:

- when delivering an RRC PDU as an PDCP SDU to the PDCP layer for transmission, the first bit of the RRC
PDU shall be represented as the first bit in the PDCP SDU and onwards; and

- when delivering an RRC PDU as an RLC SDU to the RLC layer for transmission, the first bit of the RRC PDU
shall be represented as the first bit in the RLC SDU and onwards; and

- upon reception of an PDCP SDU from the PDCP layer, the first bit of the PDCP SDU shall represent the first bit
of the RRC PDU and onwards; and

- upon reception of an RLC SDU from the RLC layer, the first bit of the RLC SDU shall represent the first bit of
the RRC PDU and onwards.

8.3 Basic production

The 'basic production' is obtained by applying UNALIGNED PER to the abstract syntax value (the ASN.1 description)
as specified in X.691. It always contains a multiple of 8 bits.

8.4 Extension

The following rules apply with respect to the use of protocol extensions:

- A transmitter compliant with this version of the specification shall, unless explicitly indicated otherwise on a
PDU type basis, set the extension part empty. Transmitters compliant with a later version may send non-empty
extensions;

- A transmitter compliant with this version of the specification shall set spare bits to zero;

8.5 Padding

If the encoded RRC message does not fill a transport block, the RRC layer shall add padding bits. This applies to
PCCH, BCCH and BR-BCCH.

Padding bits shall be set to 0 and the number of padding bits is a multiple of 8.
9 Specified and default radio configurations

Specified and default configurations are configurations of which the details are specified in the standard. Specified configurations are fixed while default configurations can be modified using dedicated signalling.

9.1 Specified configurations

9.1.1 Logical channel configurations

9.1.1.1 BCCH configuration

Parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDCP configuration</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RLC configuration</td>
<td>TM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAC configuration</td>
<td>TM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: RRC will perform padding, if required due to the granularity of the TF signalling, as defined in 8.5.

9.1.1.2 CCCH configuration

Parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDCP configuration</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RLC configuration</td>
<td>TM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAC configuration</td>
<td>TM</td>
<td>Normal MAC headers are used</td>
<td></td>
</tr>
<tr>
<td>Logical channel configuration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>priority</td>
<td>1</td>
<td>Highest priority</td>
<td></td>
</tr>
<tr>
<td>prioritisedBitRate</td>
<td>infinity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bucketSizeDuration</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>logicalChannelGroup</td>
<td>0</td>
<td></td>
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</table>
### 9.1.1.3 PCCH configuration

Parameters

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<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>logicalChannelSR-Mask-r9</td>
<td>release</td>
<td></td>
<td>v920</td>
</tr>
</tbody>
</table>

NOTE: RRC will perform padding, if required due to the granularity of the TF signalling, as defined in 8.5.

### 9.1.1.4 MCCH and MTCH configuration

Parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDCP configuration</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>RLC configuration</td>
<td>TM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAC configuration</td>
<td>TM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>sn-FieldLength</td>
<td>size5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-Reordering</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 9.1.1.5 SBCCH configuration

Parameters

<table>
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<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDCP configuration</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RLC configuration</td>
<td>TM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAC configuration</td>
<td>TM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: RRC will perform padding, if required due to the granularity of the TF signalling, as defined in 8.5.

### 9.1.1.6 STCH configuration

Parameters

<table>
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<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDCP configuration</td>
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<td></td>
</tr>
<tr>
<td>discardTimer</td>
<td>Undefined</td>
<td>Up to UE implementation</td>
<td></td>
</tr>
<tr>
<td>pdcp-SN-Size</td>
<td>16</td>
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<td></td>
</tr>
<tr>
<td>maxCID</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>profiles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RLC configuration</td>
<td></td>
<td>Uni-directional UM RLC</td>
<td></td>
</tr>
<tr>
<td>sn-FieldLength</td>
<td>5</td>
<td>UM window size is set to 0</td>
<td></td>
</tr>
<tr>
<td>logicalChannelIdentity</td>
<td>undefined</td>
<td>Selected by the transmitting UE, up to UE implementation</td>
<td></td>
</tr>
<tr>
<td>Logical channel configuration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>priority</td>
<td>Undefined</td>
<td>Selected by the transmitting UE, up to UE implementation</td>
<td></td>
</tr>
<tr>
<td>prioritisedBitRate</td>
<td>undefined</td>
<td>Selected by the transmitting UE, up to UE implementation</td>
<td></td>
</tr>
<tr>
<td>bucketSizeDuration</td>
<td>undefined</td>
<td>Selected by the transmitting UE, up to UE implementation</td>
<td></td>
</tr>
<tr>
<td>logicalChannelGroup</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAC configuration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>maxHARQ-Tx</td>
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</tr>
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9.1.1.7 SC-MCCH and SC-MTCH configuration

Parameters

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<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDCP configuration</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RLC configuration</td>
<td>UM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sn-FieldLength</td>
<td>size5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-Reordering</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.1.1.8 BR-BCCH configuration

Parameters

<table>
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<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDCP configuration</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RLC configuration</td>
<td>TM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAC configuration</td>
<td>TM</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: RRC will perform padding, if required due to the granularity of the TF signalling, as defined in 8.5.

9.1.2 SRB configurations

9.1.2.1 SRB1

Parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLC configuration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>logicalChannelIdentity</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.1.2.1a SRB1bis

Parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLC configuration</td>
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</tr>
<tr>
<td>logicalChannelIdentity</td>
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</tr>
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</table>

9.1.2.2 SRB2

Parameters

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<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>logicalChannelIdentity</td>
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</tbody>
</table>

9.2 Default radio configurations

The following sections only list default values for REL-8 parameters included in protocol version v8.5.0. For all fields introduced in a later protocol version, the default value is "released" unless explicitly specified otherwise. If UE is to apply default configuration while it is configured with some critically extended fields, the UE shall apply the original version with only default values. For the following fields, introduced in a protocol version later than v8.5.0, the default corresponds with "value not applicable":

- `codeBookSubsetRestriction-v920`;
- `pmi-RI-Report`;

NOTE 1: Value "N/A" indicates that the UE does not apply a specific value (i.e. upon switching to a default configuration, E-UTRAN can not assume the UE keeps the previously configured value). This implies that E-UTRAN needs to configure a value before invoking the related functionality.

NOTE 2: In general, the signalling should preferably support a "release" option for fields introduced after v8.5.0. The "value not applicable" should be used restrictively, mainly limited to for fields which value is relevant only if another field is set to a value other than its default.

### 9.2.1 SRB configurations

#### 9.2.1.1 SRB1

**Parameters**

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>NB-IoT</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLC configuration</td>
<td>am</td>
<td>am</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ul-RLC-Config</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-PollRetransmit</td>
<td>ms45</td>
<td></td>
<td>ms25000</td>
<td>ms45</td>
</tr>
<tr>
<td>pollPDU</td>
<td>infinity</td>
<td></td>
<td>N/A</td>
<td>infinity</td>
</tr>
<tr>
<td>pollByte</td>
<td>infinity</td>
<td></td>
<td>N/A</td>
<td>infinity</td>
</tr>
<tr>
<td>maxRetxThreshold</td>
<td>t4</td>
<td></td>
<td>t4</td>
<td></td>
</tr>
<tr>
<td>dl-RLC-Config</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-Reordering</td>
<td>ms35</td>
<td></td>
<td>N/A</td>
<td>ms35</td>
</tr>
<tr>
<td>t-StatusProhibit</td>
<td>ms0</td>
<td></td>
<td>N/A</td>
<td>ms0</td>
</tr>
<tr>
<td>enableStatusReportSN-Gap</td>
<td>N/A</td>
<td></td>
<td>disabled</td>
<td>N/A</td>
</tr>
<tr>
<td>Logical channel configuration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>priority</td>
<td>1</td>
<td>1</td>
<td>Highest priority</td>
<td></td>
</tr>
<tr>
<td>prioritisedBitRate</td>
<td>infinity</td>
<td></td>
<td>N/A</td>
<td>infinity</td>
</tr>
<tr>
<td>bucketSizeDuration</td>
<td>N/A</td>
<td></td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>logicalChannelGroup</td>
<td>0</td>
<td></td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>logicalChannelSR-Prohibit</td>
<td>N/A</td>
<td>TRUE</td>
<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>

#### 9.2.1.2 SRB2

**Parameters**

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLC configuration</td>
<td>am</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ul-RLC-Config</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-PollRetransmit</td>
<td>ms45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pollPDU</td>
<td>infinity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pollByte</td>
<td>infinity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>maxRetxThreshold</td>
<td>t4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>dl-RLC-Config</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-Reordering</td>
<td>ms35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-StatusProhibit</td>
<td>ms0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Logical channel configuration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>priority</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>prioritisedBitRate</td>
<td>infinity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bucketSizeDuration</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>logicalChannelGroup</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 9.2.2 Default MAC main configuration

**Parameters**

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>NB-IoT</th>
<th>Semantics description</th>
<th>Ver</th>
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</thead>
<tbody>
<tr>
<td>MAC main configuration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 9.2.3 Default semi-persistent scheduling configuration

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>maxHARQ-tx</td>
<td>n5</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>periodicBSR-Timer</td>
<td>infinity</td>
<td>pp8</td>
<td></td>
</tr>
<tr>
<td>retxBSR-Timer</td>
<td>sf2560</td>
<td>infinity</td>
<td></td>
</tr>
<tr>
<td>ttiBundling</td>
<td>FALSE</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>drx-Config</td>
<td>release</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>phr-Config</td>
<td>release</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

### 9.2.4 Default physical channel configuration

Parameters (not applicable for NB-IoT)

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDSCH-ConfigDedicated</td>
<td>dB0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; p-a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PUCCH-ConfigDedicated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; tdd-AckNackFeedbackMode</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;ackNackRepetition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; bundling</td>
<td>release</td>
<td>Only valid for TDD mode</td>
<td></td>
</tr>
<tr>
<td>PUSCH-ConfigDedicated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;betaOffset-ACK-Index</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;betaOffset-RI-Index</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;betaOffset-CQI-Index</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UplinkPowerControlDedicated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;p0-UE-PUSCH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;deltaMCS-Enabled</td>
<td>en0 (disabled)</td>
<td>TRUE</td>
<td></td>
</tr>
<tr>
<td>&gt;accumulationEnabled</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;p0-UE-PUCCH</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;pSRS-Offset</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; filterCoefficient</td>
<td>fc4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>tpc-pdcch-ConfigPUCCH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tpc-pdcch-ConfigPUSCH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CQI-ReportConfig</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; CQI-ReportPeriodic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; cqi-ReportModeAperiodic</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; nomPDSCH-RS-EPRE-Offset</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SoundingRS-UL-ConfigDedicated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AntennaInfoDedicated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;transmissionMode</td>
<td>tm1, tm2</td>
<td>If the number of PBCH antenna ports is one, tm1 is used as default; otherwise tm2 is used as default</td>
<td></td>
</tr>
<tr>
<td>&gt;codebookSubsetRestriction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;ue-TransmitAntennaSelection</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SchedulingRequestConfig</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Parameters applicable for NB-IoT

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPUSCH-ConfigDedicated-NB</td>
<td>r8</td>
<td>TRUE</td>
<td></td>
</tr>
<tr>
<td>&gt; ack-NACK-NumRepetitions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; npusch-AllSymbols</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UplinkPowerControlDedicated-NB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;p0-UE-NPUSCH</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9.2.5 Default values timers and constants

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>t310</td>
<td>ms1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n310</td>
<td>n1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t311</td>
<td>ms1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n311</td>
<td>n1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9.3 Sidelink pre-configured parameters

9.3.1 Specified parameters

This section only list parameters which value is specified in the standard.

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Semantics description</th>
<th>Ver</th>
</tr>
</thead>
<tbody>
<tr>
<td>preconfigSync</td>
<td>&gt;syncTxParameters &gt;&gt;alpha</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>preconfigComm</td>
<td>&gt;sc-TxParameters &gt;&gt;alpha</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;dataTxParameters &gt;&gt;alpha</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

9.3.2 Pre-configurable parameters

This ASN.1 segment is the start of the E-UTRA definitions of pre-configured sidelink parameters.

NOTE 1: Upper layers are assumed to provide a set of pre-configured parameters that are valid at the current UE location if any, see TS 24.334 [69, 10.2].

```
-- ASN1START

EUTRA-Sidelink-Preconf DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

AdditionalSpectrumEmission,
ARFCN-ValueEUTRA-r9,
FilterCoefficient,
maxSL-TxPool-r12,
maxSL-CommRxPoolPreconf-v1310,
maxSL-CommTxPoolPreconf-v1310,
maxSL-DiscRxPoolPreconf-r13,
```
SL-Preconfiguration

The IE **SL-Preconfiguration** includes the sidelink pre-configured parameters.

**SL-Preconfiguration information elements**

---

```asn1
SL-Preconfiguration-r12 ::= SEQUENCE {
    preconfigGeneral-r12             SL-PreconfigGeneral-r12,
    preconfigSync-r12                SL-PreconfigSync-r12,
    preconfigComm-r12                SL-PreconfigCommPoolList4-r12,
    ...,
    [[ preconfigComm-v1310             SEQUENCE {
        commRxPoolList-r13            SL-PreconfigCommRxPoolList-r13,
        commTxPoolList-r13            SL-PreconfigCommTxPoolList-r13                 OPTIONAL
    }                  OPTIONAL,
    preconfigDisc-r13                SEQUENCE {
        discRxPoolList-r13           SL-PreconfigDiscRxPoolList-r13,
    }
}                  OPTIONAL,
```
discTxPoolList-r13  SL-PreconfigDiscTxPoolList-r13  OPTIONAL
}

preconfigRelay-r13  SL-PreconfigRelay-r13  OPTIONAL

SL-PreconfigGeneral-r12 ::= SEQUENCE {
  -- PDCP configuration
  rohc-Profiles-r12  SEQUENCE {
    profile0x0001-r12 BOOLEAN,
    profile0x0002-r12 BOOLEAN,
    profile0x0004-r12 BOOLEAN,
    profile0x0006-r12 BOOLEAN,
    profile0x0101-r12 BOOLEAN,
    profile0x0102-r12 BOOLEAN,
    profile0x0104-r12 BOOLEAN
  },
  -- Physical configuration
  carrierFreq-r12  ARFCN-ValueEUTRA-r9,
  maxTxPower-r12  P-Max,
  additionalSpectrumEmission-r12  AdditionalSpectrumEmission,
  sl-bandwidth-r12  ENUMERATED {n6, n15, n25, n50, n75, n100},
  tdd-ConfigSL-r12  TDD-ConfigSL-r12,
  reserved-r12  BIT STRING (SIZE (19)),
  ...
}

SL-PreconfigSync-r12 ::= SEQUENCE {
  syncCP-Len-r12  SL-CP-Len-r12,
  syncOffsetIndicator1-r12  SL-OffsetIndicatorSync-r12,
  syncOffsetIndicator2-r12  SL-OffsetIndicatorSync-r12,
  syncTxParameters-r12  P0-SL-r12,
  syncTxThreshOoC-r12  RSRP-RangeSL3-r12,
  filterCoefficient-r12  FilterCoefficient,
syncRefMinHyst-r12 ENUMERATED {dB0, dB3, dB6, dB9, dB12},
syncRefDiffHyst-r12 ENUMERATED {dB0, dB3, dB6, dB9, dB12, dBinf},
...
[[ syncTxPeriodic-r13 ENUMERATED {true} OPTIONAL ]]
}

SL-PreconfigCommPoolList4-r12 ::= SEQUENCE (SIZE (1..maxSL-TxPool-r12)) OF SL-PreconfigCommPool-r12

SL-PreconfigCommRxPoolList-r13 ::= SEQUENCE (SIZE (1..maxSL-CommRxPoolPreconf-v1310)) OF SL-PreconfigCommPool-r12

SL-PreconfigCommTxPoolList-r13 ::= SEQUENCE (SIZE (1..maxSL-CommTxPoolPreconf-v1310)) OF SL-PreconfigCommPool-r12

SL-PreconfigCommPool-r12 ::=  SEQUENCE {
-- This IE is same as SL-CommResourcePool with rxParametersNCell absent
  sc-CP-Len-r12 SL-CP-Len-r12,
  sc-Period-r12 SL-PeriodComm-r12,
  sc-TF-ResourceConfig-r12 SL-TF-ResourceConfig-r12,
  sc-TxParameters-r12 P0-SL-r12,
  data-CP-Len-r12 SL-CP-Len-r12,
  data-TF-ResourceConfig-r12 SL-TF-ResourceConfig-r12,
  dataHoppingConfig-r12 SL-HoppingConfigComm-r12,
  dataTxParameters-r12 P0-SL-r12,
  trpt-Subset-r12 SL-TRPT-Subset-r12,
  ...
  [[ priorityList-r13 SL-PriorityList-r13 OPTIONAL -- For Tx ]]
}

SL-PreconfigDiscRxPoolList-r13 ::= SEQUENCE (SIZE (1..maxSL-DiscRxPoolPreconf-r13)) OF SL-PreconfigDiscPool-r13

SL-PreconfigDiscTxPoolList-r13 ::= SEQUENCE (SIZE (1..maxSL-DiscTxPoolPreconf-r13)) OF SL-PreconfigDiscPool-r13
SL-PreconfigDiscPool-r13 ::= SEQUENCE {
  -- This IE is same as SL-DiscResourcePool with rxParameters absent
  cp-Len-r13              SL-CP-Len-r12,
  discPeriod-r13          ENUMERATED {rf4, rf6, rf7, rf8, rf12, rf14, rf16, rf24, rf28,
                                  rf32, rf64, rf128, rf256, rf512, rf1024, spare},
  numRetx-r13             INTEGER (0..3),
  numRepetition-r13       INTEGER (1..50),
  tf-ResourceConfig-r13   SL-TF-ResourceConfig-r12,
  txParameters-r13        SEQUENCE {
    txParametersGeneral-r13  P0-SL-r12,
    txProbability-r13      ENUMERATED {p25, p50, p75, p100}
  } OPTIONAL,
  ...
}

SL-PreconfigRelay-r13 ::= SEQUENCE {
  reselectionInfoOoC-r13  ReselectionInfoRelay-r13
}

END

-- ASN1STOP

--- SL-Preconfiguration field descriptions ---

carrierFreq
Indicates the carrier frequency for out of coverage sidelink communication and sidelink discovery. In case of FDD it is uplink carrier frequency and the corresponding downlink frequency can be determined from the default TX-RX frequency separation defined in TS 36.101 [42, table 5.7.3-1].

commRxPoolList
Indicates a list of reception pools for sidelink communication in addition to the resource pools indicated by preconfigComm.

commTxPoolList
Indicates a list of transmission pools for sidelink communication in addition to the first resource pool within preconfigComm.

preconfigComm
Indicates a list of resource pools. The first resource pool in the list is used for both reception and transmission of sidelink communication. The other resource pools, if present, are only used for reception of sidelink communication.

syncRefDiffHyst
Hysteresis when evaluating a SyncRef UE using relative comparison. Value $dB0$ corresponds to 0 dB, $dB3$ to 3 dB and so on, value $dBinf$ corresponds to infinite dB.

syncRefMinHyst
Hysteresis when evaluating a SyncRef UE using absolute comparison. Value $dB0$ corresponds to 0 dB, $dB3$ to 3 dB and so on.
NOTE 1: The network may configure one or more of the reception only resource pools in preconfigComm to cover reception from in coverage UEs using scheduled resource allocation. For such a resource pool the network should set all bits of subframeBitmap to 1 and offsetIndicator to indicate the subframe immediately following the sidelink control information.

NOTE 2: The network should ensure that the resources defined by the first entry in preconfigComm (used for transmission by an out of coverage UE) do not overlap with those of the pool(s) covering scheduled transmissions by in coverage UEs. Furthermore, the network should ensure that for none of the entries in preconfigComm the resources defined by sc-TF-ResourceConfig overlap.

10 Radio information related interactions between network nodes

10.1 General

This section specifies RRC messages that are transferred between network nodes. These RRC messages may be transferred to or from the UE via another Radio Access Technology. Consequently, these messages have similar characteristics as the RRC messages that are transferred across the E-UTRA radio interface, i.e. the same transfer syntax and protocol extension mechanisms apply.

10.2 Inter-node RRC messages

10.2.1 General

This section specifies RRC messages that are sent either across the X2- or the S1-interface, either to or from the eNB, i.e. a single 'logical channel' is used for all RRC messages transferred across network nodes. The information could originate from or be destined for another RAT.

-- EUTRA-InterNodeDefinitions

This ASN.1 segment is the start of the E-UTRA inter-node PDU definitions.

-- ASN1START

EUTRA-InterNodeDefinitions DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

AntennaInfoCommon,
AntennaInfoDedicated-v10i0,
ARFCN-ValueEUTRA,
ARFCN-ValueEUTRA-v9e0,
ARFCN-ValueEUTRA-r9,
CellIdentity,
C-RNTI,
DL-DCCH-Message,
DRB-Identity,
DRB-ToReleaseList,
FreqBandIndicator-r11,
InDeviceCoexIndication-r11,
MasterInformationBlock,
maxBands,
maxFreq,
maxDRB,
maxSCell-r10,
maxSCell-r13,
maxServCell-r10,
maxServCell-r13,
MBMSInterestIndication-r11,
MeasConfig,
MeasGapConfig,
MeasResultForRSSI-r13,
OtherConfig-r9,
PhysCellId,
P-Max,
PowerCoordinationInfo-r12,
SidelinkUEInformation-r12,
SL-CommConfig-r12,
SL-DiscConfig-r12,
RadioResourceConfigDedicated,
RCLWI-Configuration-r13,
RSRP-Range,
RSRQ-Range,
RSRQ-Range-v1250,
RS-SINR-Range-r13,
SCellToAddModList-r10,
SCellToAddModListExt-r13,
SCG-ConfigPartSCG-r12,
SecurityAlgorithmConfig,
SCellIndex-r10,
10.2.2 Message definitions

`HandoverCommand`

This message is used to transfer the handover command generated by the target eNB.

**Direction:** target eNB to source eNB/ source RAN

**HandoverCommand message**

```
-- ASN1START

HandoverCommand ::= SEQUENCE {
  criticalExtensions CHOICE {
    c1 CHOICE {
      handoverCommand-r8 HandoverCommand-r8-IEs,
      spare7 NULL,
      spare6 NULL, spare5 NULL, spare4 NULL,
      spare3 NULL, spare2 NULL, spare1 NULL
    } 0
  }
}

-- ASN1STOP
```
HandoverCommand-r8-IEs ::= SEQUENCE {
    handoverCommandMessage
        OCTET STRING (CONTAINING DL-DCCH-Message),
    nonCriticalExtension
        SEQUENCE {} OPTIONAL
}

-- ASN1STOP

### HandoverCommand field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>handoverCommandMessage</td>
<td>Contains the entire DL-DCCH-Message including the RRCConnectionReconfiguration message used to perform handover within E-UTRAN or handover to E-UTRAN, generated (entirely) by the target eNB.</td>
</tr>
</tbody>
</table>

**NOTE:** The source BSC, in case of inter-RAT handover from GERAN to E-UTRAN, expects that the HandoverCommand message includes DL-DCCH-Message only. Thus, criticalExtensionsFuture, spare1-spare7 and nonCriticalExtension should not be used regardless whether the source RAT is E-UTRAN, UTRAN or GERAN.

- **HandoverPreparationInformation**

  This message is used to transfer the E-UTRA RRC information used by the target eNB during handover preparation, including UE capability information.

  Direction: source eNB/ source RAN to target eNB

**HandoverPreparationInformation message**

-- ASN1START

HandoverPreparationInformation ::= SEQUENCE {
    criticalExtensions
        CHOICE {
        c1
            CHOICE{
                handoverPreparationInformation-r8
                    HandoverPreparationInformation-r8-IEs,
                spare7 NULL,
                spare6 NULL, spare5 NULL, spare4 NULL,
                spare3 NULL, spare2 NULL, spare1 NULL
            },
    criticalExtensionsFuture
        SEQUENCE {}
HandoverPreparationInformation-r8-IEs ::= SEQUENCE {
  ue-RadioAccessCapabilityInfo  UE-CapabilityRAT-ContainerList,
  as-Config       AS-Config     OPTIONAL,   -- Cond HO
  rrm-Config       RRM-Config     OPTIONAL,
  as-Context       AS-Context    OPTIONAL,   -- Cond HO
  nonCriticalExtension    HandoverPreparationInformation-v920-IEs  OPTIONAL
}

HandoverPreparationInformation-v920-IEs ::= SEQUENCE {
  ue-ConfigRelease-r9     ENUMERATED {
    rel9, rel10, rel11, rel12, v10j0, v11e0,
    v1280, rel13, ...}    OPTIONAL,  -- Cond HO2
  nonCriticalExtension    HandoverPreparationInformation-v9d0-IEs  OPTIONAL
}

HandoverPreparationInformation-v9d0-IEs ::= SEQUENCE {
  lateNonCriticalExtension   OCTET STRING (CONTAINING HandoverPreparationInformation-v9j0-IEs)
    OPTIONAL,
  nonCriticalExtension    HandoverPreparationInformation-v9e0-IEs   OPTIONAL
}

-- Late non-critical extensions:
HandoverPreparationInformation-v9j0-IEs ::= SEQUENCE {
  -- Following field is only for pre REL-10 late non-critical extensions
  lateNonCriticalExtension   OCTET STRING               OPTIONAL,
  nonCriticalExtension    HandoverPreparationInformation-v10j0-IEs  OPTIONAL
}

HandoverPreparationInformation-v10j0-IEs ::= SEQUENCE {
  as-Config-v10j0      AS-Config-v10j0   OPTIONAL,
  -- Following field is only for late non-critical extensions from REL-10
  nonCriticalExtension    SEQUENCE {}    OPTIONAL
}
-- Regular non-critical extensions:
HandoverPreparationInformation-v9e0-IEs ::= SEQUENCE {
  as-Config-v9e0              AS-Config-v9e0     OPTIONAL,  -- Cond HO2
  nonCriticalExtension       HandoverPreparationInformation-v1130-IEs OPTIONAL
}

HandoverPreparationInformation-v1130-IEs ::= SEQUENCE {
  as-Context-v1130            AS-Context-v1130    OPTIONAL,  -- Cond HO2
  nonCriticalExtension       HandoverPreparationInformation-v1250-IEs OPTIONAL
}

HandoverPreparationInformation-v1250-IEs ::= SEQUENCE {
  ue-SupportedEARFCN-r12      ARFCN-ValueEUTRA-r9    OPTIONAL,  -- Cond HO3
  as-Config-v1250             AS-Config-v1250     OPTIONAL,  -- Cond HO2
  nonCriticalExtension       HandoverPreparationInformation-v1320-IEs OPTIONAL
}

HandoverPreparationInformation-v1320-IEs ::= SEQUENCE {
  as-Config-v1320             AS-Config-v1320     OPTIONAL,  -- Cond HO2
  as-Context-v1320            AS-Context-v1320    OPTIONAL,  -- Cond HO2
  nonCriticalExtension       SEQUENCE {}            OPTIONAL
}

-- ASN1STOP
HandoverPreparationInformation field descriptions

**as-Config**
The radio resource configuration. Applicable in case of intra-E-UTRA handover. If the target receives an incomplete MeasConfig and RadioResourceConfigDedicated in the as-Config, the target eNB may decide to apply the full configuration option based on the ue-ConfigRelease.

**as-Context**
Local E-UTRAN context required by the target eNB.

**rrm-Config**
Local E-UTRAN context used depending on the target node’s implementation, which is mainly used for the RRM purpose.

**ue-ConfigRelease**
Indicates the RRC protocol release or version applicable for the current UE configuration. This could be used by target eNB to decide if the full configuration approach should be used. If this field is not present, the target assumes that the current UE configuration is based on the release 8 version of RRC protocol. NOTE 1.

**ue-RadioAccessCapabilityInfo**
For E-UTRA radio access capabilities, it is up to E-UTRA how the backward compatibility among supportedBandCombinationReduced, supportedBandCombination and supportedBandCombinationAdd is ensured. If supportedBandCombinationReduced and supportedBandCombination/supportedBandCombinationAdd are included into ueCapabilityRAT-Container, it can be assumed that the value of fields, requestedBands, reducedIntNonContCombRequested and requestedCCsXL are consistent with all supported band combination fields. NOTE 2

**ue-SupportedEARFCN**
Includes UE supported EARFCN of the handover target E-UTRA cell if the target E-UTRA cell belongs to multiple frequency bands.

NOTE 1: The source typically sets the ue-ConfigRelease to the release corresponding with the current dedicated radio configuration. The source may however also consider the common radio resource configuration e.g. in case interoperability problems would appear if the UE temporary continues extensions of this part of the configuration in a target PCell not supporting them.

NOTE 2: The following table indicates per source RAT whether RAT capabilities are included or not.

<table>
<thead>
<tr>
<th>Source RAT</th>
<th>E-UTRA capabilities</th>
<th>UTRA capabilities</th>
<th>GERAN capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTRAN</td>
<td>Included</td>
<td>May be included, ignored by eNB if received</td>
<td>May be included</td>
</tr>
<tr>
<td>GERAN CS</td>
<td>Excluded</td>
<td>May be included, ignored by eNB if received</td>
<td>Included</td>
</tr>
<tr>
<td>GERAN PS</td>
<td>Excluded</td>
<td>May be included, ignored by eNB if received</td>
<td>Included</td>
</tr>
<tr>
<td>E-UTRAN</td>
<td>Included</td>
<td>May be included</td>
<td>May be included</td>
</tr>
</tbody>
</table>

**Conditional presence**

<table>
<thead>
<tr>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>HO</td>
</tr>
<tr>
<td>HO2</td>
</tr>
<tr>
<td>HO3</td>
</tr>
</tbody>
</table>

---

**SCG-Config**

This message is used to transfer the SCG radio configuration generated by the SeNB.

**Direction:** Secondary eNB to master eNB

**SCG-Config message**

```asn1
SCG-Config-r12 ::= SEQUENCE {
```
criticalExtensions       CHOICE {
  c1         CHOICE{
    scg-Config-r12     SCG-Config-r12-IEs,
    spare7 NULL,
    spare6 NULL, spare5 NULL, spare4 NULL,
    spare3 NULL, spare2 NULL, spare1 NULL
  },
  criticalExtensionsFuture   SEQUENCE {}
}
}

SCG-Config-r12-IEs ::=    SEQUENCE {
  scg-RadioConfig-r12     SCG-ConfigPartSCG-r12    OPTIONAL,
  nonCriticalExtension    SEQUENCE {}       OPTIONAL
}

--- ASN1STOP

### SCG-Config field descriptions

**scg-RadioConfig-r12**
Includes the change of the dedicated SCG configuration and, upon addition of an SCG cell, the common SCG configuration.
The SeNB only includes a new SCG cell in response to a request from MeNB, but may include release of an SCG cell or release of the SCG part of an SCG/Split DRB without prior request from MeNB. The SeNB does not use this field to initiate release of the SCG.

---

**SCG-ConfigInfo**
This message is used by MeNB to request the SeNB to perform certain actions e.g. to establish, modify or release an SCG, and it may include additional information e.g. to assist the SeNB with assigning the SCG configuration.

Direction: Master eNB to secondary eNB

### SCG-ConfigInfo message

--- ASN1START

SCG-ConfigInfo-r12 ::=    SEQUENCE {
  criticalExtensions       CHOICE {
    c1         CHOICE{
      scg-ConfigInfo-r12     SCG-ConfigInfo-r12-IEs,
      spare7 NULL,
    }
  }
}

--- ASN1STOP
spare6 NULL, spare5 NULL, spare4 NULL,
    spare3 NULL, spare2 NULL, spare1 NULL
    ),
    criticalExtensionsFuture  SEQUENCE { }
    }
}

SCG-ConfigInfo-r12-IEs ::=   SEQUENCE { 
    radioResourceConfigDedMCG-r12 RadioResourceConfigDedicated OPTIONAL, 
    sCellToAddModListMCG-r12 SCellToAddModList-r10 OPTIONAL, 
    measGapConfig-r12 MeasGapConfig OPTIONAL, 
    powerCoordinationInfo-r12 PowerCoordinationInfo-r12 OPTIONAL, 
    scg-RadioConfig-r12 SCG-ConfigPartSCG-r12 OPTIONAL, 
    eutra-CapabilityInfo-r12 OCTET STRING (CONTAINING UECapabilityInformation) OPTIONAL, 
    scg-ConfigRestrictInfo-r12 SCG-ConfigRestrictInfo-r12 OPTIONAL, 
    mbmsInterestIndication-r12 OCTET STRING (CONTAINING MBMSInterestIndication-r11) OPTIONAL, 
    measResultServCellListSCG-r12 MeasResultServCellListSCG-r12 OPTIONAL, 
    drb-ToAddModListSCG-r12 DRB-InfoListSCG-r12 OPTIONAL, 
    drb-ToReleaseListSCG-r12 DRB-ToReleaseList OPTIONAL, 
    sCellToAddModListSCG-r12 SCellToAddModListSCG-r12 OPTIONAL, 
    sCellToReleaseListSCG-r12 SCellToReleaseList-r10 OPTIONAL, 
    p-Max-r12 P-Max OPTIONAL, 
    nonCriticalExtension   SCG-ConfigInfo-v1310-IEs OPTIONAL 
    }

SCG-ConfigInfo-v1310-IEs ::=  SEQUENCE { 
    measResultSSTD-r13  MeasResultSSTD-r13 OPTIONAL, sCellToAddModListMCG-Ext-r13 SCellToAddModListExt-r13 OPTIONAL, 
    measResultServCellListSCG-Ext-r13 MeasResultServCellListSCG-Ext-r13 OPTIONAL, 
    sCellToAddModListSCG-Ext-r13 SCellToAddModListSCG-Ext-r13 OPTIONAL, 
    sCellToReleaseListSCG-Ext-r13 SCellToReleaseListExt-r13 OPTIONAL, 
    nonCriticalExtension   SCG-ConfigInfo-v1330-IEs OPTIONAL 
    }
SCG-ConfigInfo-v1330-IEs ::= SEQUENCE {
  measResultListRSSI-SCG-r13  MeasResultListRSSI-SCG-r13  OPTIONAL,
  nonCriticalExtension  SEQUENCE {}  OPTIONAL
}

DRB-InfoListSCG-r12 ::= SEQUENCE (SIZE (1..maxDRB)) OF DRB-InfoSCG-r12

DRB-InfoSCG-r12 ::= SEQUENCE {
  eps-BearerIdentity-r12  INTEGER (0..15)  OPTIONAL, -- Cond DRB-Setup
  drb-Identity-r12  DRB-Identity,
  drb-Type-r12  ENUMERATED {split, scg}  OPTIONAL, -- Cond DRB-Setup
  ...    
}

SCellToAddModListSCG-r12 ::= SEQUENCE (SIZE (1..maxSCell-r10)) OF Cell-ToAddMod-r12

SCellToAddModListSCG-Ext-r13 ::= SEQUENCE (SIZE (1..maxSCell-r13)) OF Cell-ToAddMod-r12

Cell-ToAddMod-r12 ::= SEQUENCE {
  sCellIndex-r12  SCellIndex-r10,
  cellIdentification-r12  SEQUENCE {
    physCellId-r12  PhysCellId,
    dl-CarrierFreq-r12  ARFCN-ValueEUTRA-r9
  }  OPTIONAL, -- Cond SCellAdd
  measResultCellToAdd-r12  SEQUENCE {
    rsrpResult-r12  RSRP-Range,
    rsrqResult-r12  RSRQ-Range
  }  OPTIONAL, -- Cond SCellAdd2
  ...    
[[  sCellIndex-r13  SCellIndex-r13  OPTIONAL,
    measResultCellToAdd-v1310  SEQUENCE {
      rs-sinr-Result-r13  RS-SINR-Range-r13
    }  OPTIONAL  -- Cond SCellAdd2
  ]]
}
MeasResultServCellListSCG-r12 ::= SEQUENCE (SIZE (1..maxServCell-r10)) OF MeasResultServCellSCG-r12

MeasResultServCellListSCG-Ext-r13 ::= SEQUENCE (SIZE (1..maxServCell-r13)) OF MeasResultServCellSCG-r12

MeasResultServCellSCG-r12 ::= SEQUENCE {
  servCellId-r12 ServCellIndex-r10,
  measResultSCell-r12 SEQUENCE {
    rsrpResultSCell-r12 RSRP-Range,
    rsrcqResultSCell-r12 RSRQ-Range
  }
}

MeasResultServCellSCG-r13 ::= SEQUENCE (SIZE (1..maxServCell-r13)) OF MeasResultServCellSCG-r12

MeasResultListRSSI-SCG-r13 ::= SEQUENCE (SIZE (1..maxServCell-r13)) OF MeasResultRSSI-SCG-r13

MeasResultRSSI-SCG-r13 ::= SEQUENCE {
  servCellId-r13 ServCellIndex-r13,
  measResultForRSSI-r13 MeasResultForRSSI-r13
}

SCG-ConfigRestrictInfo-r12 ::= SEQUENCE {
  maxSCH-TB-BitsDL-r12 INTEGER (1..100),
  maxSCH-TB-BitsUL-r12 INTEGER (1..100)
}
UEPagingCoverageInformation

This message is used to transfer UE paging coverage information, covering both upload to and download from the EPC.

Direction: eNB to/from EPC

UEPagingCoverageInformation message

-- ASN1START

UEPagingCoverageInformation ::= SEQUENCE {
  criticalExtensions  CHOICE {
    c 1,
  
  }

-- ASN1END

Conditional presence

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRB-Setup</td>
<td>The field is mandatory present in case DRB establishment is requested; otherwise the field is not present.</td>
</tr>
<tr>
<td>SCellAdd</td>
<td>The field is mandatory present in case SCG cell establishment is requested; otherwise the field is not present.</td>
</tr>
<tr>
<td>SCellAdd2</td>
<td>The field is optional present in case SCG cell establishment is requested; otherwise the field is not present.</td>
</tr>
</tbody>
</table>
UEPagingCoverageInformation-r13-IEs ::= SEQUENCE {
  mpdcch-NumRepetition-r13    INTEGER (1..256) OPTIONAL,
  nonCriticalExtension     SEQUENCE {}   OPTIONAL
}

-- ASN1STOP

**UEPagingCoverageInformation field descriptions**

*mpdcch-NumRepetition*
Number of repetitions for MPDCCH. The value is an estimate of the required number of repetitions for MPDCCH for paging.

**– UERadioAccessCapabilityInformation**

This message is used to transfer UE radio access capability information, covering both upload to and download from the EPC.

Direction: eNB to/ from EPC

**UERadioAccessCapabilityInformation message**

-- ASN1START

UERadioAccessCapabilityInformation ::= SEQUENCE {
  criticalExtensions     CHOICE {
    c1     CHOICE{
      ueRadioAccessCapabilityInformation-r8
        UERadioAccessCapabilityInformation-r8-IEs,
        spare7 NULL,
        spare6 NULL, spare5 NULL, spare4 NULL,
        spare3 NULL, spare2 NULL, spare1 NULL
    }
  }
}

-- ASN1STOP
Critical Extensions Future

```asn1
criticalExtensionsFuture   SEQUENCE {}
}
}

UERadioAccessCapabilityInformation-r8-IEs ::= SEQUENCE {
    ue-RadioAccessCapabilityInfo  OCTET STRING (CONTAINING UECapabilityInformation),
    nonCriticalExtension    SEQUENCE {}       OPTIONAL
}
```

---

**UERadioAccessCapabilityInformation field descriptions**

- **ue-RadioAccessCapabilityInfo**
  
  Including E-UTRA, GERAN, and CDMA2000-1xRTT Bandclass radio access capabilities (separated). UTRA radio access capabilities are not included. For E-UTRA radio access capabilities, it is up to E-UTRA how the backward compatibility among `supportedBandCombinationReduced`, `supportedBandCombination` and `supportedBandCombinationAdd` is ensured. If `supportedBandCombinationReduced` and `supportedBandCombination`/`supportedBandCombinationAdd` are included into `ueCapabilityRAT-Container`, it can be assumed that the value of fields, `requestedBands`, `reducedIntNonContCombRequested` and `requestedCCsXL` are consistent with all supported band combination fields.

---

**UERadioPagingInformation**

This message is used to transfer radio paging information, covering both upload to and download from the EPC.

Direction: eNB to/from EPC

---

**UERadioPagingInformation message**

```asn1
UERadioPagingInformation ::= SEQUENCE {
    criticalExtensions    CHOICE {
        c 1          CHOICE {
            ueRadioPagingInformation-r12   UERadioPagingInformation-r12-IEs,
            spare7 NULL,
            spare6 NULL, spare5 NULL, spare4 NULL,
            spare3 NULL, spare2 NULL, spare1 NULL 
        },
        criticalExtensionsFuture   SEQUENCE {} 
    }
}
```
UERadioPagingInformation-r12-IEs ::= SEQUENCE {
    ue-RadioPagingInfo-r12 OCTET STRING (CONTAINING UE-RadioPagingInfo-r12),
    nonCriticalExtension UERadioPagingInformation-v1310-IEs OPTIONAL
}

UERadioPagingInformation-v1310-IEs ::= SEQUENCE {
    supportedBandListEUTRAForPaging-r13 SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicator-r11 OPTIONAL,
    nonCriticalExtension SEQUENCE {} OPTIONAL
}

-- ASN1STOP

<table>
<thead>
<tr>
<th>UERadioPagingInformation field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ue-RadioPagingInfo</strong></td>
</tr>
<tr>
<td>The field is used to transfer UE capability information used for paging. The eNB generates the <strong>ue-RadioPagingInfo</strong> and the contained UE capability information is absent when not supported by the UE.</td>
</tr>
<tr>
<td><strong>supportedBandListEUTRAForPaging</strong></td>
</tr>
<tr>
<td>Indicates the UE supported frequency bands which is derived by the eNB from <strong>UE-EUTRA-Capability</strong>.</td>
</tr>
</tbody>
</table>

10.3 Inter-node RRC information element definitions

-- AS-Config

The **AS-Config** IE contains information about RRC configuration information in the source eNB which can be utilized by target eNB to determine the need to change the RRC configuration during the handover preparation phase. The information can also be used after the handover is successfully performed or during the RRC connection re-establishment.

**AS-Config** information element

-- ASN1START

AS-Config ::= SEQUENCE {
    sourceMeasConfig MeasConfig,
    sourceRadioResourceConfig RadioResourceConfigDedicated,
    sourceSecurityAlgorithmConfig SecurityAlgorithmConfig,
    sourceUE-Identity C-RNTI,
    sourceMasterInformationBlock MasterInformationBlock,
    sourceSystemInformationBlockType1 SystemInformationBlockType1(WITH COMPONENTS
sourceSystemInformationBlockType2 SystemInformationBlockType2, AntennaInfoCommon, ARFCN-ValueEUTRA,

[[ sourceSystemInformationBlockType1Ext OCTET STRING (CONTAINING SystemInformationBlockType1-v890-IEs) OPTIONAL, OtherConfig-r9 ]]

-- sourceOtherConfig-r9 should have been optional. A target eNB compliant with this transfer
-- syntax should support receiving an AS-Config not including this extension addition group
-- e.g. from a legacy source eNB
]
[[ sourceSCellConfigList-r10 SCellToAddModList-r10 OPTIONAL ]]
[[ sourceConfigSCG-r12 SCG-Config-r12 OPTIONAL ]]

AS-Config-v9e0 ::= SEQUENCE {
  sourceDl-CarrierFreq-v9e0 ARFCN-ValueEUTRA-v9e0
}

AS-Config-v10j0 ::= SEQUENCE {
  antennaInfoDedicatedPCell-v10j0 AntennaInfoDedicated-v10j0 OPTIONAL
}

AS-Config-v1250 ::= SEQUENCE {
  sourceWlan-OffloadConfig-r12 WLAN-OffloadConfig-r12 OPTIONAL,
  sourceSL-CommConfig-r12 SL-CommConfig-r12 OPTIONAL,
  sourceSL-DiscConfig-r12 SL-DiscConfig-r12 OPTIONAL
}

AS-Config-v1320 ::= SEQUENCE {
  sourceSCellConfigList-r13 SCellToAddModListExt-r13 OPTIONAL,
  sourceRCLWI-Configuration-r13 RCLWI-Configuration-r13 OPTIONAL
}
NOTE: The AS-Config re-uses information elements primarily created to cover the radio interface signalling requirements. Consequently, the information elements may include some parameters that are not relevant for the target eNB e.g. the SFN as included in the MasterInformationBlock.

**AS-Config field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>antennaInfoCommon</td>
<td>This field provides information about the number of antenna ports in the source PCell.</td>
</tr>
<tr>
<td>sourceDL-CarrierFreq</td>
<td>Provides the parameter Downlink EARFCN in the source PCell, see TS 36.101 [42]. If the source eNB provides AS-Config-v9e0, it sets sourceDL-CarrierFreq (i.e. without suffix) to maxEARFCN.</td>
</tr>
<tr>
<td>sourceOtherConfig</td>
<td>Provides other configuration in the source PCell.</td>
</tr>
<tr>
<td>sourceMasterInformationBlock</td>
<td>MasterInformationBlock transmitted in the source PCell.</td>
</tr>
<tr>
<td>sourceMeasConfig</td>
<td>Measurement configuration in the source cell. The measurement configuration for all measurements existing in the source eNB when handover is triggered shall be included. See 10.5.</td>
</tr>
<tr>
<td>sourceRCLWI-Configuration</td>
<td>RCLWI Configuration in the source PCell.</td>
</tr>
<tr>
<td>sourceSL-CommConfig</td>
<td>This field covers the sidelink communication configuration.</td>
</tr>
<tr>
<td>sourceSL-DiscConfig</td>
<td>This field covers the sidelink discovery configuration.</td>
</tr>
<tr>
<td>sourceRadioResourceConfig</td>
<td>Radio configuration in the source PCell. The radio resource configuration for all radio bearers existing in the source PCell when handover is triggered shall be included. See 10.5.</td>
</tr>
<tr>
<td>sourceSCellConfigList</td>
<td>Radio resource configuration (common and dedicated) of the SCells configured in the source eNB.</td>
</tr>
<tr>
<td>sourceSecurityAlgorithmConfig</td>
<td>This field provides the AS integrity protection (SRBs) and AS ciphering (SRBs and DRBs) algorithm configuration used in the source PCell.</td>
</tr>
<tr>
<td>sourceSystemInformationBlockType1</td>
<td>SystemInformationBlockType1 transmitted in the source PCell.</td>
</tr>
<tr>
<td>sourceSystemInformationBlockType2</td>
<td>SystemInformationBlockType2 transmitted in the source PCell.</td>
</tr>
</tbody>
</table>

---

**AS-Context**

The IE AS-Context is used to transfer local E-UTRAN context required by the target eNB.

**AS-Context information element**

```asn1
AS-Context ::= SEQUENCE {
  reestablishmentInfo  ReestablishmentInfo OPTIONAL -- Cond HO
}

AS-Context-v1130 ::= SEQUENCE {
```

ETSI
### idc-Indication
Including information used for handling the IDC problems.

#### Conditional presence

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HO</strong></td>
<td>The field is mandatory present in case of handover within E-UTRA; otherwise the field is not present.</td>
</tr>
<tr>
<td><strong>HO2</strong></td>
<td>The field is optional present in case of handover within E-UTRA; otherwise the field is not present.</td>
</tr>
</tbody>
</table>

---

### ReestablishmentInfo

The **ReestablishmentInfo** IE contains information needed for the RRC connection re-establishment.

**ReestablishmentInfo information element**

```
ReestablishmentInfo ::= SEQUENCE {
    sourcePhysCellId          PhysCellId,
    targetCellShortMAC-I      ShortMAC-I,
}
```
additionalReestabInfoList AdditionalReestabInfoList OPTIONAL,

... 

AdditionalReestabInfoList ::= SEQUENCE ( SIZE (1..maxReestabInfo) ) OF AdditionalReestabInfo

AdditionalReestabInfo ::= SEQUENCE{
    cellIdentity CellIdentity,
    key-eNodeB-Star Key-eNodeB-Star,
    shortMAC-I ShortMAC-I
}

Key-eNodeB-Star ::= BIT STRING (SIZE (256))

ReestablishmentInfo field descriptions

additionalReestabInfoList Contains a list of shortMAC-I and KeNB* for cells under control of the target eNB, required for potential re-establishment by the UE in these cells to succeed.

Key-eNodeB-Star Parameter KeNB*: See TS 33.401 [32, 7.2.8.4]. If the cell identified by cellIdentity belongs to multiple frequency bands, the source eNB selects the DL-EARFCN for the KeNB* calculation using the same logic as UE uses when selecting the DL-EARFCN in IDLE as defined in section 6.2.2. This parameter is only used for X2 handover, and for S1 handover, it shall be ignored by target eNB.

sourcePhyCellId The physical cell identity of the source PCell, used to determine the UE context in the target eNB at re-establishment.

targetCellShortMAC-I The ShortMAC-I for the handover target PCell, in order for potential re-establishment to succeed.

-- RRM-Config

The RRM-Config IE contains information about UE specific RRM information before the handover which can be utilized by target eNB.

RRM-Config information element

-- ASN1START

RRM-Config ::= SEQUENCE {
    ue-InactiveTime ENUMERATED {
        s1, s2, s3, s5, s7, s10, s15, s20,
        s25, s30, s40, s50, min1, min1s20c, min1s40,
        min2, min2s30, min3, min3s30, min4, min5, min6,
    }
}

-- ASN1STOP
min7, min8, min9, min10, min12, min14, min17, min20, min24, min28, min33, min38, min44, min50, hr1, hr1min30, hr2, hr2min30, hr3, hr3min30, hr4, hr5, hr6, hr8, hr10, hr13, hr16, hr20, day1, day1hr12, day2, day2hr12, day3, day4, day5, day7, day10, day14, day19, day24, day30, dayMoreThan30} OPTIONAL, ...

[[ candidateCellInfoList-r10 CandidateCellInfoList-r10 OPTIONAL
 ],
]

CandidateCellInfoList-r10 ::= SEQUENCE (SIZE (1..maxFreq)) OF CandidateCellInfo-r10

CandidateCellInfo-r10 ::= SEQUENCE {
  -- cellIdentification
  physCellId-r10 PhysCellId,
  dl-CarrierFreq-r10 ARFCN-ValueEUTRA,
  -- available measurement results
  rsrpResult-r10 RSRP-Range OPTIONAL,
  rsrqResult-r10 RSRQ-Range OPTIONAL,
  ..., 
  [[ dl-CarrierFreq-v1090 ARFCN-ValueEUTRA-v9e0 OPTIONAL
    ]], 
  [[ rsrqResult-v1250 RSRQ-Range-v1250 OPTIONAL
    ]], 
  [[ rs-sinr-Result-r13 RS-SINR-Range-r13 OPTIONAL
    ]]
}

-- ASN1STOP
### RRM-Config field descriptions

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>candidateCellInfoList</strong></td>
<td>A list of the best cells on each frequency for which measurement information was available, in order of decreasing RSRP.</td>
</tr>
<tr>
<td><strong>dl-CarrierFreq</strong></td>
<td>The source includes dl-CarrierFreq-v1090 if and only if dl-CarrierFreq-r10 is set to maxEARFCN.</td>
</tr>
<tr>
<td><strong>ue-InactiveTime</strong></td>
<td>Duration while UE has not received or transmitted any user data. Thus the timer is still running in case e.g., UE measures the neighbour cells for the HO purpose. Value s1 corresponds to 1 second, s2 corresponds to 2 seconds and so on. Value min1 corresponds to 1 minute, value min1s20 corresponds to 1 minute and 20 seconds, value min1s40 corresponds to 1 minute and 40 seconds and so on. Value hr1 corresponds to 1 hour, hr1min30 corresponds to 1 hour and 30 minutes and so on.</td>
</tr>
</tbody>
</table>

### 10.4 Inter-node RRC multiplicity and type constraint values

- Multiplicity and type constraints definitions

```asn1
maxReestabInfo INTEGER ::= 32 -- Maximum number of KeNB* and shortMAC-I forwarded
  -- at handover for re-establishment preparation
```

### 10.5 Mandatory information in AS-Config

The AS-Config transferred between source eNB and target-eNB shall include all IEs necessary to describe the AS context. The conditional presence in section 6 is only applicable for eNB to UE communication.

The "need" or "cond" statements are not applied in case of sending the IEs from source eNB to target eNB. Some fields shall be included regardless of the "need" or "cond" e.g. discardTimer. The AS-Config re-uses information elements primarily created to cover the radio interface signalling requirements. The information elements may include some parameters that are not relevant for the target eNB e.g. the SFN as included in the MasterInformationBlock.

All the fields in the AS-Config as defined in 10.3 that are introduced after v9.2.0 and that are optional for eNB to UE communication shall be included, if the functionality is configured. The fields in the AS-Config that are defined before and including v9.2.0 shall be included as specified in the following.
Within the sourceRadioResourceConfig, sourceMeasConfig and sourceOtherConfig, the source eNB shall include fields that are optional for eNB to UE communication, if the functionality is configured unless explicitly specified otherwise in the following:

- in accordance with a condition that is explicitly stated to be applicable; or
- a default value is defined for the concerned field; and the configured value is the same as the default value that is defined; or
- the need of the field is OP and the current UE configuration corresponds with the behaviour defined for absence of the field;

The following fields, if the functionality is configured, are not mandatory for the source eNB to include in the AS-Config since delta signalling by the target eNB for these fields is not supported:

- semiPersistSchedC-RNTI
- measGapConfig

For the measurement configuration, a corresponding operation as 5.5.6.1 and 5.5.2.2a is executed by target eNB.

10.6 Inter-node NB-IoT messages

10.6.1 General

This section specifies NB-IoT RRC messages that are sent either across the X2- or the S1-interface, either to or from the eNB, i.e. a single 'logical channel' is used for all NB-IoT RRC messages transferred across network nodes.

-- NB-IoT-InterNodeDefinitions

This ASN.1 segment is the start of the NB-IoT inter-node PDU definitions.

```
-- ASN1START

NBIOT-InterNodeDefinitions DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
  C-RNTI,
  PhysCellId,
  SecurityAlgorithmConfig,
  ShortMAC-I
FROM EUTRA-RRC-Definitions

  AdditionalReestabInfoList
FROM EUTRA-InterNodeDefinitions

```
CarrierFreq-NB-r13,
RadioResourceConfigDedicated-NB-r13,
UE-Capability-NB-r13,
UE-RadioPagingInfo-NB-r13
FROM NBIOT-RRC-Definitions;

10.6.2 Message definitions

– HandoverPreparationInformation-NB

This message is used to transfer the UE context from the eNB where the RRC connection has been suspended and transfer it to the eNB where the RRC Connection has been requested to be resumed.

Direction: source eNB to target eNB

HandoverPreparationInformation-NB message

HandoverPreparationInformation-NB ::= SEQUENCE {
criticalExtensions        CHOICE {
c1                           CHOICE{
handoverPreparationInformation-r13  HandoverPreparationInformation-NB-IEs,
spare3 NULL, spare2 NULL, spare1 NULL
},
criticalExtensionsFuture   SEQUENCE {}
}
}

HandoverPreparationInformation-NB-IEs ::= SEQUENCE {
ue-RadioAccessCapabilityInfo-r13   UE-Capability-NB-r13,
as-Config-r13                AS-Config-NB,
rrm-Config-r13                 RRM-Config-NB OPTIONAL,
as-Context-r13                 AS-Context-NB OPTIONAL,
nonCriticalExtension          SEQUENCE {} OPTIONAL
}
---

**HandoverPreparationInformation-NB field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>as-Config</td>
<td>The radio resource configuration.</td>
</tr>
<tr>
<td>as-Context</td>
<td>The local E-UTRAN context required by the target eNB.</td>
</tr>
<tr>
<td>rrm-Config</td>
<td>The local E-UTRAN context used depending on the target node’s implementation, which is mainly used for the RRM purpose.</td>
</tr>
<tr>
<td>ue-RadioAccessCapabilityInfo</td>
<td>The NB-IoT UE Radio Access Capability Parameters, see TS 36.306 [5].</td>
</tr>
</tbody>
</table>

UE Paging Coverage Information-NB

This message is used to transfer UE paging coverage information for NB-IoT, covering both upload to and download from the EPC.

Direction: eNB to/from EPC

**UE Paging Coverage Information-NB message**

---

UE Paging Coverage Information-NB ::= SEQUENCE {
  criticalExtensions CHOICE {
    c1 CHOICE {
      ue Paging Coverage Information-r13 UEPagingCoverageInformation-NB-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture SEQUENCE {} OPTIONAL
  }
}

UE Paging Coverage Information-NB-IEs ::= SEQUENCE {
  -- the possible value(s) can differ from those sent on Uu
  npdcch-NumRepetitionPaging-r13 INTEGER (1..2048) OPTIONAL,
  nonCriticalExtension SEQUENCE {} OPTIONAL
}

---

**ASN1STOP**
**UEPagingCoverageInformation-NB field descriptions**

<table>
<thead>
<tr>
<th>npdcch-NumRepetitionPaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of repetitions for NPDCCH, see TS 36.211 [21]. This value is an estimate of the required number of repetitions for NPDCCH.</td>
</tr>
</tbody>
</table>

---

**UERadioAccessCapabilityInformation-NB**

This message is used to transfer UE NB-IoT Radio Access capability information, covering both upload to and download from the EPC.

Direction: eNB to /from EPC

**UERadioAccessCapabilityInformation-NB message**

```
UERadioAccessCapabilityInformation-NB ::= SEQUENCE {
  criticalExtensions  CHOICE {
    c1              CHOICE {
      ueRadioAccessCapabilityInformation-r13
        UERadioAccessCapabilityInformation-NB-IEs,  
      spare3 NULL, spare2 NULL, spare1 NULL  
    },  
    criticalExtensionsFuture  SEQUENCE {}  
  }  
}
UERadioAccessCapabilityInformation-NB-IEs ::= SEQUENCE {
  ue-RadioAccessCapabilityInfo-r13  OCTET STRING (CONTAINING UE-Capability-NB-r13), 
  nonCriticalExtension  SEQUENCE {}  OPTIONAL  
}
```

**UERadioAccessCapabilityInformation-NB field descriptions**

<table>
<thead>
<tr>
<th>ue-RadioAccessCapabilityInfo</th>
</tr>
</thead>
<tbody>
<tr>
<td>The NB-IoT UE Radio Access Capability Parameters, see TS 36.306 [5].</td>
</tr>
</tbody>
</table>

---

**UERadioPagingInformation-NB**

This message is used to transfer NB-IoT radio paging information, covering both upload to and download from the EPC.
**UERadioPagingInformation-NB message**

```asn1
UERadioPagingInformation-NB ::= SEQUENCE {
  criticalExtensions     CHOICE {
    c1          CHOICE {
      ueRadioPagingInformation-r13   UERadioPagingInformation-NB-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
}
```

**UERadioPagingInformation-NB field descriptions**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ue-RadioPagingInfo</td>
<td>The field is used to transfer UE NB-IoT capability information used for paging. The eNB generates the ue-RadioPagingInfo and the contained UE capability information is absent when not supported by the UE.</td>
</tr>
</tbody>
</table>

### 10.7 Inter-node NB-IoT RRC information element definitions

**AS-Config-NB**

The AS-Config-NB IE contains information about NB-IoT RRC configuration information in the source eNB which can be utilized by target eNB.

**AS-Config-NB information element**

```asn1
AS-Config-NB ::= SEQUENCE {
  sourceRadioResourceConfig-r13   RadioResourceConfigDedicated-NB-r13,
  sourceSecurityAlgorithmConfig-r13  SecurityAlgorithmConfig,
}
```
sourceUE-Identity-r13  C-RNTI,
sourceDl-CarrierFreq-r13  CarrierFreq-NB-r13,

-- ASN1STOP

--- AS-Config-NB field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>sourceDL-CarrierFreq</td>
<td>Provides the parameter Downlink EARFCN in the source PCell, see TS 36.101 [42].</td>
</tr>
<tr>
<td>sourceRadioResourceConfig</td>
<td>Radio configuration in the source PCell. The radio resource configuration for all radio bearers existing in the source PCell shall be included. See 10.9.</td>
</tr>
<tr>
<td>sourceSecurityAlgorithmConfig</td>
<td>This field provides the AS integrity protection (SRBs) and AS ciphering (SRBs and DRBs) algorithm configuration used in the source PCell.</td>
</tr>
</tbody>
</table>

--- AS-Context-NB

The IE **AS-Context-NB** is used to transfer the UE context required by the target eNB.

**AS-Context-NB information element**

--- ASN1START

AS-Context-NB ::= SEQUENCE {
  reestablishmentInfo-r13  ReestablishmentInfo-NB OPTIONAL,
  ...
}

--- ASN1STOP

--- AS-Context-NB field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>reestablishmentInfo</td>
<td>Including information needed for the RRC connection re-establishment.</td>
</tr>
</tbody>
</table>

--- ReestablishmentInfo-NB

The **ReestablishmentInfo-NB** IE contains information needed for the RRC connection re-establishment.

**ReestablishmentInfo-NB information element**

--- ASN1START

ReestablishmentInfo-NB ::= SEQUENCE { |
sourcePhysCellId-r13          PhysCellId,
targetCellShortMAC-I-r13      ShortMAC-I,
additionalReestabInfoList-r13 AdditionalReestabInfoList   OPTIONAL,
...

-- ASN1STOP

<table>
<thead>
<tr>
<th>ReestablishmentInfo-NB field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>additionalReestabInfoList</strong></td>
</tr>
<tr>
<td>Contains a list of shortMAC-I and KeNB* for cells under control of the target eNB, required for potential re-establishment by the UE in these cells to succeed.</td>
</tr>
<tr>
<td><strong>sourcePhysCellId</strong></td>
</tr>
<tr>
<td>The physical cell identity of the source PCell, used to determine the UE context in the target eNB at re-establishment.</td>
</tr>
<tr>
<td><strong>targetCellShortMAC-I</strong></td>
</tr>
<tr>
<td>The ShortMAC-I for the target PCell, in order for potential re-establishment to succeed.</td>
</tr>
</tbody>
</table>

---

**RRM-Config-NB**

The **RRM-Config-NB** IE contains information about UE specific RRM information which can be utilized by target eNB.

**RRM-Config-NB information element**

-- ASN1START

RRM-Config-NB ::=    SEQUENCE {
  ue-InactiveTime    ENUMERATED {
    s1, s2, s3, s5, s7, s10, s15, s20,
    s25, s30, s40, s50, min1, min1s20, min1s40,
    min2, min2s30, min3, min3s30, min4, min5, min6,
    min7, min8, min9, min10, min12, min14, min17, min20,
    min24, min28, min33, min38, min44, min50, hr1,
    hr1min30, hr2, hr2min30, hr3, hr3min30, hr4, hr5, hr6,
    hr8, hr10, hr13, hr16, hr20, day1, day1hr12, day2,
    day2hr12, day3, day4, day5, day7, day10, day14, day19,
    day24, day30, dayMoreThan30}   OPTIONAL,
  ...
}

-- ASN1STOP
## 10.8 Inter-node RRC multiplicity and type constraint values

- Multiplicity and type constraints definitions

- End of NB-IoT-InterNodeDefinitions

### 10.9 Mandatory information in AS-Config-NB

The AS-Config-NB transferred between source eNB and target-eNB shall include all IEs necessary to describe the AS context. The conditional presence in section 6 is only applicable for eNB to UE communication.

The "Need" or "Cond" statements are not applied in case of sending the IEs from source eNB to target eNB. Some information elements shall be included regardless of the "Need" or "Cond" e.g. discardTimer. The AS-Config-NB re-uses information elements primarily created to cover the radio interface signalling requirements.

Within the sourceRadioResourceConfig, the source eNB shall include fields that are optional for eNB to UE communication, if the functionality is configured unless explicitly specified otherwise in the following:

- in accordance with a condition that is explicitly stated to be applicable; or

- a default value is defined for the concerned field; and the configured value is the same as the default value that is defined; or

- the need of the field is OP and the current UE configuration corresponds with the behaviour defined for absence of the field;
11 UE capability related constraints and performance requirements

11.1 UE capability related constraints

The following table lists constraints regarding the UE capabilities that E-UTRAN is assumed to take into account.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Value</th>
<th>NB-IoT</th>
</tr>
</thead>
<tbody>
<tr>
<td>#DRBs</td>
<td>The number of DRBs that a UE shall support</td>
<td>8</td>
<td>(0, 1, 2)</td>
</tr>
<tr>
<td>#RLC-AM</td>
<td>The number of RLC AM entities that a UE shall support</td>
<td>10</td>
<td>(2, 3)</td>
</tr>
<tr>
<td>#minCellperMeasObjectEUTRA</td>
<td>The minimum number of neighbour cells that a UE shall be able to store within a MeasObjectEUTRA</td>
<td>32</td>
<td>N/A</td>
</tr>
<tr>
<td>#minCellperMeasObjectUTRA</td>
<td>The minimum number of neighbour cells that a UE shall be able to store within a MeasObjectUTRA</td>
<td>32</td>
<td>N/A</td>
</tr>
<tr>
<td>#minCellperMeasObjectGERAN</td>
<td>The minimum number of neighbour cells that a UE shall be able to store within a measObjectGERAN</td>
<td>32</td>
<td>N/A</td>
</tr>
<tr>
<td>#minCellperMeasObjectCDMA2000</td>
<td>The minimum number of neighbour cells that a UE shall be able to store within a measObjectCDMA2000</td>
<td>32</td>
<td>N/A</td>
</tr>
<tr>
<td>#minCellTotal</td>
<td>The minimum number of neighbour cells that a UE shall be able to store in total in all measurement objects configured</td>
<td>256</td>
<td>N/A</td>
</tr>
</tbody>
</table>

NOTE: In case of CGI reporting, the limit regarding the cells E-UTRAN can configure includes the cell for which the UE is requested to report CGI i.e. the amount of neighbour cells that can be included is at most ("# minCellperMeasObjectRAT - 1"), where RAT represents EUTRA/UTRA/GERAN/CDMA2000 respectively.

NOTE1: #DRBs based on UE capability, #RLC-AM = #DRBs + 2.

11.2 Processing delay requirements for RRC procedures

The UE performance requirements for RRC procedures are specified in the following table for UE other than NB-IOT UEs, by means of a value N:

\[ N = \text{the number of 1ms subframes from the end of reception of the E-UTRAN -> UE message on the UE physical layer up to when the UE shall be ready for the reception of uplink grant for the UE -> E-UTRAN response message with no access delay other than the TTI-alignment (e.g. excluding delays caused by scheduling, the random access procedure or physical layer synchronisation).} \]

NOTE: No processing delay requirements are specified for RN-specific procedures.

\[ \text{Figure 11.2-1: Illustration of RRC procedure delay} \]
<table>
<thead>
<tr>
<th>Procedure title:</th>
<th>E-UTRAN -&gt; UE</th>
<th>UE -&gt; E-UTRAN</th>
<th>N</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure title:</td>
<td>E-UTRAN -&gt; UE</td>
<td>UE -&gt; E-UTRAN</td>
<td>N</td>
<td>Notes</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----</td>
<td>-------</td>
</tr>
<tr>
<td><strong>RRC Connection Control Procedures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RRC connection establishment</td>
<td>RRCCConnectionSetup or RRCCConnectionResume</td>
<td>RRCCConnectionSetupComplete or RRCCConnectionResumeComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>RRC connection release</td>
<td>RRCCConnectionRelease</td>
<td></td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td>RRC connection re-configuration (radio resource configuration)</td>
<td>RRCCConnectionReconfiguration</td>
<td>RRCCConnectionReconfigurationComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>RRC connection re-configuration (measurement configuration)</td>
<td>RRCCConnectionReconfiguration</td>
<td>RRCCConnectionReconfigurationComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>RRC connection re-configuration (intra-LTE mobility)</td>
<td>RRCCConnectionReconfiguration</td>
<td>RRCCConnectionReconfigurationComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>RRC connection re-configuration (SCell addition/release)</td>
<td>RRCCConnectionReconfiguration</td>
<td>RRCCConnectionReconfigurationComplete</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>RRC connection reconfiguration (SCG establishment/ release, SCG cell addition/ release)</td>
<td>RRCCConnectionReconfiguration</td>
<td>RRCCConnectionReconfigurationComplete</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>RRC connection re-establishment</td>
<td>RRCCConnectionReestablishment</td>
<td>RRCCConnectionReestablishmentComplete</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Initial security activation</td>
<td>SecurityModeCommand</td>
<td>SecurityModeCommandComplete or SecurityModeCommandFailure</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Initial security activation + RRC connection re-configuration (RB establishment)</td>
<td>SecurityModeCommand, RRCCConnectionReconfiguration</td>
<td>RRCCConnectionReconfigurationComplete</td>
<td>20</td>
<td>The two DL messages are transmitted in the same TTI</td>
</tr>
<tr>
<td>Paging</td>
<td>Paging</td>
<td></td>
<td></td>
<td>NA</td>
</tr>
<tr>
<td><strong>Inter RAT mobility</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handover to E-UTRA</td>
<td>RRCCConnectionReconfiguration (sent by other RAT)</td>
<td>RRCCConnectionReconfigurationComplete</td>
<td>NA</td>
<td>The performance of this procedure is specified in [50] in case of handover from GSM and [29], [30] in case of handover from UTRA.</td>
</tr>
<tr>
<td>Handover from E-UTRA</td>
<td>MobilityFromEUTRACommand</td>
<td></td>
<td>NA</td>
<td>The performance of this procedure is specified in [16]</td>
</tr>
<tr>
<td>Handover from E-UTRA to CDMA2000</td>
<td>HandoverFromEUTRAPreparationRequest(CDMA2000)</td>
<td></td>
<td>NA</td>
<td>Used to trigger the handover preparation procedure with a CDMA2000 RAT. The performance of this procedure is specified in [16]</td>
</tr>
<tr>
<td><strong>Measurement procedures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement Reporting</td>
<td>MeasurementReport</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td><strong>Other procedures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UE capability transfer</td>
<td>UECapabilityEnquiry</td>
<td>UECapabilityInformation</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Counter check</td>
<td>CounterCheck</td>
<td>CounterCheckResponse</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Proximity indication</td>
<td>ProximityIndication</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Procedure title</td>
<td>E-UTRAN -&gt; UE</td>
<td>UE -&gt; E-UTRAN</td>
<td>N</td>
<td>Notes</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>---------------</td>
<td>-------------------------------------</td>
<td>---</td>
<td>-------</td>
</tr>
<tr>
<td>UE information</td>
<td>UEInformationRequest</td>
<td>UEInformationResponse</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>MBMS counting</td>
<td>MBMSCountingRequest</td>
<td>MBMSCountingResponse</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>MBMS interest indication</td>
<td>MBMSInterestIndication</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>In-device coexistence indication</td>
<td>InDeviceCoexIndication</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>UE assistance information</td>
<td>UEAssistanceInformation</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>SCG failure information</td>
<td>SCGFailureInformation</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Sidelink UE information</td>
<td>SidelinkUEInformation</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>WLAN Connection Status Reporting</td>
<td>WLANConnectionStatusReport</td>
<td></td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

11.3 Void
Annex A (informative): Guidelines, mainly on use of ASN.1

Editor's note: No agreements have been reached concerning the extension of RRC PDUs so far. Any statements in this section about the protocol extension mechanism should be considered as FFS.

A.1 Introduction

The following clauses contain guidelines for the specification of RRC protocol data units (PDUs) with ASN.1.

A.2 Procedural specification

A.2.1 General principles

The procedural specification provides an overall high level description regarding the UE behaviour in a particular scenario.

It should be noted that most of the UE behaviour associated with the reception of a particular field is covered by the applicable parts of the PDU specification. The procedural specification may also include specific details of the UE behaviour upon reception of a field, but typically this should be done only for cases that are not easy to capture in the PDU section e.g. general actions, more complicated actions depending on the value of multiple fields.

Likewise, the procedural specification need not specify the UE requirements regarding the setting of fields within the messages that are send to E-UTRAN i.e. this may also be covered by the PDU specification.

A.2.2 More detailed aspects

The following more detailed conventions should be used:

- Bullets:
  - Capitals should be used in the same manner as in other parts of the procedural text i.e. in most cases no capital applies since the bullets are part of the sentence starting with 'The UE shall:'
  - All bullets, including the last one in a sub-clause, should end with a semi-colon i.e. an ';
- Conditions
  - Whenever multiple conditions apply, a semi-colon should be used at the end of each conditions with the exception of the last one, i.e. as in 'if cond1; or cond2:

A.3 PDU specification

A.3.1 General principles

A.3.1.1 ASN.1 sections

The RRC PDU contents are formally and completely described using abstract syntax notation (ASN.1), see X.680 [13], X.681 (02/2002) [14].

The complete ASN.1 code is divided into a number of ASN.1 sections in the specifications. In order to facilitate the extraction of the complete ASN.1 code from the specification, each ASN.1 section begins with a text paragraph consisting entirely of an "ASN.1 start tag", which consists of a double hyphen followed by a single space and the text string "ASN1START" (in all upper case letters). Each ASN.1 section ends with a text paragraph consisting entirely of an "ASN.1 stop tag", which consists of a double hyphen followed by a single space and the text "ASN1STOP" (in all upper case letters):

-- ASN1START
The text paragraphs containing the ASN.1 start and stop tags should not contain any ASN.1 code significant for the complete description of the RRC PDU contents. The complete ASN.1 code may be extracted by copying all the text paragraphs between an ASN.1 start tag and the following ASN.1 stop tag in the order they appear, throughout the specification.

NOTE: A typical procedure for extraction of the complete ASN.1 code consists of a first step where the entire RRC PDU contents description (ultimately the entire specification) is saved into a plain text (ASCII) file format, followed by a second step where the actual extraction takes place, based on the occurrence of the ASN.1 start and stop tags.

A.3.1.2 ASN.1 identifier naming conventions

The naming of identifiers (i.e., the ASN.1 field and type identifiers) should be based on the following guidelines:

- Message (PDU) identifiers should be ordinary mixed case without hyphenation. These identifiers, e.g., the `RRCConnectionModificationCommand`, should be used for reference in the procedure text. Abbreviated forms of these identifiers should not be used.

- Type identifiers other than PDU identifiers should be ordinary mixed case, with hyphenation used to set off acronyms only where an adjacent letter is a capital, e.g., `EstablishmentCause`, `SelectedPLMN` (not `Selected-PLMN`, since the "d" in "Selected" is lowercase), `InitialUE-Identity` and `MeasSFN-SFN-TimeDifference`.

- Field identifiers shall start with a lowercase letter and use mixed case thereafter, e.g., `establishmentCause`. If a field identifier begins with an acronym (which would normally be in upper case), the entire acronym is lowercase (`plmn-Identity`, not `pLMN-Identity`). The acronym is set off with a hyphen (`ue-Identity`, not `ueIdentity`), in order to facilitate a consistent search pattern with corresponding type identifiers.

- Identifiers that are likely to be keywords of some language, especially widely used languages, such as C++ or Java, should be avoided to the extent possible.

- Identifiers, other than PDU identifiers, longer than 25 characters should be avoided where possible. It is recommended to use abbreviations, which should be done in a consistent manner i.e. use 'Meas' instead of 'Measurement' for all occurrences. Examples of typical abbreviations are given in table A.3.1.2.1-1 below.

- For future extension: When an extension is introduced a suffix is added to the identifier of the concerned ASN.1 field and/ or type. A suffix of the form "-rX" is used, with X indicating the release, for ASN.1 fields or types introduced in a later release (i.e. a release later than the original/ first release of the protocol) as well as for ASN.1 fields or types for which a revision is introduced in a later release replacing a previous version, e.g., `Foo-r9` for the Rel-9 version of the ASN.1 type `Foo`. A suffix of the form "-rXb" is used for the first revision of a field that it appears in the same release (X) as the original version of the field, "-rXc" for a second intra-release revision and so on. A suffix of the form "-vXYZ" is used for ASN.1 fields or types that only are an extension of a corresponding earlier field or type (see sub-clause A.4), e.g., `AnElement-v10b0` for the extension of the ASN.1 type `AnElement` introduced in version 10.11.0 of the specification. A number 0...9, 10, 11, etc. is used to represent the first part of the version number, indicating the release of the protocol. Lower case letters a, b, c, etc. are used to represent the second (and third) part of the version number if they are greater than 9. In the procedural specification, in field descriptions as well as in headings suffixes are not used, unless there is a clear need to distinguish the extension from the original field.

- More generally, in case there is a need to distinguish different variants of an ASN.1 field or IE, a suffix should be added at the end of the identifiers e.g. `MeasObjectUTRA`, `ConfigCommon`. When there is no particular need to distinguish the fields (e.g. because the field is included in different IEs), a common field identifier name may be used. This may be attractive e.g. in case the procedural specification is the same for the different variants.
Table A.3.1.2-1: Examples of typical abbreviations used in ASN.1 identifiers

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Abbreviated word</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comm</td>
<td>Communication</td>
</tr>
<tr>
<td>Conf</td>
<td>Confirmation</td>
</tr>
<tr>
<td>Config</td>
<td>Configuration</td>
</tr>
<tr>
<td>Disc</td>
<td>Discovery</td>
</tr>
<tr>
<td>DL</td>
<td>Downlink</td>
</tr>
<tr>
<td>Ext</td>
<td>Extension</td>
</tr>
<tr>
<td>Freq</td>
<td>Frequency</td>
</tr>
<tr>
<td>Id</td>
<td>Identity</td>
</tr>
<tr>
<td>Ind</td>
<td>Indication</td>
</tr>
<tr>
<td>Info</td>
<td>Information</td>
</tr>
<tr>
<td>Meas</td>
<td>Measurement</td>
</tr>
<tr>
<td>Neigh</td>
<td>Neighbour(ing)</td>
</tr>
<tr>
<td>Param(s)</td>
<td>Parameter(s)</td>
</tr>
<tr>
<td>Persist</td>
<td>Persistent</td>
</tr>
<tr>
<td>Phys</td>
<td>Physical</td>
</tr>
<tr>
<td>Proc</td>
<td>Process</td>
</tr>
<tr>
<td>Reestab</td>
<td>Reestablishment</td>
</tr>
<tr>
<td>Req</td>
<td>Request</td>
</tr>
<tr>
<td>Rx</td>
<td>Reception</td>
</tr>
<tr>
<td>Sched</td>
<td>Scheduling</td>
</tr>
<tr>
<td>Sync</td>
<td>Synchronisation</td>
</tr>
<tr>
<td>Thresh</td>
<td>Threshold</td>
</tr>
<tr>
<td>Tx/ Transm</td>
<td>Transmission</td>
</tr>
<tr>
<td>UL</td>
<td>Uplink</td>
</tr>
</tbody>
</table>

NOTE: The table A.3.1.2.1-1 is not exhaustive. Additional abbreviations may be used in ASN.1 identifiers when needed.

A.3.1.3 Text references using ASN.1 identifiers

A text reference into the RRC PDU contents description from other parts of the specification is made using the ASN.1 field or type identifier of the referenced element. The ASN.1 field and type identifiers used in text references should be in the italic font style. The "do not check spelling and grammar" attribute in Word should be set. Quotation marks (i.e., " ") should not be used around the ASN.1 field or type identifier.

A reference to an RRC PDU type should be made using the corresponding ASN.1 type identifier followed by the word "message", e.g., a reference to the RRCConnectionRelease message.

A reference to a specific part of an RRC PDU, or to a specific part of any other ASN.1 type, should be made using the corresponding ASN.1 field identifier followed by the word "field", e.g., a reference to the prioritisedBitRate field in the example below.

```asn1
--/example/ ASN1START

LogicalChannelConfig ::= SEQUENCE {
  ul-SpecificParameters SEQUENCE {
    priority Priority,     
    prioritisedBitRate PrioritisedBitRate, 
    bucketSizeDuration BucketSizeDuration, 
    logicalChannelGroup INTEGER (0..3) 
  } OPTIONAL
}
```
A reference to a specific type of information element should be made using the corresponding ASN.1 type identifier preceded by the acronym “IE”, e.g., a reference to the IE LogicalChannelConfig in the example above.

References to a specific type of information element should only be used when those are generic, i.e., without regard to the particular context wherein the specific type of information element is used. If the reference is related to a particular context, e.g., an RRC PDU type (message) wherein the information element is used, the corresponding field identifier in that context should be used in the text reference.

A reference to a specific value of an ASN.1 field should be made using the corresponding ASN.1 value without using quotation marks around the ASN.1 value, e.g., ‘if the status field is set to value true’.

### A.3.2 High-level message structure

Within each logical channel type, the associated RRC PDU (message) types are alternatives within a CHOICE, as shown in the example below.

```
DL-DCCCH-Message ::= SEQUENCE {
    message           DL-DCCCH-MessageType
}

DL-DCCCH-MessageType ::= CHOICE {
    c1                 CHOICE {
        dlInformationTransfer     DLInformationTransfer,
        handoverFromEUTRAPreparationRequest  HandoverFromEUTRAPreparationRequest,
        mobilityFromEUTRACommand    MobilityFromEUTRACommand,
        rrcConnectionReconfiguration   RRCCConnectionReconfiguration,
        rrcConnectionRelease     RRCCConnectionRelease,
        securityModeCommand      SecurityModeCommand,
        ueCapabilityEnquiry      UECapabilityEnquiry,
        spare1 NULL
    },
    messageClassExtension SEQUENCE {}
}
```
A nested two-level CHOICE structure is used, where the alternative PDU types are alternatives within the inner level "c1 CHOICE."

Spare alternatives (i.e., "spare1" in this case) may be included within the "c1 CHOICE" to facilitate future extension. The number of such spare alternatives should not extend the total number of alternatives beyond an integer-power-of-two number of alternatives (i.e., eight in this case).

Further extension of the number of alternative PDU types is facilitated using the messageClassExtension alternative in the outer level CHOICE.

A.3.3 Message definition

Each PDU (message) type is specified in an ASN.1 section similar to the one shown in the example below.

```
-- /example/ ASN1START

RRCConnectionReconfiguration ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    c1          CHOICE {
      rrcConnectionReconfiguration-r8  RRCConnectionReconfiguration-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture   SEQUENCE {}
  }
}

RRCConnectionReconfiguration-r8-IEs ::= SEQUENCE {
  -- Enter the IEs here.
  ...
}

-- ASN1STOP
```

Hooks for critical and non-critical extension should normally be included in the PDU type specification. How these hooks are used is further described in sub-clause A.4.

Critical extensions are characterised by a redefinition of the PDU contents and need to be governed by a mechanism for protocol version agreement between the encoder and the decoder of the PDU, such that the encoder is prevented from sending a critically extended version of the PDU type, which is not comprehended by the decoder.

Critical extension of a PDU type is facilitated by a two-level CHOICE structure, where the alternative PDU contents are alternatives within the inner level "c1 CHOICE. Spare alternatives (i.e., "spare3" down to "spare1" in this case) may be included within the "c1 CHOICE. The number of spare alternatives to be included in the original PDU specification should be decided case by case, based on the expected rate of critical extension in the future releases of the protocol.
Further critical extension, when the spare alternatives from the original specifications are used up, is facilitated using the `criticalExtensionsFuture` in the outer level CHOICE.

In PDU types where critical extension is not expected in the future releases of the protocol, the inner level `c1` CHOICE and the spare alternatives may be excluded, as shown in the example below.

```asn1
RRCConnectionReconfigurationComplete ::= SEQUENCE {
  rrc-TransactionIdentifier   RRC-TransactionIdentifier,
  criticalExtensions     CHOICE {
    rrcConnectionReconfigurationComplete-r8
      RRCConnectionReconfigurationComplete-r8-IEs,
    criticalExtensionsFuture   SEQUENCE {}
  }
}

RRCConnectionReconfigurationComplete-r8-IEs ::= SEQUENCE {
  -- Enter the IEs here. --              -- Cond condTag
  ...
}

-- ASN1STOP
```

Non-critical extensions are characterised by the addition of new information to the original specification of the PDU type. If not comprehended, a non-critical extension may be skipped by the decoder, whilst the decoder is still able to complete the decoding of the comprehended parts of the PDU contents.

Non-critical extensions at locations other than the end of the message or other than at the end of a field contained in a BIT or OCTET STRING are facilitated by use of the ASN.1 extension marker "...". The original specification of a PDU type should normally include the extension marker at the end of the sequence of information elements contained.

Non-critical extensions at the end of the message or at the end of a field that is contained in a BIT or OCTET STRING are facilitated by use of an empty sequence that is marked OPTIONAL e.g. as shown in the following example:

```asn1
RRCMessage-r8-IEs ::=      SEQUENCE {
  field1          InformationElement1,
  field2          InformationElement2,
  nonCriticalExtension     SEQUENCE {}      OPTIONAL
}
```

-- ASN1STOP
The ASN.1 section specifying the contents of a PDU type may be followed by a field description table where a further description of, e.g., the semantic properties of the fields may be included. The general format of this table is shown in the example below. The field description table is absent in case there are no fields for which further description needs to be provided e.g. because the PDU does not include any fields, or because an IE is defined for each field while there is nothing specific regarding the use of this IE that needs to be specified.

<table>
<thead>
<tr>
<th>%PDU-TypeIdentifier%</th>
<th>field descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>%field identifier%</td>
<td>Field description.</td>
</tr>
<tr>
<td>%field identifier%</td>
<td>Field description.</td>
</tr>
</tbody>
</table>

The field description table has one column. The header row shall contain the ASN.1 type identifier of the PDU type.

The following rows are used to provide field descriptions. Each row shall include a first paragraph with a field identifier (in bold and italic font style) referring to the part of the PDU to which it applies. The following paragraphs at the same row may include (in regular font style), e.g., semantic description, references to other specifications and/ or specification of value units, which are relevant for the particular part of the PDU.

The parts of the PDU contents that do not require a field description shall be omitted from the field description table.

### A.3.4 Information elements

Each IE (information element) type is specified in an ASN.1 section similar to the one shown in the example below.

```
-- /example/ ASN1START

PRACH-ConfigSIB ::= SEQUENCE {
    rootSequenceIndex INTEGER (0..1023),
    prach-ConfigInfo PRACH-ConfigInfo
}

PRACH-Config ::= SEQUENCE {
    rootSequenceIndex INTEGER (0..1023),
    prach-ConfigInfo PRACH-ConfigInfo OPTIONAL -- Need ON
}

PRACH-ConfigInfo ::= SEQUENCE {
    prach-ConfigIndex ENUMERATED {ffs},
    highSpeedFlag ENUMERATED {ffs},
    zeroCorrelationZoneConfig ENUMERATED {ffs}
}

-- ASN1STOP
```
IEs should be introduced whenever there are multiple fields for which the same set of values apply. IEs may also be defined for other reasons e.g. to break down an ASN.1 definition into smaller pieces.

A group of closely related IE type definitions, like the IEs PRACH-ConfigSIB and PRACH-Config in this example, are preferably placed together in a common ASN.1 section. The IE type identifiers should in this case have a common base, defined as the generic type identifier. It may be complemented by a suffix to distinguish the different variants. The "PRACH-Config" is the generic type identifier in this example, and the "SIB" suffix is added to distinguish the variant. The sub-clause heading and generic references to a group of closely related IEs defined in this way should use the generic type identifier.

The same principle should apply if a new version, or an extension version, of an existing IE is created for critical or non-critical extension of the protocol (see sub-clause A.4). The new version, or the extension version, of the IE is included in the same ASN.1 section defining the original. A suffix is added to the type identifier, using the naming conventions defined in sub-clause A.3.1.2, indicating the release or version of the where the new version, or extension version, was introduced.

Local IE type definitions, like the IE PRACH-ConfigInfo in the example above, may be included in the ASN.1 section and be referenced in the other IE types defined in the same ASN.1 section. The use of locally defined IE types should be encouraged, as a tool to break up large and complex IE type definitions. It can improve the readability of the code. There may also be a benefit for the software implementation of the protocol end-points, as these IE types are typically provided by the ASN.1 compiler as independent data elements, to be used in the software implementation.

An IE type defined in a local context, like the IE PRACH-ConfigInfo, should not be referenced directly from other ASN.1 sections in the RRC specification. An IE type which is referenced in more than one ASN.1 section should be defined in a separate sub-clause, with a separate heading and a separate ASN.1 section (possibly as one in a set of closely related IE types, like the IEs PRACH-ConfigSIB and PRACH-Config in the example above). Such IE types are also referred to as 'global IEs'.

NOTE: Referring to an IE type, that is defined as a local IE type in the context of another ASN.1 section, does not generate an ASN.1 compilation error. Nevertheless, using a locally defined IE type in that way makes the IE type definition difficult to find, as it would not be visible at an outline level of the specification. It should be avoided.

The ASN.1 section specifying the contents of one or more IE types, like in the example above, may be followed by a field description table, where a further description of, e.g., the semantic properties of the fields of the information elements may be included. This table may be absent, similar as indicated in sub-clause A.3.3 for the specification of the PDU type. The general format of the field description table is the same as shown in sub-clause A.3.3 for the specification of the PDU type.

A.3.5 Fields with optional presence

A field with optional presence may be declared with the keyword DEFAULT. It identifies a default value to be assumed, if the sender does not include a value for that field in the encoding:

```asn1
-- /example/ ASN1START

PreambleInfo ::=SEQUENCE {
  numberOfRA-Preambles INTEGER (1..64) DEFAULT 1,
  ...
}

-- ASN1STOP```
Alternatively, a field with optional presence may be declared with the keyword OPTIONAL. It identifies a field for which a value can be omitted. The omission carries semantics, which is different from any normal value of the field:

```
-- /example/ ASN1START

PRACH-Config ::= SEQUENCE {
    rootSequenceIndex       INTEGER (0..1023),
    prach-ConfigInfo     PRACH-ConfigInfo OPTIONAL -- Need ON
}

-- ASN1STOP
```

The semantics of an optionally present field, in the case it is omitted, should be indicated at the end of the paragraph including the keyword OPTIONAL, using a short comment text with a need statement. The need statement includes the keyword "Need", followed by one of the predefined semantics tags (OP, ON or OR) defined in sub-clause 6.1. If the semantics tag OP is used, the semantics of the absent field are further specified either in the field description table following the ASN.1 section, or in procedure text.

The addition of OPTIONAL keywords for capability groups is based on the following guideline. If there is more than one field in the lower level IE, then OPTIONAL keyword is added at the group level. If there is only one field in the lower level IE, OPTIONAL keyword is not added at the group level.

### A.3.6 Fields with conditional presence

A field with conditional presence is declared with the keyword OPTIONAL. In addition, a short comment text shall be included at the end of the paragraph including the keyword OPTIONAL. The comment text includes the keyword "Cond", followed by a condition tag associated with the field ("UL" in this example):

```
-- /example/ ASN1START

LogicalChannelConfig ::= SEQUENCE {
    ul-SpecificParameters    SEQUENCE {
        priority       INTEGER (0),
        ...
    }  OPTIONAL                 -- Cond UL
}

-- ASN1STOP
```

When conditionally present fields are included in an ASN.1 section, the field description table after the ASN.1 section shall be followed by a conditional presence table. The conditional presence table specifies the conditions for including the fields with conditional presence in the particular ASN.1 section.
The conditional presence table has two columns. The first column (heading: "Conditional presence") contains the condition tag (in *italic* font style), which links the fields with a condition tag in the ASN.1 section to an entry in the table. The second column (heading: "Explanation") contains a text specification of the conditions and requirements for the presence of the field. The second column may also include semantics, in case of an optional presence of the field, under certain conditions i.e. using the same predefined tags as defined for optional fields in A.3.5.

Conditional presence should primarily be used when presence of a field depends on the presence and/or value of other fields within the same message. If the presence of a field depends on whether another feature/function has been configured, while this function can be configured independently e.g. by another message and/or at another point in time, the relation is best reflected by means of a statement in the field description table.

If the ASN.1 section does not include any fields with conditional presence, the conditional presence table shall not be included.

Whenever a field is only applicable in specific cases e.g. TDD, use of conditional presence should be considered.

### A.3.7 Guidelines on use of lists with elements of SEQUENCE type

Where an information element has the form of a list (the SEQUENCE OF construct in ASN.1) with the type of the list elements being a SEQUENCE data type, an information element shall be defined for the list elements even if it would not otherwise be needed.

For example, a list of PLMN identities with reservation flags is defined as in the following example:

```
-- /example/ ASN1START

PLMN-IdentityInfoList ::=      SEQUENCE (SIZE (1..6)) OF PLMN-IdentityInfo

PLMN-IdentityInfo ::=      SEQUENCE {
  plmn-Identity      PLMN-Identity,
  cellReservedForOperatorUse   ENUMERATED {reserved, notReserved}
}

-- ASN1STOP
```

rather than as in the following (bad) example, which may cause generated code to contain types with unpredictable names:

```
-- /bad example/ ASN1START

PLMN-IdentityList ::=     SEQUENCE (SIZE (1..6)) OF SEQUENCE {
  plmn-Identity       PLMN-Identity,
  cellReservedForOperatorUse    ENUMERATED {reserved, notReserved}
}
```

A.4 Extension of the PDU specifications

A.4.1 General principles to ensure compatibility

It is essential that extension of the protocol does not affect interoperability i.e. it is essential that implementations based on different versions of the RRC protocol are able to interoperate. In particular, this requirement applies for the following kind of protocol extensions:

- Introduction of new PDU types (i.e. these should not cause unexpected behaviour or damage).
- Introduction of additional fields in an extensible PDUs (i.e. it should be possible to ignore uncomprehended extensions without affecting the handling of the other parts of the message).
- Introduction of additional values of an extensible field of PDUs. If used, the behaviour upon reception of an uncomprehended value should be defined.

It should be noted that the PDU extension mechanism may depend on the logical channel used to transfer the message e.g. for some PDUs an implementation may be aware of the protocol version of the peer in which case selective ignoring of extensions may not be required.

The non-critical extension mechanism is the primary mechanism for introducing protocol extensions i.e. the critical extension mechanism is used merely when there is a need to introduce a 'clean' message version. Such a need appears when the last message version includes a large number of non-critical extensions, which results in issues like readability, overhead associated with the extension markers. The critical extension mechanism may also be considered when it is complicated to accommodate the extensions by means of non-critical extension mechanisms.

A.4.2 Critical extension of messages and fields

The mechanisms to critically extend a message are defined in A.3.3. There are both "outer branch" and "inner branch" mechanisms available. The "outer branch" consists of a CHOICE having the name criticalExtensions, with two values, c1 and criticalExtensionsFuture. The criticalExtensionsFuture branch consists of an empty SEQUENCE, while the c1 branch contains the "inner branch" mechanism.

The "inner branch" structure is a CHOICE with values of the form "MessageName-rX-IEs" (e.g., "RRCConnectionReconfiguration-r8-IEs") or "spareX", with the spare values having type NULL. The "-rX-IEs" structures contain the complete structure of the message IEs for the appropriate release; i.e., the critical extension branch for the Rel-10 version of a message includes all Rel-8 and Rel-9 fields (that are not obviated in the later version), rather than containing only the additional Rel-10 fields.

The following guidelines may be used when deciding which mechanism to introduce for a particular message, i.e. only an 'outer branch', or an 'outer branch' in combination with an 'inner branch' including a certain number of spares:

- For certain messages, e.g. initial uplink messages, messages transmitted on a broadcast channel, critical extension may not be applicable.
- An outer branch may be sufficient for messages not including any fields.
- The number of spares within inner branch should reflect the likelihood that the message will be critically extended in future releases (since each release with a critical extension for the message consumes one of the spare values). The estimation of the critical extension likelyhood may be based on the number, size and changeability of the fields included in the message.
- In messages where an inner branch extension mechanism is available, all spare values of the inner branch should be used before any critical extensions are added using the outer branch.

The following example illustrates the use of the critical extension mechanism by showing the ASN.1 of the original and of a later release

-- /example/ ASN1START -- Original release
RRCMessage ::= SEQUENCE {
  rrc-TransactionIdentifier RRC-TransactionIdentifier,
  criticalExtensions CHOICE {
    c1 CHOICE {
      rrcMessage-r8 RRCMessage-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture SEQUENCE {}
  }
}
-- ASN1STOP

-- /example/ ASN1START -- Later release

RRCMessage ::= SEQUENCE {
  rrc-TransactionIdentifier RRC-TransactionIdentifier,
  criticalExtensions CHOICE {
    c1 CHOICE {
      rrcMessage-r8 RRCMessage-r8-IEs,
      rrcMessage-r10 RRCMessage-r10-IEs,
      rrcMessage-r11 RRCMessage-r11-IEs,
      rrcMessage-r14 RRCMessage-r14-IEs
    },
    later CHOICE {
      c2 CHOICE {
        rrcMessage-r16 RRCMessage-r16-IEs,
        spare7 NULL, spare6 NULL, spare5 NULL, spare4 NULL,
        spare3 NULL, spare2 NULL, spare1 NULL
      },
      criticalExtensionsFuture SEQUENCE {}
    }
  }
}

It is important to note that critical extensions may also be used at the level of individual fields i.e. a field may be replaced by a critically extended version. When sending the extended version, the original version may also be included (e.g. original field is mandatory, EUTRAN is unaware if UE supports the extended version). In such cases, a UE supporting both versions may be required to ignore the original field. The following example illustrates the use of the critical extension mechanism by showing the ASN.1 of the original and of a later release.

```asn1
--/example/ASN1START -- Original release

RRCMessage ::= SEQUENCE {
  rrc-TransactionIdentifier  RRC-TransactionIdentifier,
  criticalExtensions  CHOICE {
    c 1  CHOICE {
      rrcMessage-r8  RRCMessage-r8-IEs,
      spare3 NULL, spare2 NULL, spare1 NULL
    },
    criticalExtensionsFuture  SEQUENCE {}  
  }
}

RRCMessage-rN-IEs ::= SEQUENCE {
  field1-rN  ENUMERATED {
    value1, value2, value3, value4} OPTIONAL, -- Need ON
  field2-rN  InformationElement2-rN  OPTIONAL, -- Cond NoField2rN
  nonCriticalExtension  RRCConnectionReconfiguration-vMxy-IEs  OPTIONAL
}

RRCConnectionReconfiguration-vMxy-IEs ::= SEQUENCE {
  field2-rM  InformationElement2-rM  OPTIONAL, -- Cond NoField2rM
  nonCriticalExtension  SEQUENCE {}  OPTIONAL
}
```

-- ASN1STOP
<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>NoField2rN</td>
<td>The field is optionally present, need ON, if field2-rN is absent. Otherwise the field is not present</td>
</tr>
</tbody>
</table>

Finally, it is noted that a critical extension may be introduced in the same release as the one in which the original field was introduced e.g. to correct an essential ASN.1 error. In such cases a UE capability may be introduced, to assist E-UTRAN in deciding whether or not to use the critically extension.

### A.4.3 Non-critical extension of messages

#### A.4.3.1 General principles

The mechanisms to extend a message in a non-critical manner are defined in A.3.3. W.r.t. the use of extension markers, the following additional guidelines apply:

- When further non-critical extensions are added to a message that has been critically extended, the inclusion of these non-critical extensions in earlier critical branches of the message should be avoided when possible.

- The extension marker ("…") is the primary non-critical extension mechanism that is used unless a length determinant is not required. Examples of cases where a length determinant is not required:
  - at the end of a message,
  - at the end of a structure contained in a BIT STRING or OCTET STRING

- When an extension marker is available, non-critical extensions are preferably placed at the location (e.g. the IE) where the concerned parameter belongs from a logical/functional perspective (referred to as the 'default extension location')

- It is desirable to aggregate extensions of the same release or version of the specification into a group, which should be placed at the lowest possible level.

- In specific cases it may be preferable to place extensions elsewhere (referred to as the 'actual extension location') e.g. when it is possible to aggregate several extensions in a group. In such a case, the group should be placed at the lowest suitable level in the message. <TBD: ref to separate example>

- In case placement at the default extension location affects earlier critical branches of the message, locating the extension at a following higher level in the message should be considered.

- In case an extension is not placed at the default extension location, an IE should be defined. The IE's ASN.1 definition should be placed in the same ASN.1 section as the default extension location. In case there are intermediate levels in-between the actual and the default extension location, an IE may be defined for each level. Intermediate levels are primarily introduced for readability and overview. Hence intermediate levels need not always be introduced e.g. they may not be needed when the default and the actual extension location are within the same ASN.1 section. <TBD: ref to separate example>

#### A.4.3.2 Further guidelines

Further to the general principles defined in the previous section, the following additional guidelines apply regarding the use of extension markers:

- Extension markers within SEQUENCE
  - Extension markers are primarily, but not exclusively, introduced at the higher nesting levels
  - Extension markers are introduced for a SEQUENCE comprising several fields as well as for information elements whose extension would result in complex structures without it (e.g. re-introducing another list)
  - Extension markers are introduced to make it possible to maintain important information structures e.g. parameters relevant for one particular RAT
  - Extension markers are also used for size critical messages (i.e. messages on BCCH, BR-BCCH, PCCH and CCCH), although introduced somewhat more carefully
- The extension fields introduced (or frozen) in a specific version of the specification are grouped together using double brackets.

- Extension markers within ENUMERATED
  - Spare values are used until the number of values reaches the next power of 2, while the extension marker caters for extension beyond that limit
  - A suffix of the form "vXYZ" is used for the identifier of each new value, e.g. "value-vXYZ".

- Extension markers within CHOICE:
  - Extension markers are introduced when extension is foreseen and when comprehension is not required by the receiver i.e. behaviour is defined for the case where the receiver cannot comprehend the extended value (e.g. ignoring an optional CHOICE field). It should be noted that defining the behaviour of a receiver upon receiving a not comprehended choice value is not required if the sender is aware whether or not the receiver supports the extended value.
  - A suffix of the form "vXYZ" is used for the identifier of each new choice value, e.g. "choice-vXYZ".

Non-critical extensions at the end of a message/ of a field contained in an OCTET or BIT STRING:

- When a nonCriticalExtension is actually used, a "Need" statement should not be provided for the field, which always is a group including at least one extension and a field facilitating further possible extensions. For simplicity, it is recommended not to provide a "Need" statement when the field is not actually used either.

Further, more general, guidelines:

- In case a need statement is not provided for a group, a "Need" statement is provided for all individual extension fields within the group i.e. including for fields that are not marked as OPTIONAL. The latter is to clarify the action upon absence of the whole group.

A.4.3.3 Typical example of evolution of IE with local extensions

The following example illustrates the use of the extension marker for a number of elementary cases (sequence, enumerated, choice). The example also illustrates how the IE may be revised in case the critical extension mechanism is used.

NOTE In case there is a need to support further extensions of release n while the ASN.1 of release (n+1) has been frozen, without requiring the release n receiver to support decoding of release (n+1) extensions, more advanced mechanisms are needed e.g. including multiple extension markers.

```
-- /example/ ASN1START

InformationElement1 ::= SEQUENCE {
  field1 ENUMERATED {
    value1, value2, value3, value4-v880,
    ..., value5-v960 },

  field2 CHOICE {
    field2a BOOLEAN,
    field2b InformationElement2b,
    ...
    field2c-v960 InformationElement2c-r9
  },
  ...
}
```
Some remarks regarding the extensions of \textit{InformationElement1} as shown in the above example:

- The \textit{InformationElement1} is initially extended with a number of non-critical extensions. In release 10 however, a critical extension is introduced for the message using this IE. Consequently, a new version of the IE \textit{InformationElement1} (i.e. \textit{InformationElement1-r10}) is defined in which the earlier non-critical extensions are incorporated by means of a revision of the original field.

- The \textit{value4-v880} is replacing a spare value defined in the original protocol version for \textit{field1}. Likewise \textit{value6-v1170} replaces \textit{spare3} that was originally defined in the r10 version of \textit{field1}.
- Within the critically extended release 10 version of InformationElement1, the names of the original fields/ IEs are not changed, unless there is a real need to distinguish them from other fields/ IEs. E.g. the field1 and InformationElement4 were defined in the original protocol version (release 8) and hence not tagged. Moreover, the field3-r9 is introduced in release 9 and not re-tagged; although, the InformationElement3 is also critically extended and therefore tagged InformationElement3-r10 in the release 10 version of InformationElement1.

A.4.3.4 Typical examples of non critical extension at the end of a message

The following example illustrates the use of non-critical extensions at the end of the message or at the end of a field that is contained in a BIT or OCTET STRING i.e. when an empty sequence is used.

```asn1
-- /example/ ASN1START

RRCMessage-r8-IEs ::= SEQUENCE {
  field1        InformationElement1,
  field2        InformationElement2,
  field3       InformationElement3 OPTIONAL, -- Need ON
  nonCriticalExtension   RRCMessage-v860-IEs OPTIONAL
}

RRCMessage-v860-IEs ::= SEQUENCE {
  field4-v860      InformationElement4 OPTIONAL, -- Need OP
  field5-v860      BOOLEAN OPTIONAL, -- Cond C54
  nonCriticalExtension   RRCMessage-v940-IEs OPTIONAL
}

RRCMessage-v940-IEs ::= SEQUENCE {
  field6-v940      InformationElement6-r9 OPTIONAL, -- Need OR
  nonCriticalExtensions   SEQUENCE {} OPTIONAL
}

-- ASN1STOP
```

Some remarks regarding the extensions shown in the above example:
- The InformationElement4 is introduced in the original version of the protocol (release 8) and hence no suffix is used.

A.4.3.5 Examples of non-critical extensions not placed at the default extension location

The following example illustrates the use of non-critical extensions in case an extension is not placed at the default extension location.
ParentIE-WithEM

The IE ParentIE-WithEM is an example of a high level IE including the extension marker (EM). The root encoding of this IE includes two lower level IEs ChildIE1-WithoutEM and ChildIE2-WithoutEM which not include the extension marker. Consequently, non-critical extensions of the Child-IEs have to be included at the level of the Parent-IE.

The example illustrates how the two extension IEs ChildIE1-WithoutEM-vNx0 and ChildIE2-WithoutEM-vNx0 (both in release N) are used to connect non-critical extensions with a default extension location in the lower level IEs to the actual extension location in this IE.

```
ParentIE-WithEM ::=     SEQUENCE {
    -- Root encoding, including:
    childIE1-WithoutEM     ChildIE1-WithoutEM    OPTIONAL,  -- Need ON
    childIE2-WithoutEM     ChildIE2-WithoutEM    OPTIONAL,  -- Need ON
    ...
    [
        childIE1-WithoutEM-vNx0    ChildIE1-WithoutEM-vNx0  OPTIONAL,  -- Need ON
        childIE2-WithoutEM-vNx0    ChildIE2-WithoutEM-vNx0  OPTIONAL  -- Need ON
    ]
}
```

Some remarks regarding the extensions shown in the above example:

- The fields childIEEx-WithoutEM-vNx0 may not really need to be optional (depends on what is defined at the next lower level).
- In general, especially when there are several nesting levels, fields should be marked as optional only when there is a clear reason.

ChildIE1-WithoutEM

The IE ChildIE1-WithoutEM is an example of a lower level IE, used to control certain radio configurations including a configurable feature which can be setup or released using the local IE ChIE1-ConfigurableFeature. The example illustrates how the new field chIE1-NewField is added in release N to the configuration of the configurable feature. The example is based on the following assumptions:

- when initially configuring as well as when modifying the new field, the original fields of the configurable feature have to be provided also i.e. as if the extended ones were present within the setup branch of this feature.
- when the configurable feature is released, the new field should be released also.
- when omitting the original fields of the configurable feature the UE continues using the existing values (which is used to optimise the signalling for features that typically continue unchanged upon handover).
when omitting the new field of the configurable feature the UE releases the existing values and discontinues the associated functionality (which may be used to support release of unsupported functionality upon handover to an eNB supporting an earlier protocol version).

The above assumptions, which affect the use of conditions and need codes, may not always apply. Hence, the example should not be re-used blindly.

**ChildIE1-WithoutEM** information elements

```plaintext
-- /example/ ASN1START

ChildIE1-WithoutEM ::= SEQUENCE {
    -- Root encoding, including:
    ChIE1-ConfigurableFeature OPTIONAL ChIE1-ConfigurableFeature OPTIONAL -- Need ON
}

ChildIE1-WithoutEM-vNx0 ::= SEQUENCE {
    ChIE1-ConfigurableFeature-vNx0 ChIE1-ConfigurableFeature-vNx0 OPTIONAL -- Cond ConfigF
}

ChIE1-ConfigurableFeature ::= CHOICE {
    release NULL,
    setup SEQUENCE {
        -- Root encoding
    }
}

ChIE1-ConfigurableFeature-vNx0 ::= SEQUENCE {
    ChIE1-NewField-rN INTEGER (0..31)
}

-- ASN1STOP
```

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConfigF</td>
<td>The field is optional present, need OR, in case of chIE1-ConfigurableFeature is included and set to &quot;setup&quot;; otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>
-- ChildIE2-WithoutEM

The IE ChildIE2-WithoutEM is an example of a lower level IE, typically used to control certain radio configurations. The example illustrates how the new field chIE1-NewField is added in release N to the configuration of the configurable feature.

**ChildIE2-WithoutEM information element**

```
ChildIE2-WithoutEM ::=    CHOICE {
    release         NULL,  
    setup          SEQUENCE {
        -- Root encoding
    }
}

ChildIE2-WithoutEM-vNx0 ::=   SEQUENCE {
    chIE2-NewField-rN     INTEGER (0..31)     OPTIONAL  -- Cond ConfigF
}
```

<table>
<thead>
<tr>
<th>Conditional presence</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConfigF</td>
<td>The field is optional present, need OR, in case of chIE2-ConfigurableFeature is included and set to &quot;setup&quot;; otherwise the field is not present and the UE shall delete any existing value for this field.</td>
</tr>
</tbody>
</table>

### A.5 Guidelines regarding inclusion of transaction identifiers in RRC messages

The following rules provide guidance on which messages should include a Transaction identifier:

1. **DL messages on CCCH that move UE to RRC-Idle** should not include the RRC transaction identifier.
2. **All network initiated DL messages** by default should include the RRC transaction identifier.
3. **All UL messages that are direct response to a DL message with an RRC Transaction identifier** should include the RRC Transaction identifier.
4. **All UL messages that require a direct DL response message** should include an RRC transaction identifier.
5. **All UL messages that are not in response to a DL message nor require a corresponding response from the network** should not include the RRC Transaction identifier.
A.6 Protection of RRC messages (informative)

The following list provides information which messages can be sent (unprotected) prior to security activation and which messages can be sent unprotected after security activation. Those messages indicated '-' in 'P' column should never be sent unprotected by eNB or UE. Further requirements are defined in the procedural text.

P…Messages that can be sent (unprotected) prior to security activation

A - I…Messages that can be sent without integrity protection after security activation

A - C…Messages that can be sent unciphered after security activation

NA… Message can never be sent after security activation
<table>
<thead>
<tr>
<th>Message</th>
<th>P</th>
<th>A-I</th>
<th>A-C</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSFBParametersRequestCDMA2000</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CSFBParametersResponseCDMA2000</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CounterCheck</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CounterCheckResponse</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>DLIinformationTransfer</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>HandoverFromEUTRAPreparationRequest (CDMA2000)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>InDeviceCoexIndication</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>InterFreqRSTDMeasurementIndication</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>LoggedMeasurementsConfigurations</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MasterInformationBlock</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>MBMSCountingRequest</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>MBMSCountingResponse</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MBSFNAreaConfiguration</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>MeasurementsReport</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>RAN2 agreed that measurement configuration may be sent prior to security activation. But: In order to protect privacy of UEs MEASUREMENT REPORT is only be sent from the UE after successful security activation.</td>
</tr>
<tr>
<td>MobilityFromEUTRACommand</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Paging</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>ProximityIndication</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RNReconfiguration</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RNReconfigurationComplete</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RRCCconnectionReconfiguration</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>The message shall not be sent unprotected before security activation if it is used to perform handover or to establish SRB2 and DRBs</td>
</tr>
<tr>
<td>RRCCconnectionReconfigurationComplete</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>Unprotected, if sent as response to RRCCconnectionReconfiguration which was sent before security activation</td>
</tr>
<tr>
<td>RRCCconnectionReestablishment</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>This message is not protected by PDCP operation.</td>
</tr>
<tr>
<td>RRCCconnectionReestablishmentComplete</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RRCCconnectionReestablishmentReject</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>One reason to send this may be that the security context has been lost, therefore sent as unprotected.</td>
</tr>
<tr>
<td>RRCCconnectionReestablishmentRequest</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>This message is not protected by PDCP operation. However a short MAC-I is included.</td>
</tr>
<tr>
<td>RRCCconnectionReject</td>
<td>+</td>
<td>NA</td>
<td>NA</td>
<td>Justification for P: If the RRC connection only for signalling not requiring DRBs or ciphered messages, or the signalling connection has to be released prematurely, this message is sent as unprotected.</td>
</tr>
<tr>
<td>RRCCconnectionRelease</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RRCCconnectionRequest</td>
<td>+</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>RRCCconnectionResume</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>RRCCconnectionResumeComplete</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RRCCconnectionResumeRequest</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>This message is not protected by PDCP operation. However a short MAC-I is included.</td>
</tr>
<tr>
<td>RRCCconnectionResumeComplete</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>RCConnectionSetup</td>
<td>+</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>SCGFailureInformation</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>SCPTMConfiguration</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>SecurityModeCommand</td>
<td>+</td>
<td>NA</td>
<td>NA</td>
<td>Integrity protection applied, but no ciphering (integrity verification done after the message received by RRC)</td>
</tr>
</tbody>
</table>
A.7 Miscellaneous

The following miscellaneous conventions should be used:

- References: Whenever another specification is referenced, the specification number and optionally the relevant subclause, table or figure, should be indicated in addition to the pointer to the References section e.g. as follows: 'see TS 36.212 [22, 5.3.3.1.6]'.

- UE capabilities: TS 36.306 [5] specifies that E-UTRAN should in general respect the UE’s capabilities. Hence there is no need to include statement clarifying that E-UTRAN, when setting the value of a certain configuration field, shall respect the related UE capabilities unless there is a particular need e.g. particularly complicated cases.
Annex B (normative): Release 8 and 9 AS feature handling

B.1 Feature group indicators

This annex contains the definitions of the bits in fields featureGroupIndicators (in Table B.1-1) and featureGroupIndRel9Add (in Table B.1-1a).

In this release of the protocol, the UE shall include the fields featureGroupIndicators in the IE UE-EUTRA-Capability and featureGroupIndRel9Add in the IE UE-EUTRA-Capability-v9a0. All the functionalities defined within the field featureGroupIndicators defined in Table B.1-1 or Table B.1-1a are mandatory for the UE (with exceptions for category M1 UE), if the related capability (frequency band, RAT, SR-VCC or Inter-RAT ANR) is also supported. For a specific indicator, if all functionalities for a feature group listed in Table B.1-1 have been implemented and tested, the UE shall set the indicator as one (1), else (i.e. if any one of the functionalities in a feature group listed in Table B.1-1 or Table B.1-1a, which have not been implemented or tested), the UE shall set the indicator as zero (0).

The UE shall set all indicators that correspond to RATs not supported by the UE as zero (0).

The UE shall set all indicators, which do not have a definition in Table B.1-1 or Table B.1-1a, as zero (0).

If the optional fields featureGroupIndicators or featureGroupIndRel9Add are not included by a UE of a future release, the network may assume that all features pertaining to the RATs supported by the UE, respectively listed in Table B.1-1 or Table B.1-1a and deployed in the network, have been implemented and tested by the UE.

In Table B.1-1, a 'VoLTE capable UE' corresponds to a UE which is IMS voice capable and a "MCPTT capable UE" corresponds to a UE which supports MCPTT voice application as defined in TS 23.179 [73].

The indexing in Table B.1-1a starts from index 33, which is the leftmost bit in the field featureGroupIndRel9Add.

<table>
<thead>
<tr>
<th>Index of indicator (bit number)</th>
<th>Definition (description of the supported functionality, if indicator set to one)</th>
<th>Notes</th>
<th>If indicated &quot;Yes&quot; the feature shall be implemented and successfully tested for this version of the specification</th>
<th>FDD/TDD diff</th>
</tr>
</thead>
</table>
| 1 (leftmost bit)                | - Intra-subframe frequency hopping for PUSCH scheduled by UL grant  
- DCI format 3a (TPC commands for PUSCH and PUSCH with single bit power adjustments)  
- Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-0 – UE selected subband CQI without PMI  
- Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-2 – UE selected subband CQI with multiple PMI | set to 1 by category M1 UE that has implemented and successfully tested 'Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-0 – UE selected subband CQI without PM' | Yes |
| 2                               | - Simultaneous CQI and ACK/NACK on PUCCH, i.e. PUCCH format 2a and 2b  
- Absolute TPC command for PUSCH  
- Resource allocation type 1 for PDSCH  
- Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-0 – UE selected subband CQI without PMI  
- Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-1 – UE selected subband CQI without PMI  
- Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-2 – UE selected subband CQI without PMI | If a category M1 UE does not support this feature group, this bit shall be set to 0. | Yes |
| 3                               | - 5bit RLC UM SN  
- 7bit PDCP SN | can only be set to 1 if the UE has set bit number 7 to 1. | Yes, if UE supports VoLTE, MCPTT, or both. Yes, if UE supports SRVCC to EUTRAN from GERAN. | No |
<table>
<thead>
<tr>
<th></th>
<th>- Short DRX cycle</th>
<th>- can only be set to 1 if the UE has set bit number 5 to 1.</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Description</td>
<td>Value</td>
<td>Reason</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>5</td>
<td>- Long DRX cycle</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>- DRX command MAC control element</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>- Prioritised bit rate</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>- RLC UM</td>
<td>- can only be set to 0 if</td>
<td>Yes, if UE supports VoLTE, MCPTT, or both.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the UE does not support VoLTE nor MCPTT, or both.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Yes, if UE supports SRVCC to EUTRAN from GERAN.</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>- EUTRA RRC_CONNECTED to UTRA FDD or UTRA TDD CELL_DCH PS handover, if the UE supports either only UTRAN FDD or only UTRAN TDD</td>
<td>- can only be set to 1 if</td>
<td>Yes (except for category M1 UE) for FDD, if UE supports UTRA FDD.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the UE has set bit number 22 to 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- EUTRA RRC_CONNECTED to UTRA FDD CELL_DCH PS handover, if the UE supports both UTRAN FDD and UTRAN TDD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>- EUTRA RRC_CONNECTED to GERAN GSM_Dedicated handover</td>
<td>- related to SR-VCC</td>
<td>Yes (except for category M1 UE), if UE supports SRVCC to EUTRAN from GERAN.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- can only be set to 1 if</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>the UE has set bit number 23 to 1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>- EUTRA RRC_CONNECTED to GERAN (Packet_) Idle by Cell Change Order</td>
<td>- related to SR-VCC</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>- EUTRA RRC_CONNECTED to GERAN (Packet_) Idle by Cell Change Order with NACC (Network Assisted Cell Change)</td>
<td>- can only be set to 1 if</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>the UE has set bit number 23 to 1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>- EUTRA RRC_CONNECTED to CDMA2000 1xRTT CS Active handover</td>
<td>- related to SR-VCC</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- can only be set to 1 if</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>the UE has set bit number 24 to 1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>- EUTRA RRC_CONNECTED to CDMA2000 HRPD Active handover</td>
<td>- can only be set to 1 if</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the UE has set bit number 26 to 1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>- Inter-frequency handover (within FDD or TDD)</td>
<td>- can only be set to 1 if</td>
<td>Yes (except for category M1 UE), unless UE only supports band 13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the UE has set bit number 25 to 1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>- Measurement reporting event: Event A4</td>
<td>- can only be set to 1 if</td>
<td>Yes (except for category M1 UE)</td>
</tr>
<tr>
<td></td>
<td>- Neighbour &gt; threshold</td>
<td>the UE has set at least one of the bit number 22, 23, 24, 26 or 39 to 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Measurement reporting event: Event A5</td>
<td>- even if the UE sets</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Serving &lt; threshold1 &amp; Neighbour &gt; threshold2</td>
<td>bit 15 to 1 if measurement reporting event B1 is tested for all RATs supported by UE</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>if a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>- Measurement reporting event: Event B1</td>
<td>- can only be set to 1 if</td>
<td>Yes for FDD, if UE supports only UTRAN FDD and does not support UTRAN TDD or GERAN or 1xRTT or HRPD</td>
</tr>
<tr>
<td></td>
<td>- Neighbour &gt; threshold for UTRAN FDD or UTRAN TDD, if the UE supports either only UTRAN FDD or only UTRAN TDD and has set bit number 22 to 1</td>
<td>the UE has set at least one of the bit number 22, 23, 24, 26 or 39 to 1.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Measurement reporting event: Event B1</td>
<td>- even if the UE sets</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Neighbour &gt; threshold for UTRAN FDD or UTRAN TDD, if the UE supports both UTRAN FDD and UTRAN TDD and has set bit number 22 or 39 to 1, respectively</td>
<td>bit 15 to 1 if measurement reporting event B1 is tested for all RATs supported by UE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Measurement reporting event: Event B1</td>
<td>- if a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Neighbour &gt; threshold for GERAN, 1xRTT or HRPD, if the UE has set bit number 23, 24 or 26 to 1, respectively</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>- Intra-frequency periodical measurement reporting where triggerType is set to reportStrongestCells</td>
<td>- can only be set to 1 if</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>- Inter-frequency periodical measurement reporting where triggerType is set to reportStrongestCells, if the UE has set bit number 25 to 1</td>
<td>the UE has set at least one of the bit number 22, 23, 24, 26 or 39 to 1.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- even if the UE sets</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>bit 15 to 1 if measurement reporting event B1 is tested for all RATs supported by UE</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- if a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- if a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>- Inter-RAT periodical measurement reporting where \textit{triggerType} is set to \textit{periodical} and \textit{purpose} is set to \textit{reportStrongestCells} for UTRAN FDD or UTRAN TDD, if the UE supports either only UTRAN FDD or only UTRAN TDD and has set bit number 22 to 1</td>
<td>- can only be set to 1 if the UE has set bit number 5 to 1.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>- Inter-RAT periodical measurement reporting where \textit{triggerType} is set to \textit{periodical} and \textit{purpose} is set to \textit{reportStrongestCells} for UTRAN FDD or UTRAN TDD, if the UE supports both UTRAN FDD and UTRAN TDD and has set bit number 22 or 39 to 1, respectively</td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOTE: Event triggered periodical reporting (i.e., with \textit{triggerType} set to \textit{event} and with \textit{reportAmount} &gt; 1) is a mandatory functionality of event triggered reporting and therefore not the subject of this bit.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Intra-frequency ANR features including:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Intra-frequency periodical measurement reporting where \textit{triggerType} is set to \textit{periodical} and \textit{purpose} is set to \textit{reportStrongestCells}</td>
<td>- can only be set to 1 if the UE has set bit number 5 to 1.</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>- Intra-frequency periodical measurement reporting where \textit{triggerType} is set to \textit{periodical} and \textit{purpose} is set to \textit{reportCGI}</td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Inter-frequency ANR features including:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Inter-frequency periodical measurement reporting where \textit{triggerType} is set to \textit{periodical} and \textit{purpose} is set to \textit{reportStrongestCells}</td>
<td>- can only be set to 1 if the UE has set bit number 5 and bit number 25 to 1.</td>
<td>Yes, unless UE only supports band 13</td>
</tr>
<tr>
<td></td>
<td>- Inter-frequency periodical measurement reporting where \textit{triggerType} is set to \textit{periodical} and \textit{purpose} is set to \textit{reportCGI}</td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Inter-RAT ANR features including:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Inter-RAT periodical measurement reporting where \textit{triggerType} is set to \textit{periodical} and \textit{purpose} is set to \textit{reportStrongestCells} for GERAN, if the UE has set bit number 23 to 1</td>
<td>- can only be set to 1 if the UE has set bit number 5 to 1 and the UE has set at least one of the bit number 22, 23, 24 or 26 to 1.</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>- Inter-RAT periodical measurement reporting where \textit{triggerType} is set to \textit{periodical} and \textit{purpose} is set to \textit{reportStrongestCellsForSON} for UTRAN FDD or UTRAN TDD, if the UE supports either only UTRAN FDD or only UTRAN TDD and has set bit number 22 to 1</td>
<td>- even if the UE sets bits 33 to 37, it shall still set bit 19 to 1 if inter-RAT ANR features are tested for all RATs for which inter-RAT measurement reporting is indicated as tested</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Inter-RAT periodical measurement reporting where \textit{triggerType} is set to \textit{periodical} and \textit{purpose} is set to \textit{reportStrongestCellsForSON} for UTRAN FDD or UTRAN TDD, if the UE supports both UTRAN FDD and UTRAN TDD and has set bit number 22 or 39 to 1, respectively</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trigger Type</td>
<td>Purpose</td>
<td>Report Strongest Cells For SON for 1xRTT or HRPD</td>
<td>Trigger Type</td>
</tr>
<tr>
<td>-------------</td>
<td>---------</td>
<td>-----------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Periodical</td>
<td></td>
<td>If the UE has set bit number 24 or 26 to 1, respectively</td>
<td>Periodical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the UE supports only UTRAN FDD or only UTRAN TDD and has set bit number 22 to 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the UE supports only UTRAN FDD or only UTRAN TDD and has set bit number 22 to 1</td>
<td></td>
</tr>
</tbody>
</table>

**Table:**

<table>
<thead>
<tr>
<th>Bit Number 7</th>
<th>Feature Group</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>SRB1 and SRB2 for DCCH + 8x AM DRB</td>
<td>Yes</td>
</tr>
<tr>
<td>1</td>
<td>SRB1 and SRB2 for DCCH + 8x AM DRB</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>SRB1 and SRB2 for DCCH + 5x AM DRB + 3x UM DRB</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**NOTE:** UE which indicates support for a DRB combination also support all subsets of the DRB combination. Therefore, release of DRB(s) never results in an unsupported DRB combination.

<table>
<thead>
<tr>
<th>Bit Number 20</th>
<th>Feature Group</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Regardless of what bit number 7 and bit number 20 is set to, UE shall support at least SRB1 and SRB2 for DCCH + 4x AM DRB</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feature Group</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predefined intra- and inter-subframe frequency hopping for PUSCH with N_sb &gt; 1</td>
<td>No</td>
</tr>
<tr>
<td>Predefined inter-subframe frequency hopping for PUSCH with N_sb &gt; 1</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feature Group</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTRAN FDD or UTRAN TDD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode, if the UE supports either only UTRAN FDD or only UTRAN TDD</td>
<td>Yes for FDD, if UE supports UTRA FDD</td>
</tr>
<tr>
<td>UTRAN FDD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode, if the UE supports both UTRAN FDD and UTRAN TDD</td>
<td>Yes for FDD, if UE supports UTRA FDD</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feature Group</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>GERAN measurements, reporting and measurement reporting event B2 in E-UTRA connected mode</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feature Group</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>1xRTT measurements, reporting and measurement reporting event B2 in E-UTRA connected mode</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Inter-frequency measurements and reporting in E-UTRA connected mode</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>25</td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
</tr>
<tr>
<td></td>
<td>NOTE: The UE setting this bit to 1 and indicating support for FDD and TDD frequency bands in the UE capability signalling implements and is tested for FDD measurements while the UE is in TDD, and for TDD measurements while the UE is in FDD.</td>
</tr>
<tr>
<td></td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
</tr>
<tr>
<td>26</td>
<td>- EUTRA RRC_CONNECTED to UTRA FDD or UTRA TDD CELL_DCH CS handover, if the UE supports either only UTRAN FDD or only UTRAN TDD</td>
</tr>
<tr>
<td></td>
<td>- EUTRA RRC_CONNECTED to UTRA FDD CELL_DCH CS handover, if the UE supports both UTRAN FDD and UTRAN TDD</td>
</tr>
<tr>
<td>27</td>
<td>- Related to SR-VCC</td>
</tr>
<tr>
<td></td>
<td>- can only be set to 1 if the UE has set bit number 8 to 1 and supports SR-VCC from EUTRA defined in TS 24.008 [49]</td>
</tr>
<tr>
<td></td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
</tr>
<tr>
<td>28</td>
<td>- TTI bundling</td>
</tr>
<tr>
<td>29</td>
<td>- Semi-Persistent Scheduling</td>
</tr>
<tr>
<td>30</td>
<td>- Handover between FDD and TDD</td>
</tr>
<tr>
<td>31</td>
<td>- Indicates whether the UE supports the mechanisms defined for cells broadcasting multi band information i.e. comprehending multiBandInfoList, disregarding in RRC_CONNECTED the related system information fields and understanding the EARFCN signalling for all bands, that overlap with the bands supported by the UE, and that are defined in the earliest version of TS 36.101 [42] that includes all UE supported bands.</td>
</tr>
<tr>
<td>32</td>
<td>Undefined</td>
</tr>
</tbody>
</table>

**NOTE:** The column FDD/ TDD diff indicates if the UE is allowed to signal different values for FDD and TDD.
<table>
<thead>
<tr>
<th>Index of indicator (bit number)</th>
<th>Definition (description of the supported functionality, if indicator set to one)</th>
<th>Notes</th>
<th>If indicated “Yes” the feature shall be implemented and successfully tested for this version of the specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>33 (leftmost bit)</td>
<td>Inter-RAT ANR features for UTRAN FDD including: - Inter-RAT periodical measurement reporting where triggerType is set to \textit{periodical} and purpose is set to report\textit{StrongestCellsForSON} - Inter-RAT periodical measurement reporting where triggerType is set to \textit{periodical} and purpose is set to report\textit{CGI}</td>
<td>- can only be set to 1 if the UE has set bit number 5 and bit number 22 to 1.</td>
<td>Yes</td>
</tr>
<tr>
<td>34</td>
<td>Inter-RAT ANR features for GERAN including: - Inter-RAT periodical measurement reporting where triggerType is set to \textit{periodical} and purpose is set to report\textit{StrongestCells} - Inter-RAT periodical measurement reporting where triggerType is set to \textit{periodical} and purpose is set to report\textit{CGI}</td>
<td>- can only be set to 1 if the UE has set bit number 5 and bit number 23 to 1.</td>
<td>Yes</td>
</tr>
<tr>
<td>35</td>
<td>Inter-RAT ANR features for 1xRTT including: - Inter-RAT periodical measurement reporting where triggerType is set to \textit{periodical} and purpose is set to report\textit{StrongestCellsForSON} - Inter-RAT periodical measurement reporting where triggerType is set to \textit{periodical} and purpose is set to report\textit{CGI}</td>
<td>- can only be set to 1 if the UE has set bit number 5 and bit number 24 to 1.</td>
<td>Yes</td>
</tr>
<tr>
<td>36</td>
<td>Inter-RAT ANR features for HRPD including: - Inter-RAT periodical measurement reporting where triggerType is set to \textit{periodical} and purpose is set to report\textit{StrongestCellsForSON} - Inter-RAT periodical measurement reporting where triggerType is set to \textit{periodical} and purpose is set to report\textit{CGI}</td>
<td>- can only be set to 1 if the UE has set bit number 5 and bit number 26 to 1.</td>
<td>Yes</td>
</tr>
<tr>
<td>37</td>
<td>Inter-RAT ANR features for UTRAN TDD including: - Inter-RAT periodical measurement reporting where triggerType is set to \textit{periodical} and purpose is set to report\textit{StrongestCellsForSON} - Inter-RAT periodical measurement reporting where triggerType is set to \textit{periodical} and purpose is set to report\textit{CGI}</td>
<td>- can only be set to 1 if the UE has set bit number 5 and at least one of the bit number 22 (for UEs supporting only UTRA TDD) or the bit number 39 to 1.</td>
<td>Yes</td>
</tr>
<tr>
<td>38</td>
<td>- EUTRA RRC_CONNECTED to UTRA TDD CELL_DCH PS handover, if the UE supports both UTRAN FDD and UTRAN TDD</td>
<td>- can only be set to 1 if the UE has set bit number 39 to 1</td>
<td>Yes</td>
</tr>
<tr>
<td>39</td>
<td>- UTRAN TDD measurements, reporting and measurement reporting event B2 in E-UTRA connected mode, if the UE supports both UTRAN FDD and UTRAN TDD</td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td>Yes</td>
</tr>
<tr>
<td>40</td>
<td>- EUTRA RRC_CONNECTED to UTRA</td>
<td>- related to SR-VCC</td>
<td>Yes</td>
</tr>
</tbody>
</table>
TDD CELL_DCH CS handover, if the UE supports both UTRAN FDD and UTRAN TDD
- can only be set to 1 if the UE has set bit number 38 to 1

41 Measurement reporting event: Event B1 – Neighbour > threshold for UTRAN FDD, if the UE supports UTRAN FDD and has set bit number 22 to 1
- If a category M1 UE does not support this feature group, this bit shall be set to 0.
Yes for FDD, unless UE has set bit number 15 to 1

42 DCI format 3a (TPC commands for PUCCH and PUSCH with single bit power adjustments)

43 Undefined
44 Undefined
45 Undefined
46 Undefined
47 Undefined
48 Undefined
49 Undefined
50 Undefined
51 Undefined
52 Undefined
53 Undefined
54 Undefined
55 Undefined
56 Undefined
57 Undefined
58 Undefined
59 Undefined
60 Undefined
61 Undefined
62 Undefined
63 Undefined
64 Undefined

NOTE: The column FDD/ TDD diff indicates if the UE is allowed to signal different values for FDD and TDD. Annex E specifies for which TDD and FDD serving cells a UE supporting TDD/FDD CA shall support a feature for which it indicates support within the FGI signalling.

Clarification for mobility from EUTRAN and inter-frequency handover within EUTRAN

There are several feature groups related to mobility from E-UTRAN and inter-frequency handover within EUTRAN. The description of these features is based on the assumption that we have 5 main "functions" related to mobility from E-UTRAN:

A. Support of measurements and cell reselection procedure in idle mode
B. Support of RRC release with redirection procedure in connected mode
C. Support of Network Assisted Cell Change in connected mode
D. Support of measurements and reporting in connected mode
E. Support of handover procedure in connected mode

All functions can be applied for mobility to Inter-frequency to EUTRAN, GERAN, UTRAN, CDMA2000 HRPD and CDMA2000 1xRTT except for function C) which is only applicable for mobility to GERAN. Table B.1-2 below summarises the mobility functions that are supported based on the UE capability signaling (band support) and the setting of the feature group support indicators.
### Table B.1-2: Mobility from E-UTRAN

<table>
<thead>
<tr>
<th>Feature</th>
<th>GERAN</th>
<th>UTRAN</th>
<th>HRPD</th>
<th>1xRTT</th>
<th>EUTRAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Measurements and cell reselection procedure in E-UTRA idle mode</td>
<td>Supported if GERAN band support is indicated</td>
<td>Supported if UTRAN band support is indicated</td>
<td>Supported if CDMA2000 HRPD band support is indicated</td>
<td>Supported if CDMA2000 1xRTT band support is indicated</td>
<td>Supported for supported bands</td>
</tr>
<tr>
<td>B. RRC release with blind redirection procedure in E-UTRA connected mode</td>
<td>Supported if GERAN band support is indicated</td>
<td>Supported if UTRAN band support is indicated</td>
<td>Supported if CDMA2000 HRPD band support is indicated</td>
<td>Supported if CDMA2000 1xRTT band support is indicated</td>
<td>Supported for supported bands</td>
</tr>
<tr>
<td>C. Cell Change Order (with or without) Network Assisted Cell Change) in E-UTRA connected mode</td>
<td>Group 10</td>
<td>N.A.</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
</tr>
<tr>
<td>D. Inter-frequency/RAT measurements, reporting and measurement reporting event B2 (for inter-RAT) in E-UTRA connected mode</td>
<td>Group 23</td>
<td>Group 22/39</td>
<td>Group 26</td>
<td>Group 24</td>
<td>Group 25</td>
</tr>
<tr>
<td>E. Inter-frequency/RAT handover procedure in E-UTRA connected mode</td>
<td>Group 9 (GSM_connected handover) Separate UE capability bit defined in TS 36.306 [5] for PS handover</td>
<td>Group 8/38 (PS handover) or Group 27/40 (SRVCC handover)</td>
<td>Group 12</td>
<td>Group 11</td>
<td>Group 13 (within FDD or TDD) Group 30 (between FDD and TDD)</td>
</tr>
</tbody>
</table>

In case measurements and reporting function is not supported by UE, the network may still issue the mobility procedures redirection (B) and CCO (C) in a blind fashion.

### B.2 CSG support

In this release of the protocol, it is mandatory for the UE to support a minimum set of CSG functionality consisting of:

- Identifying whether a cell is CSG or not;
- Ignoring CSG cells in cell selection/reselection.

Additional CSG functionality in AS, i.e. the requirement to detect and camp on CSG cells when the “CSG whitelist” is available or when manual CSG selection is triggered by the user, are related to the corresponding NAS features. This additional AS functionality consists of:

- Manual CSG selection;
- Autonomous CSG search;
- Implicit priority handling for cell reselection with CSG cells.

It is possible that this additional CSG functionality in AS is not supported or tested in early UE implementations.

Note that since the above AS features relate to idle mode operations, the capability support is not signalled to the network. For these reasons, no “feature group indicator” is assigned to this feature to indicate early support in Rel-8.
Annex C (normative): Release 10 AS feature handling

C.1 Feature group indicators

This annex contains the definitions of the bits in field featureGroupIndRel10.

In this release of the protocol, the UE shall include the field featureGroupIndRel10 in the IE UE-EUTRA-Capability-v1020-IEs. All the functionalities defined within the field featureGroupIndRel10 defined in Table C.1-1 are mandatory for the UE, if the related capability (spatial multiplexing in UL, PDSCH transmission mode 9, carrier aggregation, handover to EUTRA, or RAT) is also supported. For a specific indicator, if all functionalities for a feature group listed in Table C.1-1 have been implemented and tested, the UE shall set the indicator as one (1), else (i.e. if any one of the functionalities in a feature group listed in Table C.1-1 have not been implemented or tested), the UE shall set the indicator as zero (0).

The UE shall set all indicators that correspond to RATs not supported by the UE as zero (0).

The UE shall set all indicators, which do not have a definition in Table C.1-1, as zero (0).

If the optional field featureGroupIndRel10 is not included by a UE of a future release, the network may assume that all features, listed in Table C.1-1 and deployed in the network, have been implemented and tested by the UE.

The indexing in Table C.1-1 starts from index 101, which is the leftmost bit in the field featureGroupIndRel10.

Table C.1-1: Definitions of feature group indicators

<table>
<thead>
<tr>
<th>Index of indicator</th>
<th>Definition (description of the supported functionality, if indicator set to one)</th>
<th>Notes</th>
<th>If indicated “Yes” the feature shall be implemented and successfully tested for this version of the specification</th>
<th>FDD/TDD diff</th>
</tr>
</thead>
</table>
| 101 (leftmost bit) | - DMRS with OCC (orthogonal cover code) and SGH (sequence group hopping) disabling | - if the UE supports two or more layers for spatial multiplexing in UL, this bit shall be set to 1. 
- If a category 0 UE does not support this feature, this bit shall be set to 0. | No | |
| 102                | - Trigger type 1 SRS (aperiodic SRS) transmission (Up to X ports) NOTE: X = number of supported layers on given band | Yes | | |
| 103                | - PDSCH transmission mode 9 when up to 4 CSI reference signal ports are configured | - for Category 8 UEs, this bit shall be set to 1. | Yes | |
| 104                | - PDSCH transmission mode 9 for TDD when 8 CSI reference signal ports are configured | - if the UE does not support TDD, this bit is irrelevant (capability signalling exists for FDD for this feature), and this bit shall be set to 0. 
- For Category 8 UEs, this bit shall be set to 1. | No | |
| 105                | - Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-0 – UE selected subband CQI without PMI, when PDSCH transmission mode 9 is configured 
- Periodic CQI/PMI/RI reporting on PUCCH: Mode 2-1 – UE selected subband CQI with single PMI, when PDSCH transmission mode 9 and up to 4 CSI reference signal ports are configured | - this bit can be set to 1 only if indices 2 (Table B.1-1) and 103 are set to 1. 
- For UEs capable of TDD-FDD CA, this bit can be set to 1 for both FDD and TDD if index 2 is set to 1 for both FDD and TDD, and index 103 is set to 1 either for FDD and TDD. | Yes | |
<p>| 106 | - Periodic CQI/PMI/RI/PTI reporting on PUCCH: Mode 2-1 – UE selected subband CQI with single PMI, when PDSCH transmission mode 9 and 8 CSI reference signal ports are configured | - this bit can be set to 1 only if the UE supports PDSCH transmission mode 9 with 8 CSI reference signal ports (i.e., for TDD, if index 104 is set to 1, and for FDD, if ( tm9\text{-With-8Tx-FDD-r10 } ) is set to &quot;supported&quot;) and if index 2 (Table B.1-1) is set to 1. - For UEs capable of TDD-FDD CA, this bit can be set to 1 for both FDD and TDD if either index 104 is set to 1 or ( tm9\text{-With-8Tx-FDD-r10 } ) is set to &quot;supported&quot;, and if index 2 is set to 1 for both FDD and TDD. | Yes |
| 107 | - Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-0 – UE selected subband CQI without PMI, when PDSCH transmission mode 9 is configured - Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-2 – UE selected subband CQI with multiple PMI, when PDSCH transmission mode 9 and up to 4 CSI reference signal ports are configured | - this bit can be set to 1 only if indices 1 (Table B.1-1) and 103 are set to 1. | Yes |
| 108 | - Aperiodic CQI/PMI/RI reporting on PUSCH: Mode 2-2 – UE selected subband CQI with multiple PMI, when PDSCH transmission mode 9 and 8 CSI reference signal ports are configured | - this bit can be set to 1 only if the UE supports PDSCH transmission mode 9 with 8 CSI reference signal ports (i.e., for TDD, if index 104 is set to 1, and for FDD, if ( tm9\text{-With-8Tx-FDD-r10 } ) is set to &quot;supported&quot;). - For UEs capable of TDD-FDD CA, this bit can be set to 1 for both FDD and TDD if either index 104 is set to 1 or ( tm9\text{-With-8Tx-FDD-r10 } ) is set to &quot;supported&quot;. | Yes |
| 109 | - Periodic CQI/PMI/RI reporting on PUCCH Mode 1-1, submode 1 | - this bit can be set to 1 only if the UE supports PDSCH transmission mode 9 with 8 CSI reference signal ports (i.e., for TDD, if index 104 is set to 1, and for FDD, if ( tm9\text{-With-8Tx-FDD-r10 } ) is set to &quot;supported&quot;). - For UEs capable of TDD-FDD CA, this bit can be set to 1 for both FDD and TDD if either index 104 is set to 1 or ( tm9\text{-With-8Tx-FDD-r10 } ) is set to &quot;supported&quot;. | Yes |
| 110 | - Periodic CQI/PMI/RI reporting on PUCCH Mode 1-1, submode 2 | - this bit can be set to 1 only if the UE supports PDSCH transmission mode 9 with 8 CSI reference signal ports (i.e., for TDD, if index 104 is set to 1, and for FDD, if ( tm9\text{-With-8Tx-FDD-r10 } ) is set to &quot;supported&quot;). - For UEs capable of TDD-FDD CA, this bit can be set to 1 for both FDD and TDD if either index 104 is set to 1 or ( tm9\text{-With-8Tx-FDD-r10 } ) is set to &quot;supported&quot;. | Yes |
| 111 | - Measurement reporting trigger Event A6 | - this bit can be set to 1 only if the UE supports carrier aggregation. | Yes |</p>
<table>
<thead>
<tr>
<th></th>
<th>Feature Description</th>
<th>Condition</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>112</td>
<td>- SCell addition within the handover to EUTRA procedure</td>
<td>- this bit can be set to 1 only if the UE supports carrier aggregation and the handover to EUTRA procedure.</td>
<td>Yes</td>
</tr>
<tr>
<td>113</td>
<td>- Trigger type 0 SRS (periodic SRS) transmission on X Serving Cells</td>
<td>- this bit can be set to 1 only if the UE supports carrier aggregation in UL.</td>
<td>Yes</td>
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<tr>
<td></td>
<td>NOTE: X = number of supported component carriers in a given band combination</td>
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<tr>
<td>114</td>
<td>- Reporting of both UTRA CPICH RSCP and Ec/N0 in a Measurement Report</td>
<td>- this bit can be set to 1 only if index 22 (Table B.1-1) is set to 1.</td>
<td>No</td>
</tr>
<tr>
<td>115</td>
<td>- time domain ICIC RLM/RRM measurement subframe restriction for the serving cell</td>
<td>- If a category M1 UE does not support this feature group, this bit shall be set to 0.</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>- time domain ICIC RRM measurement subframe restriction for neighbour cells</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- time domain ICIC CSI measurement subframe restriction</td>
<td></td>
<td></td>
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<tr>
<td>116</td>
<td>- Relative transmit phase continuity for spatial multiplexing in UL</td>
<td>- this bit can be set to 1 only if the UE supports two or more layers for spatial multiplexing in UL.</td>
<td>Yes</td>
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<tr>
<td>117</td>
<td>Undefined</td>
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<td>120</td>
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<tr>
<td>132</td>
<td>Undefined</td>
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</tbody>
</table>

**NOTE:** The column FDD/ TDD diff indicates if the UE is allowed to signal different values for FDD and TDD. Annex E specifies for which TDD and FDD serving cells a UE supporting TDD/FDD CA shall support a feature for which it indicates support within the FGI signalling.
Annex D (informative): Descriptive background information

D.1 Signalling of Multiple Frequency Band Indicators (Multiple FBI)

D.1.1 Mapping between frequency band indicator and multiple frequency band indicator

This subclause describes the use of the Multiple Frequency Band Indicator (MFBI) lists and the E-UTRA frequency bands in SystemInformationBlockType1 by means of an example as shown in Figure D.1.1-1. In this example:

- E-UTRAN cell belongs to band B90 and also bands B6, B7, B91, and B92.
- The freqBandIndicatorPriority field is not present in SystemInformationBlockType1.
- E-UTRAN uses B64 to indicate the presence of B90 in freqBandIndicator-v9e0.
- For the MFBI list of this cell, E-UTRAN uses B64 in MultiBandInfoList to indicate the position and priority of the bands in MultiBandInfoList-v9e0.
- The UE, after reading SystemInformationBlockType1, generates an MFBI list with priority of B91, B6, B92, and B7. If the UE supports the frequency band in the freqBandIndicator-v9e0 IE it applies that frequency band. Otherwise, the UE applies the first listed band in the MFBI list which it supports.

![Diagram](https://via.placeholder.com/150)

**Figure D.1.1-1: Mapping of frequency bands to MultiBandInfoList/MultiBandInfoList-v9e0**

D.1.2 Mapping between inter-frequency neighbour list and multiple frequency band indicator

This subclause describes the use of the Multiple Frequency Band Indicator (MFBI) lists and the E-UTRA frequencies signalled in SystemInformationBlockType5 by means of an example as shown in Figure D.1.2-1. In this example:

- E-UTRAN includes 4 frequencies (EARFCNs): the bands associated with f1 and f4 belong to bands lower than 64; the bands associated with f2 and f3 belong to bands larger than 64. The reserved EARFCN value of 65535 is used to indicate the presence of ARFCN-ValueEUTRA-v9e0.
The band associated with f1 has two overlapping bands, B1 and B2 (lower than 64); the band associated with f2 has one overlapping band, B91; the band associated with f3 has four overlapping bands B3, B4, B92, and B93; the band associated with f4 does not have overlapping bands.

E-UTRAN includes 4 lists in both interFreqCarrierFreqList-v8h0 and interFreqCarrierFreqList-v9e0 and ensure the order of the lists is matching. Each list corresponds to one EARFCN and contains up to 8 bands. The first list corresponds to f1, the second list corresponds to f2, and so on. The grey lists mean not including MultiBandInfoList or MultiBandInfoList-v9e0, i.e. the corresponding EARFCN does not have any overlapping frequency bands in MultiBandInfoList or MultiBandInfoList-v9e0.

Figure D.1.2-1: Mapping of EARFCNs to MultiBandInfoList/MultiBandInfoList-v9e0

D.1.3 Mapping between UTRA FDD frequency list and multiple frequency band indicator

This subclause describes the use of the Multiple Frequency Band Indicator (MFBI) lists and the UTRA FDD frequencies signalled in SystemInformationBlockType6 by means of an example as shown in Figure D.1.3-1. In this example:

- E-UTRAN includes 4 UTRA FDD frequencies (UARFCNs).
- The bands associated with f1 and f4 have no overlapping bands. The band associated with f2 has two overlapping bands, B1 and B2. The band associated with f3 has one overlapping band, B3.
- E-UTRAN includes 4 lists in carrierFreqListUTRA-FDD-v8h0 with the first and fourth entry not including MultiBandInfoList.
Figure D.1.3-1: Mapping of UARFCNs to MultiBandInfoList
Annex E (normative):
TDD/FDD differentiation of FGIs/capabilities in TDD-FDD CA

Annex E specifies for which TDD and FDD serving cells a UE supporting TDD/FDD CA shall support a feature/capability for which it indicates support within the FGI/capability signalling.

A UE that indicates support for TDD/FDD CA:

- For the fields for which the UE is allowed to indicate different support for FDD and TDD, the UE shall support the feature on the PCell and/or SCell(s), as specified in tables E-1, E-2 and E-3 in accordance to the following rules:
  - PCell: the UE shall support the feature for the PCell, if the UE indicates support of the feature for the PCell duplex mode;
  - SCell: the UE shall support the feature for SCell(s), if the UE indicates support of the feature for the SCell duplex mode;
  - Per serving cell: the UE shall support the feature for a serving cell if the UE indicates support of the feature for the serving cell’s duplex mode;
  - All serving cells: UE shall support the feature if the UE indicates support of the feature for both TDD and FDD duplex modes;

- For the fields where the UE is not allowed to indicate different support for FDD and TDD, the UE shall support the feature for PCell and SCell(s) if the UE indicates support of the feature via the common FGI/capability bit.

Table E-1: Rel-8/9 FGIs for which FDD/TDD differentiation is allowed (from Annex B)

<table>
<thead>
<tr>
<th>Index of indicator</th>
<th>Classification</th>
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<tbody>
<tr>
<td>1</td>
<td>Per serving cell</td>
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<tr>
<td>2</td>
<td>All serving cells</td>
</tr>
<tr>
<td>4</td>
<td>All serving cells</td>
</tr>
<tr>
<td>8</td>
<td>PCell</td>
</tr>
<tr>
<td>9</td>
<td>PCell</td>
</tr>
<tr>
<td>10</td>
<td>PCell</td>
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<tr>
<td>11</td>
<td>PCell</td>
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<tr>
<td>12</td>
<td>PCell</td>
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<tr>
<td>15</td>
<td>PCell</td>
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<td>19</td>
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<td>40</td>
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</tr>
<tr>
<td>41</td>
<td>PCell</td>
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</table>
Table E-2: Rel-10 FGIs for which FDD/TDD differentiation is allowed (from Annex C)

<table>
<thead>
<tr>
<th>Index of indicator</th>
<th>Classification</th>
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</thead>
<tbody>
<tr>
<td>102</td>
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<td>103</td>
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<td>105</td>
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<tr>
<td>115</td>
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</tr>
<tr>
<td>116</td>
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</table>

Table E-3: Rel-12 UE-EUTRA capabilities for which FDD/TDD differentiation is allowed

<table>
<thead>
<tr>
<th>UE-EUTRA-Capability</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>crossCarrierScheduling</td>
<td>All serving cells</td>
</tr>
<tr>
<td>e-CSFB-1XRTT</td>
<td>PCell</td>
</tr>
<tr>
<td>e-CSFB-ConcPS-Mob1XRTT</td>
<td>PCell</td>
</tr>
<tr>
<td>e-CSFB-dual-1XRTT</td>
<td>PCell</td>
</tr>
<tr>
<td>ePDCCH</td>
<td>Per serving cell</td>
</tr>
<tr>
<td>e-RedirectionUTRA</td>
<td>PCell</td>
</tr>
<tr>
<td>e-RedirectionUTRA-TDD</td>
<td>PCell</td>
</tr>
<tr>
<td>inDeviceCoexInd</td>
<td>All serving cells</td>
</tr>
<tr>
<td>interFreqRSTD-Measurement</td>
<td>PCell</td>
</tr>
<tr>
<td>interFreqSI-AcquisitionForHO</td>
<td>PCell</td>
</tr>
<tr>
<td>interRAT-PS-HO-ToGERAN</td>
<td>PCell</td>
</tr>
<tr>
<td>intraFreqSI-AcquisitionForHO</td>
<td>PCell</td>
</tr>
<tr>
<td>mbms-Scell</td>
<td>SCell</td>
</tr>
<tr>
<td>mbms-NonServingCell</td>
<td>SCell</td>
</tr>
<tr>
<td>multiACK-CSIreporting</td>
<td>PCell</td>
</tr>
<tr>
<td>multiClusterPUSCH-WithinCC</td>
<td>Per serving cell</td>
</tr>
<tr>
<td>otdoa-UE-Assisted</td>
<td>PCell</td>
</tr>
<tr>
<td>pmi-Disabling</td>
<td>Per serving cell</td>
</tr>
<tr>
<td>rsrqMeasWideband</td>
<td>Per serving cell</td>
</tr>
<tr>
<td>simultaneousPUCCH-PUSCH</td>
<td>All serving cells</td>
</tr>
<tr>
<td>ss-CCH-InterHandl</td>
<td>PCell</td>
</tr>
<tr>
<td>txDiv-PUCCH1b-ChSelect</td>
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<tr>
<td>ue-TxAntennaSelectionSupported</td>
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<td>utran-SI-AcquisitionForHO</td>
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Annex F (informative):
Change history
3GPP TS 36.331 version 13.3.0 Release 13

824

ETSI TS 136 331 V13.3.0 (2016-10)

Change history
Date
12/2007
03/2008
03/2008
05/2008
09/2008
12/2008
03/2009

TSG #
RP-38
RP-39
RP-39
RP-40
RP-41
RP-42
RP-43
RP-43
RP-43
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RP-43

TSG Doc.
RP-070920
RP-080163
RP-080164
RP-080361
RP-080693
RP-081021
RP-090131
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Rev Subject/Comment
Approved at TSG-RAN #38 and placed under Change Control
4
CR to 36.331 with Miscellaneous corrections
2
CR to 36.331 to convert RRC to agreed ASN.1 format
1
CR to 36.331 on Miscellaneous clarifications/ corrections
CR on Miscellaneous corrections and clarifications
Miscellaneous corrections and clarifications
Correction to the Counter Check procedure
CR to 36.331-UE Actions on Receiving SIB11
1
Spare usage on BCCH
Issues in handling optional IE upon absence in GERAN NCL
CR to 36.331 on Removal of useless RLC re-establishment at RB
release
1
Clarification to RRC level padding at PCCH and BCCH
Removal of Inter-RAT message
Padding of the SRB-ID for security input
Validity of ETWS SIB
1
Configuration of the Two-Intervals-SPS
Corrections on Scaling Factor Values of Qhyst
1
Optionality of srsMaxUppts
CR for discussion on field name for common and dedicated IE
Corrections to Connected mode mobility
Clarification regarding the measurement reporting procedure
1
Corrections on s-Measure
1
R1 of CR0023 (R2-091029) on combination of SPS and TTI
bundling for TDD
L3 filtering for path loss measurements
1
S-measure handling for reportCGI
1
Measurement configuration clean up
Alignment of measurement quantities for UTRA
CR to 36.331 on L1 parameters ranges alignment
Default configuration for transmissionMode
CR to 36.331 on RRC Parameters for MAC, RLC and PDCP
1
CR to 36.331 - Clarification on Configured PRACH Freq Offset
Clarification on TTI bundling configuration
1
Update of R2-091039 on Inter-RAT UE Capability
Feature Group Support Indicators
Corrections to RLF detection
Indication of Dedicated Priority
2
Security Clean up
Correction of TTT value range
Correction on CDMA measurement result IE
1
Clarification of Measurement Reporting
Spare values in DL and UL Bandwidth in MIB and SIB2
1
Clarifications to System Information Block Type 8
Reception of ETWS secondary notification
1
Validity time for ETWS message Id and Sequence No
CR for Timers and constants values used during handover to EUTRA
Inter-RAT Security Clarification
CR to 36.331 on consistent naming of 1xRTT identifiers
Capturing RRC behavior regarding NAS local release
Report CGI before T321 expiry and UE null reporting
System Information and 3 hour validity
1
Inter-Node AS Signalling
Set of values for the parameter "messagePowerOffsetGroupB"
CR to paging reception for ETWS capable UEs in
RRC_CONNECTED
1
CR for CSG related items in 36.331
1
SRS common configuration
RRC processing delay
CR for HNB Name
3
Handover to EUTRA delta configuration
Delivery of Message Identifier and Serial Number to upper layers
for ETWS
Clarification on the maximum size of cell lists
Missing RRC messages in 'Protection of RRC messages'
1
Clarification on NAS Security Container
Extension of range of CQI/PMI configuration index
1
Access barring alleviation in RRC connection establishment
6
Corrections to feature group support indicators
CR from email discussion to capture DRX and TTT handling

ETSI

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RP-43 RP-090131 0079 1 Need Code handling on BCCH messages 8.4.0 8.5.0
RP-43 RP-090131 0080 - Unification of T300 and T301 and removal of miscellaneous FFSs 8.4.0 8.5.0
RP-43 RP-090131 0084 1 Proposed CR modifying the code-point definitions of neighbourCellConfiguration 8.4.0 8.5.0
RP-43 RP-090131 0087 2 Remove Redundant Optionality in SIB8 8.4.0 8.5.0
RP-43 RP-090131 0089 - Corrections to the generic error handing 8.4.0 8.5.0
RP-43 RP-090131 0090 - Configurability of T301 8.4.0 8.5.0
RP-43 RP-090131 0091 1 Correction related to TTT 8.4.0 8.5.0
RP-43 RP-090131 0095 - CR for 36.331 on SPS-config 8.4.0 8.5.0
RP-43 RP-090131 0096 2 CR for Deactivation of periodical measurement 8.4.0 8.5.0
RP-43 RP-090131 0099 2 SMC and reconfiguration 8.4.0 8.5.0
RP-43 RP-090131 0101 - TDD handover 8.4.0 8.5.0
RP-43 RP-090131 0102 - Corrections to system information acquisition 8.4.0 8.5.0
RP-43 RP-090131 0106 - Some Corrections and Clarifications to 36.331 8.4.0 8.5.0
RP-43 RP-090131 0109 - Clarification on the Maximum number of ROHC context sessions parameter 8.4.0 8.5.0
RP-43 RP-090131 0110 - Transmission of mm-Config at Inter-RAT Handover 8.4.0 8.5.0
RP-43 RP-090131 0111 1 Use of SameHetSignalsInNeighbor parameter 8.4.0 8.5.0
RP-43 RP-090131 0112 - Default serving cell offset for measurement event A3 8.4.0 8.5.0
RP-43 RP-090131 0114 - dl-EARFCN missing in HandoverPreparationInformation 8.4.0 8.5.0
RP-43 RP-090131 0115 - Cleanup of references to 36.101 8.4.0 8.5.0
RP-43 RP-090131 0117 - Correction to the value range of UE-Categories 8.4.0 8.5.0
RP-43 RP-090131 0122 1 Correction on RRC connection re-establishment 8.4.0 8.5.0
RP-43 RP-090131 0124 - Performing Measurements to report CGI for CDMA2000 8.4.0 8.5.0
RP-43 RP-090131 0125 - CDMA2000-System Timeline in VarMeasurementConfiguration 8.4.0 8.5.0
RP-43 RP-090131 0126 - UE Capability Information for CDMA2000 1xRTT 8.4.0 8.5.0
RP-43 RP-090131 0127 - CDMA2000 related editorial changes 8.4.0 8.5.0
RP-43 RP-090131 0128 - Draft CR to 36.331 on State mismatch recovery at re-establishment 8.4.0 8.5.0
RP-43 RP-090131 0129 1 Draft CR to 36.331 on Renaming of AC barring related IEs 8.4.0 8.5.0
RP-43 RP-090131 0130 2 Draft CR to 36.331 on Inheriting of dedicated priorities at Inter-RAT reselection 8.4.0 8.5.0
RP-43 RP-090131 0135 - Proposed CR to 36.331 Description alignment for paging parameter, nB 8.4.0 8.5.0
RP-43 RP-090131 0139 2 Miscellaneous corrections and clarifications resulting from ASN.1 review 8.4.0 8.5.0
RP-43 RP-090131 0141 1 Correction regarding Redirection Information to GERAN 8.4.0 8.5.0
RP-43 RP-090131 0142 - Further ASN.1 review related issues 8.4.0 8.5.0
RP-43 RP-090131 0143 - Periodic measurements 8.4.0 8.5.0
RP-43 RP-090131 0144 1 Further analysis on code point "OFF" for ri-ConfigIndex 8.4.0 8.5.0
RP-43 RP-090131 0145 1 Adding and deleting same measurement or configuration in one message 8.4.0 8.5.0
RP-43 RP-090131 0147 - Corrections to IE dataCodingScheme in SIB11 8.4.0 8.5.0
RP-43 RP-090131 0148 - Clarification on Mobility from E-UTRA 8.4.0 8.5.0
RP-43 RP-090131 0149 - 36.331 CR related to 'not applicable' 8.4.0 8.5.0
RP-43 RP-090131 0150 - UE radio capability transfer 8.4.0 8.5.0
RP-43 RP-090131 0151 - CR to 36.331 on value of CDMA band classes 8.4.0 8.5.0
RP-43 RP-090131 0152 - Corrections to DRB modification 8.4.0 8.5.0
RP-43 RP-090131 0153 - Correction to presence condition for pdcp-config 8.4.0 8.5.0
RP-43 RP-090131 0155 - TDD HARQ-ACK feedback mode 8.4.0 8.5.0
RP-43 RP-090275 0157 - Corrections regarding use of carrierFreq for CDMA (SIB8) and GERAN (meanObject) 8.4.0 8.5.0
RP-43 RP-090321 0156 1 Sending of GERAN SI/PSI information at Inter-RAT Handover 8.4.0 8.5.0
RP-43 RP-090339 0158 - Clarification of CSG support 8.4.0 8.5.0
06/2009 RP-44 RP-090516 0159 - Octet alignment of VarShortMAC-Input 8.5.0 8.6.0
RP-44 RP-090516 0160 3 Minor corrections to the feature grouping 8.5.0 8.6.0
RP-44 RP-090516 0161 - Security clarification 8.5.0 8.6.0
RP-44 RP-090516 0162 1 Sending of GERAN SI/PSI information at Inter-RAT Handover 8.5.0 8.6.0
RP-44 RP-090516 0163 1 Correction of UE measurement model 8.5.0 8.6.0
RP-44 RP-090516 0164 - Restricting the reconfiguration of UMTS SN field size 8.5.0 8.6.0
RP-44 RP-090516 0165 1 36.331 CR on Clarification on cell change order from GERAN to E- UTRAN 8.5.0 8.6.0
RP-44 RP-090516 0166 - 36.331 CR - Handling of expired TAT and failed D-SR 8.5.0 8.6.0
RP-44 RP-090516 0167 1 Proposed CR to 36.331 Clarification on mandatory information in AS-Config 8.5.0 8.6.0
RP-44 RP-090516 0168 2 Miscellaneous small corrections 8.5.0 8.6.0
RP-44 RP-090516 0173 - Clarification on the basis of delta signalling 8.5.0 8.6.0
RP-44 RP-090516 0177 - CR on Alignment of CCCH and DCCH handling of missing mandatory field 8.5.0 8.6.0
RP-44 RP-090516 0180 2 Handling of Measurement Context During HO Preparation 8.5.0 8.6.0
RP-44 RP-090516 0181 - Clarification of key-eNodeB-Star in AdditionalReestabInfo 8.5.0 8.6.0
RP-44 RP-090516 0182 1 UE Capability Transfer 8.5.0 8.6.0
RP-44 RP-090516 0186 1 Clarification regarding mobility from E-UTRA in-between SMC and SRB2/DRB setup 8.5.0 8.6.0
RP-44 RP-090516 0188 1 Correction and completion of specification conventions 8.5.0 8.6.0
<table>
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<th>RP-44</th>
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<td>Proposed update of the feature grouping</td>
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<td>- Clarification on measurement object configuration for serving frequency</td>
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<td>- Correction regarding SRVCC</td>
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<td>- Indication of DRB Release during HO</td>
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<td>- Correction regarding application of dedicated resource configuration upon handover</td>
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<td>RP-45</td>
<td>- In-order delivery of NAS PDUs at RRC connection reconfiguration</td>
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<td>- Correction on Threshold of Measurement Event</td>
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<td>- Clarification on dedicated resource of RA procedure</td>
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<td>- Cell barring when MasterInformationBlock or SystemInformationBlock1 is missing</td>
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<td>RP-45</td>
<td>- Clarification on supported handover types in feature grouping</td>
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<td>- Handling of unsupported / non-comprehended frequency band and emission requirement</td>
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<td>- RB combinations in feature group indicator 20</td>
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<td>- Introduction of Per-QCI radio link failure timers (option 1)</td>
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<td>- Emergency Support Indicator in BCCH</td>
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<td>RP-45</td>
<td>- CR to 36.331 for Enhanced CSFB to 1xRTT with concurrent PS handover</td>
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<td>- Periodic CQI/PMI/RI masking</td>
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<td>- Introduction of CMAS</td>
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<td>- (Rel-9) clarification on the description of redirectedCarrierInfo</td>
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<td>- Adding references to RRC processing delay for inter-RAT mobility messages</td>
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<td>- Alignment of srs-Bandwidth with 36.211</td>
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<td>- Baseline CR capturing eMBMS agreements</td>
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<td>- Capturing agreements on inbound mobility</td>
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<td>RP-46</td>
<td>- Clarification of preRegistrationZoneID/secondaryPreRegistrationZoneID</td>
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<td>- Clarification on NCC for IRAT HO</td>
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<td>- Clarification on P-max</td>
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<td>- Correction of q-RxLevMin reference in SI7</td>
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<td>- Correction relating to CMAS UE capability</td>
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<td>- Feature grouping bit for SRVCC handover</td>
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<td>- Correction and completion of extension guidelines</td>
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<td>- RACH optimization Stage-3</td>
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<td>RP-46</td>
<td>- SR prohibit mechanism for UL SPs</td>
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<td>- Parameters used for enhanced 1xRTT CS fallback</td>
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<td>- Correction on UTRAN UE Capability transfer</td>
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<td>- Maximum number of CDMA2000 neighbors in SIB8</td>
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<td>- Introduction of UE Rx-Tx Time Difference measurement</td>
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<td>- Introduction of SR prohibit timer</td>
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<td>RP-46</td>
<td>- Remove FF-Ss from RANZ specifications</td>
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<td>- Renaming Allowed CGS List (36.331 Rel-9)</td>
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<td>- Re-introduction of message segment discard time</td>
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<td>- Application of ASN.1 extension guidelines</td>
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3GPP TS 36.331 version 13.3.0 Release 13

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ETSI TS 136 331 V13.3.0 (2016-10)

Correction to field descriptions of UE-EUTRA-Capability
Correction to MBMS scheduling terminology
Corrections to SIB8
CR 36.331 R9 for Unifying SI reading for ANR and inbound mobility
CR to 36.331 for 1xRTT pre-registration information in SIB8
CR to 36.331 on corrections for MBMS
CR to 36.331 on CSG identity reporting
CR to 36.331 on Optionality of Rel-9 UE features
CR to 36.331 on Service Specific Acces Control (SSAC)
Introduction of power-limited device indication in UE capability.
Missing agreement in MCCH change notification.
Corrections related to MCCH change notification and value ranges
Prohibit timer for proximity indication
Proximity Indication after handover and re-establishment
Specifying the exact mapping of notificationIndicator in SIB13 to
PDCCH bits
Corrections out of ASN.1 review scope
CR on clarification of system information change
Measurement Result CDMA2000 Cell
Correction on the range of UE Rx-Tx time difference measurement
result
Small clarifications regarding MBMS
Introduction of REL-9 indication within field accessStratumRelease
Extending mobility description to cover inbound mobility
Clarification regarding enhanced CSFB to 1XRTT
Handling of dedicated RLF timers
Clarification on UE's behavior of receiving MBMS service
MBMS Service ID and Session ID
Inclusion of non-MBSFN region length in SIB13
CR to 36.331 for e1xCSFB access class barring parameters in
SIB8
Multiple 1xRTT/HRPD target cells in
MobilityFromEUTRACommand
Independent support indicators for Dual-Rx CSFB and S102 in
SIB8
Clarification on DRX StartOffset for TDD
Miscellaneous corrections from REL-9 ASN.1 review
Need codes and missing conventions
Introduction of Full Configuration Handover for handling earlier eNB
releases
Clarification to SFN reference in RRC
RSRP and RSRQ based Thresholds
Redirection enhancements to GERAN
Cell reselection enhancements CR for 36.331
CR on UE-originated RLFreporting for MRO SON use case
CR to 36.331 on Redirection enhancements to UTRAN
Proximity status indication handling at mobility
Upper layer aspect of MBSFN area id
Redirection for enhanced 1xRTT CS fallback with concurrent
PSHO
Avoiding interleaving transmission of CMAS notifications
Introduction of UE GERAN DTM capability indicator
Introducing provisions for late ASN.1 corrections
Correction/ alignment of REL-9 UE capability signalling
Clarification for mapping between warning message and CB-data
Clarification of radio link failure related actions
Clarification on UE actions upon leaving RRC_CONNECTED
Correction on CMAS system information
Corrections to MBMS
Decoding of unknown future extensions
Miscellaneous small corrections and clarifications
Prohibit timer for proximity indication
RLF report for MRO correction
Missing UTRA bands in IRAT-ParametersUTRA-FDD
Correction on handling of dedicated RLF timers
Protection of RRC messages
Handling missing Essential system information
Clarification on UMTS CSG detected cell reporting in LTE
Introducing provisions for late corrections
Clarification regarding / alignment of REL-9 UE capabilities
Correction to 3GPP2 reference for interworking with cdma2000 1x
Clarification on UL handover preparation transfer
Clarifications regarding fullConfiguration

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3GPP TS 36.331 version 13.3.0 Release 13

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ETSI TS 136 331 V13.3.0 (2016-10)

Clarifications regarding handover to E-UTRAN
Correction on the table of conditionally mandatory Release 9
features
Corrections to TS36.331 on MeasConfig IE
CR to 36.331 on clarification for MBMS PTM RBs
Introduction of late corrections container for E-UTRA UE
capabilities
Renaming of containers for late non-critical extensions
Clarifications Regarding Redirection from LTE
Description of multi-user MIMO functionality in feature group
indicator table
Correct the PEMAX_H to PEMAX
Clarification for feature group indicator bit 11
Clarification of FGI setting for inter-RAT features not supported by
the UE
FGI settings in Rel-9
Clarification on Meaning of FGI Bits
Clarification regarding reconfiguration of the quantityConfig
Corrections to the presence of IE regarding DRX and CQI
The field descriptions of MeasObjectEUTRA
Clarification of FGI settings non ANR periodical measurement
reporting
Corrections to RLF Report
T321 timer fix
Restriction of AC barring parameter setting
Removal of SEQUENCE OF SEQUENCE in
UEInformationResponse
Clarification regarding default configuration value N/A
Splitting FGI bit 3
36.331 CR on Introduction of Minimization of Drive Tests
AC-Barring for Mobile Originating CSFB call
Addition of UE-EUTRA-Capability descriptions
Clarification on Default Configuration for CQI-ReportConfig
CR to 36.331 adding e1xCSFB support for dual Rx/Tx UE
Introduction of Carrier Aggregation and UL/ DL MIMO
Introduction of relays in RRC
Priority indication for CSFB with re-direction
SIB Size Limitations
Combined Quantity Report for IRAT measurement of UTRAN
UE power saving and Local release
Inclusion of new UE categories in Rel-10
36331_CRxxx_Protection of Logged Measurements Configuration
Stage-3 CR for MBMS enhancement
Clean up MDT-related text
Clear MDT configuration and logs when the UE is not registered
Correction to the field description of nB
CR on impact on UP with remove&add approach_2
CR to 36.331 on corrections for MDT
Introduction of CA/MIMO capability signalling and measurement
capability signalling in CA
MDT PDU related clarifications
Correction on release of logged measurement configuration while
in another RAT
Miscellaneous Corrections for CA Running RRC CR
Miscellaneous small clarifications and corrections
Necessary changes for RLF reporting enhancements
Memory size for logged measurements capable UE
Parameters confusion of non-CA and CA configurations
Presence condition for cellSelectionInfo-v920 in SIB1
Removal of MDT configuration at T330 expiry
Signalling aspects of existing LTE-A parameters
Some Corrections on measurement
Stored system information for RNs
Support of Integrity Protection for Relay
Updates of L1 parameters for CA and UL/DL MIMO
Note for Dedicated SIB for RNs
Correction to cs-fallbackIndicator field description
Clarification to the default configuration of sCellDeactivationTimer
Miscellaneous corrections to TS 36.331 on Carrier Aggregation
Correction of configuration description in SIB2
Clarification of band indicator in handover from E-UTRAN to
GERAN
36331_CRxxxx Support of Delay Tolerant access requests

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| RP-51 | 0590 | Update of R2-110807 on CSI measurement resource restriction for time domain ICIC | 10.0.0 | 10.1.0 |
| RP-51 | 0590 | Update of R2-110821 on RRM/RLM resource restriction for time domain ICIC | 10.0.0 | 10.1.0 |
| RP-51 | 0590 | Corrections on UE capability related parameters | 10.0.0 | 10.1.0 |
| RP-51 | 0590 | Validity time for location information in Immediate MDT | 10.0.0 | 10.1.0 |
| RP-51 | 0590 | CR to 36.331 adding UE capability indicator for dual Rx/Tx e1xCSFB | 10.0.0 | 10.1.0 |
| RP-51 | 0590 | Miscellaneous corrections to CA | 10.0.0 | 10.1.0 |
| RP-51 | 0590 | Further correction to combined measurement report of UTRAN | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Correction to the reference of ETWS | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Introduction of OVDQA inter-freq RSTD measurement indication procedure | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Correction of use of RRConnectionReestablishment message for contention resolution | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | CR to 36.331 on MDT neighbour cell measurements logging | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Minor ASN.1 corrections for the UEInformationResponse message | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Clarification regarding dedicated RLP timers and constants | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Release of Logged Measurement Configuration | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Some corrections on TS 36.331 | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | AC barring procedure clean up | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Counter proposal to R2-110826 on UE capabilities for MDT | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | UE information report for RACH | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Measurement on the deactivated Scells | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Trace configuration parameters for Logged MDT | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Clarification on stop condition for timer T3330 | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | User consent for MDT | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Correction on the range of CQI resource index | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Small corrections to ETWS & CMAS system information | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | UE capability signaling structure w.r.t carrier aggregation, MIMO and measurement gap | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Normal PHR and the multiple uplink carriers | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Corrections to TS36.331 on SIB2 handling | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Adding a Power Management indication in PHR | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Clarification for CA and TTI bundling in RRC | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Updates to FGI settings | 10.0.0 | 10.1.0 |
| RP-51 | 0600 | Add pre Rel-10 procedures to processing delay requirement for RRC procedure Section 11.2 | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Add MBMS counting procedure to processing delay requirement for RRC procedure Section 11.2 | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Add pre Rel-10 procedures to processing delay requirement for RRC procedure Section 11.2 | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Addition of a specific reference for physical configuration fields | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Clarification of inter-frequency RSTD measurement indication procedure | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Clarification of optionality of UE features without capability | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Clarification on the definition of maxCellBlack | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Clarification on upper layer requested connection release | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Clarification regarding eICIC measurements | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | CR for s-measure handling | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | CR on clarification of RLF Report in Carrier Aggregation | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | FGI bit for handover between LTE FDD/TDD | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Further updates on L1 parameters | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | General error handling for extension fields | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Additional information for RLF report | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Introduction of TCE ID for logged MDT | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Miscellaneous corrections (related to review in preparation for ASN.1 freeze) | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | PLMN check for MDT logging | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | UE actions upon leaving RRC CONNECTED | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Clarification on bandEUTRA-r10 and supportedBandListEUTRA | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Updated value range for the Extended Wait Timer | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Value range of DRX-Inactivity Timer | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Correction for SR-VCC and QCI usage | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Restructuring of CQI-ReportConfig-r10 | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Correction on DL allocations in MBSFN subframes | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Reference SFN for MeasSubframePattern | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Clarifications to CA related field descriptions | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Corrections to codebookSubsetRestriction and SRS parameters | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Corrections to the handling of n-ConfIndex for TM9 | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | 2 UE capabilities for Rel-10 LTE features with eICIC measurement restrictions as FGI (AH) | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | CR to 36.331 on redirected utra-TDD carrier frequency | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Explicit AS signalling for mapped PTMSI/GUTI | 10.1.0 | 10.2.0 |
| RP-51 | 0600 | Counter proposal for Updates of mandatory information in AS-Config | 10.1.0 | 10.2.0 |
Introduction of absolute priority based measurements and Differentiating UTRAN modes in FGIs

Voice support Capabilities

36.331 CR introducing In-Device Coexistence (IDC)

Additional special subframe configuration related correction

Introduction of EAB

Introduction of a new security algorithm ZUC

T321 value for UTRA SI acquisition

Introducing means to signal different REL-10 FDD/TDD Capabilities/FGIs

Change in Scheduling Information for CMAS

Clarification of mch-SchedulingPeriod configuration

Change in Scheduling Information for ETWS

Duplicated ASN.1 naming correction

establishment (parallel message transmission)

Clarification on SRB2 resumption upon connection re-

for Dual-xDD UE

Introducing means to signal different FDD/TDD Capabilities/FGIs

Minor correction regarding limited service access on non-CSG-

On SIB10/11 Reception Timing

CR to 36.331 on cdma2000 band classes and references

Limiting MBMS counting responses to within the PLMN

03/2012

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RP-57 - 121349 1025 2 Introducing Carrier aggregation enhancements for REL-11 11.0.0 11.1.0
RP-57 - 121375 1026 - Introducing MBMS enhancements for REL-11 11.0.0 11.1.0
RP-57 - 121376 1052 2 Signaling support for CRS interference management in eICIC 11.0.0 11.1.0
RP-57 - 121395 1055 - CR on scell measurement cycle 11.0.0 11.1.0
RP-57 - 121395 1056 - CR on measurement report 11.0.0 11.1.0
RP-57 - 121378 1057 3 Introduction of 'Power preference indication' 11.0.0 11.1.0
RP-57 - 121280 1060 - Correction for PUCCH/SRS Release 11.0.0 11.1.0

12/2012
RP-58 - 121933 1063 - Correction related to differentiating UTRAN modes in FGl5s 11.1.0 11.2.0
RP-58 - 121936 1065 - Processing delay for RRCConnectionReconfiguration 11.1.0 11.2.0
RP-58 - 121953 1066 2 Addition of the stage-3 agreements on IDC 11.1.0 11.2.0
RP-58 - 121951 1067 3 Carrier Aggregation Enhancement RAN parameters 11.1.0 11.2.0
RP-58 - 121957 1068 - Clarification of SR period 11.1.0 11.2.0
RP-58 - 121957 1069 1 Clarification on HandoverCommand message 11.1.0 11.2.0
RP-58 - 121957 1070 - Clarification on mobility related issues 11.1.0 11.2.0
RP-58 - 121946 1071 1 Correction of the signaling for Uncertainty and Confidence 11.1.0 11.2.0
RP-58 - 121940 1072 2 Corrections to MBMS Service Continuity 11.1.0 11.2.0
RP-58 - 121940 1073 - CR to 36.331 on SIB15 acquisition 11.1.0 11.2.0
RP-58 - 121957 1074 1 Handling of 1xCSFB failure 11.1.0 11.2.0
RP-58 - 121957 1075 - Miscellaneous corrections 11.1.0 11.2.0
RP-58 - 121958 1076 1 RAN overload control using RRC connection Rejection 11.1.0 11.2.0
RP-58 - 121954 1077 - RRC support for CoMP in UL 11.1.0 11.2.0
RP-58 - 121951 1078 - Some clarification to Carrier aggregation enhancements 11.1.0 11.2.0
RP-58 - 121939 1079 1 Validity of EAB SIB and acquisition of SIB1 11.1.0 11.2.0
RP-58 - 121922 1085 - Clarification for Multiple Frequency Band Indicators feature 11.1.0 11.2.0
RP-58 - 121924 1089 1 Moving the TMS capability 11.1.0 11.2.0
RP-58 - 121959 1093 1 CR to 36.331 on introducing HOCH context continue for intra-ENB handover 11.1.0 11.2.0
RP-58 - 121946 1100 - Correction on MDI multi-PLMN support 11.1.0 11.2.0
RP-58 - 121953 1102 - Clarification and alignment of handling of other configuration 11.1.0 11.2.0
RP-58 - 121970 1103 6 Introducing support for Coordinated Multi-Point (CoMP) operation 11.1.0 11.2.0
RP-58 - 121922 1105 2 Introducing further UE aspects regarding multi band cells 11.1.0 11.2.0
RP-58 - 121947 1120 - CR to 36.331 on additional information in RLF report for inter-RAT MRO 11.1.0 11.2.0
RP-58 - 121952 1125 1 Correction on Power preference indication 11.1.0 11.2.0
RP-58 - 121950 1127 1 SIB1 provision via dedicated signalling 11.1.0 11.2.0
RP-58 - 121936 1128 2 Measurement reporting of Scells 11.1.0 11.2.0
RP-58 - 121956 1129 1 Introduction of EPDCCH parameters in TS 36.331 11.1.0 11.2.0
RP-58 - 121961 1130 2 Introduction of Rel-11 UE capabilities 11.1.0 11.2.0
RP-58 - 121958 1131 - Introduction of wideband RSRQ measurements 11.1.0 11.2.0
RP-58 - 121958 1146 - Introduction of network sharing for CDMA2000 inter-working 11.1.0 11.2.0
RP-58 - 121960 1157 - Broadcast of Time Info by Using a New SIB 11.1.0 11.2.0
RP-58 - 121957 1175 - GERAN measurement object at ANR 11.1.0 11.2.0
03/2013
RP-59 - 130246 1182 2 Miscellaneous corrections from review preceeding ASN.1 freeze 12.0.0 11.3.0
RP-59 - 130243 1186 2 DL COMP capability related correction 12.0.0 11.3.0
RP-59 - 130231 1193 1 Mandatory supporting of B1 measurement to UMTS FDD (FGI bit 15) 12.0.0 11.3.0
RP-59 - 130241 1197 - Clarification on MBMS Service Continuity 12.0.0 11.3.0
RP-59 - 130241 1198 - IDC Problem Reporting 12.0.0 11.3.0
RP-59 - 130247 1210 - Corrections on definition of CSG member cell 12.0.0 11.3.0
RP-59 - 130237 1211 - Extension of FBI and EARFCN 12.0.0 11.3.0
RP-59 - 130228 1220 - Invalidation of ETWS with security feature 12.0.0 11.3.0
RP-59 - 130225 1224 - Invalid measurement configuration with different (E)ARFCN 12.0.0 11.3.0
RP-59 - 130241 1231 2 PPI and IDC indication upon handover 12.0.0 11.3.0
RP-59 - 130227 1235 1 Correcting further UE aspects regarding multi band cells 12.0.0 11.3.0
RP-59 - 130248 1236 1 Behaviour in case of excessive dedicated priority information 12.0.0 11.3.0
RP-59 - 130225 1241 - Clarification on EARFCN signalling in Mobility control info 12.0.0 11.3.0
RP-59 - 130241 1244 - IDC-SubframePattern length for FDD 12.0.0 11.3.0
RP-59 - 130249 1252 - Introduction of wideband RSRQ measurements in RRC_IDLE 12.0.0 11.3.0
RP-59 - 130240 1255 - Optional support of RLF report for inter-RAT MRO 12.0.0 11.3.0
RP-59 - 130233 1258 2 The presence of bandcombination for non-CA capable UEs 12.0.0 11.3.0
RP-59 - 130248 1259 - Correction for event A5 12.0.0 11.3.0
RP-59 - 130332 1265 - Mandating the settings of FGI bit 14, 27 and 28 to true 12.0.0 11.3.0
06/2013
RP-60 - 130805 1267 - Clarification on the redirection to UTRA-TDD frequency in case of CSFB High Priority 13.1.0 11.4.0
RP-60 - 130804 1269 1 Correction of wrong reference 13.1.0 11.4.0
RP-60 - 130809 1270 - Clarification to support of deproliositation feature 13.1.0 11.4.0
RP-60 - 130809 1271 - Clarification on KASME key usage 13.1.0 11.4.0
RP-60 - 130808 1272 - Correction on multi-TA capability 13.1.0 11.4.0
RP-60 - 130808 1273 - MBMS interest indication upon handover/ re-establishment 13.1.0 11.4.0
RP-60 - 130808 1274 - Conditions RI reference inheriting CSI process (DL CoMP) 13.0.0 11.4.0
RP-60 - 130808 1275 - Clarification on NZP CSI-RS resource configuration for UE supporting 1 CSI process 13.0.0 11.4.0
RP-60 - 130808 1276 - Corrections to field description of pdsch-Start+11 13.1.0 11.4.0
<table>
<thead>
<tr>
<th>RP</th>
<th>TS 3GPP</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>RP-60</td>
<td>130809</td>
<td>Need code corrections in Rel-11 RRC</td>
<td>11.3.0</td>
</tr>
<tr>
<td>RP-60</td>
<td>130808</td>
<td>- Miscellaneous small corrections</td>
<td>11.3.0</td>
</tr>
<tr>
<td>RP-60</td>
<td>130809</td>
<td>1 FDD/TDD diff column correction for FGI31</td>
<td>11.3.0</td>
</tr>
<tr>
<td>RP-60</td>
<td>130804</td>
<td>1282 - measCycleSCell upon SCell configuration</td>
<td>11.3.0</td>
</tr>
<tr>
<td>RP-60</td>
<td>130809</td>
<td>1294 - Clarification on RRC Connection Reconfiguration with Critical Extension</td>
<td>11.3.0</td>
</tr>
<tr>
<td>RP-60</td>
<td>130802</td>
<td>1298 - Security key generation in case of MFBi</td>
<td>11.3.0</td>
</tr>
<tr>
<td>RP-60</td>
<td>130804</td>
<td>1303 1 Clarification on inclusion of non-CA band combinations</td>
<td>11.3.0</td>
</tr>
<tr>
<td>RP-60</td>
<td>130809</td>
<td>1308 - CR on ROHC parameter configuration in Rel-11 RRC</td>
<td>11.3.0</td>
</tr>
<tr>
<td>RP-60</td>
<td>130804</td>
<td>1315 2 Clarification on UE CA capability</td>
<td>11.3.0</td>
</tr>
<tr>
<td>RP-60</td>
<td>130809</td>
<td>1321 - Updating 3GPP2 specification references</td>
<td>11.3.0</td>
</tr>
<tr>
<td>RP-60</td>
<td>130805</td>
<td>1323 - Clarification on the configuration of the extended PHR</td>
<td>11.3.0</td>
</tr>
<tr>
<td>RP-60</td>
<td>130805</td>
<td>1324 - Clarifications on SystemTimeInfoCDMA2000 IE</td>
<td>11.3.0</td>
</tr>
<tr>
<td>RP-60</td>
<td>130808</td>
<td>1328 - MFBi impact on MBMS service continuity</td>
<td>11.3.0</td>
</tr>
<tr>
<td>RP-60</td>
<td>130818</td>
<td>1329 1 MFBi aspects for dedicated signalling</td>
<td>11.3.0</td>
</tr>
<tr>
<td>09/2013</td>
<td>61</td>
<td>RP-131311 1335 - Clarification on PhysCellIdRange</td>
<td>11.4.0</td>
</tr>
<tr>
<td>RP-61</td>
<td>131311</td>
<td>1339 1 Correction on the first subframe of the measurement gap</td>
<td>11.4.0</td>
</tr>
<tr>
<td>RP-61</td>
<td>131319</td>
<td>1340 1 Correction for MFBi in SIB15 and SIB6</td>
<td>11.4.0</td>
</tr>
<tr>
<td>RP-61</td>
<td>131319</td>
<td>1343 - Clarification of MFBi impact on MBMS service continuity</td>
<td>11.4.0</td>
</tr>
<tr>
<td>RP-61</td>
<td>131238</td>
<td>1344 2 Clarification of UE action for otherwise in conditions</td>
<td>11.4.0</td>
</tr>
<tr>
<td>RP-61</td>
<td>131311</td>
<td>1348 - Corrections to the 3GPP2 specification references in 36.331</td>
<td>11.3.0</td>
</tr>
<tr>
<td>RP-61</td>
<td>131318</td>
<td>1353 - Clarifications regarding the usage of “ril-Cause” in case of handover failure</td>
<td>11.4.0</td>
</tr>
<tr>
<td>12/2013</td>
<td>62</td>
<td>RP-131986 1366 - Introduction of capability bit for UTRA MFBi</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>131984</td>
<td>1368 1 Addition of inter-frequency RSTD measurement capability indicator for OTDOA</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>131989</td>
<td>1370 - Clarification on supportedBand</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>132003</td>
<td>1371 - Capturing mandatory/optional agreements on Rel-11 UE features</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>131995</td>
<td>1372 - Clarification on otherwise behaviour</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>131995</td>
<td>1373 - Corrections of the 3GPP2 references in TS 36.331</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>131991</td>
<td>1374 - measResultLastServCell for SON-HOF report</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>131729</td>
<td>1375 1 Clarification of timeInfoUTG field in SIB16</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>131991</td>
<td>1389 - Clarification on eRedirection to UMTS TDD with multiple UMTS TDD frequencies</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>131995</td>
<td>1390 - Delta signalling for critical extension</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>132005</td>
<td>1391 - Capability signalling for CSI processes</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>131991</td>
<td>1395 1 Clarifications on Measurement</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>131964</td>
<td>1397 - Correction to InterFreqRSTDMeasurement/Indication field descriptions</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>131984</td>
<td>1404 - Correction of Inter-frequency RSTD indication for multiple frequencies</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>131993</td>
<td>1405 1 Enabling SRVCC from GERAN without forwarding UE-EUTRA-Capability</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>131995</td>
<td>1409 1 System information and change monitoring procedure</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>131991</td>
<td>1410 1 Correction on presence of codebookSubsetRestriction-r10</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>131998</td>
<td>1376 - Introducing UE support for inband mobility to a shared CSIG cell</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>132002</td>
<td>1378 2 Introduction of support for further DL MIMO enhancement</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>131988</td>
<td>1379 - CR for SSAC in CONNECTED</td>
<td>11.5.0</td>
</tr>
<tr>
<td>RP-62</td>
<td>132002</td>
<td>1406 - Update of CMAIS reference to E-UTRAN specific sections in TS23.041</td>
<td>11.5.0</td>
</tr>
<tr>
<td>03/2014</td>
<td>63</td>
<td>RP-140359 1424 1 CR on introduction of Cell-specific time-to-trigger</td>
<td>12.0.0</td>
</tr>
<tr>
<td>RP-63</td>
<td>140346</td>
<td>1435 - UE autonomous modification of cells triggered upon serving cell addition/ release</td>
<td>12.0.0</td>
</tr>
<tr>
<td>RP-63</td>
<td>140359</td>
<td>1436 1 Introduction of T312</td>
<td>12.0.0</td>
</tr>
<tr>
<td>RP-63</td>
<td>140362</td>
<td>1439 1 Introduction of UE-supported EARFCN list in handover preparation information for MFBi</td>
<td>12.0.0</td>
</tr>
<tr>
<td>RP-63</td>
<td>140352</td>
<td>1442 - Correction of Connection Establishment Failure Report</td>
<td>12.0.0</td>
</tr>
<tr>
<td>RP-63</td>
<td>140356</td>
<td>1450 1 Clarification on the presence of TDD special subframe</td>
<td>12.0.0</td>
</tr>
<tr>
<td>RP-63</td>
<td>140359</td>
<td>1453 - Introduction of UE mobility history reporting (option 2)</td>
<td>12.0.0</td>
</tr>
<tr>
<td>RP-63</td>
<td>140340</td>
<td>1455 1 Clarification regarding need codes, conditions and ASN.1 defaults for extension fields</td>
<td>12.0.0</td>
</tr>
<tr>
<td>RP-63</td>
<td>140340</td>
<td>1456 - ASN.1 issue with inter-node signalling (AS-Config)</td>
<td>12.0.0</td>
</tr>
<tr>
<td>RP-63</td>
<td>140357</td>
<td>1457 1 Clarification for the SIB occurrence in a single SI message</td>
<td>12.0.0</td>
</tr>
<tr>
<td>RP-63</td>
<td>140353</td>
<td>1462 - New UE categories for DL 450Mbps class</td>
<td>12.0.0</td>
</tr>
<tr>
<td>RP-63</td>
<td>140354</td>
<td>1463 - IoT indication for inter-band TDD CA with different UL/DL configuration</td>
<td>12.0.0</td>
</tr>
<tr>
<td>06/2014</td>
<td>64</td>
<td>RP-140869 1471 - Removal of comment line from EUTRA-UE-Variables imports</td>
<td>12.1.0</td>
</tr>
<tr>
<td>RP-64</td>
<td>140871</td>
<td>1475 - Correction on measObjectList in VarMeasConfig</td>
<td>12.1.0</td>
</tr>
<tr>
<td>RP-64</td>
<td>140879</td>
<td>1477 - Minor correction inbound mobility to shared CSIG cell</td>
<td>12.1.0</td>
</tr>
<tr>
<td>RP-64</td>
<td>140872</td>
<td>1478 1 Clarification on presence of SCell SI provided dedicately</td>
<td>12.1.0</td>
</tr>
<tr>
<td>RP-64</td>
<td>140876</td>
<td>1479 - Support of the enhancement for T1I bundling for FDD</td>
<td>12.1.0</td>
</tr>
<tr>
<td>RP-64</td>
<td>140885</td>
<td>1490 - Corrections on timer T312</td>
<td>12.1.0</td>
</tr>
<tr>
<td>RP-64</td>
<td>140885</td>
<td>1486 - Correction to the description of physCellIdRange in MeasObjectEUTRA</td>
<td>12.1.0</td>
</tr>
</tbody>
</table>
RP-64 140885 1506 - Corrections to UE mobility history information 12.1.0 12.2.0
RP-64 140873 1489 - ACK/NACK feedback mode on PUSCH 12.1.0 12.2.0
RP-64 140878 1556 - SIB15 enhancement for service availability information 12.1.0 12.2.0
RP-64 140888 1557 - Introduction of FDD/TDD CA UE capability 12.1.0 12.2.0
RP-64 140871 1545 - Clarification of E-UTRA MFBI signalling 12.1.0 12.2.0
RP-64 140892 1520 1.1 Extended RLC LI field 12.1.0 12.2.0
RP-64 140873 1517 1 Network-requested CA Band Combination Capability Signalling 12.1.0 12.2.0
RP-64 140873 1554 1 Allowing TDD/FDD split for FGI111 and FGI112 12.1.0 12.2.0
RP-64 140871 1551 1 Inter-RAT ANR capability signalling in FGI33 when UE supports UTRA TDD only 12.1.0 12.2.0
RP-64 140864 1495 1 Introduction of TDD eMTA 12.1.0 12.2.0
RP-64 140865 1499 1 Minor Corrections to T312 12.1.0 12.2.0
RP-64 140892 1510 1 Introduction of RRC Connection Establishment failure temporary Offset handling 12.1.0 12.2.0
RP-64 140849 1555 2 Introduction of UE capability for eMBMS reception on SGCell and Non-Serving Cell 12.1.0 12.2.0

09/2014
RP-65 141494 1632 - FDD&TDD split for CA 12.2.0 12.3.0
RP-65 141505 1599 - UE capabilities for Hetnet mobility in TS 36.331 12.2.0 12.3.0
RP-65 141499 1584 - Introduction of UE eMTA capabilities 12.2.0 12.3.0
RP-65 141511 1567 - Corrections to extended RLC LI field 12.2.0 12.3.0
RP-65 141511 1603 - TAI reporting of last serving cell 12.2.0 12.3.0
RP-65 141498 1630 1 Correction to Network-requested CA Band Combination Capability Signalling 12.2.0 12.3.0
RP-65 141496 1577 1 Clarification on double indication of SAI in SIB15 12.2.0 12.3.0
RP-65 141496 1597 - Clarification on MBMSCountingResponse 12.2.0 12.3.0
RP-65 141496 1623 - Clarification on the setting of SupportedBandCombination-v1130 12.2.0 12.3.0
RP-65 141489 1574 1 Correction of E-UTRAN UE capabilities description in HandoverPreparationInformation message field descriptions 12.2.0 12.3.0
RP-65 141507 1570 - Introducing MBBSFN measurement by extension of logged measurements 12.2.0 12.3.0
RP-65 141510 1572 1 Introduction of ACB skip for MMTEL voice/video and SMS 12.2.0 12.3.0
RP-65 141496 1615 1 Clarification on determining MBMS frequencies of interest in MBMSInterestIndication 12.2.0 12.3.0
RP-65 141506 1579 1 Introduction of signaling support for low complexity UEs 12.2.0 12.3.0
RP-65 141499 1601 1 Rel-12 ASN.1 correction 12.2.0 12.3.0
RP-65 141511 1560 1 Introduction of shorter MCH scheduling period 12.2.0 12.3.0
RP-65 141493 1611 - Clarification for time-domain resource restriction pattern applicable to neighbour cell RSRQ measurements 12.2.0 12.3.0
RP-65 141511 1559 2 Correction to stop condition for "Chiba offset" 12.2.0 12.3.0
RP-65 141115 1636 - Mandating the FGI bit 31 to true 12.2.0 12.3.0
RP-65 141618 1566 2 Connected mode procedures and RRC signaling of WLAN/3GPP Radio Interworking for LTE 12.2.0 12.3.0

12/2014
RP-66 142122 1643 - Clarification on WLAN interworking 12.3.0 12.4.0
RP-66 142122 1644 - Correction on handling of dedicated parameters during re-establishment 12.3.0 12.4.0
RP-66 142122 1645 - Corrections to WLAN/3GPP Radio Interworking for LTE 12.3.0 12.4.0
RP-66 142122 1646 - Reduction of possible values for WLAN backhaul rate thresholds in LTE 12.3.0 12.4.0
RP-66 142140 1648 - PDCH SN size change during HO for RLC-UM mode bearers 12.3.0 12.4.0
RP-66 142124 1651 - Support of TTI bundling without resource allocation restriction for LTE coverage enhancements for Rel-12 12.3.0 12.4.0
RP-66 142123 1652 - Corrections to eMTA capabilities 12.3.0 12.4.0
RP-66 142140 1653 - ACB, ACB-skip, CSFB and SSAC signalling per PLMN 12.3.0 12.4.0
RP-66 142122 1642 1 Minor corrections regarding WLAN interworking 12.3.0 12.4.0
RP-66 142115 1659 - Correction of remaining TBD for Rel-10 FGIs 12.3.0 12.4.0
RP-66 142117 1663 - New UE categories for DL 600Mbps 12.3.0 12.4.0
RP-66 142135 1687 - Introduction of Dual Connectivity 12.3.0 12.4.0
RP-66 142140 1697 1 Prohibit timer for SR 12.3.0 12.4.0
RP-66 142133 1666 - Support of 256QAM in TS 36.331 (per band 256QAM capability report) 12.3.0 12.4.0
RP-66 142128 1690 1 Introduction of increased number of frequencies to monitor 12.3.0 12.4.0
RP-66 142140 1696 2 Introduction of extended RSRQ value range and new RSRQ definition 12.3.0 12.4.0
RP-66 142115 1650 1 Introduction of signalling for serving cell interruptions 12.3.0 12.4.0
RP-66 142123 1655 - Correction for p0-Persistent-SubframeSet2 Handling 12.3.0 12.4.0
RP-66 142134 1681 - Introduction of missing Rel-12 UE capabilities 12.3.0 12.4.0
RP-66 142140 1647 1 Extended RLC LI field correction 12.3.0 12.4.0
RP-66 142140 1656 - Outstanding Need OP for non-critical extension removal 12.3.0 12.4.0
RP-66 142140 1669 2 Clarification on statusReportRequired handling 12.3.0 12.4.0
RP-66 142136 1598 2 MCH BLER and RSRQ update for MBFSN MDT 12.3.0 12.4.0
RP-66 142130 1699 1 Optionality support of UE mandatory features for Category 0 UEs 12.3.0 12.4.0
RP-66 142123 1661 - Further Clarifications on eMTA and eCIC 12.3.0 12.4.0
RP-66 142113 1686 1 UE capability for modified MPR behavior 12.3.0 12.4.0
RP-66 142132 1664 1 Support of Discovery Signals measurement in TS 36.331 12.3.0 12.4.0
<table>
<thead>
<tr>
<th>Release</th>
<th>Document Ref.</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>03/2015</td>
<td>RP-150373</td>
<td>1737 - Clarification on the setting of measScaleFactor without reducedMeasPerformance</td>
</tr>
<tr>
<td></td>
<td>RP-150371</td>
<td>1747 - Clarification on Measurement Configuration handling</td>
</tr>
<tr>
<td></td>
<td>RP-150371</td>
<td>1765 - Clarification to usage of field delta1xOffsetPUCCH-Format1bCS-r11 in dedicated uplink power control parameter signalling</td>
</tr>
<tr>
<td></td>
<td>RP-150370</td>
<td>1751 - Clarification on CSI measurement subframe set</td>
</tr>
<tr>
<td></td>
<td>RP-150368</td>
<td>1795 - The absence of supportedMIMO-CapabilityUL-r10</td>
</tr>
<tr>
<td></td>
<td>RP-150370</td>
<td>1798 - Presence of codecbookSubsetRestriction</td>
</tr>
<tr>
<td></td>
<td>RP-150377</td>
<td>1768 - 2 Miscellaneous changes resulting from review for REL-12 ASN.1 freeze</td>
</tr>
<tr>
<td></td>
<td>RP-150374</td>
<td>1770 - 2 Introduction of ProSe</td>
</tr>
<tr>
<td>06/2015</td>
<td>RP-150921</td>
<td>1800 - Correction field description of networkControlledSyncTx</td>
</tr>
<tr>
<td></td>
<td>RP-150921</td>
<td>1801 - Correction on SCG reconfiguration</td>
</tr>
<tr>
<td></td>
<td>RP-150921</td>
<td>1802 - Correction for aperiodic CSI trigger</td>
</tr>
<tr>
<td></td>
<td>RP-150920</td>
<td>1804 - Correction on handling of wlan-OffloadConfigDedicated upon leaving RRC_CONNECTED</td>
</tr>
<tr>
<td></td>
<td>RP-150921</td>
<td>1805 - Reconfiguration of SPS</td>
</tr>
<tr>
<td></td>
<td>RP-150916</td>
<td>1809 - CR on Aperiodic CSI Reporting for 1.4MHz cell</td>
</tr>
<tr>
<td></td>
<td>RP-150921</td>
<td>1815 - Clarification on PDCP reconfiguration</td>
</tr>
<tr>
<td></td>
<td>RP-150921</td>
<td>1816 - Correction to SCG change</td>
</tr>
<tr>
<td></td>
<td>RP-150921</td>
<td>1817 - Minor corrections for PCell configuration in DC</td>
</tr>
<tr>
<td></td>
<td>RP-150921</td>
<td>1818 - CR on ROHC for split bearer</td>
</tr>
<tr>
<td></td>
<td>RP-150921</td>
<td>1819 - Clarification on FDD/TDD differentiation of FIs/capabilities in TDD-FDD CA</td>
</tr>
<tr>
<td></td>
<td>RP-150921</td>
<td>1803 - 1 Correction to SCG and split bearer configuration</td>
</tr>
<tr>
<td></td>
<td>RP-150921</td>
<td>1810 - 1 Clarifications on use of preconfigComm for direct communication</td>
</tr>
<tr>
<td></td>
<td>RP-150921</td>
<td>1811 - 1 Miscellaneous corrections (i.o. Sidelink)</td>
</tr>
<tr>
<td></td>
<td>RP-150921</td>
<td>1813 - 1 Conditions for establishing RRC Connection for sidelink transmission</td>
</tr>
<tr>
<td></td>
<td>RP-150921</td>
<td>1814 - 1 Correction on field description on SL-TF-ResourceConfig</td>
</tr>
<tr>
<td></td>
<td>RP-150917</td>
<td>1806 - 1 Mandatory present of supportedMIMO-CapabilityDL-r10</td>
</tr>
<tr>
<td></td>
<td>RP-150923</td>
<td>1853 - Clarification on Cell barring for downlink only bands</td>
</tr>
<tr>
<td></td>
<td>RP-150917</td>
<td>1852 - Clarification regarding no MBMS sessions ongoing</td>
</tr>
<tr>
<td></td>
<td>RP-150917</td>
<td>1827 - 1 Correction to additionalSpectrumEmission</td>
</tr>
<tr>
<td></td>
<td>RP-150923</td>
<td>1820 - 4 Clarification on extended RSRQ range support</td>
</tr>
<tr>
<td></td>
<td>RP-150917</td>
<td>1838 - Restriction to CA capability signalling</td>
</tr>
<tr>
<td></td>
<td>RP-150921</td>
<td>1823 - Clarification on PUCCH and SRS</td>
</tr>
<tr>
<td></td>
<td>RP-150926</td>
<td>1849 - Introduction of new DL UE categories 15&amp;16</td>
</tr>
<tr>
<td></td>
<td>RP-150923</td>
<td>1824 - Clean-up corrections to TS 36.331</td>
</tr>
<tr>
<td></td>
<td>RP-150918</td>
<td>1846 - 1 Correction to IDC signalling</td>
</tr>
<tr>
<td></td>
<td>RP-150921</td>
<td>1822 - 1 Change of LCID upon DC-specific DRB reconfiguration</td>
</tr>
<tr>
<td></td>
<td>RP-150921</td>
<td>1832 - 1 Correction to PHR format</td>
</tr>
<tr>
<td></td>
<td>RP-150921</td>
<td>1842 - 1 Correction on conditions for sidelink operation</td>
</tr>
<tr>
<td></td>
<td>RP-150811</td>
<td>1834 - 2 Correction on the SL-TF-IndexPair values for ProSe Direct Discovery</td>
</tr>
<tr>
<td>09/2015</td>
<td>RP-151443</td>
<td>1866 - Correction on UE band combination capability</td>
</tr>
<tr>
<td></td>
<td>RP-151438</td>
<td>1869 - Correction on Restriction to CA capability signalling</td>
</tr>
<tr>
<td></td>
<td>RP-151442</td>
<td>1894 - The support of UL64QAM</td>
</tr>
<tr>
<td></td>
<td>RP-151442</td>
<td>1889 - Small corrections concerning RadioResourceConfig</td>
</tr>
<tr>
<td></td>
<td>RP-151441</td>
<td>1900 - Sidelink discovery related corrections</td>
</tr>
<tr>
<td></td>
<td>RP-151440</td>
<td>1905 - 2 Clarification of Beacon RSSI Encoding</td>
</tr>
<tr>
<td></td>
<td>RP-151439</td>
<td>1911 - 1 CR for IDC signalling enhancement for UL CA</td>
</tr>
<tr>
<td></td>
<td>RP-151440</td>
<td>1880 - 2 Clarification on cell selection sequence upon leaving RRC_CONNECTED</td>
</tr>
<tr>
<td></td>
<td>RP-151438</td>
<td>1890 - 1 Introduction to additionalSpectrumEmission - Option 1</td>
</tr>
<tr>
<td></td>
<td>RP-151439</td>
<td>1879 - 1 Clarification on the reference of EPDCCH</td>
</tr>
<tr>
<td></td>
<td>RP-151441</td>
<td>1891 - 1 Introducing general handling and guidelines concerning critical extensions within a release</td>
</tr>
<tr>
<td></td>
<td>RP-151443</td>
<td>1909 - 1 Applicability of longCodeState1XRTT for 1xRTT IRAT ANR</td>
</tr>
<tr>
<td></td>
<td>RP-151444</td>
<td>1912 - Sidelink terminology alignment in TS 36.331</td>
</tr>
<tr>
<td></td>
<td>RP-151442</td>
<td>1906 - 2 Clarification for NAICS-capability signalling</td>
</tr>
<tr>
<td></td>
<td>RP-151467</td>
<td>1861 - 2 Additional MIMO/CSI capability for intra-band contiguous CA</td>
</tr>
<tr>
<td></td>
<td>RP-151466</td>
<td>1887 - 2 Signalling for 4-layer MIMO with TM3 and TM4</td>
</tr>
<tr>
<td></td>
<td>RP-151625</td>
<td>1914 - 2 Allowing NAICS with TM10</td>
</tr>
<tr>
<td>12/2015</td>
<td>RP-70</td>
<td>152053 - 1916 - Correction on SCG release</td>
</tr>
<tr>
<td></td>
<td>RP-70</td>
<td>152053 - 1932 - Clarification on SCG RLF timers and constants reconfiguration</td>
</tr>
<tr>
<td></td>
<td>RP-70</td>
<td>152053 - 1933 - Correction to triggerQuantityCSI-RS</td>
</tr>
<tr>
<td></td>
<td>RP-70</td>
<td>152053 - 1946 - Correction to NAICS field descriptions</td>
</tr>
<tr>
<td></td>
<td>RP-70</td>
<td>152055 - 1947 - Correction of need code definition terminology</td>
</tr>
<tr>
<td></td>
<td>RP-70</td>
<td>152050 - 1964 - Clarification on FDD/TDD difference for UL CA IDC indication</td>
</tr>
<tr>
<td></td>
<td>RP-70</td>
<td>152046 - 1975 - Correction to SystemTimeInfoCDMA2000 IE</td>
</tr>
</tbody>
</table>
Maximum UL timing difference for DC
Introduction of LWIP UE capabilities
and IPsec establishment parameters
Applicability of longCodeState1XRTT
Correction on the RRC signalling configuration for 4Tx MIMO
EBF/FD-MIMO changes related to remaining issues
Miscellaneous corrections for SC-PTM
Introducing eSL
Introducing extended DRX
Introduction of SC-PTM
Introduction of Licensed-Assisted Access using LTE
Introduction of Dual Connectivity enhancements in Rel-13
Extension of Frequency Priorities
Introduction of RS-SINR measurements using non critical extension
Introducing EBF FD MIMO parameters
Removing SCG change restrictions regarding upon handover
Introduction of Application specific Congestion control for Data Communication in LTE
36331 CR for capturing B5C and SCell on PUCCH
Introducing CRS interference mitigation on SCell
Introduction of SC-PTM
Introduction of Rel-13 MDT enhancements
Introduction of load redistribution in RRC_IDLE
Introducing extended DRX
Clariication on FGI bits setting for MCPTT
Introducing eSL
ed2D changes resulting from review for ASN.1 freeze
Miscellaneous changes resulting from review for ASN.1 freeze
Corrections and missing agreement on the eCA
365133 Introduction of LTE-WLAN Aggregation
Corrections on SG-PTM
Support of extended RLC AM SN for SCG
Miscellaneous corrections for SC-PTM
EBF/FD-MIMO changes related to remaining issues
Correction on the RRC signalling configuration for 4Tx MIMO
Applicability of longCodeState1XRTT
Further clarifications on Rel-13 MDT enhancements
Capability for CA enhancement
Some corrections on CA enhancement
The introduction of UE capability concerning extended E-UTRA frequency priorities
Introduction of RAN controlled LTE-WLAN interworking
Stage-3 text updates for bearer Identification within IPsec Tunnel and IPsec establishment parameters
Introduction of LWIP UE capabilities
UE capabilities for LAA
Minor corrections for CA enhancements
Maximum UL timing difference for DC
152121 for Category 0 UE
Addition of low complexity UE and coverage enhancement features
ed2D Capability
SC-PTM corrections following ASN.1 review
Procedural clarification on PCell change involving PCell release
Modification of network requested CA band combination retrieval for intra-band non-contiguous CA
ANR in case of MFI
Clariication on the leftmost bit for the supportedCellGrouping
Clariication on the value range of guaranteed power for the MeNB and SeNB
36331 CR on TM10 CRS-IM UE capability report signalling introduction
Miscellaneous corrections to TS 36.331 related to eDRX
Guideline on handling of uplink spare values
| RP-71   | 2100 | - In-Device Coexistence for UL CA change of victim system | 13.0.0 | 13.1.0 |
| RP-71   | 2101 | - Clarification on initial RSRQ measurement reporting | 13.0.0 | 13.1.0 |
| RP-71   | 2102 | - Introduction of capability on PDSCH collision handling | 13.0.0 | 13.1.0 |
| RP-71   | 2103 | 1 The correction on the definition of measObjectld range | 13.0.0 | 13.1.0 |
| RP-71   | 2105 | 1 The correction on the description of 5.5.4.1 | 13.0.0 | 13.1.0 |
| RP-71   | 2106 | - Introduction of sf60 DRX cycle | 13.0.0 | 13.1.0 |
| RP-71   | 2109 | 1 Clarification on NAICS subset capability | 13.0.0 | 13.1.0 |
| RP-71   | 2110 | - SC-PTM reception on non-Pcell | 13.0.0 | 13.1.0 |
| RP-71   | 2111 | - MBMS interest indication by SC-PTM capable UE | 13.0.0 | 13.1.0 |
| RP-71   | 2112 | 1 Additional Layer 1 capabilities for Rel-13 CA enhancements | 13.0.0 | 13.1.0 |
| RP-72   | 2114 | - Corrections to MTCe in TS 36.331 | 13.1.0 | 13.2.0 |
| RP-72   | 2115 | 2 Miscellaneous corrections to TS 36.331 | 13.1.0 | 13.2.0 |
| RP-72   | 2116 | 1 Inter-node signalling | 13.1.0 | 13.2.0 |
| RP-72   | 2117 | - Clarification on SC-PTM | 13.1.0 | 13.2.0 |
| RP-72   | 2118 | 1 UE capability of an additional Rx and Tx requirement for a CA band combination | 13.1.0 | 13.2.0 |
| RP-72   | 2125 | - dbi-identity change in full configuration | 13.1.0 | 13.2.0 |
| RP-72   | 2126 | - Miscellaneous correction for sidelink | 13.1.0 | 13.2.0 |
| RP-72   | 2127 | - Corrections for conditions of sidelink operation | 13.1.0 | 13.2.0 |
| RP-72   | 2130 | 1 Correction on conditions for establishing RRC Connection for sidelink communication | 13.1.0 | 13.2.0 |
| RP-72   | 2131 | 1 Corrections for sidelink communication transmission | 13.1.0 | 13.2.0 |
| RP-72   | 2132 | 1 Correction to WLAN measurements | 13.1.0 | 13.2.0 |
| RP-72   | 2133 | 1 Small corrections to LWIP | 13.1.0 | 13.2.0 |
| RP-72   | 2134 | 1 Small eSL related corrections | 13.1.0 | 13.2.0 |
| RP-72   | 2135 | 1 Alignment of RCLWI configuration | 13.1.0 | 13.2.0 |
| RP-72   | 2136 | 1 Configuration of LWA and LWIP upon handover | 13.1.0 | 13.2.0 |
| RP-72   | 2137 | 1 Introducing EBF/FD-MIMO capabilities | 13.1.0 | 13.2.0 |
| RP-72   | 2140 | - Clarification regarding ID indication upon change of UL CA affecting GNSS | 13.1.0 | 13.2.0 |
| RP-72   | 2143 | 3 Correction of periodic CSI reporting and clarification on p-C and CQSI signalling | 13.1.0 | 13.2.0 |
| RP-72   | 2144 | - CR on SI window combining for MTC | 13.1.0 | 13.2.0 |
| RP-72   | 2145 | - Avoiding simultaneous configuration of LWA and DC for a UE | 13.1.0 | 13.2.0 |
| RP-72   | 2146 | - Miscellaneous RRC corrections for LWA | 13.1.0 | 13.2.0 |
| RP-72   | 2147 | 1 Autonomous WLAN measurement ID removal | 13.1.0 | 13.2.0 |
| RP-72   | 2149 | 1 Correction to channel number range | 13.1.0 | 13.2.0 |
| RP-72   | 2150 | - Correction of backhaul bandwidth description | 13.1.0 | 13.2.0 |
| RP-72   | 2151 | 1 Correction on frequency hopping signaling | 13.1.0 | 13.2.0 |
| RP-72   | 2152 | 1 Support of CRS-Assistance signaling for the DL Control Channel IM | 13.1.0 | 13.2.0 |
| RP-72   | 2154 | - Correction on condition nonFullEventuallyCorrect in dual connectivity | 13.1.0 | 13.2.0 |
| RP-72   | 2159 | 1 Correction on system information handling in eMTC | 13.1.0 | 13.2.0 |
| RP-72   | 2160 | 1 Correction on essential system information missing | 13.1.0 | 13.2.0 |
| RP-72   | 2162 | - Steering command during T350 | 13.1.0 | 13.2.0 |
| RP-72   | 2163 | 1 UE behaviours while configured with steeringCommandWLAN (release) | 13.1.0 | 13.2.0 |
| RP-72   | 2166 | 1 Correction of IE name 'systemInformationBlockType1Dedicated' | 13.1.0 | 13.2.0 |
| RP-72   | 2167 | - Clarification of timer description for MCLD | 13.1.0 | 13.2.0 |
| RP-72   | 2169 | - Clarification on the usage of threshold conditions for sidelink relay UE | 13.1.0 | 13.2.0 |
| RP-72   | 2170 | - Corrections to LWA | 13.1.0 | 13.2.0 |
| RP-72   | 2171 | - Variable Handling for RCLWI | 13.1.0 | 13.2.0 |
| RP-72   | 2174 | 1 Correction on configuration of PRACH and MPDCCH for RA procedure for BL UEs or UEs in CE | 13.1.0 | 13.2.0 |
| RP-72   | 2175 | - Clarification on LWA | 13.1.0 | 13.2.0 |
| RP-72   | 2176 | 1 Miscellaneous corrections | 13.1.0 | 13.2.0 |
| RP-72   | 2180 | - Correction on FDD/TDD differentiation for Rel-13 capabilities | 13.1.0 | 13.2.0 |
| RP-72   | 2181 | 1 Correction on the definition of sc-mch-duration | 13.1.0 | 13.2.0 |
| RP-72   | 2182 | - System information acquisition for SC-PTM reception on non-Pcell | 13.1.0 | 13.2.0 |
| RP-72   | 2183 | - Corrections on capability report for eCA | 13.1.0 | 13.2.0 |
| RP-72   | 2185 | 1 Corrections to RS-SINR configuration | 13.1.0 | 13.2.0 |
| RP-72   | 2186 | 1 UL UE Categories support for 64 QAM | 13.1.0 | 13.2.0 |
| RP-72   | 2187 | - Correction on SI update for eDRX | 13.1.0 | 13.2.0 |
| RP-72   | 2188 | - Add the field description for mpdchc-NarrowbandsToMonitor-r13 | 13.1.0 | 13.2.0 |
| RP-72   | 2192 | - WLAN measurements and user preference | 13.1.0 | 13.2.0 |
| RP-72   | 2193 | 1 Miscellaneous corrections resulting from REL-13 ASN.1 review | 13.1.0 | 13.2.0 |
| RP-72   | 2195 | - Correction to eMTC message classes and logical channels | 13.1.0 | 13.2.0 |
| RP-72   | 2198 | - Some eCA related corrections | 13.1.0 | 13.2.0 |
| RP-72   | 2199 | 1 PUCCCH SCell corrections | 13.1.0 | 13.2.0 |
| RP-72   | 2200 | 1 Small corrections of timer description for Sidelink | 13.1.0 | 13.2.0 |
| RP-72   | 2201 | - Clarification of use of extended timer values for UEs that support CE mode B | 13.1.0 | 13.2.0 |
| RP-72   | 2202 | 2 Correction to UL SPS operation | 13.1.0 | 13.2.0 |
- Clarification on PDCP-Config and statusFeedback for LWA
- CR on forwarding LAA measurement results for DC
- Clarification on timer handling for zero value
- Invalidation of stored system information in connected mode
- Various corrections to MTCe related ASN.1 code and field descriptions
- Correction to NB-IoT in 36.331
- Restricting Unattended Data Traffic
- The handling of WLAN status monitoring
- Correction on keeping SCG upon inter eNB handove
- Invalidation of stored system information in connected mode
- Correction on DRX cycle used by the UE
- Clarification on PDCP-Config and statusFeedback for LWA
- Order of addition and removal of WLAN-Identifiers
- Multiple WLAN measurement objects on the same frequency
- Correction about eMTC frequency hopping parameters
- Handling of tdd ConfigID10 for LAA "Scoel"
| RP-73  | RP-161755 | 2320 | 2 | Extended T310 timer values for eMTC | 13.2.0 | 13.3.0 |
| RP-73  | RP-161761 | 2323 | 1 | Introducing UE capability of Rel 13 CCH IM | 13.2.0 | 13.3.0 |
| RP-73  | RP-161761 | 2324 | 1 | Introducing UE capability of CRS-IM for TM 1-9 | 13.2.0 | 13.3.0 |
| RP-73  | RP-161827 | 2325 | 2 | Continuous uplink transmission in eMTC | 13.2.0 | 13.3.0 |
| RP-73  | RP-161755 | 2328 | 1 | Correction on PUSCH repetition numbers for CE Mode A | 13.2.0 | 13.3.0 |
| RP-73  | RP-161755 | 2329 | - | Frequency hopping configuration for paging | 13.2.0 | 13.3.0 |
| RP-73  | RP-161758 | 2334 | 2 | Reservation of RA resources in NB-IoT | 13.2.0 | 13.3.0 |
| RP-73  | RP-161754 | 2336 | 1 | Extended PHR corrections | 13.2.0 | 13.3.0 |
| RP-73  | RP-161766 | 2337 | 1 | Corrections for LWA/LWIP | 13.2.0 | 13.3.0 |
| RP-73  | RP-161762 | 2338 | 3 | Correction on 12/16-port CSI-RS resource configuration for FD-MIMO | 13.2.0 | 13.3.0 |
| RP-73  | RP-161755 | 2339 | 2 | Corrections in Rel-13 eMTC SI acquisition | 13.2.0 | 13.3.0 |
| RP-73  | RP-161758 | 2342 | - | Correction of downlink gap applicability for NB-IoT | 13.2.0 | 13.3.0 |
| RP-73  | RP-161751 | 2344 | 1 | Indication of the maxLayersMIMO | 13.2.0 | 13.3.0 |
| RP-73  | RP-161758 | 2346 | - | nrs-Power signaling for NB-IoT non-anchor carrier | 13.2.0 | 13.3.0 |
History

<table>
<thead>
<tr>
<th>Document history</th>
</tr>
</thead>
<tbody>
<tr>
<td>V13.0.0</td>
</tr>
<tr>
<td>V13.1.0</td>
</tr>
<tr>
<td>V13.2.0</td>
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</tbody>
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