**3GPP TSG-RAN4 Meeting #102-eR4-2206610**

**Electronic meeting, 21st Feb – 3rd Mar, 2022**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.101-1** | **CR** |  | **rev** | **-** | **Current version:** | **15.16.0** |  |
|  | | | | | | | | |
| *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 | **x** | Radio Access Network |  | Core Network |  |

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| ***Title:*** | Big CR for TS 38.101-1 Maintenance Part-1 (Rel-15) | | | | | | | | | |
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| ***Source to WG:*** | MCC, OPPO | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_newRAT-Core | | | | |  | ***Date:*** | | | 2022-03-07 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | | Rel-15 |
|  | *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:*** | | This big CRs merge the mutiple endorsed draft CRs. The reason for change in each endorsed draft CR is copied below.  R4-2203605 Correction to FR1 UL RMCs  <Reason for change>  The Payload size for the 1RB allocation in the Pi/2 BPSK UL RMC is not correct. According to 38.214 calculation rules, the payload size must be 24. Additionally several RB allocations which are required for RAN5 testing are not defined in the UL RMC tables.  R4-2203670 draftCR for TS 38.101-1 Rel-15: Corrections on single bands for UE co-existence  <Reason for change>  n78 is missing certain bands in its UE coexistence list which are deployed in the same region. This CR aims to add those bands to n78 and also corrects a faulty harmonic exception found in n28 list.  R4-2205301 Draft CR for 38.101-1 to add spurious response exception for intra-band CA(R15)  <Reason for change>  The spurious response exception is missing for intra-band CA  R4-2205618 Draft CR to correct the general SE requirements for n41  <Reason for change>  In a case of band n41 (2496 MHz – 2690 MHz), due to the description of note 1 in Table 6.5.3.1-2, measured frequency range is currently defined up to 12.75 GHz and cannot cover the range from 12.75 GHz to 5th harmonic of the upper frequency edge of 2690 MHz (i.e. 13.45 GHz).  In other words, spurious emission requirements from 12.75 GHz to 13.45 GHz for n41 is missing.  R4-2206285 draft CR to 38.101-1 on AMPR edge RB allocation for NS R15  <Reason for change>  RAN4 received an LS from RAN5 (R4-2117029) in RAN4#101-e to clarify Edge RB allocation A-MPR requirements in NS\_21 and other NS values where A-MPR tables are defined with "Outer” and “Outer/Inner” RB allocations. It was agreed by RAN4 that Edge RB allocations are a subset of Outer RB allocations and get the same A-MPR. Accordingly an update of the wording is required and a corresponding reply LS R4-2120027 was send out to RAN5.  R4-2206286 Draft CR to TS 38.101-1 on removal the bracket for the note of NS\_01  <Reason for change>  There is no need to keep the bracket for the note of NS\_01 below the A-MPR table in Table 6.2.3.1-1.  R4-2206288 CR CatF n1 NS\_05 inequality error  <Reason for change>  Missing AMPR due to inequality error  R4-2206289 DraftCR for TS 38.101-1 on correction on IL for SRS antenna switching  <Reason for change>  The description of inserion loss for SRS antenna switching capability indicated as ‘t1r4-t2r4’ is incorrect. The primitive SRS antenna switching capability is ‘t1r2’, ‘t1r4’ and ‘t2r4’. Any combination of these primitive capabilities is covered by its corresponding description.  b) UE transmits SRS on the second, third and fourth SRS resources of the total 4 SRS resources from all configured SRS resource set(s) consisting of one SRS port when the *SRS-TxSwitch* capability is indicated as 't1r4' or, 't1r4-t2r4'  🡪 According to TS 38.214 Section 6.2.1.2, ‘t1r4-t2r4’ means two cases ‘t1r4’ and ‘t2r4’. But for ‘t2r4’, there are only two SRS resources in each SRS resource set, so the above sentence does not hold for ‘t2r4’ because the total SRS resource is 2 in each SRS resource set  c) UE transmits SRS from the second SRS port pair on the second SRS resource in every configured SRS resource set consisting of two SRS ports when the *SRS-TxSwitch* capabilityis indicated as' t2r4' or ' t1r4-t2r4', or  🡪 According to TS 38.214 Section 6.2.1.2, ‘t1r4-t2r4’ means two cases ‘t1r4’ and ‘t2r4’. But for ‘t1r4’, SRS ports are not paired as in ‘t2r4’, so there is no SRS port pair  R4-2206290 Draft CR for 38.101-1 to align the UL channel bandwidth between clause 6.5.3.3 and 6.2.3.1 for n74(R15)  <Reason for change>  The UL channel bandwidth between clause 6.5.3.3.6 and 6.2.3.1 is not aligned with each other.  R4-2206485 Draft CR for clarification on per band pair simultaneous RxTx capability for CA and SUL for TS 38.101-1  <Reason for change>  In response to the introduction of the new capability signalling of per band pair simultaneous RxTx capability in RAN2#116-e, RAN4#101-bis-e discusses the clarification on mandatory applicaibility for band pairs included in higher order band combinations, and the following proposals were agreed in R4-2202295.  *Agreement:*   * *Proposal 1: For inter-band EN-DC, NE-DC, NR CA, NR DC and SUL configurations,*   + *If mandatory simultaneous RxTx capability apply for a band configuration, mandatory simultaneous RxTx capability also apply for the band pair of the configuration when the applicable configuration is a subset of a higher order band configuration.* * *Proposal 2: Clarification in Proposal 1 should apply from Rel-15 TS 38.101 series.* * *Proposal 3: FFS how to capture proposal 1 in TS 38.101 series.*   + *Option 1: Add NOTEs in band configuration tables including higher order band configuration (more than 2 bands cases).*   + *Option 2: Add description in general sections.*   This CR tries to capture propsals 1 and 2 into TS 38.101-1. Regarding proposal 3, this CR is based on option 2 because it is redandant to put the same NOTEs into all band configuration tables. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The summary of change in each endorsed draft CR is copied below.  R4-2203605 Correction to FR1 UL RMCs  <Summary of change>  Correct Payload size from 32 to 24.  Add missing RB allocations for UL RMCs.  R4-2203670 draftCR for TS 38.101-1 Rel-15: Corrections on single bands for UE co-existence  <Summary of change>  The following modifications are made for :   1. n28: The protected band 73 does not require harmonic exception. Note 2 was removed.   n78: Seperated n77 and n78 coexistence requirements. Added the bands 32, 75 and 76 to the UE coexistence list of n78 as they are deployed in the same region.  R4-2205301 Draft CR for 38.101-1 to add spurious response exception for intra-band CA(R15)  <Summary of change>  The declaration of spurious response exception is added for intra-band CA.  R4-2205618 Draft CR to correct the general SE requirements for n41  <Summary of change>  Change Note 1 in Table 6.5.3.1-2 as “Applies for Band for which the upper frequency edge of the UL Band is greater than 2.55 GHz and less than or equal to 5.2 GHz”.  R4-2206285 draft CR to 38.101-1 on AMPR edge RB allocation for NS R15  <Summary of change>  Update wording in section 6.2.3.1 to clarify that Edge RB allocations get the same A-MPR as Outer RB allocations.  R4-2206286 Draft CR to TS 38.101-1 on removal the bracket for the note of NS\_01  <Summary of change>   1. Remove the bracket for the note of NS\_01 below the A-MPR table. 2. Some other editorial corrections.   R4-2206288 CR CatF n1 NS\_05 inequality error  <Summary of change>  Correct inequality sign < to ≤ in region A because there is no AMPR defined for = condition in either region A or region B.  Remove A3, A5 inner AMPR values as the region defined by A3 and A5 are outer regions only.  R4-2206289 DraftCR for TS 38.101-1 on correction on IL for SRS antenna switching  <Summary of change>  Remove ‘t1r4-t2r4’ in the above two bullets  R4-2206290 Draft CR for 38.101-1 to align the UL channel bandwidth between clause 6.5.3.3 and 6.2.3.1 for n74(R15)  <Summary of change>  1. 20MHz is removed for NS\_37 in clause 6.5.3.3.6.  R4-2206485 Draft CR for clarification on per band pair simultaneous RxTx capability for CA and SUL for TS 38.101-1  <Summary of change>  The following description is added into section 5.2A and 5.2C:  *If the mandatory simultaneous Rx/Tx capability applies for a band combination, the mandatory simultaneous Rx/Tx capability also applies for the band combination when the applicable band combination is a subset of a higher order band combination.* | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The consequences if not approved for each endorsed draft CR are coppied below.  R4-2203605 Correction to FR1 UL RMCs  <Consequences if not approved>  Wrong RMC remains in the spec and required RMC remain missing.  R4-2203670 draftCR for TS 38.101-1 Rel-15: Corrections on single bands for UE co-existence  <Consequences if not approved>  UE coexistence requirements stay missing or wrong.  R4-2205301 Draft CR for 38.101-1 to add spurious response exception for intra-band CA(R15)  <Consequences if not approved>  The spurious response exception is missing for intra-band CA.  R4-2205618 Draft CR to correct the general SE requirements for n41  <Consequences if not approved>  Inconsistency between 3GPP requirements and ITU-R & TELEC requirements.  R4-2206285 draft CR to 38.101-1 on AMPR edge RB allocation for NS R15  <Consequences if not approved>  Applicability of Edge RB allocations with A-MPR requirements remains unclear and may lead to false test requirements in RAN5.  R4-2206286 Draft CR to TS 38.101-1 on removal the bracket for the note of NS\_01  <Consequences if not approved>  The bracket for the note of NS\_01 will remain.  R4-2206288 CR CatF n1 NS\_05 inequality error  <Consequences if not approved>  UE cannot define AMPR due to ineqaulity error  R4-2206289 DraftCR for TS 38.101-1 on correction on IL for SRS antenna switching  <Consequences if not approved>  The description is not correct  R4-2206290 Draft CR for 38.101-1 to align the UL channel bandwidth between clause 6.5.3.3 and 6.2.3.1 for n74(R15)  <Consequences if not approved>  The UL channel bandwidth between clause 6.5.3.3 and 6.2.3.1 is not aligned with each other.  R4-2206485 Draft CR for clarification on per band pair simultaneous RxTx capability for CA and SUL for TS 38.101-1  <Consequences if not approved>  Mandatory applicaibility for band pairs included in higher order band combinations is unclear considering the existence of per band pair simultaneous RxTx capability signalling of *simultaneousRxTxInterBandCAPer-band-pair/* *simultaneousRxTxSULPer-band-pair* | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.2A; 5.2C; 6.2.3; 6.2.4; 6.5.3; 7.6A.3.1; Annex A.2.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | | **X** |  | Test specifications | | | | TS 38.521-1 | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

## << Start of change 1 >>

## 5.2A Operating bands for CA

### 5.2A.1 Intra-band CA

NR intra-band contiguous carrier aggregation is designed to operate in the operating bands defined in Table 5.2A.1-1, where all operating bands are within FR1.

Table 5.2A.1-1: Intra-band contiguous CA operating bands in FR1

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n411 | n41 |
| CA\_n771 | n77 |
| CA\_n781 | n78 |
| CA\_n791 | n79 |
| NOTE 1: The minimum requirements only apply for non‑simultaneous Tx/Rx between all carriers. | |

### 5.2A.2 Inter-band CA

NR inter-band carrier aggregation is designed to operate in the operating bands defined in Table 5.2A.2.1-1, where all operating bands are within FR1.

If the mandatory simultaneous Rx/Tx capability applies for a band combination, the mandatory simultaneous Rx/Tx capability also applies for the band combination when the applicable band combination is a subset of a higher order band combination.

Table 5.2A.2-1: Void

#### 5.2A.2.1 Inter-band CA (two bands)

Table 5.2A.2.1-1: Inter-band CA operating bands involving FR1 (two bands)

|  |  |
| --- | --- |
| NR CA Band | NR Band  (Table 5.2-1) |
| CA\_n3-n771 | n3, n77 |
| CA\_n3-n781 | n3, n78 |
| CA\_n3-n791 | n3, n79 |
| CA\_n8-n751 | n8, n75 |
| CA n8-n781 | n8, n78 |
| CA\_n8-n791 | n8, n79 |
| CA\_n28-n752 | n28, n75 |
| CA\_n28-n781 | n28, n78 |
| CA\_n41-n78 | n41, n78 |
| CA\_n75-n781 | n75, n78 |
| CA\_n76-n781 | n76, n78 |
| CA\_n77-n79 | n77, n79 |
| CA\_n78-n793 | n78, n79 |
| NOTE 1: Applicable for UE supporting inter-band carrier aggregation with mandatory simultaneous Rx/Tx capability.  NOTE 2: The frequency range in band n28 is restricted for this band combination to 703-733 MHz for the UL and 758-788 MHz for the DL.  NOTE 3: For UEs supporting band n77, the minimum requirements apply only when there is non-simultaneous Rx/Tx operation between n78-n79 NR carriers. This restriction applies also for these carriers when applicable NR CA configuration is part of a higher order configuration.  NOTE 4: The minimum requirements apply only when there is non-simultaneous Rx/Tx operation between n77-n79 NR carriers. This restriction applies also for these carriers when applicable NR CA configuration is part of a higher order configuration. | |

## 5.2B Void

## 5.2C Operating band combination for SUL

NR operation is designed to operate in the operating band combination defined in Table 5.2C-1, where all operating bands are within FR1.

If the mandatory simultaneous Rx/Tx capability applies for a band combination, the mandatory simultaneous Rx/Tx capability also applies for the band combination when the applicable band combination is a subset of a higher order band combination.

Table 5.2C-1: Operating band combination for SUL in FR1

|  |  |
| --- | --- |
| NR Band combination for SUL | NR Band  (Table 5.2-1) |
| SUL\_n78-n802 | n78, n80 |
| SUL\_n78-n812 | n78, n81 |
| SUL\_n78-n822 | n78, n82 |
| SUL\_n78-n832 | n78, n83 |
| SUL\_n78-n842 | n78, n84 |
| SUL\_n78-n862 | n78, n86 |
| SUL\_n79-n802 | n79, n80 |
| SUL\_n79-n812 | n79, n81 |
| NOTE 1: If a UE is configured with both NR UL and NR SUL carriers in a cell, the switching time between NR UL carrier and NR SUL carrier is 0 us.  NOTE 2: For UE supporting SUL band combination simultaneous Rx/Tx capability is mandatory.  NOTE 3: For UE supporting SUL band combination, UL MIMO is not configured on SUL carrier. | |

<<< End of changed sections >>>

## << Start of change 2 >>

#### 6.2.3.1 General

Additional emission requirements can be signalled by the network. Each additional emission requirement is associated with a unique network signalling (NS) value indicated in RRC signalling by an NR frequency band number of the applicable operating band and an associated value in the field *additionalSpectrumEmission.* Throughout this specification, the notion of indication or signalling of an NS value refers to the corresponding indication of an NR frequency band number of the applicable operating band, the IE field *freqBandIndicatorNR* and an associated value of *additionalSpectrumEmission* in the relevant RRC information elements [7]*.*

To meet the additional requirements, additional maximum power reduction (A-MPR) is allowed for the maximum output power as specified in Table 6.2.1-1. Unless stated otherwise, the total reduction to UE maximum output power is max(MPR, A-MPR) where MPR is defined in clause 6.2.2. Outer and inner allocation notation used in clause 6.2.3 is defined in clause 6.2.2. Unless stated otherwise, Edge RB allocations get the same AMPR as Outer RB allocations. In absense of modulation and waveform types the A-MPR applies to all modulation and waveform types.

Table 6.2.3.1-1 specifies the additional requirements with their associated network signalling values and the allowed A-MPR and applicable operating band(s) for each NS value. In case of a power class 3 UE, when IE *powerBoostPi2BPSK* is set to 1, power class 2 A-MPR values apply. The mapping of NR frequency band numbers and values of the *additionalSpectrumEmission* to network signalling labels is specified in Table 6.2.3.1-1A.

For almost contiguous allocations in CP-OFDM waveforms in power class 3, the allowed A-MPR defined in clause 6.2.3 is increased by CEIL{10 log10(1 + NRB\_gap / NRB\_alloc), 0.5} dB, where CEIL{x, 0.5} means x rounding upwards to closest 0.5dB, NRB\_gap is the total number of unallocated RBs between allocated RBs and NRB\_alloc is the total number of allocated RBs, and the parameter LCRB is replaced by NRB\_alloc + NRB\_gap in specifying the RB allocation regions.

Table 6.2.3.1-1: Additional maximum power reduction (A-MPR)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Network signalling label | Requirements (clause) | NR Band | Channel bandwidth (MHz) | Resources blocks (*N*RB) | A-MPR (dB) |
| NS\_01 |  | Table 5.2-1  (NOTE 4) | 5, 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100 | Table 5.3.2-1 | N/A |
| NS\_03 | 6.5.2.3.3 | n2, n25, n66,  n70, n86 |  |  | Clause 6.2.3.7 |
| NS\_03U | 6.5.2.3.3, 6.5.2.4.2 | n2, n25, n66, n86 |  |  | Clause 6.2.3.7 |
| NS\_04 | 6.5.2.3.2, 6.5.3.3.1 | n41 | 10, 15, 20, 40, 50, 60 80, 90, 100 |  | Clause 6.2.3.2 |
| NS\_05 | 6.5.3.3.4 | n1, n84 | 5, 10, 15, 20(NOTE 2) |  | Clause 6.2.3.4 |
| NS\_05U | 6.5.3.3.4, 6.5.2.4.2 | n1, n84 | 5, 10, 15, 20 |  | Clause 6.2.3.4 |
| NS\_06 | 6.5.2.3.4 | n12 | 5, 10, 15 |  | N/A |
| NS\_10 |  | n20, n82 | 15, 20 | Table 6.2.3.3-1 | Table  6.2.3.3-1 |
| NS\_17 | 6.5.3.3.2 | n28, n83 | 5,10 | Table 5.3.2-1 | N/A |
| NS\_18 | 6.5.3.3.3 | n28, n83 | 5 |  | Table 6.2.3.13-1, A1 |
| 10, 15, 20 |  | Table 6.2.3.13-1, A2 |
| NS\_35 | 6.5.2.3.1 | n71 | 5, 10, 15, 20 | Table 5.3.2-1 | N/A |
| NS\_37 | 6.5.3.3.6 | n74  (NOTE 3) | 10, 15 | Table 6.2.3.8-1 | Table  6.2.3.8-1 |
| NS\_38 | 6.5.3.3.7 | n74 | 5, 10, 15, 20 | Table 6.2.3.9-1 | Table  6.2.3.9-1 |
| NS\_39 | 6.5.3.3.8 | n74 | 10, 15, 20 | Table 6.2.3.10-1 | Table 6.2.3.10-1 |
| NS\_40 | 6.5.3.3.9 | n51 | 5 |  | Table  6.2.3.5-1 |
| NS\_41 | 6.5.3.3.10 | n50 | 5, 10, 15, 20, 40, 50, 60 |  | Table 6.2.3.11-1 |
| NS\_42 | 6.5.3.3.11 | n50 | 5, 10, 15, 20, 40, 50, 60 |  | Table 6.2.3.12-1 |
| NS\_43 | 6.5.3.3.5 | n8, n81 | 5, 10, 15 |  | Clause 6.2.3.6 |
| NS\_43U | 6.5.3.3.5, 6.5.2.4.2 | n8, n81 | 5, 10, 15 |  | Clause 6.2.3.6 |
| NS\_50 | 6.5.3.3.16 | n39 | 25, 30, 40 |  | Clause 6.2.3.19 |
| NS\_100 | 6.5.2.4.2 | n1, n2, n3, n5, n8, n25, n66, n80, n81, n84, n86  (NOTE 1) |  |  | Table  6.2.3.1-2 |
| NOTE 1: This NS can be signalled for NR bands that have UTRA services deployed.  NOTE 2: No A-MPR is applied for 5 MHz BWChannel where the lower channel edge is ≥ 1930 MHz,10 MHz BWChannel where the lower channel edge is ≥ 1950 MHz and 15 MHz BWChannel where the lower channel edge is ≥ 1955 MHz.  NOTE 3: Applicable when the NR carrier is within 1447.9 – 1462.9 MHz.  NOTE 4: The NS\_01 label with the field *additionalPmax* [7] absent is default for all NR bands. | | | | | |

Table 6.2.3.1-1A: Mapping of network signalling label

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR band | Value of *additionalSpectrumEmission* | | | | | | | |
| **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| n1 | NS\_01 | NS\_100 | NS\_05 | NS\_05U |  |  |  |  |
| n2 | NS\_01 | NS\_100 | NS\_03 | NS\_03U |  |  |  |  |
| n3 | NS\_01 | NS\_100 |  |  |  |  |  |  |
| n5 | NS\_01 | NS\_100 |  |  |  |  |  |  |
| n7 | NS\_01 |  |  |  |  |  |  |  |
| n8 | NS\_01 | NS\_100 | NS\_43 | NS\_43U |  |  |  |  |
| n12 | NS\_01 | NS\_06 |  |  |  |  |  |  |
| n20 | NS\_01 | Void | NS\_10 |  |  |  |  |  |
| n25 | NS\_01 | NS\_100 | NS\_03 | NS\_03U |  |  |  |  |
| n28 | NS\_01 | NS\_17 | NS\_18 |  |  |  |  |  |
| n34 | NS\_01 |  |  |  |  |  |  |  |
| n38 | NS\_01 |  |  |  |  |  |  |  |
| n39 | NS\_01 | NS\_50 |  |  |  |  |  |  |
| n40 | NS\_01 |  |  |  |  |  |  |  |
| n41 | NS\_01 | NS\_04 |  |  |  |  |  |  |
| n50 | NS\_01 | NS\_41 | NS\_42 |  |  |  |  |  |
| n51 | NS\_01 | NS\_40 |  |  |  |  |  |  |
| n66 | NS\_01 | NS\_100 | NS\_03 | NS\_03U |  |  |  |  |
| n70 | NS\_01 | NS\_03 |  |  |  |  |  |  |
| n71 | NS\_01 | NS\_35 |  |  |  |  |  |  |
| n74 | NS\_01 | NS\_37 | NS\_38 | NS\_39 |  |  |  |  |
| n77 | NS\_01 |  |  |  |  |  |  |  |
| n78 | NS\_01 |  |  |  |  |  |  |  |
| n79 | NS\_01 |  |  |  |  |  |  |  |
| n80 | NS\_01 | NS\_100 |  |  |  |  |  |  |
| n81 | NS\_01 | NS\_100 | NS\_43 | NS\_43U |  |  |  |  |
| n82 | NS\_01 | Void | NS\_10 |  |  |  |  |  |
| n83 | NS\_01 | NS\_17 | NS\_18 |  |  |  |  |  |
| n84 | NS\_01 | NS\_100 | NS\_05 | NS\_05U |  |  |  |  |
| n86 | NS\_01 | NS\_100 | NS\_03 | NS\_03U |  |  |  |  |
| NOTE: *additionalSpectrumEmission* corresponds to an information element of the same name defined in clause 6.3.2 of TS 38.331 [7]. | | | | | | | | |

Table 6.2.3.1-2: A-MPR for NS\_100 (UTRA protection)

|  |  |  |
| --- | --- | --- |
| Modulation/Waveform | | Outer (dB) |
| DFT-s-OFDM | Pi/2 BPSK | ≤ 2 |
| QPSK | ≤ 2 |
| 16 QAM | ≤ 2.5 |
| 64 QAM | ≤ 3 |
| 256 QAM | ≤ 4.5 |
| CP-OFDM | QPSK | ≤ 4 |
| 16 QAM | ≤ 4 |
| 64 QAM | ≤ 4 |
| 256 QAM | ≤ 6.5 |
| NOTE 1: Void  NOTE 2: Void | | |

<<< End of changed sections >>>

## << Start of change 3>>

#### 6.2.3.4 A-MPR for NS\_05 and NS\_05U

Table 6.2.3.4-1: A-MPR regions for NS\_05 and NS\_05U

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Channel Bandwidth (MHz) | Carrier Centre Frequency, Fc (MHz) | Region A | | | Region B | | | Region C | | |
|  |  | RBstart | LCRB | A-MPR | RBstart | LCRB | A-MPR | RBstart | LCRB | A-MPR |
| 5 | 1922.5 ≤ FC < 1927.5 | < 1.62 MHz/12/SCS | > 2.52 MHz/12/SCS | A3 |  |  |  |  |  |  |
| 10 | 1925 ≤ FC < 1935 | ≤ 1.62 MHz/12/SCS | > 0 | A1 | > 1.62 MHz/12/SCS  ≤ 3.60 MHz/12/SCS | > 5.4 MHz/12/SCS | A7 | ≥ 7.2 MHz/12/SCS | ≤ 1.08 MHz/12/SCS | A2 |
| 10 | 1935 ≤ FC < 1945 |  | > 4.5 MHz/12/SCS | A4 |  |  |  |  |  |  |
| 15 | 1927.5 ≤ FC < 1932.5 | ≤ 3.24MHz/12/SCS | > 0 | A1 | > 3.24 MHz/12/SCS  ≤ 5.40 MHz/12/SCS | > 8.1 MHz/12/SCS | A7 | ≥ 10.08  MHz/12/SCS | ≤ 1.08 MHz/12/SCS | A2 |
| 15 | 1932.5 ≤ FC < 1942.5 | < 1.62 MHz/12/SCS | > 0 | A1 |  |  |  | ≥ 12.24 MHz/12/SCS | ≤ 1.08 MHz/12/SCS | A2 |
| 15 | 1942.5 ≤ FC < 1947.5 |  | > 7.2 MHz/12/SCS | A5 |  |  |  |  |  |  |
| 20 | 1930 ≤ FC < 1950 | ≤ 4.86 MHz/12/SCS | > 0 | A1 | > 4.86 MHz/12/SCS  ≤ 7.20 MHz/12/SCS | > 9.0 MHz/12/SCS | A7 | ≥ 13.68 MHz/12/SCS | ≤ 1.08 MHz/12/SCS | A2 |
| 20 | 1950 ≤ FC < 1960 |  | > 9.0 MHz/12/SCS | A6 |  |  |  |  |  |  |
| NOTE 1: The A-MPR values are specified in Table 6.2.3.4-2, 6.2.3.4-3 and 6.2.3.4-10.  NOTE 2: Void | | | | | | | | | | |

Table 6.2.3.4-2: A-MPR for NS\_05 and NS\_05U

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Modulation/Waveform | | A1 (dB) | A2 (dB) | A3 (dB) | |
|  | | Outer/Inner | Outer/Inner | Outer |  |
| DFT-s-OFDM | Pi/2 BPSK | ≤ 10 | ≤ 5 | ≤ 4 |  |
|  | QPSK | ≤ 10 | ≤ 5 | ≤ 4.5 |  |
|  | 16 QAM | ≤ 10 | ≤ 5 | ≤ 6 |  |
|  | 64 QAM | ≤ 11 | ≤ 5 | ≤ 6 |  |
|  | 256 QAM | ≤ 13 | ≤ 5 | ≤ 7 |  |
| CP-OFDM | QPSK | ≤ 10 | ≤ 5 | ≤ 7.5 |  |
|  | 16 QAM | ≤ 10 | ≤ 5 | ≤ 7.5 |  |
|  | 64 QAM | ≤ 11 | ≤ 5 | ≤ 8 |  |
|  | 256 QAM | ≤ 13 |  | ≤ 10 |  |
| NOTE 1: Void  NOTE 2: Void | | | | | |

Table 6.2.3.4-3: A-MPR for NS\_05

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Modulation/Waveform | | A4 (dB) | | A5 (dB) | | A6 (dB) | | A7 (dB) |
|  | | Outer | Inner | Outer |  | Outer | Inner | Outer/Inner |
| DFT-s-OFDM | Pi/2 BPSK | ≤ 1 | N/A | ≤ 1 |  | ≤ 1 | N/A | ≤ 6 |
|  | QPSK |  |  | ≤ 1.5 |  | ≤ 1.5 |  | ≤ 6 |
|  | 16 QAM |  |  |  |  |  |  | ≤ 6 |
|  | 64 QAM |  |  |  |  |  |  | ≤ 6 |
|  | 256 QAM |  |  |  |  |  |  | ≤ 6 |
| CP-OFDM | QPSK | ≤ 3.5 |  | ≤ 3.5 |  | ≤ 3.5 |  | ≤ 6 |
|  | 16 QAM | ≤ 3.5 |  | ≤ 3.5 |  | ≤ 3.5 |  | ≤ 6 |
|  | 64 QAM |  |  |  |  |  |  | ≤ 6 |
|  | 256 QAM |  |  |  |  |  |  | ≤ 6 |
| NOTE 1: Void  NOTE 2: Void | | | | | | | | |

<<< End of changed sections >>>

## << Start of change 4>>

### 6.2.4 Configured transmitted power

The UE is allowed to set its configured maximum output power PCMAX,f,c for carrier f of serving cell c in each slot. The configured maximum output power PCMAX,f,c is set within the following bounds:

PCMAX\_L,f,c ≤ PCMAX,f,c ≤ PCMAX\_H,f,c with

PCMAX\_L,f,c = MIN {PEMAX,c– ∆TC,c, (PPowerClass – ΔPPowerClass) – MAX(MAX(MPRc, A-MPRc)+ ΔTIB,c + ∆TC,c +∆TRxSRS, P-MPRc) }

PCMAX\_H,f,c = MIN {PEMAX,c, PPowerClass – ΔPPowerClass }

where

PEMAX,c is the value given by either the *p-Max* IE or the field *additionalPmax* of the *NR-NS-PmaxList IE*, whichever is applicable according to TS 38.331[7];

PPowerClass is the maximum UE power specified in Table 6.2.1-1 without taking into account the tolerance specified in the Table 6.2.1-1;

When the IE *powerBoostPi2BPSK* is set to 1, PEMAX,c is increased by +3 dB for a power class 3 capable UE operating in TDD bands n40, n41, n77, n78, and n79 with PI/2 BPSK modulation and UE indicates support for UE capability *powerBoosting-pi2BPSK* and 40% or less symbols in certain evaluation period are used for UL transmission when PEMAX,c ≥ 20 dBm (The exact evaluation period is no less than one radio frame).

When the IE *powerBoostPi2BPSK* is set to 1, ΔPPowerClass = -3 dB for a power class 3 capable UE operating in TDD bands n40, n41, n77, n78, and n79 with Pi/2 BPSK modulation and UE indicates support for UE capability *powerBoosting-pi2BPSK* and 40% or less slots in radio frame are used for UL transmission.

ΔPPowerClass = 3 dB for a power class 2 capable UE when P-max of 23 dBm or lower is indicated; or when the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is absent and the percentage of uplink symbols transmitted in a certain evalutation period is larger than 50%; or when the field of UE capability *maxUplinkDutyCycle-PC2-FR1* is not absent and the percentage of uplink symbols transmitted in a certain evaluation period is larger than *maxUplinkDutyCycle-PC2-FR1* as defined in TS 38.331 (The exact evaluation period is no less than one radio frame); otherwise ΔPPowerClass = 0 dB;

∆TIB,c is the additional tolerance for serving cell c as specified in clause 6.2A.4.2 for NR CA, clause 6.2C.2 for SUL, or TS 38.101-3 clause 6.2B.4.2 for EN-DC; ∆TIB,c = 0 dB otherwise; In case the UE supports more than one of band combinations for CA, SUL or DC, and an operating band belongs to more than one band combinations then

a) When the operating band frequency range is ≤ 1 GHz, the applicable additional ∆TIB,c shall be the average value for all band combinations defined in clause 6.2A.4.2, 6.2C.2 in this specification and 6.2B.4.2 in TS 38.101-3 [3], truncated to one decimal place that apply for that operating band among the supported band combinations. In case there is a harmonic relation between low band UL and high band DL, then the maximum ∆TIB,c among the different supported band combinations involving such band shall be applied

b) When the operating band frequency range is > 1 GHz, the applicable additional ∆TIB,c shall be the maximum value for all band combinations defined in clause 6.2A.4.2, 6.2C.2 in this specification and 6.2B.4.2 in TS 38.101-3 [3] for the applicable operating bands.

∆TC,c = 1.5dB when NOTE 3 in Table 6.2.1-1 in 38.101-1 applies for a serving cell c, otherwise ∆TC,c = 0 dB ;

MPRc and A-MPRc for serving cell c are specified in clause 6.2.2 and clause 6.2.3, respectively;

∆TRxSRS is applied during SRS transmission occasions with *usage* in *SRS-ResourceSet* set as ‘antennaSwitching’ when

a) UE transmits SRS on the second SRS resource in every configured SRS resource set when the *SRS-TxSwitch* capability is indicated as 't1r2'

b) UE transmits SRS on the second, third and fourth SRS resources of the total 4 SRS resources from all configured SRS resource set(s) consisting of one SRS port when the *SRS-TxSwitch* capability is indicated as 't1r4' or, 't1r4-t2r4' but in ‘t1r4’ mode.

c) UE transmits SRS from the second SRS port pair on the second SRS resource in every configured SRS resource set consisting of two SRS ports when the *SRS-TxSwitch* capabilityis indicated as 't2r4' or 't1r4-t2r4' but in ‘t2r4’ mode, or

d) UE transmits SRS to a DL-only carrier.

The value of ∆TRxSRS is 4.5dB for n79 and 3 dB for bands whose FUL\_high is lower than the FUL\_low of n79 when the device is capable of power class 3 in the band, or when the device is capable of power class 2 in the band and ΔPPowerClass = 3 dB. The value of ∆TRxSRS is 7.5dB for n79 and 6 dB for bands whose FUL\_high is lower than the FUL\_low of n79 when the device is capable of power class 2 in the band and ΔPPowerClass = 0 dB.

For other SRS transmissions ∆TRxSRS is zero;

P-MPRc is the power management maximum power reduction for

a) ensuring compliance with applicable electromagnetic energy absorption requirements and addressing unwanted emissions / self desense requirements in case of simultaneous transmissions on multiple RAT(s) for scenarios not in scope of 3GPP RAN specifications;

b) ensuring compliance with applicable electromagnetic energy absorption requirements in case of proximity detection is used to address such requirements that require a lower maximum output power.

The UE shall apply P-MPRc for serving cell c only for the above cases. For UE conducted conformance testing P-MPRc shall be 0 dB

NOTE 1: P-MPRc was introduced in the PCMAX,f,c equation such that the UE can report to the gNB the available maximum output transmit power. This information can be used by the gNB for scheduling decisions.

NOTE 2: P-MPRc may impact the maximum uplink performance for the selected UL transmission path.

<<< End of changed sections >>>

## << Start of change 5>>

#### 6.5.3.1 General spurious emissions

Unless otherwise stated, the spurious emission limits apply for the frequency ranges that are more than FOOB (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth. The spurious emission limits in Table 6.5.3.1-2 apply for all transmitter band configurations (NRB) and channel bandwidths.

Table 6.5.3.1-1: Boundary between NR out of band and general spurious emission domain

|  |  |
| --- | --- |
| Channel bandwidth | OOB boundary FOOB (MHz) |
| BWChannel | BWChannel + 5 |

Table 6.5.3.1-2: Requirement for general spurious emissions limits

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency Range | Maximum Level | Measurement bandwidth | NOTE |
| 9 kHz ≤ f < 150 kHz | -36 dBm | 1 kHz |  |
| 150 kHz ≤ f < 30 MHz | -36 dBm | 10 kHz |  |
| 30 MHz ≤ f < 1000 MHz | -36 dBm | 100 kHz |  |
| 1 GHz ≤ f < 12.75 GHz | -30 dBm | 1 MHz | 4 |
| -25 dBm | 1 MHz | 3 |
| 12.75 GHz ≤ f < 5th harmonic of the upper frequency edge of the UL operating band in GHz | -30 dBm | 1 MHz | 1 |
| 12.75 GHz < f < 26 GHz | -30 dBm | 1 MHz | 2 |
| NOTE 1: Applies for Band for which the upper frequency edge of the UL Band is greater than 2.55 GHz and less than or equal to 5.2 GHz  NOTE 2: Applies for Band that the upper frequency edge of the UL Band more than 5.2 GHz  NOTE 3: Applies for Band n41, CA configurations including Band n41, and EN-DC configurations that include n41 specified in clause 5.2B of TS 38.101-3 [3] when NS\_04 is signalled.  NOTE 4: Does not apply for Band n41, CA configurations including Band n41, and EN-DC configurations that include n41 specified in subclause 5.2B of TS 38.101-3 [3] when NS\_04 is signalled. | | | |

<<< End of changed sections >>>

## << Start of change 6>>

#### 6.5.3.2 Spurious emissions for UE co-existence

This clause specifies the requirements for NR bands for coexistence with protected bands.

Table 6.5.3.2-1: Requirements for spurious emissions for UE co-existence

| NR Band | Spurious emission for UE co-existence | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Protected band | Frequency range (MHz) | | | Maximum Level (dBm) | MBW (MHz) | NOTE |
| n1, n84 | E-UTRA Band 1, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 38, 40, 41, 42, 43, 44, 45, 50, 51, 52, 65, 67, 68, 69, 72, 73, 74, 75, 76,  NR Band n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 3, 34 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| Frequency range | 1880 | - | 1895 | -40 | 1 | 15, 27 |
| Frequency range | 1895 | - | 1915 | -15.5 | 5 | 15, 26, 27 |
| Frequency range | 1915 | - | 1920 | +1.6 | 5 | 15, 26, 27 |
| n2 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 42, 48, 50, 51, 53, 66, 70, 71, 74, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 2, 25 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| E-UTRA Band 43 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| n3, n80 | E-UTRA Band 1, 5, 7, 8, 20, 26, 27, 28, 31, 32, 33, 34, 38, 39, 40, 41, 43, 44, 45, 50, 51, 65, 67, 68, 69, 72, 73,74, 75, 76.  NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 3 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| E-UTRA Band 11, 18, 19, 21 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 22, 42, 52,  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| n5 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 17, 18, 19, 24, 25, 26, 28, 29, 30, 31, 34, 38, 40, 42, 43, 45, 48, 50, 51, 65, 66, 70, 71, 73, 74, 85  NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 41, 52, 53  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 11, 21 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| n7 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 17, 20, 22, 26, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 50, 51, 52, 65, 66, 67, 68, 72, 74, 75, 76, 85,  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 2570 | - | 2575 | +1.6 | 5 | 15, 21, 26 |
| Frequency range | 2575 | - | 2595 | -15.5 | 5 | 15, 21, 26 |
| Frequency range | 2595 | - | 2620 | -40 | 1 | 15, 21 |
| n8, n81 | E-UTRA Band 1, 20, 28, 31, 32, 33, 34, 38, 39, 40, 45, 50, 51, 65, 67, 68, 69, 72, 73, 74, 75, 76 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA band 3, 7, 22, 41, 42, 43, 52,  NR Band n77, n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA 8 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| E-UTRA Band 11, 21 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| n12 | E-UTRA Band 2, 5, 13, 14, 17, 24, 25, 26, 27, 30, 41, 50, 53, 70, 71, 74 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 4, 48, 51, 66 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 12, 85 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| n20, n82 | E-UTRA Band 1, 3, 7, 8, 22, 31, 32, 33, 34, 40, 43, 50, 51, 65, 67, 68, 72, 74, 75, 76 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 20 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| E-UTRA Band 38, 42, 52, 69,  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 758 | - | 788 | -50 | 1 |  |
| n25 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 27, 28, 29, 30, 41, 42, 48, 53, 66, 70, 71, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 2 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| E-UTRA Band 25 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| E-UTRA Band 43 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| n28, n83 | E-UTRA Band 1, 4, 22, 32, 42, 43, 50, 51, 65, 66, 74, 75, 76,  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 1 | FDL\_low | - | FDL\_high | -50 | 1 | 19, 25 |
| E-UTRA Band 2, 3, 5, 7, 8, 18, 19, 20, 25, 26, 27, 31, 34, 38, 40, 41, 52, 72, 73  NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 11, 21 | FDL\_low | - | FDL\_high | -50 | 1 | 19, 24 |
| Frequency range | 470 | - | 694 | -42 | 8 | 15, 35 |
| Frequency range | 470 | - | 710 | -26.2 | 6 | 34 |
| Frequency range | 662 | - | 694 | -26.2 | 6 | 15 |
| Frequency range | 758 | - | 773 | -32 | 1 | 15 |
| Frequency range | 773 | - | 803 | -50 | 1 |  |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8, 19 |
| n34 | E-UTRA Band 1, 3, 7, 8, 11, 18, 19, 20, 21, 22, 26, 28, 31, 32, 33, 38,39, 40, 41, 42, 43, 44, 45, 50, 51, 52, 65, 67, 69, 72, 74, 75, 76,  NR Band n78, n79 | FDL\_low | - | FDL\_high | -50 | 1 | 5 |
| NR Band n77 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| n38 | E-UTRA Band 1, 2, 3, 4, 5, 8, 12, 13, 14, 17, 20, 22, 27, 28, 29, 30, 31, 32, 33, 34, 40, 42, 43, 50, 51, 52, 65, 66, 67, 68, 72, 74, 75, 76, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 2620 | - | 2645 | -15.5 | 5 | 15, 22, 26 |
| Frequency range | 2645 | - | 2690 | -40 | 1 | 15, 22 |
| n39 | E-UTRA Band 1, 8, 22, 26, 34, 40, 41, 42, 44, 45, 50, 51, 52, 74,  NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1805 | - | 1855 | -40 | 1 | 33 |
| Frequency range | 1855 | - | 1880 | -15.5 | 5 | 15, 26, 33 |
| n40 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 22, 26, 27, 28, 31, 32, 33, 34, 38, 39, 42, 43, 44, 45, 50, 51, 52, 65, 67, 68, 69, 72, 74, 75, 76,  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
|  | Frequency range | 1884.5 |  | 1915.7 | -41 | 0.3 | 8 |
| n41 | E-UTRA Band 1, 2, 3, 4, 5, 8, 12, 13, 14, 17, 24, 25, 26, 27, 28, 29, 30, 34, 39, 42, 44, 45, 48, 50, 51, 52, 65, 66, 70, 71, 73, 74, 85,  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 11, 18, 19, 21 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 1884.5 |  | 1915.7 | -41 | 0.3 | 8 |
| n50 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 20, 26, 28, 29, 31, 34, 38, 39, 40, 41, 42, 43, 48, 52, 65, 66, 67, 68, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| n51 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 20, 26, 28, 29, 31, 34, 38, 39, 40, 41, 42, 43, 48, 65, 66, 67, 68 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| n66, n86 | E-UTRA Band 2, 4, 5, 7, 12, 13, 14, 17, 25, 26, 27, 28, 29, 30, 38, 41, 43, 50, 51, 53, 66, 70, 71, 74, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 42, 48 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| n70 | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 48, 66, 70, 71, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| n71 | E-UTRA Band 4, 5, 12, 13, 14, 17, 24, 26, 30, 48, 53, 66, 85 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| E-UTRA Band 2, 25, 41, 70 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| E-UTRA Band 29 | FDL\_low | - | FDL\_high | -38 | 1 | 15 |
| E-UTRA Band 71 | FDL\_low | - | FDL\_high | -50 | 1 | 15 |
| n74 | E-UTRA Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 18, 19, 20, 26, 28, 29, 31, 34, 38, 39, 40, 41, 42, 43, 48, 52, 65, 66, 67, 68, 85  NR Band n77, n78 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| NR Band n79 | FDL\_low | - | FDL\_high | -50 | 1 | 2 |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| Frequency range | 1400 | - | 1427 | -32 | 27 | 15, 41 |
| Frequency range | 1475 | - | 1488 | -50 | 1 | 42 |
| Frequency range | 1475 | - | 1488 | -28 | 1 | 15, 42 |
|  | Frequency range | 1475 | - | 1488 | -50 | 1 | 15, 45 |
|  | Frequency range | 1475.9 | - | 1510.9 | -35 | 1 | 15, 46 |
| n77 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 34, 39, 40, 41, 65, 74 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| n78 | E-UTRA Band 1, 3, 5, 7, 8, 11, 18, 19, 20, 21, 26, 28, 32, 34, 39, 40, 41, 65, 74, 75, 76 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| n79 | E-UTRA Band 1, 3, 5, 8, 11, 18, 19, 21, 28, 34, 39, 40, 41, 42, 65, 74 | FDL\_low | - | FDL\_high | -50 | 1 |  |
| Frequency range | 1884.5 | - | 1915.7 | -41 | 0.3 | 8 |
| NOTE 1: FDL\_low and FDL\_high refer to each frequency band specified in Table 5.2-1 in TS 38.101-1 or Table 5.5-1 in TS 36.101  NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.5.3.1-2 are permitted for each assigned NR carrier used in the measurement due to 2nd, 3rd, 4th or 5th harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2 MHz + N x LCRB x RBsize kHz), where N is 2, 3, 4, 5 for the 2nd, 3rd, 4th or 5th harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.  NOTE 3: 15 kHz SCS is assumed when RB is mentioned in the note when channel bandwidth is less than or equal to 50MHz, lowest SCS is assumed when channel bandwidth is larger than 50 MHz. The transmission bandwidth in terms of RB position and range is not limited to 15 kHz SCS and shall scale with SCS accordingly.  NOTE 4: Void  NOTE 5: For non-synchronised TDD operation to meet these requirements some restriction will be needed for either the operating band or protected band  NOTE 6: N/A  NOTE 7: Void  NOTE 8: Applicable when co-existence with PHS system operating in 1884.5 - 1915.7 MHz.  NOTE 9: Void  NOTE 10: Void  NOTE 11: Void  NOTE 12: Void  NOTE 13: Void  NOTE 14: Void  NOTE 15: These requirements also apply for the frequency ranges that are less than FOOB (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.  NOTE 16: Void  NOTE 17: Void  NOTE 18: Void  NOTE 19: Applicable when the assigned NR carrier is confined within 718 MHz and 748 MHz and when the channel bandwidth used is 5 or 10 MHz.  NOTE 20: Void  NOTE 21: This requirement is applicable for any channel bandwidths within the range 2500 - 2570 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2560.5 - 2562.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2552 - 2560 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.  NOTE 22: This requirement is applicable for power class 3 UE for any channel bandwidths within the range 2570 - 2615 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2605.5 - 2607.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2597 - 2605 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB. For power class 2 UE for any channel bandwidths within the range 2570 - 2615 MHz, NS\_44 shall apply. For power class 2 or 3 UE for carriers with channel bandwidth overlapping the frequency range 2615 - 2620 MHz the requirement applies with the maximum output power configured to +19 dBm in the IE P-Max.  NOTE 23: Void  NOTE 24: As exceptions, measurements with a level up to the applicable requirement of -38 dBm/MHz is permitted for each assigned NR carrier used in the measurement due to 2nd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.3.1-1) for which the 2nd harmonic totally or partially overlaps the measurement bandwidth (MBW).  NOTE 25: As exceptions, measurements with a level up to the applicable requirement of -36 dBm/MHz is permitted for each assigned NR carrier used in the measurement due to 3rd harmonic spurious emissions. An exception is allowed if there is at least one individual RB within the transmission bandwidth (see Figure 5.3.1-1) for which the 3rd harmonic totally or partially overlaps the measurement bandwidth (MBW).  NOTE 26: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.  NOTE 27: This requirement is applicable for any channel bandwidths within the range 1920 - 1980 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 1927.5 - 1929.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 1930 - 1938 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB.  NOTE 28: Void  NOTE 29: Void  NOTE 30: Void  NOTE 31: Void  NOTE 32: Void  NOTE 33: This requirement is only applicable for carriers with bandwidth up to 20MHz and confined within 1885-1920 MHz (requirement for carriers with at least 1RB confined within 1880 - 1885 MHz is not specified). This requirement applies for an uplink transmission bandwidth less than or equal to 54 RB for carriers of 15 MHz bandwidth when carrier center frequency is within the range 1892.5 - 1894.5 MHz and for carriers of 20 MHz bandwidth when carrier center frequency is within the range 1895 - 1903 MHz.  NOTE 34: This requirement is applicable for 5 and 10 MHz NR channel bandwidth allocated within 718-728 MHz. For carriers of 10 MHz bandwidth, this requirement applies for an uplink transmission bandwidth less than or equal to 30 RB with RBstart > 1 and RBstart < 48.  NOTE 35: This requirement is applicable in the case of a 10 MHz NR carrier confined within 703 MHz and 733 MHz, otherwise the requirement of -25 dBm with a measurement bandwidth of 8 MHz applies.  NOTE 36: Void  NOTE 37: Void  NOTE 38: Void  NOTE 39: Void  NOTE 40: Void  NOTE 41: Applicable for cases and when the lower edge of the assigned NR UL channel bandwidth frequency is greater than or equal to 1427 MHz + the channel BW assigned for 5 and 10 MHz bandwidth, and when the lower edge of the assigned NR UL channel bandwidth frequency is greater than or equal to 1440 MHz for 15 and 20 MHz bandwidth. This requirement shall be verified with UE transmission power of 15 dBm.  NOTE 42: Applicable when upper edge of the assigned NR UL channel bandwidth frequency is more than 1460 MHz and less than or equal to 1470 MHz for 5 MHz bandwidth, and when the upper edge of the assigned NR UL channel bandwidth frequency is more than 1460 MHz and less than or equal to 1465 MHz for 10 MHz bandwidth.  NOTE 43: Void  NOTE 44: Void  NOTE 45: Applicable when upper edge of the assigned NR UL channel bandwidth frequency is equal to or less than 1460 MHz.  NOTE 46: Applicable for 5 MHz bandwidth and when the NR carrier is within 1447.9 – 1462.9 MHz. | | | | | | | |

NOTE: To simplify Table 6.5.3.2-1, E-UTRA band numbers are listed for bands which are specified only for E-UTRA operation or both E-UTRA and NR operation. NR band numbers are listed for bands which are specified only for NR operation.

<<< End of changed sections >>>

## << Start of change 7>>

##### 6.5.3.3.6 Requirement for network signalling value "NS\_37"

When "NS\_37" is indicated in the cell, the power of any UE emission shall not exceed the levels specified in Table 6.5.3.3.6-1. This requirement also applies for the frequency ranges that are less than FOOB (MHz) in Table 6.5.3.1-1 from the edge of the channel bandwidth.

Table 6.5.3.3.6-1: Additional requirement for "NS\_37"

|  |  |  |
| --- | --- | --- |
| Frequency band  (MHz) | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | Measurement bandwidth |
| 5, 10, 15 |
| 1475.9 ≤ f ≤ 1510.9 | -35 | 1 MHz |

<<< End of changed sections >>>

## << Start of change 8>>

#### 7.6A.3.1 Out-of-band blocking for Intra-band contiguous CA

For intra-band contiguous carrier aggreagation the downlink SCC(s) shall be configured at nominal channel spacing to the PCC. For FDD, the PCC shall be configured closest to the uplink band. All downlink carriers shall be active throughout the test.

The UE shall fulfil the minimum requirement in presence of an interfering signal specified in Tables 7.6A.3-1 and Tables 7.6A.3-2 being on either side of the aggregated signal. The throughput of each carrier shall be ≥ 95% of the maximum throughput of the reference measurement channels as specified in Annexes A.2.2, A.3.2, and A.3.3 (with one sided dynamic OCNG Pattern OP.1 FDD/TDD for the DL-signal as described in Annex A.5.1.1/A.5.2.1).

Table 7.6A.3-1: Out-of-band blocking parameters for intra-band contiguous CA

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| RX parameter | Units | CA bandwidth class | | |
| C |  |  |
| Power in transmission bandwidth configuration | dBm | REFSENS + CA bandwidth class specific value below | | |
| dB | 9 |  |  |
| NOTE 1: The transmitter shall be set to 4 dB below PCMAX\_L,f,c at the minimum UL configuration specified in Table 7.3.2-3 with PCMAX\_L,f,c defined in clause 6.2.4. | | | | |

Table 7.6A.3-2: Out of-band blocking for intra-band contiguous CA

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| NR band | Parameter | Unit | Range1 | Range 2 | Range 3 |
|  | Pinterferer | dBm | -45 | -30 | -15 |
| n41 | Finterferer (CW) | MHz | -60 < f – FDL\_low < -15  or  15 < f – FDL\_high < 60 | -85 < f – FDL\_low ≤ -60  or  60 ≤ f – FDL\_high < 85 | 1 ≤ f ≤ FDL\_low – 85  or  FDL\_high + 85 ≤ f  ≤ 12750 |
| n77, n78  (NOTE 3) | Finterferer (CW) | MHz | N/A | N/A | 1 ≤ f ≤ FDL\_low – MAX(200,3\*BWChannel\_CA)  or  FDL\_high+ MAX(200,3\*BWChannel\_CA)  ≤ f ≤ 12750 |
| n79  (NOTE 4) | Finterferer (CW) | MHz | N/A | N/A | 1 ≤ f ≤ FDL\_low – MAX(150,3\*BWChannel\_CA)  or  FDL\_high + MAX(150,3\*BWChannel\_CA)  ≤ f ≤ 12750 |
| NOTE 1: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm for FInterferer > 6000 MHz.  NOTE 2: BWChannel\_CA denotes the aggregated channel bandwidth of the wanted signal  NOTE 3: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm, for FInterferer > 2700 MHz and FInterferer < 4800 MHz. For BWChannel\_CA > 15 MHz, the requirement for Range 1 is not applicable and Range 2 applies from the frequency offset of 3\*BWChannel\_CA from the band edge. For BWChannel\_CA larger than 60 MHz, the requirement for Range 2 is not applicable and Range 3 applies from the frequency offset of 3\*BWChannel\_CA from the band edge.  NOTE 4: The power level of the interferer (PInterferer) for Range 3 shall be modified to -20 dBm, for FInterferer > 3650 MHz and FInterferer < 5750 MHz. For BWChannel\_CA ≥ 40 MHz, the requirement for Range 2 is not applicable and Range 3 applies from the frequency offset of 3\*BWChannel\_CA from the band edge | | | | | |

For interferer frequencies across ranges 1, 2 and 3 in Table 7.6A.3-2, a maximum of



exceptions are allowed for spurious response frequencies in each assigned frequency channel when measured using a step size of MHz with  the number of resource blocks in the downlink transmission bandwidth configuration, BWChannel is the bandwidth of the frequency channel in MHz and *n* = 1, 2, 3 for SCS = 15, 30, 60 kHz, respectively. For these exceptions, the requirements in subclause 7.7A.1 apply.

<<< End of changed sections >>>

## << Start of change 9>>

### A.2.2.1 DFT-s-OFDM Pi/2-BPSK

Table A.2.2.1-1: Reference Channels for DFT-s-OFDM Pi/2-BPSK

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Allocated resource blocks (LCRB) | DFT-s-OFDM Symbols per slot (Note 1) | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks per slot (Note 3) | Total number of bits per slot | Total modulated symbols per slot |
| Unit |  |  |  |  | Bits | Bits |  |  | Bits |  |
|  | 1 | 11 | pi/2 BPSK | 0 | 24 | 16 | 2 | 1 | 132 | 132 |
|  | 5 | 11 | pi/2 BPSK | 0 | 160 | 16 | 2 | 1 | 660 | 660 |
|  | 9 | 11 | pi/2 BPSK | 0 | 288 | 16 | 2 | 1 | 1188 | 1188 |
|  | 10 | 11 | pi/2 BPSK | 0 | 320 | 16 | 2 | 1 | 1320 | 1320 |
|  | 12 | 11 | pi/2 BPSK | 0 | 384 | 16 | 2 | 1 | 1584 | 1584 |
|  | 15 | 11 | pi/2 BPSK | 0 | 480 | 16 | 2 | 1 | 1980 | 1980 |
|  | 18 | 11 | pi/2 BPSK | 0 | 576 | 16 | 2 | 1 | 2376 | 2376 |
|  | 24 | 11 | pi/2 BPSK | 0 | 768 | 16 | 2 | 1 | 3168 | 3168 |
|  | 25 | 11 | pi/2 BPSK | 0 | 808 | 16 | 2 | 1 | 3300 | 3300 |
|  | 30 | 11 | pi/2 BPSK | 0 | 984 | 16 | 2 | 1 | 3960 | 3960 |
|  | 32 | 11 | pi/2 BPSK | 0 | 1032 | 16 | 2 | 1 | 4224 | 4224 |
|  | 36 | 11 | pi/2 BPSK | 0 | 1128 | 16 | 2 | 1 | 4752 | 4752 |
|  | 45 | 11 | pi/2 BPSK | 0 | 1416 | 16 | 2 | 1 | 5940 | 5940 |
|  | 50 | 11 | pi/2 BPSK | 0 | 1544 | 16 | 2 | 1 | 6600 | 6600 |
|  | 60 | 11 | pi/2 BPSK | 0 | 1864 | 16 | 2 | 1 | 7920 | 7920 |
|  | 64 | 11 | pi/2 BPSK | 0 | 2024 | 16 | 2 | 1 | 8448 | 8448 |
|  | 75 | 11 | pi/2 BPSK | 0 | 2408 | 16 | 2 | 1 | 9900 | 9900 |
|  | 80 | 11 | pi/2 BPSK | 0 | 2472 | 16 | 2 | 1 | 10560 | 10560 |
|  | 81 | 11 | pi/2 BPSK | 0 | 2536 | 16 | 2 | 1 | 10692 | 10692 |
|  | 90 | 11 | pi/2 BPSK | 0 | 2792 | 16 | 2 | 1 | 11880 | 11880 |
|  | 100 | 11 | pi/2 BPSK | 0 | 3104 | 16 | 2 | 1 | 13200 | 13200 |
|  | 108 | 11 | pi/2 BPSK | 0 | 3368 | 16 | 2 | 1 | 14256 | 14256 |
|  | 120 | 11 | pi/2 BPSK | 0 | 3752 | 16 | 2 | 1 | 15840 | 15840 |
|  | 128 | 11 | pi/2 BPSK | 0 | 3976 | 24 | 2 | 2 | 16896 | 16896 |
|  | 135 | 11 | pi/2 BPSK | 0 | 4104 | 24 | 2 | 2 | 17820 | 17820 |
|  | 160 | 11 | pi/2 BPSK | 0 | 4872 | 24 | 2 | 2 | 21120 | 21120 |
|  | 162 | 11 | pi/2 BPSK | 0 | 5000 | 24 | 2 | 2 | 21384 | 21384 |
|  | 180 | 11 | pi/2 BPSK | 0 | 5512 | 24 | 2 | 2 | 23760 | 23760 |
|  | 216 | 11 | pi/2 BPSK | 0 | 6664 | 24 | 2 | 2 | 28512 | 28512 |
|  | 243 | 11 | pi/2 BPSK | 0 | 7560 | 24 | 2 | 2 | 32076 | 32076 |
|  | 270 | 11 | pi/2 BPSK | 0 | 8448 | 24 | 2 | 3 | 35640 | 35640 |
| NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.  NOTE 2: MCS Index is based on MCS table 6.1.4.1-1 defined in TS 38.214 [10].  NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  NOTE 4: The RMCs apply to all channel bandwidth where LCRB ≤ NRB. | | | | | | | | | | |

Table A.2.2.1-2: Void

Table A.2.2.1-3: Void

### A.2.2.2 DFT-s-OFDM QPSK

Table A.2.2.2-1: Reference Channels for DFT-s-OFDM QPSK

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Allocated resource blocks (LCRB) | DFT-s-OFDM Symbols per slot (Note 1) | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks per slot (Note 3) | Total number of bits per slot | Total modulated symbols per slot |
| Unit |  |  |  |  | Bits | Bits |  |  | Bits |  |
|  | 1 | 11 | QPSK | 2 | 48 | 16 | 2 | 1 | 264 | 132 |
|  | 5 | 11 | QPSK | 2 | 256 | 16 | 2 | 1 | 1320 | 660 |
|  | 9 | 11 | QPSK | 2 | 456 | 16 | 2 | 1 | 2376 | 1188 |
|  | 10 | 11 | QPSK | 2 | 504 | 16 | 2 | 1 | 2640 | 1320 |
|  | 12 | 11 | QPSK | 2 | 608 | 16 | 2 | 1 | 3168 | 1584 |
|  | 15 | 11 | QPSK | 2 | 768 | 16 | 2 | 1 | 3960 | 1980 |
|  | 18 | 11 | QPSK | 2 | 928 | 16 | 2 | 1 | 4752 | 2376 |
|  | 20 | 11 | QPSK | 2 | 1032 | 16 | 2 | 1 | 5280 | 2640 |
|  | 24 | 11 | QPSK | 2 | 1192 | 16 | 2 | 1 | 6336 | 3168 |
|  | 25 | 11 | QPSK | 2 | 1256 | 16 | 2 | 1 | 6600 | 3300 |
|  | 30 | 11 | QPSK | 2 | 1544 | 16 | 2 | 1 | 7920 | 3960 |
|  | 32 | 11 | QPSK | 2 | 1608 | 16 | 2 | 1 | 8448 | 4224 |
|  | 36 | 11 | QPSK | 2 | 1800 | 16 | 2 | 1 | 9504 | 4752 |
|  | 45 | 11 | QPSK | 2 | 2208 | 16 | 2 | 1 | 11880 | 5940 |
|  | 50 | 11 | QPSK | 2 | 2472 | 16 | 2 | 1 | 13200 | 6600 |
|  | 60 | 11 | QPSK | 2 | 3104 | 16 | 2 | 1 | 15840 | 7920 |
|  | 64 | 11 | QPSK | 2 | 3240 | 16 | 2 | 1 | 16896 | 8448 |
|  | 75 | 11 | QPSK | 2 | 3752 | 16 | 2 | 1 | 19800 | 9900 |
|  | 80 | 11 | QPSK | 2 | 3976 | 24 | 2 | 2 | 21120 | 10560 |
|  | 81 | 11 | QPSK | 2 | 4040 | 24 | 2 | 2 | 21384 | 10692 |
|  | 90 | 11 | QPSK | 2 | 4488 | 24 | 2 | 2 | 23760 | 11880 |
|  | 100 | 11 | QPSK | 2 | 5000 | 24 | 2 | 2 | 26400 | 13200 |
|  | 108 | 11 | QPSK | 2 | 5384 | 24 | 2 | 2 | 28512 | 14256 |
|  | 120 | 11 | QPSK | 2 | 5896 | 24 | 2 | 2 | 31680 | 15840 |
|  | 128 | 11 | QPSK | 2 | 6408 | 24 | 2 | 2 | 33792 | 16896 |
|  | 135 | 11 | QPSK | 2 | 6664 | 24 | 2 | 2 | 35640 | 17820 |
|  | 160 | 11 | QPSK | 2 | 7944 | 24 | 2 | 3 | 42240 | 21120 |
|  | 162 | 11 | QPSK | 2 | 8064 | 24 | 2 | 3 | 42768 | 21384 |
|  | 180 | 11 | QPSK | 2 | 8976 | 24 | 2 | 3 | 47520 | 23760 |
|  | 216 | 11 | QPSK | 2 | 10752 | 24 | 2 | 3 | 57024 | 28512 |
|  | 243 | 11 | QPSK | 2 | 12040 | 24 | 2 | 4 | 64152 | 32076 |
|  | 270 | 11 | QPSK | 2 | 13320 | 24 | 2 | 4 | 71280 | 35640 |
| NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.  NOTE 2: MCS Index is based on MCS table 6.1.4.1-1 defined in TS 38.214 [10].  NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  NOTE 4: The RMCs apply to all channel bandwidth where LCRB ≤ NRB. | | | | | | | | | | |

Table A.2.2.2-2: Void

Table A.2.2.2-3: Void

### A.2.2.3 DFT-s-OFDM 16QAM

Table A.2.2.3-1: Reference Channels for DFT-s-OFDM 16QAM

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Allocated resource blocks (LCRB) | DFT-s-OFDM Symbols per slot (Note 1) | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks per slot (Note 3) | Total number of bits per slot | Total modulated symbols per slot |
| Unit |  |  |  |  | Bits | Bits |  |  | Bits |  |
|  | 1 | 11 | 16QAM | 10 | 176 | 16 | 2 | 1 | 528 | 132 |
|  | 5 | 11 | 16QAM | 10 | 888 | 16 | 2 | 1 | 2640 | 660 |
|  | 9 | 11 | 16QAM | 10 | 1608 | 16 | 2 | 1 | 4752 | 1188 |
|  | 10 | 11 | 16QAM | 10 | 1800 | 16 | 2 | 1 | 5280 | 1320 |
|  | 12 | 11 | 16QAM | 10 | 2088 | 16 | 2 | 1 | 6336 | 1584 |
|  | 15 | 11 | 16QAM | 10 | 2664 | 16 | 2 | 1 | 7920 | 1980 |
|  | 18 | 11 | 16QAM | 10 | 3240 | 16 | 2 | 1 | 9504 | 2376 |
|  | 24 | 11 | 16QAM | 10 | 4224 | 24 | 1 | 1 | 12672 | 3168 |
|  | 25 | 11 | 16QAM | 10 | 4352 | 24 | 1 | 1 | 13200 | 3300 |
|  | 30 | 11 | 16QAM | 10 | 5248 | 24 | 1 | 1 | 15840 | 3960 |
|  | 32 | 11 | 16QAM | 10 | 5632 | 24 | 1 | 1 | 16896 | 4224 |
|  | 36 | 11 | 16QAM | 10 | 6272 | 24 | 1 | 1 | 19008 | 4752 |
|  | 45 | 11 | 16QAM | 10 | 7808 | 24 | 1 | 1 | 23760 | 5940 |
|  | 50 | 11 | 16QAM | 10 | 8712 | 24 | 1 | 2 | 26400 | 6600 |
|  | 60 | 11 | 16QAM | 10 | 10504 | 24 | 1 | 2 | 31680 | 7920 |
|  | 64 | 11 | 16QAM | 10 | 11272 | 24 | 1 | 2 | 33792 | 8448 |
|  | 75 | 11 | 16QAM | 10 | 13064 | 24 | 1 | 2 | 39600 | 9900 |
|  | 80 | 11 | 16QAM | 10 | 14088 | 24 | 1 | 2 | 42240 | 10560 |
|  | 81 | 11 | 16QAM | 10 | 14088 | 24 | 1 | 2 | 42768 | 10692 |
|  | 90 | 11 | 16QAM | 10 | 15880 | 24 | 1 | 2 | 47520 | 11880 |
|  | 100 | 11 | 16QAM | 10 | 17424 | 24 | 1 | 3 | 52800 | 13200 |
|  | 108 | 11 | 16QAM | 10 | 18960 | 24 | 1 | 3 | 57024 | 14256 |
|  | 120 | 11 | 16QAM | 10 | 21000 | 24 | 1 | 3 | 63360 | 15840 |
|  | 128 | 11 | 16QAM | 10 | 22536 | 24 | 1 | 3 | 67584 | 16896 |
|  | 135 | 11 | 16QAM | 10 | 23568 | 24 | 1 | 3 | 71280 | 17820 |
|  | 160 | 11 | 16QAM | 10 | 28168 | 24 | 1 | 4 | 84480 | 21120 |
|  | 162 | 11 | 16QAM | 10 | 28168 | 24 | 1 | 4 | 85536 | 21384 |
|  | 180 | 11 | 16QAM | 10 | 31752 | 24 | 1 | 4 | 95040 | 23760 |
|  | 216 | 11 | 16QAM | 10 | 37896 | 24 | 1 | 5 | 114048 | 28512 |
|  | 243 | 11 | 16QAM | 10 | 43032 | 24 | 1 | 6 | 128304 | 32076 |
|  | 270 | 11 | 16QAM | 10 | 47112 | 24 | 1 | 6 | 142560 | 35640 |
| NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.  NOTE 2: MCS Index is based on MCS table 6.1.4.1-1 defined in TS 38.214 [10].  NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  NOTE 4: The RMCs apply to all channel bandwidth where LCRB ≤ NRB. | | | | | | | | | | |

Table A.2.2.3-2: Void

Table A.2.2.3-3: Void

### A.2.2.4 DFT-s-OFDM 64QAM

Table A.2.2.4-1: Reference Channels for DFT-s-OFDM 64QAM

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Allocated resource blocks (LCRB) | DFT-s-OFDM Symbols per slot (Note 1) | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks per slot (Note 3) | Total number of bits per slot | Total modulated symbols per slot |
| Unit |  |  |  |  | Bits | Bits |  |  | Bits |  |
|  | 1 | 11 | 64QAM | 18 | 408 | 16 | 2 | 1 | 792 | 132 |
|  | 5 | 11 | 64QAM | 18 | 2024 | 16 | 2 | 1 | 3960 | 660 |
|  | 9 | 11 | 64QAM | 18 | 3624 | 16 | 2 | 1 | 7128 | 1188 |
|  | 10 | 11 | 64QAM | 18 | 3968 | 24 | 1 | 1 | 7920 | 1320 |
|  | 12 | 11 | 64QAM | 18 | 4736 | 24 | 1 | 1 | 9504 | 1584 |
|  | 15 | 11 | 64QAM | 18 | 6016 | 24 | 1 | 1 | 11880 | 1980 |
|  | 18 | 11 | 64QAM | 18 | 7168 | 24 | 1 | 1 | 14256 | 2376 |
|  | 24 | 11 | 64QAM | 18 | 9480 | 24 | 1 | 2 | 19008 | 3168 |
|  | 25 | 11 | 64QAM | 18 | 9992 | 24 | 1 | 2 | 19800 | 3300 |
|  | 30 | 11 | 64QAM | 18 | 12040 | 24 | 1 | 2 | 23760 | 3960 |
|  | 32 | 11 | 64QAM | 18 | 12808 | 24 | 1 | 2 | 25344 | 4224 |
|  | 36 | 11 | 64QAM | 18 | 14344 | 24 | 1 | 2 | 28512 | 4752 |
|  | 45 | 11 | 64QAM | 18 | 17928 | 24 | 1 | 3 | 35640 | 5940 |
|  | 50 | 11 | 64QAM | 18 | 19968 | 24 | 1 | 3 | 39600 | 6600 |
|  | 60 | 11 | 64QAM | 18 | 24072 | 24 | 1 | 3 | 47520 | 7920 |
|  | 64 | 11 | 64QAM | 18 | 25608 | 24 | 1 | 4 | 50688 | 8448 |
|  | 75 | 11 | 64QAM | 18 | 30216 | 24 | 1 | 4 | 59400 | 9900 |
|  | 80 | 11 | 64QAM | 18 | 31752 | 24 | 1 | 4 | 63360 | 10560 |
|  | 81 | 11 | 64QAM | 18 | 32264 | 24 | 1 | 4 | 64152 | 10692 |
|  | 90 | 11 | 64QAM | 18 | 35856 | 24 | 1 | 5 | 71280 | 11880 |
|  | 100 | 11 | 64QAM | 18 | 39936 | 24 | 1 | 5 | 79200 | 13200 |
|  | 108 | 11 | 64QAM | 18 | 43032 | 24 | 1 | 6 | 85536 | 14256 |
|  | 120 | 11 | 64QAM | 18 | 48168 | 24 | 1 | 6 | 95040 | 15840 |
|  | 128 | 11 | 64QAM | 18 | 51216 | 24 | 1 | 7 | 101376 | 16896 |
|  | 135 | 11 | 64QAM | 18 | 54296 | 24 | 1 | 7 | 106920 | 17820 |
|  | 160 | 11 | 64QAM | 18 | 63528 | 24 | 1 | 8 | 126720 | 21120 |
|  | 162 | 11 | 64QAM | 18 | 64552 | 24 | 1 | 8 | 128304 | 21384 |
|  | 180 | 11 | 64QAM | 18 | 71688 | 24 | 1 | 9 | 142560 | 23760 |
|  | 216 | 11 | 64QAM | 18 | 86040 | 24 | 1 | 11 | 171072 | 28512 |
|  | 243 | 11 | 64QAM | 18 | 96264 | 24 | 1 | 12 | 192456 | 32076 |
|  | 270 | 11 | 64QAM | 18 | 108552 | 24 | 1 | 13 | 213840 | 35640 |
| NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.  NOTE 2: MCS Index is based on MCS table 6.1.4.1-1 defined in TS 38.214 [10].  NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  NOTE 4: The RMCs apply to all channel bandwidth where LCRB ≤ NRB. | | | | | | | | | | |

Table A.2.2.4-2: Void

Table A.2.2.4-3: Void

### A.2.2.5 DFT-s-OFDM 256QAM

Table A.2.2.5-1: Reference Channels for DFT-s-OFDM 256QAM

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Allocated resource blocks (LCRB) | DFT-s-OFDM Symbols per slot (Note 1) | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks per slot (Note 3) | Total number of bits per slot | Total modulated symbols per slot |
| Unit |  |  |  |  | Bits | Bits |  |  | Bits |  |
|  | 1 | 11 | 256QAM | 20 | 704 | 16 | 2 | 1 | 1056 | 132 |
|  | 5 | 11 | 256QAM | 20 | 3496 | 16 | 2 | 1 | 5280 | 660 |
|  | 9 | 11 | 256QAM | 20 | 6272 | 24 | 1 | 1 | 9504 | 1188 |
|  | 10 | 11 | 256QAM | 20 | 7040 | 24 | 1 | 1 | 10560 | 1320 |
|  | 12 | 11 | 256QAM | 20 | 8456 | 24 | 1 | 2 | 12672 | 1584 |
|  | 15 | 11 | 256QAM | 20 | 10504 | 24 | 1 | 2 | 15840 | 1980 |
|  | 18 | 11 | 256QAM | 20 | 12552 | 24 | 1 | 2 | 19008 | 2376 |
|  | 24 | 11 | 256QAM | 20 | 16896 | 24 | 1 | 3 | 25344 | 3168 |
|  | 25 | 11 | 256QAM | 20 | 17424 | 24 | 1 | 3 | 26400 | 3300 |
|  | 30 | 11 | 256QAM | 20 | 21000 | 24 | 1 | 3 | 31680 | 3960 |
|  | 32 | 11 | 256QAM | 20 | 22536 | 24 | 1 | 3 | 33792 | 4224 |
|  | 36 | 11 | 256QAM | 20 | 25104 | 24 | 1 | 3 | 38016 | 4752 |
|  | 45 | 11 | 256QAM | 20 | 31752 | 24 | 1 | 4 | 47520 | 5940 |
|  | 50 | 11 | 256QAM | 20 | 34816 | 24 | 1 | 5 | 52800 | 6600 |
|  | 60 | 11 | 256QAM | 20 | 42016 | 24 | 1 | 5 | 63360 | 7920 |
|  | 64 | 11 | 256QAM | 20 | 45096 | 24 | 1 | 6 | 67584 | 8448 |
|  | 75 | 11 | 256QAM | 20 | 53288 | 24 | 1 | 7 | 79200 | 9900 |
|  | 80 | 11 | 256QAM | 20 | 56368 | 24 | 1 | 7 | 84480 | 10560 |
|  | 81 | 11 | 256QAM | 20 | 57376 | 24 | 1 | 7 | 85536 | 10692 |
|  | 90 | 11 | 256QAM | 20 | 63528 | 24 | 1 | 8 | 95040 | 11880 |
|  | 100 | 11 | 256QAM | 20 | 69672 | 24 | 1 | 9 | 105600 | 13200 |
|  | 108 | 11 | 256QAM | 20 | 75792 | 24 | 1 | 9 | 114048 | 14256 |
|  | 120 | 11 | 256QAM | 20 | 83976 | 24 | 1 | 10 | 126720 | 15840 |
|  | 128 | 11 | 256QAM | 20 | 90176 | 24 | 1 | 11 | 135168 | 16896 |
|  | 135 | 11 | 256QAM | 20 | 94248 | 24 | 1 | 12 | 142560 | 17820 |
|  | 160 | 11 | 256QAM | 20 | 112648 | 24 | 1 | 14 | 168960 | 21120 |
|  | 162 | 11 | 256QAM | 20 | 114776 | 24 | 1 | 14 | 171072 | 21384 |
|  | 180 | 11 | 256QAM | 20 | 127080 | 24 | 1 | 16 | 190080 | 23760 |
|  | 216 | 11 | 256QAM | 20 | 151608 | 24 | 1 | 18 | 228096 | 28512 |
|  | 243 | 11 | 256QAM | 20 | 172176 | 24 | 1 | 21 | 256608 | 32076 |
|  | 270 | 11 | 256QAM | 20 | 188576 | 24 | 1 | 23 | 285120 | 35640 |
| NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.  NOTE 2: MCS Index is based on MCS table 5.1.3.1-2 defined in TS 38.214 [10].  NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  NOTE 4: The RMCs apply to all channel bandwidth where LCRB ≤ NRB. | | | | | | | | | | |

Table A.2.2.5-2: Void

Table A.2.2.5-3: Void

### A.2.2.6 CP-OFDM QPSK

Table A.2.2.6-1: Reference Channels for CP-OFDM QPSK

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Allocated resource blocks (LCRB) | DFT-s-OFDM Symbols per slot (Note 1) | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks per slot (Note 3) | Total number of bits per slot | Total modulated symbols per slot |
| Unit |  |  |  |  | Bits | Bits |  |  | Bits |  |
|  | 1 | 11 | QPSK | 2 | 48 | 16 | 2 | 1 | 264 | 132 |
|  | 5 | 11 | QPSK | 2 | 256 | 16 | 2 | 1 | 1320 | 660 |
|  | 6 | 11 | QPSK | 2 | 304 | 16 | 2 | 1 | 1584 | 792 |
|  | 9 | 11 | QPSK | 2 | 456 | 16 | 2 | 1 | 2376 | 1188 |
|  | 10 | 11 | QPSK | 2 | 504 | 16 | 2 | 1 | 2640 | 1320 |
|  | 11 | 11 | QPSK | 2 | 552 | 16 | 2 | 1 | 2904 | 1452 |
|  | 12 | 11 | QPSK | 2 | 608 | 16 | 2 | 1 | 3168 | 1584 |
|  | 13 | 11 | QPSK | 2 | 672 | 16 | 2 | 1 | 3432 | 1716 |
|  | 15 | 11 | QPSK | 2 | 768 | 16 | 2 | 1 | 3960 | 1980 |
|  | 16 | 11 | QPSK | 2 | 808 | 16 | 2 | 1 | 4224 | 2112 |
|  | 18 | 11 | QPSK | 2 | 928 | 16 | 2 | 1 | 4752 | 2376 |
|  | 19 | 11 | QPSK | 2 | 984 | 16 | 2 | 1 | 5016 | 2508 |
|  | 24 | 11 | QPSK | 2 | 1192 | 16 | 2 | 1 | 6336 | 3168 |
|  | 25 | 11 | QPSK | 2 | 1256 | 16 | 2 | 1 | 6600 | 3300 |
|  | 26 | 11 | QPSK | 2 | 1288 | 16 | 2 | 1 | 6864 | 3432 |
|  | 31 | 11 | QPSK | 2 | 1544 | 16 | 2 | 1 | 8184 | 4092 |
|  | 33 | 11 | QPSK | 2 | 1672 | 16 | 2 | 1 | 8712 | 4356 |
|  | 38 | 11 | QPSK | 2 | 1928 | 16 | 2 | 1 | 10032 | 5016 |
|  | 39 | 11 | QPSK | 2 | 2024 | 16 | 2 | 1 | 10296 | 5148 |
|  | 40 | 11 | QPSK | 2 | 2024 | 16 | 2 | 1 | 10560 | 5280 |
|  | 47 | 11 | QPSK | 2 | 2408 | 16 | 2 | 1 | 12408 | 6204 |
|  | 51 | 11 | QPSK | 2 | 2536 | 16 | 2 | 1 | 13464 | 6732 |
|  | 52 | 11 | QPSK | 2 | 2600 | 16 | 2 | 1 | 13728 | 6864 |
|  | 53 | 11 | QPSK | 2 | 2664 | 16 | 2 | 1 | 13992 | 6996 |
|  | 54 | 11 | QPSK | 2 | 2664 | 16 | 2 | 1 | 14256 | 7128 |
|  | 61 | 11 | QPSK | 2 | 3104 | 16 | 2 | 1 | 16104 | 8052 |
|  | 65 | 11 | QPSK | 2 | 3240 | 16 | 2 | 1 | 17160 | 8580 |
|  | 67 | 11 | QPSK | 2 | 3368 | 16 | 2 | 1 | 17688 | 8844 |
|  | 68 | 11 | QPSK | 2 | 3368 | 16 | 2 | 1 | 17952 | 8976 |
|  | 78 | 11 | QPSK | 2 | 3848 | 24 | 2 | 2 | 20592 | 10296 |
|  | 79 | 11 | QPSK | 2 | 3912 | 24 | 2 | 2 | 20856 | 10428 |
|  | 80 | 11 | QPSK | 2 | 3976 | 24 | 2 | 2 | 21120 | 10560 |
|  | 81 | 11 | QPSK | 2 | 4040 | 24 | 2 | 2 | 21384 | 10692 |
|  | 93 | 11 | QPSK | 2 | 4616 | 24 | 2 | 2 | 24552 | 12276 |
|  | 95 | 11 | QPSK | 2 | 4744 | 24 | 2 | 2 | 25080 | 12540 |
|  | 106 | 11 | QPSK | 2 | 5256 | 24 | 2 | 2 | 27984 | 13992 |
|  | 107 | 11 | QPSK | 2 | 5256 | 24 | 2 | 2 | 28248 | 14124 |
|  | 108 | 11 | QPSK | 2 | 5384 | 24 | 2 | 2 | 28512 | 14256 |
|  | 109 | 11 | QPSK | 2 | 5384 | 24 | 2 | 2 | 28776 | 14388 |
|  | 121 | 11 | QPSK | 2 | 6024 | 24 | 2 | 2 | 31944 | 15972 |
|  | 123 | 11 | QPSK | 2 | 6152 | 24 | 2 | 2 | 32472 | 16236 |
|  | 133 | 11 | QPSK | 2 | 6664 | 24 | 2 | 2 | 35112 | 17556 |
|  | 135 | 11 | QPSK | 2 | 6664 | 24 | 2 | 2 | 35640 | 17820 |
|  | 137 | 11 | QPSK | 2 | 6792 | 24 | 2 | 2 | 36168 | 18084 |
|  | 160 | 11 | QPSK | 2 | 7944 | 24 | 2 | 3 | 42240 | 21120 |
|  | 162 | 11 | QPSK | 2 | 8064 | 24 | 2 | 3 | 42768 | 21384 |
|  | 189 | 11 | QPSK | 2 | 9480 | 24 | 2 | 3 | 49896 | 24948 |
|  | 216 | 11 | QPSK | 2 | 10752 | 24 | 2 | 3 | 57024 | 28512 |
|  | 217 | 11 | QPSK | 2 | 10752 | 24 | 2 | 3 | 57288 | 28644 |
|  | 245 | 11 | QPSK | 2 | 12296 | 24 | 2 | 4 | 64680 | 32340 |
|  | 270 | 11 | QPSK | 2 | 13320 | 24 | 2 | 4 | 71280 | 35640 |
|  | 273 | 11 | QPSK | 2 | 13576 | 24 | 2 | 4 | 72072 | 36036 |
| NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.  NOTE 2: MCS Index is based on MCS table 5.1.3.1-1 defined in TS 38.214 [10].  NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  NOTE 4: The RMCs apply to all channel bandwidth where LCRB ≤ NRB. | | | | | | | | | | |

Table A.2.2.6-2: Void

Table A.2.2.6-3: Void

### A.2.2.7 CP-OFDM 16QAM

Table A.2.2.7-1: Reference Channels for CP-OFDM 16QAM

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Allocated resource blocks (LCRB) | DFT-s-OFDM Symbols per slot (Note 1) | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks per slot (Note 3) | Total number of bits per slot | Total modulated symbols per slot |
| Unit |  |  |  |  | Bits | Bits |  |  | Bits |  |
|  | 1 | 11 | 16QAM | 10 | 176 | 16 | 2 | 1 | 528 | 132 |
|  | 5 | 11 | 16QAM | 10 | 888 | 16 | 2 | 1 | 2640 | 660 |
|  | 6 | 11 | 16QAM | 10 | 1064 | 16 | 2 | 1 | 3168 | 792 |
|  | 9 | 11 | 16QAM | 10 | 1608 | 16 | 2 | 1 | 4752 | 1188 |
|  | 10 | 11 | 16QAM | 10 | 1800 | 16 | 2 | 1 | 5280 | 1320 |
|  | 11 | 11 | 16QAM | 10 | 1928 | 16 | 2 | 1 | 5808 | 1452 |
|  | 12 | 11 | 16QAM | 10 | 2088 | 16 | 2 | 1 | 6336 | 1584 |
|  | 13 | 11 | 16QAM | 10 | 2280 | 16 | 2 | 1 | 6864 | 1716 |
|  | 15 | 11 | 16QAM | 10 | 2664 | 16 | 2 | 1 | 7920 | 1980 |
|  | 16 | 11 | 16QAM | 10 | 2792 | 16 | 2 | 1 | 8448 | 2112 |
|  | 18 | 11 | 16QAM | 10 | 3240 | 16 | 2 | 1 | 9504 | 2376 |
|  | 19 | 11 | 16QAM | 10 | 3368 | 16 | 2 | 1 | 10032 | 2508 |
|  | 24 | 11 | 16QAM | 10 | 4224 | 24 | 1 | 1 | 12672 | 3168 |
|  | 25 | 11 | 16QAM | 10 | 4352 | 24 | 1 | 1 | 13200 | 3300 |
|  | 26 | 11 | 16QAM | 10 | 4480 | 24 | 1 | 1 | 13728 | 3432 |
|  | 31 | 11 | 16QAM | 10 | 5376 | 24 | 1 | 1 | 16368 | 4092 |
|  | 33 | 11 | 16QAM | 10 | 5760 | 24 | 1 | 1 | 17424 | 4356 |
|  | 38 | 11 | 16QAM | 10 | 6656 | 24 | 1 | 1 | 20064 | 5016 |
|  | 39 | 11 | 16QAM | 10 | 6784 | 24 | 1 | 1 | 20592 | 5148 |
|  | 40 | 11 | 16QAM | 10 | 7040 | 24 | 1 | 1 | 21120 | 5280 |
|  | 47 | 11 | 16QAM | 10 | 8192 | 24 | 1 | 1 | 24816 | 6204 |
|  | 51 | 11 | 16QAM | 10 | 8968 | 24 | 1 | 2 | 26928 | 6732 |
|  | 52 | 11 | 16QAM | 10 | 9224 | 24 | 1 | 2 | 27456 | 6864 |
|  | 53 | 11 | 16QAM | 10 | 9224 | 24 | 1 | 2 | 27984 | 6996 |
|  | 54 | 11 | 16QAM | 10 | 9480 | 24 | 1 | 2 | 28512 | 7128 |
|  | 61 | 11 | 16QAM | 10 | 10760 | 24 | 1 | 2 | 32208 | 8052 |
|  | 65 | 11 | 16QAM | 10 | 11272 | 24 | 1 | 2 | 34320 | 8580 |
|  | 67 | 11 | 16QAM | 10 | 11784 | 24 | 1 | 2 | 35376 | 8844 |
|  | 68 | 11 | 16QAM | 10 | 11784 | 24 | 1 | 2 | 35904 | 8976 |
|  | 78 | 11 | 16QAM | 10 | 13576 | 24 | 1 | 2 | 41184 | 10296 |
|  | 79 | 11 | 16QAM | 10 | 13832 | 24 | 1 | 2 | 41712 | 10428 |
|  | 80 | 11 | 16QAM | 10 | 14088 | 24 | 1 | 2 | 42240 | 10560 |
|  | 81 | 11 | 16QAM | 10 | 14088 | 24 | 1 | 2 | 42768 | 10692 |
|  | 93 | 11 | 16QAM | 10 | 16392 | 24 | 1 | 2 | 49104 | 12276 |
|  | 95 | 11 | 16QAM | 10 | 16392 | 24 | 1 | 2 | 50160 | 12540 |
|  | 106 | 11 | 16QAM | 10 | 18432 | 24 | 1 | 3 | 55968 | 13992 |
|  | 107 | 11 | 16QAM | 10 | 18960 | 24 | 1 | 3 | 56496 | 14124 |
|  | 108 | 11 | 16QAM | 10 | 18960 | 24 | 1 | 3 | 57024 | 14256 |
|  | 109 | 11 | 16QAM | 10 | 18960 | 24 | 1 | 3 | 57552 | 14388 |
|  | 121 | 11 | 16QAM | 10 | 21000 | 24 | 1 | 3 | 63888 | 15972 |
|  | 123 | 11 | 16QAM | 10 | 21504 | 24 | 1 | 3 | 64944 | 16236 |
|  | 133 | 11 | 16QAM | 10 | 23040 | 24 | 1 | 3 | 70224 | 17556 |
|  | 135 | 11 | 16QAM | 10 | 23568 | 24 | 1 | 3 | 71280 | 17820 |
|  | 137 | 11 | 16QAM | 10 | 24072 | 24 | 1 | 3 | 72336 | 18084 |
|  | 160 | 11 | 16QAM | 10 | 28168 | 24 | 1 | 4 | 84480 | 21120 |
|  | 162 | 11 | 16QAM | 10 | 28168 | 24 | 1 | 4 | 85536 | 21384 |
|  | 189 | 11 | 16QAM | 10 | 32776 | 24 | 1 | 4 | 99792 | 24948 |
|  | 216 | 11 | 16QAM | 10 | 37896 | 24 | 1 | 5 | 114048 | 28512 |
|  | 217 | 11 | 16QAM | 10 | 37896 | 24 | 1 | 5 | 114576 | 28644 |
|  | 245 | 11 | 16QAM | 10 | 43032 | 24 | 1 | 6 | 129360 | 32340 |
|  | 270 | 11 | 16QAM | 10 | 47112 | 24 | 1 | 6 | 142560 | 35640 |
|  | 273 | 11 | 16QAM | 10 | 48168 | 24 | 1 | 6 | 144144 | 36036 |
| NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.  NOTE 2: MCS Index is based on MCS table 5.1.3.1-1 defined in TS 38.214 [10].  NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  NOTE 4: The RMCs apply to all channel bandwidth where LCRB ≤ NRB. | | | | | | | | | | |

Table A.2.2.7-2: Void

Table A.2.2.7-3: Void

### A.2.2.8 CP-OFDM 64QAM

Table A.2.2.8-1: Reference Channels for CP-OFDM 64QAM

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Allocated resource blocks (LCRB) | DFT-s-OFDM Symbols per slot (Note 1) | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks per slot (Note 3) | Total number of bits per slot | Total modulated symbols per slot |
| Unit |  |  |  |  | Bits | Bits |  |  | Bits |  |
|  | 1 | 11 | 64QAM | 19 | 408 | 16 | 2 | 1 | 792 | 132 |
|  | 5 | 11 | 64QAM | 19 | 2024 | 16 | 2 | 1 | 3960 | 660 |
|  | 9 | 11 | 64QAM | 19 | 3624 | 16 | 2 | 1 | 7128 | 1188 |
|  | 10 | 11 | 64QAM | 19 | 3968 | 24 | 1 | 1 | 7920 | 1320 |
|  | 11 | 11 | 64QAM | 19 | 4352 | 24 | 1 | 1 | 8712 | 1452 |
|  | 12 | 11 | 64QAM | 19 | 4736 | 24 | 1 | 1 | 9504 | 1584 |
|  | 13 | 11 | 64QAM | 19 | 5120 | 24 | 1 | 1 | 10296 | 1716 |
|  | 15 | 11 | 64QAM | 19 | 6016 | 24 | 1 | 1 | 11880 | 1980 |
|  | 18 | 11 | 64QAM | 19 | 7168 | 24 | 1 | 1 | 14256 | 2376 |
|  | 19 | 11 | 64QAM | 19 | 7552 | 24 | 1 |  | 15048 | 2508 |
|  | 24 | 11 | 64QAM | 19 | 9480 | 24 | 1 | 2 | 19008 | 3168 |
|  | 25 | 11 | 64QAM | 19 | 9992 | 24 | 1 | 2 | 19800 | 3300 |
|  | 26 | 11 | 64QAM | 19 | 10504 | 24 | 1 | 2 | 20592 | 3432 |
|  | 31 | 11 | 64QAM | 19 | 12296 | 24 | 1 | 2 | 24552 | 4092 |
|  | 33 | 11 | 64QAM | 19 | 13064 | 24 | 1 | 2 | 26136 | 4356 |
|  | 38 | 11 | 64QAM | 19 | 15112 | 24 | 1 | 2 | 30096 | 5016 |
|  | 39 | 11 | 64QAM | 19 | 15624 | 24 | 1 | 2 | 30888 | 5148 |
|  | 47 | 11 | 64QAM | 19 | 18960 | 24 | 1 | 3 | 37224 | 6204 |
|  | 51 | 11 | 64QAM | 19 | 20496 | 24 | 1 | 3 | 40392 | 6732 |
|  | 52 | 11 | 64QAM | 19 | 21000 | 24 | 1 | 3 | 41184 | 6864 |
|  | 53 | 11 | 64QAM | 19 | 21000 | 24 | 1 | 3 | 41976 | 6996 |
|  | 61 | 11 | 64QAM | 19 | 24567 | 24 | 1 | 3 | 48312 | 8052 |
|  | 65 | 11 | 64QAM | 19 | 26120 | 24 | 1 | 4 | 51480 | 8580 |
|  | 67 | 11 | 64QAM | 19 | 26632 | 24 | 1 | 4 | 53064 | 8844 |
|  | 78 | 11 | 64QAM | 19 | 31240 | 24 | 1 | 4 | 61776 | 10296 |
|  | 79 | 11 | 64QAM | 19 | 31752 | 24 | 1 | 4 | 62568 | 10428 |
|  | 80 | 11 | 64QAM | 19 | 31752 | 24 | 1 | 4 | 63360 | 10560 |
|  | 81 | 11 | 64QAM | 19 | 32264 | 24 | 1 | 4 | 64152 | 10692 |
|  | 93 | 11 | 64QAM | 19 | 36896 | 24 | 1 | 5 | 73656 | 12276 |
|  | 95 | 11 | 64QAM | 19 | 37896 | 24 | 1 | 5 | 75240 | 12540 |
|  | 106 | 11 | 64QAM | 19 | 42016 | 24 | 1 | 5 | 83952 | 13992 |
|  | 107 | 11 | 64QAM | 19 | 43032 | 24 | 1 | 6 | 84744 | 14124 |
|  | 108 | 11 | 64QAM | 19 | 43032 | 24 | 1 | 6 | 85536 | 14256 |
|  | 109 | 11 | 64QAM | 19 | 44040 | 24 | 1 | 6 | 86328 | 14388 |
|  | 121 | 11 | 64QAM | 19 | 48168 | 24 | 1 | 6 | 95832 | 15972 |
|  | 123 | 11 | 64QAM | 19 | 49176 | 24 | 1 | 6 | 97416 | 16236 |
|  | 133 | 11 | 64QAM | 19 | 53288 | 24 | 1 | 7 | 105336 | 17556 |
|  | 135 | 11 | 64QAM | 19 | 54296 | 24 | 1 | 7 | 106920 | 17820 |
|  | 137 | 11 | 64QAM | 19 | 54296 | 24 | 1 | 7 | 108504 | 18084 |
|  | 160 | 11 | 64QAM | 19 | 63528 | 24 | 1 | 8 | 126720 | 21120 |
|  | 162 | 11 | 64QAM | 19 | 64552 | 24 | 1 | 8 | 128304 | 21384 |
|  | 189 | 11 | 64QAM | 19 | 75792 | 24 | 1 | 9 | 149688 | 24948 |
|  | 216 | 11 | 64QAM | 19 | 86040 | 24 | 1 | 11 | 171072 | 28512 |
|  | 217 | 11 | 64QAM | 19 | 86040 | 24 | 1 | 11 | 171864 | 28644 |
|  | 245 | 11 | 64QAM | 19 | 98376 | 24 | 1 | 12 | 194040 | 32340 |
|  | 270 | 11 | 64QAM | 19 | 108552 | 24 | 1 | 13 | 213840 | 35640 |
|  | 273 | 11 | 64QAM | 19 | 108552 | 24 | 1 | 13 | 216216 | 36036 |
| NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.  NOTE 2: MCS Index is based on MCS table 5.1.3.1-1 defined in TS 38.214 [10].  NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  NOTE 4: The RMCs apply to all channel bandwidth where LCRB ≤ NRB. | | | | | | | | | | |

Table A.2.2.8-2: Void

Table A.2.2.8-3: Void

### A.2.2.9 CP-OFDM 256QAM

Table A.2.2.9-1: Reference Channels for CP-OFDM 256QAM

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Parameter | Allocated resource blocks (LCRB) | DFT-s-OFDM Symbols per slot (Note 1) | Modulation | MCS Index (Note 2) | Payload size | Transport block CRC | LDPC Base Graph | Number of code blocks per slot (Note 3) | Total number of bits per slot | Total modulated symbols per slot |
| Unit |  |  |  |  | Bits | Bits |  |  | Bits |  |
|  | 1 | 11 | 256QAM | 20 | 704 | 16 | 2 | 1 | 1056 | 132 |
|  | 5 | 11 | 256QAM | 20 | 3496 | 16 | 2 | 1 | 5280 | 660 |
|  | 9 | 11 | 256QAM | 20 | 6272 | 24 | 1 | 1 | 9504 | 1188 |
|  | 10 | 11 | 256QAM | 20 | 7040 | 24 | 1 | 1 | 10560 | 1320 |
|  | 11 | 11 | 256QAM | 20 | 7680 | 24 | 1 | 1 | 11616 | 1452 |
|  | 12 | 11 | 256QAM | 20 | 8456 | 24 | 1 | 2 | 12672 | 1584 |
|  | 13 | 11 | 256QAM | 20 | 9224 | 24 | 1 | 2 | 13728 | 1716 |
|  | 15 | 11 | 256QAM | 20 | 10504 | 24 | 1 | 2 | 15840 | 1980 |
|  | 18 | 11 | 256QAM | 20 | 12552 | 24 | 1 | 2 | 19008 | 2376 |
|  | 19 | 11 | 256QAM | 20 | 13320 | 24 | 1 | 2 | 20064 | 2508 |
|  | 24 | 11 | 256QAM | 20 | 16896 | 24 | 1 | 3 | 25344 | 3168 |
|  | 25 | 11 | 256QAM | 20 | 17424 | 24 | 1 | 3 | 26400 | 3300 |
|  | 26 | 11 | 256QAM | 20 | 18432 | 24 | 1 | 3 | 27456 | 3432 |
|  | 31 | 11 | 256QAM | 20 | 22032 | 24 | 1 | 3 | 32736 | 4092 |
|  | 33 | 11 | 256QAM | 20 | 23040 | 24 | 1 | 3 | 34848 | 4356 |
|  | 38 | 11 | 256QAM | 20 | 26632 | 24 | 1 | 4 | 40128 | 5016 |
|  | 39 | 11 | 256QAM | 20 | 27656 | 24 | 1 | 4 | 41184 | 5148 |
|  | 47 | 11 | 256QAM | 20 | 32776 | 24 | 1 | 4 | 49632 | 6204 |
|  | 51 | 11 | 256QAM | 20 | 35856 | 24 | 1 | 5 | 53856 | 6732 |
|  | 52 | 11 | 256QAM | 20 | 36896 | 24 | 1 | 5 | 54912 | 6864 |
|  | 53 | 11 | 256QAM | 20 | 36896 | 24 | 1 | 5 | 55968 | 6996 |
|  | 61 | 11 | 256QAM | 20 | 43032 | 24 | 1 | 6 | 64416 | 8052 |
|  | 65 | 11 | 256QAM | 20 | 46104 | 24 | 1 | 6 | 68640 | 8580 |
|  | 67 | 11 | 256QAM | 20 | 47112 | 24 | 1 | 6 | 70752 | 8844 |
|  | 78 | 11 | 256QAM | 20 | 55304 | 24 | 1 | 7 | 82368 | 10296 |
|  | 79 | 11 | 256QAM | 20 | 55304 | 24 | 1 | 7 | 83424 | 10428 |
|  | 80 | 11 | 256QAM | 20 | 56368 | 24 | 1 | 7 | 84480 | 10560 |
|  | 81 | 11 | 256QAM | 20 | 57376 | 24 | 1 | 7 | 85536 | 10692 |
|  | 93 | 11 | 256QAM | 20 | 65576 | 24 | 1 | 8 | 98208 | 12276 |
|  | 95 | 11 | 256QAM | 20 | 67584 | 24 | 1 | 8 | 100320 | 12540 |
|  | 106 | 11 | 256QAM | 20 | 73776 | 24 | 1 | 9 | 111936 | 13992 |
|  | 107 | 11 | 256QAM | 20 | 75792 | 24 | 1 | 9 | 112992 | 14124 |
|  | 108 | 11 | 256QAM | 20 | 75792 | 24 | 1 | 9 | 114048 | 14256 |
|  | 109 | 11 | 256QAM | 20 | 75792 | 24 | 1 | 9 | 115104 | 14388 |
|  | 121 | 11 | 256QAM | 20 | 86040 | 24 | 1 | 11 | 127776 | 15972 |
|  | 123 | 11 | 256QAM | 20 | 86040 | 24 | 1 | 11 | 129888 | 16236 |
|  | 133 | 11 | 256QAM | 20 | 94248 | 24 | 1 | 12 | 140448 | 17556 |
|  | 135 | 11 | 256QAM | 20 | 94248 | 24 | 1 | 12 | 142560 | 17820 |
|  | 137 | 11 | 256QAM | 20 | 96264 | 24 | 1 | 12 | 144672 | 18084 |
|  | 160 | 11 | 256QAM | 20 | 112648 | 24 | 1 | 14 | 168960 | 21120 |
|  | 162 | 11 | 256QAM | 20 | 114776 | 24 | 1 | 14 | 171072 | 21384 |
|  | 189 | 11 | 256QAM | 20 | 131176 | 24 | 1 | 16 | 199584 | 24948 |
|  | 216 | 11 | 256QAM | 20 | 151608 | 24 | 1 | 18 | 228096 | 28512 |
|  | 217 | 11 | 256QAM | 20 | 151608 | 24 | 1 | 18 | 229152 | 28644 |
|  | 245 | 11 | 256QAM | 20 | 172176 | 24 | 1 | 21 | 258720 | 32340 |
|  | 270 | 11 | 256QAM | 20 | 188576 | 24 | 1 | 23 | 285120 | 35640 |
|  | 273 | 11 | 256QAM | 20 | 192624 | 24 | 1 | 23 | 288288 | 36036 |
| NOTE 1: PUSCH mapping Type-A and single-symbol DM-RS configuration Type-1 with 2 additional DM-RS symbols, such that the DM-RS positions are set to symbols 2, 7, 11. DMRS is [TDM'ed] with PUSCH data. DM-RS symbols are not counted.  NOTE 2: MCS Index is based on MCS table 5.1.3.1-2 defined in TS 38.214 [10].  NOTE 3: If more than one Code Block is present, an additional CRC sequence of L = 24 Bits is attached to each Code Block (otherwise L = 0 Bit)  NOTE 4: The RMCs apply to all channel bandwidth where LCRB ≤ NRB. | | | | | | | | | | |

Table A.2.2.9-2: Void

Table A.2.2.9-3: Void

<<< End of changed sections >>>