**3GPP TSG-RAN5 Meeting #93-e R5-218483  
Electronic Meeting,** **8 November – 19 November 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.521-4** | **CR** |  | **rev** | **1** | **Current version:** | **16.9.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network |  |

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|  | | | | | | | | | | |
| ***Title:*** | Update on 9.4B.1.1 message contents | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Keysight Technologies | | | | | | | | | |
| ***Source to TSG:*** | R5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5GS\_NR\_LTE-UEConTest | | | | |  | ***Date:*** | | | 2021-11-18 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | There is a need to have a one to one mapping between DRB and EPS bearer. Hence, 9.4B.1.1 requires to map MCG DRB with Default EPS bearer and SCG DRB with Dedicated EPS bearer | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Updated SCG DRB with Dedicated EPS bearer | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Test case will not operate with conformance UE | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 9.4B.1.1 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | Final version of R5-217659 incuding message exceptions for Close UE test loop in MCG DRB and SCG DRB and radioBearerConfig to change PDCP version of MCG DRB to NR PDCP | | | | | | | | |

## <<< START OF CHANGES >>>

#### 9.4B.1.1 Sustained downlink data rate performance for EN-DC within FR1

9.4B.1.1.1 Test Purpose

The purpose of the test is to verify that the Layer 1 and Layer 2 correctly process in a sustained manner the received packets corresponding to the maximum data rate indicated by UE capabilities*.* The sustained downlink data rate shall be verified in terms of the success rate of delivered PDCP SDU(s) by Layer 2. The test case below specifies the RF conditions and the required success rate of delivered TB by Layer 1 to meet the sustained data rate requirement

9.4B.1.1.2 Test Applicability

This test applies to all types of EUTRA UE release 15 and forward supporting EN-DC.

9.4B.1.1.3 Minimum conformance requirements

During the test, the PDSCH performance on both the NR cell(s) and LTE cell(s) shall be verified.

The TB success rate shall be higher than 85% when NR PDSCH is scheduled with MCS defined for the selected EN-DC bandwidth combination and with the downlink physical channel setup according to Annex C.3.1 and when E-UTRA PDSCH is scheduled with FRC defined for the selected EN-DC bandwidth combination and with the downlink physical channel setup according to Annex C.3.2 from TS 36.101 [X].

The TB success rate is defined as 100%\*NDL\_correct\_rx/ (NDL\_newtx + NDL\_retx), where NDL\_newtx is the number of newly transmitted DL transport blocks, NDL\_retx is the number of retransmitted DL transport blocks, and NDL\_correct\_rx is the number of correctly received DL transport blocks.

The common test parameters for NR cell are specified in Table 9.4B.1.1.3-1. The parameters specified in Table 9.4B.1.1.3-2 are applicable for tests on FDD NR cell and parameters specified in Table 9.4B.1.1.3-3 are applicable for tests on TDD NR cell.

Unless otherwise stated, no user data is scheduled on slot #0, 10 and 11 within 20 ms for SCS 15 kHz for NR cell.

Unless otherwise stated, no user data is scheduled on slot #0, 20 and 21 within 20 ms for SCS 30 kHz for NR cell.

Table 9.4B.1.1.3-1: Common test parameters for FDD or TDD NR band

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Parameter** | | | **Unit** | **Value** |
| PDSCH transmission scheme | | |  | Transmission scheme 1 |
| EPRE ratio of PTRS to PDSCH | | | dB | N/A |
| Channel bandwidth | | | MHz | Channel bandwidth from selected CA bandwidth combination |
| Common serving cell parameters | Physical Cell ID | |  | 0 |
| SSB position in burst | |  | First SSB in Slot #0 |
| SSB periodicity | | ms | 20 |
| First DMRS position for Type A PDSCH mapping | |  | 2 |
| Cross carrier scheduling | | |  | Not configured |
| Active DL BWP index | | |  | 1 |
| Actual carrier configuration | Offset between Point A and the lowest usable subcarrier on this carrier (Note 2) | | RBs | 0 |
| Subcarrier spacing | | kHz | 15 or 30 |
| DL BWP configuration #1 | RB offset | | RBs | 0 |
| Number of contiguous PRB | |  | Maximum transmission bandwidth configuration as specified in clause 5.3.2 of TS 38.101-1 [2] for tested channel bandwidth and subcarrier spacing |
| Subcarrier spacing | | kHz | 15 or 30 |
| Cyclic prefix | |  | Normal |
| PDCCH configuration | Slots for PDCCH monitoring | |  | Each slot |
| Symbols with PDCCH | |  | Symbols #0 |
| Number of PRBs in CORESET | |  | Table 9.4B.1.1.3-4 |
| Number of PDCCH candidates and aggregation levels | |  | 2/AL2 for 15 kHz / 5 MHz and 30 kHz / 15 MHz  2/AL4 for 15 kHz / 10 MHz, 30 kHz / 10 MHz and 30 kHz / 20 MHz  2/AL8 for other greater combinations |
| CCE-to-REG mapping type | |  | Non-interleaved |
| DCI format | |  | 1\_1 |
| TCI State | |  | TCI state #1 |
| PDCCH & PDCCH DMRS Precoding configuration | |  | For 2Tx:  Single Panel Type I, Random precoder chosen from precoder index 0 and 2, selection updated per slot  For 4Tx:  Single Panel Type I, Random precoder chosen from precoders with i\_1,1 in {1,2,3,5,6,7} and i\_2 in {0,2}, selection updated per slot |
| PDSCH configuration | Mapping type | |  | Type A |
| k0 | |  | 0 |
| PDSCH aggregation factor | |  | 1 |
| PRB bundling type | |  | Static |
| PRB bundling size | |  | WB |
| Resource allocation type | |  | Type 0 |
| VRB-to-PRB mapping type | |  | Non-interleaved |
| VRB-to-PRB mapping interleaver bundle size | |  | N/A |
| PDSCH DMRS configuration | DMRS Type | |  | Type 1 |
| Number of additional DMRS | |  | 1 |
| Length | |  | 1 |
| Antenna ports indexes | |  | {1000} for 1 Layer CCs {1000, 1001} for 2 Layers CCs  {1000 – 1003} for 4 Layers CCs |
| Number of PDSCH DMRS CDM group(s) without data | |  | 1 for 1 layer and 2 layers CCs  2 for 4 Layers CCs |
| PTRS configuration | | |  | PTRS is not configured |
| CSI-RS for tracking | Subcarrier indexes in the PRB used for CSI-RS | |  | k0 = 3 for CSI-RS resource 1,2,3,4 |
| OFDM symbols in the PRB used for CSI-RS | |  | l0 = 6 for CSI-RS resource 1 and 3  l0 = 10 for CSI-RS resource 2 and 4 |
| Number of CSI-RS ports (X) | |  | 1 for CSI-RS resource 1,2,3,4 |
| CDM Type | |  | 'No CDM' for CSI-RS resource 1,2,3,4 |
| Density (ρ) | |  | 3 for CSI-RS resource 1,2,3,4 |
| CSI-RS periodicity | | Slots | 15 kHz SCS: 20 for CSI-RS resource 1,2,3,4  30 kHz SCS: 40 for CSI-RS resource 1,2,3,4 |
| CSI-RS offset | | Slots | 15 kHz SCS:  10 for CSI-RS resource 1 and 2  11 for CSI-RS resource 3 and 4  30 kHz SCS:  20 for CSI-RS resource 1 and 2  21 for CSI-RS resource 3 and 4 |
| Frequency Occupation | |  | Start PRB 0  Number of PRB = BWP size |
| QCL info | |  | TCI state #0 |
| NZP CSI-RS for CSI acquisition | Subcarrier indexes in the PRB used for CSI-RS | |  | k0 = 4 |
| OFDM symbols in the PRB used for CSI-RS | |  | l0 = 12 |
| Number of CSI-RS ports (X) | |  | Same as number of transmit antenna |
| CDM Type | |  | 'FD-CDM2' |
| Density (ρ) | |  | 1 |
| CSI-RS periodicity | |  | 15 kHz SCS: 20  30 kHz SCS: 40 |
| CSI-RS offset | |  | 0 |
| Frequency Occupation | |  | Start PRB 0  Number of PRB = BWP size |
| QCL info | |  | TCI state #1 |
| ZP CSI-RS for CSI acquisition | Subcarrier indexes in the PRB used for CSI-RS | |  | k0 = 0 |
| OFDM symbols in the PRB used for CSI-RS | |  | l0 = 12 |
| Number of CSI-RS ports (X) | |  | 4 |
| CDM Type | |  | 'FD-CDM2' |
| Density (ρ) | |  | 1 |
| CSI-RS periodicity | |  | 15 kHz SCS: 20  30 kHz SCS: 40 |
| CSI-RS offset | |  | 0 |
| Frequency Occupation | |  | Start PRB 0  Number of PRB = BWP size |
| TCI state #0 | Type 1 QCL information | SSB index |  | SSB #0 |
| QCL Type |  | Type C |
| Type 2 QCL information | SSB index |  | N/A |
| QCL Type |  | N/A |
| TCI state #1 | Type 1 QCL information | CSI-RS resource |  | CSI-RS resource 1 from 'CSI-RS for tracking' configuration |
| QCL Type |  | Type A |
| Type 2 QCL information | CSI-RS resource |  | N/A |
| QCL Type |  | N/A |
| Maximum number of code block groups for ACK/NACK feedback | | |  | 1 |
| Maximum number of HARQ transmission | | |  | 4 |
| HARQ ACK/NACK bundling | | |  | Multiplexed |
| Redundancy version coding sequence | | |  | {0,2,3,1} |
| PDSCH & PDSCH DMRS Precoding configuration | | |  | Single Panel Type I, Random precoder selection updated per slot, with equal probability of each applicable i1, i2 combination with PRB bundling granularity |
| Symbols for all unused REs | | |  | OCNG Annex A.5 |
| Propagation condition | | |  | Static propagation condition  No external noise sources are applied |
| Antenna configuration | 1 layer CCs | |  | 1x2 or 1x4 |
| 2 layers CCs | |  | 2x2 or 2x4 |
| 4 layers CCs | |  | 4x4 |
| Physical signals, channels mapping and precoding | | |  | As specified in Annex B.4.1 |
| Note 1: UE assumes that the TCI state for the PDSCH is identical to the TCI state applied for the PDCCH transmission  Note 2: Point A coincides with minimum guard band as specified in Table 5.3.3-1 from TS 38.101-1 [2] for tested channel bandwidth and subcarrier spacing | | | | |

Table 9.4B.1.1.3-2: Additional test parameters for NR FDD band

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** |
| Duplex mode | |  | FDD |
| PDSCH configuration | Starting symbol (S) |  | 1 |
| Length (L) |  | 13 |
| Number of HARQ Processes | |  | 4 |
| K1 value | |  | 2 |

Table 9.4B.1.1.3-3: Additional test parameters for NR TDD band

|  |  |  |  |
| --- | --- | --- | --- |
| **Parameter** | | **Unit** | **Value** |
| Duplex mode | |  | TDD |
| PDSCH configuration | Starting symbol (S) |  | 1 |
| Length (L) |  | 13 |
| Number of HARQ Processes | |  | 8 |
| K1 value | |  | Specific to each UL-DL pattern |
| TDD UL-DL pattern | |  | 15 kHz SCS: FR1.15-1  30 kHz SCS: FR1.30-1 |
| Note 1: PDSCH is scheduled only on full DL slots | | | |

Table 9.4B.1.1.3-4: Number of PRBs in CORESET for NR cell

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SCS (kHz)** | **5MHz** | **10MHz** | **15MHz** | **20 MHz** | **25 MHz** | **30 MHz** | **40 MHz** | **50MHz** | **60 MHz** | **80 MHz** | **100 MHz** |
| 15 | 24 | 48 | 78 | 102 | 132 | 156 | 216 | 270 | N/A | N/A | N/A |
| 30 | 6 | 24 | 36 | 48 | 60 | 78 | 102 | 132 | 162 | 216 | 270 |

Table 9.4B.1.1.3-5: MCS indexes for indicated UE capabilities for NR cell

|  |  |  |  |
| --- | --- | --- | --- |
| **Maximum number of PDSCH MIMO layers** | **Maximum modulation format** | **Scaling factor** | **MCS** |
| 1 | 8 | 1 | 26 |
| 1 | 8 | 0.8 | 21 |
| 1 | 8 | 0.75 | 20 |
| 1 | 8 | 0.4 | 11 |
| 1 | 6 | 1 | 27 |
| 1 | 6 | 0.8 | 23 |
| 1 | 6 | 0.75 | 22 |
| 1 | 6 | 0.4 | 14 |
| 1 | 4 | 1 | 16 |
| 1 | 4 | 0.8 | 16 |
| 1 | 4 | 0.75 | 16 |
| 1 | 4 | 0.4 | 10 |
| 1 | 2 | 1 | 9 |
| 1 | 2 | 0.8 | 9 |
| 1 | 2 | 0.75 | 9 |
| 1 | 2 | 0.4 | 4 |
| 2 | 8 | 1 | 26 |
| 2 | 8 | 0.8 | 21 |
| 2 | 8 | 0.75 | 20 |
| 2 | 8 | 0.4 | 11 |
| 2 | 6 | 1 | 27 |
| 2 | 6 | 0.8 | 23 |
| 2 | 6 | 0.75 | 22 |
| 2 | 6 | 0.4 | 14 |
| 2 | 4 | 1 | 16 |
| 2 | 4 | 0.8 | 16 |
| 2 | 4 | 0.75 | 16 |
| 2 | 4 | 0.4 | 10 |
| 2 | 2 | 1 | 9 |
| 2 | 2 | 0.8 | 9 |
| 2 | 2 | 0.75 | 9 |
| 2 | 2 | 0.4 | 4 |
| 4 | 8 | 1 | 26 |
| 4 | 8 | 0.8 | 23 |
| 4 | 8 | 0.75 | 22 |
| 4 | 8 | 0.4 | 12 |
| 4 | 6 | 1 | 27 |
| 4 | 6 | 0.8 | 24 |
| 4 | 6 | 0.75 | 23 |
| 4 | 6 | 0.4 | 14 |
| 4 | 4 | 1 | 16 |
| 4 | 4 | 0.8 | 16 |
| 4 | 4 | 0.75 | 16 |
| 4 | 4 | 0.4 | 11 |
| 4 | 2 | 1 | 9 |
| 4 | 2 | 0.8 | 9 |
| 4 | 2 | 0.75 | 9 |
| 4 | 2 | 0.4 | 5 |

Table 9.4B.1.1.3-6: Additional test setup for E-UTRA CC

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Unit** | **Value** |
| Inter-TTI Distance |  | 1 |
| Number of OFDM symbols for PDCCH per component carrier | OFDM symbols | 1 |
| Cross carrier scheduling |  | Not configured |
| Propagation condition |  | Static propagation condition  No external noise sources are applied |
| at antenna port | dBm/15kHz | -85 |
| Antenna configuration | 2 layer CC | 2x2 or 2x4 |
| 4 layer CC | 4x4 |
| Codebook subset  restriction | 2 layer CC | 10 |
| 4 layer CC | 1000 |
| Downlink power  allocation | 2 layer CC | = -3dB,  = -3dB, σ = 0dB |
| 4 layer CC | = -6dB,  = -6dB, σ = 3dB |

Table 9.4B.1.1.3-7: E-UTRA FRC for SDR test (FDD)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MIMO layer | Bandwidth | Reference channel | | |
| 64QAM | 256QAM | 1024QAM |
| 2 layer | 5 | R.PDSCH.4-1.1 FDD | R.PDSCH.4-3.1 FDD | R.PDSCH.4-5.1 FDD |
| 10 | R.PDSCH.4-1.2 FDD | R.PDSCH.4-3.2 FDD | R.PDSCH.4-5.2 FDD |
| 15 | R.PDSCH.4-1.3 FDD | R.PDSCH.4-3.3 FDD | R.PDSCH.4-5.3 FDD |
| 20 | R.PDSCH.4-1.4 FDD | R.PDSCH.4-3.4 FDD | R.PDSCH.4-5.4 FDD |
| 4 layer | 5 | R.PDSCH.4-2.1 FDD | R.PDSCH.4-4.1 FDD | R.PDSCH.4-6.1 FDD |
| 10 | R.PDSCH.4-2.2 FDD | R.PDSCH.4-4.2 FDD | R.PDSCH.4-6.2 FDD |
| 15 | R.PDSCH.4-2.3 FDD | R.PDSCH.4-4.3 FDD | R.PDSCH.4-6.3 FDD |
| 20 | R.PDSCH.4-2.4 FDD | R.PDSCH.4-4.4 FDD | R.PDSCH.4-6.4 FDD |

Table 9.4B.1.1.3-8: E-UTRA FRC for SDR test (TDD)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MIMO layer | Bandwidth | Reference channel | | |
| 64QAM | 256QAM | 1024QAM |
| 2 layer | 10 | R.PDSCH.6-1.1 TDD | R.PDSCH.6-3.1 TDD | R.PDSCH.6-5.1 TDD |
| 15 | R.PDSCH.6-1.2 TDD | R.PDSCH.6-3.2 TDD | R.PDSCH.6-5.2 TDD |
| 20 | R.PDSCH.6-1.3 TDD | R.PDSCH.6-3.3 TDD | R.PDSCH.6-5.3 TDD |
| 4 layer | 10 | R.PDSCH.6-2.1 TDD | R.PDSCH.6-4.1 TDD | R.PDSCH.6-6.1 TDD |
| 15 | R.PDSCH.6-2.2 TDD | R.PDSCH.6-4.2 TDD | R.PDSCH.6-6.2 TDD |
| 20 | R.PDSCH.6-2.3 TDD | R.PDSCH.6-4.3 TDD | R.PDSCH.6-6.3 TDD |

9.4B.1.1.3.1 Procedure for test parameter selection

The test parameters are determined by the following procedure:

- Select one EN-DC bandwidth combination among all supported EN-DC configurations and set of per component carrier (CC) UE capabilities among all supported UE capabilities that provides the largest data rate [TS 38.306 [14, Section 4.1.2]].

- Set of per NR CC UE capabilities include channel bandwidth, subcarrier spacing, number of PDSCH MIMO layers, modulation format and scaling factor TS 38.306 [14] Section 4.1.2]].

- Set of per E-UTRA CC UE capabilities includes channel bandwidth, number of PDSCH MIMO layers and modulation format [TS 38.306 [14] Section 4.1.2]].

- When there are multiple sets of EN-DC bandwidth combinations and UE capabilities with same largest data rate, select one among sets with the smallest aggregated channel bandwidth.

- For each NR FR1 CC in EN-DC bandwidth combination, use Table 9.4B.1.1.3-5 to determine MCS based on test parameters and indicated UE capabilities.

- For each E-UTRA CC in EN-DC bandwidth combination, use Table 9.4B.1.1.3-7 and Table 9.4B.1.1.3-8 to determine FRC based on test parameters and indicated UE capabilities.

Pasting relevant portion of max data rate equation from TS 38.306 [14] section 4.1

For NR, the approximate data rate for a given number of aggregated carriers in a band or band combination is computed as follows.



wherein

J is the number of aggregated component carriers in a band or band combination

Rmax = 948/1024

For the j-th CC,

 is the maximum number of supported layers given by higher layer parameter *maxNumberMIMO-LayersPDSCH* for downlink and maximum of higher layer parameters *maxNumberMIMO-LayersCB-PUSCH* and *maxNumberMIMO-LayersNonCB-PUSCH* for uplink.

 is the maximum supported modulation order given by higher layer parameter *supportedModulationOrderDL* for downlink and higher layer parameter *supportedModulationOrderUL* for uplink.

is the scaling factor given by higher layer parameter *scalingFactor* and can take the values 1, 0.8, 0.75, and 0.4.

 is the numerology (as defined in TS 38.211 [6])

 is the average OFDM symbol duration in a subframe for numerology , i.e. . Note that normal cyclic prefix is assumed.

 is the maximum RB allocation in bandwidth  with numerology , as defined in 5.3 TS 38.101-1 [2] and 5.3 TS 38.101-2 [3], where  is the UE supported maximum bandwidth in the given band or band combination.

is the overhead and takes the following values

0.14, for frequency range FR1 for DL

0.18, for frequency range FR2 for DL

0.08, for frequency range FR1 for UL

0.10, for frequency range FR2 for UL

NOTE: Only one of the UL or SUL carriers (the one with the higher data rate) is counted for a cell operating SUL.

For EUTRA in case of MR-DC, the approximate data rate for a given number of aggregated carriers in a band or band combination is computed as follows.

Data rate (in Mbps) = 

wherein

J is the number of aggregated EUTRA component carriers in MR-DC band combination

is the total maximum number of DL-SCH transport block bits received within a 1ms TTI for j-th CC, as derived from TS36.213 [22] based on the UE supported maximum MIMO layers for the j-th carrier, and based on the modulation order and number of PRBs based on the bandwidth of the j-th carrier.

The approximate maximum data rate can be computed as the maximum of the approximate data rates computed using the above formula for each of the supported band or band combinations.

For MR-DC, the approximate maximum data rate is computed as the sum of the approximate maximum data rates from NR and EUTRA

The normative reference for this requirement is TS 38.101-4 [5], clause 9.4B.1.1.

9.4B.1.1.4 Test description

9.4B.1.1.4.1 Initial conditions

Initial conditions are a set of test configurations the UE needs to be tested in and the steps for the SS to take with the UE to reach the correct measurement state.

The initial test configurations consist of environmental conditions, test frequencies, test channel bandwidths and sub-carrier spacing based on NR and E-UTRA operating bands specified in Table 5.3.5-1 of TS 38.521-1.

Configurations of NR PDSCH and NR PDCCH before measurement are specified in Annex C.

E-UTRA configurations before measurement are specified in at Table 9.4B.1.1.3-6.

Test Environment: Normal, as defined in TS 38.508-1 [6] clause 4.1.

Frequencies to be tested: Mid Range, as defined in TS 38.508-1 [6] clause 4.3.1.1.

1. Connect the SS to the UE antenna connectors as shown in TS 38.508-1 [6] Annex A, in Figure A.3.1.7.1 for TE diagram (without fader and AWGN) and clause A.3.2.2 for UE diagram.

2. Downlink signals for the NR cell are initially set up according to Annexes C.0, C.1, C.2, C.3.1, and uplink signals according to Annexes G.0, G.1, G.2, G.3.1 of TS 38.521-1 [7].

3. Downlink signals for E-UTRA cell are initially set up according to TS 36.521-1 [16] Annex C.0 and uplink signals according to TS 36.521-1 [16] Annex H

4. Propagation conditions are set according to TS 36.521-1 [16] and TS 38.521-1 [7] Annex B.0 for E-UTRA CG and NR CG respectively.

5. Ensure the UE is in state RRC\_CONNECTED with generic procedure parameters Connectivity EN-DC, DC bearer *MCG(s)* and *SCG*, Connected without release *On, Test Loop Function On with UE Test Loop Mode A with UL\_PDCP\_SDU\_SIZE = 0* for MCG DRB and SCG DRB according to TS 38.508-1 [6] clause 4.5.4. Message content are defined in clause 5.5.1.4.3.

6. SS sends a RRCConnectionReconfiguration message to change PDCP version of MCG DRB to NR PDCP.

7. SS shall transmit UECapabilityEnquiry message containing *UE-CapabilityRAT-Request* with *rat-Type* set to *eutra-nr* and *eutra*.

8. The UE shall transmit UECapabilityInformation message.

9. Using the UE capabilities advertised in the *UE-CapabilityRAT-Container* of the type *UE-MRDC-Capability and UE-EUTRA-Capability,* and the procedure outlined in 9.4B.1.1.3.1 determine one EN-DC bandwidth combination that would provide the largest aggregated data rate.

10. Setup up the NR CG and E-UTRA CG using these parameters for the test.

11. Configure the NR CG TBsize, NR CG DL RMC, NR CG UL RMC from Annex A.3.2\_1 and Annex A.2.2 for UL as appropriate. Configure the E-UTRA CG TBsize, DL RMC and UL RMC from Table 9.4B.1.1.3-7, Table 9.4B.1.1.3-8 as appropriate.

9.4B.1.1.4.2 Test procedure

1. SS configures T-reordering timer to be infinity for both E-UTRA MCG DRB and NR SCG DRB.

2. SS sends a PDCP reestablishment via RRCConnectionReconfigurationmessage requesting for PDCP Status Report for both E-UTRA MCG DRB and NR SCG DRB.

3. SS sets the counters NDL\_newtx NDL\_retx per NR CG and E-UTRA CG to 0.

4. For each new DL HARQ transmission the SS generates sufficient NR PDCP SDUs (max PDCP SDU size and minimum number of consecutive PDCP SDUs) to fill up the TB in accordance with Annex A.3.2\_1 for both E-UTRA MCG DRB and NR SCG DRB. The SS ciphers the PDCP SDUs, concatenates the resultant PDCP PDUs to form an RLC PDU and then a MAC PDU. The SS transmits the MAC PDU per NR CG and E-UTRA CG. The SS increments then NDL\_newtx by one per CG.

5. If PHY requests a DL HARQ retransmission, the SS performs a HARQ retransmission and increments NDL\_retx by one for that CG accordingly.

6. Steps 5 to 6 are repeated at every TTI for at least 300 frames and the SS waits for 300ms to let any HARQ retransmissions and RLC retransmissions to finish.

7. SS sends a PDCP reestablishment via RRCConnectionReconfigurationmessage requesting for PDCP Status Report for both E-UTRA MCG and NR SCG DRB.

8. The SS calculates the TB success rate per NR CG and E-UTRA CG as A = 100% NDL\_correct\_rx \*/ (NDL\_newtx + NDL\_retx).

9. SS computes the PDCP SDU loss by looking into the FMC and Bitmap field in the PDCP Status Report. PDCP SDU loss B = COUNT reported in the Bitmap field of PDCP Status Report.

10. The UE passes the test if A ≥ 85% TB success rates for both NR CG and E-UTRA CG and B = 0.

NOTE 1: In case of RLC PDU retransmission, the number of new required PDCP SDUs is as many as to fill the rest of TB.

9.4B.1.1.4.3 Message contents

Message contents are according to TS 38.508-1 [6] clause 5.4.2 with the following exceptions

Table 9.4B.1.1.4.3-0: CLOSE UE TEST LOOP (MCG DRB in the preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.509 clause 6.3.1 | | | |
| Information Element | | Value/remark | Comment | Condition |
| Protocol discriminator | | 1 1 1 1 |  |  |
| Skip indicator | | 0 0 0 0 |  |  |
| Message type | | 1 0 0 0 0 0 0 0 |  |  |
| UE test loop mode | | 0 0 0 0 0 0 0 0 | UE test loop mode A |  |
| UE test loop mode A LB setup | |  |  |
| Length of UE test loop mode A LB setup list in bytes | | 0 0 0 0 0 0 1 1 | Length of one LB setup DRB (3 bytes) |
| LB setup DRB | | 0 0 0 0 0 0 0 0,  0 0 0 0 0 0 0 0,  0 0 0 Q4 Q3 Q2 Q1 Q0 | UL PDCP SDU size = 0  Q4..Q0 = MCG Data Radio Bearer identity number -1 for the radio bearer. See 38.509 clause 6.3.1 |
| UE test loop mode B LB setup | | Not present |  |

Table 9.4B.1.1.4.3-1: CLOSE UE TEST LOOP (SCG DRB in the preamble)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: 38.509 clause 6.3.1 | | | |
| Information Element | | Value/remark | Comment | Condition |
| Protocol discriminator | | 1 1 1 1 |  |  |
| Skip indicator | | 0 0 0 0 |  |  |
| Message type | | 1 0 0 0 0 0 0 0 |  |  |
| UE test loop mode | | 0 0 0 0 0 0 0 0 | UE test loop mode A |  |
| UE test loop mode A LB setup | |  |  |
| Length of UE test loop mode A LB setup list in bytes | | 0 0 0 0 0 0 1 1 | Length of one LB setup DRB (3 bytes) |
| LB setup DRB | | 0 0 0 0 0 0 0 0,  0 0 0 0 0 0 0 0,  0 0 0 Q4 Q3 Q2 Q1 Q0 | UL PDCP SDU size = 0  Q4..Q0 = SGC Data Radio Bearer identity number -1 for the radio bearer. See 38.509 clause 6.3.1 |
| UE test loop mode B LB setup | | Not present |  |

Table 9.4B.1.1.4.3-2 to -7: Void



Table 9.4B.1.1.4.3-8: RadioBearerConfig (Initial Conditions, Step 5)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [6], clause 4.6.3-132 | | | |
| Information Element | Value/remark | Comment | Condition |
| RadioBearerConfig ::= SEQUENCE { |  |  |  |
| drb-ToAddModList SEQUENCE (SIZE (1..maxDRB)) OF DRB-ToAddMod { | 1 entry |  |  |
| DRB-ToAddMod[1] SEQUENCE { |  | entry 1 |  |
| cnAssociation CHOICE { |  |  |  |
| eps-BearerIdentity | Dedicated EPS bearer ID |  |  |
| } |  |  |  |
| drb-Identity | DRB-Identity of the SCG DRB |  |  |
| reestablishPDCP | Not Present |  |  |
| pdcp-Config | PDCP-Config |  |  |
| } |  |  |  |

Table 9.4B.1.1.4.3-8A: *PDCP-Config*

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 38.508-1 [6], Table 4.6.3-99 | | | |
| Information Element | Value/remark | Comment | Condition |
| PDCP-Config ::= SEQUENCE { |  |  |  |
| drb SEQUENCE { |  |  |  |
| discardTimer | infinity |  |  |
| pdcp-SN-Size-UL | len18bits |  |  |
| pdcp-SN-Size-DL | len18bits |  |  |
| headerCompression CHOICE { |  |  |  |
| notUsed | Null |  |  |
| } |  |  |  |
| integrityProtection | Not present |  |  |
| statusReportRequired | true |  |  |
| outOfOrderDelivery | Not present |  |  |
| } |  |  |  |
| t-Reordering | Not present |  |  |
| } |  |  |  |

Table 9.4B.1.1.4.3-9: *RRCConnectionReconfiguration* (Initial conditions, step6)

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.6.1-8 with condition HO | | | |
| Information Element | Value/remark | Comment | Condition |
| RRCConnectionReconfiguration ::= SEQUENCE { |  |  |  |
| criticalExtensions CHOICE { |  |  |  |
| c1 CHOICE { |  |  |  |
| rrcConnectionReconfiguration-r8 SEQUENCE { |  |  |  |
| mobilityControlInfo | As per Table 4.6.5-1 of TS 36.508 [19] |  |  |
| radioResourceConfigDedicated | RadioResourceConfigDedicated-MCG-DRB-NR-PDCP | As per Table 9.4B.1.1.4.3-10A |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nonCriticalExtension SEQUENCE { |  |  |  |
| nr-Config-r15 | Not present |  |  |
| nr-RadioBearerConfig1-r15 | OCTET STRING containing RadioBearerConfig according to TS 38.508-1 [6], Table 4.6.3-132 with conditions MCG\_NR\_PDCP |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |
| } |  |  |  |

Table 9.4B.1.1.4.3-10A: *RadioResourceConfigDedicated-MCG-DRB-NR-PDCP*

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [7], Table 4.6.3-19 | | | |
| Information Element | Value/remark | Comment | Condition |
| RadioResourceConfigDedicated-MCG-DRB-NR-PDCP ::= SEQUENCE { |  |  |  |
| drb-ToAddModList SEQUENCE (SIZE (1..maxDRB)) OF DRB-ToAddMod { | 1 entry |  |  |
| DRB-ToAddMod[1] | DRB-ToAddMod-MCG-DRB-NR-PDCP | entry 1  As per Table 9.4B.1.1.4.3-10B |  |
| } |  |  |  |
| drb-ToReleaseList SEQUENCE (SIZE (1..maxDRB)) OF DRB-Identity { | 1 entry |  |  |
| DRB-Identity[1] | Same as the DRB identity associated with the default EPS bearer | entry 1 |  |
| } |  |  |  |
| physicalConfigDedicated | PhysicalConfigDedicated-DEFAULT with condition RBC-HO |  |  |
| } |  |  |  |

Table 9.4B.1.1.4.3-10B: DRB-ToAddMod-MCG-DRB-NR-PDCP

|  |  |  |  |
| --- | --- | --- | --- |
| Derivation Path: TS 36.508 [19], Table 4.8.2.1.7-1 | | | |
| Information Element | | Value/remark | Comment | Condition |
| DRB-ToAddMod ::= SEQUENCE { | |  |  |  |
| eps-BearerIdentity | | Same as the default EPS bearer Identity |  |  |
| drb-Identity | | Same as the DRB identity associated with the default EPS bearer |  |  |
| pdcp-Config | | Not present |  |  |
| } | |  |  |  |

9.4B.1.1.5 Test requirement

The PDCP SDU success rate of greater than 85% shall be sustained during at least 300 frames.

## <<< END OF CHANGES >>>