**3GPP TSG-RAN WG2 Meeting #121 *R2-2300621***

**Athens, Greece, February 27 – March 03, 2023**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.822** | **CR** | **0012** | **rev** | **1** | **Current version:** | **16.4.0** |  |
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| *For* ***HELP*** *on using this form: comprehensive instructions can be found at http://www.3gpp.org/Change-Requests.* | | | | | | | | |
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| ***Proposed change affects:*** | | | UICC apps | | | |  | ME | **x** | Radio Access Network | | | | | **X** | Core Network |  |
|  | | | | | | | | | | | | | | | | | |
| ***Title:*** | UE Feature List for Rel-17 | | | | | | | | | | | | | | | | |
|  |  | | | | | | | | | | | | | | | | |
| ***Source to WG:*** | Intel Corporation | | | | | | | | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | | | | | | | | |
|  |  | | | | | | | | | | | | | | | | |
| ***Work item code:*** | NR\_IIOT\_URLLC\_enh-Core,  NR\_NTN\_solutions-Core, TEI17, NR\_pos\_enh-Core, NR\_SL\_enh-Core, NR\_feMIMO-Core, NR\_cov\_enh-Core, NR\_SL\_relay-Core, NR\_MBS-Core, NR\_SmallData\_INACTIVE, NR\_RF\_FR1\_enh, NR\_RedCap, LTE\_NR\_DC\_enh2-Core, NR\_DSS | | | | | | | | |  | ***Date:*** | | | 2023-02-16 | | | |
|  |  | | | | |  | | | | |  | | |  | | | |
| ***Category:*** | **B** |  | | | | | | | | | ***Release:*** | | | Rel-17 | | | |
|  | *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. | | | | | | | | | | | | *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)*  *Rel-19 (Release 19)* | | | | |
|  |  | | | | | | | | | | | | | | | | |
| ***Reason for change:*** | | Capture RAN1 and RAN4 NR features with IE mapping for NR Rel-17. Capture Layer 2 and 3 features. The RAN1 UE feature list for this CR is based on R1-2212895 and the RAN4 feature list is based on R4-2215143. | | | | | | | | | | | | | | | |
|  | |  | | | | | | | | | | | | | | | |
| ***Summary of change:*** | | New Release-17 capabilities from RAN1/RAN4 are added based on the latest RAN1 and RAN4 feature list  New Release-17 capabilities from RAN2 based on endorsed/agreed CRs. | | | | | | | | | | | | | | | |
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| ***Consequences if not approved:*** | | RAN1, RAN2, RAN4 features list for NR Rel-17 will not be captured in any TR or TS. | | | | | | | | | | | | | | | |
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| ***Clauses affected:*** | | 2, 6 (new) | | | | | | | | | | | | | | | |
|  | |  | | | | | | | | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | | | | | | | | |

START OF CHANGE

# 1 Scope

The present document provides the list of UE features for NR. For each NR UE feature, the corresponding field name of UE capability, as specified in TS 38.331 [2] is also captured in this document. The Release 15 UE feature list described in clause 4 reflects the status of Release 15 in June 2019 and has not been maintained after this date. The Release 16 UE feature list described in clause 5 reflects the status of Release 16 in June 2021 and has not been maintained after this date.

# 2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 38.331: "NR; Radio Resource Control (RRC) protocol specification".

[3] 3GPP R1-1907862: "RAN1 NR UE features", contribution to TSG-RAN WG1 meeting #XX.

[4] 3GPP R2-1906665: "Update of L2/3 feature lists", contribution to TSG-RAN WG2 meeting #105bis.

[5] 3GPP R4-1907593: "RAN4 NR UE features", contribution to TSG-RAN WG4 meeting #XX.

[6] 3GPP R1-2106160: "Updated RAN1 UE features list for Rel-16 NR after RAN1#105-e", contribution to TSG-RAN WG1 meeting #105-e.

[7] 3GPP R2-2100378:"RAN2 UE features list for Rel-16 NR", contribution to TSG-RAN WG2 meeting #113e.

[8] 3GPP R4-2108334:"Updated RAN4 UE features list for Rel-16", contribution to TSG-RAN WG4 meeting #99-e.

[9] 3GPP TS 37.355: "LTE Positioning Protocol (LPP)".

[10] 3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification".

[11] 3GPP TS 38.340: "NR; Backhaul Adaptation Protocol (BAP) specification".

[12] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification".

[13] 3GPP TS 37.324: "Evolved Universal Terrestrial Radio Access (E-UTRA) and NR; Service Data Adaptation Protocol (SDAP) specification".

[14] 3GPP TS 36.306: "UE Radio Access capabilities".

[15] 3GPP TS 38.323: "NR; Packet Data Convergence Protocol (PDCP) specification".

[16] 3GPP TS 38.300: "NR; NR and NG-RAN Overall description; Stage-2".

[17] 3GPP R1-2212895: "Updated RAN1 UE features list for Rel-17 NR after RAN1#111"

[18] 3GPP R4-2215143: "Rel-17 RAN4 UE feature list for NR"

[19] 3GPP TS 38.304: "NR; User Equipment (UE) procedures in idle mode and in RRC Inactive state"

[20] 3GPP TS 38.214: "NR; Physical layer procedures for data"

# 3 Definitions of terms, symbols and abbreviations

## 3.1 Terms

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

**example:** text used to clarify abstract rules by applying them literally.

## 3.2 Abbreviations

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

<<OMITTED>>

NEXT CHANGE

# 6 Release 17 UE feature list

## 6.1 Layer-1 UE features

### 6.1.0 General

Tables 6.1.1-1 to 6.1.17-1 provide the list of Layer-1 features, as shown in [17] and the corresponding UE capability field name, as specified in TS 38.331 [2].

### 6.1.1 NR\_FeMIMO

Table 6.1.1-1: Layer-1 feature list for NR\_FeMIMO

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Capability interpretation for mixture of FDD/TDD and/or FR1/FR2 | Note | Mandatory/Optional |
| 23. NR\_FeMIMO | 23-1-1 | Unified TCI with joint DL/UL TCI update for intra-cell beam management | 1. Joint DL/UL TCI update with their components: (configuration mechanism, QCL rules, applicable source and target signals) 2. The maximum number of configured joint TCI states per BWP per CC in a band 3. One MAC-CE activated joint TCI state per CC in a band 4. TCI state indication for update and activationa) MAC CE based TCI state indication for one active TCI state 5. The maximum number of MAC-CE activated joint TCI states across all CC(s) in a band |  | *unifiedJointTCI-r17 {*  *maxConfiguredJointTCI-r17, maxActivatedTCIAcrossCC-r17*  *}* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component 2 candidate value {8, 12, 16, 24, 32, 48, 64, 128}  Component 5 candidate value {1, 2, 4, 8, 16}  If a UE supports FG 23-1-1a, the signalled component values (except component 5) also apply to inter-cell beam management  Note: activated joint TCI state(s) include all PDCCH/PDSCH receptions and PUSCH/PUCCH transmissions | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-1-1a | Unified TCI with joint DL/UL TCI update for inter-cell beam management | 1. Support of unified TCI with joint DL/UL TCI update for inter-cell beam management 2. Support K additional MAC-CE activated joint TCI states per CC in a band 3. Support K additional MAC-CE activated joint TCI states across all CC(s) in a band | 23-1-2, 23-1-1 | *unifiedJointTCI-InterCell-r17*  *{*  *additionalMAC-CE-PerCC-r17,*  *additionalMAC-CE-AcrossCC-r17*  *}* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component candidate values for K: {0,1,2,4}  Note: A UE that supports 23-1-1a supports K additional MAC-CE activated joint TCI states across all CC(s) in a band in addition to the maximum number of MAC-CE activated joint TCI states across all CC(s) in a band signalled in FG 23-1-1. The signalled value in component 3 of 23-1-1a plus the signalled value in component 5 of 23-1-1 determine the maximum number of MAC-CE activated joint TCI states across all CC(s) in a band that are applied to intra and inter-cell beam management jointly. | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-1-1b | Unified TCI with joint DL/UL TCI update for intra- and inter-cell beam management with more than one MAC-CE activated joint TCI state per CC | 1. TCI state indication for update and activation  b) MAC-CE+DCI-based TCI state indication (use of DCI formats 1\_1/1\_2 with DL assignment) c) MAC-CE+DCI-based TCI state indication (use of DCI formats 1\_1/1\_2 without DL assignment) 2. The minimum beam application time in Y symbols per SCS 3. The maximum number of MAC-CE activated joint TCI states per CC in a band | 23-1-1 | *unifiedJointTCI-multiMAC-CE-r17*  *{ minBeamApplicationTime-r17,*  *maxNumMAC-CE-PerCC*  *}* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component 2 candidate values: {1, 2, 4, 7, 14, 28, 42, 56, 70, 84, 98, 112, 224, 336}, where {84, 98, 112, 224, 336 } only can be indicated in FR2  Component 3 candidate values: {2, 3, 4, 5, 6, 7, 8}  Note: The maximum number of MAC-CE activated joint TCI states across all CC(s) in a band for more than one MAC-CE activated joint TCI state is signaled in 23-1-1, component 5  Note: activated joint TCI state(s) include all PDCCH/PDSCH receptions and PUSCH/PUCCH | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-1-1c | SCell BFR with unified TCI framework | 1. Support of SCell BFR with unified TCI framework |  | *unifiedJointTCI-SCellBFR-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | The maximum number of CCs configured with SCell BFR with unified TCI framework in a band with SpCell BFR is given by FG 16-1f, in this case FG 16-1f includes SpCell | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-1-1d | Per BWP TCI state pool configuration for CA mode | * + - 1. Support of TCI state pool configuration per BWP for CA mode | 23-1-1 | *unifiedJointTCI-perBWP-CA-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signaling |
| 23. NR\_FeMIMO | 23-1-1e | TCI state pool configuration with TCI pool sharing for CA mode | 1. Support of reference BWP/CC configured with reference TCI state pool shared by a set of BWP/CC 2. The maximum number of configured joint TCI state pools across all BWPs and all CCs in a band | 23-1-1 | *unifiedJointTCI-ListSharingCA-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component 2 candidate values: {1, 2, 4, 8}  A UE that supports 23-1-1 together with CA must support this FG | Optional with capability signaling |
| 23. NR\_FeMIMO | 23-1-1f | Common multi-CC TCI state ID update and activation | Common multi-CC TCI state ID update and activation | 23-1-1 | *unifiedJointTCI-commonMultiCC-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signaling |
| 23. NR\_FeMIMO | 23-1-1g | Beam misalignment between the DL source RS in the TCI state | Beam misalignment between the DL source RS in the TCI state to provide spatial relation indication and the PL-RS | 23-1-1 | *unifiedJointTCI-BeamAlignDLRS-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | FR2 only | Optional with capability signaling |
| 23. NR\_FeMIMO | 23-1-1h | Association between TCI state and UL PC settings for PUCCH, PUSCH, and SRS | For PUCCH, PUSCH, and SRS, association between TCI state and UL PC settings except for PL RS | 23-1-1 | *unifiedJointTCI-PC-association-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signaling |
| 23. NR\_FeMIMO | 23-1-1i | Indication/configuration of R17 TCI states for aperiodic CSI-RS, PDCCH, PDSCH | Support of indication/configuration of R17 TCI states for aperiodic CSI-RS, PDCCH, PDSCH (except for TRS and for CORESET #0 and the respective PDSCH reception) reusing the Rel-15/16 signaling/configuration design(s) | 23-1-1 | *unifiedJointTCI-Legacy-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Note: This has no impact on detail signaling design for SRS TCI indication | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-1-1m | Indication/configuration of R17 TCI states for SRS | Support of indication/configuration of R17 TCI states for SRS (except for periodic/semi-persistent SRS for BM) reusing the Rel-15/16 signaling/configuration design(s) | 23-1-1 | *unifiedJointTCI-Legacy-SRS-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Note: This has no impact on detail signaling design for SRS TCI indication | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-1-1j | Indication/configuration of R17 TCI states for CORESET #0 | Support of indication/configuration of R17 TCI states for CORESET #0 and the respective PDSCH reception reusing the Rel-15/16 signaling/configuration design(s) | 23-1-1 | *unifiedJointTCI-Legacy-CORESET0-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-1-1k | Maximum number of configured CC lists | Maximum number of configured CC lists per cell group for common multi-CC TCI state ID update and activation | 23-1-1f or 23-10-1f | *unifiedJointTCI-commonUpdate-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component candidate values: {1,2,3,4} | Optional with capability signaling |
| 23. NR\_FeMIMO | 23-1-2 | Inter-cell beam measurement and reporting (for inter-cell BM and mTRP) | 1. Support of L1-RSRP measurement and reporting on SSB(s) with PCI(s) different from serving cell PCI  2. Support of up to K SSBRI-RSRP pairs in one report where a pair is associated with a PCI different from serving cell PCI can be reported  3. The maximum number of RRC-configured PCI(s) different from serving cell PCI for L1-RSRP measurement  4. The max number of SSB resources configured to measure L1-RSRP within a slot with PCI(s) same as or different from serving cell PCI across all CC |  | *unifiedJointTCI-mTRP-InterCell-BM-r17*  *{*  *maxNumAdditionalPCI-L1-RSRP-r17,*  *maxNumSSB-ResourceL1-RSRP-AcrossCC-r17*  *}* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component 3 candidate values: {1, 2, 3, 4, 5, 6, 7}  Component 4 candidate values: {1, 2, 4, 8}  Note: K is equal to maxNumberNonGroupBeamReporting  Note: component 4 is also counted in FG16-1g/16-1g-1 | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-1-3 | MPE mitigation | 1. Support of enhanced PHR reporting which includes pairs of (P-MPR, SSBRI/CRI)  2. Maximum number of reported P-MPR and SSBRI/CRI pairs  3. Maximum number of candidate RS(s) configured in a RRC pool for MPE mitigation |  | *mpe-Mitigation-r17 {*  *maxNumP-MPR-RI-pairs-r17,*  *maxNumConfRS-r17*  *}* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component 2 candidate values: {1,2,3, 4}  Component 3 candidate values: {1, 2, 4, 8, 12, 16, 28, 32, 48, 64}  Note: FR2 only  Note: Component 3 is also counted in FG16-1g/16-1g-1 | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-1-4 | UE capability value reporting | 1. Supported UE capability value and corresponding max number of SRS ports for each UE capability value |  | *srs-PortReport-r17*  *{*  *capVal1-r17,*  *capVal2-r17,*  *capVal3-r17,*  *capVal4-r17*  *}* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component 1 candidate values: Up to 4 value each with one value of {1,2,4}  Note: the reported list contains only unique value | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-1-4a | Semi-persistent/aperiodic capability value report | Support of Semi-persistent/aperiodic capability value report | 23-1-4,  2-22 or 2-23 or 2-23a  or 16-1a-1 or 16-1a-4 or 16-1a-5 | *srs-PortReportSP-AP-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Note: UE that supports this FG, supports capability value reporting together with the AP/SP L1-RSRP/L1-SINR reporting(s) that UE supports in Rel-15/16, reported by FG2-22. FG2-23, FG2-23a, FG16-1a-1, FG16-1a-4 and FG16-1a-5 | Optional with capability signaling |
| 23. NR\_FeMIMO | 23-2-1 | PDCCH repetition | 1. Support of intra-slot PDCCH repetition based on two linked SS sets associated with corresponding CORESETs including PDCCH repetition for Type 3 CSS  2. Required number of BDs for the two PDCCH candidates  3. Support max number of overlaps when one of the linked PDCCH candidates uses the same set of CCEs as an individual (unlinked) PDCCH candidate per scheduled component carrier per slot |  | *mTRP-PDCCH-Repetition-r17*  *{*  *numBD-twoPDCCH-r17,*  *maxNumOverlaps-r17,*  *}* | *FeatureSetDownlink-v1700* | n/a | n/a | n/a | Component 2 candidate values: 2 or 3  Component 3 candidate values: {1,2,3, 5, 10, 20, 40}  Note: UE supports PDCCH repetition for the following (basic) PDCCH monitoring capability: For type 1 CSS with dedicated RRC configuration, type 3 CSS, and UE-SS, the monitoring occasion is within the first 3 OFDM symbols of a slot  Note: for component 3, each unique pair of overlaps is counted as one.  Note: This FG does not include supporting Two QCL-TypeD in time-domain overlapping CORESETs in FR2. | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-2-1a | Monitoring of individual candidates | Support of monitoring of individual candidates when one of the linked PDCCH candidates uses the same set of CCEs as an individual (unlinked) PDCCH candidate, and they both are associated with the same DCI size, scrambling, and CORESET | 23-2-1 | *mTRP-PDCCH-individual-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-2-1b | PDCCH repetition with PDCCH  monitoring on any span of up to 3 consecutive OFDM symbols of a slot | Support of PDCCH repetition for PDCCH monitoring on any span of up to 3 consecutive OFDM symbols of a slot | 3-2  23-2-1 | *mTRP-PDCCH-anySpan-3Symbols-r17* | *MIMO-ParametersPerBand* | n/a | FR1 only | n/a | Applicable to 15KHz SCS only | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-2-1c | PDCCH repetition with PDCCH monitoring with a single span of three contiguous OFDM symbols that is within the first four OFDM symbols in a slot | Support of PDCCH repetition for PDCCH monitoring with a single span of three contiguous OFDM symbols that is within the first four OFDM symbols in a slot | 22-12  23-2-1 | *mTRP-PDCCH-singleSpan-r17* | *MIMO-ParametersPerBand* | No | FR1 only | No | Applicable to 15KHz SCS only | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-2-1d | PDCCH repetition for Case 2 PDCCH monitoring with a span gap | 1. Support of PDCCH repetition for PDCCH monitoring of any occasions with span gap as defined in FG 3-5b.  2. Supported mode of PDCCH repetition  3. X per CC  4. X across all CCs | 3-5b, 23-2-1 | *mTRP-PDCCH-Case2-1SpanGap-r17*  *{*  *scs-15kHz-r17,*  *scs-30kHz-r17,*  *scs-60kHz-r17,*  *scs-120kHz-r17*  *}* | *FeatureSetDownlink-v1700* | n/a | n/a | n/a | This capability is necessary for each SCS.  Component 2 candidate values: {intra-span, inter-span, both}  Component 3 candidate values: {4, 8, 16, 32, 44, 64, no limit}  Component 4 candidate values: {4, 8, 16, 32, 44, 64, 128, 256, 512, no limit}  Note:   * Components 3 and 4 are reported only if UE supports inter-span PDCCH repetition. * The limit (X) is associated with the total number of linked candidates of which the first candidate is received and the second one has not been received at any given span, where “received” and “not been received” is wrt the end of the corresponding span of PDCCH candidate. * The limit X is indicated as a total count assuming count 1 for AL=1; 2 for AL=2; 4 for AL=4 or 8 or 16. * Candidate value “no limit” does not imply BD limit can be exceeded | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-2-1e | PDCCH repetition for Rel-16 PDCCH monitoring | 1. Support of PDCCH repetition with Rel-16 PDCCH monitoring capability as defined in FG 11-2 family.  2. Supported mode of PDCCH repetition  3. X per CC  4. X across all CCs | 11-2, 23-2-1 | *mTRP-PDCCH-legacyMonitoring-r17*  *{*  *scs-15kHz-r17,*  *scs-30kHz-r17*  *}* | *FeatureSetDownlink-v1700* | n/a | n/a | n/a | This capability is signalled for SCS 15 kHz and 30 kHz.  Component2: {intra-span, inter-span, both}  Component3: {4, 8, 16, 32, 44, 64, no limit}  Component 4: {4, 8, 16, 32, 44, 64, 128, 256, 512, no limit}  Note:   * Components 3 and 4 are reported only if UE supports inter-span PDCCH repetition. * The limit X is associated with the total number of linked candidates of which the first candidate is received and the second one has not been received at any given span, where “received” and “not been received” is wrt the end of the corresponding span of PDCCH candidate. * The limit X is indicated as a total count assuming count 1 for AL=1; 2 for AL=2; 4 for AL=4 or 8 or 16. * Candidate value “no limit” does not imply BD limit can be exceeded | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-2-2 | Two QCL TypeD for CORESET monitoring in PDCCH repetition | Support of determining two QCL-TypeD for time-domain overlapping CORESETs in the same CC or for intra-band CA when UE is configured with PDCCH repetition | 23-2-1 | *mTRP-PDCCH-TwoQCL-TypeD-r17* | *MIMO-ParametersPerBand* | n/a | FR2 only | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-2-4 | Simultaneous configuration of PDCCH repetition and multi-DCI based multi-TRP | Support of simultaneous configuration of PDCCH repetition and multi-DCI based multi-TRP | 23-2-1, 16-2a | *mTRP-PDCCH-multiDCI-multiTRP-r17* | *FeatureSetDownlink-v1700* | n/a | n/a | n/a | Note: Two linked PDCCH candidates are not expected to be associated with different CORESETPoolIndex values | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-3-1 | Multi-TRP PUSCH repetition (type A) -codebook based | 1. Support of multi-TRP PUSCH repetition (based on PUSCH repetition type A)  - sequential mapping for repetitions larger than 2  - cyclic mapping for 2 repetitions  2. Support of two SRS resource sets with usage set to 'codebook'  3. Supported number of SRS resources in one SRS resource set | 2-14 | *mTRP-PUSCH-TypeA-CB-r17* | *FeatureSetUplink-v1710* | n/a | n/a | n/a | Component 3 candidate values: {1,2 ,4}  Note: If value 4 is reported for component 3, UE also reports value 4 in FG 16-5c. | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-3-1-2 | Multi-TRP PUSCH repetition (type A) - non-codebook based | 1. Support of multi-TRP PUSCH repetition for non-codebook based PUSCH (based on PUSCH repetition type A)  - sequential mapping for repetitions larger than 2  - cyclic mapping for 2 repetitions  2. Support of two SRS resource sets with usage set to 'nonCodebook'  3. Supported number of SRS resources in one SRS resource set | 2-15 | *mTRP-PUSCH-RepetitionTypeA-r17* | *FeatureSetUplink-v1710* | n/a | n/a | n/a | Component 3: {1,2,3,4} | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-3-1-2a | Two associated CSI-RS resources | Support of up to two NZP CSI-RS resources associated with the two SRS resource sets for non-codebook-based mTRP PUSCH | 2-15a, 23-3-1-2 | *mTRP-PUSCH-twoCSI-RS-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-3-1-2b | CSI-RS processing framework for SRS with two associated CSI-RS resources | 1. Maximum number of periodic SRS resources associated with first and second CSI-RS per BWP  2. Maximum number of aperiodic SRS resources associated with first and second CSI-RS per BWP  3. Maximum number of semi-persistent SRS resources associated with first and second CSI-RS per BWP  4. UE can process Y SRS resources associated with first and second CSI-RS resources simultaneously in a CC. Includes P/SP/A SRS  5. UE can process up to X CSI-RS resources associated with SRS for non-codebook based transmission simultaneously | 23-3-1-2a | *mTRP-PUSCH-CSI-RS-r17*  *{*  *maxNumPeriodicSRS-r17,*  *maxNumAperiodicSRS-r17,*  *maxNumSP-SRS-r17*  *}* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component 1: {1 to 8}  Component 2: {1 to 8}  Component 3: {0 to 8}  Component 4: {1 to 16}  Component 5: {1,2} | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-3-1a | Cyclic mapping for Multi-TRP PUSCH repetition | Support of cyclic mapping when the number of repetitions is larger than 2 | 23-3-1 or 23-3-1-2 | *mTRP-PUSCH-cyclicMapping-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Candidate component values: {for repetition Type A, for repetition Type B, both} | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-3-1b | Second TPC field for Multi-TRP PUSCH repetition | Support of second TPC field for per TRP closed-loop power control for PUSCH with DCI formats 0\_1 / 0\_2 | 23-3-1 or 23-3-1-2 | *mTRP-PUSCH-secondTPC-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-3-1c | Two PHR reporting | Support of PHR reporting related to M-TRP PUSCH repetition (calculate two PHRs (at least corresponding to the CC that applies m-TRP PUSCH repetitions), each associated with a first PUSCH occasion corresponding to each SRS resource set, and report two PHRs.) | 23-3-1 or 23-3-1-2 | *mTRP-PUSCH-twoPHR-Reporting-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-3-1e | A-CSI report | Support of A-CSI report on two PUSCH repetitions | 23-3-1 or 23-3-1-2 | *mTRP-PUSCH-A-CSI-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-3-1f | SP-CSI report | Support of SP-CSI report on two PUSCH repetitions | 23-3-1 or 23-3-1-2 | *mTRP-PUSCH-SP-CSI-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-3-1g | CG PUSCH transmission | Support of CG PUSCH transmission towards M-TRPs using a single CG configuration (Use same beam mapping principals as dynamic grant PUSCH repetition scheme.) | 23-3-1 or 23-3-1-2 | *mTRP-PUSCH-CG-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-3-1-1 -codebook based | Multi-TRP PUSCH repetition (type B) | 1. Support of multi-TRP PUSCH repetition (based on PUSCH repetition type B) for codebook based  - sequential mapping for repetitions larger than 2  - cyclic mapping for 2 repetitions  2. Support of two SRS resource sets with usage set to ‘codebook’  3. Supported number of SRS resources in one SRS resource set | 2-14, 11-5 | *mTRP-PUSCH-TypeB-CB-r17* | *FeatureSetUplinkPerCC-v1700* | No | No | No | Component 3 candidate values: {1,2,4} | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-3-1-3 | Multi-TRP PUSCH repetition (type B) – non-codebook based | 1. Support of multi-TRP PUSCH repetition (based on PUSCH repetition type B) for non-codebook based  - sequential mapping for repetitions larger than 2  - cyclic mapping for 2 repetitions  2. support of two SRS resource sets with usage set to ‘nonCodebook’  3. supported number of SRS resources in one SRS resource set | 2-15, 11-5 |  |  | No | No | No | Component 3 candidate values: {1,2,3,4} | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-3-2 | Multi-TRP PUCCH repetition scheme 1 (inter-slot) | 1. Support of PUCCH repetition scheme 1 (inter-slot repetition)- sequential mapping for repetitions larger than 2  - cyclic mapping for 2 repetitions  2. Support of up to two PUCCH power control parameter sets/spatial relation info per PUCCH resource  3. Supported PUCCH formats for this scheme |  | *mTRP-PUCCH-InterSlot-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component 3 candidate values: {PF0/2, PF1/3/4, PF0-4}  Note: power control parameter sets (w/o spatial relation info) only apply to FR1  Note: spatial relation info only applies to FR2 | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-3-2b | Cyclic mapping for multi-TRP PUCCH repetition | Support of cyclic mapping for beam mapping/power control parameter set mapping for PUCCH repetitions scheme 1 and/or 3 when the number of repetitions is larger than 2 | 23-3-2 | *mTRP-PUCCH-CyclicMapping-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-3-2c | Second TPC field for multi-TRP PUCCH repetition | Support of second TPC field for per TRP closed-loop power control for PUCCH with DCI formats 1\_1 / 1\_2 | 23-3-2 | *mTRP-PUCCH-SecondTPC-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-3-2d | Updating two Spatial relation or two sets of power control parameters for PUCCH group | Support of updating two Spatial Relation Info’s / two sets of power control parameters for a group of PUCCH resources in a CC by MAC-CE | 23-3-2 | *mTRP-PUCCH-MAC-CE-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-3-2e | Maximum number of power control parameter sets configured for multi-TRP PUCCH repetition in FR1 | Maximum number of power control parameter sets configured for multi-TRP PUCCH repetition in FR1 | 23-3-2 | *mTRP-PUCCH-maxNum-PC-FR1-r17* | *MIMO-ParametersPerBand* | n/a | FR1 only | n/a | Candidate values: {3 to 8} | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-3-3 | Multi-TRP PUCCH repetition-intra-slot | 1. Support of PUCCH repetition scheme 3 (intra-slot repetition)  - sequential mapping for repetitions larger than 2  - cyclic mapping for 2 repetitions  2. Support of up to two PUCCH power control parameter sets/spatial relation info per PUCCH resource  3. Supported PUCCH formats for this scheme |  | *mTRP-PUCCH-IntraSlot-r17* | *FeatureSetUplink-v1710* | n/a | n/a | n/a | Component 3 candidate values: {PF0/2, PF1/3/4, PF0-4}  Note: power control parameter sets (w/o spatial relation info) only apply to FR1  Note: spatial relation info only applies to FR2 | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-4 | IntCell-mTRP | 1. Support of RRC configuration of additional PCI different from serving cell associated with the TCI state and/or QCL-info  2. The maximum number of configured additional PCIs per CC is X1 (Case 1) when each configuration of SSB time domain positions and periodicity of the additional PCIs is the same as SSB time domain positions and periodicity of the serving cell PCI  3. The maximum number of configured additional PCIs per CC is X2 (Case 2) when the configurations of SSB time domain positions and periodicity of the additional PCIs is not according to Case 1 | 16-2a | *mTRP-inter-Cell-r17*  *{*  *maxNumAdditionalPCI-Case1-r17,*  *maxNumAdditionalPCI-Case2-r17*  *}* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7}  Component 3 candidate values: {0,1,2,3,4,5,6,7}  Note: case1 and case2 cannot be enabled simultaneously as any configuration that is not based on Case 1 is defined as Case 2 | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-5-1 | Group based L1-RSRP reporting enhancements | 1. Max number N of beam groups (M=2 beams per beam group) in a single L1-RSRP reporting instance based on measurement on two CMR resource sets  2. Maximum number of SSB and CSI-RS resources for measurement in both CMR sets within a slot across all CCs  3. Maximum number of configured SSB and CSI-RS resources for measurement in both CMR sets across all CCs |  | *mTRP-GroupBasedL1-RSRP-r17*  *{*  *maxNumBeamGroups-r17,*  *maxNumRS-WithinSlot-r17,*  *maxNumRS-AcrossSlot-r17*  *}* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component 1 candidate values: {1,2,3,4}  Component 2 candidate values: {2,3,4,8,16,32,64}  Component 3 candidate values: {8, 16, 32, 64, 128}  Note: component 2 and 3 are also counted in FG 16-1g and 16-1g-1 | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-5-2 | MTRP BFR based on two BFD-RS sets | 1. Maximum number of supported measured BFD-RS resources per set per BWP  2. The maximum number of CCs per band configured with BFR (including spCell/SCell/MTRP BFR in Rel-15/16/17)  3. Supported maximum number of measured BFD-RS resources across two BFD-RS sets per BWP |  | *mTRP-BFR-twoBFD-RS-Set-r17*  *{*  *maxBFD-RS-resourcesPerSetPerBWP-r17,*  *maxBFR-r17,*  *maxBFD-RS-resourcesAcrossSetsPerBWP-r17*  *}* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component 1 candidate values: {1, 2}  Component 2 candidate values: {1, 2, 3, 4, 5, 6, 7, 8, 9}  Component 3 candidate values: {2,3,4}  Note: component 3 is also counted in FG 16-1g and 16-1g-1 | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-5-2a | PUCCH-SR resources for MTRP BFRQ | 1. Max number of PUCCH-SR resources for MTRP BFRQ per cell group |  | *mTRP-BFR-PUCCH-SR-perCG-r17* | *MIMO-ParametersPerBand* | No | Yes | No | Component candidate values: {1, 2}  Note: A UE that supports FG 23-5-2 must indicate this FG is supported with at least component candidate value 1 | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-5-2b | Association between a BFD-RS resource set on SpCell and a PUCCH SR resource | Support of association between a BFD-RS resource set on SpCell and a PUCCH SR resource | 23-5-2a | *mTRP-BFR-association-PUCCH-SR-r17* | *MIMO-ParametersPerBand* | No | Yes | No |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-5-2c | MAC-CE based update of explicit BFD-RS | 1. Support of MAC-CE based update of explicit BFD-RS for mTRP BFR 2. Maximum number of configured candidate BFD-RS per BWP for MAC-CE based update | 23-5-2 | *mTRP-BFD-RS-MAC-CE-r17* | *MIMO-ParametersPerBand* | No | Yes | No | Component 2 candidate values: {4, 8, 12, 16, 32, 48, 64} | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-6-1 | SFN scheme A (scheme 1) for PDSCH and PDCCH | 1. Support of SFN scheme A for PDCCH scheduling SFN Scheme A PDSCH |  | *sfn-SchemeA-r17* | *FeatureSetDownlink-v1700* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-6-1-1 | SFN scheme A (scheme 1) for PDCCH only | Support of SFN scheme A for PDCCH scheduling single TRP PDSCH |  | *sfn-SchemeA-PDCCH-only-r17* | *FeatureSetDownlink-v1700* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-6-1a | Dynamic switching - scheme A | Support of dynamic switching between single-TRP and PDSCH SFN scheme A by TCI state field in DCI formats 1\_1, 1\_2 | 23-6-1 or 23-6-1b | *sfn-SchemeA-DynamicSwitching-r17* | *FeatureSetDownlink-v1700* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-6-1b | SFN scheme A (scheme 1) for PDSCH only | 1. Support of SFN scheme A for PDSCH scheduled by single TRPPDCCH |  | *sfn-SchemeA-PDSCH-only-r17* | *FeatureSetDownlink-v1700* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-6-2 | SFN scheme B (TRP based pre-compensation) for PDSCH and PDCCH | 1. Support of SFN scheme B for PDCCH scheduling SFN Scheme B PDSCH |  | *sfn-SchemeB-r17* | *FeatureSetDownlink-v1700* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-6-2a | Dynamic switching - scheme B | Support of dynamic switching between single-TRP and PDSCH SFN scheme B by TCI state field in DCI formats 1\_1, 1\_2 | 23-6-2 or 23-6-2b | *sfn-SchemeB-DynamicSwitching-r17* | *FeatureSetDownlink-v1700* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-6-2b | SFN scheme B (TRP based pre-compensation) for PDSCH only | 1. Support of SFN scheme B for PDSCH scheduled by single TRP PDCCH |  | *sfn-SchemeB-PDSCH-only-r17* | *FeatureSetDownlink-v1700* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-6-3 | Simultaneous activation of two TCI states for PDCCH across multiple CCs (HST/URLLC) | Support of simultaneous activation of two TCI states for CORESETs with the same CORESET ID in all BWPs across a set of configured component carriers by single MAC-CE | 23-6-1 or 23-6-2 or 23-6-1-1 | *sfn-SimulTwoTCI-AcrossMultiCC-r17* | *MIMO-ParametersPerBand* | No | Yes | No |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-6-4 | Default DL beam setup for SFN | 1. Support of PDSCH reception using default beam for Rel-17 enhanced SFN scheme when PDSCH is scheduled with offset less than threshold  2. Support PDSCH reception using default beam for Rel-17 enhanced SFN scheme when TCI field is not present in DCI format 1\_0/1\_1/1\_2 when PDSCH is scheduled with offset equal or larger than the threshold, if applicable  3. Support aperiodic CSI-RS reception using default beam for Rel-17 enhanced SFN scheme when scheduling offset is less than threshold | 23-6-1 or 23-6-2 | *sfn-DefaultDL-BeamSetup-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Note: FR2 only for component 1 and 3 only | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-6-4a | Default UL beam setup for SFN PDCCH | 1. Support of single-TRP PUCCH transmission using default beam when enhanced SFN PDCCH transmission scheme is configured  2. Support of single-TRP PUSCH transmission using default beam when enhanced SFN PDCCH transmission scheme is configured  3. Support of single-TRP SRS resource transmission using default beam when enhanced SFN PDCCH transmission scheme is configured | 23-6-1 or 23-6-2 or 23-6-1-1 | *sfn-DefaultUL-BeamSetup-r17* | *MIMO-ParametersPerBand* | n/a | FR2 only | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-6-5 | Support implicit configuration of RS(s) with two TCI states for beam failure detection | Support RS(s) with two TCI states configured implicitly for beam failure detection enhancement for HST |  | *sfn-ImplicitRS-twoTCI-r17* | *MIMO-ParametersPerBand* | n/a | n/a |  |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-6-6 | QCL-TypeD collision handling with CORESET with 2 TCI states | Support of identifying two QCL-TypeD properties for multiple overlapping CORESETs when a CORESET is activated with two TCI states which overlaps with another CORESET. |  | *sfn-QCL-TypeD-Collision-twoTCI-r17* | *MIMO-ParametersPerBand* | n/a | n/a |  |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-7-1 | Basic Features of CSI Enhancement for Multi-TRP | 1. Support of NZP CSI-RS resource pairs used as CMR (channel measurement resource) pairs for NCJT measurement hypothesis: Support of N=1 2. Maximum number of NZP CSI-RS resources in one CSI-RS resource set: Ks,max 3. CSI report mode selection of mode 1 with X=0 and/or mode 2 4. A list of supported combinations, up to 16, across all CCs simultaneously, where each combination is 5. Maximum number of Tx ports in one NZP CSI-RS resource associated with an NCJT measurement hypothesis 6. Maximum total number of CMRs for NCJT measurement 7. Maximum total number of Tx ports of NZP CSI-RS resources associated with NCJT measurement hypotheses 8. Supported codebook modes for NCJT CSI |  | *mTRP-CSI-EnhancementPerBC-r17*  *{*  *maxNumNZP-CSI-RS-r17,*  *cSI-Report-mode-r17,*  *supportedComboAcrossCCs-r17,*  *codebookMode-NCJT-r17*  *}* | *CA-ParametersNR-v1700* | n/a | n/a | n/a | Component 2 candidate value set: {2, 3, 4, 5, 6, 7, 8}  Component 3 candidate value set: { mode 1 with X=0, mode 2, both}  Component 4 candidate values:   1. {2, 4, 8, 12, 16, 24, 32} 2. {2,3,4 … 64} 3. {2,3,4, …, 256}   Component 5 candidate values: {mode 1, both mode 1 and mode 2} | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-7-1c | Basic Features of CSI Enhancement for Multi-TRP – number of CPUs | Number of CPUs occupied by a pair of CMRs for NCJT CSI hypotheses | 23-7-1 | *mTRP-CSI-numCPU-r1* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component candidate values: {2,3 ,4}  Note: Maximum number of CPUs is reported in FG 2-35 | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-7-1b | Active CSI-RS resources and ports in the presence of multi-TRP CSI | 1. List of codebook combinations  2. List of {max number of ports per resource, max number of resources, max number of total ports} for each codebook combination | 23-7-1 | *codebookComboParameterMultiTRP-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component 1 candidate values:  Codebook 1 = {‘NCJT’, NCJT+Type 1 SP (for sTRP)}  {Codebook 2, Codebook 3} = {(NULL, NULL}), {“Rel 16 combinations in FG 16-8”}, {“New Rel17 combinations in FG 23-9-5”}}  Component 2 candidate values:  - Maximum 16 triplets for each codebook combination  - Max # of Tx ports in one resource: {2, 4,8,12,16,24,32}  - Max # resources: {1 to 64}  - Max # total ports: {4 to 256}  Note 1: A CMR pair configured for NCJT will be counted as two activated resources, a CMR configured for sTRP will be counted as one activated resource for a triplet.  Note2: This capability is relevant only when UE is configured with NCJT CSI in at least one CSI report setting in at least one CC in the band and/or band combination. | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-7-1a | Additional CSI report mode 1 | Maximum value of numberOfSingleTRP-CSI-Mode1 | 23-7-1 | *mTRP-CSI-additionalCSI-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component 1 candidate value set: { X=1, X=2}  Note: UE reports this capability only when UE reports “mode 1 with X=0” or “both” for component 3 of FG 23-7-1 | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-7-4 | Support of Nmax=2 for Multi-TRP CSI | Support of maximum number of CMR pairs Nmax=2 configured in NZP-CSI-RS-ResourceSet for a given CSI report setting | 23-7-1 | *mTRP-CSI-N-Max2-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-7-5 | CMR sharing | Support a NZP CSI-RS resource referred by both a CMR pair configured for Rel-17 Multi-TRP CSI enhancement and a single CMR configured for Single-TRP measurement in a CSI reporting setting | 23-7-1 | *mTRP-CSI-CMR-r17* | *MIMO-ParametersPerBand* | n/a | FR2 only | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-8-1 | SRS triggering offset enhancement | The maximum number of configured available slots offsets for determining aperiodic SRS location based on available slot | 2-52 | *srs-TriggeringOffset-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Candidate 1 component values: {1, 2, 4} | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-8-2 | Triggering SRS only in DCI 0\_1/0\_2 | Support of triggering SRS in DCI 0\_1/0\_2 without data and without CSI | 2-52 | *srs-TriggeringDCI-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-8-3 | SRS Antenna switching for >4Rx | 1. Support of SRS antenna switching xTyR with y>4  2. Report the entry number of the first-listed band with UL in the band combination that affects this DL  3. Report the entry number of the first-listed band with UL in the band combination that switches together with this UL | 2-55 | *srs-AntennaSwitchingBeyond4RX-r17*  *{*  *supportedSRS-TxPortSwitchBeyond4Rx-r17,*  *entryNumberAffectBeyond4Rx-r17,*  *entryNumberSwitchBeyond4Rx-r17*  *}* | *BandParameters-v1710* | n/a | n/a | n/a | Component 1 candidate values: a combination from the set {t1r1, t2r2, t1r2, t4r4, t2r4, t1r4, t2r6, t1r6, t4r8, t2r8, t1r8}  Note: For any indicated value, x shall be equal to or smaller than the one associated with the largest y  Component 2 candidate values: {1 to 32}  Component 3 candidate values: {1 to 32}  Component 2 and Component 3 are optional. If reported, the reported values for component 2 and component 3 are not valid for the same values of xTyR in component 1 reported with Rel-15/16 UE capability reporting | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-8-4 | Maximum 2 SP and 1 periodic SRS sets for antenna switching | Support of maximum 2 SP SRS resource sets and maximum 1 periodic SRS resource set for antenna switching | 2-53 | *srs-AntennaSwitching2SP-1Periodic-r17* | *FeatureSetUplink-v1710* | n/a | n/a | n/a | Note1:   * Applies for all supported xTyR where y<=8 * For xTyR where y>4, if UE does NOT support this feature, support maximum one SRS resource set for periodic SRS and maximum one SRS resource set for semi-persistent SRS * For xTyR where y<=4, if UE does not support this feature, follow Rel-15 on the number of resource sets for periodic and semi-persistent SRS * The two SP-SRS resource sets are not activated at the same time | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-8-5 | Increased repetition for SRS | Support of increased repetition patterns (8, 10, 12, 14 symbols) for SRS resource | 10-11, 2-52 | *srs-increasedRepetition-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-8-6 | Partial frequency sounding of SRS with frequency hopping | Support of partial frequency sounding for SRS with frequency hopping | 2-52 | *srs-partialFrequencySounding-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-8-7 | Start RB location hopping for partial frequency SRS | Support of start RB location hopping in partial frequency SRS transmission across different SRS frequency hopping periods for periodic/semi-persistent/aperiodoc SRS | 23-8-6 | *srs-startRB-locationHoppingPartial-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-8-8 | Comb-8 SRS | Support of comb-8 for SRS other than for positioning |  | *srs-combEight-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-8-9 | Extension of aperiodic SRS configuration for 1T4R, 1T2R and 2T4R | Support of 4 aperiodic SRS resource sets for 1T4R and 2 aperiodic resource sets for 1T2R/2T4R. | 2-53, 2-55 | *srs-ExtensionAperiodicSRS-r17* | *FeatureSetUplink-v1710* | N/A | N/A | N/A | Note: When UE only supports part of {1T4R, 1T2R, 2T4R}, this FG is only applicable to the antenna switching configuration(s) that UE supports | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-8-10 | 1 aperiodic SRS resource set for 1T4R | Support of 1 aperiodic SRS resource sets for 1T4R. | 10-11, 2-55 | *srs-OneAP-SRS-r17* | *FeatureSetUplink-v1710* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-8-11 | Partial frequency sounding of SRS for non-frequency hopping case | Support of partial frequency sounding for SRS for non-frequency hopping case. | 23-8-6 | *srs-partialFreqSounding-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-9-1 | Basic Features of Further Enhanced Port-Selection Type II Codebook (FeType-II) | 1. {Max # of Tx ports in one resource, Max # of resources and total # of Tx ports} to support Port-selection FeType-II with M=1 and R=1 2. Support rank 1,2 3. Support parameter combinations with M=1 | 2-35 | *codebookParametersfetype2PerBC-r17* | *CA-ParametersNR-v1700* | n/a | n/a | n/a | Component 1 candidate values:   * Maximum 16 triplets * Max # of Tx ports in one resource: {4,8,12,16,24,32} * Max # resources: {1 to 64} * Max # total ports: {4 to 256} | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-9-5 | Active CSI-RS resources and ports for mixed codebook types in any slot | 1. List of codebook combinations 2. List of {max number of ports per resource, max number of resources, max number of total ports} for each codebook combination | 23-9-1, 16-3a, 2-36, 2-40, 2-41, 23-9-2, 23-9-4 | *codebookComboParameterMixedTypePerBC-r17* | *CA-ParametersNR-v1700* | n/a | n/a | n/a | Component 1 candidate values:  Codebook 1 = {Type I SP, Type I MP}  {Codebook 2, Codebook 3} = {{FeType II PS M=1, NULL},{FeType II PS M=2 R=1, NULL}, {FeType II PS M=2 R=2, NULL}, {Type II, FeType II PS M=1}, {Type II, FeType II PS M=2 R=1} ,{eType II R=1, FeType II PS M=1},{eType II R=1, FeType II PS M=2 R=1}}  Component 2 candidate values:  - Maximum 16 triplets for each codebook combination  - Max # of Tx ports in one resource: {4,8,12,16,24,32}  - Max # resources: {1 to 64}  - Max # total ports: {4 to 256}  Note 1：if a UE reports one or more codebook combinations in 23-9-5, then usage of active CSI-RS resources and ports for multiple codebooks in any slot is allowed only within those combinations  Note 2: For coexisting of mixed codebooks in any slot, gNB need to honor 16-8, 23-9-5 and per-codebook capability 2-36/40/41, 16-3a, and 23-9-1/23-9-2/23-9-4  Note 3: Up to 4 combinations for component 1 | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-9-2 | Support of M=2 and R=1 for FeType-II | 1. {Max # of Tx ports in one resource, Max # of resources and total # of Tx ports} to support Port-selection FeType-II with M=2 and R=1  2. Support parameter combinations with M=2 | 23-9-1 | *fetype2R1-r17* | *CodebookParametersfetype2-r17* | n/a | n/a | n/a | Component 1 candidate values  - Maximum 8 triplets  - Max # of Tx ports in one resource: {4,8,12,16,24,32}  - Max # resources: {1 to 64}  - Max # total ports: {4 to 256} | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-9-3 | Support of rank 3, 4 for FeType-II | Support of rank 3, 4 for FeType-II | 23-9-1 | *fetype2Rank3Rank4-r17* | *CodebookParametersfetype2-r17* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-9-4 | Support of R = 2 for FeType-II | 1. Support of R = 2 for FeType-II  2. {Max # of Tx ports in one resource, Max # of resources and total # of Tx ports} to support Port-selection FeType-II with M=2 and R=2 | 23-9-2 | *fetype2R2-r17* | *CodebookParametersfetype2-r17* | n/a | n/a | n/a | Component 2 candidate values:  • Maximum 8 triplets  • Max # of Tx ports in one resource: {4,8,12,16,24,32}  • Max # resources: {1 to 64}  • Max # total ports: {4 to 256} | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-10-1 | Unified TCI with separate DL/UL TCI update for intra-cell beam management | 1. Separate DL/UL TCI update with their components: (configuration mechanism, QCL rules, applicable source and target signals) 2. The maximum number of configured DL TCI states per BWP per CC 3. The maximum number of configured UL TCI states per BWP per CC 4. One MAC-CE activated DL TCI state per CC in a band 5. One MAC-CE activated UL TCI state per CC in a band 6. TCI state indication for update and activation a) MAC CE based TCI state indication for one active DL/UL TCI state 7. The maximum number of MAC-CE activated DL TCI states across all CC(s) in a band 8. The maximum number of MAC-CE activated UL TCI states across all CC(s) in a band | 23-1-1 | *unifiedSeparateTCI-r17*  *{*  *maxConfiguredDL-TCI-r17,*  *maxConfiguredUL-TCI-r17,*  *maxActivatedDL-TCIAcrossCC-r17,*  *maxActivatedUL-TCIAcrossCC-r17*  *}* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component 2 candidate value {4, 8, 12, 16, 24, 32, 48, 64, 128}  Component 3 candidate value {4, 8, 12, 16, 24, 32, 48, 64}  Component 7 candidate value {1, 2, 4, 8, 16}  Component 8 candidate value {1, 2, 4, 8, 16}  If a UE supports FG 23-10-1m, the signalled component values (except components 7 and 8) apply to intra- and inter-cell beam management jointly | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-10-1b | Unified TCI with separate DL/UL TCI update for intra-cell beam management with more than one MAC-CE activated separate TCI state per CC | 1. TCI state indication for update and activation  b) MAC-CE+DCI-based TCI state indication (use of DCI formats 1\_1/1\_2 with DL assignment) c) MAC-CE+DCI-based TCI state indication (use of DCI formats 1\_1/1\_2 without DL assignment) 2. The minimum beam application time in Y symbols per SCS 3. The maximum number of MAC-CE activated DL TCI states per CC in a band 4. The maximum number of MAC-CE activated UL TCI states per CC in a band | 23-10-1 | *unifiedSeparateTCI-multiMAC-CE-r17*  *{*  *minBeamApplicationTime-r17,*  *maxActivatedDL-TCIPerCC-r17,*  *maxActivatedUL-TCIPerCC-r17*  *}* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | If a UE supports FG 23-10-1m, the signalled component values also apply to inter-cell beam management | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-10-1d | Per BWP DL/UL-TCI state pool configuration for CA mode | 1. Support of DL/UL TCI state pool configuration per BWP for CA mode | 23-10-1 | *unifiedSeparateTCI-perBWP-CA-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-10-1e | TCI state pool configuration with DL/UL-TCI pool sharing for CA mode | 1. Support of reference BWP/CC configured with reference TCI state pool shared by a set of BWP/CC 2. The maximum number of configured DL TCI state pools across all BWPs and all CCs in a band 3. The maximum number of configured UL TCI state pools across all BWPs and all CCs in a band |  | *unifiedSeparateTCI-ListSharingCA-r17*  *{*  *maxNumListDL-TCI-r17,*  *maxNumListUL-TCI-r17*  *}* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component 2 candidate values: {1, 2, 4, 8}  Component 3 candidate values: {1, 2, 4, 8} | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-10-1f | Common multi-CC DL/UL-TCI state ID update and activation with separate DL/UL TCI update | Common multi-CC DL/UL-TCI state ID update and activation | 23-10-1 | *unifiedSeparateTCI-commonMultiCC-r17* | *MIMO-ParametersPerBand* | n/a | n/a | n/a |  | Optional with capability signalling |
| 23. NR\_FeMIMO | 23-10-1m | Unified TCI with separate DL/UL TCI update for inter-cell beam management with more than one MAC-CE activated separate TCI state per CC | Support of unified TCI with separate DL/UL TCI update for inter-cell beam management with more than one MAC-CE activated separate TCI state per CC  2. Support K additional MAC-CE activated DL TCI states per CC in a band  3. Support K additional MAC-CE activated UL TCI states per CC in a band  4. Support K additional MAC-CE activated DL TCI states across all CC(s) in a band  5. Support K additional MAC-CE activated UL TCI states across all CC(s) in a band | 23-10-1 | *unifiedSeparateTCI-InterCell-r17*  *{*  *k-DL-PerCC-r17,*  *k-UL-PerCC-r17,*  *k-DL-AcrossCC-r17,*  *k-UL-AcrossCC-r17*  *}* | *MIMO-ParametersPerBand* | n/a | n/a | n/a | Component candidate values for K: {0,1,2,4}  Note: A UE that supports 23-10-1m supports K additional MAC-CE activated DL and K additional MAC-CE activated UL TCI states across all CC(s) in a band in addition to the maximum number of MAC-CE activated DL and UL TCI states across all CC(s) in a band signalled in FG 23-10-1. The signalled value in component 4 (5) of 23-10-1m plus the signalled value in component 7 (8) of 23-10-1 determine the maximum number of MAC-CE activated DL (UL) TCI states across all CC(s) in a band that are applied to intra and inter-cell beam management jointly. | Optional with capability signalling |

### 6.1.2 NR\_ext\_to\_71GHz

Table 6.1.2-1: Layer-1 feature list for NR\_ext\_to\_71GHz

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 24. NR\_ext\_to\_71GHz | 24-1 | Basic FR2-2 DL support | 1. Support reception of 120kHz subcarrier spacing for DL data and control channels, SSB, and reference signals in FR2-2 for non-initial access |  | *dl-FR2-2-SCS-120kHz-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A | A UE that supports FR2-2 must indicate this FG is supported | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-1a | Basic FR2-2 UL support | 1. PRACH with 120KHz SCS and length 139  2. Support transmission of 120kHz subcarrier spacing for UL data and control channels and reference signals in FR2-2 | 24-1 | *ul-FR2-2-SCS-120kHz-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A |  | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-1b | Wideband PRACH for 120 kHz in FR2-2 | Enhanced PRACH design for operation by adopting a single long ZC sequence, with ZC sequence equal to 1151 for 120kHz and ZC sequence equal to 571 for 120kHz | 24-1a | *widebandPRACH-SCS-120kHz-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A | This FG is only applicable when PSD limitation applies within FR2-2 based on the regional regulations | Optional withcapability signalling |
| 24. NR\_ext\_to\_71GHz | 24-1c | Multi-RB support  PUCCH format 0/1/4 for 120 kHz in FR2-2 | 1. Support multi-RB PUCCH format 4 for 120 kHz  2. Support multi-RB PUCCH format 0/1 for 120 kHz | 24-1a | *multiRB-PUCCH-SCS-120kHz-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A | This FG is only applicable when PSD limitation applies within FR2-2 based on the regional regulations | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-1d | Multiple PDSCH scheduling by single DCI for 120kHz in FR2-2 | 1. Multi-PDSCH scheduling by single DCI for the operation with 120 kHz SCS  2. HARQ enhancements for both type 1 and type 2 HARQ codebook for supporting multi-PDSCH scheduling with singe DCI | 24-1 | *multiPDSCH-SingleDCI-FR2-2-SCS-120kHz-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A |  | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-1f | Multiple PDSCH scheduling by single DCI for 120kHz in FR2-1 | 1. Multi-PDSCH scheduling by single DCI for the operation with 120 kHz SCS  2. HARQ enhancements for both type 1 and type 2 HARQ codebook for supporting multi-PDSCH scheduling with singe DCI |  | *multiPDSCH-SingleDCI-FR2-1-SCS-120kHz-r17* | *BandNR* | N/A | N/A |  | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-1e | Multiple PUSCH scheduling by single DCI for 120kHz in FR2-2 | 1. Multi-PUSCH scheduling by single DCI for the operation with 120 kHz SCS | 24-1a | *multiPUSCH-SingleDCI-FR2-2-SCS-120kHz-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A |  | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-1g | Multiple PUSCH scheduling by single DCI for 120kHz in FR2-1 | 1. Multi-PUSCH scheduling by single DCI for the operation with 120 kHz SCS with non-contiguous allocation |  | *multiPUSCH-SingleDCI-FR2-1-SCS-120kHz-r17* | *BandNR* | N/A | N/A |  | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-2 | 120KHz SSB support for initial access in FR2-2 | 1. Support 120KHz SSB for initial access in FR2-2 | 24-1, 24-1a | *initialAccessSSB-120kHz-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A |  | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-3 | 480KHz SSB support for initial access in FR2-2 | 1. Support 480KHz SSB for initial access in FR2-2 | 24-2, 24-4, 24-4a | *initialAccessSSB-480kHz-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A |  | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-4 | 480KHz SCS support for DL | 1. 480KHz SCS for DL data and control channels, SSB, and reference signal reception in FR2-2 for non-initial access  2. Multiple-slot PDCCH monitoring for 480KHz with (Xs,Ys) = (4,1)  3. Multi- PDSCH scheduling by single DCI for the operation with 480 kHz SCS and corresponding HARQ enhancements  4. Within the Ys = 1 slot (with Xs=4), monitoring of type 1 CSS with dedicated RRC configuration, type 3 CSS, and UE-SS with a maximum of two monitoring spans per slot with a span duration of Y symbols and a minimum gap of X symbols between the start of two spans, where (X,Y) = (4, 3) and (7, 3) are supported  5. Processing one unicast DCI scheduling DL and one unicast DCI scheduling UL per slot group of Xs slots per scheduled CC for FDD  6. Processing one unicast DCI scheduling DL and 2 unicast DCI scheduling UL per slot group of Xs slots per scheduled CC for TDD  7. For type 1 CSS without dedicated RRC configuration and for type 0, 0A, and 2 CSS, the configured monitoring occasion(s) can be any OFDM symbol(s) of any slot(s) of the slot group, and the actual monitoring occasion for any one of Type 1- CSS without dedicated RRC configuration, or Types 0, 0A, or 2 CSS is within a single span of three consecutive OFDM symbols within a single slot of the slot group. | 24-1 | *dl-FR2-2-SCS-480kHz-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A |  | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-4a | 480KHz SCS support for UL | 1. PRACH with 480KHz and length 139  2. 480KHz SCS for UL data and control channels and reference signal transmission in FR2-2  3. Multi-PUSCH scheduling by single DCI for the operation with 480 kHz SCS | 24-1a, 24-4 | *ul-FR2-2-SCS-480kHz-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A |  | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-4b | Wideband PRACH for 480 kHz in FR2-2 | PRACH with 480KHz and length 571 | 24-4a | *widebandPRACH-SCS-480kHz-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A | This FG is only applicable when PSD limitation applies within FR2-2 based on the regional regulations | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-4c | Multi-RB PUCCH format 0/1/4 for 480 kHz in FR2-2 | Support multi-RB PUCCH format 0/1/4 for 480 kHz | 24-4a | *multiRB-PUCCH-SCS-480kHz-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A | This FG is only applicable when PSD limitation applies within FR2-2 based on the regional regulations | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-4f | Enhanced PDCCH monitoring for 480KHz in FR2-2 | 1. Multiple-slot PDCCH monitoring for 480KHz with (Xs,Ys)=(4,2)  2.) Within each of the Ys = 2 slots (with Xs=4), monitoring of type 1 CSS with dedicated RRC configuration, type 3 CSS, and UE-SS in the first 3 OFDM symbols of each slot | 24-4 | *enhancedPDCCH-monitoringSCS-480kHz-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A |  | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-5 | 960KHz SCS support for DL | 1. 960KHz SCS for DL data and control channels, SSB, and reference signal reception in FR2-2 for non-initial access  2. Multiple-slot PDCCH monitoring for 960KHz with (Xs,Ys)=(8,1)  3. MultiPDSCH scheduling by single DCI for the operation with 960 kHz SCS and corresponding HARQ enhancements  4. Within the Ys = 1 slot (with Xs=8), monitoring of type 1 CSS with dedicated RRC configuration, type 3 CSS, and UE-SS with a span duration of Y symbols and a minimum gap of X symbols between the start of two spans, where (X,Y)= (7, 3) is supported  5. Processing one unicast DCI scheduling DL and one unicast DCI scheduling UL per slot group of Xs slots per scheduled CC for FDD  6. Processing one unicast DCI scheduling DL and 2 unicast DCI scheduling UL per slot group of Xs slots per scheduled CC for TDD  7. For type 1 CSS without dedicated RRC configuration and for type 0, 0A, and 2 CSS, the configured monitoring occasion(s) can be any OFDM symbol(s) of any slot(s) of the slot group, and the actual monitoring occasion for any one of Type 1- CSS without dedicated RRC configuration, or Types 0, 0A, or 2 CSS is within a single span of three consecutive OFDM symbols within a single slot of the slot group. | 24-1 | *dl-FR2-2-SCS-960kHz-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A |  | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-5a | 960KHz SCS support for UL | 1. PRACH with 960KHz and length 139  2. 960KHz SCS for UL data and control channels and reference signal transmission in FR2-2  3. Multi-PUSCH scheduling by single DCI for the operation with 960 kHz SCS | 24-1a, 24-5 | *ul-FR2-2-SCS-960kHz-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A |  | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-5c | Multi-RB PUCCH format 0/1/4 for 960 kHz in FR2-2 | Support multi-RB PUCCH format 0/1/4 for 960 kHz | 24-5a | *multiRB-PUCCH-SCS-960kHz-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A | This FG is only applicable when PSD limitation applies within FR2-2 based on the regional regulations | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-5f | Enhanced PDCCH monitoring for 960KHz in FR2-2 | 1. Multiple-slot PDCCH monitoring for 960KHz with (Xs,Ys)  2.) Within each of the Ys = 2 (with Xs=4) or Ys = 4 (with Xs=8) slots, monitoring of type 1 CSS with dedicated RRC configuration, type 3 CSS, and UE-SS in the first 3 OFDM symbols of each slot or within the Ys = 1 (with Xs=4) slot, monitoring of type 1 CSS with dedicated RRC configuration, type 3 CSS, and UE-SS with a span duration of Y symbols and a minimum gap of X symbols between the start of two spans, where (X,Y) = (7, 3) | 24-5 | *enhancedPDCCH-monitoringSCS-960kHz-r17*  *{*  *pdcch-monitoring4-1-r17,*  *pdcch-monitoring4-2-r17,*  *pdcch-monitoring8-4-r17*  *}* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A | Component 1 candidate values: one or more of {(4,1), (4,2), (8,4)} | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-6 | Type 1 channel access procedure in uplink for FR2-2 with shared spectrum channel access | 1. Support Type 1 channel access procedure  2. Support LBT performed per channel, as defined in 37.213 Clause 4.4 | 24-1a | *type1-ChannelAccess-FR2-2-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A | A UE that supports FR2-2 must indicate this FG is supported when required by regulation | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-7 | Type 2 channel access procedure in uplink for FR2-2 with shared spectrum channel access | 1. Support Type 2 channel access procedure  2. Support LBT performed per channel, as defined in 37.213 Clause 4.4 | 24-1a, 24-6 | *type2-ChannelAccess-FR2-2-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A | A UE that supports FR2-2 must indicate this FG is supported when required by regulation | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-8 | 32 DL HARQ processes for FR 2-2 | Support 32 HARQ processes in DL for 120/480/960 kHz | 24-1 | *support32-DL-HARQ-ProcessPerSCS-r17*  *{*  *scs-120kHz-r17,*  *scs-480kHz-r17,*  *scs-960kHz-r17*  *}* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A | A UE supporting 32 maximum number of HARQ processes for 480/960 kHz SCS for DL shall support 32 as the maximum number of HARQ processes for 120 kHz SCS for DL in FR2-2 | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-8b | 32 DL HARQ processes for FR 2-2 - maximum number of component carriers | Maximum number of component carriers that can be configured with 32 DL HARQ processes | 24-8 | *maxCC-32-DL-HARQ-ProcessFR2-2-r17* | *CA-ParametersNR-v1700* | N/A | N/A | Candidate component values: {1,2,3,4,6,8,16,32} | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-9 | 32 UL HARQ processes for FR 2-2 | Support 32 HARQ processes in UL for 120/480/960 kHz | 24-1 | *support32-UL-HARQ-ProcessPerSCS-r17*  *{*  *scs-120kHz-r17,*  *scs-480kHz-r17,*  *scs-960kHz-r17*  *}* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A | A UE supporting 32 maximum number of HARQ processes for 480/960 kHz SCS for UL shall support 32 as the maximum number of HARQ processes for 120 kHz SCS for UL in FR2-2 | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-9b | 32 UL HARQ processes for FR 2-2 - maximum number of component carriers | Maximum number of component carriers that can be configured with 32 UL HARQ processes | 24-9 | *maxCC-32-UL-HARQ-ProcessFR2-2-r17* | *CA-ParametersNR-v1700* | N/A | N/A | Candidate component values: {1,2,3,4,5,8,16,32} | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-10 | Reduced beam switching time delay | Support of reduced beam switching time delay d = 56 symbols for 480 kHz SCS |  | *reduced-BeamSwitchTiming-FR2-2-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | N/A | If this capability is not reported and the UE supports both FG 24-4 and 24-5, the default value of 112 symbols is assumed | Optional with capability signalling |
| 24. NR\_ext\_to\_71GHz | 24-11a | Capability on the number of CCs for monitoring a maximum number of BDs and non-overlapped CCEs when configured with DL CA with Rel-17 PDCCH monitoring capability on all the serving cells | Capability on the number of CCs for monitoring a maximum number of BDs and non-overlapped CCEs when configured with DL CA with Rel-17 PDCCH monitoring capability on all the serving cells | 24-4 or 24-5 | *pdcch-MonitoringCA-r17* | *CA-ParametersNR-v1720* | N/A | N/A | Candidate values: {4, 5, …, 16} | Optional with capability signaling |
| 24. NR\_ext\_to\_71GHz | 24-11c | Number of carriers for CCE/BD scaling with DL CA with mix of Rel. 17 and Rel. 15 PDCCH monitoring capabilities on different carriers | Supported combination(s) of (pdcch-BlindDetectionCA-R15, pdcch-BlindDetectionCA-R17) | 24-4 or 24-5 | *pdcch-BlindDetectionMixedList1-r17* | *CA-ParametersNR-v1720* | N/A | N/A | Candidate values for pdcch-BlindDetectionCA-R15: 1 to 15  Candidate values for pdcch-BlindDetectionCA-R17: 1 to 15  Range of pdcch-BlindDetectionCA-R15 + pdcch-BlindDetectionCA-R17: {4, 5, …, 16} | Optional with capability |
| 24. NR\_ext\_to\_71GHz | 24-11d | Number of carriers for CCE/BD scaling with DL CA with mix of Rel. 17 and Rel. 16 PDCCH monitoring capabilities on different carriers | Supported combination(s) of (pdcch-BlindDetectionCA-R16, pdcch-BlindDetectionCA-R17) | 24-4 or 24-5 | *pdcch-BlindDetectionMixedList2-r17* | *CA-ParametersNR-v1720* | N/A | N/A | Candidate values for pdcch-BlindDetectionCA-R16: 1 to 15  Candidate values for pdcch-BlindDetectionCA-R17: 1 to 15  Range of pdcch-BlindDetectionCA-R16 + pdcch-BlindDetectionCA-R17: {3, 4, 5, …, 16} | Optional with capability |
| 24. NR\_ext\_to\_71GHz | 24-11e | Number of carriers for CCE/BD scaling with DL CA with mix of Rel. 17, Rel. 16 and Rel. 15 PDCCH monitoring capabilities on different carriers | Supported combination(s) of (pdcch-BlindDetectionCA-R15, pdcch-BlindDetectionCA-R16, pdcch-BlindDetectionCA-R17) | 24-4 or 24-5 | *pdcch-BlindDetectionMixedList3-r17* | *CA-ParametersNR-v1720* | N/A | N/A | Candidate values for pdcch-BlindDetectionCA-R15: 1 to 15  Candidate values for pdcch-BlindDetectionCA-R16: 1 to 15  Candidate values for pdcch-BlindDetectionCA-R17: 1 to 15  Range of pdcch-BlindDetectionCA-R15 + pdcch-BlindDetectionCA-R16+ pdcch-BlindDetectionCA-R17: {3,4, 5, …, 16} | Optional with capability |
| 24. NR\_ext\_to\_71GHz | 24-11f | Capability on the number of CCs for monitoring a maximum number of BDs and non-overlapped CCEs for MCG and for SCG when configured for NR-DC operation with Rel-17 PDCCH monitoring capability on all the serving cells | * Capability on the number of CCs for monitoring a maximum number of BDs and non-overlapped CCEs for MCG and for SCG when configured for NR-DC operation with Rel-17 PDCCH monitoring capability on all the serving cells * Supported combination of (pdcch-BlindDetectionMCG-UE-r17, pdcch-BlindDetectionSCG-UE-r17) | 24-4 or 24-5 | *pdcch-BlindDetectionMCG-SCG-List-r17* | *CA-ParametersNR-v1720* | N/A | N/A | Maximum number of supported combinations is {1,…,16}  If the UE reports pdcch-BlindDetectionCA-r17,  - Candidate values for pdcch-BlindDetectionMCG-UE-r17 is 1 to pdcch-BlindDetectionCA-r17-1  - Candidate values for pdcch-BlindDetectionSCG-UE-r17 is 1 to pdcch-BlindDetectionCA-r17-1  - pdcch-BlindDetectionMCG-UE-r17 + pdcch-BlindDetectionSCG-UE-r17 >= pdcch-BlindDetectionCA-r17  Otherwise, the value of pdcch-BlindDetectionMCG-UE-r17 or of pdcch-BlindDetectionSCG-UE-r17 is {1, 2, 3} | Optional with capability |
| 24. NR\_ext\_to\_71GHz | 24-11g | Number of carriers for CCE/BD scaling for MCG and for SCG when configured for NR-DC operation with mix of Rel. 17 and Rel. 15 PDCCH monitoring capabilities on different carriers | Supported combination(s) of (pdcch-BlindDetectionMCG-UE-r15, pdcch-BlindDetectionSCG-UE-r15, pdcch-BlindDetectionMCG-UE-r17, pdcch-BlindDetectionSCG-UE-r17) | 24-4 or 24-5 | *pdcch-BlindDetectionMixedList1-r17* | *CA-ParametersNR-v1720* | N/A | N/A | Maximum number of supported combinations is {1,…,16}  One combination of (pdcch-BlindDetectionMCG-UE-r15, pdcch-BlindDetectionSCG-UE-r15, pdcch-BlindDetectionMCG-UE-r17, pdcch-BlindDetectionSCG-UE-r17) corresponds to one combination of (pdcch-BlindDetectionCA-r15, pdcch-BlindDetectionCA-r17)  If the UE reports pdcch-BlindDetectionCA-r15,  - Candidate values for pdcch-BlindDetectionMCG-UE-r15 is 0 to pdcch-BlindDetectionCA-r15  - Candidate values for pdcch-BlindDetectionSCG-UE-r15 is 0 to pdcch-BlindDetectionCA-r15  - pdcch-BlindDetectionMCG-UE-r15 + pdcch-BlindDetectionSCG-UE-r15>= pdcch-BlindDetectionCA-r15  Otherwise,  - Candidate values for pdcch-BlindDetectionMCG-UE-r15 is {0, 1, 2, 3}  - Candidate values for pdcch-BlindDetectionSCG-UE-r15 is {0, 1, 2, 3}  If the UE reports pdcch-BlindDetectionCA-r17,  - Candidate values for pdcch-BlindDetectionMCG-UE-r17 is 0 to pdcch-BlindDetectionCA-r17  - Candidate values for pdcch-BlindDetectionSCG-UE-r17 is 0 to pdcch-BlindDetectionCA-r17  - pdcch-BlindDetectionMCG-UE-r17 + pdcch-BlindDetectionSCG-UE-r17>= pdcch-BlindDetectionCA-r17  Otherwise,  - Candidate values for pdcch-BlindDetectionMCG-UE-r17 is {0, 1, 2, 3}  - Candidate values for pdcch-BlindDetectionSCG-UE-r17 is {0, 1, 2, 3} | Optional with capability |
| 24. NR\_ext\_to\_71GHz | 24-11h | Number of carriers for CCE/BD scaling for MCG and for SCG when configured for NR-DC operation with mix of Rel. 17 and Rel. 16 PDCCH monitoring capabilities on different carriers | Supported combination(s) of (pdcch-BlindDetectionMCG-UE-r16, pdcch-BlindDetectionSCG-UE-r16, pdcch-BlindDetectionMCG-UE-r17, pdcch-BlindDetectionSCG-UE-r17) | 24-4 or 24-5 | *pdcch-BlindDetectionMixedList2-r17* | *CA-ParametersNR-v1720* | N/A | N/A | Maximum number of supported combinations is {1,…,16}  One combination of (pdcch-BlindDetectionMCG-UE-r16, pdcch-BlindDetectionSCG-UE-r16, pdcch-BlindDetectionMCG-UE-r17, pdcch-BlindDetectionSCG-UE-r17) corresponds to one combination of (pdcch-BlindDetectionCA-r16, pdcch-BlindDetectionCA-r17)  If the UE reports pdcch-BlindDetectionCA-r16,  - Candidate values for pdcch-BlindDetectionMCG-UE-r16 is 0 to pdcch-BlindDetectionCA-r16  - Candidate values for pdcch-BlindDetectionSCG-UE-r16 is 0 to pdcch-BlindDetectionCA-r16  - pdcch-BlindDetectionMCG-UE-r15 + pdcch-BlindDetectionSCG-UE-r16>= pdcch-BlindDetectionCA-r16  Otherwise,  - Candidate values for pdcch-BlindDetectionMCG-UE-r16 is {0, 1}  - Candidate values for pdcch-BlindDetectionSCG-UE-r16 is {0, 1}  If the UE reports pdcch-BlindDetectionCA-r17,  - Candidate values for pdcch-BlindDetectionMCG-UE-r17 is 0 to pdcch-BlindDetectionCA-r17  - Candidate values for pdcch-BlindDetectionSCG-UE-r17 is 0 to pdcch-BlindDetectionCA-r17  - pdcch-BlindDetectionMCG-UE-r17 + pdcch-BlindDetectionSCG-UE-r17>= pdcch-BlindDetectionCA-r17  Otherwise,  - Candidate values for pdcch-BlindDetectionMCG-UE-r17 is {0, 1, 2}  - Candidate values for pdcch-BlindDetectionSCG-UE-r17 is {0, 1, 2} | Optional with capability |
| 24. NR\_ext\_to\_71GHz | 24-11i | Number of carriers for CCE/BD scaling for MCG and for SCG when configured for NR-DC operation with mix of Rel. 17, Rel. 16 and Rel. 15 PDCCH monitoring capabilities on different carriers | Supported combination(s) of (pdcch-BlindDetectionMCG-UE-r15, pdcch-BlindDetectionSCG-UE-r15, pdcch-BlindDetectionMCG-UE-r16, pdcch-BlindDetectionSCG-UE-r16, pdcch-BlindDetectionMCG-UE-r17, pdcch-BlindDetectionSCG-UE-r17) | 24-4 or 24-5 | *pdcch-BlindDetectionMixedList3-r17* | *CA-ParametersNR-v1720* | N/A | N/A | Maximum number of supported combinations is {1,…,16}  One combination of (pdcch-BlindDetectionMCG-UE-r15, pdcch-BlindDetectionSCG-UE-r15,pdcch-BlindDetectionMCG-UE-r16, pdcch-BlindDetectionSCG-UE-r16, pdcch-BlindDetectionMCG-UE-r17, pdcch-BlindDetectionSCG-UE-r17) corresponds to one combination of (pdcch-BlindDetectionCA-r15, pdcch-BlindDetectionCA-r16, pdcch-BlindDetectionCA-r17)  If the UE reports pdcch-BlindDetectionCA-r15,  - Candidate values for pdcch-BlindDetectionMCG-UE-r15 is 0 to pdcch-BlindDetectionCA-r15  - Candidate values for pdcch-BlindDetectionSCG-UE-r15 is 0 to pdcch-BlindDetectionCA-r15  - pdcch-BlindDetectionMCG-UE-r15 + pdcch-BlindDetectionSCG-UE-r15>= pdcch-BlindDetectionCA-r15  Otherwise,  - Candidate values for pdcch-BlindDetectionMCG-UE-r15 is {0, 1}  - Candidate values for pdcch-BlindDetectionSCG-UE-r15 is {0, 1}  If the UE reports pdcch-BlindDetectionCA-r16,  - Candidate values for pdcch-BlindDetectionMCG-UE-r16 is 0 to pdcch-BlindDetectionCA-r16  - Candidate values for pdcch-BlindDetectionSCG-UE-r16 is 0 to pdcch-BlindDetectionCA-r16  - pdcch-BlindDetectionMCG-UE-r15 + pdcch-BlindDetectionSCG-UE-r16>= pdcch-BlindDetectionCA-r16  Otherwise,  - Candidate values for pdcch-BlindDetectionMCG-UE-r16 is {0, 1}  - Candidate values for pdcch-BlindDetectionSCG-UE-r16 is {0, 1}  If the UE reports pdcch-BlindDetectionCA-r17,  - Candidate values for pdcch-BlindDetectionMCG-UE-r17 is 0 to pdcch-BlindDetectionCA-r17  - Candidate values for pdcch-BlindDetectionSCG-UE-r17 is 0 to pdcch-BlindDetectionCA-r17  - pdcch-BlindDetectionMCG-UE-r17 + pdcch-BlindDetectionSCG-UE-r17>= pdcch-BlindDetectionCA-r17  Otherwise,  - Candidate values for pdcch-BlindDetectionMCG-UE-r17 is {0, 1}  - Candidate values for pdcch-BlindDetectionSCG-UE-r17 is {0, 1} | Optional with capability |

### 6.1.3 NR\_IIOT\_URLLC\_enh

Table 6.1.3-1: Layer-1 feature list for NR\_IIOT\_URLLC\_enh

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 25. NR\_IIOT\_URLLC\_enh | 25-1 | SPS HARQ-ACK deferral in case of TDD collision | 1. Identify HARQ-ACK bits of active SPS configurations for deferral in the initial PUCCH slot  2. Determination of the target PUCCH slot for SPS HARQ-ACK deferral  3. Multiplexing and transmission of deferred SPS HARQ-ACK information in the target PUCCH slot  4. Handling of the collision for the same HARQ process due to deferred SPS HARQ-ACK | 5-18 | *sps-HARQ-ACK-Deferral-r17*  *{*  *non-SharedSpectrumChAccess-r17,*  *sharedSpectrumChAccess-r17*  *}* | *Phy-ParametersCommon* | No  (TDD only) | No | Reporting type of FG 25-1 is per UE with licensed/unlicensed and TN/NTN differentiation, detail signalling is up to RAN2  Note: the differentiation as mentioned above are not common differentiation types, and are not described in 38.306 Annex. RAN1 does not imply to formally introduce these as new differentiations. RAN2 can decide the signalling as long as the intention is reflected | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-2 | Repetitions for PUCCH format 0, and 2 over multiple slots with K = 2, 4, 8 | Repetitions for PUCCH format 0 and 2 over multiple slots with K = 2, 4, 8 | 4-23 | *pucch-Repetition-F0-2-r17* | *BandNR* | N/A | N/A |  | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-3 | Repetitions for PUCCH format 0, 1, 2, 3 and 4 over multiple PUCCH subslots with configured K = 2, 4, 8 | Repetitions for PUCCH format 0, 1, 2, 3 and 4 over multiple PUCCH subslots with RRC configured repetition factor K = 2, 4, 8  Note: The support of FG 25-3 doesn’t imply an increase of the maximum number of PUCCHs per slot that supported by the UE | 4-23  11-3 | *pucch-Repetition-F0-1-2-3-4-RRC-Config-r17* | *FeatureSetUplink-v1720* | N/A | N/A |  | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-3a | Repetitions for PUCCH format 0, 1, 2, 3 and 4 over multiple PUCCH subslots using dynamic repetition indication | Repetitions for PUCCH format 0, 1, 2, 3 and 4 over multiple PUCCH subslots based on dynamic repetition indication.  Note: Dynamic PUCCH repetition factor indication is only supported for HARQ-ACK | 25-3 | *pucch-Repetition-F0-1-2-3-4-DynamicIndication-r17* | *FeatureSetUplink-v1720* | N/A | N/A |  | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-3b | Inter-subslot frequency hopping for PUCCH repetitions | 1. Support inter-subslot frequency hopping for PUCCH repetition operation of PUCCH Formats 0, 1, 2, 3 and 4 for 7OS slot-based PUCCH configurations.  2. Support inter-subslot frequency hopping for PUCCH repetition operation of PUCCH Format 0 and Format 2 for 2OS slot-based PUCCH configurations | 25-3 | *interSubslotFreqHopping-PUCCH-r17* | *FeatureSetUplink-v1720* | N/A | N/A |  | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-4 | One-shot HARQ ACK feedback triggered by DCI format 1\_2 | 1. Support feedback of type 3 HARQ-ACK codebook, triggered by a DCI 1\_2 scheduling a PDSCH  2. Support feedback of type 3 HARQ-ACK codebook, triggered by a DCI 1\_2 without scheduling a PDSCH using a reserved FDRA value | 10-16  11-1 | *oneShotHARQ-feedbackTriggeredByDCI-1-2-r17* | *BandNR* | N/A | N/A |  | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-5 | PHY priority handling for one-shot HARQ ACK feedback | Support transmission of type 3 HARQ-ACK codebook using the first or second PUCCH configuration based on PHY priority indication in the triggering DCI | 10-16  11-4 | *oneShotHARQ-feedbackPhy-Priority-r17* | *BandNR* | N/A | N/A |  | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-6 | Enhanced type 3 HARQ-ACK codebook feedback | 1. Support feedback of enhanced type 3 HARQ-ACK codebook, triggered by a DCI 1\_1 and DCI format 1\_2 (for a UE supporting DCI format 1\_2, 11-1)  2. Support configuration of up to 8 enhanced type 3 HARQ-ACK codebooks.  3. Support feedback of a dynamically selected enhanced type 3 HARQ-ACK codebook based on triggering information in DCI 1\_1 and DCI 1\_2 (for a UE supporting DCI format 1\_2, 11-1)  4. Support transmission of enhanced type 3 HARQ-ACK codebook using the first or second PUCCH configuration based on PHY priority indication in the triggering DCI (for a UE supporting two HARQ-ACK codebooks / PUCCH config in 11-4)  5. Supported maximum number of actual PUCCH transmissions for type 3 or enhanced type 3 HARQ-ACK codebook feedback within a slot | 10-16 | *enhancedType3-HARQ-CodebookFeedback-r17*  *{*  *enhancedType3-HARQ-Codebooks-r17,*  *maxNumberPUCCH-Transmissions-r17*  *}* | *BandNR* | N/A | N/A | For component 2, the UE indicates its capability in the number of enhanced type 3 HARQ-ACK codebooks: {1, 2, 4, 8}  For component 3, the dynamic indication is only supported if the UE for component 2 supports more than one enhanced type 3 HARQ-ACK codebook to be configured  Candidate values for component 5 is: {1, 2, 3, 4, 5, 6, 7}. | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-7 | Triggered HARQ-ACK codebook re-transmission | 1. Support HARQ-ACK re-transmission from an earlier PUCCH slot based on the triggering information in DCI format 1\_1 and DCI format 1\_2 (for a UE supporting DCI format 1\_2, 11-1)  2. Support the related PHY priority handling in terms of HARQ-ACK codebook selection and the applicable PUCCH configuration (for a UE supporting two HARQ-ACK codebooks / PUCCH config in 11-4)  3. Supported minimum value M for the HARQ re-tx offset  4. Supported maximum value N for the HARQ re-tx offset |  | *triggeredHARQ-CodebookRetx-r17*  *{*  *minHARQ-Retx-Offset-r17,*  *maxHARQ-Retx-Offset-r17*  *}* | *BandNR* | N/A | N/A | Candidate values for component 3 is: M = {-7, -5, …, 1}  Candidate values for component 4 is: N= {4, 6, …, 24}  Note: The minimum requirement for Component 3 and Component 4 of FG 25-7 is valid for HARQ CBs consisted of HARQ Processes with a single HARQ bit per HARQ Process ID | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-8 | Semi-static HARQ-ACK codebook for sub-slot PUCCH | Semi-static (Type 1) HARQ-ACK codebook for sub-slot based PUCCH configuration | 4-11, 11-3 | *semiStaticHARQ-ACK-CodebookSub-SlotPUCCH-r17* | *FeatureSetUplink-v1720* | N/A | N/A |  | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-9 | Semi-static PUCCH cell switching for a single PUCCH group only | 1. Semi-static PUCCH cell switching using configured time-domain domain pattern of applicable PUCCH cell / carrier for a single PUCCH group only. This component indicates one of the candidate values {only primary PUCCH group can support PUCCH cell switch, only secondary PUCCH group can support PUCCH cell switch, either primary or secondary PUCCH group can support PUCCH cell switch}  2. For the PUCCH group supporting semi-static PUCCH cell switch, for a BC, the UE reports one or multiple of supported configuration(s) of PUCCH group config, where each supported configuration includes the following information   * one or multiple carrier type pairs that can support PUCCH cell switch, where the carrier type are selected from {FR1 licensed TDD, FR2 licensed TDD} |  | *semiStaticPUCCH-CellSwitchSingleGroup-r17*  *{*  *pucch-Group-r17,*  *pucch-Group-Config-r17*  *}* | *CA-ParametersNR-v1720* | N/A  (TDD only) | N/A | Note: this feature applies to cells in the same TAG only  If UE supporting this FG also supports both FGs 6-9 and 6-9a or both FGs 22-7b and 22-7c or FGs 22-6 or 22-6a when UE is not configured with two NR PUCCH groups, the UE supports the cases of both same and different numerologies between switchable cells. Otherwise, the UE supports the case of same numerology between switchable cells | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-9a | Semi-static PUCCH cell switching for two PUCCH groups | Semi-static PUCCH cell switching using configured time-domain domain pattern of applicable PUCCH cell / carrier  For the BC, the UE reports one or multiple of supported configuration(s) of {primary PUCCH group config, secondary PUCCH group config} where for each supported configuration,   * The “primary PUCCH group config” includes following information:   + one or multiple carrier type pairs that can support PUCCH cell switch, where the carrier type are selected from {FR1 licensed TDD, FR2 licensed TDD} * The “secondary PUCCH group config” includes following information:   + one or multiple carrier type pairs that can support PUCCH cell switch, where the carrier type are selected from {FR1 licensed TDD, FR2 licensed TDD} |  | *semiStaticPUCCH-CellSwitchTwoGroups-r17* | *CA-ParametersNR-v1720* | N/A  (TDD only) | N/A | Note: this feature applies to cells in the same TAG only  If UE supporting this FG also supports both FGs 6-9 and 6-9a or both FGs 22-7b and 22-7c, the UE supports the cases of both same and different numerologies between switchable cells. Otherwise, the UE supports the case of same numerology between switchable cells | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-10 | PUCCH cell switching based on dynamic indication for same length of overlapping PUCCH slots/sub-slots for a single PUCCH group only | 1. PUCCH cell switching based on dynamic indication in the DCI scheduling the PUCCH for same length (in physical time) of overlapping PUCCH slots/sub-slots for a single PUCCH group only. This component indicates one of the candidate values {only primary PUCCH group can support PUCCH cell switch, only secondary PUCCH group can support PUCCH cell switch, either primary or secondary PUCCH group can support PUCCH cell switch}  2. For the PUCCH group supporting PUCCH cell switching based on dynamic indication in the DCI scheduling the PUCCH for same length (in physical time) of overlapping PUCCH slots/sub-slots, for a BC, the UE reports one or multiple of supported configuration(s) of PUCCH group config, where each supported configuration includes the following information   * one or multiple carrier type pairs that can support PUCCH cell switch, where the carrier type are selected from {FR1 licensed TDD, FR2 licensed TDD} |  | *dynamicPUCCH-CellSwitchSameLengthSingleGroup-r17*  *{*  *pucch-Group-r17,*  *pucch-Group-Config-r17*  *}* | *CA-ParametersNR-v1720* | N/A (TDD only) | N/A | Note: this feature applies to cells in the same TAG only  If UE supporting this FG also supports both FGs 6-9 and 6-9a or both FGs 22-7b and 22-7c or FGs 22-6 or 22-6a when UE is not configured with two NR PUCCH groups, the UE supports the cases of both same and different numerologies between switchable cells. Otherwise, the UE supports the case of same numerology between switchable cells | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-10a | PUCCH cell switching based on dynamic indication for different length of overlapping PUCCH slots/sub-slots for a single PUCCH group only | 1. PUCCH cell switching based on dynamic indication in the DCI scheduling the PUCCH for different length (in physical time) of overlapping PUCCH slots/sub-slots for a single PUCCH group only. This component indicates one of the candidate values {only primary PUCCH group can support PUCCH cell switch, only secondary PUCCH group can support PUCCH cell switch, either primary or secondary PUCCH group can support PUCCH cell switch}  2. For the PUCCH group supporting PUCCH cell switching based on dynamic indication in the DCI scheduling the PUCCH for different length (in physical time) of overlapping PUCCH slots/sub-slots, for a BC, the UE reports one or multiple of supported configuration(s) of PUCCH group config, where each supported configuration includes the following information   * one or multiple carrier type pairs that can support PUCCH cell switch, where the carrier type are selected from {FR1 licensed TDD, FR2 licensed TDD} |  | *dynamicPUCCH-CellSwitchDiffLengthSingleGroup-r17*  *{*  *pucch-Group-r17,*  *pucch-Group-Config-r17*  *}* | *CA-ParametersNR-v1720* | N/A  (TDD only) | N/A | Note: this feature applies to cells in the same TAG only  If UE supporting this FG also supports both FGs 6-9 and 6-9a or both FGs 22-7b and 22-7c or FGs 22-6 or 22-6a when UE is not configured with two NR PUCCH groups, the UE supports the cases of both same and different numerologies between switchable cells. Otherwise, the UE supports the case of same numerology between switchable cells | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-10b | PUCCH cell switching based on dynamic indication for same length of overlapping PUCCH slots/sub-slots for two PUCCH groups | PUCCH cell switching based on dynamic indication in the DCI scheduling the PUCCH for same length (in physical time) of overlapping PUCCH slots/sub-slots for two PUCCH groups  For the BC, the UE reports one or multiple of supported configuration(s) of {primary PUCCH group config, secondary PUCCH group config} where for each supported configuration,   * The “primary PUCCH group config” includes following information:   + one or multiple carrier type pairs that can support PUCCH cell switch, where the carrier type are selected from {FR1 licensed TDD, FR2 licensed TDD} * The “secondary PUCCH group config” includes following information:   + one or multiple carrier type pairs that can support PUCCH cell switch, where the carrier type are selected from {FR1 licensed TDD, FR2 licensed TDD} |  | *dynamicPUCCH-CellSwitchSameLengthTwoGroups-r17* | *CA-ParametersNR-v1720* | N/A  (TDD only) | N/A | Note: this feature applies to cells in the same TAG only  If UE supporting this FG also supports both FGs 6-9 and 6-9a or both FGs 22-7b and 22-7c, the UE supports the cases of both same and different numerologies between switchable cells. Otherwise, the UE supports the case of same numerology between switchable cells | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-10c | PUCCH cell switching based on dynamic indication for different length of overlapping PUCCH slots/sub-slots for two PUCCH groups | PUCCH cell switching based on dynamic indication in the DCI scheduling the PUCCH for different length (in physical time) of overlapping PUCCH slots/sub-slots for two PUCCH groups  For the BC, the UE reports one or multiple of supported configuration(s) of {primary PUCCH group config, secondary PUCCH group config} where for each supported configuration,   * The “primary PUCCH group config” includes following information:   + one or multiple carrier type pairs that can support PUCCH cell switch, where the carrier type are selected from {FR1 licensed TDD, FR2 licensed TDD} * The “secondary PUCCH group config” includes following information:   + one or multiple carrier type pairs that can support PUCCH cell switch, where the carrier type are selected from {FR1 licensed TDD, FR2 licensed TDD} |  | *dynamicPUCCH-CellSwitchDiffLengthTwoGroups-r17* | *CA-ParametersNR-v1720* | N/A  (TDD only) | N/A | Note: this feature applies to cells in the same TAG only  If UE supporting this FG also supports both FGs 6-9 and 6-9a or both FGs 22-7b and 22-7c, the UE supports the cases of both same and different numerologies between switchable cells. Otherwise, the UE supports the case of same numerology between switchable cells | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-11 | 4-bits subband CQI | Subband CQI reporting with 4 bits per subband |  | *cqi-4-BitsSubbandTN-NonSharedSpectrumChAccess-r17* | *Phy-ParametersFRX-Diff* | No | No | This FG is reported for TN and licensed | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-11a | 4-bits subband CQI for NTN and unlicensed | Subband CQI reporting with 4 bits per subband for NTN and unlicensed |  | *cqi-4-BitsSubbandNTN-SharedSpectrumChAccess-r17* | *BandNR* | N/A | N/A | This FG is reported for NTN and unlicensed | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-12 | UE initiating a semi-static channel occupancy with configurations dependent on gNB semi-static channel access configurations | 1. Support initiating a semi-static channel access occupancy by the UE where the corresponding period is the same as, integer multiple of, or inter-factor of the period configured for a semi-static channel occupancy that can be initiated by gNB.  2. Sensing to initiate a semi-static CO or transmit after a gap greater than 16us from any transmission burst within a UE-initiated CO  3. Determination of COT initiator assumption based on rules for configured UL  4. Validating COT initiator assumption indicated in UL scheduling DCI | 10-1a | *ul-Semi-StaticChAccessDependentConfig-r17* | *SharedSpectrumChAccessParamsPerBand-v1710* | N/A | N/A | The signaling is per band but is only expected for a band where shared spectrum channel access must be used | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-13 | UE initiating a semi-static channel occupancy with independent configurations from gNB semi-static channel access configurations | Support initiating a semi-static channel access occupancy by the UE where the corresponding period is independently configured from the period configured for a semi-static channel occupancy that can be initiated by gNB. | 10-1a, 25-12 | *ul-Semi-StaticChAccessIndependentConfig-r17* | *SharedSpectrumChAccessParamsPerBand-v1710* | N/A | N/A | The signaling is per band but is only expected for a band where shared spectrum channel access must be used | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-14 | PHY prioritization of overlapping low-priority DG-PUSCH and high-priority CG-PUSCH | 1. Support PHY prioritization for the case where low-priority DG-PUSCH collides with high-priority CG-PUSCH  2. Configuration of PHY priority level for CG PUSCH, and dynamic indication of priority level for dynamic PUSCH with a single DCI format  3. Maximum number of supported carriers on the band across a set of contiguous carriers for the reported FS of that band |  | *phy-PrioritizationLowPriorityDG-HighPriorityCG-r17* | *FeatureSetUplink-v1720* | N/A | N/A | Candidate value set for component 3: {1, 2, …, 16} | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-15 | PHY prioritization of overlapping high-priority DG-PUSCH and low-priority CG-PUSCH | 1. Support PHY prioritization of overlapping high-priority dynamic grant PUSCH and low-priority configured grant PUSCH on a BWP of a serving cell  2. Configuration of PHY priority level for CG PUSCH, and dynamic indication of priority level for dynamic PUSCH with a single DCI format  3. Additional number of symbols (d1) needed beyond the PUSCH preparation time for cancelling a low priority UL transmission.  4. Additional number of symbols (d3) needed on top of Rel-16 cancellation time (which results N2+d1+d3 in total cancellation time).  5. Maximum number of supported carriers on the band across a set of contiguous carriers for the reported FS of that band |  | *phy-PrioritizationHighPriorityDG-LowPriorityCG-r17*  *{*  *pusch-PreparationLowPriority-r17,*  *additionalCancellationTime-r17*  *{*  *scs-15kHz-r17,*  *scs-30kHz-r17,*  *scs-60kHz-r17,*  *scs-120kHz-r17*  *},*  *maxNumberCarriers-r17*  *}* | *FeatureSetUplink-v1720* | N/A | N/A | Candidate value set for component 3: {0, 1, 2}  Candidate value set for component 4: d3 = {0, 1, …, 𝜇+1} symbol(s) upon UE capability report, where 𝜇=0,1,2,3 for SCS=15/30/60/120kHz, respectively.  Candidate value set for component 5: {1, 2, …, 16} | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-16 | HARQ-ACK with different priorities multiplexing on a PUCCH/PUSCH | 1. Support multiplexing a high-priority HARQ-ACK and a low-priority HARQ-ACK into a PUCCH. Support separate coding for the two HARQ-ACKs.  3. Support multiplexing a low-priority HARQ-ACK, a high-priority HARQ-ACK and a high-priority SR into a PUCCH.  4. Support multiplexing a low-priority HARQ-ACK in a high-priority PUSCH (conveying UL-SCH only). Support separate beta\_offset values for this priority combination.  5. Support multiplexing a high-priority HARQ-ACK in a low-priority PUSCH (conveying UL-SCH only). Support separate beta\_offset values for this priority combination.  6. Support multiplexing a low-priority HARQ-ACK, a high-priority PUSCH, a high-priority HARQ-ACK and/or CSI.  7. Support multiplexing a high-priority HARQ-ACK, a low-priority PUSCH, a low-priority HARQ-ACK and/or CSI. | 11-4 | *mux-HARQ-ACK-DiffPriorities-r17* | *BandNR* | N/A | N/A |  | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-18 | Parallel PUCCH and PUSCH transmission across CCs in inter-band CA | Support simultaneous PUCCH and PUSCH transmissions of different priority on different cells for inter-band CA. | 6-6 | *parallelTxPUCCH-PUSCH-r17* | *CA-ParametersNR-v1700* | N/A | N/A |  | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-19 | RTT-based Propagation delay compensation based on CSI-RS for tracking and SRS | Support RTT-based Propagation delay compensation for time synchronization of the Uu interface based on CSI-RS for tracking and SRS | 2-51, 2-53 | *rtt-BasedPDC-CSI-RS-ForTracking-r17* | *FeatureSetDownlink-v1720* | N/A | N/A |  | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-19a | RTT-based Propagation delay compensation based on DL PRS for RTT-based PDC and SRS | 1. Support RTT-based Propagation delay compensation for time synchronization of the Uu interface based on DL PRS and SRS  2. Max number of DL PRS Resources in DL PRS Resource Set for PDC  Values = {1, 2, 4, 8, 16, 32, 64}  Note: 16, 32, 64 are only applicable to FR2 bands  3. Max number of DL PRS resources that UE can process in a slot.  a) FR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHz  b) FR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz | 2-53 | *rtt-BasedPDC-PRS-r17*  *{*  *maxNumberPRS-Resource-r17,*  *maxNumberPRS-ResourceProcessedPerSlot-r17,*  *{*  *scs-15kHz-r17,*  *scs-30kHz-r17,*  *scs-60kHz-r17,*  *scs-120kHz-r17*  *},*  *}* | *FeatureSetDownlink-v1720* | N/A | N/A |  | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-19b | Support of PRS as spatial relation RS for SRS | Support of PRS as spatial relation RS for SRS | 25-19a | *prs-AsSpatialRelationRS-For-SRS-r17* | *FeatureSetDownlink-v1730* | N/A | N/A (FR2 only) |  | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-20 | Propagation delay compensation based on legacy TA procedure | Support propagation delay compensation based on legacy TA procedure |  | *ta-BasedPDC-TN-NonSharedSpectrumChAccess-r17* | *Phy-ParametersCommon* | no | no | This FG is reported for TN and licensed | Optional with capability signaling |
| 25. NR\_IIOT\_URLLC\_enh | 25-20a | Propagation delay compensation based on legacy TA procedure for NTN and unlicensed | Support propagation delay compensation based on legacy TA procedure for NTN and unlicensed |  | *ta-BasedPDC-NTN-SharedSpectrumChAccess-r17* | *BandNR* | N/A | N/A | This FG is reported for NTN and unlicensed | Optional with capability signaling |

### 6.1.4 NR\_NTN\_solutions

Table 6.1.4-1: Layer-1 feature list for NR\_NTN\_solutions

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 26. NR\_NTN\_solutions | 26-1 | Uplink Time and Frequency pre-compensation and timing relationship enhancements | 1. Support of UE specific TA calculation based on its GNSS-acquired position and the serving satellite ephemeris. 2. Support of common TA calculation according to the parameters provided by the network (UE considers common TA as 0 if the parameters are not provided) 3. For TA update in RRC\_CONNECTED state, support of combination of both open (i.e. UE autonomous TA estimation, and common TA estimation) and closed (i.e., received TA commands) control loops 4. Support of pre-compensation of the calculated TA in its uplink transmissions 5. Support of estimating UE-gNB RTT and delaying the start of RAR window by UE-gNB RTT 6. Support of frequency pre-compensation to counter shift the Doppler experienced on the service link 7. Support of determining timing of the scheduling of PUSCH, PUCCH and PDCCH ordered PRACH, CSI reference resource, transmission of aperiodic SRS activation of TA command, first PUSCH transmission in CG Type 2 with cell-specific K\_offset if indicated 8. Support of determining timing of the UE action and assumption on a downlink configuration carried by MAC CE command by K\_mac if it is indicated and determining the timing of PDCCH monitoring in recovery search space using K-mac during beam failure recovery procedure 9. Support of UE receiving cell-specific K\_offset/K\_mac in system information |  | *uplinkPreCompensation-r17* | *BandNR* | No | No | An NTN UE is required to at least support UE specific TA and frequency calculation based at least on its GNSS-acquired position and the serving satellite ephemeris  Note: This UE feature group is applicable only for bands in Table 5.2.2-1 in TS 38.101-5 and HAPS operation bands in Clause 5.2 of TS 38.104 | Optional with capability signalling  For UE supports NR communication via satellite, UE must indicate this FG is supported. |
| 26. NR\_NTN\_solutions | 26-4 | UE reporting of information related to TA pre-compensation | 1. Support UE reporting of information related to TA pre-compensation | 26-1 | *uplink-TA-Reporting-r17* | *BandNR* | No | No | Note: The exact content of UE reporting of information about the TA pre-compensation is up to RAN2  Note: This UE feature group is applicable only for bands in Table 5.2.2-1 in TS 38.101-5 and HAPS operation bands in Clause 5.2 of TS 38.104 | Optionalwith capability signalling |
| 26. NR\_NTN\_solutions | 26-5 | Increasing the number of HARQ processes | 1. The maximal supported HARQ process number is X for UL and Y for DL |  | *max-HARQ-ProcessNumber-r17* | *BandNR* | No | No | Candidate component values for (X,Y): {(16,32),(32,16),(32,32)}  Note: This UE feature group is applicable only for bands in Table 5.2.2-1 in TS 38.101-5 and HAPS operation bands in Clause 5.2 of TS 38.104 | Optional with capability signalling |
| 26. NR\_NTN\_solutions | 26-6 | Type-2 HARQ codebook enhancement | 1. Support of type-2 HARQ codebook enhancements when there are feedback-disabled HARQ processes | harq-FeedbackDisabled | *type2-HARQ-Codebook-r17* | *BandNR* | No | No | Note: This UE feature group is applicable only for bands in Table 5.2.2-1 in TS 38.101-5 and HAPS operation bands in Clause 5.2 of TS 38.104 | Optional with capability signalling |
| 26. NR\_NTN\_solutions | 26-6a | Type-1 HARQ codebook enhancement | 1. Support of Type-1 HARQ codebook enhancements when there are feedback-disabled HARQ processes | harq-FeedbackDisabled | *type1-HARQ-Codebook-r17* | *BandNR* | No | No | Note: This UE feature group is applicable only for bands in Table 5.2.2-1 in TS 38.101-5 and HAPS operation bands in Clause 5.2 of TS 38.104 | Optional with capability signalling |
| 26. NR\_NTN\_solutions | 26-6b | Type-3 HARQ codebook enhancement | 1. Support of Type-3 HARQ codebook enhancements when there are feedback-disabled HARQ processes | harq-FeedbackDisabled | *type3-HARQ-Codebook-r17* | *BandNR* | No | No | Note: This UE feature group is applicable only for bands in Table 5.2.2-1 in TS 38.101-5 and HAPS operation bands in Clause 5.2 of TS 38.104 | Optional with capability signalling |
| 26. NR\_NTN\_solutions | 26-8 | Support of polarization signalling in NR NTN | 1. Support polarization indication reception in SIB indicating DL and/or UL polarization information using respective polarization type parameters to indicate: RHCP or LHCP or linear 2. Support polarization signalling for target serving cell in handover command message 3. Support polarization signalling for non-serving cell in RRM measurement configuration |  | n/a | n/a | No | No | Note: This UE feature group is applicable only for bands in Table 5.2.2-1 in TS 38.101-5 and HAPS operation bands in Clause 5.2 of TS 38.104 | Optional without capability signalling |
| 26. NR\_NTN\_solutions | 26-9 | UE-specific K\_offset | 1. Support of reception of UE-specific K\_offset via MAC-CE 2. Support of determining the timing of PUSCH, PUCCH, CSI reference resource, transmission of aperiodic SRS, activation of TA command, first PUSCH transmission in CG Type 2 with UE-specific Koffset | 26-1, 26-4 | *ue-specific-K-Offset-r17* | *BandNR* | No | No | Note: This UE feature group is applicable only for bands in Table 5.2.2-1 in TS 38.101-5 and HAPS operation bands in Clause 5.2 of TS 38.104 | Optional with capability signalling |
| 26. NR\_NTN\_solutions | 26-10 | K1 range extension | 1. Support of extended K1 value range of (0..31) for unpaired spectrum |  | *k1-RangeExtension-r17* | *BandNR* | No | No | Note: This UE feature group is applicable only for bands in Table 5.2.2-1 in TS 38.101-5 and HAPS operation bands in Clause 5.2 of TS 38.104 | Optional with capability signalling |

### 6.1.5 NR\_pos\_enh

Table 6.1.5-1: Layer-1 feature list for NR\_pos\_enh

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] or TS 37.355 [9] | Parent IE in TS 38.331 [2] or TS 37.355 [9] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 27. NR\_pos\_enh | 27-1-1 | UE-RxTEGs for UE-assisted DL TDOA and/or Multi-RTT positioning | 1. Support of UE-RxTEGs for UE-assisted DL TDOA and/or Multi-RTT positioning  2. The maximum number of UE-RxTEG, which is supported and reported by UE for UE assisted DL TDOA and/or Multi-RTT positioning | 13-1, one or more of {13-3, 13-4} | *nr-UE-RxTEG-ID-MaxSupport-r17* | *LPP*  *NR-UE-TEG-ID-CapabilityPerBand-r17* | n/a | n/a | Component 1 candidate values: {UE-assisted DL TDOA, Multi-RTT positioning, UE-assisted DL TDOA and Multi-RTT positioning}  Component 2 candidate values: {1, 2, 3, 4, 6, 8}  Note: a single value is reported when both multi-RTT and DL-TDOA are supported  Need for location server to know if the feature is supported  If the UE does not include RxTEG-ID associated with a measurement, no assumption can be made on the UE Rx timing errors for this measurement  Note: The “per band” reporting on this capability does not imply, that the RxTEG IDs in the measurement report are grouped per band; In the measurement report, the RxTEG ID can span from 0, up to 31 | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-1-2 | Support of UE-TxTEGs for UL TDOA | The maximum number of UE-TxTEG for SRS resource for positioning, which is supported and reported by UE for UL TDOA | 13-8 | *nr-UE-TxTEG-ID-MaxSupport-r17* | *RRC*  *BandNR*  *LPP*  *NR-UE-TEG-ID-CapabilityPerBand-r17* | n/a | n/a | The candidate values are {1,2,3,4,6,8}  Need for location server to know if the feature is supported  Note: It should support the serving gNB to request the UE to provide the association information of UL SRS resources for positioning with Tx TEGs to the serving gNB for UL TDOA  Note: If the UE does not include TxTEG-ID associated with a SRS resource for positioning, no assumption can be made on the UE Tx timing error for this SRS resource for positioning. | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-1-2a | Support of UE-TxTEGs for Multi-RTT positioning | The maximum number of UE-TxTEG, which is supported and reported by UE for Multi-RTT positioning | 13-4, 13-8 | *nr-UE-TxTEG-ID-MaxSupport-r17* | *LPP*  *NR-UE-TEG-ID-CapabilityPerBand-r17* | n/a | n/a | The candidate values are {1,2,3,4,6,8}  Need for location server to know if the feature is supported  If the UE does not include TxTEG-ID associated with a measurement, no assumption can be made on the UE Tx timing errors for this SRS resource for positioning  Note: It should support the LMF to request the UE to provide the association information of UL SRS resources for positioning with Tx TEGs directly to the LMF for Multi-RTT if Multi-RTT is supported by UE | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-1-3 | Support of UE-RxTxTEGs for Multi-RTT | The maximum number of UE-RxTxTEG, which is supported and reported by UE for Multi-RTT positioning | 13-4 and 13-8 | *nr-UE-RxTxTEG-ID-MaxSupport-r17* | *LPP*  *NR-UE-TEG-ID-CapabilityPerBand-r17* | n/a | n/a | The candidate values are {1, 2, 4, 6, 8, 12, 16, 24, 32, 36, 48, 64}  Need for location server to know if the feature is supported  If the UE does not include RxTxTEG-ID associated with a measurement, no assumption can be made on the UE RxTx timing errors for this measurement  Note: The “per band” reporting on this capability does not imply, that the RxTxTEG IDs in the measurement report are grouped per band; In the measurement report, the RxTxTEG ID can span from 0, up to 255 | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-1-4 | Support of UE Rx TEGs for measuring the same DL PRS resource | The maximum number of different UE-RxTEGs that a UE can support to measure the same DL PRS of a TRP | 27-1-1 | *measureSameDL-PRS-ResourceWithDifferentRxTEGs-r17* | *LPP*  *NR-UE-TEG-ID-CapabilityPerBand-r17* | n/a | n/a | The candidate values are {2, 3, 4, 6, 8}  Need for location server to know if the feature is supported | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-1-4a | Support of UE Rx TEGs for measuring the same DL PRS resource simultaneously | The maximum number of UE Rx TEGs for measuring the same DL PRS resource simultaneously | 27-1-4 | *measureSameDL-PRS-ResourceWithDifferentRxTEGsSimul-r17* | *LPP*  *NR-UE-TEG-ID-CapabilityPerBand-r17* | n/a | n/a | The candidate values are {1,2,3,4,6,8}  Need for location server to know if the feature is supported. | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-2-1 | DL PRS RSRPP measurement report of the first path for UE-assisted DL-AoD | 1.) Support of measuring and reporting the PRS RSRPP of the first path for DL-AoD positioning method  2.) The maximum number of first path PRS RSRPP per TRP | 13-5 | *maxDL-PRS-FirstPathRSRP-MeasPerTRP-r17* | *LPP*  *DL-AoD-MeasCapabilityPerBand-r16* | n/a | n/a | Component 2 candidate values: 1, 2,4,8,16,24  Need for location server to know if the feature is supported  The maximum number of first path PRS RSRP per TRP should be less than or equal to the maximum number of PRS RSRP (27-2-2) | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-2-2 | DL PRS RSRP reporting for more than 8 measurements for UE-assisted DL-AoD positioning | Support reporting K> 8 DL PRS RSRP measurements per TRP. | 13-5 | *maxDL-PRS-RSRP-MeasurementFR1-v1730*  *maxDL-PRS-RSRP-MeasurementFR2-v1730* | *LPP*  *NR-DL-AoD-MeasurementCapability-r16* | n/a | Yes | The candidate values are {16, 24}  Note: Multiple RSRPs corresponding to same or different Rx Beam index should be able to be reported for a given PRS resource for different timestamps.  Need for location server to know if the feature is supported  The maximum number of reported DL PRS RSRP in the capability signaling should be no less than the maximum number of reported DL PRS RSRPP of the first path in the capability signaling | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-3-1 | M-sample measurements in RRC\_CONNECTED | The capability to support reporting a measurement based on measuring M=1 or 2 samples (instances) of a DL PRS resource set | 13-1 | *supportedDL-PRS-ProcessingSamples-RRC-CONNECTED-r17* | *LPP*  *PRS-ProcessingCapabilityPerBand-r16* | n/a | n/a | Need for location server to know if the feature is supported  Note: this feature is supported for both UE-assisted and UE based positioning | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-3-2 | DL PRS measurement outside MG and in a PRS processing window | 1. Supported PRS processing types subject to the UE determining that DL PRS to be higher priority for PRS measurement outside MG and in a PRS processing window  2. Support of priority handing options of PRS: Option1, Option2 or Option3   * + 1. Option 1: Support of “st1” and “st3” defined in clause 5.1.6.5 of TS 38.214 [20]     2. Option 2: Support of “st1”, “st2”, and “st3” defined in clause 5.1.6.5 of TS 38.214 [20]     3. Option 3: Support of “st1” only defined in clause 5.1.6.5 of TS 38.214 [20] | 13-1 | *prs-ProcessingWindowType1A-r17*  *prs-ProcessingWindowType1B-r17*  *prs-ProcessingWindowType2-r17* | *RRC*  *BandNR*  *LPP*  *PRS-ProcessingCapabilityPerBand-r16* | n/a | n/a | Component 1 candidate values: One or more of {Type 1A, Type 1B, Type 2}  Component 2 candidate values: {option1, option2, option3}  Need for location server to know if the feature is supported  Note: Component 2 can be reported per supported band for each type supported by the UE, details left to RAN2  Note:   * Type 1A refers to the determination of prioritization between DL PRS and other DL signals/channels in all OFDM symbols within the PRS processing window. The DL signals/channels from all DL CCs (per UE) are affected across LTE and NR * Type 1B refers to the determination of prioritization between DL PRS and other DL signals/channels in all OFDM symbols within the PRS processing window. The DL signals/channels from a certain band are affected * Type 2 refers to the determination of prioritization between DL PRS and other DL signals/channels only in DL PRS symbols within the PRS processing window   Note: When the UE determines higher priority for other DL signals/channels over the PRS measurement/processing, the UE is not expected to measure/process DL PRS which is applicable to all of the above capability options  Note: Within a PRS processing window, UE measurement is inside the active DL BWP with PRS having the same numerology as the active DL BWP  Note: Support of configuration of PRS processing window in RRC and support of using DL MAC CE to activate/deactivate the PRS processing window for PRS measurements is part of the FG , but no dedicated signaling is required.  A UE that supports FG 27-3-3 must indicate this FG is supported | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-3-3 | DL PRS Processing Capability outside MG - buffering capability | 1. DL PRS buffering capability  a) Type 1 – sub-slot/symbol level buffering  b) Type 2 – slot level buffering  2a. Duration of DL PRS symbols N in units of ms a UE can process every T ms assuming maximum DL PRS bandwidth in MHz, which is supported and reported by UE  2b. Duration of DL PRS symbols N2 in units of ms a UE can process inT2 ms assuming maximum DL PRS bandwidth in MHz, which is supported and reported by UE  3. Max number of DL PRS resources that UE can process in a slot  4. Maximum DL PRS bandwidth in MHz, which is supported and reported by UE for PRS measurement outside MG within the PPW | 27-3-2 | *PRS-ProcessingCapabilityOutsideMGinPPWperType-r17* | *RRC*  *BandNR*  *LPP*  *PRS-ProcessingCapabilityPerBand-r16* | n/a | n/a | Component 1 candidate values: {Type 1, Type 2}  Component 2a candidate values:   1. T: {1, 2, 4, 8, 16, 20, 30, 40, 80, 160, 320, 640, 1280} ms 2. N: {0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50} ms   Candidate 2b component values:  a) N2: {0.125, 0.25, 0.5, 1, 2, 3, 4, 5, 6, 8, 12} ms  b) T2: {4, 5, 6, 8} ms  Component 3 candidate values:  FR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHz  FR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz  Component 4 candidate values:  FR1 bands: {5, 10, 20, 40, 50, 80, 100}  FR2 bands: {50, 100, 200, 400}  Need for location server to know if the feature is supported  Note 1:The (N, T) UE capabilities are interpreted as legacy (N, T) in FG 13-1, and the UE is expected to receive the PRS within the PRS processing window and but the processing of the received PRS may be outside a PRS processing window.    The (N2, T2) UE capabilities are interpreted such that the UE is capable of measuring up to N2 ms PRS within a PPW and is capable of completing the PRS processing within the PPW, e.g., if the time duration from the last symbol of the measured PRS resource(s) inside the PPW, to the end of PPW is not smaller than T2 ms    Note 3: UE shall support either component 2a and component 2b , but not both for each supported type in a band  Note 4: A UE shall declare PRS processing capabilities of each of the supported Type-1A, Type-1B, Type-2” capabilities in case it supports multiple types in a band  A UE that supports FG 27-3-2 must indicate this FG is supported | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-4-1 | LOS/NLOS Indicator for UE-assisted positioning | 1. Support reporting LoS/NLoS indicator type to LMF  2. LOS/NLOS indicator granularity | one of 13-5,13-6, or 13-11 | *nr-los-nlos-AssistanceDataSupport-r17* | *LPP*  *NR-DL-AoD-ProvideCapabilities-r16*  *NR-DL-TDOA-ProvideCapabilities-r16* | n/a | n/a | Component 1 candidate values: {hard value, hard+soft value}  Component 2 candidate values: {trpSpecific, resourceSpecific, both}  Note: a single value is reported when both multi-RTT and DL-TDOA are supported  Need for location server to know if the feature is supported | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-6 | DL PRS processing capabilities in RRC inactive state | 1. DL PRS buffering capability  a) Type 1 – sub-slot/symbol level buffering  b) Type 2 – slot level buffering  2. Duration of DL PRS symbols N in units of ms a UE can process every T ms assuming maximum DL PRS bandwidth in MHz, which is supported and reported by UE  3. Max number of DL PRS resources that UE can process in a slot |  | *dl-PRS-BufferType-RRC-Inactive-r17*  *durationOfPRS-Processing-RRC-Inactive-r17*  *{*  *durationOfPRS-ProcessingSymbols-r17,*  *durationOfPRS-ProcessingSymbolsInEveryTms-r17*  *}*  *maxNumOfDL-PRS-ResProcessedPerSlot-RRC-Inactive-r17* | *LPP*  *PRS-ProcessingCapabilityPerBand-r16* | n/a | n/a | Component 1 candidate values: {Type 1, Type 2}  Component 2 candidate values:  T: {8, 16, 20, 30, 40, 80, 160, 320, 640, 1280} ms  N: {0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50} ms  Component 3 candidate values:  FR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHz  FR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz  Need for location server to know if the feature is supported  Note: Having the PRS processing capabilities in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-7 | Multiple measurement instances which can be included in a single measurement report | Support of multiple measurement instances which can be included in a single measurement report |  | *multiMeasInSameMeasReport-r17* | *LPP*  *NR-DL-TDOA-ProvideCapabilities-r16*  *NR-DL-AoD-ProvideCapabilities-r16*  *NR-Multi-RTT-ProvideCapabilities-r16* | No | No |  | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-8 | Support of PRS TEG association information for UE-based DL-TDOA | Support of reception of association between PRS and TRP Tx TEG for UE-based positioning | 13-1 | *nr-PosCalcAssistanceSupport-r17* | *LPP*  *NR-DL-TDOA-ProvideCapabilities-r16* | n/a | n/a | Need for location server to know if the feature is supported. | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-9 | Support of lower Rx beam sweeping factor | 1. Support of the lower Rx beam sweeping factor than 8 for FR2  2. Number of Rx beam sweeping factors |  | *supportedLowerRxBeamSweepingFactor-FR2-r17* | *LPP*  *PRS-ProcessingCapabilityPerBand-r16* | n/a | n/a  FR2 only | Component 2 candidate values: {1,2,4,6}  Need for location server to know if the feature is supported | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-10 | Support of UL MAC CE based MG activation request for PRS measurements | 1. Support of using UL MAC CE to request measurement gap activation/deactivation for PRS measurements: The information in the UL MAC CE for MG activation request by the UE can be one ID associated with the preconfiguration of the MG  2. Support of preconfiguration of MGs in RRC signaling for PRS measurements: Each MG in the preconfiguration is associated with an ID | 27-11 | *mg-ActivationRequestPRS-Meas-r17* | *RRC*  *MAC-ParametersCommon* | No | No |  | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-10a | Low latency MG activation request for PRS measurements | support of low latency MG activation request for PRS measurements | 27-10, 27-11 | *mg-ActivationRequest-r17* | *LPP*  *NR-DL-TDOA-ProvideCapabilities-r16*  *NR-DL-AoD-ProvideCapabilities-r16*  *NR-Multi-RTT-ProvideCapabilities-r16* | No | No | Need for location server to know if the feature is supported  Note: RAN1 understands that FG 27-10a is intended only for the LMF to know, and that the current prerequisite FGs of FG 27-10a are capabilities only for the gNB to know. It is up to RAN2 to decide whether such a FG dependency is meaningful from signaling description perspective, and whether and how it can be captured in RAN2 specifications. | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-11 | Support of DL MAC CE based MG activation for PRS measurements | 1. Support of preconfiguration of MGs in RRC signaling for PRS measurements: Each MG in the preconfiguration is associated with an ID  2. Support of using DL MAC CE to activate/deactivate the MG for PRS measurements: The DL MAC CE for MG activation indicates the ID associated with the preconfigured MG |  | |  | | --- | | *mg-ActivationCommPRS-Meas-r17* | | *RRC*  *MAC-ParametersCommon* | No | No |  | Optional with capability signaling. |
| 27. NR\_pos\_enh | 27-12 | LOS/NLOS indicator for UE-based positioning assistance data | Support reception of the assistance data containing the LOS/NLOS indicator.  1. LOS/NLOS indicator type  2. LOS/NLOS indicator granularity |  | *nr-los-nlos-IndicatorSupport-r17* | *NR-DL-TDOA-ProvideCapabilities-r16*  *NR-DL-AoD-ProvideCapabilities-r16*  *NR-Multi-RTT-ProvideCapabilities-r16* | No | No | Component 1 candidate values: {hardValue+softValue, hardValue}  Component 2 candidate values: {resourceSpecific, trpSpecific}  Need for location server to know if the feature is supported. | Optional with capability signaling. |
| 27. NR\_pos\_enh | 27-13 | Additional path reporting for UE-assisted DL-TDOA | 1. Support of additional detected path timing reporting for K>2 additional paths for UE-assisted DL-TDOA  2. Support of RSRPP reporting for additional paths if UE supports FG 27-13a |  | *additionalPathsExtSupport-r17* | *LPP*  *NR-DL-TDOA-ProvideCapabilities-r16* | No | No | Component 1 candidate values: {4, 6, 8}  Need for location server to know if the feature is supported. | Optional with capability signaling. |
| 27. NR\_pos\_enh | 27-13a | First path RSRPP reporting for UE-assisted DL-TDOA | 1. Support of RSRPP reporting for first path | 13-1 | *supportOfDL-PRS-FirstPathRSRP-r17* | *LPP*  *DL-TDOA-MeasCapabilityPerBand-r17* | n/a | n/a | Need for location server to know if the feature is supported. | Optional with capability signaling. |
| 27. NR\_pos\_enh | 27-14 | Additional path reporting for Multi-RTT | 1. Support of additional detected path timing reporting for K>2 additional paths for Multi-RTT  2. Support of RSRPP reporting for additional paths if UE supports FG 27-14a |  | *additionalPathsExtSupport-r17* | *LPP*  *NR-Multi-RTT-ProvideCapabilities-r16* | No | No | Component 1 candidate values: {4, 6, 8}  Need for location server to know if the feature is supported. | Optional with capability signaling. |
| 27. NR\_pos\_enh | 27-14a | First path RSRPP reporting for Multi-RTT | 1. Support of RSRPP reporting for first path | 13-1 | *supportOfDL-PRS-FirstPathRSRP-r17* | *LPP*  *Multi-RTT-MeasCapabilityPerBand-r17* | n/a | n/a | Need for location server to know if the feature is supported. | Optional with capability signaling. |
| 27. NR\_pos\_enh | 27-15 | Positioning SRS transmission in RRC\_INACTIVE state for initial UL BWP | 1. Max number of SRS Resource Sets for positioning supported by UE  2. Max number of P/SPSRS Resources for positioning  3. Max number of P/SPSRS Resources for positioning per slot  4. Max number of periodic SRS Resources for positioning  5. Max number of periodic SRS Resources for positioning per slot |  | *RRC*  *srs-AllPosResourcesRRC-Inactive-r17*  *LPP*  *posSRS-RRC-Inactive-InInitialUL-BWP-r17* | *RRC*  *BandNR*  *LPP*  *NR-UL-SRS-Capability* | n/a | n/a | Component 1 candidate values: {1, 2, 4, 8, 12, 16}  Component 2 candidate values: {1,2,4,8,16,32,64}  Component 3 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Component 4 candidate values: {1,2,4,8,16,32,64}  Component 5 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Note: OLPC for SRS for positioning based on SSB from the last serving cell (the cell that releases UE from connection) is part of this FG. No dedicated capability signaling is intended for this component  Need for location server to know if the feature is supported | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-15b | Positioning SRS transmission in RRC\_INACTIVE state configured outside initial UL BWP | 1. Maximum SRS bandwidth supported for each SCS that UE supports within a single CC 2. Max number of SRS Resource Sets for positioning supported by UE 3. Max number of periodic SRS Resources for positioning 4. Max number of periodic SRS Resources for positioning per slot 5. Support of different numerology between the SRS and the initial UL BWP 6. Support of SRS operation without restriction on the BW: BW of the SRS may not include BW of the CORESET#0 and SSB 7. Max number of P/SP SRS Resources for positioning 8. Max number of P/SP SRS Resources for positioning per slot 9. Support a different center frequency between the SRS for positioning and the initial UL BWP 10. Switching time between SRS Tx and other Tx in initial UL BWP or Rx in initial DL BWP | 27-15 | *posSRS-RRC-Inactive-OutsideInitialUL-r17*  *posSRS-RRC-Inactive-OutsideInitialUL-BWP-r17* | *RRC*  *BandNR*  *LPP*  *SRS-CapabilityPerBand-r16* | n/a | n/a | Component 1 candidate values:   1. FR1 bands: {5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100} 2. FR2 bands: {50, 100, 200, 400}   Component 2 candidate values: {1, 2, 4, 8, 12, 16}  Component 3 candidate values: {1,2,4,8,16,32,64}  Component 4 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Component 7 candidate values: {1,2,4,8,16,32,64}  Component 8 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Component 10 candidate values: {100us, 140us, 200us, 300us, 500us}  Note 1: The SRS should have a locationAndBandwidth, SCS, CP, defined the same way as a legacy BWP.  Note 2: If component 9 is not signaled, the UE only supports same center frequency between the SRS for positioning and initial UL BWP  Note 3: If component 5 is not signaled, the UE only supports same numerology between the SRS and the initial UL BWP  Note 4: If component 6 is not signaled, the UE supports only SRS BW that include the BW of the CORESET #0 and SSB  Note 5: Component 6 is not applicable to FDD or SUL bands  Need for location server to know if the feature is supported | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-15a | Support of positioning SRS transmission in RRC\_INACTIVE state for initial BWP with semi-persistent SRS | 1. Max number of semi-persistent SRS Resources for positioning  2. Max number of semi-persistent SRS Resources for positioning per slot | 27-15 | *RRC*  *srs-SemiPersistent-PosResourcesRRC-Inactive-r17*  *{*  *maxNumOfSemiPersistentSRSposResources-r17, maxNumOfSemiPersistentSRSposResourcesPerSlot-r17*  *}*  *LPP*  *posSRS-SP-RRC-Inactive-InInitialUL-BWP-r17* | *RRC*  *BandNR*  *LPP*  *SRS-CapabilityPerBand-r16* | n/a | n/a | Component 1 candidate values: {1,2,4,8,16,32,64}  Component 2 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Need for location server to know if the feature is supported | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-15c | Support of positioning SRS transmission in RRC\_INACTIVE state outside initial BWP with semi-persistent SRS | 1. Max number of semi-persistent SRS Resources for positioning  2. Max number of semi-persistent SRS Resources for positioning per slot | 27-15 | *RRC*  *maxNumOfSemiPersistentSRSposResources-r17*  *LPP*  *posSRS-RRC-Inactive-OutsideInitialUL-BWP-r17* | *RRC*  *PosSRS-RRC-Inactive-OutsideInitialUL-BWP-r17*  *LPP*  *SRS-CapabilityPerBand-r16* | n/a | n/a | Component 1 candidate values: {1,2,4,8,16,32,64}  Component 2 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Need for location server to know if the feature is supported | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-16 | OLPC for positioning SRS in RRC\_INACTIVE state - gNB | Same as RRC  OLPC-SRS-Pos-r16 | 27-15 | *olpc-SRS-PosRRC-Inactive-r17* | *RRC*  *BandNR*  *LPP*  *SRS-CapabilityPerBand-r16* | n/a | n/a |  | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-16a | OLPC for positioning SRS in RRC\_INACTIVE state – location server | Same as LPP  OLPC-SRS-Pos-r16 | 27-15 | *olpc-SRS-PosRRC-Inactive-r17* | *RRC*  *SRS-CapabilityPerBand-r16*  *LPP*  *SRS-CapabilityPerBand-r16* | n/a | n/a | Need for location server to know if the feature is supported.  Support of OLPC in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-17 | PRS processing in RRC\_INACTIVE | Support of PRS processing in RRC\_INACTIVE | 13-1 | *prs-ProcessingRRC-Inactive-r17* | *RRC*  *BandNR* | n/a | n/a | Note: UE supporting this feature shall support at least one from DL RSTD, DL PRS-RSRP, or UE Rx – Tx time difference measurement | Optional with capability signaling. |
| 27. NR\_pos\_enh | 27-18a | Support of PRS measurement in RRC\_INACTIVE state for DL-TDOA | Support of PRS measurement in RRC\_INACTIVE state for DL-TDOA - location server | 13-3, 27-6 | *dl-PRS-MeasRRC-Inactive-r17* | *LPP*  *DL-TDOA-MeasCapabilityPerBand-r17* | n/a | n/a | Need for location server to know if the feature is supported.  Note: Applicable for both UE-assisted and UE-based DL-TDOA  Note: PRS capabilities for DL-TDOA measurement and reporting described in FGs in 13-3, 13-3a, 13-3b, 13-6, 13-13 are the same for RRC Inactive.  Support of PRS processing measurement in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signaling. |
| 27. NR\_pos\_enh | 27-18b | Support of PRS measurement in RRC\_INACTIVE state for DL-AoD | Support of PRS measurement in RRC\_INACTIVE state for DL-AoD - location server | 13-2, 27-6 | *dl-PRS-MeasRRC-Inactive-r17* | *LPP*  *DL-AoD-MeasCapabilityPerBand-r16* | n/a | n/a | Need for location server to know if the feature is supported.  Note: Applicable for both UE-assisted and UE-based DL-AoD  Note: PRS capabilities for DL-AOD measurement and reporting described in FGs 13-2, 13-2a, 13-2b, 13-5, 13-13 are the same for RRC Inactive.  Support of PRS processing measurement in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signaling. |
| 27. NR\_pos\_enh | 27-18c | Support of PRS measurement in RRC\_INACTIVE state for Multi-RTT | 1. Support of PRS measurement in RRC\_INACTIVE state for Multi-RTT - location server | 13-4, 13-11, 27-6 | *dl-PRS-MeasRRC-Inactive-r17* | *LPP*  *Multi-RTT-MeasCapabilityPerBand-r17* | n/a | n/a | Need for location server to know if the feature is supported.  Note: PRS capabilities for Multi-RTT measurement and reporting described in FGs in 13-4, 13-4a, 13-4b, 13-11, 13-11a, 13-14 are the same for RRC Inactive  Support of PRS processing measurement in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signaling. |
| 27. NR\_pos\_enh | 27-19 | Spatial relation for positioning SRS in RRC\_INACTIVE state - gNB | Same as RRC  SpatialRelationsSRS-Pos-r16 | 27-15 | *spatialRelationsSRS-PosRRC-Inactive-r17* | *RRC*  *BandNR* | n/a | FR2 only |  | Optional with capability signalling |
| 27. NR\_pos\_enh | 27-19a | Spatial relation for positioning SRS in RRC\_INACTIVE state – location server | Same as LPP  SpatialRelationsSRS-Pos-r16 | 27-15 | *spatialRelationsSRS-PosRRC-Inactive-r17* | *LPP*  *SRS-CapabilityPerBand-r16* | n/a | FR2 only | Need for location server to know if the feature is supported.  Support of spatial relation in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signalling |
| 27. NR\_pos\_enh | 27-20 | PRS subset association for UE assisted DL-AoD | 1. Support of assistance data enhancement to indicate a subset of PRS resources for each PRS resource for the purpose of prioritization of DL-AoD reporting.  2. Supported resource set relationship for the target PRS resource and the associated subset |  | *dl-PRS-ResourcePrioritySubset-Sup-r17* | *LPP*  *NR-DL-AoD-ProvideCapabilities-r16* | n/a | n/a | Component 2 candidate values: {sameSet, DifferentSet, sameOrDifferentSet}  Need for location server to know | Optional with capability signaling. |
| 27. NR\_pos\_enh | 27-21 | PRS boresight direction for UE-assisted DL-AoD | Support of assistance data enhancement to indicate the boresight direction of a PRS resource for UE-assisted DL-AoD. |  | *nr-DL-PRS-BeamInfoSup-r17* | *LPP*  *NR-DL-AoD-ProvideCapabilities-r16* | n/a | n/a | Need for location server to know | Optional with capability signaling. |
| 27. NR\_pos\_enh | 27-22 | PRS beam pattern for UE-based DL-AoD | Support of PRS beam pattern for DL-AoD |  | *nr-PosCalcAssistanceSupport-r17* | *LPP*  *NR-DL-AoD-ProvideCapabilities-r16* | n/a | n/a | Need for location server to know | Optional with capability signaling. |
| 27. NR\_pos\_enh | 27-23 | Support of more than one activated PRS processing windows across all active DL BWPs | 1. Number of supported activated PRS processing windows | 27-3-2 | *supportedActivatedPRS-ProcessingWindow-r17* | *RRC*  *Phy-ParametersCommon* | No | No | Candidate values:{2, 3, 4} | Optional with capability signaling |

### 6.1.6 NR\_RedCap

Table 6.1.6-1: Layer-1 feature list for NR\_RedCap

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 28. NR\_RedCap | 28-1 | RedCap UE | 1. Maximum FR1 RedCap UE bandwidth is 20 MHz.  2. Maximum FR2 RedCap UE bandwidth is 100 MHz.  3. Early indication of RedCap UE in Msg.1 for 4-step RACH  4. Separate initial UL BWP for RedCap UEs  - It includes the configuration(s) needed for RedCap UE to perform random access  - Enabling/disabling of frequency hopping for common PUCCH resources  5. Separate initial DL BWP for RedCap UEs  - It includes CSS/CORESET for random access  - For separate initial DL BWP used for paging, CD-SSB is included  - For separate initial DL BWP only used for RACH, SSB may or may not be included  - For separate initial DL BWP used in connected mode as BWP#0 configuration option 1, CD-SSB is included  6. 1 UE-specific RRC configured DL BWP per carrier  7. 1 UE-specific RRC configured UL BWP per carrier  8. RRC reconfiguration of any parameters related to BWP  9. UE-specific RRC configured DL BWP with CD-SSB or NCD-SSB  10. NCD-SSB based measurements in RRC-configured DL BWP |  | *supportOfRedCap-r17* | *RedCapParameters-r17* | No | No | RedCap UEs do not support carrier aggregation or dual connectivity.  It is up to RAN2 whether/how to capture the capabilities for early indication of RedCap UE in Msg 3 and Msg A  A UE supporting this FG is not required to support FG 6-1 | Optional with capability signaling  RedCap UE must indicate this FG is supported |
| 28. NR\_RedCap | 28-1a | RRC-configured DL BWP without CD-SSB or NCD-SSB | RRC-configured DL BWP without CD-SSB or NCD-SSB | 28-1 | *bwp-WithoutCD-SSB-OrNCD-SSB-RedCap-r17* | *BandNR* | N/A | N/A |  | Optional with capability signaling |
| 28. NR\_RedCap | 28-3 | Half-duplex FDD operation type A for RedCap UE | 1. Half-duplex FDD operation (instead of full-duplex FDD operation) type A for RedCap UE | 28-1 | *halfDuplexFDD-TypeA-RedCap-r17* | *BandNR* | FDD only | FR1 only |  | Optional with capability signaling |

### 6.1.7 NR\_UE\_pow\_sav\_enh

Table 6.1.7-1: Layer-1 feature list for NR\_UE\_pow\_sav\_enh

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 29. NR\_UE\_pow\_sav\_enh | 29-1 | Paging enhancement | 1. Support receiving paging early indication in DCI format 2\_7  2. Support receiving UE subgroup indication in DCI format 2\_7  3. The set of OFDM symbols within a slot where UE can monitor the PEI PDCCH in Type 2A CSS is the same as the requirement for paging PDCCH in Type 2 CSS for IDLE and INACTIVE mode UEs |  | *pei-SubgroupingSupportBandList-r17* | *UE-RadioPagingInfo-r17* | N/A | N/A |  | Optional with capability signalling |
| 29. NR\_UE\_pow\_sav\_enh | 29-2 | TRS resources for idle/inactive UEs | TRS occasions for idle/inactive UEs  1. Support reading TRS configuration from SIB  2. Support receiving L1 indication for TRS availability |  | n/a | n/a | N/A | N/A | Receiving L1 indication via DCI format 2\_7 is supported only if the UE supports receiving DCI format 2\_7 | Optional without capability signalling |
| 29. NR\_UE\_pow\_sav\_enh | 29-3a | PDCCH skipping | Support of up to 2-bit indication of PDCCH skipping by scheduling DCI if SSSG is not configured |  | *pdcch-SkippingWithoutSSSG-r17* | *BandNR* | N/A | N/A |  | Optional with capability signaling |
| 29. NR\_UE\_pow\_sav\_enh | 29-3b | 2 search space sets group switching | Support of 1-bit indication of SSSG switching between 2 SSSGs by scheduling DCI, and timer based SSSG switching, if PDCCHSkippingDurationList is not configured |  | *sssg-Switching-1BitInd-r17* | *BandNR* | N/A | N/A | UE supports search space set group switching capability-1 according to Table 10.4-1 of 38.213 | Optional with capability signaling |
| 29. NR\_UE\_pow\_sav\_enh | 29-3c | 3 search space sets group switching | Support of 2-bit indication of SSSG switching among 3 SSSGs by scheduling DCI and timer based SSSG switching, if PDCCHSkippingDurationList is not configured | 29-3b | *sssg-Switching-2BitInd-r17* | *BandNR* | N/A | N/A | UE supports search space set group switching capability-1 according to Table 10.4-1 of 38.213 | Optional with capability signaling |
| 29. NR\_UE\_pow\_sav\_enh | 29-3d | 2 search space sets group switching with PDCCH skipping | Support of 2-bit indication of SSSG switching between 2 SSSGs, PDCCH skipping by scheduling DCI, and timer based SSSG switching | 29-3a, 29-3b | *pdcch-SkippingWithSSSG-r17* | *BandNR* | N/A | N/A | UE supports search space set group switching capability-1 according to Table 10.4-1 of 38.213 | Optional with capability signaling |
| 29. NR\_UE\_pow\_sav\_enh | 29-3e | Support Search space set group switching capability 2 for FR1 | Search space set group switching Capability-2 according to Table 10.4-1 of 38.213 for SSSG switching. | 29-3b | *searchSpaceSetGrp-switchCap2-r17* | *BandNR* | N/A | N/A (FR1 only) | For UE supporting this FG and FG 29-3b, 29-3c, and/or 29-3d, search space set group switching Capability-2 is applied to the FGs | Optional with capability signaling |

### 6.1.8 NR\_cov\_enh

Table 6.1.8-1: Layer-1 feature list for NR\_cov\_enh

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 30. NR\_cov\_enh | 30-1 | Increased maximum number of PUSCH Type A repetitions | Maximum value of K (the number of repetitions) = 32  For DG PUSCH, the number of repetitions is indicated in a TDRA list. A row index of the TDRA list is indicated by a DCI.  For Type 1 CG PUSCH, the number of repetitions is indicated by repK-r17  For Type 2 CG PUSCH, the number of repetitions is indicated in a TDRA list or by repK-r17. | One of {5-14, 5-16, 11-6} | *maxNumberPUSCH-TypeA-Repetition-r17* | *BandNR* | N/A | N/A |  | Optional with capability signalling |
| 30. NR\_cov\_enh | 30-2 | PUSCH Type A repetitions based on available slots | Transmission occasions for repetitions for dynamic and configured grant PUSCH are determined on the basis of available slots. | One of {5-14, 5-16, 5-17} | *puschTypeA-RepetitionsAvailSlot-r17* | *BandNR* | N/A | N/A |  | Optional with capability signalling |
| 30. NR\_cov\_enh | 30-3 | TB processing over multi-slot PUSCH | Support of TB processing over multi-slot PUSCH for DG and Type 2 CG without repetition in RRC connected mode. |  | *tb-ProcessingMultiSlotPUSCH-r17* | *BandNR* | N/A | N/A |  | Optional with capability signalling |
| 30. NR\_cov\_enh | 30-3a | Repetition of TB processing over multi-slot PUSCH | Support repetition of TB processing over multi-slot PUSCH in RRC connected mode. | 30-3 | *tb-ProcessingRepMultiSlotPUSCH-r17* | *BandNR* | N/A | N/A |  | Optional with capability signalling |
| 30. NR\_cov\_enh | 30-4 | The maximum duration for DM-RS bundling | The maximum duration during which UE is able to maintain power consistency and phase continuity to support DM-RS bundling for PUSCH/PUCCH |  | *maxDurationDMRS-Bundling-r17*  *{*  *fdd-r17,*  *tdd-r17*  *}* | *BandNR* | N/A | N/A | Candidate values for the maximum duration for FDD are {4, 8, 16, 32}  Candidate values for the maximum duration for TDD are {2, 4, 8, 16}  NOTE: DM-RS bundling is only applicable for UL transmissions with pi/2 BPSK, BPSK, and QPSK modulation orders for the corresponding physical channels. | Optional with capability signalling |
| 30. NR\_cov\_enh | 30-4a | DM-RS bundling for PUSCH repetition type A | Support DM-RS bundling for PUSCH repetition type A over consecutive symbols | 30-4 and one of {5-14, 5-16, 5-17} | *dmrs-BundlingPUSCH-RepTypeA-r17* | *BandNR* | N/A | N/A | This capability is applicable to following multiple carrier scenarios in addition to single carrier scenarios   * FR1+FR2 UL CA, FR1+FR2 DC, and EN-DC with NR on FR2. DMRS bundling configuration is limited to one uplink NR carrier in total on all FRs at a time. * FR1 inter-band DL CA with a “single” uplink band configured, meaning no switching to transmit SRS on another carrier. * DL CA with “additional” UL carrier configured with SRS only (i.e. no PUCCH/PUSCH configured) * FR1 inter-band UL CA with DMRS bundling * SUL with DMRS bundling   For the last three scenarios listed above, DMRS bundling can be applied with the following conditions:   * Concurrent transmissions scheduled/configured over multiple carriers are not expected by UE * Only configuration of a single TAG * Only applicable for the back-to-back case (i.e., zero gap between two transmissions within an actual TDW) * Only one band can be configured with DMRS bundling at a time * Note 1: Under the above conditions, phase continuity and power consistency within any actual TDW on one carrier is not impacted by operations on a different carrier. * Note 2: Under the above conditions, the events defined in section 6.1.7 of TS38.214 [20] for the carrier with DMRS bundling are not triggered by any transmission within any actual TDW on the other carrier. * Note 3: If the modulation scheme higher than QPSK is scheduled for transmission on any carrier configured with DMRS bundling, DMRS bundling is not applicable according to UE feature 30-4 (i.e., the error case and up to UE implementation) | Optional with capability signalling |
| 30. NR\_cov\_enh | 30-4b | DM-RS bundling for PUSCH repetition type B | Support DM-RS bundling for PUSCH repetition type B over consecutive symbols | 30-4, 11-5 | *dmrs-BundlingPUSCH-RepTypeB-r17* | *BandNR* | N/A | N/A | This capability is applicable to following multiple carrier scenarios in addition to single carrier scenarios   * FR1+FR2 UL CA, FR1+FR2 DC, and EN-DC with NR on FR2. DMRS bundling configuration is limited to one uplink NR carrier in total on all FRs at a time. * FR1 inter-band DL CA with a “single” uplink band configured, meaning no switching to transmit SRS on another carrier. * DL CA with “additional” UL carrier configured with SRS only (i.e. no PUCCH/PUSCH configured) * FR1 inter-band UL CA with DMRS bundling * SUL with DMRS bundling   For the last three scenarios listed above, DMRS bundling can be applied with the following conditions:   * Concurrent transmissions scheduled/configured over multiple carriers are not expected by UE * Only configuration of a single TAG * Only applicable for the back-to-back case (i.e., zero gap between two transmissions within an actual TDW) * Only one band can be configured with DMRS bundling at a time * Note 1: Under the above conditions, phase continuity and power consistency within any actual TDW on one carrier is not impacted by operations on a different carrier. * Note 2: Under the above conditions, the events defined in section 6.1.7 of TS38.214 [20] for the carrier with DMRS bundling are not triggered by any transmission within any actual TDW on the other carrier. * Note 3: If the modulation scheme higher than QPSK is scheduled for transmission on any carrier configured with DMRS bundling, DMRS bundling is not applicable according to UE feature 30-4 (i.e., the error case and up to UE implementation) | Optional with capability signalling |
| 30. NR\_cov\_enh | 30-4c | DM-RS bundling for TB processing over multi-slot PUSCH | Support DM-RS bundling for TB processing over multi-slot PUSCH over consecutive symbols | 30-4, 30-3 | *dmrs-BundlingPUSCH-multiSlot-r17* | *BandNR* | N/A | N/A | Note: If a UE reports support of FG 30-3a and 30-4c, the UE supports DMRS bundling for the repetitions of TBoMS  This capability is applicable to following multiple carrier scenarios in addition to single carrier scenarios   * FR1+FR2 UL CA, FR1+FR2 DC, and EN-DC with NR on FR2. DMRS bundling configuration is limited to one uplink NR carrier in total on all FRs at a time. * FR1 inter-band DL CA with a “single” uplink band configured, meaning no switching to transmit SRS on another carrier. * DL CA with “additional” UL carrier configured with SRS only (i.e. no PUCCH/PUSCH configured) * FR1 inter-band UL CA with DMRS bundling * SUL with DMRS bundling   For the last three scenarios listed above, DMRS bundling can be applied with the following conditions:   * Concurrent transmissions scheduled/configured over multiple carriers are not expected by UE * Only configuration of a single TAG * Only applicable for the back-to-back case (i.e., zero gap between two transmissions within an actual TDW) * Only one band can be configured with DMRS bundling at a time * Note 1: Under the above conditions, phase continuity and power consistency within any actual TDW on one carrier is not impacted by operations on a different carrier. * Note 2: Under the above conditions, the events defined in section 6.1.7 of TS38.214 [20] for the carrier with DMRS bundling are not triggered by any transmission within any actual TDW on the other carrier. * Note 3: If the modulation scheme higher than QPSK is scheduled for transmission on any carrier configured with DMRS bundling, DMRS bundling is not applicable according to UE feature 30-4 (i.e., the error case and up to UE implementation) | Optional with capability signalling |
| 30. NR\_cov\_enh | 30-4d | DMRS bunding for PUCCH repetitions | Support DM-RS bundling for PUCCH repetitions for PUCCH formats 1/3/4 over consecutive symbols | 30-4, 4-23 | *dmrs-BundlingPUCCH-Rep-r17* | *BandNR* | N/A | N/A | This capability is applicable to following multiple carrier scenarios in addition to single carrier scenarios   * FR1+FR2 UL CA, FR1+FR2 DC, and EN-DC with NR on FR2. DMRS bundling configuration is limited to one uplink NR carrier in total on all FRs at a time. * FR1 inter-band DL CA with a “single” uplink band configured, meaning no switching to transmit SRS on another carrier. * DL CA with “additional” UL carrier configured with SRS only (i.e. no PUCCH/PUSCH configured) * FR1 inter-band UL CA with DMRS bundling * SUL with DMRS bundling   For the last three scenarios listed above, DMRS bundling can be applied with the following conditions:   * Concurrent transmissions scheduled/configured over multiple carriers are not expected by UE * Only configuration of a single TAG * Only applicable for the back-to-back case (i.e., zero gap between two transmissions within an actual TDW) * Only one band can be configured with DMRS bundling at a time * Note 1: Under the above conditions, phase continuity and power consistency within any actual TDW on one carrier is not impacted by operations on a different carrier. * Note 2: Under the above conditions, the events defined in section 6.1.7 of TS38.214 [20] for the carrier with DMRS bundling are not triggered by any transmission within any actual TDW on the other carrier. * Note 3: If the modulation scheme higher than QPSK is scheduled for transmission on any carrier configured with DMRS bundling, DMRS bundling is not applicable according to UE feature 30-4 (i.e., the error case and up to UE implementation) | Optional with capability signalling |
| 30. NR\_cov\_enh | 30-4e | Enhanced inter-slot frequency hopping with inter-slot bundling for PUSCH | Support enhanced inter-slot frequency hopping with inter-slot bundling for PUSCH | 30-4a or 30-4b or 30-4c | *interSlotFreqHopInterSlotBundlingPUSCH-r17* | *BandNR* | N/A | N/A |  | Optional with capability signalling |
| 30. NR\_cov\_enh | 30-4f | Enhanced inter-slot frequency hopping for PUCCH repetitions with DMRS bundling | Enhanced inter-slot frequency hopping for PUCCH repetitions with DMRS bundling | 30-4d | *interSlotFreqHopPUCCH-r17* | *BandNR* | N/A | N/A |  | Optional with capability signalling |
| 30. NR\_cov\_enh | 30-4g | Restart DM-RS bundling | Support restarting DM-RS bundling after the events triggered by DCI or MAC CE that violate power consistency and phase continuity  Note: Events which are triggered by DCI or MAC CE, but do not require UE capability to resume maintaining power consistency and/or phase continuity as specified in subclause 6.1.7 of TS 38.214 [20] v17.3.0 are excluded from this feature | 30-4 | *dmrs-BundlingRestart-r17* | *BandNR* | N/A | N/A |  | Optional with capability signalling |
| 30. NR\_cov\_enh | 30-4h | DM-RS bundling for non-back-to-back transmission | Support DM-RS bundling for non-back-to-back transmission for consecutive slots for PUSCH and PUCCH only for corresponding supported back-to-back transmission FGs (30-4a, 30-4b, 30-4c, or 30-4d) | 30-4a, 30-4b, 30-4c, or 30-4d | *dmrs-BundlingNonBackToBackTX-r17* | *BandNR* | N/A | N/A | Note: This capability is only applicable when UE is configured with single uplink carrier within a frequency range. | Optional with capability signalling |
| 30. NR\_cov\_enh | 30-5 | Slot based dynamic PUCCH repetition indication | Support slot based dynamic PUCCH repetition indication for PUCCH formats 0/1/2/3/4  support slot based dynamic PUCCH repetition for PUCCH formats 0/1/2/3/4 | 4-23 or 25-2 | *slotBasedDynamicPUCCH-Rep-r17* | *Phy-ParametersCommon* | No | No |  | Optional with capability signalling |
| 30. NR\_cov\_enh | 30-6 | Repetition of PUSCH transmission scheduled by RAR UL grant and DCI format 0\_0 with CRC scrambled by TC-RNTI | Support of repetition of PUSCH transmission scheduled by RAR UL grant and DCI format 0\_0 with CRC scrambled by TC-RNTI |  | *pusch-RepetitionMsg3-r17* | *BandNR* | N/A | N/A |  | Optional with capability signalling |

### 6.1.9 NR\_IAB\_enh

Table 6.1.9-1: Layer-1 feature list for NR\_IAB\_enh

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 31. NR\_IAB\_enh | 31-1 | Guard symbols | 1) Support Rel-17 DesiredGuardSymbols reporting  2) Support Rel-17 ProvidedGuardSymbols reception | one or more of {31-4, 31-5} | *guardSymbolReportReception-IAB-r17* | *Phy-ParametersCommon* | No | No | IAB-MT impact  Note: If an IAB node does not support a certain timing mode, the reported/provided values shall be ignored | Optional with capability signalling. |
| 31. NR\_IAB\_enh | 31-2 | IAB-DU beam restriction indication | Support restricted IAB-DU Beam Indication reception |  | *restricted-IAB-DU-BeamReception-r17* | *Phy-ParametersCommon* | No | No | IAB-MT impact | Optional with capability signalling. |
| 31. NR\_IAB\_enh | 31-3 | IAB-MT beam recommendation indication | Support recommended IAB-MT Beam Indication transmission  1) IAB-MT DL beam  2) IAB-MT UL beam |  | *recommended-IAB-MT-BeamTransmission-r17* | *Phy-ParametersCommon* | no | no | IAB-MT impact | Optional with capability signalling. |
| 31. NR\_IAB\_enh | 31-4 | Case 6 timing alignment | 1) Support Case 6 timing alignment indication reception  2) Support signalling to the parent-node that Case 6 Timing Mode is required for simultaneous transmission |  | *case6-TimingAlignmentReception-IAB-r17* | *Phy-ParametersCommon* | No | No | IAB-MT impact | Optional with capability signalling. |
| 31. NR\_IAB\_enh | 31-5 | Case 7 timing alignment | 1.) Support Case7 timing offset indication reception  2.) Support Case 7 timing at parent-node indication reception |  | *case7-TimingAlignmentReception-IAB-r17* | *Phy-ParametersCommon* | No | No | IAB-MT impact | Optional with capability signalling. |
| 31. NR\_IAB\_enh | 31-6 | DL TX power adjustment | 1.) Support Desired DL TX Power Adjustment reporting  2.) Support DL TX Power Adjustment reception |  | *dl-tx-PowerAdjustment-IAB-r17* | *Phy-ParametersCommon* | No | No | IAB-MT impact | Optional with capability signalling. |
| 31. NR\_IAB\_enh | 31-7 | Desired UL TX power adjustment | Support Desired IAB-MT PSD range reporting |  | *desired-ul-tx-PowerAdjustment-r17* | *Phy-ParametersCommon* | No | No | IAB-MT impact | Optional with capability signalling. |
| 31. NR\_IAB\_enh | 31-8 | Dynamic indication of FDM soft resource availability | Support monitoring DCI Format 2\_5 scrambled by AI-RNTI for indication of FDM soft resource availability to an IAB node |  | *fdm-SoftResourceAvailability-DynamicIndication-r17* | *Phy-ParametersCommon* | No | No | IAB-MT impact | Optional with capability signalling |
| 31. NR\_IAB\_enh | 31-9 | Simultaneous transmission and reception from multiple parent nodes | Support simultaneous transmission and reception from multiple parent nodes |  | *simultaneousRxTx-IAB-MultipleParents-r17* | *CA-ParametersNRDC-v1700* | No | No | IAB-MT impact | Optional with capability signalling. |
| 31. NR\_IAB\_enh | 31-10 | Updated T\_delta range | Support updated T\_delta range reception |  | *updated-T-DeltaRangeRecption-r17* | *Phy-ParametersCommon* | No | No | IAB-MT impact | Optional with capability signalling. |
| 31. NR\_IAB\_enh | 31-11 | Directional Collision Handling in DC operation | Support for directional collision handling between MCG and SCG cell(s) of the dual parent nodes for simultaneous operation in inter-donor and/or intra-donor DC operation |  | *directionalCollisionDC-IAB-r17* | *Phy-ParametersCommon* | No | No | IAB-MT impact | Optional with capability signalling |

### 6.1.10 NR\_SL\_enh

Table 6.1.10-1: Layer-1 feature list for NR\_SL\_enh

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 32. NR\_SL\_enh | 32-2a | Receiving NR sidelink of PSFCH | 1) UE can receive PSFCH with HARQ-ACK information in NR sidelink.  2) UE can receive up to N PSFCH(s) resources in a slot | 32-2b, at least one of 15-2 or 15-3 or 32-4 or 32-4a | *rx-sidelinkPSFCH-r17* | *BandParametersSidelinkEUTRA-NR-v1710* | N.A. | N.A. | Note: configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1  Candidate values for N are {5, 15, 25, 32, 35, 45, 50, 64}  If UE reports more than one FGs of 15-11, FG32-2a and 32-5b-2, the reported value N in each FG is the total number and the same among those FGs | Optional with capability signalling. |
| 32. NR\_SL\_enh | 32-2b | Receiving NR sidelink of S-SSB | 1) UE can receive S-SSB in NR sidelink.  2) UE supports synchronization to a reference UE |  | n/a | n/a | N.A. | N.A. | Note: configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1 | Optional without capability signalling. |
| 32. NR\_SL\_enh | 32-4 | Transmitting NR sidelink mode 2 with partial sensing | 1) UE can transmit PSCCH/PSSCH using NR sidelink mode 2 with partial sensing configured by NR Uu or preconfiguration. Up to B sidelink processes are supported.  2) UE can transmit PSSCH according to the normal 64QAM MCS table.  3) UE supports PT-RS transmission in FR2.  4) UE can perform periodic-based partial sensing and resource allocation operation.  5) UE can perform contiguous partial sensing and resource allocation operation.  6) UE can transmit using the subcarrier spacing and CP length defined for a given band in RAN4  8) Supports 14-symbol SL slot with all DMRS patterns corresponding to {#PSSCH symbols} = {12, 9} for slots w/wo PSFCH. If UE signals support of ECP, support 12-symbol SL slot with all DMRS patterns corresponding to {#PSSCH symbols} = {10,7} for slots w/wo PSFCH.  10) UE can transmit using 30 kHz and normal CP subcarrier spacing in FR1, 120 kHz subcarrier spacing with normal CP FR2  11) DL pathloss based open loop power control when mode 2 is configured by NR Uu | one of {15-4, 32-2b, 32-4b} | *sl-TransmissionMode2-PartialSensing-r17* | *BandParametersSidelinkDiscovery-r17 or BandParametersSidelinkEUTRA-NR-v1710* | N.A. | N.A. | Note: Random selection in the exceptional pool is supported.  Note: configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1  Candidate values for B are {8,16}  If UE reports more than one FGs of 15-3, 32-4 and 32-4a, the reported value B in each FG is the total number of SL processes and the same among those FGs.  Note: Component 6 is not required to be signalled in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1  Component-6 candidate value set in FR1:  {{15 kHz}, {30 kHz}, {60 kHz}, {15, 30 kHz}, {30, 60 kHz}, {15, 60 kHz}, {15, 30, 60 kHz}}  Component-6 candidate value set in FR2:  {{60 kHz}, {120 kHz}, {60, 120 kHz}}  Component-6 candidate value set for CP length: {NCP,NCP and ECP}  (ECP only applies to SCS of 60 kHz)  Note: Component 10 is only required in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1  Note: Component 11 is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1 | Optional with capability signalling. |
| 32. NR\_SL\_enh | 32-4a | Transmitting NR sidelink mode 2 with random resource selection | 1) UE can transmit PSCCH/PSSCH using NR sidelink mode 2 with random resource selection configured by NR Uu or preconfiguration. Up to B sidelink processes are supported.  2) UE can transmit PSSCH according to the normal 64QAM MCS table.  3) UE supports PT-RS transmission in FR2.  4) UE can transmit using the subcarrier spacing and CP length defined for a given band in RAN4  5) Supports 14-symbol SL slot with all DMRS patterns corresponding to {#PSSCH symbols} = {12, 9} for slots w/wo PSFCH. If UE signals support of ECP, support 12-symbol SL slot with all DMRS patterns corresponding to {#PSSCH symbols} = {10,7} for slots w/wo PSFCH.  6) UE can transmit using 30 kHz and normal CP subcarrier spacing in FR1, 120 kHz subcarrier spacing with normal CP FR2  7) DL pathloss based open loop power control when mode 2 is configured by NR Uu | one of {15-4, 32-2b, 32-4b} | *sl-TransmissionMode2-* *RandomResourceSelection-r17* | *BandSidelink-r16* | N.A. | N.A. | Note: Random selection in the exceptional pool is supported.  Note: configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1  Candidate values for B are {8,16}  If UE reports more than one FGs of 15-3, 32-4 and 32-4a, the reported value B in each FG is the total number of SL processes and the same among those FGs.  Note: Component 4 is not required to be signalled in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1  Component-4 candidate value set in FR1:  {{15 kHz}, {30 kHz}, {60 kHz}, {15, 30 kHz}, {30, 60 kHz}, {15, 60 kHz}, {15, 30, 60 kHz}}  Component-4 candidate value set in FR2:  {{60 kHz}, {120 kHz}, {60, 120 kHz}}  Component-4 candidate value set for CP length: {NCP,NCP and ECP}  (ECP only applies to SCS of 60 kHz)  Note: Component 6 is only required in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1  Note: Component 7 is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1 | Optional with capability signalling. |
| 32. NR\_SL\_enh | 32-4b | Synchronization sources for NR sidelink transmission | 1) UE supports GNSS as the synchronization reference according to the synchronization procedure with sl-SyncPriority set to GNSS and sl-NbAsSync set to false.  2) UE can transmit NR sidelink based on the synchronization to an gNB  3) UE additionally supports gNB and GNSS as the synchronization reference according to the synchronization procedure with sl-SyncPriority set to gnbEnb if the UE supports Components 1 and 2  4) UE additionally supports gNB and GNSS as the synchronization reference according to the synchronization procedure with sl-SyncPriority set to GNSS and sl-NbAsSync set to true if the UE supports Components 1 and 2.  5) UE can transmit S-SSB in NR sidelink if it supports 15-2 or 15-3 or 32-4 or 32-4a  6) UE supports synchronization to a reference UE if it supports 15-1. |  | *sync-Sidelink-v1710* | *BandSidelink-r16* | N.A. | N.A. | Note: configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1  Note: Component 1 is only required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1  Note: Components 2/3/4 are not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1 | Optional with capability signalling. |
| 32. NR\_SL\_enh | 32-4c | eNB type synchronization sources for NR sidelink transmission | 1) UE can transmit NR sidelink based on the synchronization to an eNB.  2) If UE supports component 1 in FG 32-4b, UE additionally supports eNB and GNSS as the synchronization reference according to the synchronization procedure with sl-SyncPriority set to gnbEnb.  3) If UE supports component 1 in FG 32-4b, UE additionally supports eNB and GNSS as the synchronization reference according to the synchronization procedure with sl-SyncPriority set to GNSS and sl-NbAsSync set to true. | 32-4b | *enb-sync-Sidelink-v1710* | *BandSidelink-r16* | N.A. | N.A. | Note: configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1 | Optional with capability signalling. |
| 32. NR\_SL\_enh | 32-5a-1 | Transmitting Inter-UE coordination scheme 1 in NR sidelink mode 2 | 1) UE can transmit inter-UE coordination information of preferred resource set/non-preferred resource set in NR sidelink mode 2.  2) UE can receive an explicit request for inter-UE coordination information of both preferred resource set and non-preferred resource set. | one of {15-4, 32-2b, 32-4b} | *tx-IUC-Scheme1-Mode2Sidelink-r17* | *BandParametersSidelink-v1710* | N.A. | N.A. | Note: configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1” in FG 32-5a-1/32-5a-2/32-5a-3/32-5b-1/32-5b-2 | Optional with capability signalling. |
| 32. NR\_SL\_enh | 32-5a-2 | Receiving Inter-UE coordination information of preferred resource set in NR sidelink mode 2 | 1) UE can receive inter-UE coordination information of preferred resource set and use the received information in its own resource (re-)selection in NR sidelink mode 2.  2) UE can transmit an explicit request for inter-UE coordination information of preferred resource set only. | one of {15-4, 32-2b, 32-4b} | *rx-IUC-Scheme1-PreferredMode2Sidelink-r17* | *BandSidelinkPC5-r16* | N.A. | N.A. | Note: configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1” in FG 32-5a-1/32-5a-2/32-5a-3/32-5b-1/32-5b-2 | Optional with capability signalling. |
| 32. NR\_SL\_enh | 32-5a-3 | Receiving Inter-UE coordination information of non-preferred resource set in NR sidelink mode 2 | 1) UE can receive inter-UE coordination information of non-preferred resource set and use the received information in its own resource (re-)selection in NR sidelink mode 2.  2) UE can transmit an explicit request for inter-UE coordination information of non-preferred resource set only. | one of {15-4, 32-2b, 32-4b} | *rx-IUC-Scheme1-NonPreferredMode2Sidelink-r17* | *BandSidelinkPC5-r16* | N.A. | N.A. | Note: configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1” in FG 32-5a-1/32-5a-2/32-5a-3/32-5b-1/32-5b-2 | Optional with capability signalling. |
| 32. NR\_SL\_enh | 32-5b-1 | Transmitting Inter-UE coordination scheme 2 in NR sidelink mode 2 | 1) UE can transmit inter-UE coordination information of presence of expected/potential resource conflict in NR sidelink mode 2.  2) UE can transmit up to M PSFCH(s) resources in a slot | 32-5b-2, one of {15-4, 32-2b, 32-4b} | *tx-IUC-Scheme2-Mode2Sidelink-r17* | *BandParametersSidelink-v1710* | N.A. | N.A. | Note: configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1  Candidate values for M are {4, 8, 16}  If UE reports more than one FGs of 15-11 and 32-5b-1, the reported value M in each FG is the total number and the same among those FGs. | Optional with capability signalling. |
| 32. NR\_SL\_enh | 32-5b-2 | Receiving Inter-UE coordination scheme 2 in NR sidelink mode 2 | 1) UE can receive inter-UE coordination information of presence of expected/potential resource conflict and use the received information in its own resource re-selection in NR sidelink mode 2.  2) UE can receive up to N PSFCH(s) resources in a slot. | one of {15-4, 32-2b, 32-4b} | *rx-IUC-Scheme2-Mode2Sidelink-r17* | *BandSidelink-r16* | N.A. | N.A. | Note: configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1  Candidate values for N are {5, 15, 25, 32, 35, 45, 50, 64}  If UE reports more than one FGs of 15-11, 32-2a and 32-5b-2, the reported value N in each FG is the total number and the same among those FGs. | Optional with capability signalling. |
| 32. NR\_SL\_enh | 32-6-1 | Reception of Scheme 1 inter-UE coordination information over 2nd SCI | 1) UE can receive Scheme 1 inter-UE coordination transmission over 2nd SCI that is used in addition to the MAC-CE carrying the same inter-UE coordination information in the same transmission. | At least one of 32-5a-2 and 32-5a-3 | *rx-IUC-Scheme1-SCI-r17* | *SidelinkParametersNR-r16* | N.A. | N.A. | Note: configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1 | Optional with capability signalling |
| 32. NR\_SL\_enh | 32-6-2 | Reception of Scheme 1 explicit request over 2nd SCI | 1) UE can receive an explicit request for inter-UE coordination information of both preferred resource set and non-preferred resource set over 2nd SCI that is used in addition to the MAC-CE carrying the explicit request in the same transmission | 32-5a-1 | *rx-IUC-Scheme1-SCI-ExplicitReq-r17* | *SidelinkParametersNR-r16* | N.A. | N.A. | Note: configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1 | Optional with capability signalling |
| 32. NR\_SL\_enh | 32-7 | Determination of expected conflict in Scheme 2 based on RSRP difference | 1) UE can determine a conflict for overlapping resource reservation between UE-B and another UE based on RSRP difference of the two reservations | 32-5b-1 | *scheme2-ConflictDeterminationRSRP-r17* | *BandSidelinkPC5-r16* | N.A. | N.A. | Note: configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1 | Optional with capability signalling |

### 6.1.11 NR\_MBS

Table 6.1.11-1: Layer-1 feature list for NR\_MBS

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 33. NR\_MBS | 33-1 | Broadcast | 1. Support of group-common PDCCH/PDSCH for broadcast with CRC scrambled by MCCH-RNTI.  2. Support of group-common PDCCH/PDSCH for broadcast with CRC scrambled by G-RNTI(s) for MTCH.  3. Support of CFR configuration for broadcast.  4. Support of CORESET and common search space for broadcast.  5. Support of DCI format 4\_0 with CRC scrambled with G-RNTI/MCCH-RNTI for broadcast.  6. Support of inter-slot TDM between unicast PDSCH and MCCH group-common PDSCH or MTCH group-common PDSCH, or between MCCH group-common PDSCH and MTCH group-common PDSCH, or among unicast PDSCH and MCCH group-common PDSCH and MTCH group-common PDSCH in different slots.  7. Support MCCH change notification indication via DCI.  8. support of higher layer configured slot-level repetition up to 8 for MTCH  9. One G-RNTI per UE is supported for broadcast reception  10. Support of FDMed MCCH and PBCH  11. Support of up to 64QAM for FR1/FR2 |  | n/a | n/a | N/A | N/A | It is up to RAN2 whether/how to introduce the capability for support of N > 1 G-RNTIs for broadcast for a UE | Optional without capability signalling |
| 33. NR\_MBS | 33-1-1 | DCI indicated slot-level repetition up to 16 for broadcast MTCH | Support up to 16 times dynamic slot-level repetition for broadcast MTCH. | 33-1 | *dci-BroadcastWith16Repetitions-r17* | *FeatureSetDownlinkPerCC-v1730* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-1-2 | FDM-ed unicast PDSCH and group-common PDSCH for broadcast | 1. Support FDM between one unicast PDSCH and one group-common PDSCH for broadcast in RRC CONNECTED mode in a slot. | 33-1 | *fdm-BroadcastUnicast-r17* | *FeatureSetDownlinkPerCC-v1720* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-2 | Dynamic scheduling for multicast for PCell | 1. Support of group-common PDCCH/PDSCH for multicast with CRC scrambled by G-RNTI for PCell.  2. Support of CFR configuration for multicast.  3. Support of CORESET and common search space configuration for multicast.  4. Support of DCI format 4\_1 with CRC scrambled with G-RNTI for multicast.  5. Support of inter-slot TDM between group-common PDSCH for multicast and other PDSCHs in different slots.  6. Support {2, 4, 8} times semi-static slot-level repetition for group-common PDSCH for multicast |  | *dynamicMulticastPCell-r17* | *FeatureSetDownlink-v1700* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-2a | Support of ACK/NACK based HARQ-ACK feedback andRRC-based enabling/disabling ACK/NACK-based feedback for dynamic scheduling for multicast | 1) Support of ACK/NACK based HARQ-ACK feedback, and support of enabling/disabling ACK/NACK based HARQ-ACK feedback configured by RRC signalling  2) Support of PTM retransmission for multicast  3) support of Type-1 and Type-2 HARQ-ACK CB for multicast feedback only  4) Support of shared PUCCH resource configurations with unicast  5) Support of Type-2 HARQ-ACK codebook for multicast on PUSCH/PUCCH with max number X of G-RNTIs | 33-2 | *ack-NACK-FeedbackForMulticast-r17* | *CA-ParametersNR-v1720* | N/A | N/A | Candidate values of X is {1, 2, 3, 4} with X no larger than max number of G-RNTIs of FG33-2e  Note: the value of X should be common across FG33-2a, 33-3-3a and 33-3-3b if reported | Optional with capability signalling |
| 33. NR\_MBS | 33-2b | DCI-based enabling/disabling ACK/NACK-based feedback for dynamic scheduling for multicast | Support of DCI-based enabling/disabling ACK/NACK based HARQ-ACK feedback configured per G-RNTI by RRC signaling via DCI format 4\_2 | 33-2a, 33-2f | *ack-NACK-FeedbackForMulticastWithDCI-Enabler-r17* | *BandNR* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-2d | PTP retransmission for multicast dynamic scheduling | Support of PTP retransmission for multicast on the same cell as multicast initial transmission | 33-2a | *ptp-Retx-Multicast-r17* | *CA-ParametersNR-v1720* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-2e | Multiple G-RNTIs for group-common PDSCHs | Capability on number of G-RNTI for multicast | 33-2 | *maxNumberG-RNTI-r17* | *BandNR* | [Yes] | Yes | Reporting type of FG 33-2e is per UE with [FDD/TDD,] FR1/FR2, licensed/unlicensed, and TN/NTN differentiation, detail signalling is up to RAN2 | Optional with capability signalling |
| 33. NR\_MBS | 33-2f | Dynamic multicast with DCI format 4\_2 | Support of DCI format 4\_2 with CRC scrambled with G-RNTI for multicast | 33-2 | *dynamicMulticastDCI-Format4-2-r17* | *BandNR* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-2g | MIMO layers for multicast PDSCH | Supported maximal number of MIMO layers for multicast PDSCH | 33-2 | *maxNumberMIMO-LayersMulticastPDSCH-r17* | *FeatureSetDownlinkPerCC-v1700* | N/A | N/A | Candidate values: {2,4,8}  Note: If UE supports up to 8 layers, the UE supports TB2 | Optional with capability signalling |
| 33. NR\_MBS | 33-2h | Dynamic scheduling for multicast for SCell | Support of group-common PDCCH/PDSCH with CRC scrambled by G-RNTI for SCell. | 33-2 | *dynamicMulticastSCell-r17* | *FeatureSetDownlinkPerCC-v1700* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-2i | Supported maximal modulation order for multicast PDSCH | 1. For FR1, up to 1024QAM is supported, candidate values {256QAM, 1024QAM}  2. For FR2, up to 256QAM is supported, candidate values {64QAM, 256QAM} | 33-2 | *maxModulationOrderForMulticast-r17*  *{*  *fr1-r17,*  *fr2-r17*  *}* | *BandNR* | N/A | N/A | Note: A UE shall support the corresponding mandatory maximum modulation for unicast. | Optional with capability signalling |
| 33. NR\_MBS | 33-2j | Supported maximum modulation order used for maximum data rate calculation for multicast PDSCH | 1. For FR1, up to 1024QAM is supported as maximum modulation order used for maximum data rate calculation for multicast PDSCH, candidate values {256QAM, 1024QAM}  2. For FR2, up to 256QAM is supported as maximum modulation order used for maximum data rate calculation for multicast PDSCH, candidate values {64QAM, 256QAM} | 33-2 | *maxModulationOrderForMulticastDataRateCalculation-r17* | *FeatureSetDownlinkPerCC-v1720* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-3-1 | Dynamic Slot-level repetition for group-common PDSCH | 1. Support up to X times dynamic slot-level repetition for group-common PDSCH for multicast. | 33-2 | *dynamicSlotRepetitionMulticastTN-NonSharedSpectrumChAccess-r17* | *BandNR* | Yes | Yes | Candidate values for X is: {8, 16}  This FG is reported for TN and licensed. | Optional with capability signalling |
| 33. NR\_MBS | 33-3-1a | Dynamic Slot-level repetition for group-common PDSCH for NTN and unlicensed | 1. Support up to X times dynamic slot-level repetition for group-common PDSCH for multicast for NTN and unlicensed | 33-2 | *dynamicSlotRepetitionMulticastNTN-SharedSpectrumChAccess-r17* | *BandNR* | N/A | N/A | Candidate values for X is: {8, 16}  This FG is reported for NTN and unlicensed | Optional with capability signalling |
| 33. NR\_MBS | 33-3-2 | FDM-ed unicast PDSCH and one group-common PDSCH for multicast | 1. Support FDM between one unicast PDSCH and one group-common PDSCH for multicast in RRC CONNECTED mode in a slot. | 33-2 | *fdm-MulticastUnicast-r17* | *FeatureSetDownlinkPerCC-v1720* | N/A | N/A | Note: this FG does not support FDMed SPS | Optional with capability signalling |
| 33. NR\_MBS | 33-3-3 | Intra-slot TDM-ed unicast PDSCH and group-common PDSCH | 1. Support TDM between one unicast PDSCH and one group-common PDSCH in a slot.  2. Support TDM between M (M>1) TDMed unicast PDSCHs and one group-common PDSCH in a slot per CC  3. Support TDM among N (N>1) group-common PDSCHs in a slot per CC  4. Support TDM between K (K>1) TDMed unicast PDSCHs and L (L>1) TDMed group-common PDSCHs in a slot per CC  5. The UE maximum number of TDMed PDSCH receptions capability in a slot per CC is kept as for Rel-15/Rel-16, i.e., {2/4/7} based on UE FG5-11/5-11a/5-11b.   * + Note:  Group-common PDSCH(s) are counted as unicast PDSCH(s).   + Note: The max number of (M+1), N, (K+L) are determined based on the numbers reported by FG5-11 and/or FG5-11a and/or FG5-11b.   6. up to one broadcast PDSCH is supported in a slot.  7. For any two consecutive slots n and n+1, if there are more than 1 broadcast/multicast/unicast PDSCH in either slot, whether to require the minimum time separation between starting time of any two broadcast/multicast/unicast PDSCHs within the duration of these slots is 4 OFDM symbol for 30kHz and 7 OFDM symbol for 60kHz | 33-1 and/or 33-2, 5-11 and/or 5-11a and/or 5-11b | *intraSlotTDM-UnicastGroupCommonPDSCH-r17* | *FeatureSetDownlinkPerCC-v1730* | N/A | N/A | Candidate value for component 7: require the minimum time separation time {yes, no} | Optional with capability signalling |
| 33. NR\_MBS | 33-3-3a | FDM-ed Type-1 and Type-2 HARQ-ACK codebooks for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast | 1. Support of FDM-ed Type-1 HARQ-ACK codebooks for multiplexing HARQ-ACK for unicast and ACK/NACK-based HARQ-ACK for multicast on PUCCH or PUSCH  2. Support of Type-2 HARQ-ACK codebooks for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast on PUCCH or PUSCH with max number X of G-RNTIs | 33-3-2, at least one of {33-2a, 33-4, 33-5-1a, 33-5-1f} | *fdm-CodebookForMux-UnicastMulticastHARQ-ACK-r17* | *CA-ParametersNR-v1730* | N/A | N/A | Note1: FDM-ed Type-1 HARQ-ACK codebook is generated by concatenating the Type-1 sub-codebook for unicast and the Type-1 sub-codebook for multicast.  Note2: The Type-2 HARQ-ACK codebook is generated by concatenating the Type-2 sub-codebook for unicast and the Type-2 sub-codebook for multicast.  Candidate values of X is {1, 2, 3, 4} with X no larger than max number of G-RNTIs of FG33-2e  Note: the value of X should be common across FG33-2a, 33-3-3a and 33-3-3b if reported | Optional with capability signalling |
| 33. NR\_MBS | 33-3-3b | Mode 2 TDM-ed Type-1 and Type-2 HARQ-ACK codebook for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast | 1. Support of Mode 2 TDM-ed Type-1 HARQ-ACK codebook for multiplexing HARQ-ACK for unicast and ACK/NACK-based HARQ-ACK for multicast on PUCCH or PUSCH  2. Support of Type-2 HARQ-ACK codebooks for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast on PUCCH or PUSCH with max number X of G-RNTIs | 33-2a or 33-4 or 33-5-1a or 33-5-1f | *mode2-TDM-CodebookForMux-UnicastMulticastHARQ-ACK-r17* | *CA-ParametersNR-v1730* | N/A | N/A | Note1: Mode 2 TDM-ed Type-1 HARQ-ACK codebook is generated based on the union TDRA tables from unicast and multicast and the union of k1 sets from unicast and multicast.  Note2: The Type-2 HARQ-ACK codebook is generated by concatenating the Type-2 sub-codebook for unicast and the Type-2 sub-codebook for multicast.  Candidate values of X is {1, 2, 3, 4} with X no larger than max number of G-RNTIs of FG33-2e  Note: the value of X should be common across FG33-2a, 33-3-3a and 33-3-3b if reported | Optional with capability signalling |
| 33. NR\_MBS | 33-3-4 | Mode 1 for type1 codebook generation | Supports type1-Codebook-Generation-Mode configured as mode 1 | 33-3-3b | *mode1-ForType1-CodebookGeneration-r17* | *CA-ParametersNR-v1730* | N/A | N/A | This FG is for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast on PUCCH or PUSCH | Optional with capability signalling |
| 33. NR\_MBS | 33-3-5 | Feedback multiplexing for unicast PDSCH and group-common PDSCH for multicast with same priority and different codebook type | Support of multiplexing HARQ-ACK for unicast and for multicast with the same priority and different HARQ-ACK codebook types in a PUCCH or in a PUSCH | 33-2a or 33-4 or 33-5-1a or 33-5-1f | *mux-HARQ-ACK-UnicastMulticast-r17* | *CA-ParametersNR-v1730* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-4 | NACK-only based HARQ-ACK feedback for multicast with ACK/NACK transforming | 1. Support NACK-only based HARQ-ACK feedback for dynamic scheduling for multicast, including:  a) A single TB with NACK-only feedback transmitted in PUCCH  b) multiple TB with NACK-only feedback transmitted in PUCCH by transforming into ACK/NACK bits  2. Support of shared PUCCH resource configurations with unicast  3. One or multiple TB with NACK-only feedback transmitted in PUSCH by transforming into ACK/NACK bits  4. One or multiple TB with NACK-only feedback transmitted in PUCCH by transforming into ACK/NACK bits when multiplexing with other UCI | 33-2a | *nack-OnlyFeedbackForMulticast-r17* | *CA-ParametersNR-v1720* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-4a | NACK-only based HARQ-ACK feedback for multicast corresponding to a specific sequence or a PUCCH transmission | 1. Support NACK-only based HARQ-ACK feedback for dynamic scheduling for multicast, including:  a) Up to 4 TBs with NACK-only feedback transmitted in PUCCH by select one PUCCH resource.  2. Support of separate PUCCH resource configurations from unicast  3. Single TB with NACK-only feedback transmitted in PUCCH  4. up to 4TBs with NACK-only feedback transmitted in PUSCH by transforming into ACK/NACK bits | 33-4 | *nack-OnlyFeedbackSpecificResourceForMulticast-r17* | *CA-ParametersNR-v1720* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-4-1 | DCI-based enabling/disabling NACK-only based feedback for dynamic scheduling for multicast | Support of DCI-based enabling/disabling NACK-only based HARQ-ACK feedback configured per G-RNTI by RRC signalling via DCI format 4\_2 | 33-4 and 33-2f | *nack-OnlyFeedbackForMulticastWithDCI-Enabler-r17* | *BandNR* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-5-1 | SPS group-common PDSCH for multicast on PCell | 1. Support one SPS group-common PDSCH configuration for multicast  2. Support {2, 4, 8} times semi-static slot-level repetition for SPS group-common PDSCH | 33-2 | *sps-Multicast-r17* | *FeatureSetDownlink-v1720* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-5-1a | Support of ACK/NACK based HARQ-ACK feedback and RRC-based enabling/disabling ACK/NACK-based feedback for SPS group-common PDSCH for multicast | 1. Support of ACK/NACK based HARQ-ACK feedback, and support of enabling/disabling ACK/NACK based HARQ-ACK feedback configured by RRC signalling for SPS group-common PDSCH without PDCCH scheduling, [SPS group-common PDSCH activation, and SPS release PDCCH]  2. Support of PTM retransmission for SPS multicast associated with G-CS-RNTI  3. Support of Type-1 and Type-2 HARQ-ACK CB for SPS multicast feedback only  4. Support of shared SPS-PUCCH-AN-List configuration from unicast SPS | 33-5-1 | *ack-NACK-FeedbackForSPS-Multicast-r17* | *CA-ParametersNR-v1720* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-5-1b | DCI-based enabling/disabling ACK/NACK-based feedback for SPS group-common PDSCH for multicast | Support of DCI-based enabling/disabling ACK/NACK based HARQ-ACK feedback configured per G-CS-RNTI for multicast by RRC signaling via DCI format 4\_2 | 33-5-1a, 33-5-1i | *ack-NACK-FeedbackForSPS-MulticastWithDCI-Enabler-r17* | *BandNR* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-5-1d | PTP retransmission for SPS group-common PDSCH for multicast | Support of PTP retransmission associated with CS-RNTI for SPS multicast on the cell same as multicast initial transmission | 33-5-1a | *ptp-Retx-SPS-Multicast-r17* | *CA-ParametersNR-v1720* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-5-1e | Dynamic Slot-level repetition for SPS group-common PDSCH for multicast | Support up to X times dynamic slot-level repetition for SPS group-common PDSCH for multicast. | 33-5-1 | *Not implemented yet* |  | [No] | [No] | Candidate values for X is: {8, 16} | Optional with capability signalling |
| 33. NR\_MBS | 33-5-1f | NACK-only based HARQ-ACK feedback for multicast RRC-based enabling/disabling NACK-only based feedback for SPS group-common PDSCH for multicast | 1) Support NACK-only based HARQ-ACK feedback, and support of enabling/disabling NACK-only based HARQ-ACK feedback configured by RRC signalling for SPS group-common PDSCH without PDCCH scheduling  2) Support of PTM retransmission associated with G-CS-RNTI for SPS multicast | 33-5-1 | *Not implemented yet* |  | [No] | [No] |  | Optional with capability signalling |
| 33. NR\_MBS | 33-5-1g | DCI-based enabling/disabling NACK-only based feedback for SPS group-common PDSCH for multicast | Support of DCI-based enabling/disabling NACK-only based HARQ-ACK feedback configured per G-CS-RNTI for multicast by RRC signaling via DCI format 4\_2 | 33-5-1f, 33-5-1i | *Not implemented yet* |  | [No] | [No] |  | Optional with capability signalling |
| 33. NR\_MBS | 33-5-1h | Multiple G-CS-RNTIs for SPS group-common PDSCHs | Max number of G-CS-RNTIs for SPS multicast | 33-5-1 | *maxNumberG-CS-RNTI-r17* | *BandNR* | [Yes] | Yes | Reporting type of FGs 33-5-1h is per UE with [FDD/TDD,] FR1/FR2, licensed/unlicensed, and TN/NTN differentiation, detail signalling is up to RAN2 | Optional with capability signalling |
| 33. NR\_MBS | 33-5-1i | Multicast SPS scheduling with DCI format 4\_2 | 1.Support of DCI format 4\_2 with CRC scrambled with G-CS-RNTI for multicast SPS scheduling  2. Retransmission scheduled by DCI format 4\_2 with CRC scrambled with G-CS-RNTI | 33-5-1 | *Not implemented yet* |  | FFS | FFS |  | Optional with capability signalling |
| 33. NR\_MBS | 33-5-1j | NACK-only based HARQ-ACK feedback for multicast corresponding to a specific sequence or a PUCCH transmission for SPS group-commmon PDSCH for multicast | 1. Support NACK-only based HARQ-ACK feedback for SPS PDSCH for multicast, including:  a) Multiple TBs with NACK-only feedback transmitted in PUCCH by select one PUCCH resource.  2. Support of separate SPS-PUCCH-AN-List from unicast | 33-5-1f | *nack-OnlyFeedbackSpecificResourceForSPS-Multicast-r17* | *CA-ParametersNR-v1730* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-5-2 | Multiple SPS group-common PDSCH configuration on PCell | 1. Support up to 8 SPS group-common PDSCH configuration per CFR for multicast  2. Support M>=1 activated SPS group-common PDSCH configurations per CFR for multicast  3. The total number of SPS configurations for both multicast and unicast is no larger than 8 in a BWP of a serving cell, and activated SPS group-common PDSCH configurations is no larger than M.  4. The total number of SPS configurations for both multicast and unicast in a cell group is no larger than 32 | 33-5-1 | *Not implemented yet* |  | [No] | [No] | Candidate value set for M is {1, 2, …, 8} | Optional with capability signalling |
| 33. NR\_MBS | 33-5-3 | One SPS group-common PDSCH configuration for multicast for Scell | 1. Support one SPS group-common PDSCH configuration for multicast for Scell.  2. Support {2, 4, 8} times semi-static slot-level repetition for SPS group-common PDSCH for Scell. | 33-5-1, 33-2h | *sps-MulticastSCell-r17* | *FeatureSetDownlinkPerCC-v1730* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-5-4 | Up to 8 SPS group-common PDSCH configurations per CFR for multicast for SCell | 1. Support up to 8 SPS group-common PDSCH configuration per CFR for multicast for Scell.  2. Support M>=1 activated SPS group-common PDSCH configurations per CFR for multicast for Scell.  3. The total number of SPS configurations for both multicast and unicast is no larger than 8 in a BWP of a serving cell, and activated SPS group-common PDSCH configurations is no larger than M.  4. The total number of SPS configurations for both multicast and unicast in a cell group is no larger than 32. | 33-5-3 | *sps-MulticastSCellMultiConfig-r17* | *FeatureSetDownlinkPerCC-v1730* | N/A | N/A | Candidate value set for M is {1, 2, …, 8} | Optional with capability signalling |
| 33. NR\_MBS | 33-6-1 | DL priority indication for multicast in DCI | 1. Support of priority indicator field configured in DCI formats 4\_2 with CRC scrambled with G-RNTI for multicast.  2. Supports two HARQ-ACK codebooks with different priorities to be simultaneously constructed different priorities for multicast and multicast at a UE | 33-2a, 33-2f | *priorityIndicatorInDCI-Multicast-r17* | *Phy-ParametersCommon* | No | No |  | Optional with capability signalling |
| 33. NR\_MBS | 33-6-1a | DL priority configuration for SPS multicast | Support of priority indicator field configured in DCI format 4\_2 for multicast HARQ-ACK feedback of SPS multicast | 33-6-1 | *priorityIndicatorInDCI-SPS-Multicast-r17* | *Phy-ParametersCommon* | No | No |  | Optional with capability signalling |
| 33. NR\_MBS | 33-6-2 | Two HARQ-ACK codebooks simultaneously constructed for supporting HARQ-ACK codebooks with different priorities for unicast and multicast at a UE | 1. Supports two HARQ-ACK codebooks with different priorities to be simultaneously constructed different priorities for unicast and multicast at a UE. | 33-6-1 | *twoHARQ-ACK-CodebookForUnicastAndMulticast-r17* | *Phy-ParametersCommon* | No | No |  | Optional with capability signalling |
| 33. NR\_MBS | 33-6-3 | More than one PUCCH for HARQ-ACK transmission for multicast or for unicast and multicast within a slot | 1. Supports two non-overlapping slot-based PUCCHs for ACK/NACK based HARQ-ACK feedback for multicast or for unicast and multicast with different priorities in a slot. | 33-6-1, 33-6-2 | *multiPUCCH-HARQ-ACK-ForMulticastUnicast-r17* | *Phy-ParametersCommon* | No | No |  | Optional with capability signalling |
| 33. NR\_MBS | 33-8-1 | PUCCH resource configuration for multicast feedback for dynamically scheduled multicast | Support of a PUCCH-Config for multicast HARQ-ACK feedback, separate from that of unicast configurations | 33-2a | *Not implemented yet* |  | [No] | [No] |  | Optional with capability signalling |
| 33. NR\_MBS | 33-8-2 | Up to 2 PUCCH resources configuration for multicast feedback for dynamically scheduled multicast | Support of a PUCCH-ConfigurationList for multicast HARQ-ACK feedback, separate from that of unicast configurations | 33-8-1, 33-6-1 | *multiPUCCH-ConfigForMulticast-r17* | *CA-ParametersNR-v1730* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-8-3 | PUCCH resource configuration for multicast feedback for SPS GC-PDSCH | Support of a SPS-PUCCH-AN-List for multicast HARQ-ACK feedback of all multicast SPS configuration(s), separate from that of SPS unicast configurations | 33-5-1a | *pucch-ConfigForSPS-Multicast-r17* | *CA-ParametersNR-v1730* | N/A | N/A |  | Optional with capability signalling |
| 33. NR\_MBS | 33-9 | Supporting unicast PDCCH to release SPS group-common PDSCH | Supports unicast PDCCH scrambled with CS-RNTI to release SPS group-common PDSCH | 33-5-1, 12-2 | *Not implemented yet* |  | [No] | [No] |  | Optional with capability signalling |
| 33. NR\_MBS | 33-10 | Support group-common PDSCH RE-level rate matching for multicast | 1) Support of SP ZP-CSI-RS for group-common PDSCH RE-mapping patterns  2) Support of P ZP-CSI-RS for group-common PDSCH RE-mapping patterns  3) Support p-ZP-CSI-RS-ResourceSet configured in PDSCH-Config-Multicast same as or different from the p-ZP-CSI-RS-ResourceSet configured in PDSCH-Config  Note 1: The total number of semi-persistent ZP-CSI-RS-ResourceSet that a UE can be configured with is the same as for unicast in Rel-16  4) Support of AP ZP-CSI-RS for group-common PDSCH RE-mapping patterns | 2-33a, 33-2 | *re-LevelRateMatchingForMulticast-r17* | *BandNR* | [Yes] | Yes | Reporting type of FG 33-10 is per UE with [FDD/TDD,] FR1/FR2, licensed/unlicensed, and TN/NTN differentiation, detail signalling is up to RAN2 | Optional with capability signalling |

### 6.1.12 NR\_DSS

Table 6.1.12-1: Layer-1 feature list for NR\_DSS

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 34. NR\_DSS | 34-2 | Cross-carrier scheduling from SCell to PCell/PSCell (Type B) | Support of Cross-carrier scheduling (CCS) from sSCell to PCell/PSCell (Type B)   1. Cross-carrier scheduling from sSCell to PCell/PSCell with CIF 2. sSCell USS set(s) (for CCS from sSCell to PCell/PSCell) and search space sets on PCell/PSCell can be configured so that the UE monitors them in overlapping slot of PCell/PSCell and sSCell 3. Configuration of scaling factor α for BD and CCE limit handling and PDCCH overbooking handling on P(S)Cell 4. The number of unicast DCI limits for PCell/PSCell scheduling  * Processing K1 unicast DCI scheduling DL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * Processing K2 unicast DCI scheduling UL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60)  1. Same numerology between sSCell and P(S)Cell or sSCell SCS is larger than P(S)Cell SCS 2. USS set(s) for DCI format 0\_1,1\_1 configured on sSCell for CCS from sSCell to PCell/PSCell and USS set(s) for DCI format 0\_2,1\_2 configured on sSCell for CCS from sSCell to PCell/PSCell if UE supports FG 11-1 (dci-Format1-2And0-2-r16) 3. PDCCH monitoring occasion(s) on sSCell for cross-carrier scheduling to Pcell/PSCell 4. frame boundary alignment between PCell/PSCell and sSCell | 6-5 | *crossCarrierSchedulingSCell-SpCellTypeB-r17* | *CA-ParametersNR-v1700* | No | Applicable to FR1 only | Candidate value set: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), {30,30}, {30,60},{60,60})  Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}  Component 4 candidate values: (K1, K2) = {(1,1) for FDD P(S)Cell; (K1, K2) = (1,2) for TDD P(S)Cell}  Component 7 candidate values:  Value 1: within the first 3 OFDM symbols of sSCell slot overlapping with the first 3 OFDM symbols of PCell/PSCell slot.  Value 2: within the first 3 OFDM symbols of any sSCell slot overlapping with PCell/PSCell slot  Note: The CCS from sSCell to Pcell is applicable to FR1 only but there can be other Scells in FR2 configured for the UE  Note: The SCell configured with Cross-carrier scheduling to PCell/PSCell is referred to as ‘sSCell’  Note: Candidate value set 2 only applies for the following value sets of components 1: {30,30}, {30,60},{60,60}  Note: A UE supporting this FG does not imply that the UE can be configured with sSCell in shared spectrum  Note: Parameters in CSI-MeasConfig of P(S)Cell and sSCell are configured such that combination of P(S)Cell and sSCell configurations does not result in exceeding any of the UE’s capabilities for A-/SP-CSI reporting on PUSCH on P(S)Cell | Optional with capability signalling |
| 34. NR\_DSS | 34-1 | Cross-carrier scheduling from SCell to PCell/PSCell with search space restrictions (Type A) | Support of Cross-carrier scheduling from sSCell to PCell/PSCell with search space restrictions (Type A)   1. Cross-carrier scheduling from sSCell to PCell/PSCell with CIF 2. Search space restrictions: sSCell USS set(s) (for CCS from sSCell to PCell/PSCell) and following search space sets on PCell/PSCell can only be configured such that UE does not monitor them in overlapping slot of PCell/PSCell and sSCell    * USS sets for DCI formats 0\_1,1\_1,0\_2,1\_2    * USS sets for DCI formats 0\_0,1\_0    * Type3-CSS set(s) for DCI formats 1\_0/0\_0 with C-RNTI/CS-RNTI/MCS-C-RNTI 3. Configuration of scaling factor α for BD and CCE limit handling and PDCCH overbooking handling on P(S)Cell 4. The number of unicast DCI limits for PCell/PSCell scheduling  * Processing K1 unicast DCI scheduling DL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * Processing K2 unicast DCI scheduling UL on PCell/PSCell per PCell/PSCell slot and its aligned N consecutive sSCell slot(s) * N is based on pair of (PCell/PSCell SCS, sSCell SCS): N=1 for(15,15), (30,30), (60,60) and N=2 for (15,30), (30,60) and N=4 for (15, 60)  1. Same numerology between sSCell and P(S)Cell or sSCell SCS is larger than P(S)Cell SCS 2. USS set(s) for DCI format 0\_1,1\_1 configured on sSCell for CCS from sSCell to Pcell/PSCell and USS set(s) for DCI format 0\_2,1\_2 configured on sSCell for CCS from sSCell to PCell/PSCell if UE supports FG 11-1 (dci-Format1-2And0-2-r16) 3. sSCell USS set(s) (for CCS from sSCell to Pcell/PSCell) and Type0/0A/1/2 CSS sets on Pcell/PSCell can be configured so that the UE monitors them in overlapping slot of Pcell/PSCell and sSCell    * no simultaneous monitoring between ‘USS sets (for P(S)Cell scheduling) on sSCell’ and ‘Type 0/0A/1/2/CSS sets on P(S)Cell for DCI formats with CRC scrambled by C-RNTI/MCS-C-RNTI/CS-RNTI’    * simultaneous monitoring of ‘USS sets (for P(S)Cell scheduling) on sSCell’ and ‘Type 0/0A/1/2/CSS sets on P(S)Cell for DCI formats with CRC not scrambled by C-RNTI/MCS-C-RNTI/CS-RNTI’ 4. PDCCH monitoring occasion(s) on sSCell for cross-carrier scheduling to PCell/PSCell 5. frame boundary alignment between PCell/PSCell and sSCell | 6-5 | *crossCarrierSchedulingSCell-SpCellTypeA-r17* | *CA-ParametersNR-v1700* | No | Applicable to FR1 only | Candidate value set: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, {15, 60}, {30,30}, {30,60},{60,60})  Candidate value set 2: frequency band pair(s) for {PCell/PSCell, sSCell}  Component 4 candidate values: (K1, K2) = {(1,1) for FDD P(S)Cell; (K1, K2) = (1,2) for TDD P(S)Cell}  Component 8 candidate values:  Value 1: within the first 3 OFDM symbols of sSCell slot overlapping with the first 3 OFDM symbols of PCell/PSCell slot.  Value 2: within the first 3 OFDM symbols of any sSCell slot overlapping with PCell/PSCell slot  Note: The CCS from sSCell to PCell is applicable to FR1 only but there can be other SCells in FR2 configured for the UE  Note: The SCell configured with Cross-carrier scheduling to PCell/PSCell is referred to as ‘sSCell’  Note: Candidate value set 2 only applies for the following value sets of components 1: {30,30}, {30,60},{60,60}  Note: A UE supporting this FG does not imply that the UE can be configured with sSCell in shared spectrum  Note: Parameters in CSI-MeasConfig of P(S)Cell and sSCell are configured such that combination of P(S)Cell and sSCell configurations does not result in exceeding any of the UE’s capabilities for A-/SP-CSI reporting on PUSCH on P(S)Cell | Optional with capability signalling |
| 34. NR\_DSS | 34-1a | DCI formats on PCell/PSCell USS set(s) | Support of monitoring DCI formats 0\_1,1\_1,0\_2 (if supported),1\_2 (if supported) on PCell/PSCell USS set(s) | 34-1 | *dci-FormatsPCellPSCellUSS-Sets-r17* | *CA-ParametersNR-v1700* | No | Applicable to FR1 only |  | Optional with capability signalling |
| 34. NR\_DSS | 34-3 | Disabling scaling factor α when sSCell is deactivated | Support of disabling scaling factor α for Cross-carrier scheduling (CCS) from sSCell to PCell/PSCell (Type A or Type B) when sSCell is deactivated (scaling factor α is not applied for PDCCH overbooking/BD/CCE limit computation when sSCell is deactivated) | 34-1 or 34-2 | *disablingScalingFactorDeactSCell-r17* | *CA-ParametersNR-v1700* | No | Applicable to FR1 only |  | Optional with capability signalling |
| 34. NR\_DSS | 34-4 | Disabling scaling factor α when sSCell is dormant | Support of disabling scaling factor α for Cross-carrier scheduling (CCS) from sSCell to PCell/PSCell (Type A or Type B) when sSCell is switched to dormant BWP (scaling factor α is not applied for PDCCH overbooking/BD/CCE limit computation when sSCell is switched to dormant BWP) | 34-1 or 34-2 | *disablingScalingFactorDormantSCell-r17* | *CA-ParametersNR-v1700* | No | Applicable to FR1 only |  | Optional with capability signalling |
| 34. NR\_DSS | 34-5 | Non-aligned frame boundaries between PCell/PSCell and sSCell | CA with non-aligned frame boundaries for PCell/PSCell and sSCell in inter-band CA | 34-1 or 34-2 | *non-AlignedFrameBoundaries-r17*  *{*  *scs15kHz-15kHz-r17,*  *scs15kHz-30kHz-r17,*  *scs15kHz-60kHz-r17,*  *scs30kHz-30kHz-r17,*  *scs30kHz-60kHz-r17,*  *scs60kHz-60kHz-r17*  *}* | *CA-ParametersNR-v1700* | No | Applicable to FR1 only | Candidate value set 1: One or more of supported SCS combinations ({P(S)Cell SCS in kHz, sSCell SCS in kHz}) from following set are indicated by the UE: {15,15}, {15,30}, (15, 60), {30,30}, {30,60}, {60,60})  Candidate value set 2: frequency band pair(s) for {Pcell/PSCell, sSCell} | Optional with capability signalling |

### 6.1.13 LTE\_NR\_DC\_enh2

Table 6.1.13-1: Layer-1 feature list for LTE\_NR\_DC\_enh2

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 35. LTE\_NR\_DC\_enh2 | 35-1 | Aperiodic CSI-RS for tracking for fast SCell activation | 1. Aperiodic CSI-RS for tracking for fast SCell activation is triggered by enhanced SCell activation/deactivation MAC CE 2. Aperiodic CSI-RS for tracking for fast SCell activation is triggered within the BWP indicated by firstActiveDownlinkBWP-Id for the SCell 3. Maximum number of aperiodic CSI-RS resource set configurations for tracking for fast SCell activation that can be configured to UE per CC in a reported band 4. Maximum number of aperiodic CSI-RS resource set configurations for tracking for fast SCell activation that can be configured to UE across CCs in a reported band | 6-5 | *aperiodicCSI-RS-FastScellActivation-r17*  *{*  *maxNumberAperiodicCSI-RS-PerCC-r17,*  *maxNumberAperiodicCSI-RS-AcrossCCs-r17*  *}* | *BandNR* | N/A | N/A | Component 3 candidate values: {8,16,32,48,64,128,255}  Component 4 candidate values: {8,16,32,64,128,256,512,1024}  Note: component 3 and 4 candidate values refer to the number of RS configurations for fast SCell activation that can be indicated by the MAC CE  The NZP-CSI-RS configured as RS for tracking for fast SCell activation are not considered when counting the maximum NZP-CSI-RS configurations of FG2-33 | Optional with capability signalling |
| 35. LTE\_NR\_DC\_enh2 | 35-2 | Aperiodic CSI-RS bandwidth for tracking for fast SCell activation for 10MHz UE channel bandwidth | 1. Indicates the UE supported TRS bandwidths for fast SCell activation, in addition to 52 RBs, for a 10MHz UE channel bandwidth. This only applies for the BWPs configured with 52 RBs size and 15kHz SCS, in FDD bands. | 35-1 | *aperiodicCSI-RS-AdditionalBandwidth-r17* | *BandNR* | FDD only | FR1 only | Candidate values of Set 1: 28, 32, 36, 40, 44, 48 RBs  Candidate values of Set 2: 32, 36, 40, 44, 48 RBs | Optional with capability signalling |

### 6.1.14 NR\_DL1024QAM\_FR1

Table 6.1.14-1: Layer-1 feature list for NR\_DL1024QAM\_FR1

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 36. NR\_DL1024QAM\_FR1 | 36-1 | 1024QAM for PDSCH for FR1 | Support 1024QAM for PDSCH for FR1 including 1024QAM modulation scheme as defined in TS 38.211, MCS and CQI feedback tables based on 1024QAM modulation order as defined in TS 38.214 [20]. | pdsch-256QAM-FR1 | *pdsch-1024QAM-FR1-r17* | *BandNR* | N/A | Applicable only to FR1 | Note from WI objective: DL PDSCH 1024QAM for FR1 should be defined as a per-band UE capability | Optional with capability signalling |
| 36. NR\_DL1024QAM\_FR1 | 36-1a | 1024QAM for PDSCH for FR1 with maximum 2 MIMO layers restriction | Support 1024QAM for PDSCH with maximum 2 MIMO layers for FR1 including 1024QAM modulation scheme as defined in TS 38.211, MCS and CQI feedback tables based on 1024QAM modulation order as defined in TS 38.214 [20]. | pdsch-256QAM-FR1 | *pdsch-1024QAM-2MIMO-FR1-r17* | *BandNR* | N/A | Applicable only to FR1 | Note from WI objective: DL PDSCH 1024QAM for FR1 should be defined as a per-band UE capability | Optional with capability signalling |
| 36. NR\_DL1024QAM\_FR1 | 36-2 | scalingFactor for 1024QAM | Indicates the scaling factor to be applied to the band in the max data rate calculation for 1024-QAM as defined in 4.1.2 when support of 1024-QAM is signalled for the band | 36-1 or 36-1a | *scalingFactor-1024QAM-FR1-r17* | *FeatureSetDownlink-v1700* | N/A | Applicable only to FR1 | Candidate component values:  {0.4, 0.75, 0.8, 1.0}  If absent, the scaling factor 1 is applied to the band in the max data rate calculation for 1024-QAM. | Optional with capability signaling |

### 6.1.15 [NR\_RF\_FR1\_enh]

Table 6.1.15-1: Layer-1 feature list for [NR\_RF\_FR1\_enh]

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 37. [NR\_RF\_FR1\_enh] | 37-x |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |

Note: Placeholder as there are no RAN1 UE features for Rel-17 Tx switching agreed until RAN1#109-e.

### 6.1.16 [NR\_SmallData\_INACTIVE]

Table 6.1.16-1: Layer-1 feature list for [NR\_SmallData\_INACTIVE]

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 38. [NR\_SmallData\_INACTIVE] | 38-x |  |  |  |  |  |  |  |  |  |

Note: Placeholder as there are no RAN1 UE features for SDT agreed until RAN1#109-e.

### 6.1.17 TEI17

Table 6.1.17-1: Layer-1 feature list for TEI17

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 39. TEI17 | 39-1 | Parallel SRS and PUCCH/PUSCH transmission across CCs in intra-band non-contiguous CA | Parallel SRS and PUCCH/PUSCH transmission across CCs in intra-band non-contiguous CA |  | *parallelTxSRS-PUCCH-PUSCH-intraBand-r17* | *CA-ParametersNR-v1720* | No | Yes | This feature is the same as parallelTxSRS-PUCCH-PUSCH, but for intra-band non-contiguous CA | Optional with capability signaling |
| 39. TEI17 | 39-2 | Parallel PRACH and SRS/PUCCH/PUSCH transmissions across CCs in intra-band non-contiguous CA | Parallel PRACH and SRS/PUCCH/PUSCH transmissions across CCs in intra-band non-contiguous CA |  | *parallelTxPRACH-SRS-PUCCH-PUSCH-intraBand-r17* | *CA-ParametersNR-v1720* | No | Yes | This feature is the same as parallelTxPRACH-SRS-PUCCH-PUSCH, but for intra-band non-contiguous CA. This feature is enabled by a new UE-specific RRC parameter *intraBandNC-PRACH-simulTx-r17* | Optional with capability signaling |
| 39. TEI17 | 39-3-1 | Stay on the target CC for SRS carrier switching | Stay on the target CC when remaining SRS resource set(s) for SRS carrier switching exists | 2-56 | *stayOnTargetCC-SRS-CarrierSwitch-r17* | *CA-ParametersNR-v1730* | n/a | n/a | Note1: When UE supports this capability, if the time period between the SRS resource sets is smaller than the total required RF switching time to the source CC and back to the target CC and a higher priority UL transmission and/or DL reception is not scheduled on the source CC in the time period between the two SRS resources sets, the UE stays in the target CC in the period between the SRS resource sets; otherwise, the UE switches back to the source CC after transmitting each SRS resource set  Note2: If the UE does not indicate this capability, the UE falls back to Rel-15 behavior, that is UE switches back to source CC between the SRS resource sets | Optional with capability signaling |
| 39. TEI17 | 39-3-2 | Affected bands for inter-band CA during SRS carrier switching | 1. Indicate which other bands in the band combination are affected by the SRS switch.  2. The dropping rules / timelines apply to the indicated bands when SRS carrier switching on target CC and other UL on source CC are overlapped in the same symbol. | 2-56 | *srs-SwitchingAffectedBandsListNR-r17* | *BandParameters-v1730* | n/a | n/a | Note: If this new indication is missing, the UE defaults to Rel-15 behavior.  For each “source-target” pair (as indicated by srs-SwitchingTimesListNR), the UE can indicate which other bands in the band combination are affected by the SRS switch. | Optional with capability signaling |
| 39. TEI17 | 39-4 | Parallel MsgA and SRS/PUCCH/PUSCH transmissions across CCs in intra-band non-contiguous CA | Parallel MsgA and SRS/PUCCH/PUSCH transmissions across CCs in intra-band non-contiguous CA | 9-3 | *parallelTxMsgA-SRS-PUCCH-PUSCH-intraBand-r17* | *CA-ParametersNR-v1720* | No | Yes | This feature is the same as *parallelTxMsgA-SRS-PUCCH-PUSCH-r16*, but for intra-band non-contiguous CA. | Optional with capability signaling |

## 6.2 Layer-2 and Layer-3 features

### 6.2.0 General

Tables 6.2.1-1 to 6.2.19-1 provide the list of Layer-2 and Layer-3 features, and the corresponding UE capability field name, as specified in TS 38.331 [2].

### 6.2.1 NR\_MBS

**Table 6.2.1-1: Layer-2 and Layer-3 feature list for NR\_MBS-Core**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 25. NR\_MBS-Core | 25-1 | Additional maximum number of MRBs for multicast | Indicates the additional maximum number of MRBs that the UE supports for MBS multicast reception as specified in TS 38.331 [2]. |  | *maxMRB-Add-r17* | *MBS-Parameters-r17* | No | No |  | Optional with capability signalling |
| 25-2 | Broadcast reception | It is optional for UE to support broadcast reception (RAN1 FG 33-1) as specified in TS 38.331 [2]. A UE that supports the feature shall also support:  -     4 broadcast MRBs as the minimum number;  -     PDCP 12 bits SN;  -     ROHC with profiles 0x0000, 0x0001 and 0x0002;  -     4 ROHC context sessions;  -     RLC UM with 6 bits SN;  -     RLC UM with 12 bits SN;  -     DRX with long DRX cycle for MBS broadcast as specified in TS 38.321 [10]. |  | *n/a* | *n/a* | n/a | n/a |  | Optional without capability signalling |
| 25-3 | SCell based MBS broadcast reception | Indicates whether the UE supports MBS reception via broadcast in RRC\_CONNECTED, on one frequency indicated in an MBSInterestIndication message, when an SCell is configured and activated on that frequency, as specified in TS 38.331 [2]. |  | *broadcastSCell-r17* | *FeatureSetDownlinkPerCC-v1700* | No | No | The UE is not required to receive MBS via broadcast on PCell and SCell simultaneously. | Optional with capability signalling |

### 6.2.2 LTE\_NR\_DC\_enh2

**Table 6.2.2-1: Layer-2 and Layer-3 feature list for LTE\_NR\_DC\_enh2-Core**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Features** | **Index** | **Feature group** | **Components** | **Prerequisite feature groups** | **Field name in TS 38.331 [2]** | **Parent IE in TS 38.331 [2]** | **Need of FDD/TDD differentiation** | **Need of FR1/FR2 differentiation** | **Note** | **Mandatory/Optional** |
| 42. LTE\_NR\_DC\_enh2-Core | 26-1 | Activation/Deactivation of SCG | Indicates whether the UE supports activation (with or without RACH) and deactivation on SCG in NR-DC, upon SCG addition and upon reconfiguration of the SCG, as specified in TS 38.331 [2]. | support of NR-DC as specified in TS 38.331 [2]. | *scg-ActivationDeactivationNRDC-r17* | *CA-ParametersNRDC-v1700* | No | No | For the UE supporting this feature, it is mandatory to report *maxNumberCSI-RS-BFD* and *maxNumberSSB-BFD* for all NR bands of this band combination where the UE supports SpCell. | Optional with capability signalling |
| 26-2 | Activation/Deactivation of SCG | Indicates whether the UE supports activation (with or without RACH) and deactivation on SCG in NR-DC, upon reception of an *RRCReconfiguration* included in an *RRCResume* message, as specified in TS 38.331 [2]. | support of NR-DC and of *resumeWithSCG-Config-r16* as specified in TS 38.331 [2]. | *scg-ActivationDeactivationResumeNRDC-r17* | *CA-ParametersNRDC-v1700* | No | No | For the UE supporting this feature, it is mandatory to report *maxNumberCSI-RS-BFD* and *maxNumberSSB-BFD* for all NR bands of this band combination where the UE supports SpCell. | Optional with capability signalling |
| 26-3 | Activation/Deactivation of SCG | Indicates whether the UE supports activation (with or without RACH) and deactivation on SCG in EN-DC, upon SCG addition and upon reconfiguration of the SCG, as specified in TS 38.331 [2]. | support of EN-DC as specified in TS 36.331 [12] | *scg-ActivationDeactivationENDC-r17* | *MRDC-Parameters-v1700* | No | No | For the UE supporting this feature, it is mandatory to report *maxNumberCSI-RS-BFD* and *maxNumberSSB-BFD* for all NR bands of this band combination where the UE supports SpCell. | Optional with capability signalling |
| 26-4 | Activation/Deactivation of SCG | Indicates whether the UE supports activation (with or without RACH) and deactivation on SCG in EN-DC, upon reception of an *RRCReconfiguration* included in an *RRCConnectionResume* message, as specified in TS 38.331 [2] and TS 36.331 [12]. | support of EN-DC and support of *resumeWithSCG-Config-r16* as specified in TS 36.331 [12] | *scg-ActivationDeactivationResumeENDC-r17* | *MRDC-Parameters-v1700* | No | No | For the UE supporting this feature, it is mandatory to report *maxNumberCSI-RS-BFD* and *maxNumberSSB-BFD* for all NR bands of this band combination where the UE supports SpCell. | Optional with capability signalling |
| 26-5 | CPAC | Indicates whether the UE supports conditional PSCell addition in NR-DC. |  | *condPSCellAdditionNRDC-r17* | *CA-ParametersNRDC-v1700* | No | No | The UE supporting this feature shall also support 2 trigger events for same execution condition in conditional PSCell addition in NR-DC. | Optional with capability signalling |
| 26-6 | CPAC | Indicates whether the UE supports conditional PSCell addition in EN-DC. |  | *condPSCellAdditionENDC-r17* | *MRDC-Parameters-v1700* | No | No | The UE supporting this feature shall also support 2 trigger events for same execution condition in conditional PSCell addition in EN-DC. | Optional with capability signalling |
| 26-7 | CPAC | Indicates whether the UE supports MN initiated conditional PSCell change in NR-DC, which is configured by NR *conditionalReconfiguration* using MN configured measurement as triggering condition. |  | *mn-InitiatedCondPSCellChangeNRDC-r17* | *BandNR* | No | No | The UE supporting this feature shall also support 2 trigger events for same execution condition in MN initiated conditional PSCell change in NR-DC. UE shall set the capability value consistently for all FDD-FR1 bands, all TDD-FR1 bands and all TDD-FR2 bands respectively. | Optional with capability signalling |
| 26-8 | CPAC | Indicates whether the UE supports SN initiated inter-SN conditional PSCell change in NR-DC, which is configured by NR *conditionalReconfiguration* using SN configured measurement as triggering condition. |  | *sn-InitiatedCondPSCellChangeNRDC-r17* | *BandNR* | No | No | The UE supporting this feature shall also support 2 trigger events for same execution condition in SN initiated inter-SN conditional PSCell change in NR-DC. UE shall set the capability value consistently for all FDD-FR1 bands, all TDD-FR1 bands and all TDD-FR2 bands respectively. | Optional with capability signalling |
| 26-9 | CPAC | Indicates whether the UE supports inter SN conditional PSCell change between FDD and TDD cells in NR-DC. | *mn-InitiatedCondPSCellChangeNRDC-r17* is set for FDD band(s) and TDD band(s), or *sn-InitiatedCondPSCellChangeNRDC-r17* is set for FDD band(s) and TDD band(s) | *inter-SN-condPSCellChangeFDD-TDD-NRDC-r17* | *MeasAndMobParametersMRDC-Common-v1700* | No | No |  | Optional with capability signalling |
| 26-10 | CPAC | Indicates whether the UE supports inter SN conditional PSCell change between FR1 and FR2 cells. | *mn-InitiatedCondPSCellChangeNRDC-r17* is set for FR1 band(s) and FR2 band(s), or *sn-InitiatedCondPSCellChangeNRDC-r17* is set for FR1 band(s) and FR2 band(s). | *inter-SN-condPSCellChangeFR1-FR2-NRDC-r17* | *MeasAndMobParametersMRDC-Common-v1700* | No | No |  | Optional with capability signalling |
| 26-11 | CPAC | Indicates whether the UE supports inter SN conditional PSCell change between FDD and TDD cells in EN-DC. | *mn-InitiatedCondPSCellChange-FR1FDD-ENDC-r17* is supported and at least one *of mn-InitiatedCondPSCellChange-FR1TDD-ENDC-r17* and *mn-InitiatedCondPSCellChange-FR2TDD-ENDC-r17* is supported,  - or *sn-InitiatedCondPSCellChange-FR1FDD-ENDC-r17* is supported and at least one of *sn-InitiatedCondPSCellChange-FR1TDD-ENDC-r17* and *sn-InitiatedCondPSCellChange-FR2TDD-ENDC-r17* is supported. | *inter-SN-condPSCellChangeFDD-TDD-ENDC-r17* | *MeasAndMobParametersMRDC-Common-v1700* | No | No |  | Optional with capability signalling |
| 26-12 | CPAC | Indicates whether the UE supports inter SN conditional PSCell change between FR1 and FR2 cells in EN-DC. | *mn-InitiatedCondPSCellChange-FR2TDD-ENDC-r17* is supported and at least one of *mn-InitiatedCondPSCellChange-FR1TDD-ENDC-r17* and *mn-InitiatedCondPSCellChange-FR1FDD-ENDC-r17* is supported,  - or *sn-InitiatedCondPSCellChange-FR2TDD-ENDC-r17* is supported and at least one of *sn-InitiatedCondPSCellChange-FR1TDD-ENDC-r17* and *sn-InitiatedCondPSCellChange-FR1FDD-ENDC-r17* is supported. | *inter-SN-condPSCellChangeFR1-FR2-ENDC-r17* | *MeasAndMobParametersMRDC-Common-v1700* | No | No |  | Optional with capability signalling |
| 26-13 | CPAC | Indicates whether the UE supports MN initiated conditional PSCell change within all supported FR1-FDD bands in EN-DC, which is configured by E-UTRA *conditionalReconfiguration* field using MN configured measurement as triggering condition. |  | *mn-InitiatedCondPSCellChange-FR1FDD-ENDC-r17* | *MeasAndMobParametersMRDC-Common-v1700* | No | No | The UE supporting this feature shall also support 2 trigger events for same execution condition in MN initiated conditional PSCell change in EN-DC. | Optional with capability signalling |
| 26-14 | CPAC | Indicates whether the UE supports MN initiated conditional PSCell change within all supported FR1-TDD bands in EN-DC, which is configured by E-UTRA *conditionalReconfiguration* field using MN configured measurement as triggering condition. |  | *mn-InitiatedCondPSCellChange-FR1TDD-ENDC-r17* | *MeasAndMobParametersMRDC-Common-v1700* | No | No | The UE supporting this feature shall also support 2 trigger events for same execution condition in MN initiated conditional PSCell change in EN-DC. | Optional with capability signalling |
| 26-15 | CPAC | Indicates whether the UE supports MN initiated conditional PSCell change within all supported FR2-TDD bands in EN-DC, which is configured by E-UTRA *conditionalReconfiguration* field using MN configured measurement as triggering condition. |  | *mn-InitiatedCondPSCellChange-FR2TDD-ENDC-r17* | *MeasAndMobParametersMRDC-Common-v1700* | No | No | The UE supporting this feature shall also support 2 trigger events for same execution condition in MN initiated conditional PSCell change in EN-DC. | Optional with capability signalling |
| 26-16 | CPAC | Indicates whether the UE supports SN initiated inter-SN conditional PSCell change within all supported FR1-FDD bands in EN-DC, which is configured by E-UTRA *conditionalReconfiguration* field using SN configured measurement as triggering condition. |  | *sn-InitiatedCondPSCellChange-FR1FDD-ENDC-r17* | *MeasAndMobParametersMRDC-Common-v1700* | No | No | The UE supporting this feature shall also support 2 trigger events for same execution condition in SN initiated inter-SN conditional PSCell change in EN-DC. | Optional with capability signalling |
| 26-17 | CPAC | Indicates whether the UE supports SN initiated inter-SN conditional PSCell change within all supported FR1-TDD bands in EN-DC, which is configured by E-UTRA *conditionalReconfiguration* field using SN configured measurement as triggering condition. |  | *sn-InitiatedCondPSCellChange-FR1TDD-ENDC-r17* | *MeasAndMobParametersMRDC-Common-v1700* | No | No | The UE supporting this feature shall also support 2 trigger events for same execution condition in SN initiated inter-SN conditional PSCell change in EN-DC. | Optional with capability signalling |
| 26-18 | CPAC | Indicates whether the UE supports SN initiated inter-SN conditional PSCell change within all supported FR2-TDD bands in EN-DC, which is configured by E-UTRA *conditionalReconfiguration* field using SN configured measurement as triggering condition. |  | *sn-InitiatedCondPSCellChange-FR2TDD-ENDC-r17* | *MeasAndMobParametersMRDC-Common-v1700* | No | No | The UE supporting this feature shall also support 2 trigger events for same execution condition in SN initiated inter-SN conditional PSCell change in EN-DC. | Optional with capability signalling |

### 6.2.3 LTE\_NR\_MUSIM

**Table 6.2.3-1: Layer-2 and Layer-3 feature list for LTE\_NR\_MUSIM-Core**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Features** | **Index** | **Feature group** | **Components** | **Prerequisite feature groups** | **Field name in TS 38.331 [2]** | **Parent IE in TS 38.331 [2]** | **Need of FDD/TDD differentiation** | **Need of FR1/FR2 differentiation** | **Note** | **Mandatory/Optional** |
| 27. LTE\_NR\_MUSIM-Core | 27-1 | MUSIM NW Switching- MUSIM Gap request | Indicates whether the UE supports providing MUSIM assistance information with MUSIM gap preference and related MUSIM gap configuration, as defined in TS 38.331 [2]. UE supporting this feature supports 3 periodic gaps and 1 aperiodic gap. |  | *musim-GapPreference-r17* | *UE-NR-Capability-v1700* | No | No |  | Optional with capability signalling |
|  | 27-2 | MUSIM NW Switching-leaving RRC\_CONNECTED state-request | Indicates whether the UE supports providing MUSIM assistance information with indication of leaving RRC\_CONNECTED state as defined in TS 38.331 [2]. |  | *musim-LeaveConnected-r17* | *UE-NR-Capability-v1700* | No | No |  | Optional with capability signalling |
|  | 27-3 | Paging cause in RAN paging message | It is mandatory for a UE to support paging cause in RAN paging if UE supports paging cause in CN paging. |  | *n/a* | *n/a* | n/a | n/a |  | Conditionally mandatory without capability signalling |

### 6.2.4 NR\_IAB\_enh

**Table 6.2.4-1: Layer-2 and Layer-3 feature list for NR\_IAB\_enh**

**Table 5.2.28-1: Layer-2 and Layer-3 feature list for NR\_IAB\_enh-Core**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Features** | **Index** | **Feature group** | **Components** | **Prerequisite feature groups** | **Field name in TS 38.331 [2]** | **Parent IE in TS 38.331 [2]** | **Need of FDD/TDD differentiation** | **Need of FR1/FR2 differentiation** | **Note** | **Mandatory/Optional** |
| 28. NR\_IAB\_enh-Core | 28-1 | RLF handling | Indicates whether the IAB-MT supports BH RLF detection indication and BH RLF recovery indication handling as specified in TS 38.331 [2] and in TS 38.340 [11] |  | *bh-RLF-DetectionRecovery-Indication-r17* | *UE-NR-Capability-v17* | No | No |  | Optional with capability signalling for IAB-MT |
|  | 28-2 | BAP Header Rewirting | 1) Indicates whether the IAB-MT supports BAP header rewriting for inter-donor-DU re-routing, as specified in TS 38.340 [11] and TS 38.300 [16]. IAB-donor-DUs can belong to the same or different IAB-donor CUs.  2) Indicates whether the IAB-MT supports BAP header rewriting based for inter-donor CU routing, including inter-donor- CU partial migration, inter-donor-CU RLF recovery, and inter-donor- CU routing for topology redundancy, as specified in TS 38.340 [11] and TS38.300 [16]. |  | *1) bapHeaderRewriting-Rerouting-r17*  *2) bapHeaderRewriting-Routing-r17* | *BAP-Parameters-r17* | No | No |  | Optional with capability signalling for IAB-MT |
|  | 28-3 | LCG Extension | Indicates whether the IAB-MT supports extended logical channel group as specified in TS 38.321 [10]. A UE supporting this feature shall also support Extended Buffer Status Report formats. |  | *lcg-ExtensionIAB-r17* | *MAC-ParametersCommon* | No | No |  | Optional with capability signalling for IAB-MT |
|  | 28-4 | F1AP over NR RRC | Indicates whether the IAB-MT supports F1-C signalling over *DLInformationTransfer* and *ULInformationTransfer* messages via MN when IAB-MT operates in NR-DC and MN is the non-F1-termination node or via SN when IAB-MT operates in NR-DC and SN is the non-F1-termination node, as specified in TS 37.401 and TS 37.340. |  | *f1c-OverNR-RRC-r17* | *NRDC-Parameters-v17* | No | No |  | Optional with capability signalling for IAB-MT |

### 6.2.5 NR\_IIOT\_URLLC\_enh

**Table 6.2.5-1: Layer-2 and Layer-3 feature list for NR\_IIOT\_URLLC\_enh**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Features** | **Index** | **Feature group** | **Components** | **Prerequisite feature groups** | **Field name in TS 38.331 [2]** | **Parent IE in TS 38.331 [2]** | **Need of FDD/TDD differentiation** | **Need of FR1/FR2 differentiation** | **Note** | **Mandatory/Optional** |
| 29. NR\_IIOT\_URLLC\_enh-Core | 29-1 | Enhancements in unlicensed controlled environments | 1) Indicates whether the UE supports simultaneous configuration of LCH based prioritization and *cg-RetransmissionTimer-r16* as specified in TS 38.321 [10].  2) Indicate whether the UE supports the HARQ process ID selection based on LCH priority as specified in TS 38.321 [10]. | 1) *lch-priorityBasedPrioritization-r16* and *configuredGrantWithReTx-r16*  2) *jointPrioritizationCG-Retx-Timer-r17* | 1) *jointPrioritizationCG-Retx-Timer-r17*  2) *intraCG-Prioritization-r17* | *MAC-ParametersCommon* | No | No |  | Optional with capability signalling |
| 29-2 | Survival time | Indicates whether the UE supports services with survival time requirement using configured grant resource and PDCP duplication, as specified in TS 38.321 [10]. | *pdcp-DuplicationMCG-orSCG-DRB* or *pdcp-DuplicationSplitDRB;*  *configuredUL-GrantType1-v1650* or *configuredUL-GrantType2-v1650* | *survivalTime-r17* | *MAC-ParametersCommon* | No | No |  | Optional with capability signalling |
| 29-3 | gNB-side RTT-based PDC | Indicates whether the UE supports gNB-side RTT-based PDC, as specified in TS 38.300 [yy]. |  | *gNB-SideRTT-BasedPDC-r17* | *UE-NR-Capability* | No | No |  | Optional with capability signalling |
| 29-4 | Simultaneous transmission of SR and PUSCH in different PUCCH groups | Indicates whether the UE supports simultaneous transmission of SR and PUSCH in different PUCCH groups as specified in TS 38.321 [10]. |  | *simultaneousSR-PUSCH-DiffPUCCH-groups-r17* | *MAC-ParametersCommon* | No | No |  | Optional with capability signalling |

### 6.2.6 NR\_SmallData\_INACTIVE

**Table 6.2.6-1: Layer-2 and Layer-3 feature list for NR\_SmallData\_INACTIVE**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 30. NR\_SmallData\_INACTIVE | 30-1 | RA-SDT | Indicates whether the UE supports transmission of data and/or signalling over allowed radio bearers in RRC\_INACTIVE state via Random Access procedure (i.e., RA-SDT) with 4-step RA type and if UE supports *twoStepRACH-r16,* with 2-step RA type, as specified in TS 38.331 [2]. |  | *ra-SDT-r17* | *UE-NR-Capability-v1700* | No | No |  | Optional with capability signaling |
| 30-2 | CG-SDT | Indicates whether the UE supports transmission of data and/or signalling over allowed radio bearers in RRC\_INACTIVE state via configured grant type 1 (i.e. CG-SDT), as specified in TS 38.331 [2]. |  | *cg-SDT-r17* | *BandNR* | N/A | N/A | UE shall set the capability value consistently for NTN bands. | Optional with capability signalling |
| 30-3 | SRB-SDT | Indicates whether the UE supports the usage of signaling radio bearer SRB2 over RA-SDT or CG-SDT, as specified in TS 38.331 [2]. | A UE supporting this feature shall also support *ra-SDT-r17* or *cg-SDT-r17*. | *srb-SDT-r17* | *UE-NR-Capability-v1700* | No | No |  | Optional with capability signalling |
| 30-4 | CG-SDT | Indicates whether the UE supports PUSCH repetitions for CG-SDT | A UE can include this feature only if the UE indicates the support *cg-SDT-r17*.  A UE supporting this feature shall also indicate the support of *type1-PUSCH-RepetitionMultiSlots* or *pusch-RepetitionTypeB-r16*. | *pusch-Repetition-CG-SDT-r17* | *Phy-ParametersCommon* | No | No |  | Optional with capability signaling |

### 6.2.7 NR\_SL\_Relay

**Table 6.2.7-1: Layer-2 and Layer-3 feature list for NR\_SL\_Relay**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Features** | **Index** | **Feature group** | **Components** | **Prerequisite feature groups** | **Field name in TS 38.331 [2]** | **Parent IE in TS 38.331 [2]** | **Need of FDD/TDD differentiation** | **Need of FR1/FR2 differentiation** | **Note** | **Mandatory/Optional** |
| 31. NR\_SL\_Relay-Core | 31-1 | Band combination list supporting transmission and reception of relay discovery | Defines the supported band combinations of NR sidelink relay discovery message transmission and reception by the UE. This parameter is used by the remote UE and relay UE, and for the case of L2 and L3 relay. |  | *supportedBandCombinationListSidelinkRelayDiscovery-r17* | *RF-Parameters* | No | No |  | Optional with capability signalling |
| 31-2 | Band combination list supporting transmission and reception of non-relay discovery | Defines the supported band combinations of NR sidelink non-relay discovery message transmission and reception by the UE. |  | *supportedBandCombinationListSidelinkNonRelayDiscovery-r17* | *RF-Parameters* | No | No |  | Optional with capability signalling |
| 31-3 | Basic NR L2 sidelink relay UE operation | Indicates whether basic NR L2 sidelink relay UE operation is supported by the UE. |  | *relayUE-Operation-L2-r17* | *SidelinkParametersNR-r16* | No | No |  | Optional with capability signalling |
| 31-4 | Basic NR L2 sidelink remote UE operation | Indicate whether basic NR L2 sidelink remote UE operation is supported by the UE. |  | *remoteUE-Operation-L2-r17* | *SidelinkParametersNR-r16* | No | No |  | Optional with capability signalling |
| 31-5 | Remote UE performs handover to idle/inactive relay UE | Indicate whether L2 sidelink remote UE supports direct to indirect path switch with target relay in RRC\_IDLE or RRC\_INACTIVE state. |  | *remoteUE-PathSwitchToIdleInactiveRelay-r17* | *SidelinkParametersNR-r16* | No | No |  | Optional with capability signalling |
| 31-6 | UE supports simultaneous transmission/reception of PC5 data (Relay discovery) and Uu uplink/downlink respectively | Indicates, for a particular Uu band combination, the PC5 Relay discovery band combination(s) on which the UE supports simultaneous transmission/reception of PC5 data (Relay discovery) and Uu uplink/downlink respectively. |  | *supportedBandCombListPerBC-SL-RelayDiscovery-r17* | *BandCombination-v1700* | No | No |  | Optional with capability signalling |
| 31-7 | UE supports simultaneous transmission/reception of PC5 data (non-Relay discovery) and Uu uplink/downlink respectively | Indicates, for a particular Uu band combination, the PC5 non-Relay discovery band combination(s) on which the UE supports simultaneous transmission/reception of PC5 data (non-Relay discovery) and Uu uplink/downlink respectively. |  | *supportedBandCombListPerBC-SL-NonRelayDiscovery-r17* | *BandCombination-v1700* | No | No |  | Optional with capability signalling |
| 31-8 | Support L3 sidelink relay UE operation | It is optional for UE to support L3 sidelink relay UE operation |  | *n/a* | *n/a* | n/a | n/a |  | Optional without capability signalling |
| 31-9 | Support L3 sidelink remote UE operation | It is optional for UE to support L3 sidelink remote UE operation |  | *n/a* | *n/a* | n/a | n/a |  | Optional without capability signalling |

### 6.2.8 NR\_Slice

**Table 6.2.8-1: Layer-2 and Layer-3 feature list for NR\_Slice**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 32. NR\_Slice-Core | 32-1 | Slice based cell reselection | Indicates whether the UE supports slice-based cell reselection Information in SIB and on RRC release for slice-based cell reselection in RRC \_IDLE and RRC INACTIVE as defined in TS 38.304 [19]. |  | *sliceInfoforCellReselection-r17* | *UE-NR-Capability-v17* | No | No |  | Optional with capability signalling |
|  | 32-2 | Random access prioritisation for Slicing | It is optional for UE to support slice-based prioritisation for random access as specified in TS 38.321 [10] |  | *n/a* | *n/a* | n/a | n/a |  | Optional without capability signalling |
|  | 32-3 | Random access partitioning for Slicing | It is optional for UE to support slice-based RACH partitioning specified in TS 38.321 [10]. |  | *n/a* | *n/a* | n/a | n/a |  | Optional without capability signalling |

### 6.2.9 NR\_UE\_pow\_sav\_enh

**Table 6.2.9-1: Layer-2 and Layer-3 feature list for NR\_UE\_pow\_sav\_enh**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 33. NR\_UE\_pow\_sav\_enh-Core | 33-1 | RLM relaxation | Indicates whether the UE supports RLM relaxation criteria and requirement as specified in TS 38.133. |  | *rlm-Relaxation-r17* | *BandNR* | No | Yes |  | Optional with capability signalling |
| 33-2 | BFD relaxation | Indicates whether the UE supports BFD relaxation criteria and requirement as specified in TS 38.133. |  | *bfd-Relaxation-r17* | *BandNR* | No | Yes |  | Optional with capability signalling |

### 6.2.10 NR\_NTN\_solutions

**Table 6.2.10-1: Layer-2 and Layer-3 feature list for NR\_NTN\_solutions**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Features** | **Index** | **Feature group** | **Components** | **Prerequisite feature groups** | **Field name in TS 38.331 [2]** | **Parent IE in TS 38.331 [2]** | **Need of FDD/TDD differentiation** | **Need of FR1/FR2 differentiation** | **Note** | **Mandatory/Optional** |
| 34. NR\_NTN\_solutions-Core | 34-1 | Support of non Terrestrial Network | Indicates whether the UE supports NR NTN access. |  | *nonTerrestrialNetwork-r17* | *UE-NR-Capability-v1700* | No | No | If the UE indicates this capability the UE shall support the following NTN essential features, i.e., timer extension in MAC/RLC/PDCP layers and RACH adaptation to handle long RTT, acquiring NTN specific SIB and more than one TAC per PLMN broadcast in one cell. | Optional with capability signalling |
| 34-2 | Disabling HARQ feedback for downlink transmission | Indicates whether the UE supports disabled HARQ feedback for downlink transmission. | *34-1* | *harq-FeedbackDisabled-r17* | *MAC-ParametersCommon* | No | No |  | Optional with capability signalling |
| 34-3 | HARQ mode B for uplink transmission | Indicates whether the UE supports HARQ mode B and the corresponding LCR restrictions for uplink transmission | *34-1* | *uplink-Harq-ModeB-r17* | *MAC-ParametersCommon* | No | No |  | Optional with capability signalling |
| 34-4 | Location based CHO | Indicates whether the UE supports location based CHO | *34-1, and condHandover-r16 is set for NTN bands.* | *locationBasedCondHandover-r17* | *BandNR* | No | No | UE shall set the capability value consistently for all FDD-FR1 NTN bands. | Optional with capability signalling |
| 34-5 | Time based CHO | Indicates whether the UE supports time based CHO | *34-1, and condHandover-r16 is set for NTN bands.* | *timeBasedCondHandover-r17* | *BandNR* | No | No | UE shall set the capability value consistently for all FDD-FR1 NTN bands. | Optional with capability signalling |
| 34-6 | Event A4 based CHO | Indicates whether the UE supports Event A4 based CHO | *34-1, and condHandover-r16 is set for NTN bands.* | *eventA4BasedCondHandover-r17* | *BandNR* | No | No | UE shall set the capability value consistently for all FDD-FR1 NTN bands. | Optional with capability signalling |
| 34-7 | SR triggered by a TA report | Indicates whether the UE supports triggering of SR when a TA report is triggered and there are no available UL-SCH resources. | *34-1* | *sr-TriggeredBy-TA-Report-r17* | *MAC-ParametersCommon* | No | No |  | Optional with capability signalling |
| 34-8 | Supported NTN scenario(s) | Indicates whether the UE supports the NTN features in GSO scenario or NGSO scenario. If a UE does not include this field but includes nonTerrestrialNetwork-r17, the UE supports the NTN features for both GSO and NGSO scenarios, and also supports mobility between GSO and NGSO scenarios. | *34-1* | *ntn-ScenarioSupport-r17* | *UE-NR-Capability-v1700* | No | No |  | Optional with capability signalling |
| 34-9 | Time-based measurement initiation | It’s optional for UE to start neighbour cell measurements before the broadcast cell service stop-time |  | *n/a* | *n/a* | n/a | n/a |  | Optional without capability signalling |
| 34-10 | Location-based measurement initiation | It’s optional for UE to perform location-based measurement initiation for neighbour cells |  | *n/a* | *n/a* | n/a | n/a |  | Optional without capability signalling |
| 34-11 | SMTC adjustment in idle/inactive | It’s optional for UE to perform SMTC adjustment in RRC\_IDLE/RRC\_INACTIVE |  | *n/a* | *n/a* | n/a | n/a |  | Optional without capability signalling |
| 34-12 | Reporting of service link propagation delay difference between serving cell and neighbour cell(s) | Indicates whether the UE supports the reporting of service link propagation delay difference between serving cell and neighbour cell(s). | *34-1* | *serviceLinkPropDelayDiffReporting-r17* | *MeasAndMobParametersCommon* | No | No |  | Optional with capability signalling |
| 34-13 | Location-based measurement report trigger | Indicates whether the UE supports location-based triggered measurement reporting (i.e., event D1) | *34-4* | *eventD1-MeasReportTrigger-r17* | *MeasAndMobParametersCommon* | No | No |  | Optional with capability signalling |
| 34-14 | RRC\_INACTIVE in NTN | Indicates whether the UE supports RRC\_INACTIVE in NTN | *34-1* | *inactiveStateNTN-r17* | *NTN-Parameters-r17* | No | No |  | Conditional mandatory with capability signalling |
| 34-15 | RA-SDT in NTN | Indicates whether the UE supports transmission of data and/or signalling over allowed radio bearers in RRC\_INACTIVE state in NTN via Random Access procedure (i.e., RA-SDT) with 4-step RA type and if UE supports *twoStepRACH-r16* for NTN, with 2-step RA type. | *34-1* | *ra-SDT-NTN-r17* | *NTN-Parameters-r17* | No | No |  | Optional with capability signalling |
| 34-16 | SRB-SDT in NTN | Indicates whether the UE supports the usage of signalling radio bearer SRB2 over RA-SDT or CG-SDT in NTN. | *34-1 and {34-15 or 30-2 in NTN bands}* | *srb-SDT-NTN -r17* | *NTN-Parameters-r17* | No | No |  | Optional with capability signalling |
| 34-17 | TA reporting during initial access | It is mandatory to support TA reporting during initial access for UEs supporting uplink-TA-Reporting-r17 as specified in TS 38.321 [10]. |  | *n/a* | *n/a* | n/a | n/a |  | Conditional mandatory without capability signalling |

### 6.2.11 NR\_pos\_enh

**Table 6.2.11-1: Layer-2 and Layer-3 feature list for NR\_pos\_enh**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 37.355 [9] | Parent IE in TS 37.355 [9] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 35. NR\_pos\_enh-Core | 35-1 | Scheduled Location Time | Indicates whether the target device supports scheduled location requests. |  | *scheduledLocationRequestSupported-r17* | *OTDOA-ProvideCapabilities or*  *A-GNSS-ProvideCapabilities or*  *ECID-Provide-Capabilities or*  *TBS-ProvideCapabilities or*  *Sensor-ProvideCapabilities or*  *WLAN-ProvideCapabilities or*  *BT-ProvideCapabilities or*  *NR-ECID-ProvideCapabilities or*  *NR-DL-TDOA-ProvideCapabilities or*  *NR-DL-AoD-ProvideCapabilities or*  *NR-Multi-RTT-ProvideCapabilities* | N/A | N/A |  | Optional with capability signalling |
| 35-2 | 10 ms ganularity for response time | Indicates whether the '*ten-milli-seconds*' response time unit is supported by the target device. |  | *ten-ms-unit-ResponseTime-r17* | NR-ECID-ProvideCapabilities or  NR-DL-TDOA-ProvideCapabilities or  NR-DL-AoD-ProvideCapabilities or  *NR-Multi-RTT-ProvideCapabilities* | N/A | N/A |  | Optional with capability signalling |
|  | 35-3 | PRS validity area | Indicates whether the target device supports validity conditions for pre-configured assistance data. |  | *nr-dl-prs-AssistanceDataValidity-r17* | *NR-DL-TDOA-ProvideCapabilities or*  *NR-DL-AoD-ProvideCapabilities or*  *NR-Multi-RTT-ProvideCapabilities* | N/A | N/A |  | Optional with capability signalling | |
|  | 35-4a | On-demand PRS for DL-TDOA | Indicates whether the target device supports on-demand DL-PRS requests for DL-TDOA. |  | *nr-DL-TDOA-On-Demand-DL-PRS-Support-r17* | *NR-DL-TDOA-ProvideCapabilities* | N/A | N/A |  | Optional with capability signalling | |
|  | 35-4b | On-demand PRS request for DL-AoD | Indicates whether the target device supports on-demand DL-PRS requests for DL-AoD. |  | *nr-DL-AoD-On-Demand-DL-PRS-Support-r17* | *NR-DL-AoD-ProvideCapabilities* | N/A | N/A |  | Optional with capability signalling | |
|  | 35-4c | On-demand PRS request for multi-RTT | Indicates whether the target device supports on-demand DL-PRS requests for Multi-RTT. |  | *nr-Multi-RTT-On-Demand-DL-PRS-Support-r17* | *NR-Multi-RTT-ProvideCapabilities* | N/A | N/A |  | Optional with capability signalling | |
|  | 35-5 | Service parameters for GNSS Integrity | Indicates whether the target device supports the IE *GNSS-Integrity-ServiceParameters.* |  | *gnss-Integrity-ServiceParametersSupport-r17* | *GNSS-CommonAssistanceDataSupport* | N/A | N/A |  | Optional with capability signalling | |
|  | 35-6 | Service alert for GNSS Integrity | Indicates whether the target device supports the IE *GNSS-Integrity-ServiceAlert.* |  | *gnss-Integrity-ServiceAlertSupport-r17* | *GNSS-CommonAssistanceDataSupport* | N/A | N/A |  | Optional with capability signalling | |
|  | 35-7 | Orbit parameters for GNSS Integrity | Indicates whether the target device supports the IEs *ORBIT-IntegrityParameters* and *SSR-IntegrityOrbitBounds*. |  | *orbit-IntegritySup-r17* | *GNSS-SSR-OrbitCorrectionsSupport-r15* | N/A | N/A |  | Optional with capability signalling | |
|  | 35-8 | Code bias bound for GNSS Integrity | Indicates whether the target device supports the IE *SSR-IntegrityCodeBiasBounds*. |  | *ssr-IntegrityCodeBiasBoundsSup-r17* | *GNSS-SSR-CodeBiasSupport-r15* | N/A | N/A |  | Optional with capability signalling | |
|  | 35-9 | Phase bias bound for GNSS Integrity | Indicates whether the target device supported the IE *SSR-IntegrityPhaseBiasBounds.* |  | *ssr-IntegrityPhaseBiasBoundsSup-r17* | *GNSS-SSR-PhaseBiasSupport-r16* | N/A | N/A |  | Optional with capability signalling | |
|  | 35-10 | STEC parameters for GNSS Integrity | Indicates whether the target device supported the IE *STEC-IntegrityParameters* and *STEC-IntegrityErrorBounds* |  | *stec-IntegritySup-r17* | *GNSS-SSR-STEC-CorrectionSupport-r16* | N/A | N/A |  | Optional with capability signalling | |
|  | 35-11 | Gridded correction parameters for GNSS Integrity | Indicates whether the target device supports the IEs *SSR-GriddedCorrectionIntegrityParameters* and *TropoDelayIntegrityErrorBounds*. |  | *griddedCorrectionIntegritySup-r17* | *GNSS-SSR-GriddedCorrectionSupport-r16* | N/A | N/A |  | Optional with capability signalling |

### 6.2.12 NR\_RedCap

**Table 6.2.12-1: Layer-2 and Layer-3 feature list for NR\_RedCap**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 36. NR\_redcap-Core | 36-1 | Support 16 DRBs | Defines whether the RedCap UE supports 16 DRBs as specified in TS 38.331 [2]. |  | *supportOf16DRB-RedCap-r17* | *RedCapParameters-r17* | No | No |  | Optional with capability signalling |
| 36-2 | Support 18 bit length of PDCP sequence number | Defines whether the RedCap UE supports 18 bit length of PDCP sequence number as specified in TS 38.331 [2]. |  | *longSN-RedCap-r17* | *PDCP-Parameters* | No | No |  | Optional with capability signalling |
| 36-3 | Support AM DRB with 18 bit length of RLC sequence number | Defines whether the RedCap UE supports AM DRB with 18 bit length of RLC sequence number as specified in TS 38.331 [2]. |  | *am-WithLongSN-RedCap-r17* | *RLC-Parameters* | No | No |  | Optional with capability signalling |
| 36-4 | Support of RRM relaxation in RRC\_CONNECTED | Defines whether the RedCap UE supports Rel-17 relaxed RRM measurements in RRC\_CONNECTED as specified in TS 38.331 [2]. |  | *rrm-RelaxationRRC-ConnectedRedCap-r17* | *MeasAndMobParametersCommon* | No | No |  | Optional with capability signalling |
| 36-5 | Support of extended DRX in RRC\_INACTIVE | Defines whether a UE (RedCap or Non-RedCap) supports the extended DRX in RRC\_INACTIVE with values of 256, 512 and 1024 radio frames as specified in TS 38.331 [2]. The UE may indicate support for extended DRX in RRC\_INACTIVE only if it supports extended DRX in RRC\_IDLE. |  | *extendedDRX-CycleInactive-r17* | *MAC-ParametersCommon* | No | No |  | Optional with capability signalling |

### 6.2.13 NR\_ENDC\_SON\_MDT\_enh

**Table 6.2.13-1: Layer-2 and Layer-3 feature list for NR\_ENDC\_SON\_MDT\_enh**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Features** | **Index** | **Feature group** | **Components** | **Prerequisite feature groups** | **Field name in TS 38.331 [2]** | **Parent IE in TS 38.331 [2]** | **Need of FDD/TDD differentiation** | **Need of FR1/FR2 differentiation** | **Note** | **Mandatory/Optional** |
| 37. NR\_ENDC\_SON\_MDT\_enh-Core | 37-1 | RLF for CHO | Indicates whether the UE supports RLF-Report for conditional handover. |  | *rlfReportCHO-r17* | *SON-Parameters-r16* | No | No |  | Optional with capability signalling |
| 37-2 | RLF for DAPS HO | Indicates whether the UE supports RLF-Report for DAPS handover. |  | *rlfReportDAPS-r17* | *SON-Parameters-r16* | No | No |  | Optional with capability signalling |
| 37-3 | Report for SHR | Indicates whether the UE supports the storage and delivery of Successful Handover Report upon request from the network as specified in TS 38.331 [2]. |  | *success-HO-Report-r17* | *SON-Parameters-r16* | No | No |  | Optional with capability signalling |
| 37-4 | RA report for 2-step RA | Indicates whether the UE supports the storage and delivery of 2-step RACH related information upon request from the network as specified in TS 38.331 [2]. | 20-1 | *twoStepRACH-Report-r17* | *SON-Parameters-r16* | No | No |  | Optional with capability signalling |
| 37-5 | SpCell ID indication | It is optional for UE to support the delivery of the *SpCellID-r17* in the RA-Report, if the RA procedure is performed in a SCell of the MCG/SCG. | 20-1 | *N/A* | *N/A* | No | No |  | Optional without capability signalling |
| 37-6 | PSCell MHI storage | t is optional for UE to support the storage of PSCell mobility history information and the reporting in UEInformationResponse message as specified in TS 38.331 [2]. | 20-12 | *pscell-MHI-Report-r17* | *SON-Parameters-r16* | No | No |  | Optional with capability signalling |
| 37-7 | SCG Failure Report for MRO | It is optional for UE to support the delivery of the SCG failure related parameters for MRO in SCGFailureInformation message to the network. |  | *N/A* | *N/A* | No | No |  | Optional without capability signalling |
| 37-8 | On demand SI report | Indicates whether the UE supports delivery of on-Demand SI information upon request from the network as specified in TS 38.331 [2]. | 20-1 | *onDemandSI-Report-r17* | *SON-Parameters-r16* | No | No |  | Optional with capability signalling |
| 37-9 | Signaling Based Logged MDT Override Protection | Indicates whether the UE supports the override protection of the signalling based logged measurements configured in NR. | 20-6 | *sigBasedLogMDT-OverrideProtect-r17* | *UE-BasedPerfMeas-Parameters-r16* | No | No |  | Optional with capability signalling |
| 37-10 | Multiple CEF report | Indicates whether the UE supports the storage and delivery of multiple CEF reports upon request from the network as specified in TS 38.331 [2]. |  | *multipleCEF-Report-r17* | *UE-BasedPerfMeas-Parameters-r16* | No | No |  | Optional with capability signalling |
| 37-11 | Excess packet delay | Indicates whether the UE supports the UL PDCP excess packet delay measurement per DRB as specified in TS 38.314. A UE that supports the UL PDCP excess packet delay measurement shall also support the measurement configuration and reporting as specified in TS 38.331 [2]. |  | *excessPacketDelay-r17* | *UE-BasedPerfMeas-Parameters-r16* | No | No |  | Optional with capability signalling |
| 37-12 | Logged Measurements Suspension due to IDC Interference | It is mandatory to support Logged Measurements Suspension due to IDC Interference if both logged MDT and IDC are supported. | 20-6 and 24-7 | *n/a* | *n/a* | n/a | n/a |  | Conditional mandatory without capability signalling |
|  | 37-13 | Early measurement log | Indicates whether the UE supports the storage of Early Measurement Logging in logged measurements and the reporting upon request from the network as specified in TS 38.331 [2]. |  | *earlyMeasLog-r17* | *UE-BasedPerfMeas-Parameters-r16* | No | No |  | Optional with capability signalling |

### 6.2.14 NR\_QoE

**Table 6.2.14-1: Layer-2 and Layer-3 feature list for NR\_QoE**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 38. NR\_QoE-Core | 38-1a | NR QoE measurement collection for streaming | Indicates whether the UE supports NR QoE Measurement Collection for streaming services. |  | *qoe-Streaming-MeasReport-r17* | *AppLayerMeasParameters-r17* | No | No |  | Optional with capability signalling |
|  | 38-1b | NR QoE measurement collection for MTSI | Indicates whether the UE supports NR QoE Measurement Collection for MTSI services. |  | *qoe-MTSI-MeasReport-r17* | *AppLayerMeasParameters-r17* | No | No |  | Optional with capability signalling |
|  | 38-1c | NR QoE measurement collection for VR | Indicates whether the UE supports NR QoE Measurement Collection for VR services. |  | *qoe-VR-MeasReport-r17* | *AppLayerMeasParameters-r17* | No | No |  | Optional with capability signalling |
|  | 38-2a | RAN visible QoE measurement collection for streaming | Indicates whether the UE supports RAN visible QoE Measurement Collection for streaming services. | 38-1a | *ran-VisibleQoE-Streaming-MeasReport-r17* | *AppLayerMeasParameters-r17* | No | No |  | Optional with capability signalling |
|  | 38-2b | RAN visible QoE measurement collection for VR | Indicates whether the UE supports RAN visible QoE Measurement Collection for VR services. | 38-1c | *ran-VisibleQoE-VR-MeasReport-r17* | *AppLayerMeasParameters-r17* | No | No |  | Optional with capability signalling |
|  | 38-3 | Segmentation of MeasurementReportAppLayer message in UL | Indicates whether the UE supports RRC segmentation of the MeasurementReportAppLayer message in UL. |  | *ul-MeasurementReportAppLayer-Seg-r17* | *AppLayerMeasParameters-r17* | No | No |  | Optional with capability signalling |
|  | 38-4 | AS layer memory size for QoE paused measurement reports | It is mandatory to support the minimum AS layer memory size of 64KB for QoE paused measurement reports for UEs which support *qoe-Streaming-MeasReport-r17, qoe-MTSI-MeasReport-r17* or *qoe-VR-MeasReport-r17*. |  | *n/a* | *n/a* | n/a | n/a |  | Conditionally mandatory without capability signalling |

### 6.2.15 NR\_SL\_enh

**Table 6.2.15-1: Layer-2 and Layer-3 feature list for NR\_SL\_enh**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 39. NR\_SL\_enh-Core | 39-1 | Sidelink DRX on PC5 interface | Indicates whether UE supports sidelink DRX for unicast, groupcast and broadcast. |  | *drx-OnSidelink-r17* | *MAC-ParametersSidelinkCommon-r16* | No | No |  | Optional with capability signalling |
| 39-2 | Uu DRX for sidelink | Indicates whether UE supports sidelink related Uu-DRX mechanisms for PDCCH monitoring. | 15-2 | *enhancedUuDRX-forSidelink-r17* | *MAC-ParametersCommon* | No | No |  | Optional with capability signaling |

### 6.2.16 NR\_RAN\_PRN\_enh

**Table 6.2.16-1: Layer-2 and Layer-3 feature list for NR\_RAN\_PRN\_enh**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 40. NG\_RAN\_PRN\_enh-Core | 40-1 | IMS emergency service over SNPN | it is mandatory to support IMS emergency call over SNPN for UEs that are SNPN capable and IMS voice capable over SNPNs |  | *n/a* | *n/a* | n/a | n/a | *Include it in existing IMS emergency call* | Conditional mandatory without capability signalling |
| 40-2 | VoiceOverNR in SNPN | Indicates whether the UE supports IMS voice over NR. It is mandated to the UE if the UE is capable of IMS voice over NR (including SNPN if the UE is SNPN capable). Otherwise, the UE does not include this field. If this field is included and the UE is capable of E-UTRA with EPC, the UE shall support IMS voice over E-UTRA via EPC. |  | *voiceOverNR* | *IMS-ParametersFRX-Diff* | No | Yes | *Update to the field description of existing VoiceOverNR* | Optional with capability signalling |

### 6.2.17 NR\_ext\_to\_71GHz

**Table 6.2.17-1: Layer-2 and Layer-3 feature list for NR\_ext\_to\_71GHz**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 41. NR\_ext\_to\_71GHz-Core | 41-1 | UE assistance information for power saving – Maximum aggregated bandwidth preference | Indicates whether the UE supports providing its preference of a cell group on the maximum aggregated bandwidth for power saving in RRC\_CONNECTED, as specified in TS 38.331 [2]. |  | *maxBW-Preference-r17* | *PowSav-ParametersFR2-2-r17* | No | Yes  (Incl FR2-2 DIFF) |  | Optional capability with signalling |
| 41-2 | UE assistance information for power saving – Maximum number of MIMO layers preference | Indicates whether the UE supports providing its preference of a cell group on the maximum number of MIMO layers for power saving in RRC\_CONNECTED, as specified in TS 38.331 [2]. |  | *maxMIMO-LayerPreference-r17* | *PowSav-ParametersFR2-2-r17* | No | Yes  (Incl FR2-2 DIFF) |  | Optional capability with signalling |
| 41-3 | Direct NR MCG SCell activation | 1) Indicates whether the UE supports direct NR MCG SCell activation, as specified in TS 38.321 [10], upon SCell addition, upon reconfiguration with sync of the MCG, as specified in TS 38.331 [2].  2) Indicates whether the UE supports direct NR MCG SCell activation, as specified in TS 38.321 [10], upon reception of an RRCResume message, as specified in TS 38.331 [2]. |  | *1) directMCG-SCellActivation-r17*  *2) directMCG-SCellActivationResume-r17* | *MAC-ParametersFR2-2-r17* | No | Yes  (Incl FR2-2 DIFF) |  | Optional capability with signalling |
| 41-4 | Direct NR SCG SCell activation | 1) Indicates whether the UE supports direct NR SCG SCell activation, as specified in TS 38.321 [10], upon SCell addition and upon reconfiguration with sync of the SCG, both performed via an RRCReconfiguration message received via SRB3 or contained in an RRC(Connection)Reconfiguration message received via SRB1, as specified in TS 38.331 [2] and TS 36.331 [12].  2) Indicates whether the UE supports direct NR SCG SCell activation, as specified in TS 38.321 [10]:  - upon reception of an RRCReconfiguration included in an RRCConnectionResume message, as specified in TS 38.331 [2] and TS 36.331 [12], if the UE indicates support of en-dc and of *resumeWithSCG-Config-r16* as specified in TS 36.331 [12],  - upon reception of an RRCReconfiguration included in an RRCResume message, as specified in TS 38.331 [2], if the UE indicates support of nr-dc and of *resumeWithSCG-Config-r16* as specified in TS 38.331 [2]. | 1) Support of EN-DC or NGEN-DC as specified in TS 36.331 [12], or Support of *nr-dc* as specified in TS 38.331 [2].  2) Support of EN-DC or NGEN-DC, and *resumeWithSCG-Config-r16* as specified in TS 36.331 [12], or Support of *nr-dc* and *18-3* | *1)directSCG-SCellActivation-r17*  *2) directSCG-SCellActivationResume-r17* | *MAC-ParametersFR2-2-r17* | No | Yes  (Incl FR2-2 DIFF) |  | Optional capability with signalling |
| 41-5 | HO to EUTRA connected to 5GC in FR2-2 | Indicates whether the UE supports HO to EUTRA connected to 5GC. It is mandated if the UE supports EUTRA connected to 5GC |  | *handoverLTE-5GC-r17* | *MeasAndMobParametersFR2-2-r17* | No | Yes  (Incl FR2-2 DIFF) |  | Optional capability with signalling |
| 41-6 | HO between FR1 and FR2-2 | Indicates whether the UE supports HO between FR1 and FR2-2. This field only applies to NR SA/NR-DC/NE-DC (e.g. PCell handover) and PSCell change when (NG)EN-DC/NR-DC is configured. UEs supporting this shall indicate support of handoverInterF for both FR1 and FR2-2. |  | *handoverFR1-FR2-2-r17* | *MeasAndMobParametersCommon* | No | No |  | Optional capability with signalling |
| 41-7 | HO between FR2-1 and FR2-2 | Indicates whether the UE supports HO between FR2-1 and FR2-2. This field only applies to NR SA/NR-DC/NE-DC (e.g. PCell handover) and PSCell change when (NG)EN-DC/NR-DC is configured. UEs supporting this shall indicate support of handoverInterF for both FR2-1 and FR2-2. |  | *handoverFR2-1-FR2-2-r17* | *MeasAndMobParametersCommon* | No | No |  | Optional capability with signalling |
| 41-8 | Inter-frequency HO for FR2-2 | Indicates whether the UE supports inter-frequency HO. It indicates the support for inter-frequency HO from the corresponding duplex mode and from frequency range indicated to be supported as described in Annex B. This field only applies to NR SA/NR-DC/NE-DC (e.g. PCell handover). For PSCell change when (NG)EN-DC/NR-DC is configured, this feature is mandatory supported. |  | *handoverInterF-r17* | *MeasAndMobParametersFR2-2-r17* | No | Yes  (Incl FR2-2 DIFF) |  | Optional capability with signalling |
| 41-9 | HO to EUTRA connected to EPC in FR2-2 | Indicates whether the UE supports HO to EUTRA connected to EPC. It is mandated if the UE supports EUTRA connected to EPC. |  | *handoverLTE-EPC-r17* | *MeasAndMobParametersFR2-2-r17* | No | Yes  (Incl FR2-2 DIFF) |  | Optional capability with signalling |
| 41-10 | RRM during IDLE/INACTIVE – Support of NR SSB measurement and reporting upon network request in FR2-2 | Indicates whether the UE supports configuration of NR SSB measurements in RRC\_IDLE/RRC\_INACTIVE and reporting of the corresponding results upon network request as specified in TS 38.331 [2]. If this parameter is indicated for FR1 and FR2 differently, each indication corresponds to the frequency range of measured target cell. |  | *idleInactiveNR-MeasReport-r17* | *MeasAndMobParametersFR2-2-r17* | No | Yes  (Incl FR2-2 DIFF) |  | Optional capability with signalling |
| 41-11 | IMS voice for FR2-2 | Indicates whether the UE supports IMS voice over NR. It is mandated to the UE if the UE is capable of IMS voice over NR (including SNPN if the UE is SNPN capable). Otherwise, the UE does not include this field. If this field is included and the UE is capable of E-UTRA with EPC, the UE shall support IMS voice over E-UTRA via EPC. |  | *voiceOverNR-r17* | *IMS-ParametersFR2-2-r17* | No | Yes  (Incl FR2-2 DIFF) |  | Optional capability with signalling |
| 41-12 | DRX adaptation for FR2-2 | Indicates whether the UE supports DRX adaptation comprised of the following functional components:  - Configured ps-Offset for the detection of DCI format 2\_6 with CRC scrambling by ps-RNTI and reported MinTimeGap before the start of drx-onDurationTimer of Long DRX  - Indication of UE whether or not to start drx-onDurationTimer for the next Long DRX cycle by detection of DCI format 2\_6  - Configured UE wakeup or not when DCI format 2\_6 is not detected at all monitoring occasions outside Active Time  - Configured periodic CSI report apart from L1-RSRP (ps-TransmitOtherPeriodicCSI) when impacted by DCI format 2\_6 that drx-onDurationTimer does not start for the next Long DRX cycle  - Configured periodic L1-RSRP report (ps-TransmitPeriodicL1-RSRP) when impacted by DCI format 2\_6 that drx-onDurationTimer does not start for the next Long DRX cycle  The capability signalling includes the minimum time gap between the end of the slot of last DCI format 2\_6 monitoring occasion and the beginning of the slot where the UE would start the drx-onDurationTimer of Long DRX for each SCS. The value sl1 indicates 1 slot. The value sl2 indicates 2 slots, and so on. Support of this feature is reported for licensed and unlicensed bands, respectively. When this field is reported, either of sharedSpectrumChAccess-r16 or non-SharedSpectrumChAccess-r16 shall be reported, at least. |  | *drx-Adaptation-r17* | *MAC-ParametersFR2-2-r17* | No | Yes  (Incl FR2-2 DIFF) |  | Optional capability with signalling |
| 41-13 | Extended values for drx-HARQ-RTT-TimerDL/UL | It is mandatory for UEs which support FR2-2 bands with SCS 480kHz and/or 960kHz |  | *n/a* | n/a | n/a | n/a |  | Conditionally mandatory without capability signalling |

### 6.2.18 NR\_UDC

**Table 6.2.18-1: Layer-2 and Layer-3 feature list for NR\_UDC**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Features** | **Index** | **Feature group** | **Components** | **Prerequisite feature groups** | **Field name in TS 38.331 [2]** | **Parent IE in TS 38.331 [2]** | **Need of FDD/TDD differentiation** | **Need of FR1/FR2 differentiation** | **Note** | **Mandatory/Optional** |
| 2. NR\_UDC-Core | 42-1 | UDC | Indicates whether the UE supports the uplink data compression. |  | *udc-r17* | *PDCP-Parameters* | No | No |  | Optional with capability signalling |
| 42-2 | UDC | Indicates whether the UE supports uplink data compression with the SIP static dictionary. | 42-1 | *standardDictionary-r17* | *PDCP-Parameters* | No | No |  | Optional with capability signalling |
| 42-3 | UDC | Indicates whether the UE supports UL data compression with operator defined dictionary. | 42-1 | *operatorDictionary-r17* | *PDCP-Parameters* | No | No |  | Optional with capability signalling |
| 42-4 | UDC | Indicates the version of the operator defined dictionary that the UE supports. | 42-1 | *versionofDictionary-r17* | *PDCP-Parameters* | No | No |  | Optional with capability signalling |
| 42-5 | UDC | Indicates the associated PLMN ID of the operator defined dictionary that the UE supports which has no relationship with UE’s HPLMN ID. | 42-1 | *associatedPLMN-ID-r17* | *PDCP-Parameters* | No | No |  | Optional with capability signalling |
| 42-6 | UDC | Indicates whether the UE supports continuation of uplink data compression protocol operation where the UE does not reset the buffer upon PDCP re-establishment. | 42-1 | *continueUDC-r17* | *PDCP-Parameters* | No | No |  | Optional with capability signalling |
| 42-7 | UDC | Indicates which compression buffer size the UE supports. | 42-1 | *supportOfBufferSize-r17* | *PDCP-Parameters* | No | No |  | Optional with capability signalling |

### 6.2.19 TEI17 and Others

**Table 6.2.19-1: Layer-2 and Layer-3 feature list for TEI17 and Others**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 43. TEI17/Others | 43-1 | Minimization of service interruption | It is optional for UE to support minimization of service interruption including reporting to NAS of disaster roaming information for available PLMNs and Access Barring check for Access Identity 3, as specified in TS 38.331 [2]. |  | *n/a* | *n/a* | n/a | n/a |  | Optional without capability signalling |
| 43-2 | Use the same i\_s to determine PO in RRC\_INACTIVE state as in RRC\_IDLE state | Indicates whether the UE supports to use the same i\_s to determine PO in RRC\_INACTIVE state as in RRC\_IDLE state. |  | *inactiveStatePO-Determination-r17* | *UE-NR-Capability-v1700* | No | No |  | Optional with capability signalling |
| 43-3 | Cell reselection priority handling for NR HSDN | It is optional for UE to support HSDN cell reselection priority handling in RRC\_IDLE/RRC\_INACTIVE as specified in TS 38.304 [19] and TS 38.331 [2]. |  | *n/a* | *n/a* | n/a | n/a |  | Optional without capability signalling |
| 43-4 | Acquisition of SI messages with explicit SI window positions | It is mandatory to support acquisition of SI messages with explicit SI window positions for UEs which support the SIB types in schedulingInfoList2 as specified in TS 38.331 [2]. |  | *n/a* | *n/a* | n/a | n/a |  | Conditional mandatory without capability signalling |
| 43-5 | CHO with target SCG for NR-DC | Indicates whether the UE supports conditional handover with NR SCG configuration for NR-DC. | 17-3 and at least one NR-DC band combination | *condHandoverWithSCG-NRDC-r17* | *MeasAndMobParametersCommon* | No | No |  | Optional with capability signalling |
| 43-6 | CHO with target SCG for EN-DC | Indicates whether the UE supports conditional handover with NR SCG configuration for EN-DC. | *cho-r16* in TS 36.306 [14] and at least one EN-DC band combination. | *condHandoverWithSCG-ENDC-r17* | *MeasAndMobParametersMRDC-Common-v1700* | No | No |  | Optional with capability signalling |
| 43-7 | CHO with target SCG for NE-DC | Indicates whether the UE supports conditional handover with E-UTRA SCG configuration for NE-DC. | 17-3 and at least one NE-DC band combination. | *condHandoverWithSCG-NEDC-r17* | *MeasAndMobParametersMRDC-Common-v1700* | No | No |  | Optional with capability signalling |
| 43-8 | Flexible gNB ID length for NR-DC | Indicates whether the UE supports acquisition and reporting of gNB ID length from a neighbouring intra-frequency or inter-frequency NR cell by reading the SI of the neighbouring cell and reporting the acquired gNB ID length to the network as specified in TS 38.331 [2] when (NG)EN-DC and NE-DC are not configured or, when consistent DRX is configured in NR-DC. The consistent DRX configuration implies that MN and SN have the same DRX cycle and on-duration configured by MN completely contains on-duration configured by SN. It is mandated if UE supports NR CGI reporting (NG)EN-DC and NE-DC are not configured or, when consistent DRX is configured in NR-DC. |  | *gNB-ID-Length-Reporting-r17* | *MeasAndMobParametersCommon* | No | No |  | Conditional mandatory with capability signalling |
| 43-9 | Flexible gNB ID length for (NG)EN-DC | Indicates whether the UE supports acquisition and reporting of gNB ID length from a neighbouring intra-frequency or inter-frequency NR cell by reading the SI of the neighbouring cell and reporting the acquired gNB ID length to the network as specified in TS 38.331 [2] when the (NG)EN-DC is configured. It is mandated if UE supports NR CGI reporting when (NG)EN-DC is configured. |  | *gNB-ID-Length-Reporting-ENDC-r17* | *MeasAndMobParametersCommon* | No | No |  | Conditional mandatory with capability signalling |
| 43-10 | Flexible gNB ID length for NE-DC | Indicates whether the UE supports acquisition and reporting of gNB ID length from a neighbouring intra-frequency or inter-frequency NR cell by reading the SI of the neighbouring cell and reporting the acquired gNB ID length to the network as specified in TS 38.331 [2] when the NE-DC is configured. It is mandated if UE supports NR CGI reporting when NE-DC is configured. |  | *gNB-ID-Length-Reporting-NEDC-r17* | *MeasAndMobParametersCommon* | No | No |  | Conditional mandatory with capability signalling |
| 43-11 | Flexible gNB ID length | Indicates whether the UE supports acquisition and reporting of gNB ID length from a neighbouring intra-frequency or inter-frequency NR cell by reading the SI of the neighbouring cell and reporting the acquired gNB ID length to the network as specified in TS 38.331 [2] when the NR-DC is configured wherein MN and SN have different DRX cycles, or on-duration configured by MN does not contain on-duration configured by SN if the DRX cycles are the same. It is mandated if UE supports NR CGI reporting when NR-DC is configured. |  | *gNB-ID-Length-Reporting-NRDC-r17* | *MeasAndMobParametersCommon* | No | No |  | Conditional mandatory with capability signalling |
| 43-12 | Flexible gNB ID length | Indicates whether the UE supports acquisition of NPN-relevant gNB ID length from a neighbouring intra-frequency or inter-frequency NR NPN cell by reading the SI of the neighbouring cell and reporting the acquired gNB ID length to the network as specified in TS 38.331 [2]. It is mandated if UE supports NPN CGI reporting. |  | *gNB-ID-Length-Reporting-NPN-r17* | *MeasAndMobParametersCommon* | No | No |  | Conditional mandatory with capability signalling |
| 43-13 | CG Time Domain Allocation extension | Indicates whether UE supports the *timeDomainAllocation-v1700* configured in rrc-ConfiguredUplinkGrant to indicate more than 16 entries in PUSCH TDRA table. | This field is only applicable if the UE supports both *pusch-RepetitionTypeB-r16* and either *configuredUL-GrantType1* or *configuredUL-GrantType1-v1650.* | *cg-TimeDomainAllocationExtension-r17* | *Phy-ParametersCommon* | No | No |  | Optional with capability signalling |
| 43-14 | n77 Canada | This field is only applicable for UEs that indicate support for band n77. If present, the UE supports the restriction to 3450 - 3650 MHz and 3650 - 3980 ranges of band n77 in Canada as specified in Note 12 of Table 5.2-1 in TS 38.101. If absent, the UE supports only restriction to the 3450 - 3650 MHz range of band n77 in Canada. A UE that indicates this field shall also support NS value 57 as specified in TS 38.101-1. A UE supporting NS value 57 shall indicate this field. |  | *extendedBand-n77-2-r17* | *RF-Parameters* | No | No |  | Optional with capability signalling |
| 43-15 | DRX HARQ　RTT　UL timer with bundling | Indicates whether the UE supports starting the *drx-HARQ-RTT-TimerUL* after the end of the last transmission within a bundle as specified in TS 38.321 [10]. |  | *lastTransmissionUL-r17* | *MAC-ParametersCommon* | No | No |  | Optional with capability signalling |
| 43-16 | Idle/Inactive measurement for voice fallback | It is optional for UE to support the idle/inactive measurement for EPS fallback in RRC\_IDLE/RRC\_INACTIVE as specified in TS 38.331 [2]. |  | *n/a* | *n/a* | n/a | n/a |  | Optional without capability signalling |
| 43-17 | Selection of acceptable E-UTRA cell upon HO failure during EPS fallback for emergency call | It is optional for UE to support selecting an acceptable E-UTRA cell supporting emergency call if no suitable E-UTRA cell is available upon handover failure during EPS fallback when the UE has an ongoing emergency call as specified in TS 38.331 [2]. |  | *n/a* | *n/a* | n/a | n/a |  | Optional without capability signalling |
| 43-18 | E-UTRA cell selection upon HO failure during EPS services fallback | It is optional for UE to support selecting a suitable E-UTRA cell, and support selecting an acceptable E-UTRA cell supporting emergency call if no suitable E-UTRA cell is available upon handover failure when the UE is performing emergency services fallback as specified in TS 38.331 [2]. |  | *n/a* | *n/a* | n/a | n/a |  | Optional without capability signalling |
| 43-19 | Higher granularity for per-FR gap capability | This field indicates whether the UE supports two independent measurement gap configurations for FR1 and FR2 as specified in clause 9.1.2 of TS 38.133 while the number of configured serving cells is less than or equal to the indicated number.  UE indicating support of this feature shall not indicate support of *independentGapConfig*. |  | *independentGapConfig-maxCC-r17* | *MeasAndMobParametersCommon* | No | No |  | Optional with capability signalling |
|  | 43-20 | Support of the value ‘n3’ for repetitionFactor-r17 | Indicates the support of the value “n3” for *repetitionFactor-r17*. | The UE indicating support of this feature shall also indicate support of *srs-increasedRepetition-r17*. | *srs-AdditionalRepetition-r17* | *Phy-ParametersCommon* | No | No |  | Optional with capability signalling |

## 6.3 RF and RRM Features

### 6.3.0 General

Tables 6.3.1-1 to 6.3.13-1 provide the list of RF and RRM features, as shown in [18], and the corresponding UE capability field name, as specified in TS 38.331 [2].

### 6.3.1 NR\_pos\_enh

Table 6.3.1-1: RF and RRM Feature List for NR\_pos\_enh

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] or TS 37.355 [9] | Parent IE in TS 38.331 [2] or TS 37.355 [9] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 14. NR\_pos\_enh | 14-1 | per-FR MG for PRS measurement | Capability of supporting per-FR MG for PRS measurement | Rel-15 per-FR gap (independentGapConfig) | *independentGapConfigPRS-r17* | *MeasAndMobParametersCommon* | No | No |  | Optional with capability signalling |
| 14  NR\_pos\_enh | 14-2 | PRS measurement for reduced sample in RRC\_inactive state | Capability of supporting reduced number of samples (M=1, 2) for PRS measurement in RRC\_inactive state | 27-17 | *supportedDL-PRS-ProcessingSamples-RRC-Inactive-r17* | *LPP*  *PRS-ProcessingCapabilityPerBand-r16* | No | No |  | Optional with capability signalling |
| 14. NR\_pos\_enh | 14-3 | PRS measurement without MG | Capability for the threshold used to be compared against with the Rx timing difference to determine whether the PRS from the non-serving cell satisfy the condition of PRS measurement outside MG. | 27-3-2 | *prs-MeasurementWithoutMG-r17* | *RRC*  *BandNR*  *LPP*  *PRS-ProcessingCapabilityPerBand-r16* | No | No | The candidate threshold values: CP length, 1/4 symbol, 1/2 symbol, half of slot | Optional with capability signalling |
| 14. NR\_pos\_enh | 14-4 | Parallel PRS measurements in RRC\_INACTIVE state | Capability for the support of performing RRM measurement and PRS measurement in parallel |  | *parallelPRS-MeasRRC-Inactive-r17* | *BandNR* | No | Yes | Measurement period for UE suporting this capability scales with Kcarrier\_PRS=1 | Optional with capability signalling |

### 6.3.2 NR\_ext\_to\_71GHz

Table 6.3.2-1: RF and RRM Feature List for NR\_ext\_to\_71GHz

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 15. NR\_ext\_to\_71GHz | 15-1 | 64QAM for PUSCH for FR2-2 | 1) Support of 64QAM modulation for FR2-2 PUSCH |  | *modulation64-QAM-PUSCH-FR2-2-r17* | *FR2-2-AccessParamsPerBand-r17* | N/A | Applicable to FR2-2 only |  | Optional with capability signalling |
| 15. NR\_ext\_to\_71GHz | 15-3 | UE support of CBW for 480kHz SCS | Support of {800, 1600} CBW for 480kHz SCS | Support of 480kHz SCS | *channelBWs-DL-SCS-480kHz-FR2-2-r17,*  *channelBWs-UL-SCS-480kHz-FR2-2-r17* | *BandNR* | N/A | Applicable to FR2-2 only | 400 MHz is a mandatory CBW if the UE supports 480 kHz SCS | Optional with capability signalling |
| 15. NR\_ext\_to\_71GHz | 15-4 | UE support of CBW for 960kHz SCS | Support of {800, 1600, 2000} CBW for 960kHz SCS | Support of 960kHz SCS | *channelBWs-DL-SCS-960kHz-FR2-2-r17,*  *channelBWs-UL-SCS-960kHz-FR2-2-r17* | *BandNR* | N/A | Applicable to FR2-2 only | 400 MHz is a mandatory CBW if the UE supports 960 kHz SCS | Optional with capability signalling |

### 6.3.3 NR\_RF\_FR1\_enh

Table 6.3.3-1: RF and RRM Feature List for NR\_RF\_FR1\_enh

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 16. NR\_RF\_FR1\_enh | 16-1 | Dynamic Tx switching between 2CC 2Tx-2Tx switching | Indicate the supported switching period for dynamic UL Tx switching between two uplink carriers with two transmit antenna connectors in inter-band UL CA or SUL |  | *ULTxSwitchingBandPair-v1700* | *supportedBandPairListNR-v1700* | No need | Applicable only to FR1 | Candidate value set: {35us, 140 us, 210us}  Detailed information can refer to the LS to RAN2 in R4-2103234 and R4-2107847. | Optional with capability signalling |
| 16. NR\_RF\_FR1\_enh | 16-2 | Dynamic Tx switching between 3CC 1Tx-2Tx switching | Indicate the supported switching period for dynamic UL Tx switching between one band (with one carrier) capable of one transmit antenna connector and one band (with two carriers) capable of two transmit antenna connectors in inter-band UL CA or SUL |  | *ULTxSwitchingBandPair-v1700* | *supportedBandPairListNR-v1700* | No need | Applicable only to FR1 | Candidate value set: {35us, 140 us, 210us}  Detailed information can refer to the LS to RAN2 in R4-2103234 and R4-2107847. | Optional with capability signalling |
| 16. NR\_RF\_FR1\_enh | 16-3 | Dynamic Tx switching between 3CC 2Tx-2Tx switching | Indicate the supported switching period for dynamic UL Tx switching between one band (with one carrier) capable of two transmit antenna connectors and one band (with two carriers) capable of two transmit antenna connectors in inter-band UL CA or SUL |  | *ULTxSwitchingBandPair-v1700* | *supportedBandPairListNR-v1700* | No need | Applicable only to FR1 | Candidate value set: {35us, 140 us, 210us}  Detailed information can refer to the LS to RAN2 in R4-2103234 and R4-2107847. | Optional with capability signalling |
| 16. NR\_RF\_FR1\_enh | 16-4 | Application of DL interruptions due to dynamic UL Tx switching | Capability to indicate that for the band where DL interruption is needed, the RRM interruption requirements defined in RAN4 shall be applied for duplex mode combinations except the combinations   * SUL+TDD * TDD+TDD CA with the same UL-DL pattern | 16-1, 16-2, or 16-3 | *uplinkTxSwitching-DL-Interruption-r16* | *ULTxSwitchingBandPair-r16* | No need | Applicable only to FR1 | The same capability for Rel-16 DL interruption due to Tx switching is reused.  Detailed information can refer to the LS to RAN2 in R4-2103234. | Optional with capability signalling |
| 16. NR\_RF\_FR1\_enh | 16-5 | UL-MIMO coherence capability for dynamic Tx switching between 3CC 1Tx-2Tx switching | Capability to indicate whether UL-MIMO coherence is supported when dynamic Tx switching between 3CC (within 2 bands) 1Tx-2Tx switching is conducted. | 16-2 | *uplinkTxSwitching-PUSCH-TransCoherence-r16* | *BandCombination-UplinkTxSwitch-r16* | No need | Applicable only to FR1 | The Rel-16 UL-MIMO capability for 2CC 1Tx-2Tx switching is reused.  Detailed information can refer to the LS to RAN2 in R4-2120039. | Optional with capability signalling |
| 16. NR\_RF\_FR1\_enh | 16-6 | UL-MIMO coherence capability for dynamic Tx switching between 2Tx-2Tx switching | Capability to indicate whether UL-MIMO coherence is supported when dynamic Tx switching between 2CC or 3CC (within 2 bands) 2Tx-2Tx switching is conducted. | 16-1 or 16-3 | *uplinkTxSwitchingBandParametersList-v1700* | *BandCombination-UplinkTxSwitch-v1700* | No need | Applicable only to FR1 | Detailed information can refer to the LS to RAN2 in R4-2120039. | Optional with capability signalling |
| 16. NR\_RF\_FR1\_enh | 16-8 | UE power class per band per band combination | Per band per band combination power class |  | *ue-PowerClassPerBandPerBC-r17* | *FeatureSetUplink-v1710* | No | FR1 only |  | Optional with capability signalling |

### 6.3.4 NR\_RF\_FR2\_req\_enh2

Table 6.3.4-1: RF and RRM Feature List for NR\_RF\_FR2\_req\_enh2

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 17. UL gap for Tx power management | 17-1 | Support of UL gap in FR2 for Tx power management | Capability of performing BPS sensing for Tx power management by the use of uplink gap patterns.(UL MGP #0, #1, #2, #3 as specified in TS 38.133) The UE indicating this capability shall meet the corresponding enhanced UE requirements defined in Section TBD.  If UE reports this capability, UE is mandated to report 17-2 |  | *ul-GapFR2-r17* | *BandNR* | No | FR2 only |  | Optional with capability signalling |
| 17. UL gap pattern for Tx power management | 17-2 | Support of UL gap patterns for Tx power management | Capability of supporting UL gap patterns (UL MGP #0, #1, #2, #3 as specified in TS 38.133) needed for performing BPS sensing for Tx power management. The UE indicating this capability shall meet the corresponding enhanced UE requirements defined in Section TBD.  UE is mandated to support at least one of UL MGP #1 and #3 when it indicate support of UL gap for Tx power management (FG 17-1). All other gap patterns except for the one or two selected mandatory gap pattern(s) are optional. | 17-1 | *ul-GapFR2-Pattern-r17* | *UE-NR-Capability-v1700* | No | FR2 only |  | Optional with capability signalling |
| 17. FR2 interband CA | 17-4 | Support of beam management | Capability of support of specific beam management type. |  | *beamManagementType-CBM-r17* | *CA-ParametersNR-v1700*  *CA-ParametersNRDC-v1700* | No | FR2 only | Indicate the supported beam management type for inter-band CA within FR2. Beam management type can be independent beam management (IBM) or common beam management (CBM), or both.  The capability is only applicable to band combinations with two bands.  UE is not allowed to report CBM or both in Rel-17. | Optional with capability signalling |
| 17. DC-location | 17-5 | Support of UL DC location(s) report | Capability of support for the extended DC location reporting (based on indicated default DC location) for at least 2 UL CCs in one band. |  | *extendedDC-LocationReport-r17* | *FeatureSetUplink-v1720* | No | No |  | Optional with capability signalling |
| 17. New CA BW clases | 17-6 | Support of new CA BW Classes | RAN4 has introduced new CA BW Classes R2~R12, and [‘R, S, T, U’] for REL17 |  | *CA-BandwidthClassNR* | *BandParameters* | No | FR2 only |  | Optional with capability signalling |
| 17. UL transmission in FR2 bands within an UL gap when the UL gap is activated | 17-8 | Support of UL transmission in FR2 bands within an UL gap when the UL gap is activated in inter-band UL CA | UE indicates the constituent band(s) for which UL transmission is supported within an UL gap when the UL gap is activated in inter-band UL CA. | 17-1 | *tx-Support-UL-GapFR2-r17* | *FeatureSetUplink-v1710* | No | FR2 only |  | Optional with capability signalling |

### 6.3.5 NR\_HST\_FR1\_enh

Table 6.3.5-1: RF and RRM Feature List for NR\_HST\_FR1\_enh

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 18. NR\_HST\_FR1\_enh | 18-1 | Enhanced RRM requirements specified for CA for FR1 HST | Support of the enhanced RRM for requirements CA to support FR1 high speed up to 500 km/h, as specified in TS 38.133 | Rel-16 RAN4 feature 10-1 or 10-4 | *measurementEnhancementCA-r17* | *HighSpeedParameters-v1700* | NO | FR1 only |  | Optional with capability signalling |
| 18. NR\_HST\_FR1\_enh | 18-2 | Enhanced RRM requirements specified for inter-frequency measurement in connected mode for FR1 HST | Support of the enhanced RRM requirements for inter-frequency measurement in connected mode to support FR1 high speed up to 500 km/h, as specified in TS 38.133 | Rel-16 RAN4 feature 10-1 or 10-4 | *measurementEnhancementInterFreq-r17* | *HighSpeedParameters-v1700* | NO | FR1 only |  | Optional with capability signalling |
| 18. NR\_HST\_FR1\_enh | 18-3 | Enhanced RRM requirements specified for inter-frequency measurement in Idle and Inactive mode for FR1 HST | Support of the enhanced RRM requirements for inter-frequency measurement in idle and Inactive mode to support FR1 high speed up to 500 km/h, as specified in TS 38.133 |  | n/a | n/a | NO | FR1 only |  | Optional without capability signalling |
| 18. NR\_HST\_FR1\_enh | 18-4 | Support of enhanced Demodulation requirements for CA in HST SFN FR1 | 1) Support of demodulation processing for HST SFN CA scenario in FR1 | Rel-16 RAN4 feature 10-2 | *demodulationEnhancementCA-r17* | *CA-ParametersNR-v1700* | No | FR1 only |  | Optional with capability signalling |

### 6.3.6 NR\_MG\_enh

Table 6.3.6-1: RF and RRM Feature List for NR\_MG\_enh

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 19. Network controlled small gap (NCSG) | 19-1a | Reporting of Network controlled small gap (NCSG) for NR | Reporting of the NCSG and measurement gap requirement information for SSB based measurement |  | *nr-NeedForGapNCSG-Reporting-r17* | *MeasAndMobParametersCommon* | No | No |  | Optional with capability signalling |
| 19-1b | Reporting of Network controlled small gap (NCSG) for EUTRA | Reporting of the NCSG and measurement gap requirement information for E-UTRA target bands |  | *eutra-NeedForGapNCSG-Reporting-r17* | *MeasAndMobParametersCommon* | No | No |  | Optional with capability signalling |
| 19-1-1 | per FR Network controlled small gap | Support of per-FR NCSG | 19-1a | *ncsg-MeasGapPerFR-r17* | *MeasAndMobParametersCommon* | No | No |  | Optional with capability signalling |
| 19-1-2 | Network controlled small gap (NCSG) supported patterns | Supported NCSG patterns | 19-1a or 19-1b | *ncsg-MeasGapPatterns-r17* | *MeasAndMobParametersCommon* | No | No | NCSG patterns #0, #1 are conditional mandatory if the UE is NCSG capable  NCSG patterns #13, #14 are conditional mandatory if UE supports ~~19-1 and~~ 19-1-1 | Optional with capability signalling |
| 19-1-3 | Network controlled small gap (NCSG) supported NR-only patterns | Supported NR-only NCSG patterns | 19-1a | *ncsg-MeasGapNR-Patterns-r17* | *MeasAndMobParametersCommon* | No | No | NCSG patterns #2 and #3 are conditional mandatory if the UE is NCSG capable  NCSG patterns #17 and #18 are conditional mandatory if the UE is NCSG capable and supports a FR2 band | Optional with capability signalling |
| 19-1-4 | Network controlled small gap (NCSG) performing measurement based on flag *deriveSSB-IndexFromCellInter* | Support performing measurement with NCSG based on flagderiveSSB-IndexFromCell-inter and meeting the following requirements:  -       Scheduling restriction in FR2 serving cell during NCSG ML is on SSB symbol level | 19-1a | *ncsg-SymbolLevelScheduleRestrictionInter-r17* | *MeasAndMobParametersCommon* | No | FR2 only |  | Optional with capability signalling |
| 19. Concurrent measurement gap | 19-2 | Concurrent measurement gaps | Support of more than 1 per-UE measurement gap configurations  Support of more than 1 per-FR gap measurement gap configurations in an FR, or simultaneous 1 per-UE measurement gap plus 1 per-FR measurement gap configurations in an FR, or more than 1 per-UE measurement gap configurations for UE capable of Rel-15 per-FR gap (*independentGapConfig*)  Note: The above 2 bullets are not 2 separate indications but a single indication with different interpretations, depending on the support of independentGapConfig. |  | *concurrentMeasGap-r17 CHOICE*  *{*  *concurrentPerUE-OnlyMeasGap-r17,*  *concurrentPerUE-PerFRCombMeasGap-r17*  *}* | *MeasAndMobParametersCommon* | No | No | This is the baseline capability is to indicate UE support multiple concurrent gaps. | Optional with capability signalling |
| 19. Concurrent measurement gap | 19-2-1 | Concurrent measurement gaps for E-UTRAN measurement objectives | Capability of supporting configurations of E-UTRAN measurement objectives associated with more than 1 concurrent measurement gaps | 19-2 | *concurrentMeasGapEUTRA-r17* | *MeasAndMobParametersCommon* | No | No |  | Optional with capability signalling |
| 19. Pre-configured gap | 19-3-1 | Pre-configured measurement gap with network-controlled activation and deactivation mechanism | Capability of supporting preconfigured measurement gap with network-controlled mechanism for activation and deactivation |  | *preconfiguredNW-ControlledMeasGap-r17* | *MeasAndMobParametersCommon* | No | No |  | Optional with capability signalling |
| 19. Pre-configured gap | 19-3-2 | Pre-configured measurement gap with UE autonomous activation and deactivation mechanism | Capability of supporting preconfigured measurement gap with UE autonomous mechanism for activation and deactivation |  | *preconfiguredUE-AutonomousMeasGap-r17* | *MeasAndMobParametersCommon* | No | No |  | Optional with capability signalling |

### 6.3.7 NR\_SAR\_PC2\_interB\_SUL\_2BUL

Table 6.3.7-1: RF and RRM Feature List for NR\_SAR\_PC2\_interB\_SUL\_2BUL

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 20. NR\_SAR\_PC2\_interB\_SUL\_2BUL | 20-1 | Maximum uplink duty cycle for NR inter-band CA power class 2 (maxUplinkDutyCycle-interBandCA-PC2-r17  ) | Indicates the maximum average percentage of symbols during a certain evaluation period that can be scheduled for uplink transmission so as to ensure compliance with applicable electromagnetic energy absorption requirements provided by regulatory bodies. The average percentage of uplink symbols is specified in 6.2A.1.3 in TS 38101-1[2] and the capability applies to the CA combinations listed in table 6.2A.1.3-1 in TS 38101-1[2].  If the field is absent, UE shall work on power class 2 regardless of UL duty cycle and may use P-MPRc as defined in 6.2.4 in TS 38101-1[2] if necessary.  Value n50 corresponds to 50%, value n60 corresponds to 60% and so on.  NOTE: Specific targeted UL duty cycle percentage is not assumed if the field is absent. |  | *maxUplinkDutyCycle-interBandCA-PC2-r17* | *CA-ParametersNR-v1700* | N/A | FR1 only |  | Optional with capability signalling |
| 20. NR\_SAR\_PC2\_interB\_SUL\_2BUL | 20-2 | Maximum uplink duty cycle for NR SUL combination power class 2 (maxUplinkDutyCycle-SULcombination-PC2-r17  ) | Indicates the maximum average percentage of symbols during a certain evaluation period that can be scheduled for uplink transmission so as to ensure compliance with applicable electromagnetic energy absorption requirements provided by regulatory bodies. The average percentage of uplink symbols is specified in 6.2C.1 in TS 38101-1[2] and the capability applies to all the SUL configurations with 1 SUL band + 1 TDD band.  If the field is absent, UE shall work on power class 2 regardless of UL duty cycle and may use P-MPRc as defined in 6.2.4 in TS 38101-1[2] if necessary.  Value n50 corresponds to 50%, value n60 corresponds to 60% and so on.  NOTE: Specific targeted UL duty cycle percentage is not assumed if the field is absent. |  | *maxUplinkDutyCycle-SULcombination-PC2-r17* | *CA-ParametersNR-v1700* | N/A | FR1 only |  | Optional with capability signalling |

### 6.3.8 NR\_PC2\_UE\_FDD

Table 6.3.8-1: RF and RRM Feature List for NR\_PC2\_UE\_FDD

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
|  |  |  |  |  |  |  |  |  |  |  |

### 6.3.9 NR\_HST\_FR2

Table 6.3.9-1: RF and RRM Feature List for NR\_HST\_FR2

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 22. NR\_HST\_FR2 | 22-1 | Support of FR2 HST operation | 1) Support of FR2 UE PC6  2) Support of enhanced RRM requirements for FR2 HST (except the requirement for one shot large UL timing adjustment)  3) Support of demodulation processing for FR2 HST |  | *ue-PowerClass-v1700* | *BandNR* | NO | FR2 only | FR2 UE power class PC6 signalling is used to indicate support of feature group | Optional with capability signalling |
| 22. NR\_HST\_FR2 | 22-2 | Support of one shot large UL timing adjustment | 1) Support of one shot large UL timing adjustment | 22-1 Support of FR2 HST operation | *ue-OneShotUL-TimingAdj-r17* | *BandNR* | NO | FR2 only |  | Optional with capability signaling |

### 6.3.10 NR\_UE\_pow\_sav\_enh

Table 6.3.10-1: RF and RRM Feature List for NR\_UE\_pow\_sav\_enh

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 23. NR\_UE\_pow\_sav\_enh | 23-1 | Support of RLM relaxation | For the UE capable of SSB-based RLM, and/or CSI-RS based RLM, the feature indicates the support of corresponding RLM relaxation measurement. | 1-3 SS block based RLM and/or  1-7 CSI-RS based RLM and/or | *rlm-Relaxation-r17* | *BandNR* | NO | Yes | The feature group can be supported by UE if any prerequisite feature group is supported by UE. | Optional with capability signalling |
| 23. NR\_UE\_pow\_sav\_enh | 23-2 | Support of BFD relaxation | For the UE capable of SSB-based BFD, and/or CSI-RS based BFD, the feature indicates the support of corresponding BFD relaxation measurement. | 2-31 Beam failure recovery | *bfd-Relaxation-r17* | *BandNR* | NO | Yes |  | Optional with capability signalling |

### 6.3.11 NR\_demod\_enh2-Perf

Table 6.3.11-1: RF and RRM Feature List for NR\_demod\_enh2-Perf

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 24.  NR\_demod\_enh2-Perf | 24-1 | CRS-IM (Interference Mitigation) in DSS scenario | Support of neighboring LTE cell CRS-IM in DSS scenario with NR 15 kHz SCS  Note: In the DSS scenario, serving and neighboring cells are both operating with dynamic spectrum sharing (DSS) of NR and LTE. | 5-28 (Rate-matching around LTE CRS) | *crs-IM-DSS-15kHzSCS-r17* | *FeatureSetDownlinkPerCC-v1700*  *supportedCRS-InterfMitigation-r17*  *CRS-InterfMitigation-r17* | No | Applicable only to FR1 | Note: UE can support the feature on the CC(s) in a band only if the UE indicates support of rateMatchingLTE-CRS on that band. | Optional with capability signaling |
| 24.  NR\_demod\_enh2-Perf | 24-2 | CRS-IM in non-DSS and 15 kHz NR SCS scenario, without the assistance of network signaling on LTE channel bandwidth | Support of neighboring LTE cell CRS-IM in non-DSS and 15 kHz NR SCS scenario, without the assistance of network signaling on LTE channel bandwidth  Note: In the non-DSS scenario, serving cell is operating in NR, and neighboring cells are operating in LTE. |  | *crs-IM-nonDSS-15kHzSCS-r17* | *FeatureSetDownlinkPerCC-v1700*  *supportedCRS-InterfMitigation-r17*  *CRS-InterfMitigation-r17* | No | Applicable only to FR1 |  | Optional with capability signaling |
| 24.  NR\_demod\_enh2-Perf | 24-3 | CRS-IM in non-DSS and 15 kHz NR SCS scenario, with the assistance of network signaling on LTE channel bandwidth | Support of neighboring LTE cell CRS-IM in non-DSS and 15 kHz NR SCS scenario, with the assistance of network signaling on LTE channel bandwidth |  | *crs-IM-nonDSS-NWA-15kHzSCS-r17* | *FeatureSetDownlinkPerCC-v1700*  *supportedCRS-InterfMitigation-r17*  *CRS-InterfMitigation-r17* | No | Applicable only to FR1 |  | Optional with capability signaling |
| 24.  NR\_demod\_enh2-Perf | 24-4 | CRS-IM in non-DSS and 30 kHz NR SCS scenario, without the assistance of network signaling on LTE channel bandwidth | Support of neighboring LTE cell CRS-IM in non-DSS and 30 kHz NR SCS scenario, without the assistance of network signaling on LTE channel bandwidth |  | *crs-IM-nonDSS-30kHzSCS-r17* | *FeatureSetDownlinkPerCC-v1700*  *supportedCRS-InterfMitigation-r17*  *CRS-InterfMitigation-r17* | No | Applicable only to FR1 |  | Optional with capability signaling |
| 24.  NR\_demod\_enh2-Perf | 24-5 | CRS-IM in non-DSS and 30 kHz NR SCS scenario, with the assistance of network signaling on LTE channel bandwidth | Support of neighboring LTE cell CRS-IM in non-DSS and 30 kHz NR SCS scenario, with the assistance of network signaling on LTE channel bandwidth |  | *crs-IM-nonDSS-NWA-30kHzSCS-r17* | *FeatureSetDownlinkPerCC-v1700*  *supportedCRS-InterfMitigation-r17*  *CRS-InterfMitigation-r17* | No | Applicable only to FR1 |  | Optional with capability signaling |
| 24.  NR\_demod\_enh2-Perf | 24-6 | MMSE-IRC receiver for scenarios with inter-cell and intra-cell inter-user interference | Support of MMSE-IRC processing for scenarios with inter-cell and intra-cell inter-user interference |  | n/a | n/a | No | FR1 only |  | Optional without capability signalling for Rel-15 and Rel-16  Mandatory without capability signalling from Rel-17 |

### 6.3.12 NR\_NTN\_Solutions

Table 6.3.12-1: RF and RRM Feature List for NR\_NTN\_Solutions

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 25.  NR\_NTN\_solutions | 25-1 | Parallel measurements on multiple SMTC-s for a single frequency carrier | Support of measurements on target cells belonging to 4 SMTC-s on a single frequency carrier |  | *parallelSMTC-r17* | *MeasAndMobParametersCommon* | FDD only | FR1 only | UE is mandatory to support 2 and can optionally support 4 if the feature is supported | Optional with capability signaling |
| 25.  NR\_NTN\_solutions | 25-2 | Parallel measurements on cells belonging to a different NGSO satellite than a serving satellite without scheduling restrictions on normal operations with the serving cell | Support of measurements on cells belonging to different satellite as the serving cell in parallel with normal operation (i.e. data/control transmission and/or reception, and L1 measurements) of serving cell without scheduling restrictions. The feature is applicable only when the serving satellite is NGSO. If the serving cell belongs to GSO satellite, the scheduling restriction is not applied on the premise that a mixed type of satellites on the same frequency layer is not supported in this release (Rel-17). |  | *parallelMeasurementWithoutRestriction-r17* | *BandNR* | FDD only | FR1 only | For UEs not able to perform measurements in parallel with normal operation of serving cell scheduling restrictions shall apply. | Optional with capability signaling |
| 25.  NR\_NTN\_solutions | 25-3 | Parallel measurements with multiple measurement gaps | Support of 2 measurement gaps |  | *parallelMeasurementGap-r17* | *MeasAndMobParametersCommon* | FDD only | FR1 only | UE is mandatory to support 1 measurement gaps | Optional with capability signaling |
| 25.  NR\_NTN\_solutions | 25-4 | Enhanced RRM requirements for measurements in IDLE and INACTIVE modes | If UE does not support the capability, legacy TN non-HST measurement requirements for both LEO and GEO. |  | n/a | n/a | FDD only | FR1 only |  | Optional without capability signaling |
| 25.  NR\_NTN\_solutions | 25-5 | Parallel measurements on multiple NGSO satellites within a SMTC | Support of simultaneously measurements on target cells belonging to different NGSO satellites within a SMTC |  | *maxNumber-NGSO-SatellitesWithinOneSMTC-r17* | *BandNR* | FDD only | FR1 only | Candidate values for the number of NGSO satellites are 1,2,3, or 4 |  |
| 25.  NR\_NTN\_solutions | 25-6 | Relaxed cell reselection on GEO | Support of relaxed cell reselection on GEO |  | n/a | n/a | FDD only | FR1 only | Only applicable for GEO | Optional without capability signaling |
| 25. NR\_NTN\_solutions | 25-7 | The number of target LEO satellites the UE can monitor per carrier including serving satellite | On serving carrier, it indicates the number of target LEO satellites the UE can monitor per carrier including serving satellite  On non-serving carrier, it indicates the number of target LEO satellites the UE can monitor per carrier. |  | *maxNumber-LEO-SatellitesPerCarrier-r17* | *BandNR* | FDD only | FR1 only | Candidate values for the number of NGSO satellites are 2,3, or 4.  The value shall be larger than or equal to the reported value on FG 25-5. | Optional with capability signaling |

### 6.3.13 Higher Power Limit CA\_DC

Table 6.3.13-1: RF and RRM Feature List for Higher Power Limit CA\_DC

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Field name in TS 38.331 [2] | Parent IE in TS 38.331 [2] | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Note | Mandatory/Optional |
| 26.  Increased MOP for CA and DC | 26-1 | Higher Power Limit CA\_DC | Support of increase in maximum output power above the power class indication |  | *higherPowerLimit-r17* | *CA-ParametersNR-v1720* | N/A | FR1 only |  | Optional with capability signaling |

END OF CHANGE