**3GPP TSG-RAN WG2 Meeting #117-e R2-2203551**

**E-Meeting, Feb 21th – Mar 3rd, 2022**

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
|  |
|  | **38.306** | **CR** | **Draft** | **rev** | **-** | **Current version:** | **16.7.0** |  |
|  |
| *For* [***HELP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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|  |
| ***Title:***  | Draft 306 CR for NR NTN UE capabilities |
|  |  |
| ***Source to WG:*** | Intel Corporation |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | NR\_NTN\_solutions-Core |  | ***Date:*** | 2022-02-26 |
|  |  |  |  |  |
| ***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 canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* *Rel-19 (Release 19)* |
|  |  |
| ***Reason for change:*** | Introduction of R17 NR NTN features. |
|  |  |
| ***Summary of change:*** | UE capabilities for NR NTN related features are defined. |
|  |  |
| ***Consequences if not approved:*** | No UE capabilities for NR NTN are defined. |
|  |  |
| ***Clauses affected:*** | 3.3, 4.2.2, 4.2.6, 4.2.7.2, 4.2.9, 4.2.18 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS38.331 CR TBD |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

*First change*

## 3.3 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].

BAP Backhaul Adaptation Protocol

BC Band Combination

BT Bluetooth

DAPS Dual Active Protocol Stack

DL Downlink

EHC Ethernet Header Compression

FS Feature Set

FSPC Feature Set Per Component-carrier

IAB-MT Integrated Access Backhaul Mobile Termination

MAC Medium Access Control

MCG Master Cell Group

MN Master Node

MR-DC Multi-RAT Dual Connectivity

NTN Non-Terrestrial Network

PDCP Packet Data Convergence Protocol

RLC Radio Link Control

RTT Round Trip Time

SCG Secondary Cell Group

SDAP Service Data Adaptation Protocol

SN Secondary Node

TN Terrestrial Network

UL Uplink

WLAN Wireless Local Area Network

*Next change*

### 4.2.2 General parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Definitions for parameters | Per | M | FDD-TDD DIFF | **FR1-FR2**DIFF |
| ***accessStratumRelease***Indicates the access stratum release the UE supports as specified in TS 38.331 [9]. | UE | Yes | No | No |
| ***delayBudgetReporting***Indicates whether the UE supports delay budget reporting as specified in TS 38.331 [9]. | UE | No | No | No |
| ***dl-DedicatedMessageSegmentation-r16***Indicates whether the UE supports reception of segmented DL RRC messages. | UE | No | No | No |
| ***drx-Preference-r16***Indicates whether the UE supports providing its preference of a cell group on DRX parameters for power saving in RRC\_CONNECTED, as specified in TS 38.331 [9]. | UE | No | No | No |
| ***inactiveState***Indicates whether the UE supports RRC\_INACTIVE as specified in TS 38.331 [9]. | UE | Yes | No | No |
| ***inDeviceCoexInd-r16***Indicates whether the UE supports IDC (In-Device Coexistence) assistance information as specified in TS 38.331 [9]. | UE | No | No | No |
| ***maxBW-Preference-r16***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 [9]. | UE | No | No | Yes |
| ***maxCC-Preference-r16***Indicates whether the UE supports providing its preference of a cell group on the maximum number of secondary component carriers for power saving in RRC\_CONNECTED, as specified in TS 38.331 [9]. | UE | No | No | No |
| ***maxMIMO-LayerPreference-r16***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 [9]. | UE | No | No | Yes |
| ***mcgRLF-RecoveryViaSCG-r16***Indicates whether the UE supports recovery from MCG RLF via split SRB1 (if supported) and via SRB3 (if supported) as specified in TS 38.331[9]. | UE | No | No | No |
| ***minSchedulingOffsetPreference-r16***Indicates whether the UE supports providing its preference on the minimum scheduling offset for cross-slot scheduling of the cell group for power saving in RRC\_CONNECTED, as specified in TS 38.331 [9]. | UE | No | No | No |
| ***mpsPriorityIndication-r16***Indicates whether the UE supports *mpsPriorityIndication* on RRC release with redirect as defined in TS 38.331 [9]. | UE | No | No | No |
| ***nonTerrestrialNetwork-r17*** Indicates whether the UE supports NR NTN access. If the UE indicates this capability the UE shall support all the GSO and NGSO essential features, including 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. | UE | No | No | No |
| ***onDemandSIB-Connected-r16***Indicates whether the UE supports the on-demand request procedure of SIB(s) or posSIB(s) while in RRC\_CONNECTED, as specified in TS 38.331 [9]. | UE | No | No | No |
| ***overheatingInd***Indicates whether the UE supports overheating assistance information. | UE | No | No | No |
| ***partialFR2-FallbackRX-Req***Indicates whether the UE meets only a partial set of the UE minimum receiver requirements for the eligible FR2 fallback band combinations as defined in Clause 4.2 of TS 38.101-2 [3] and Clause 4.2 of TS 38.101-3 [4]. If not indicated, the UE shall meet all the UE minimum receiver requirements for all the FR2 fallback combinations in TS 38.101-2 [3] and TS 38.101-3 [4]. The UE shall support configuration of any of the FR2 fallback band combinations regardless of the presence or the absence of this field. | UE | No | No | No |
| ***redirectAtResumeByNAS-r16***Indicates whether the UE supports reception of *redirectedCarrierInfo* in an *RRCRelease* message in response to an *RRCResumeRequest* or *RRCResumeRequest1* which is triggered by the NAS layer, as specified in TS 38.331 [9]. | UE | No | No | No |
| ***reducedCP-Latency***Indicates whether the UE supports reduced control plane latency as defined in TS 38.331 [9] | UE | No | No | No |
| ***referenceTimeProvision-r16***Indicates whether the UE supports provision of referenceTimeInfo in *DLInformationTransfer* message and in SIB9 and reference time information preference indication via assistance information, as specified in TS 38.331 [9]. | UE | No | No | No |
| ***releasePreference-r16***Indicates whether the UE supports providing its preference assistance information to transition out of RRC\_CONNECTED for power saving, as specified in TS 38.331 [9]. | UE | No | No | No |
| ***resumeWithStoredMCG-SCells-r16***Indicates whether the UE supports not deleting the stored MCG SCell configuration when initiating the resume procedure. | UE | No | No | No |
| ***resumeWithStoredSCG-r16***Indicates whether the UE supports not deleting the stored SCG configuration when initiating resume. The UE which indicates support for *resumeWithStoredSCG-r16* shall also indicate support for *resumeWithSCG-Config-r16*. | UE | No | No | No |
| ***resumeWithSCG-Config-r16***Indicates whether the UE supports (re-)configuration of an SCG during the resume procedure. | UE | No | No | No |
| ***splitSRB-WithOneUL-Path***Indicates whether the UE supports UL transmission via MCG path and DL reception via either MCG path or SCG path, as specified for the split SRB in TS 37.340 [7]. The UE shall not set the FDD/TDD specific fields for this capability (i.e. it shall not include this field in *UE-MRDC-CapabilityAddXDD-Mode*). | UE | No | No | No |
| ***splitDRB-withUL-Both-MCG-SCG***Indicates whether the UE supports UL transmission via both MCG path and SCG path for the split DRB as specified in TS 37.340 [7]. The UE shall not set the FDD/TDD specific fields for this capability (i.e. it shall not include this field in *UE-MRDC-CapabilityAddXDD-Mode*). | UE | Yes | No | No |
| ***srb3***Indicates whether the UE supports direct SRB between the SN and the UE as specified in TS 37.340 [7]. The UE shall not set the FDD/TDD specific fields for this capability (i.e. it shall not include this field in *UE-MRDC-CapabilityAddXDD-Mode*). This field is not applied to NE-DC. | UE | Yes | No | No |

*Editor’s Note:* FFS on the SMTC related enhancements

*Next change*

### 4.2.6 MAC parameters

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| --- | --- | --- | --- | --- |
| Definitions for parameters | Per | M | FDD-TDD DIFF | FR1-FR2 DIFF |
| ***autonomousTransmission-r16***Indicates whether the UE supports autonomous transmission of the MAC PDU generated for a deprioritized configured uplink grant as specified in TS 38.321 [8]. A UE supporting this feature shall also support *lch-priorityBasedPrioritization-r16*. | UE | No | No | No |
| ***directMCG-SCellActivation-r16***Indicates whether the UE supports direct NR MCG SCell activation, as specified in TS 38.321 [8], upon SCell addition, upon reconfiguration with sync of the MCG, as specified in TS 38.331 [9]. | UE | No | No | Yes |
| ***directMCG-SCellActivationResume-r16***Indicates whether the UE supports direct NR MCG SCell activation, as specified in TS 38.321 [8], upon reception of an *RRCResume* message, as specified in TS 38.331 [9]. | UE | No | No | Yes |
| ***directSCG-SCellActivation-r16***Indicates whether the UE supports direct NR SCG SCell activation, as specified in TS 38.321 [8], 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 [9] and TS 36.331 [17].A UE indicating support of *directSCG-SCellActivation-r16* shall indicate support of EN-DC or support of NGEN-DC as specified in TS 36.331 [17] or support of NR-DC as specified in TS 38.331 [9]. | UE | No | No | Yes |
| ***directSCG-SCellActivationResume-r16***Indicates whether the UE supports direct NR SCG SCell activation, as specified in TS 38.321 [8]:- upon reception of an *RRCReconfiguration* included in an *RRCConnectionResume* message, as specified in TS 38.331 [9] and TS 36.331 [17], if the UE indicates support of EN-DC or NGEN-DC, and support of *resumeWithSCG-Config-r16* as specified in TS 36.331 [17],- upon reception of an *RRCReconfiguration* included in an *RRCResume* message, as specified in TS 38.331 [9], if the UE indicates support of NR-DC and of *resumeWithSCG-Config-r16* as specified in TS 38.331 [9].A UE indicating support of *directSCG-SCellActivationResume-r16* shall indicate support of EN-DC or NGEN-DC and support of *resumeWithSCG-Config-r16* as specified in TS 36.331 [17] or indicate support of NR-DC and of *resumeWithSCG-Config-r16* as specified in TS 38.331 [9]. | UE | No | No | Yes |
| ***drx-Adaptation-r16***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 cycleThe 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. | UE | No | No | Yes |
| ***enhancedSkipUplinkTxConfigured-r16***Indicates whether the UE supports skipping UL transmission for a configured uplink grant only if no data is available for transmission and no UCI is multiplexed on the corresponding PUSCH of the uplink grant as specified in TS 38.321 [8]. | UE | No | Yes | No |
| ***enhancedSkipUplinkTxDynamic-r16***Indicates whether the UE supports skipping UL transmission for an uplink grant addressed to a C-RNTI only if no data is available for transmission and no UCI is multiplexed on the corresponding PUSCH of the uplink grant as specified in TS 38.321 [8]. | UE | No | Yes | No |
| ***harqFeedbackDisabled-r17***Indicates whether the UE supports disabled HARQ feedback for downlink transmission. A UE supporting this feature shall also indicate the support of *nonTerrestrialNetwork-r17*. | UE | No | No | No |
| ***lch-PriorityBasedPrioritization-r16***Indicates whether the UE supports prioritization between overlapping grants and between scheduling request and overlapping grants based on LCH priority as specified in TS 38.321 [8].  | UE | No | No | No |
| ***lch-ToConfiguredGrantMapping-r16***Indicates whether the UE supports restricting data transmission from a given LCH to a configured (sub-) set of configured grant configurations (see *allowedCG-List-r16* in *LogicalChannelConfig* in TS 38.331 [9]) as specified in TS 38.321 [8].  | UE | No | No | No |
| ***lch-ToGrantPriorityRestriction-r16***Indicates whether the UE supports restricting data transmission from a given LCH to a configured (sub-) set of dynamic grant priority levels (see *allowedPHY-PriorityIndex-r16* in *LogicalChannelConfig* in TS 38.331 [9]) as specified in TS 38.321 [8].  | UE | No | No | No |
| ***lch-ToSCellRestriction***Indicates whether the UE supports restricting data transmission from a given LCH to a configured (sub-) set of serving cells (see *allowedServingCells* in *LogicalChannelConfig*). A UE supporting *pdcp-DuplicationMCG-OrSCG-DRB* or *pdcp-DuplicationSRB* (see *PDCP-Config*) shall also support *lch-ToSCellRestriction*. | UE | No | No | No |
| ***lcp-Restriction***Indicates whether UE supports the selection of logical channels for each UL grant based on RRC configured restriction using RRC parameters *allowedSCS-List*, *maxPUSCH-Duration*, and *configuredGrantType1Allowed* as specified in TS 38.321 [8]. | UE | No | No | No |
| ***logicalChannelSR-DelayTimer***Indicates whether the UE supports the *logicalChannelSR-DelayTimer* as specified in TS 38.321 [8]. | UE | No | Yes | No |
| ***longDRX-Cycle***Indicates whether UE supports long DRX cycle as specified in TS 38.321 [8]. | UE | Yes | Yes | No |
| ***multipleConfiguredGrants***Indicates whether UE supports more than one configured grant configurations (including both Type 1 and Type 2) in a cell group. For each cell, the UE supports at most one configured grant per BWP and the maximum number of configured grant configurations per cell group is 2. If absent, for each configured cell group, the UE only supports one configured grant configuration on one serving cell. | UE | No | Yes | No |
| ***multipleSR-Configurations***Indicates whether the UE supports 8 SR configurations per PUCCH cell group as specified in TS 38.321 [8]. | UE | No | Yes | No |
| ***recommendedBitRate***Indicates whether the UE supports the bit rate recommendation message from the gNB to the UE as specified in TS 38.321 [8]. | UE | No | No | No |
| ***recommendedBitRateMultiplier-r16***Indicates whether the UE supports the bit rate multiplier for recommended bit rate MAC CE as specified in TS 38.321 [8], clause 6.1.3.20. This field is only applicable if the UE supports recommendedBitRate. | UE | No | No | No |
| ***recommendedBitRateQuery***Indicates whether the UE supports the bit rate recommendation query message from the UE to the gNB as specified in TS 38.321 [8]. This field is only applicable if the UE supports *recommendedBitRate*. | UE | No | No | No |
| ***secondaryDRX-Group-r16***Indicates whether UE supports secondary DRX group as specified in TS 38.321 [8]. | UE | No | Yes | No |
| ***shortDRX-Cycle***Indicates whether UE supports short DRX cycle as specified in TS 38.321 [8]. | UE | Yes | Yes | No |
| ***singlePHR-P-r16***Indicates whether UE supports the P bit in single PHR MAC CE as specified in TS 38.321 [8]. | UE | No | No | No |
| ***skipUplinkTxDynamic***Indicates whether the UE supports skipping of UL transmission for an uplink grant indicated on PDCCH if no data is available for transmission as specified in TS 38.321 [8]. | UE | No | Yes | No |
| ***spCell-BFR-CBRA-r16***Indicates whether the UE supports sending BFR MAC CE for SpCell BFR as specified in TS 38.321 [8]. | UE | No | No | No |
| ***srs-ResourceId-Ext-r16***Indicates whether the UE supports the extended 6-bit (Positioning) SRS resource ID in SP Positioning SRS Activation/Deactivation MAC CE, as specified in TS 38.321 [8]. | UE | No | No | No |
| ***tdd-MPE-P-MPR-Reporting-r16***Indicates whether the UE supports P-MPR reporting for Maximum Permissible Exposure, as specified in TS38.321 [8]. | UE | No | TDD only | FR2 only |
| *ul-LBT-FailureDetectionRecovery-r16*Indicates whether the UE supports consistent uplink LBT detection and recovery, as specified in TS 38.321 [8], for cells operating with shared spectrum channel access.This field applies to all serving cells with which the UE is configured with shared spectrum channel access. | UE | No | No | No |
| ***uplinkHarqModeB-r17***Indicates whether the UE supports HARQ Mode B and the corresponding LCP restrictions for uplink transmission. A UE supporting this feature shall also indicate the support of *nonTerrestrialNetwork-r17*. | UE | No | No | No |

*Next change*

#### 4.2.7.2 *BandNR parameters*

| Definitions for parameters | Per | M | FDD-TDDDIFF | FR1-FR2DIFF |
| --- | --- | --- | --- | --- |
| ***activeConfiguredGrant-r16***Indicates whether the UE supports up to 12 configured/active configured grant configurations in a BWP of a serving cell. This field includes the following parameters:- *maxNumberConfigsPerBWP-r16* indicates the maximum number of configured/active configured grant configurations in a BWP of a serving cell.- *maxNumberConfigsAllCC-r16* indicates the maximum number of configured/active configured grant configurations across all serving cells in a MAC entity, and across MCG and SCG in case of NR-DC.The UE can include this feature only if the UE indicates supports of either *configuredUL-GrantType1* or *configuredUL-GrantType2*.NOTE:- For all the reported bands in FR1, a same X1 value is reported for *maxNumberConfigsAllCC-r16*. For all the reported bands in FR2, a same X2 value is reported for *maxNumberConfigsAllCC-r16*.- The total number of configured/active configured grant configurations across all serving cells in FR1 is no greater than X1.- The total number of configured/active configured grant configurations across all serving cells in FR2 is no greater than X2.- If the CA have some serving cell(s) in FR1 and some serving cell(s) in FR2, the total number of configured/active configured grant configurations across all serving cells is no greater than max(X1, X2). | Band | No | N/A | N/A |
| ***additionalActiveTCI-StatePDCCH***Indicates whether the UE supports one additional active TCI-State for control in addition to the supported number of active TCI-States for PDSCH. The UE can include this field only if *maxNumberActiveTCI-PerBWP* in *tci-StatePDSCH* is set to *n1*. Otherwise, the UE does not include this field. | Band | No | N/A | N/A |
| ***aperiodicBeamReport***Indicates whether the UE supports aperiodic 'CRI/RSRP' or 'SSBRI/RSRP' reporting on PUSCH. The UE provides the capability for the band number for which the report is provided (where the measurement is performed). | Band | Yes | N/A | N/A |
| ***aperiodicTRS***Indicates whether the UE supports DCI triggering aperiodic TRS associated with periodic TRS. | Band | No | N/A | Yes |
| ***asymmetricBandwidthCombinationSet***Defines the supported asymmetric channel bandwidth combination for the band as defined in the TS 38.101-1 [2]. Field encoded as a bit map, where bit N is set to "1" if UE support asymmetric channel bandwidth combination set N for this band as defined in the TS 38.101-1 [2]. The leading / leftmost bit (bit 0) corresponds to the asymmetric channel bandwidth combination set 1, the next bit corresponds to the asymmetric channel bandwidth combination set 2 and so on. UE shall support asymmetric channel bandwidth combination set 0. If the field is absent, the UE supports asymmetric channel bandwidth combination set 0. | Band | No | N/A | N/A |
| ***bandNR***Defines supported NR frequency band by NR frequency band number, as specified in TS 38.101-1 [2] and TS 38.101-2 [3]. | Band | Yes | N/A | N/A |
| ***beamCorrespondenceCSI-RS-based-r16***Indicates whether the UE support for beam correspondence based on CSI-RS has the ability to select its uplink beam based on measurement of CSI-RS. If a UE supports beam correspondence based on CSI-RS, then the network can expect the UE to also fulfil Rel-15 beam correspondence requirements.If UE supports neither *beamCorrespondenceSSB-based-r16*nor *beamCorrespondenceCSI-RS-based-r16*, gNB can expect the UE to fulfill beam correspondence based on Rel-15 beam correspondence requirements. | Band | No | TDD only | FR2 only |
| ***beamCorrespondenceSSB-based-r16***Indicates whether the UE support for beam correspondence based on SSB has the ability to select its uplink beam based on measurement of SSB. If a UE supports beam correspondence based on SSB, then the network can expect the UE to also fulfil Rel-15 beam correspondence requirements.If UE supports neither *beamCorrespondenceSSB-based-r16*nor *beamCorrespondenceCSI-RS-based-r16*, gNB can expect the UE to fulfil beam correspondence based on Rel-15 beam correspondence requirements. | Band | No | TDD only | FR2 only |
| ***beamCorrespondenceWithoutUL-BeamSweeping***Indicates how UE supports FR2 beam correspondence as specified in TS 38.101-2 [3], clause 6.6. The UE that fulfils the beam correspondence requirement without the uplink beam sweeping (as specified in TS 38.101-2 [3], clause 6.6) shall set the field to *supported*. The UE that fulfils the beam correspondence requirement with the uplink beam sweeping (as specified in TS 38.101-2 [3], clause 6.6) shall not report this field. | Band | Yes | N/A | FR2 only |
| ***beamManagementSSB-CSI-RS***Defines support of SS/PBCH and CSI-RS based RSRP measurements. The capability comprises signalling of- *maxNumberSSB-CSI-RS-ResourceOneTx* indicates maximum total number of configured one port NZP CSI-RS resources and SS/PBCH blocks that are supported by the UE to measure L1-RSRP as specified in TS 38.215 [13] within a slot and across all serving cells (see NOTE). On FR2, it is mandatory to report >=8; On FR1, it is mandatory with capability signalling to report >=8.- *maxNumberCSI-RS-Resource* indicates maximum total number of configured NZP-CSI-RS resources that are supported by the UE to measure L1-RSRP as specified in TS 38.215 [13] across all serving cells (see NOTE). It is mandated to report at least n8 for FR1.- *maxNumberCSI-RS-ResourceTwoTx* indicates maximum total number of two ports NZP CSI-RS resources that are supported by the UE to measure L1-RSRP as specified in TS 38.215 [13] within a slot and across all serving cells (see NOTE).- *supportedCSI-RS-Density* indicates density of one RE per PRB for one port NZP CSI-RS resource for RSRP reporting, if supported. On FR2, it is mandatory to report either "three" or "oneAndThree"; On FR1, it is mandatory with capability signalling to report either "three" or "oneAndThree".- *maxNumberAperiodicCSI-RS-Resource* indicates maximum number of configured aperiodic CSI-RS resources across all serving cells (see NOTE). For FR1 and FR2, the UE is mandated to report at least n4.NOTE: If the UE sets a value other than *n0* in an FR1 band, it shall set that same value in all FR1 bands. If the UE sets a value other than *n0* in an FR2 band, it shall set that same value in all FR2 bands. The UE supports a total number of resources equal to the maximum of the FR1 and FR2 value, but no more than the FR1 value across all FR1 serving cells and no more than the FR2 value across all FR2 serving cells. | Band | Yes | N/A | FD |
| ***beamReportTiming***Indicates the number of OFDM symbols between the end of the last symbol of SSB/CSI-RS and the start of the first symbol of the transmission channel containing beam report. The UE provides the capability for the band number for which the report is provided (where the measurement is performed). The UE includes this field for each supported sub-carrier spacing. | Band | Yes | N/A | N/A |
| ***beamSwitchTiming***Indicates the minimum number of OFDM symbols between the DCI triggering of aperiodic CSI-RS and aperiodic CSI-RS transmission. The number of OFDM symbols is measured from the end of the last symbol containing the indication to the start of the first symbol of CSI-RS. The UE includes this field for each supported sub-carrier spacing.NOTE: *beamSwitchTiming* of value (*sym224* or *sym336*) will be used to determine UE expectation/behaviour for aperiodic CSI-RS for tracking and latency requirements for L1-RSRP reporting as described in clause 5.1.6.1.1 of TS 38.214 [12], while UE behaviour/assumption regarding before or after beam switch timing is unspecified for measuring AP CSI-RS for CSI acquisition (without *trs-Info* and without repetition) and for beam management (with repetition 'off'). | Band | No | N/A | FR2 only |
| ***beamSwitchTiming-r16***Indicates the minimum number of required OFDM symbols (sym224, sym336) between the DCI triggering aperiodic CSI-RS and the corresponding aperiodic CSI-RS transmission in a CSI-RS resource set configured with repetition 'ON' if *enableBeamSwitchTiming-r16* is configured.For CSI-RS configured with repetition "*off*", the UE applies beam switch time of sym48 if *beamSwitchTiming-r16* is reported and *enableBeamSwitchTiming-r16* is configured. For CSI-RS configured without repetition and without *trs-info*, the UE applies beam switch time of sym48 if *beamSwitchTiming-r16* is reported and *enableBeamSwitchTiming-r16* is configured. | Band | No | N/A | FR2 only |
| ***bwp-DiffNumerology***Indicates whether the UE supports BWP adaptation up to 4 BWPs with the different numerologies, via DCI and timer. Except for SUL, the UE only supports the same numerology for the active UL and DL BWP. For the UE capable of this feature, the bandwidth of a UE-specific RRC configured DL BWP includes the bandwidth of the CORESET#0 (if CORESET#0 is present) and SSB for PCell and PSCell (if configured). For SCell(s), the bandwidth of the UE-specific RRC configured DL BWP includes SSB, if there is SSB on SCell(s). | Band | No | N/A | N/A |
| ***bwp-SameNumerology***Indicates whether UE supports BWP adaptation (up to 2/4 BWPs) with the same numerology, via DCI and timer. Except for SUL, the UE only supports the same numerology for the active UL and DL BWP. For the UE capable of this feature, the bandwidth of a UE-specific RRC configured DL BWP includes the bandwidth of the CORESET#0 (if CORESET#0 is present) and SSB for PCell and PSCell (if configured). For SCell(s), the bandwidth of the UE-specific RRC configured DL BWP includes SSB, if there is SSB on SCell(s). | Band | No | N/A | N/A |
| ***bwp-WithoutRestriction***Indicates support of BWP operation without bandwidth restriction. The Bandwidth restriction in terms of DL BWP for PCell and PSCell means that the bandwidth of a UE-specific RRC configured DL BWP may not include the bandwidth of CORESET #0 (if configured) and SSB. For SCell(s), it means that the bandwidth of DL BWP may not include SSB. | Band | No | N/A | N/A |
| ***cancelOverlappingPUSCH-r16***Indicates whether UE supports the cancellation of the (repetition of the) PUSCHs transmission on all other intra-band serving cell(s). The cancellation of the (repetition of the) PUSCH transmission on a the set of intra-band serving cell(s) includes all symbols from the earliest symbol that is overlapping with the first cancelled symbol of the PUSCH on the serving cell for which the DCI format 2\_4 is applicable to. If the UE supports this feature, the UE needs to report *pa-PhaseDiscontinuityImpacts* and *ul-CancellationSelfCarrier-r16*. | Band | No | N/A | N/A |
| ***channelBWs-DL***Indicates for each subcarrier spacing the UE supported channel bandwidths.Absence of the *channelBWs-DL* (without suffix) for a band or absence of specific scs-XXkHz entry for a supported subcarrier spacing means that the UE supports the channel bandwidths among [5, 10, 15, 20, 25, 30, 40, 50, 60, 80, 100] and [50, 100, 200] that were defined in clause 5.3.5 of TS 38.101-1 version 15.7.0 [2] and TS 38.101-2 version 15.7.0 [3] for the given band or the specific SCS entry. For IAB-MT, to determine whether the IAB-MT supports a channel bandwidth of 100 MHz, the network checks c*hannelBW-DL-IAB-r16*.For FR1, the bits in *channelBWs-DL* (without suffix) starting from the leading / leftmost bit indicate 5, 10, 15, 20, 25, 30, 40, 50, 60 and 80MHz. For FR2, the bits in *channelBWs-DL* (without suffix) starting from the leading / leftmost bit indicate 50, 100 and 200MHz. The third / rightmost bit (for 200MHz) shall be set to 1. For IAB-MT the third / rightmost bit (for 200MHz) is ignored. To determine whether the IAB-MT supports a channel bandwidth of 200 MHz, the network checks *channelBW-DL-IAB-r16*.For FR1, the leading/leftmost bit in *channelBWs-DL-v1590* indicates 70MHz, the second leftmost bit indicates 45MHz, the third leftmost bit indicates 35MHz, the fourth leftmost bit indicates 100MHz and all the remaining bits in *channelBWs-DL-v1590* shall be set to 0. The fourth leftmost bit (for 100MHz) is not applicable for bands n41, n48, n77, n78, n79 and n90 as defined in TS 38.101-1 [2].NOTE: To determine whether the UE supports a specific SCS for a given band, the network validates the *supportedSubCarrierSpacingDL* and the *scs-60kHz*.To determine whether the UE supports a channel bandwidth of 90 MHz, the network may ignore this capability and validate instead the *channelBW-90mhz*, the *supportedBandwidthCombinationSet* and the *supportedBandwidthCombinationSetIntraENDC*. For serving cell(s) with other channel bandwidths the network validates the *channelBWs-DL*, the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, the *asymmetricBandwidthCombinationSet* (for a band supporting asymmetric channel bandwidth as defined in clause 5.3.6 of TS 38.101-1 [2]) and *supportedBandwidthDL*. | Band | Yes | N/A | N/A |
| ***channelBWs-UL***Indicates for each subcarrier spacing the UE supported channel bandwidths.Absence of the *channelBWs-UL* (without suffix) for a band or absence of specific scs-XXkHz entry for a supported subcarrier spacing means that the UE supports the channel bandwidths among [5, 10, 15, 20, 25, 30, 40, 50, 60, 80, 100] and [50, 100, 200] that were defined in clause 5.3.5 of TS 38.101-1 version 15.7.0 [2] and TS 38.101-2 version 15.7.0 [3] for the given band or the specific SCS entry. For IAB-MT, to determine whether the IAB-MT supports a channel bandwidth of 100 MHz, the network checks *channelBW-UL-IAB-r16*.For FR1, the bits in *channelBWs-UL* (without suffix) starting from the leading / leftmost bit indicate 5, 10, 15, 20, 25, 30, 40, 50, 60 and 80MHz. For FR2, the bits in *channelBWs-UL* (without suffix) starting from the leading / leftmost bit indicate 50, 100 and 200MHz. The third / rightmost bit (for 200MHz) shall be set to 1. For IAB-MT the third / rightmost bit (for 200MHz) is ignored. To determine whether the IAB-MT supports a channel bandwidth of 200 MHz, the network checks *channelBW-UL-IAB-r16*.For FR1, the leading/leftmost bit in *channelBWs-UL-v1590* indicates 70 MHz, the second leftmost bit indicates 45MHz, the third leftmost bit indicates 35MHz, the fourth leftmost bit indicates 100MHz and all the remaining bits in *channelBWs-UL-v1590* shall be set to 0. The fourth leftmost bit (for 100MHz) is not applicable for bands n41, n48, n77, n78, n79 and n90 as defined in TS 38.101-1 [2].NOTE: To determine whether the UE supports a specific SCS for a given band, the network validates the *supportedSubCarrierSpacingUL* and the *scs-60kHz*.To determine whether the UE supports a channel bandwidth of 90 MHz the network may ignore this capability and validate instead the *channelBW-90mhz*, the *supportedBandwidthCombinationSet* and the *supportedBandwidthCombinationSetIntraENDC*. For serving cell(s) with other channel bandwidths the network validates the *channelBWs-UL*, the *supportedBandwidthCombinationSet*, the *supportedBandwidthCombinationSetIntraENDC*, the *asymmetricBandwidthCombinationSet* (for a band supporting asymmetric channel bandwidth as defined in clause 5.3.6 of TS 38.101-1 [2]) and *supportedBandwidthUL*. | Band | Yes | N/A | N/A |
| ***channelBW-DL-IAB-r16***Indicates whether the IAB-MT supports channel bandwidth of 100 MHz for a given SCS in FR1 for DL or whether the IAB-MT supports channel bandwidth of 200 MHz for a given SCS in FR2 for DL. | Band | No | N/A | N/A |
| ***channelBW-UL-IAB-r16***Indicates whether the IAB-MT supports channel bandwidth of 100 MHz for a given SCS in FR1 for UL or whether the IAB-MT supports channel bandwidth of 200 MHz for a given SCS in FR2 for UL. | Band | No | N/A | N/A |
| ***codebookComboParametersAddition-r16***Indicates the UE supports of the mixed codebook combinations and the corresponding parameters supported by the UE.For mixed codebook types, UE reports support active CSI-RS resources and ports for up to 4 mixed codebook combinations in any slot. The following is the possible mixed codebook combinations:- {Type 1 Single Panel, Type 2, Null}- {Type 1 Single Panel, Type 2 with port selection, Null}- {Type 1 Single Panel, eType 2 with R=1, Null}- {Type 1 Single Panel, eType 2 with R=2, Null}- {Type 1 Single Panel, eType 2 with R=1 and port selection, Null}- {Type 1 Single Panel, eType 2 with R=2 and port selection, Null}- {Type 1 Single Panel, Type 2, Type 2 with port selection}- {Type 1 Multi Panel, Type 2, Null}- {Type 1 Multi Panel, Type 2 with port selection, Null}- {Type 1 Multi Panel, eType 2 with R=1, Null}- {Type 1 Multi anel, eType 2 with R=2, Null}- {Type 1 Multi Panel, eType 2 with R=1 with port selection, Null}- {Type 1 Multi Panel, eType 2 with R=2 with port selection, Null}- {Type 1 Multi Panel, Type 2, Type 2 with port selection}Parameters for each mixed codebook supported by the UE:- *supportedCSI-RS-ResourceListAdd-r16* indicates the list of supported CSI-RS resources in a band by referring to *codebookVariantsList*. The following parameters are included in *codebookVariantsList*:For *supportedCSI-RS-ResourceListAdd-r16* related to the additional codebooks:- The minimum of *maxNumberTxPortsPerResource* is '*p4*';- The minimum value of *totalNumberTxPortsPerBand* is 4.If a UE reports one or more mixed codebook combinations, then usage of active CSI-RS resources and ports for multiple codebooks in any slot is allowed only within those combinations. For coexisting of mixed codebooks in any slot, gNB needs to consider the mixed codebook combination capability as well as per codebook capability of each codebook type in the mixed codebook combination.UE indicates support of a codebook type in the mixed codebook combination shall indicates support of the individual codebook type in the per band capability. | Band | No | N/A | N/A |
| ***codebookParameters***Indicates the codebooks and the corresponding parameters supported by the UE.Parameters for type I single panel codebook (type1 singlePanel) supported by the UE, which are mandatory to report:- *supportedCSI-RS-ResourceList*;- a UE shall support a *maxNumberTxPortsPerResource* minimum value of 4 for codebook type I single panel in FR1 in the case of a single active CSI-resource across all bands in a band combination, regardless of what it reports in *supportedCSI-RS-ResourceList* with *maxNumberTxPortsPerResource*;- a UE shall support a *maxNumberTxPortsPerResource* minimum value of 8 when configured with wideband CSI report for codebook type I single panel in FR1 in the case of a single active CSI-resource across all bands in a band combination, regardless of what it reports in *supportedCSI-RS-ResourceList* with *maxNumberTxPortsPerResource*;- a UE shall support a *maxNumberTxPortsPerResource* minimum value of 2 for codebook type I single panel in FR2 in the case of a single active CSI-resource across all bands in a band combination, regardless of what it reports in *supportedCSI-RS-ResourceList* with *maxNumberTxPortsPerResource*.- *modes* indicates supported codebook modes (mode 1, both mode 1 and mode 2);- *maxNumberCSI-RS-PerResourceSet* indicates the maximum number of CSI-RS resource in a resource set.Parameters for type I multi-panel codebook (type1 multiPanel) supported by the UE, which are optional:- *supportedCSI-RS-ResourceList*;- *modes* indicates supported codebook modes (mode 1, mode 2, or both mode 1 and mode 2);- *maxNumberCSI-RS-PerResourceSet* indicates the maximum number of CSI-RS resource in a resource set;- *nrofPanels* indicates supported number of panels.Parameters for type II codebook (type2) supported by the UE, which are optional:- *supportedCSI-RS-ResourceList*;- *parameterLx* indicates the parameter "Lx" in codebook generation where x is an index of Tx ports indicated by *maxNumberTxPortsPerResource*;- *amplitudeScalingType* indicates the amplitude scaling type supported by the UE (wideband or both wideband and sub-band);- *amplitudeSubsetRestriction* indicates whether amplitude subset restriction is supported for the UE.Parameters for type II codebook with port selection (type2-PortSelection) supported by the UE, which are optional:- *supportedCSI-RS-ResourceList*;- *parameterLx* indicates the parameter "Lx" in codebook generation where x is an index of Tx ports indicated by *maxNumberTxPortsPerResource*;- *amplitudeScalingType* indicates the amplitude scaling type supported by the UE (wideband or both wideband and sub-band).*supportedCSI-RS-ResourceList* includes list of the following parameters:- *maxNumberTxPortsPerResource* indicates the maximum number of Tx ports in a resource;- *maxNumberResourcesPerBand* indicates the maximum number of resources across all CCs within a band simultaneously;- *totalNumberTxPortsPerBand* indicates the total number of Tx ports across all CCs within a band simultaneously.For each codebook type, the UE may report another list of supported CSI-RS resources via *supportedCSI-RS-ResourceListAlt* in *codebookParametersPerBand*. For type I single panel codebook (type1 singlePanel) supportedCSI-RS-ResourceListAlt,- a UE shall report at least one triplet in supportedCSI-RS-ResourceListAlt with maxNumberTxPortsPerResource greater than or equal to 8 for FR1;- a UE shall report at least one triplet in supportedCSI-RS-ResourceListAlt with maxNumberTxPortsPerResource greater than or equal to 2 for FR2. | Band | FD | N/A | N/A |
| ***codebookParametersAddition-r16***Indicates the UE support of additional codebooks and the corresponding parameters supported by the UE.Codebook etype 2 R=1 support parameter combination 1 to 6 and rank 1 to 2. Parameters for etype 2 R=1 (*etype2R1-r16*) supported by the UE, which are optional:- *supportedCSI-RS-ResourceListAdd-r16* indicates the list of supported CSI-RS resources in a band by referring to *codebookVariantsList*. The following parameters are included in *codebookVariantsList*:- *maxNumberTxPortsPerResource* indicates the maximum number of Tx ports in a resource of a band;- *maxNumberResourcesPerBand* indicates the maximum number of resources across all CCs in a band, simultaneously;- *totalNumberTxPortsPerBand* indicates the total number of Tx ports across all CCs in a band, simultaneously.- *paramComb7-8-r16* indicates the support of parameter combinations 7-8 for etype 2 R=1- *rank3-4-r16* indicates the support of rank 3,4.- *amplitudeSubsetRestriction-r16* indicates the support of amplitude subset restriction.Parameters for etype 2 R=2 (*etype2R2-r16*) supported by the UE, which are optional:- *supportedCSI-RS-ResourceListAdd-r16*;UE supporting *etype2R2-r16*supports also indicates support of *etype2R1-r16*.Codebook etype 2 R=1 with port selection supports 6 parameter combinations and rank 1,2. Parameters for etype 2 R=1 with port selection (*etype2R1-PortSelection-r16*) supported by the UE, which are optional:- *supportedCSI-RS-ResourceListAdd-r16*;- *rank3-4-r16* indicates the support of rank 3,4Parameters for etype 2 R=2 with port selection (*etype2R2-PortSelection-r16*) supported by the UE, which are optional:- *supportedCSI-RS-ResourceListAdd-r16*;UE supporting *etype2R2-PortSelection-r16* also indicates support of *etype2R1-PortSelection-r16*.For *supportedCSI-RS-ResourceListAdd-r16* related to the additional codebooks:- The minimum of *maxNumberTxPortsPerResource* is '*p4*';- The minimum value of *totalNumberTxPortsPerBand* is 4. | Band | No | N/A | N/A |
| ***condHandover-r16***Indicates whether the UE supports conditional handover including execution condition, candidate cell configuration and maximum 8 candidate cells. For TN, UE shall set the capability value consistently for all FDD-FR1 bands, all TDD-FR1 bands and all TDD-FR2 bands respectively. For NTN, UE shall set the capability value consistently for all FDD-FR1 NTN bands. | Band | No | N/A | N/A |
| ***condHandoverFailure-r16***Indicates whether the UE supports conditional handover during re-establishment procedure when the selected cell is configured as candidate cell for condition handover. For TN, UE shall set the capability value consistently for all FDD-FR1 bands, all TDD-FR1 bands and all TDD-FR2 bands respectively. For NTN, UE shall set the capability value consistently for all FDD-FR1 NTN bands. | Band | No | N/A | N/A |
| ***condHandoverTwoTriggerEvents-r16***Indicates whether the UE supports 2 trigger events for same execution condition. This feature is mandatory supported if the UE supports *condHandover-r16*. For TN, UE shall set the capability value consistently for all FDD-FR1 bands, all TDD-FR1 bands and all TDD-FR2 bands respectively. For NTN, UE shall set the capability value consistently for all FDD-FR1 NTN bands. | Band | CY | N/A | N/A |
| ***condPSCellChange-r16***Indicates whether the UE supports conditional PSCell change including execution condition, candidate cell configuration and maximum 8 candidate cells. UE shall set the capability value consistently for all FDD-FR1 bands, all TDD-FR1 bands and all TDD-FR2 bands respectively. | Band | No | N/A | N/A |
| ***condPSCellChangeTwoTriggerEvents-r16***Indicates whether the UE supports 2 trigger events for same execution condition. This feature is mandatory supported if the UE supports *condPSCellChange-r16*. UE shall set the capability value consistently for all FDD-FR1 bands, all TDD-FR1 bands and all TDD-FR2 bands respectively. | Band | CY | N/A | N/A |
| ***configuredUL-GrantType1-v1650***Indicates whether the UE supports Type 1 PUSCH transmissions with configured grant as specified in TS 38.214 [12] with UL-TWG-repK value of one. This applies only to non-shared spectrum channel access. For shared spectrum channel access, *configuredUL-GrantType1-r16* applies. UE shall set the capability value consistently for all FDD-FR1 bands, all TDD-FR1 bands and all TDD-FR2 bands respectively.The UE only includes *configuredUL-GrantType1-v1650* if *configuredUL-GrantType1* is absent. | Band | No | N/A | N/A |
| ***configuredUL-GrantType2-v1650***Indicates whether the UE supports Type 2 PUSCH transmissions with configured grant as specified in TS 38.214 [12] with UL-TWG-repK value of one. This applies only to non-shared spectrum channel access. For shared spectrum channel access, *configuredUL-GrantType2-r16* applies. UE shall set the capability value consistently for all FDD-FR1 bands, all TDD-FR1 bands and all TDD-FR2 bands respectively.The UE only includes *configuredUL-GrantType2*-v1650 if *configuredUL-GrantType2* is absent. | Band | No | N/A | N/A |
| ***crossCarrierScheduling-SameSCS***Indicates whether the UE supports cross carrier scheduling for the same numerology with carrier indicator field (CIF) in carrier aggregation where numerologies for the scheduling cell and scheduled cell are same. | Band | No | N/A | N/A |
| ***csi-ReportFramework***Indicates whether the UE supports CSI report framework. This capability signalling comprises the following parameters:- *maxNumberPeriodicCSI-PerBWP-ForCSI-Report* indicates the maximum number of periodic CSI report setting per BWP for CSI report;- *maxNumberPeriodicCSI-PerBWP-ForBeamReport* indicates the maximum number of periodic CSI report setting per BWP for beam report.- *maxNumberAperiodicCSI-PerBWP-ForCSI-Report* indicates the maximum number of aperiodic CSI report setting per BWP for CSI report;- *maxNumberAperiodicCSI-PerBWP-ForBeamReport* indicates the maximum number of aperiodic CSI report setting per BWP for beam report;- *maxNumberAperiodicCSI-triggeringStatePerCC* indicates the maximum number of aperiodic CSI triggering states in *CSI-AperiodicTriggerStateList* per CC;- *maxNumberSemiPersistentCSI-PerBWP-ForCSI-Report* indicates the maximum number of semi-persistent CSI report setting per BWP for CSI report;- *maxNumberSemiPersistentCSI-PerBWP-ForBeamReport* indicates the maximum number of semi-persistent CSI report setting per BWP for beam report;- *simultaneousCSI-ReportsPerCC* indicates the number of CSI report(s) for which the UE can measure and process reference signals simultaneously in a CC of the band for which this capability is provided. The CSI report comprises periodic, semi-persistent and aperiodic CSI and any latency classes and codebook types. The CSI report in simultaneousCSI-ReportsPerCC includes the beam report and CSI report.The UE is mandated to report *csi-ReportFramework*. | Band | Yes | N/A | N/A |
| ***csi-ReportFrameworkExt-r16***Indicates whether the UE supports the extension of the maximum number of configured aperiodic CSI report settings for all codebook types. The capability signalling comprises the following:*maxNumberAperiodicCSI-PerBWP-ForCSI-ReportExt-r16* indicates the extended maximum number of aperiodic CSI report setting per BWP for CSI report. If present, the value of *maxNumberAperiodicCSI-PerBWP-ForCSI-Report-r16* shall replace the corresponding value in *csi-ReportFramework*. | Band | No | N/A | N/A |
| ***csi-RS-ForTracking***Indicates support of CSI-RS for tracking (i.e. TRS). This capability signalling comprises the following parameters:- *maxBurstLength* indicates the TRS burst length. Value 1 indicates 1 slot and value 2 indicates both of 1 slot and 2 slots. In this release UE is mandated to report value 2;- *maxSimultaneousResourceSetsPerCC* indicates the maximum number of TRS resource sets per CC which the UE can track simultaneously;- *maxConfiguredResourceSetsPerCC* indicates the maximum number of TRS resource sets configured to UE per CC. It is mandated to report at least 8 for FR1 and 16 for FR2;- *maxConfiguredResourceSetsAllCC* indicates the maximum number of TRS resource sets configured to UE across CCs. If the UE includes the field in an FR1 band, it shall set the same value in all FR1 bands. If the UE includes the field in an FR2 band, it shall set the same value in all FR2 bands. The UE supports a total number of resources equal to the maximum of the FR1 and FR2 value, but no more than the FR1 value across all FR1 serving cells and no more than the FR2 value across all FR2 serving cells. The UE is mandated to report at least 16 for FR1 and 32 for FR2.The UE is mandated to report *csi-RS-ForTracking*. | Band | Yes | N/A | N/A |
| ***csi-RS-IM-ReceptionForFeedback***Indicates support of CSI-RS and CSI-IM reception for CSI feedback. This capability signalling comprises the following parameters:- *maxConfigNumberNZP-CSI-RS-PerCC* indicates the maximum number of configured NZP-CSI-RS resources per CC;- *maxConfigNumberPortsAcrossNZP-CSI-RS-PerCC* indicates the maximum number of ports across all configured NZP-CSI-RS resources per CC;- *maxConfigNumberCSI-IM-PerCC* indicates the maximum number of configured CSI-IM resources per CC;- *maxNumberSimultaneousNZP-CSI-RS-PerCC* indicates the maximum number of simultaneous CSI-RS-resources per CC;- *totalNumberPortsSimultaneousNZP-CSI-RS-PerCC* indicates the total number of CSI-RS ports in simultaneous CSI-RS resources per CC.The UE is mandated to report csi-RS-IM-ReceptionForFeedback. | Band | Yes | N/A | N/A |
| ***csi-RS-ProcFrameworkForSRS***Indicates support of CSI-RS processing framework for SRS. This capability signalling comprises the following parameters:- *maxNumberPeriodicSRS-AssocCSI-RS-PerBWP* indicates the maximum number of periodic SRS resources associated with CSI-RS per BWP;- *maxNumberAperiodicSRS-AssocCSI-RS-PerBWP* indicates the maximum number of aperiodic SRS resources associated with CSI-RS per BWP;- *maxNumberSP-SRS-AssocCSI-RS-PerBWP* indicates the maximum number of semi-persistent SRS resources associated with CSI-RS per BWP;- *simultaneousSRS-AssocCSI-RS-PerCC* indicates the number of SRS resources that the UE can process simultaneously in a CC, including periodic, aperiodic and semi-persistent SRS. | Band | No | N/A | N/A |
| ***defaultQCL-PerCORESETPoolIndex-r16***Indicates whether the UE supports default QCL assumption per CORESET pool index using multi-DCI based multi-TRP. The UE that indicates support of this feature shall support *multiDCI-MultiTRP-r16* and *simultaneousReceptionDiffTypeD-r16.* | Band | No | N/A | FR2 only |
| ***defaultQCL-TwoTCI-r16***Indicates whether the UE supports default QCL assumption with two TCI states using single-DCI based multi-TRP. The UE can include this field only if *simultaneousReceptionDiffTypeD-r16*is present. Otherwise, the UE does not include this field. | Band | No | N/A | FR2 only |
| ***enhancedSkipUplinkTxConfigured-v1660***Indicates whether the UE supports skipping UL transmission for a configured uplink grant only if no data is available for transmission and no UCI is multiplexed on the corresponding PUSCH of the uplink grant as specified in TS 38.321 [8]. UE shall set the capability value consistently for all FDD-FR1 bands, all TDD-FR1 bands and all TDD-FR2 bands respectively.The UE only includes *enhancedSkipUplinkTxConfigured-v1660* if *enhancedSkipUplinkTxConfigured-r16* is absent. | Band | No | N/A | N/A |
| ***enhancedSkipUplinkTxDynamic-v1660***Indicates whether the UE supports skipping UL transmission for an uplink grant addressed to a C-RNTI only if no data is available for transmission and no UCI is multiplexed on the corresponding PUSCH of the uplink grant as specified in TS 38.321 [8]. UE shall set the capability value consistently for all FDD-FR1 bands, all TDD-FR1 bands and all TDD-FR2 bands respectively.The UE only includes *enhancedSkipUplinkTxDynamic-v1660* if *enhancedSkipUplinkTxDynamic-r16* is absent. | Band | No | N/A | N/A |
| ***enhancedUL-TransientPeriod-r16***Indicates whether the UE supports enhanced UL performance for the transient period as specified in clause 6.3.3 of TS 38.101-1 [2]. If not reported, the UE supports transient period of 10us. | Band | No | N/A | FR1 only |
| ***eventA4BasedCondHandover-r17***Indicates whether the UE supports Event A4 based conditional handover, i.e., CondEvent A4 as specified in TS 38.331 [9]. A UE supporting this feature shall also indicate the support of *condHandover-r16* for NTN bands and the support of *nonTerrestrialNetwork-r17*. UE shall set the capability value consistently for all FDD-FR1 NTN bands. | Band | No | No | No |
| ***extendedCP***Indicates whether the UE supports 60 kHz subcarrier spacing with extended CP length for reception of PDCCH, and PDSCH, and transmission of PUCCH, PUSCH, and SRS. | Band | No | N/A | N/A |
| ***groupBeamReporting***Indicates whether UE supports RSRP reporting for the group of two reference signals. | Band | No | N/A | N/A |
| ***groupSINR-reporting-r16***Indicates whether UE supports group based L1-SINR reporting. UE indicates support of this feature shall indicate support of *ssb-csirs-SINR-measurement-r16.* | Band | No | N/A | N/A |
| ***handoverUTRA-FDD-r16***Indicates whether the UE supports NR to UTRA-FDD CELL\_DCH CS handover for the PCell on the band. It is mandatory to support both UTRA-FDD measurement and event B triggered reporting, and periodic UTRA-FDD measurement and reporting if the UE supports HO to UTRA-FDD. If this field is included, then UE shall support IMS voice over NR. UE shall set the capability value consistently for all FDD-FR1 bands, all TDD-FR1 bands and all TDD-FR2 bands respectively. | Band | No | N/A | N/A |
| ***maxMIMO-LayersForMulti-DCI-mTRP-r16***Indicates the interpretation of *maxNumberMIMO-LayersPDSCH* for multi-DCI based mTRP. If this field is included, *maxNumberMIMO-LayersPDSCH* is interpreted as the maximum number of layers per PDSCH for multi-DCI multi-TRP operation.If this field is not included, *maxNumberMIMO-LayersPDSCH* is interpreted as the maximum number of layers across two PDSCHs if having at least one RE overlapped, for multi-DCI multi-TRP operation. The UE that indicates support of this feature shall support *overlapPDSCHsFullyFreqTime-r16*.NOTE 1: For data rate calculation in clause 4.1.2, if this feature is indicated, each multi-DCI based multi-TRP CC is counted two times toward J. | Band | No | N/A | N/A |
| ***jointReleaseConfiguredGrantType2-r16***Indicates whether the UE supports joint release in a DCI for two or more configured grant Type 2 configurations for a given BWP of a serving cell. The UE can include this feature only if the UE indicates supports of *activeConfiguredGrant-r16*. | Band | No | N/A | N/A |
| ***jointReleaseSPS-r16***Indicates whether the UE supports joint release in a DCI for two or more SPS configurations for a given BWP of a serving cell. The UE can include this feature only if the UE indicates supports of *sps-r16*. | Band | No | N/A | N/A |
| ***locationBasedCondHandover-r17***Indicates whether the UE supports location based conditional handover, i.e., CondEvent D1 as specified in TS 38.331 [9]. A UE supporting this feature shall also indicate the support of *condHandover-r16* for NTN bands and the support of *nonTerrestrialNetwork-r17*. UE shall set the capability value consistently for all FDD-FR1 NTN bands. | Band | No | No | No |
| ***lowPAPR-DMRS-PDSCH-r16***Indicates whether the UE supports low PAPR DMRS for PDSCH. | Band | No | N/A | N/A |
| ***lowPAPR-DMRS-PUCCH-r16***Indicates whether the UE supports low PAPR DMRS for PUCCH format 3 and format 4 with transform precoding and with pi/2 BPSK modulation. UE indicates support of this feature shall indicate support of *pucch-F3-4-HalfPi-BPSK* and any combination of support of *pucch-F3-WithFH*, *pucch-F4-WithFH* and *pucch-F1-3-4WithoutFH*. | Band | No | N/A | N/A |
| ***lowPAPR-DMRS-PUSCHwithoutPrecoding-r16***Indicates whether the UE supports low PAPR DMRS for PUSCH without transform precoding. | Band | No | N/A | N/A |
| ***lowPAPR-DMRS-PUSCHwithPrecoding-r16***Indicates whether the UE supports low PAPR DMRS for PUSCH with transform precoding and with pi/2 BPSK modulation. UE indicates support of this feature shall indicate support of *pusch-HalfPi-BPSK*. | Band | No | N/A | N/A |
| ***maxNumberActivatedTCI-States-r16***Indicates maximum number of activated TCI states. This capability signalling includes the following:- *maxNumberPerCORESET-Pool-r16* indicates maximal number of activated TCI states per *CORESETPoolIndex* per BWP per CC including data and control- *maxTotalNumberAcrossCORESET-Pool-r16* indicates maximal total number of activated TCI states across *CORESETPoolIndex* per BWP per CC including data and controlThe UE that indicates support of this feature shall support *multiDCI-MultiTRP-r16*. | Band | No | N/A | N/A |
| ***maxNumberCSI-RS-BFD***Indicates maximal number of CSI-RS resources across all CCs, and across MCG and SCG in case of NR-DC, for UE to monitor PDCCH quality. In this release, the maximum value that can be signalled is 16. If the UE includes the field in an FR1 band, it shall set the same value in all FR1 bands. If the UE includes the field in an FR2 band, it shall set the same value in all FR2 bands. The UE supports a total number of resources equal to the maximum of the FR1 and FR2 value, but no more than the FR1 value across all FR1 serving cells and no more than the FR2 value across all FR2 serving cells. It is mandatory with capability signalling for FR2 and optional for FR1. | Band | CY | N/A | N/A |
| ***maxNumberCSI-RS-SSB-CBD***Defines maximal number of different CSI-RS [and/or SSB] resources across all CCs, and across MCG and SCG in case of NR-DC, for new beam identifications. In this release, the maximum value that can be signalled is 128. If the UE includes the field in an FR1 band, it shall set the same value in all FR1 bands. If the UE includes the field in an FR2 band, it shall set the same value in all FR2 bands. The UE supports a total number of resources equal to the maximum of the FR1 and FR2 value, but no more than the FR1 value across all FR1 serving cells and no more than the FR2 value across all FR2 serving cells. It is mandatory with capability signalling for FR2 and optional for FR1. The UE is mandated to report at least 32 for FR2. | Band | CY | N/A | N/A |
| ***maxNumberNonGroupBeamReporting***Defines support of non-group based RSRP reporting using N\_max RSRP values reported. | Band | Yes | N/A | N/A |
| ***maxNumberRxBeam***Defines whether UE supports receive beamforming switching using NZP CSI-RS resource. UE shall indicate a single value for the preferred number of NZP CSI-RS resource repetitions per CSI-RS resource set. Support of Rx beam switching is mandatory for FR2. | Band | CY | N/A | N/A |
| ***maxNumberRxTxBeamSwitchDL***Defines the number of Tx and Rx beam changes UE can perform on this band within a slot. UE shall report one value per each subcarrier spacing supported by the UE. In this release, the number of Tx and Rx beam changes for scs-15kHz and scs-30kHz are not included. | Band | No | N/A | FR2 only |
| ***maxNumberSCellBFR-r16***Defines the maximum number of SCells configured for SCell beam failure recovery simultaneously. The UE indicating support of this also indicates the capabilities of *maxNumberCSI-RS-BFD, maxNumberSSB-BFD* and *maxNumberCSI-RS-SSB-CBD.* | Band | No | N/A | N/A |
| ***maxNumberSSB-BFD***Defines maximal number of different SSBs across all CCs, and across MCG and SCG in case of NR-DC, for UE to monitor PDCCH quality. In this release, the maximum value that can be signalled is 16. If the UE includes the field in an FR1 band, it shall set the same value in all FR1 bands. If the UE includes the field in an FR2 band, it shall set the same value in all FR2 bands. The UE supports a total number of resources equal to the maximum of the FR1 and FR2 value, but no more than the FR1 value across all FR1 serving cells and no more than the FR2 value across all FR2 serving cells. It is mandatory with capability signalling for FR2 and optional for FR1. | Band | CY | N/A | N/A |
| ***maxUplinkDutyCycle-PC2-FR1***Indicates the maximum 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. This field is only applicable for FR1 power class 2 UE as specified in clause 6.2.1 of TS 38.101-1 [2]. If the field is absent, 50% shall be applied. Value n60 corresponds to 60%, value n70 corresponds to 70% and so on. This capability is not applicable to IAB-MT. | Band | No | N/A | FR1 only |
| ***maxUplinkDutyCycle-FR2***Indicates the maximum percentage of symbols during 1s that can be scheduled for uplink transmission at the UE maximum transmission power, so as to ensure compliance with applicable electromagnetic power density exposure requirements provided by regulatory bodies. This field is applicable for all power classes UE in FR2 as specified in TS 38.101-2 [3]. Value n15 corresponds to 15%, value n20 corresponds to 20% and so on. If the field is absent or the percentage of uplink symbols transmitted within any 1s evaluation period is larger than *maxUplinkDutyCycle-FR2*, the UE behaviour is specified in TS 38.101-2 [3]. This capability is not applicable to IAB-MT. | Band | No | N/A | FR2 only |
| ***maxUplinkDutyCycle-PC1dot5-MPE-FR1-r16***Indicates the maximum 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. This field is only applicable for FR1 power class 1.5 UE as specified in clause 6.2.1 of TS 38.101-1 [2]. If the field is absent, UE shall mitigate MPE autonomously by P-MPR or by other means and no restriction on scheduled uplink duty cycle is needed. | Band | No | N/A | FR1 only |
| ***modifiedMPR-Behaviour***Indicates whether UE supports modified MPR behaviour defined in TS 38.101-1 [2] and TS 38.101-2 [3]. | Band | No | N/A | N/A |
| ***mpr-PowerBoost-FR2-r16***Indicates whether UE supports uplink transmission power boost by suspension of in-band emission (IBE) requirements as specified in TS 38.101-2 [3]. | Band | No | TDD only | FR2 only |
| ***multipleRateMatchingEUTRA-CRS-r16***Indicates whether the UE supports multiple E-UTRA CRS rate matching patterns, which is supported only for FR1. The capability signalling comprises the following parameters:- *maxNumberPatterns-r16* indicates the maximum number of LTE-CRS rate matching patterns in total within a NR carrier using 15 kHz SCS. The UE can report the value larger than 2 only if UE reports the value of *maxNumberNon-OverlapPatterns-r16* is larger than 1.- *maxNumberNon-OverlapPatterns-r16* indicates the maximum number of LTE-CRS non-overlapping rate matching patterns within a NR carrier using 15 kHz SCS.The UE can include this feature only if the UE indicates support of *rateMatchingLTE-CRS*. | Band | No | N/A | FR1 only |
| ***multipleTCI***Indicates whether UE supports more than one TCI state configurations per CORESET. UE is only required to track one active TCI state per CORESET. UE is required to support minimum between 64 and number of configured TCI states indicated by *tci-StatePDSCH*. This field shall be set to *supported*. | Band | Yes | N/A | N/A |
| ***nonGroupSINR-reporting-r16***Indicates N\_max L1-SINR values reported when UE supports non-group based L1-SINR reporting. UE indicates support of this feature shall indicate support of *ssb-csirs-SINR-measurement-r16.* | Band | No | N/A | N/A |
| ***olpc-SRS-Pos-r16***Indicates whether the UE supports OLPC for SRS for positioning. The capability signalling comprises the following parameters.- *olpc-SRS-PosBasedOnPRS-Serving-r16* indicates whether the UE supports OLPC for SRS for positioning based on PRS from the serving cell in the same band. The UE can include this field only if the UE supports *NR-DL-PRS-ProcessingCapability-r16* defined in TS 37.355 [22], and *srs-PosResources-r16*. Otherwise, the UE does not include this field;- *olpc-SRS-PosBasedOnSSB-Neigh-r16* indicates whether the UE supports OLPC for SRS for positioning based on SSB from the neighbouring cell in the same band. The UE can include this field only if the UE supports *srs-PosResources-r16*. Otherwise, the UE does not include this field;- *olpc-SRS-PosBasedOnPRS-Neigh-r16* indicates whether the UE supports OLPC for SRS for positioning based on PRS from the neighbouring cell in the same band. The UE can include this field only if the UE supports *olpc-SRS-PosBasedOnPRS-Serving-r16*. Otherwise, the UE does not include this field;NOTE: A PRS from a PRS-only TP is treated as PRS from a non-serving cell.- *maxNumberPathLossEstimatePerServing-r16* indicates the maximum number of pathloss estimates that the UE can simultaneously maintain for all the SRS resource sets for positioning per serving cell in addition to the up to four pathloss estimates that the UE maintains per serving cell for the PUSCH/PUCCH/SRS transmissios. The UE shall include this field if the UE supports any of *olpc-SRS-PosBasedOnPRS-Serving-r16, olpc-SRS-PosBasedOnSSB-Neigh-r16* and *olpc-SRS-PosBasedOnPRS-Neigh-r16.* Otherwise, the UE does not include this field. | Band | No | N/A | N/A |
| ***oneSlotPeriodicTRS-r16***Indicates whether the UE supports one-slot periodic TRS configuration only when no two consecutive slots are indicated as downlink slots by *tdd-UL-DL-ConfigurationCommon* or *tdd-UL-DL-ConfigDedicated*. If the UE supports this feature, the UE needs to report *csi-RS-ForTracking*. | Band | No | TDD only | FR1 only |
| ***outOfOrderOperationDL-r16***Indicates whether the UE supports out of order operation for DL. The UE that indicates support of this feature shall support *multiDCI-MultiTRP-r16*. The capability signalling comprises the following parameters:*- supportPDCCH-ToPDSCH-r16* indicates support out-of-order operation for PDCCH to PDSCH;*- supportPDSCH-ToHARQ-ACK-r16* indicates support out-of-order operation for PDSCH to HARQ-ACK. | Band | No | N/A | N/A |
| ***outOfOrderOperationUL-r16***Indicates whether the UE supports out of order operation for UL. The UE that indicates support of this feature shall support *multiDCI-MultiTRP-r16.*Note: Same closed loop index for power control across PUSCHs associated with different *CORESETPoolIndex* values is not supported by a UE indicating the support of this feature when TPC accumulation is enabled. | Band | No | N/A | N/A |
| ***overlapPDSCHsFullyFreqTime-r16***Indicates the maximal number of PDSCH scrambling sequences per serving cell when the UE supports PDSCHs with fully overlapping Resource Elements. The UE that indicates support of this feature shall support *multiDCI-MultiTRP-r16.*Note: A UE may assume that its maximum receive timing difference between the DL transmissions from two TRPs is within a Cyclic Prefix | Band | No | N/A | N/A |
| ***overlapPDSCHsInTimePartiallyFreq-r16***Indicates whether the UE support PDSCHs with partially overlapping Resource Elements. The UE that indicates support of this feature shall support *multiDCI-MultiTRP-r16.* | Band | No | N/A | N/A |
| ***overlapRateMatchingEUTRA-CRS-r16***Indicates whether the UE supports two LTE-CRS overlapping rate matching patterns within a part of NR carrier using 15 kHz SCS overlapping with a LTE carrier. If the UE supports this feature, the UE needs to report *multipleRateMatchingEUTRA-CRS-r16*. | Band | No | N/A | FR1 only |
| ***pdsch-256QAM-FR2***Indicates whether the UE supports 256QAM modulation scheme for PDSCH for FR2 as defined in 7.3.1.2 of TS 38.211 [6]. | Band | No | N/A | FR2 only |
| ***pdsch-MappingTypeB-Alt-r16***Indicates whether the UE supports PDSCH Type B scheduling of length 9 and 10 OFDM symbols, and DMRS shift for length-10 symbols. If the UE supports this feature, the UE needs to report *pdsch-MappingTypeB*. | Band | No | N/A | FR1 only |
| ***periodicBeamReport***Indicates whether UE supports periodic 'CRI/RSRP' or 'SSBRI/RSRP' reporting using PUCCH formats 2, 3 and 4 in one slot. | Band | Yes | N/A | N/A |
| ***powerBoosting-pi2BPSK***Indicates whether UE supports power boosting for pi/2 BPSK, when applicable as defined in 6.2 of TS 38.101-1 [2]. This capability is not applicable to IAB-MT. | Band | No | TDD only | FR1 only |
| ***ptrs-DensityRecommendationSetDL***For each supported sub-carrier spacing, indicates preferred threshold sets for determining DL PTRS density. It is mandated for FR2. For each supported sub-carrier spacing, this field comprises:- two values of *frequencyDensity*;- three values of *timeDensity*. | Band | CY | N/A | N/A |
| ***ptrs-DensityRecommendationSetUL***For each supported sub-carrier spacing, indicates preferred threshold sets for determining UL PTRS density. For each supported sub-carrier spacing, this field comprises:- two values of *frequencyDensity*;- three values of *timeDensity*;- five values of *sampleDensity*. | Band | No | N/A | N/A |
| ***pucch-SpatialRelInfoMAC-CE***Indicates whether the UE supports indication of *PUCCH-spatialrelationinfo* by a MAC CE per PUCCH resource. It is mandatory for FR2 and optional for FR1. | Band | CY | N/A | N/A |
| ***pusch-256QAM***Indicates whether the UE supports 256QAM modulation scheme for PUSCH as defined in 6.3.1.2 of TS 38.211 [6]. | Band | No | N/A | N/A |
| ***pusch-RepetitionMultiSlots-v1650***Indicates whether the UE supports transmitting PUSCH scheduled by DCI format 0\_1 when configured with higher layer parameter *pusch-AggregationFactor* > 1, as defined in clause 6.1.2.1 of TS 38.214 [12]. This applies only to non-shared spectrum channel access. For shared spectrum channel access, *pusch-RepetitionMultiSlots-r16* applies. UE shall set the capability value consistently for all FDD-FR1 bands, all TDD-FR1 bands and all TDD-FR2 bands respectively.The UE only includes *pusch-RepetitionMultiSlots-v1650* if *pusch-RepetitionMultiSlots* is absent. | Band | Yes | N/A | N/A |
| ***pusch-TransCoherence***Defines support of the uplink codebook subset by the UE for UL precoding for PUSCH transmission as described in clause 6.1.1.1 of TS 38.214 [12]. UE indicated support of partial coherent codebook subset shall also support non-coherent codebook subset. UE indicated support of full coherent codebook subset shall also support partial and non-coherent codebook subset. | Band | No | N/A | N/A |
| ***rateMatchingLTE-CRS***Indicates whether the UE supports receiving PDSCH with resource mapping that excludes the REs determined by the higher layer configuration LTE-carrier configuring common RS, as specified in TS 38.214 [12]. | Band | Yes | N/A | N/A |
| ***separateCRS-RateMatching-r16***Indicates whether the UE supports rate match around configured CRS patterns which is associated with *CORESETPoolIndex* (if configured) and are applied to the PDSCH scheduled with a DCI detected on a CORESET with the same value of *CORESETPoolIndex*. The UE that indicates support of this feature shall support *multiDCI-MultiTRP-r16* and *overlapRateMatchingEUTRA-CRS-r16.* This is only applicable for 15kHz SCS. | Band | No | N/A | FR1 only |
| ***semi-PersistentL1-SINR-Report-PUCCH-r16***Indicates whether the UE supports semi-persistent L1-SINR report on PUCCH. The UE indicating support of this feature shall include at least one of the following capabilities:- *supportReportFormat1-2OFDM-syms-r16* indicates support of report on PUCCH formats over 1 – 2 OFDM symbols once per slot (or piggybacked on a PUSCH)- *supportReportFormat4-14OFDM-syms-r16* indicates support of report on PUCCH formats over 4 – 14 OFDM symbols once per slot (or piggybacked on a PUSCH).The UE indicating support of this feature shall also indicate support of *ssb-csirs-SINR-measurement-r16.*  | Band | No | N/A | N/A |
| ***semi-PersistentL1-SINR-Report-PUSCH-r16***Indicates whether the UE supports semi-persistent L1-SINR report on PUSCH. The UE indicating support of this feature shall also indicate support of *ssb-csirs-SINR-measurement-r16.*  | Band | No | N/A | N/A |
| ***simul-SpatialRelationUpdatePUCCHResGroup-r16***Indicates whether the UE support PUCCH resource groups per BWP for simultaneous spatial relation update. The UE indicating support of this also indicates the capabilities of supported SRS resources and maximum supported spatial relations for the supported bands using *supportedSRS-Resources, maxNumberConfiguredSpatialRelations* and *pucch-SpatialRelInfoMAC-CE*. | Band | No | N/A | N/A |
| ***simulTX-SRS-AntSwitchingIntraBandUL-CA-r16***Indicates whether the UE support simultaneous transmission of SRS on different CCs for intra-band UL CA. The UE indicating support of this feature shall include at least one of the following capabilities:- *supportSRS-xTyR-xLessThanY-r16* indicates support transmission of SRS for xTyR (x<y) based antenna switching and SRS for CB/NCB/BM on different CCs in overlapped symbol(s) for intra-band UL CA.- *supportSRS-xTyR-xEqualToY-r16* indicates support transmission of SRS for xTyR (x=y) based antenna switching and SRS for CB/NCB/BM on different CCs in overlapped symbol(s) for intra-band UL CA.- *supportSRS-AntennaSwitching-r16* Indicates whether the UE support simultaneous transmission of SRS for antenna switching on different CCs in overlapped symbol(s) for intra-band UL CA.NOTE: For simultaneously antenna switching and antenna switching SRS in intra-band CAs with bands whose UL are switched together according to the reported *supportSRS-AntennaSwitching-r16*, the UE expects the same configuration of xTyR across the different CCs and the SRS resources overlapped in time domain from UE perspective are from the same UE antenna ports. | Band | No | N/A | N/A |
| ***simulSRS-MIMO-TransWithinBand-r16***Indicates the number of SRS resources for positioning and SRS resource for MIMO on a symbol within a band across multiple CCs. The UE can include this field only if the UE supports *srs-PosResources-r16*. Otherwise, the UE does not include this field. | Band | No | N/A | N/A |
| ***simulSRS-TransWithinBand-r16***Indicates the number of SRS resources for positioning on a symbol within a band across multiple CCs. The UE can include this field only if the UE supports *srs-PosResources-r16*. Otherwise, the UE does not include this field. | Band | No | N/A | N/A |
| ***simultaneousReceptionDiffTypeD-r16***Indicates whether the UE supports simultaneous reception with different QCL Type D reference signal as specified in TS38.213 [11]. | Band | No | N/A | FR2 only |
| ***spatialRelations, spatialRelations-v1640***Indicates whether the UE supports spatial relations. The capability signalling comprises the following parameters.- *maxNumberConfiguredSpatialRelations* indicates the maximum number of configured spatial relations per CC for PUCCH and SRS. It is not applicable to FR1 and applicable to FR2 only. The UE is mandated to report 16 or higher values. *maxNumberConfiguredSpatialRelations-v1640* indicates the maximum number of configured spatial relations per CC for PUCCH and SRS with UE supporting the configuration of maximum 64 PUCCH spatial relations per BWP per CC;- *maxNumberActiveSpatialRelations* indicates the maximum number of active spatial relations with regarding to PUCCH and SRS for PUSCH, per BWP per CC. It is not applicable to FR1 and applicable and mandatory to report one or higher value for FR2 only;- *additionalActiveSpatialRelationPUCCH* indicates support of one additional active spatial relation for PUCCH. It is mandatory with capability signalling if *maxNumberActiveSpatialRelations* is set to n1;- *maxNumberDL-RS-QCL-TypeD* indicates the maximum number of downlink RS resources used for QCL type D in the active TCI states and active spatial relation information, which is optional.The UE is mandated to report *spatialRelations* for FR2. if *maxNumberConfiguredSpatialRelations-v1640* is reported, UE shall report value *n96* in *maxNumberConfiguredSpatialRelations*. | Band | FD | N/A | FD |
| ***spatialRelationsSRS-Pos-r16***Indicates whether the UE supports spatial relations for SRS for positioning. The capability signalling comprises the following parameters.- *spatialRelation-SRS-PosBasedOnSSB-Serving-r16* indicates whether the UE supports spatial relation for SRS for positioning based on SSB from the serving cell in the same band. The UE can include this field only if the UE supports *srs-PosResources-r16*. Otherwise, the UE does not include this field;- *spatialRelation-SRS-PosBasedOnCSI-RS-Serving-r16* indicates whether the UE supports spatial relation for SRS for positioning based on CSI-RS from the serving cell in the same band. The UE can include this field only if the UE supports *spatialRelation-SRS-PosBasedOnSSB-Serving-r16*. Otherwise, the UE does not include this field;- *spatialRelation-SRS-PosBasedOnPRS-Serving-r16* indicates whether the UE supports spatial relation for SRS for positioning based on PRS from the serving cell in the same band. The UE can include this field only if the UE supports any of DL PRS Resources for DL AoD, DL PRS Resources for DL-TDOA or DL PRS Resources for Multi-RTT defined in TS37.355 [22], or *srs-PosResources-r16*. Otherwise, the UE does not include this field;- *spatialRelation-SRS-PosBasedOnSRS-r16* indicates whether the UE supports spatial relation for SRS for positioning based on SRS in the same band. The UE can include this field only if the UE supports *srs-PosResources-r16*. Otherwise, the UE does not include this field;- *spatialRelation-SRS-PosBasedOnSSB-Neigh-r16* indicates whether the UE supports spatial relation for SRS for positioning based on SSB from the neighbouring cell in the same band. The UE can include this field only if the UE supports *spatialRelation-SRS-PosBasedOnSSB-Serving-r16*. Otherwise, the UE does not include this field;- *spatialRelation-SRS-PosBasedOnPRS-Neigh-r16* indicates whether the UE supports spatial relation for SRS for positioning based on PRS from the neighbouring cell in the same band. The UE can include this field only if the UE supports *spatialRelation-SRS-PosBasedOnPRS-Serving-r16*. Otherwise, the UE does not include this field;NOTE: A PRS from a PRS-only TP is treated as PRS from a non-serving cell. | Band | No | N/A | FR2 only |
| ***sp-BeamReportPUCCH***Indicates support of semi-persistent 'CRI/RSRP' or 'SSBRI/RSRP' reporting using PUCCH formats 2, 3 and 4 in one slot. | Band | No | N/A | N/A |
| ***sp-BeamReportPUSCH***Indicates support of semi-persistent 'CRI/RSRP' or 'SSBRI/RSRP' reporting on PUSCH. | Band | No | N/A | N/A |
| ***sps-r16***Indicates whether the UE support of up to 8 configured SPS configurations in a BWP of a serving cell and up to 32 configured SPS configurations in a cell group. This field includes the following parameters:- *maxNumberConfigsPerBWP-r16* indicates the maximum number of active SPS configurations in a BWP of a serving cell.- *maxNumberConfigsAllCC-r16* indicates the maximum number of active SPS configurations across all serving cells in a MAC entity, and across MCG and SCG in case of NR-DC.The UE can include this feature only if the UE indicates supports of *downlinkSPS*.NOTE:- For all the reported bands in FR1, a same X1 value is reported for *maxNumberConfigsAllCC-r16*. For all the reported bands in FR2, a same X2 value is reported for *maxNumberConfigsAllCC-r16*.- The total number of active SPS configurations across all serving cells in FR1 is no greater than X1.- The total number of active SPS configurations across all serving cells in FR2 is no greater than X2.- If the CA have some serving cell(s) in FR1 and some serving cell(s) in FR2, the total number of active SPS configurations across all serving cells is no greater than max(X1, X2). | Band | No | N/A | N/A |
| ***srs-AssocCSI-RS***Parameters for the calculation of the precoder for SRS transmission based on channel measurements using associated NZP CSI-RS resource (srs-AssocCSI-RS) as described in clause 6.1.1.2 of TS 38.214 [12]. UE supporting this feature shall also indicate support of non-codebook based PUSCH transmission.This capability signalling includes list of the following parameters:- *maxNumberTxPortsPerResource* indicates the maximum number of Tx ports in a resource;- *maxNumberResourcesPerBand* indicates the maximum number of resources across all CCs within a band simultaneously;*-* *totalNumberTxPortsPerBand* indicates the total number of Tx ports across all CCs within a band simultaneously. | Band | No | N/A | N/A |
| ***ssb-csirs-SINR-measurement-r16***Indicates the limitations of the UE support of SSB/CSI-RS for L1-SINR measurement.This capability signalling includes list of the following parameters:Per slot limitations:- *maxNumberSSB-CSIRS-OneTx-CMR-r16* indicates the maximum number of SSB/CSI-RS (1TX) for Channel Measurement Report- *maxNumberCSI-IM-NZP-IMR-res-r16* indicates the maximum number of CSI-IM/NZP-IMR resources- maxNumberCSIRS-2Tx-res-r16 indicates the maximum number of CSI-RS (2TX) resources for Channel Measurement ReportMemory limitations:- *maxNumberSSB-CSIRS-res-r16* indicates the max number of SSB/CSI-RS resources as Channel Measurement Report- *maxNumberCSI-IM-NZP-IMR-res-mem-r16* indicates the maximum number of CSI-IM/NZP-IMR resourcesOther limitations:- *supportedCSI-RS-Density-CMR-r16* indicates supported density of CSI-RS for Channel Measurement Report.- *maxNumberAperiodicCSI-RS-Res-r16* indicates the maximum number of aperiodic CSI-RS resources across all CCs configured to measure L1-SINR (including CMR and IMR) shall not exceed MD\_1- *supportedSINR-meas* indicates the supported SINR measurements.- *supportedSINR-meas-r16* contains values {*ssbWithCSI-IM*, *ssbWithNZP-IMR*, *csirsWithNZP-IMR*, *csi-RSWithoutIMR*} representing {SSB as CMR with dedicated CSI-IM, SSB as CMR with dedicated NZP IMR, CSI-RS as CMR with dedicated NZP IMR configured, CSI-RS as CMR without dedicated IMR configured}. UE supporting this feature shall always support CSI-RS as CMR with dedicated IMR configured.- *supportedSINR-meas-v1670* indicates a 4-bit bitmap {ssbWithCSI-IM, ssbWithNZP-IMR, csirsWithNZP-IMR, csi-RSWithoutIMR}, where the leftmost bit corresponds to ssbWithCSI-IM, the next bit corresponds to ssbWithNZP-IMR and so on. UE indicating *supportedSINR-meas-v1670* shall always indicate *supportedSINR-meas-r16.*UE indicating support of this feature shall also support *periodicBeamReport* and *aperiodicBeamReport* or *sp-BeamReportPUCCH* and *sp-BeamReportPUSCH.* UE indicating support of *ssb-csirs-SINR-measurement-r16* shall support periodic and aperiodic L1-SINR report.NOTE 1: The reference slot duration is the shortest slot duration defined for the frequency range where the reported band belongs.NOTE 2: For *maxNumberSSB-CSIRS-res-r16* and *maxNumberCSI-IM-NZP-IMR-res-mem-r16* the configured CSI-RS resources for both active and inactive BWPs are counted.NOTE 3: For *maxNumberSSB-CSIRS-OneTx-CMR-r16, maxNumberCSI-IM-NZP-IMR-res-r16* and *maxNumberCSIRS-2Tx-res-r16*, CSI-RS resources configured as CMR without dedicated IMR are counted both as CMR and IMR.NOTE 4: For *maxNumberSSB-CSIRS-OneTx-CMR-r16*, *maxNumberCSI-IM-NZP-IMR-res-r16*, *maxNumberCSIRS-2Tx-res-r16*, *maxNumberAperiodicCSI-RS-Res-r16*, a SSB/CSI-RS resource is counted within the duration of a reference slot in which the corresponding reference signals are transmitted.NOTE 5: For *maxNumberSSB-CSIRS-OneTx-CMR-r16*, *maxNumberCSI-IM-NZP-IMR-res-r16*, *maxNumberCSIRS-2Tx-res-r16*, *maxNumberAperiodicCSI-RS-Res-r16*, if one resource used for L1-SINR measurement is referred N times by one or more CSI reporting settings with *reportQuantity-r16* = *ssb-Index-SINR-r16* or *cri-SINR-r16*, it is counted N times.NOTE 6: If more than one type of SINR measurement is indicated in *supportedSINR-meas-v1670*, it is left to UE implementation which SINR measurement to indicate in *supportedSINR-meas-r16*. | Band | No | N/A | N/A |
| ***support64CandidateBeamRS-BFR-r16***Indicates UE support of configuring maximum 64 candidate beam RSs per BWP per CC. UE indicating support of this feature shall also indicate support of *maxNumberCSI-RS-BFD, maxNumberSSB-BFD* and *maxNumberCSI-RS-SSB-CBD.* | Band | No | N/A | N/A |
| ***supportCodeWordSoftCombining-r16***Indicates whether UE supports codeword soft combining for FDMSchemeB. UE indicates support of this feature depends on whether the *supportFDM-SchemeB-r16* is also supported. | Band | No | N/A | N/A |
| ***supportFDM-SchemeA-r16***Indicates whether UE supports single DCI based FDMSchemeA. | Band | No | N/A | N/A |
| ***supportInter-slotTDM-r16***Indicates whether UE supports single-DCI based inter-slot TDM. This capability signalling includes the following:- *supportRepNumPDSCH-TDRA-r16* indicates support of RepNumR16 in PDSCH-TimeDomainResourceAllocation and the maximum value of RepNumR16- *maxTBS-Size-r16* indicates maximum TBS size.- *maxNumberTCI-states-r16* indicates the maximum number of TCI states. | Band | No | N/A | N/A |
| ***supportNewDMRS-Port-r16***Indicates whether UE supports of new DMRS port entry {0,2,3}. UE supports this feature should indicate support *singleDCI-SDM-scheme-r16* for the band. | Band | No | N/A | N/A |
| ***supportTDM-SchemeA-r16***Indicates whether UE supports single DCI based TDMSchemeA. The capability signalling includes the maximum TBS size. | Band | No | N/A | N/A |
| ***supportTwoPortDL-PTRS-r16***Indicates whether UE supports 2-port DL PT-RS. UE supports this feature should indicate support *singleDCI-SDM-scheme-r16* for the band. | Band | No | N/A | n/A |
| ***tci-StatePDSCH***Defines support of TCI-States for PDSCH. The capability signalling comprises the following parameters:- *maxNumberConfiguredTCIstatesPerCC* indicates the maximum number of configured TCI-states per CC for PDSCH. For FR2, the UE is mandated to set the value at least to 64 (i.e. value 128 is an optional value). For FR1, the UE is mandated to set these values at least to the maximum number of allowed SSBs in the supported band;- *maxNumberActiveTCI-PerBWP* indicates the maximum number of activated TCI-states per BWP per CC, including control and data. If a UE reports X active TCI state(s), it is not expected that more than X active QCL type D assumption(s) for any PDSCH and any CORESETs for a given BWP of a serving cell become active for the UE. The UE shall include this field.Note the UE is required to track only the active TCI states.The UE is mandated to report *tci-StatePDSCH*. | Band | Yes | N/A | N/A |
| ***timeBasedCondHandover-r17***Indicates whether the UE supports time based conditional handover, i.e., CondEvent T1 as specified in TS 38.331 [9]. A UE supporting this feature shall also indicate the support of *condHandover-r16* for NTN bands and the support of *nonTerrestrialNetwork-r17*. UE shall set the capability value consistently for all FDD-FR1 NTN bands. | Band | No | No | No |
| ***trs-AdditionalBandwidth-r16***Indicates the UE supported TRS bandwidths, in addition to 52 RBs, for a 10MHz UE channel bandwidth. This field only applies for the BWPs configured with 52 RBs size and 15kHz SCS, in FDD bands.Value *trs-AddBW-Set1* indicates 28, 32, 36, 40, 44, 48 RBs.Value *trs-AddBW-Set2* indicates 32, 36, 40, 44, 48 RBs. | Band | No | FDD only | FR1 only |
| ***twoPortsPTRS-UL***Defines whether UE supports PT-RS with 2 antenna ports for UL transmission. | Band | No | N/A | N/A |
| ***type1-PUSCH-RepetitionMultiSlots-v1650***Indicates whether the UE supports Type 1 PUSCH transmissions with configured grant as specified in TS 38.214 [12] with UL-TWG-repK value equal to 2, 4, or 8 with a single repetition of the transport block within each slot, and redundancy version pattern as indicated by UL-TWG-RV-rep. A UE supporting this feature shall also support Type 1 PUSCH transmissions with configured grant as specified in TS 38.214 [12] with UL-TWG-repK value of one. This applies only to non-shared spectrum channel access. For shared spectrum channel access, *type1-PUSCH-RepetitionMultiSlots-r16* applies. UE shall set the capability value consistently for all FDD-FR1 bands, all TDD-FR1 bands and all TDD-FR2 bands respectively.The UE only includes *type1-PUSCH-RepetitionMultiSlots-v1650* if *type1-PUSCH-RepetitionMultiSlots* is absent | Band | No | N/A | N/A |
| ***type2-PUSCH-RepetitionMultiSlots-v1650***Indicates whether the UE supports Type 2 PUSCH transmissions with configured grant as specified in TS 38.214 [12] with UL-TWG-repK value equal to 2, 4, or 8 with a single repetition of the transport block within each slot, and redundancy version pattern as indicated by UL-TWG-RV-rep. A UE supporting this feature shall also support Type 2 PUSCH transmissions with configured grant as specified in TS 38.214 [12] with UL-TWG-repK value of one. This applies only to non-shared spectrum channel access. For shared spectrum channel access, *type2-PUSCH-RepetitionMultiSlots-r16* applies. UE shall set the capability value consistently for all FDD-FR1 bands, all TDD-FR1 bands and all TDD-FR2 bands respectively.The UE only includes *type2-PUSCH-RepetitionMultiSlots-v1650* if *type2-PUSCH-RepetitionMultiSlots* is absent | Band | No | N/A | N/A |
| ***txDiversity-r16***Indicates whether the UE supports transparent Tx diversity requirements as specified in the suffix G clauses of TS 38.101-1 [2] (see also clauses 4.2 and 4.3 of TS38.101-1 [2]). | Band | No | N/A | FR1 only |
| ***ue-PowerClass, ue-PowerClass-v1610***For FR1, if the UE supports the different UE power class than the default UE power class as defined in clause 6.2 of TS 38.101-1 [2], the UE shall report the supported UE power class in this field. For FR2, UE shall report the supported UE power class as defined in clause 6 and 7 of TS 38.101-2 [3] in this field. This capability is not applicable to IAB-MT. | Band | Yes | N/A | N/A |
| ***uplinkBeamManagement***Defines support of beam management for UL. This capability signalling comprises the following parameters:- *maxNumberSRS-ResourcePerSet-BM* indicates the maximum number of SRS resources per SRS resource set configurable for beam management, supported by the UE.- *maxNumberSRS-ResourceSet* indicates the maximum number of SRS resource sets configurable for beam management, supported by the UE.If the UE does not set *beamCorrespondenceWithoutUL-BeamSweeping* to *supported*, the UE shall report this capability. This feature is optional for the UE that supports beam correspondence without uplink beam sweeping as defined in clause 6.6, TS 38.101-2 [3].NOTE: The network uses *maxNumberSRS-ResourceSet* to determine the maximum number of SRS resource sets that can be configured to the UE for periodic/semi-persistent/aperiodic configurations as below:

|  |  |
| --- | --- |
| Maximum number of SRS resource sets across all time domain behaviour (periodic/semi-persistent/aperiodic) reported in *maxNumberSRS-ResourceSet* | Additional constraint on the maximum number of SRS resource sets configured to the UE for each supported time domain behaviour (periodic/semi-persistent/aperiodic) |
| 1 | 1 |
| 2 | 1 |
| 3 | 1 |
| 4 | 2 |
| 5 | 2 |
| 6 | 2 |
| 7 | 4 |
| 8 | 4 |

 | Band | No | N/A | FR2 only |

*Next change*

### 4.2.18 UE-based performance measurement parameters

| Definitions for parameters | Per | M | FDD-TDD DIFF | FR1-FR2 DIFF |
| --- | --- | --- | --- | --- |
| ***barometerMeasReport-r16***Indicates whether UE supports uncompensated barometeric pressure measurement reporting upon request from the network. | UE | No | No | No |
| ***immMeasBT-r16***Indicates whether the UE supports Bluetooth measurements in RRC\_CONNECTED state. | UE | No | No | No |
| ***immMeasWLAN-r16***Indicates whether the UE supports WLAN measurements in RRC\_CONNECTED state. | UE | No | No | No |
| ***loggedMeasBT-r16***Indicates whether the UE supports Bluetooth measurements in RRC\_IDLE and RRC\_INACTIVE state. | UE | No | No | No |
| ***loggedMeasurements-r16***Indicates whether the UE supports logged measurements in RRC\_IDLE and RRC\_INACTIVE. A UE that supports logged measurements shall support both periodical logging and event-triggered logging. The memory size of MDT logged measurements is 64KB. | UE | No | No | No |
| ***loggedMeasWLAN-r16***Indicates whether the UE supports WLAN measurements in RRC\_IDLE and RRC\_INACTIVE state. | UE | No | No | No |
| ***orientationMeasReport-r16***Indicates whether the UE supports orientation information reporting upon request from the network. | UE | No | No | No |
| ***speedMeasReport-r16***Indicates whether the UE supports speed information reporting upon request from the network. | UE | No | No | No |
| ***gnss-Location-r16***Indicates whether the UE is equipped with a GNSS or A-GNSS receiver that may be used to provide detailed location information along with SON, MDT, and NTN related measurements in RRC\_CONNECTED, RRC\_IDLE and RRC\_INACTIVE. A UE shall set this field to *supported* if it indicates the support of *nonTerrestrialNetwork-r17*. | UE | CY | No | No |
| ***ulPDCP-Delay-r16***Indicates whether the UE supports UL PDCP Packet Average Delay measurement (as specified in TS 38.314 [26]) and reporting in RRC\_CONNECTED state. | UE | No | No | No |

*End of change*

# Annex

According to the following agreements made in RAN2#116-e, a draft subsection of RAN2 determined UE capabilities for TR 38.822 is included.

* Include an annex containing the RAN2 determined UE capabilities in the feature list format in the running UE capability CRs (similar to annex containing RAN2 agreements) for easy compilation into the TR38.822 in the later stage.
* For capabilities developed in R2, WIs will provide input to the mega CR.

5.2.x NR\_NTN\_solutions-Core

**Table 5.2.x-1: Layer-2 and Layer-3 feature list for NR\_NTN\_solutions-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** |
| X. NR\_NTN\_solutions-Core | x-1 | Support of non Terrestrial Network | Indicates whether the UE supports NR NTN access. | *x-1* | *nonTerrestrialNetwork-r17* | *UE-NR-Capability-v17x0* | No | No |  | Optional with capability signalling |
| x-2 | Disabling HARQ feedback for downlink transmission  | Indicates whether the UE supports disabled HARQ feedback for downlink transmission. | *x-1* | *harqFeedbackDisabled-r17* | *MAC-ParametersCommon* | No | No |  | Optional with capability signalling |
| x-3 | HARQ mode B for uplink transmission  | Indicates whether the UE supports HARQ mode B and the corresponding LCR restrictions for uplink transmission | *x-1* | *uplinkHarqModeB-r17* | *MAC-ParametersCommon* | No | No |  | Optional with capability signalling |
| x-4 | Location based CHO | Indicates whether the UE supports location based CHO | *x-1, and condHandover-r16 is set for NTN bands.* | *locationBasedCondHandover-r17* | *BandNR* | No | No |  | Optional with capability signalling |
| x-5 | Time based CHO | Indicates whether the UE supports time based CHO | *x-1, and condHandover-r16 is set for NTN bands.* | *timeBasedCondHandover-r17* | *BandNR* | No | No |  | Optional with capability signalling |
| x-6 | Event A4 based CHO | Indicates whether the UE supports Event A4 based CHO | *x-1, and condHandover-r16 is set for NTN bands.* | *eventA4BasedCondHandover-r17* | *BandNR* | No | No |  | Optional with capability signalling |
| x-7 | Cell stop-time based neighbour cell measurements | It’s optional for UE to start neighbour cell measurements before the broadcast cell stop-time |  | *N/A* | *N/A* | *N/A* | *N/A* |  | Optional without capability signalling |
| x-8 | Location based cell reselection  | It’s optional for UE to perform location based cell reselection |  | *N/A* | *N/A* | *N/A* | *N/A* |  | Optional without capability signalling |
| x-9 | 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 |