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Technical Specification

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Contents

Foreword

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- x the first digit:
  - 1 presented to TSG for information;
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- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document defines the NR UE Radio Access Capability Parameters.

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

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

[2] 3GPP TS 38.101-1: "NR User Equipment (UE) radio transmission and reception Part 1: Range 1 Standalone".

[3] 3GPP TS 38.101-2: "NR User Equipment (UE) radio transmission and reception Part 2: Range 2 Standalone".

[4] 3GPP TS 38.101-3: "NR User Equipment (UE) radio transmission and reception Part 3: Range 1 and Range 2 Interworking operation with other radios".

[5] 3GPP TS 38.133: "NR Requirements for support of radio resource management".

[6] 3GPP TS 38.211: "NR Physical channels and modulation".

[7] 3GPP TS 37.340: "Evolved Universal Terrestrial Radio Access (E-UTRA) and NR Multi-connectivity".

[8] 3GPP TS 38.321: "NR Medium Access Control (MAC) protocol specification".

[9] 3GPP TS 38.331: "NR Radio Resource Control (RRC) protocol specification".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

Fallback band combination: A band combination that would result from another band combination by releasing at least one SCell or uplink configuration of SCell.

3.2 Symbols

For the purposes of the present document, the following symbols apply:

MaxDLDataRate: Maximum DL data rate
MaxDLDataRate_MN: Maximum DL data rate in the MN

MaxULDataRate: Maximum UL data rate
MaxULDataRate_SN: Maximum UL data rate in the SN

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP 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 3GPP TR 21.905 [1].

DL	Downlink
MAC	Medium Access Control
MCG	Master Cell Group
MN	Master Node
MR-DC	Multi-RAT Dual Connectivity
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
UL	Uplink

4 UE radio access capability parameters

4.1 Supported max data rate

4.1.1 General

The DL and UL max data rate supported by the UE is calculated by band combinations and baseband processing combinations supported by the UE. A UE supporting MR-DC shall support the calculated DL and UL max data rate defined in 4.1.2. A non MR-DC capable UE supporting a max data rate lower than the calculated max data rate indicates the DL and UL max data rate by the UE category as defined in 4.1.3.

4.1.2 Max data rate without *ue-CategoryDL* and *ue-CategoryUL*

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

$$\text{data rate (in Mbps)} = 10^{-6} \cdot \sum_{j=1}^{J} \left(v_{Layers}^{(j)} \cdot Q_m^{(j)} \cdot f^{(j)} \cdot R_{\max} \cdot \frac{N_{PRB}^{BW(j),\mu} \cdot 12}{T_s^{\mu}} \cdot \left(1 - OH^{(j)}\right) \right)$$

wherein

J is the number of aggregated component carriers in a band or band combination
R_{max} = 948/1024
For the j-th CC,

$v_{Layers}^{(j)}$ is the maximum number of layers

$Q_m^{(j)}$ is the maximum modulation order

$f^{(j)}$ is the scaling factor

The scaling factor can at least take the values 1 and 0.75.

$f^{(j)}$ is signalled per band and per band per band combination

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

T_s^{μ} is the average OFDM symbol duration in a subframe for numerology μ, i.e. $T_s^{\mu} = \frac{10^{-3}}{14 \cdot 2^{\mu}}$. Note that normal cyclic prefix is assumed.

$N_{PRB}^{BW(j),\mu}$ is the maximum RB allocation in bandwidth $BW^{(j)}$ with numerology μ, as defined in 5.3 TS 38.101-1 [2] and 5.3 TS 38.101-2 [3], where $BW^{(j)}$ is the UE supported maximum bandwidth in the given band or band combination.

$OH^{(j)}$ is the overhead and takes the following values
[0.14], for frequency range FR1 for DL
[0.18], for frequency range FR2 for DL
[0.08], for frequency range FR1 for UL
[0.10], for frequency range FR2 for UL

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

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

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

Data rate (in Mbps) = $10^{-3} * \sum_{j=1}^{J} TBS_j$

wherein

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

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

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

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

Editors' Note: RAN1 confirmation is needed on scaling factor and EUTRA max data rate calculation.

4.1.3 Max data rate with *ue-CategoryDL* and *ue-CategoryUL*

Editor's Note: Targeted for completion in June 2018.

4.1.4 Total layer 2 buffer size

The total layer 2 buffer size is defined as the sum of the number of bytes that the UE is capable of storing in the RLC transmission windows and RLC reception and reordering windows for all radio bearers, and for UEs capable of split bearers, also in PDCP reordering windows for all split radio bearers.

The required total layer 2 buffer size for split bearer operation in MR-DC is calculated by *MaxULDataRate * RLC RTT + MaxDLDataRate_SN * RLC RTT + MaxDLDataRate_MN * (RLC RTT + Xn delay + Queuing in SN)*. Otherwise it is calculated by *MaxDLDataRate * RLC RTT + MaxULDataRate * RLC RTT*. The required total layer 2 buffer size is determined as the maximum total layer 2 buffer size of all the calculated ones for each band combination in the supported MR-DC or NR band combinations..

wherein

Xn delay + Queuing in SN = 25ms

RLC RTT for EUTRA cell group = 75ms

RLC RTT for NR cell group is defined in Table 4.1.4-1

Table 4.4-1: MAC function location and link direction association.

SCS (KHz)	RLC RTT (ms)
15KHz	TBD
30KHz	TBD
60KHz	TBD
120KHz	TBD

Editor's Note: Both MN terminated split bearer and SN terminated split bearers are considered for L2 buffer size calculation for MR-DC and discussion/decision on the detailed equation is needed.

4.2 UE Capability Parameters

4.2.1 Introduction

If the UE supports both FDD and TDD, set all fields in UE-MRDC-Capability and/or UE-NR-Capability, except fdd-UE-MRDC-Capability, tdd-UE-MRDC-Capability, fdd-UE-NR-Capability, and tdd-UE-NR-Capability, to include the values applicable for both FDD and TDD (i.e. functionality supported by both modes). If (some of) the UE capability fields have a different value for FDD and TDD, the UE includes supported FDD/TDD dedicated additional functionality by the field in fdd-UE-MRDC-Capability/tdd-UE-MRDC-Capability and/or fdd-UE-NR-Capability/tdd-UE-NR-Capability. If the UE supports either FDD or TDD only, set all fields in UE-MRDC-Capability and/or UE-NR-Capability, except fdd-UE-MRDC-Capability, tdd-UE-MRDC-Capability, fdd-UE-NR-Capability and tdd-UE-NR-Capability, to include the values applicable for the FDD/TDD supported by the UE.

4.2.2 General parameters

Definitions for parameters	Per	M	FDD-TDD diff
splitSRB-WithOneUL-Path Indicates whether the UE supports UL transmission via either MCG path or SCG path for the split SRB as specified in TS 37.340 [7].	UE	TBD	Yes
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].	UE	TBD	Yes
srb3 Indicates whether the UE supports direct SRB between the SN and the UE as specified in TS 37.340 [7].	UE	TBD	Yes

4.2.3 SDAP Parameters

Editor's Note: Targeted for completion in June 2018.

4.2.4 PDCP Parameters

Definitions for parameters	Per	M	FDD-TDD diff
continueROHC-Context Defines whether the UE supports ROHC context continuation operation where the UE does not reset the current ROHC context upon handover.	UE	No	No
dataRateDRB-IP Defines the upper bound of the aggregated data rate of user plane integrity protected data in either UL or DL DRBs. Value 64kbps corresponds to the aggregated data rate of user plane integrity protected data in either UL or DL cannot exceed 64kbps and so on. It is not supported in this version and is targeted for completion in June 2018. NOTE: It may be moved to NAS as part of the rest of the UE security capability (CT1/SA3 confirmation is needed).	UE	N/A	No
maxNumberROHC-ContextSessions Defines the maximum number of header compression context sessions supported by the UE, excluding context sessions that leave all headers uncompressed.	UE	No	No
outOfOrderDelivery Indicates whether UE supports Out of order delivery of data to upper layers by PDCP.	UE	TBD	No
shortSN Indicates whether the UE supports 12 bit length of PDCP sequence number.	UE	Yes	No
supportedROHC-Profiles Defines which ROHC profiles from the list below are supported by the UE: - 0x0000 ROHC No compression (RFC 5795) - 0x0001 ROHC RTP/UDP/IP (RFC 3095, RFC 4815) - 0x0002 ROHC UDP/IP (RFC 3095, RFC 4815) - 0x0003 ROHC ESP/IP (RFC 3095, RFC 4815) - 0x0004 ROHC IP (RFC 3843, RFC 4815) - 0x0006 ROHC TCP/IP (RFC 6846) - 0x0101 ROHC RTP/UDP/IP (RFC 5225) - 0x0102 ROHC UDP/IP (RFC 5225) - 0x0103 ROHC ESP/IP (RFC 5225) - 0x0104 ROHC IP (RFC 5225) A UE that supports one or more of the listed ROHC profiles shall support ROHC profile 0x0000 ROHC uncompressed (RFC 5795).	UE	No	No
uplinkOnlyROHC-Profiles Indicates which ROHC profile(s) from the list below are supported in uplink-only ROHC operation by the UE. - 0x0006 ROHC TCP (RFC [6846]) A UE that supports uplink-only ROHC profile(s) shall support ROHC profile 0x0000 ROHC uncompressed (RFC 5795).	UE	No	No

4.2.5 RLC parameters

Definitions for parameters	Per	M	FDD-TDD diff
am-WithShortSN Indicates whether the UE supports RLC AM with 12 bit length of RLC sequence number.	UE	Yes	No
um-WIthLongSN Indicates whether the UE supports RLC UM with 12 bit length of RLC sequence number.	UE	Yes	No
um-WithShortSN Indicates whether the UE supports RLC UM with 6 bit length of RLC sequence number.	UE	Yes	No

4.2.6 MAC parameters

Definitions for parameters	Per	M	FDD-TDD diff
lcp-Restriction Indicates whether UE supports the selection of logical channels for each UL grant based on RRC configured restriction.	UE	No	No
logicalChannelSR-DelayTimer Indicates whether the UE supports the logicalChannelSR-DelayTimer as specified in TS 38.321 [8]	UE	TBD	Yes
longDRX-Cycle Indicates whether UE supports long DRX cycle as specified in TS 38.321 [8].	UE	Yes	Yes
multipleConfiguredGrantConfigurations Indicates whether UE supports [16] configured grant configurations per cell group.	UE	No	Yes
multipleSR-Configurations Indicates whether the UE supports [8] SR configurations per cell group.	UE	No	Yes
pucch-SpatialRelInfoMAC-CE Indicates whether the UE supports indication of PUCCH-spatialrelationinfo by a MAC CE per PUCCH resource.	UE	No	No
shortDRX-Cycle Indicates whether UE supports short DRX cycle as specified in TS 38.321 [8].	UE	Yes	Yes
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	TBD	Yes

4.2.7 Physical layer parameters

Definitions for parameters	Per	M	FDD TDD DIFF	FR1 FR2 DIFF
absoluteTPC-Command Indicates whether the UE supports absolute TPC command mode.	UE	Tbd	No	Yes
almostContiguousCP-OFDM-UL Indicates whether the UE supports almost contiguous UL CP-OFDM transmissions.	UE	Tbd	No	Yes
bwp-SwitchingDelay Defines whether the UE supports BWP switching delay within type1 or type2 specified in TS38.xxx	UE	Tbd	No	No
ca-BandwidthClassDL, ca-BandwidthClassUL This field defines for DL and UL, the class defined by the aggregated transmission bandwidth configuration and maximum number of component carriers supported by a UE, as specified in TS 38.101-1 [2] and TS 38.101-2 [3].	Band per BPC	Yes	No	Tbd
calibrationGapPA Indicates whether the UE supports PA calibration gap to implement PA digital pre-distortion techniques.	UE	Tbd	No	No FR2
cbg-FlushIndication-DL Indicates whether the UE supports CBG-based (re)transmission for DL using CBG flushing out information (CBGFI) as specified in TS 38.214.	UE	Tbd	No	No
cbg-TransIndication Indicates whether the UE supports CBG-based (re)transmission for DL and UL using CBG transmission information (CBGTI) as specified in TS 38.214.	UE	Tbd	No	No
configuredUL-GrantType1 Indicates whether the UE supports Type 1 PUSCH transmissions with configured grant as specified in TS 38.214 with UL-TWG-repK value of one.	UE	Tbd	No	No
configuredUL-GrantType2 Indicates whether the UE supports Type 2 PUSCH transmissions with configured grant as specified in TS 38.214 with UL-TWG-repK value of one.	UE	Tbd	No	No
crossCarrierScheduling Indicates whether the UE supports cross carrier scheduling operation for carrier aggregation with carrier indicator field (CIF).	CC per BPC	Tbd	No	No
csi-ReportWithCRI Indicates whether UE supports CSI reporting with CRI as defined in Section 5.2.1.4 of TS 38.214	UE	Tbd	No	Yes
csi-ReportWithoutCQI Indicates whether UE supports CSI reporting with report quantity set to 'CRI/RI/i1' as defined in Section 5.2.1.4 of TS 38.214.	UE	Tbd	No	Yes
csi-ReportWithoutPMI Indicates whether UE supports CSI reporting with report quantity set to 'CRI/RI/CQI' as defined in Section 5.2.1.4 of TS 38.214.	UE	Tbd	No	Yes
csi-RS-CFRA-ForHO Indicates whether the UE can perform handover using a contention free random access on PRACH resources that are associated with CSI-RS resources of the target cell.	UE	Tbd	No	No
csi-RS-MeasSCellWithoutSSB Defines whether the UE can perform CSI-RSRP and CSI-RSRQ measurement as specified in TS38.215 [ref], where CSI-RS resource is configured for a cell that does not transmit SS/PBCH block. A UE that supports this feature shall also support scellWithoutSSB	CC per BPC	Tbd	No	No
diffNumerologyAcrossPUCCH-Group Indicates whether different numerology across PUCCH groups in CA is supported by the UE.	CC per BPC	Tbd	No	No
diffNumerologyWithinPUCCH-Group Indicates whether UE supports different numerology across carriers within a PUCCH group and a same numerology between DL and UL per carrier for data/control channel at a given time.	CC per BPC	Tbd	No	No
downlinkSPS Indicates whether the UE supports PDSCH reception based on semi-persistent scheduling.	UE	Tbd	No	No
dynamicBetaOffsetInd-HARQ-ACK-CSI Indicates whether the UE supports indicating beta-offset (UCI repetition factor onto PUSCH) for HARQ-ACK and/or SR via DCI among the RRC configured beta-offsets.	UE	Tbd	No	No

Definitions for parameters	Per	M	FDD TDD DIFF	FR1 FR2 DIFF
dynamicHARQ-ACK-CodeB-CBG-Retx-DL Indicates whether the UE supports HARQ-ACK codebook size for CBG-based (re)transmission based on the DAI-based solution as specified in TS 38.213.	UE	Tbd	No	No
dynamicHARQ-ACK-Codebook Indicates whether the UE supports HARQ-ACK codebook dynamically constructed by DCI(s).	UE	Yes	No	No
dynamicPowerSharing Indicates whether the UE supports dynamic EN-DC power sharing or not. If the UE supports this capability it will dynamically share the power between NR and LTE if P_LTE + P_NR > Pcmax.	UE	Tbd	No	Tbd
dynamicPRB-BundlingDL Indicates whether UE supports DCI-based indication of the PRG size for PDSCH reception.	UE	No	No	No
dynamicSFI Indicates whether the UE supports monitoring for DCI format 2_0 and determination of slot formats via DCI format 2_0.	UE	Tbd	No	No
dynamicSwitchRA-Type0-1-PDSCH Indicates whether the UE supports dynamic switching between resource allocation Types 0 and 1 for PDSCH as specified in TS 38.212.	UE	Tbd	No	No
dynamicSwitchRA-Type0-1-PUSCH Indicates whether the UE supports dynamic switching between resource allocation Types 0 and 1 for PUSCH as specified in TS 38.212.	UE	Tbd	No	No
dynamicSwitchSUL Indicates whether the UE supports supplemental uplink with dynamic switch (DCI based selection of PUSCH carrier)	CC per BPC	Tbd	No	No
freqHoppingPUCCH-F0-2 Indicates whether the UE supports transmission of a PUCCH format 0 or 2 without frequency hopping.	UE	Tbd	No	Yes
freqHoppingPUCCH-F1-3-4 Indicates whether the UE supports transmission of a PUCCH format 1, 3 or 4 without frequency hopping.	UE	Tbd	No	Yes
interleavingVRB-ToPRB-PDSCH Indicates whether the UE supports receiving PDSCH with interleaved VRB-to-PRB mapping as specified in TS 38.211.	UE	Tbd	No	No
interleavingVRB-ToPRB-PUSCH Indicates whether the UE supports transmitting PUSCH with interleaved VRB-to-PRB mapping as specified in TS 38.211. A UE that supports this feature shall also support supports non-continuous resource block transmission in uplink using CP-OFDM waveform for each component carrier.	UE	Tbd	No	No
interSlotFreqHopping-PUSCH Indicates whether the UE supports inter-slot frequency hopping for PUSCH transmissions.	UE	Tbd	No	No
intraSlotFreqHopping-PUSCH Indicates whether the UE supports intra-slot frequency hopping for PUSCH transmission, except for PUSCH scheduled by PDCCH in the Type1-PDCCH common search space before RRC connection establishment.	UE	Yes	No	Yes
lowLatencyCSI-Feedback Indicates whether UE supports supporting low latency class as defined in Section [TBD] in TS 38.214.	CC per BPC	No	No	No
maxNumberMIMO-LayersPDSCH Defines the maximum number of spatial multiplexing layer(s) supported by the UE for DL reception.	CC per BPC	Tbd	No	No
maxNumberMIMO-LayersCB-PUSCH Defines supported maximum number of MIMO layers at the UE for PUSCH transmission with codebook precoding. UE indicating support of this feature shall also indicate support of PUSCH codebook coherency subset.	CC per BPC	Tbd	No	No
maxNumberMIMO-LayersNonCB-PUSCH Defines supported maximum number of MIMO layers at the UE for PUSCH transmission using non-codebook precoding.	CC per BPC	Tbd	No	No
multipleCORESET Indicates whether the UE supports configuration of more than one PDCCH CORESET per BWP in addition to the CORESET with CORESET-ID 0 in the BWP.	UE	Td	No	No

Definitions for parameters	Per	M	FDD TDD DIFF	FR1 FR2 DIFF
mux-SR-HARQ-ACK-CSI-PUCCH Indicates whether the UE supports multiplexing SR, HARQ-ACK and CSI on a PUCCH or piggybacking on a PUSCH once per slot.	UE	Tbd	No	Yes
nzp-CSI-RS-IntefMgmt Indicates whether the UE supports interference measurements using NZP CSI-RS.	UE	No	No	No
oneFL-DMRS-ThreeAdditionalDMRS Defines whether the UE supports DM-RS pattern for DL reception and/or UL transmission with 1 symbol front-loaded DM-RS with three additional DM-RS symbols.	UE	Tbd	No	Yes
oneFL-DMRS-TwoAdditionalDMRS Defines support of DM-RS pattern for DL reception and/or UL transmission with 1 symbol front-loaded DM-RS with 2 additional DM-RS symbols and more than 1 antenna ports.	UE	Yes	No	Yes
onePortsPTRS Defines whether UE supports PT-RS with 1 antenna port in DL reception and/or UL transmission for FR1. For FR2, it is mandatory with UE capability signalling.	UE	Yes /No	No	Yes
onePUCCH-LongAndShortFormat Indicates whether the UE supports transmission of one long PUCCH format and one short PUCCH format in TDM in the same slot.	UE	Tbd	No	Yes
oneSymbolGP-TDD Indicates whether the UE supports slot formats with 1-symbol GP(s) for 120KHz SCS in unpaired spectrum in FR2 or slot formats with 1-symbol GP(s) for 60KHz SCS in unpaired spectrum in FR1.	UE	Tbd	No TDD	Yes
pdcch-BlindDetectionCA Indicates PDCCH blind decoding capabilities supported by the UE for CA with more than 4 CCs as specified in TS 38.213. The field value is from 4 to 16.	UE	Tbd	No	Yes
pdcchMonitoringAnyOccasions Defines the supported PDCCH search space monitoring occasions. withoutDCI-gap indicates whether the UE supports PDCCH search space monitoring occasions in any symbol of the slot for Type 1-PDCCH common search space configured by dedicated RRC signaling, for a Type 3-PDCCH common search space, or for a UE-specific search space with the capability of supporting at least 44, 36, 22, and 20 blind decodes in a slot for 15 kHz, 30 kHz, 60kHz, and 120 kHz subcarrier spacing values respectively. withDCI-gap indicates whether the UE supports PDCCH search space monitoring occasions in any symbol of the slot with minimum time separation between two consecutive transmissions of PDCCH scrambled with C-RNTI or CS-RNTI for Type 1-PDCCH common search space configured by dedicated RRC signaling, for a Type 3-PDCCH common search space, or for a UE-specific search space, with the capability of supporting at least 44, 36, 22, and 20 blind decodes in a slot for 15 kHz, 30 kHz, 60kHz, and 120 kHz subcarrier spacing values respectively.	CC per BPC	Tbd	No	No
pdcchMonitoringSingleOccasion Indicates whether the UE supports receiving PDCCH scrambled with C-RNTI or CS-RNTI in a search space configured to be monitored within a single span of any three contiguous OFDM symbols in a slot with the capability of supporting at least 44 blind decodes in a slot for 15 kHz subcarrier spacing.	UE	Tbd	No	No FR1
pdsch-256QAM-FR1 Indicates whether the UE supports 256QAM for PDSCH for FR1.	UE	Yes	No	Yes
pdsch-DifferentTB-PerSlot Defines whether the UE supports reception of up to two PDSCHs for different transport blocks with PDSCH scrambled using C-RNTI, TC-RNTI, or CS-RNTI within the same slot or whether the UE supports reception of up to seven PDSCHs for different transport blocks with PDSCH scrambled using C-RNTI or CS-RNTI within the same slot.	CC per BPC	Tbd	No	No
pdsch-MappingTypeA Indicates whether the UE supports receiving PDSCH using PDSCH mapping type A with less than seven symbols.	UE	[Yes]	No	No
pdsch-MappingTypeB Indicates whether the UE supports receiving PDSCH using PDSCH mapping type B.	UE	Yes	No	No
pdsch-RepetitionMultiSlots Indicates whether the UE supports receiving PDSCH scheduled by DCI format 1_0 or 1_1 when configured with higher layer parameter aggregationFactorDL > 1.	UE	Tbd	No	Tbd
pre-EmptIndication-DL Indicates whether the UE supports interrupted transmission indication for PDSCH reception based on reception of DCI format 2_1 as defined in TS 38.213.	UE	Tbd	No	No

Definitions for parameters	Per	M	FDD TDD DIFF	FR1 FR2 DIFF
precoderGranularityCORESET Indicates whether the UE supports receiving PDCCH in CORESETs configured with CORESET-precoder-granularity equal to the size of the CORESET in the frequency domain as specified in TS 38.211.	UE	Tbd	No	No
pucch-F2-WithFH Indicates whether the UE supports transmission of a PUCCH format 2 (2 OFDM symbols in total) with frequency hopping in a slot.	UE	Yes	No	Yes
pucch-F3-4-HalfPi-BPSK Indicates whether the UE supports pi/2-BPSK for PUCCH format 3/4. For FR1, it is optional.	UE	No	No	Yes
pucch-F3-WithFH Indicates whether the UE supports transmission of a PUCCH format 3 (4~14 OFDM symbols in total) with frequency hopping in a slot.	UE	Yes	No	Yes
pucch-F4-WithFH Indicates whether the UE supports transmission of a PUCCH format 4 (4~14 OFDM symbols in total) with frequency hopping in a slot.	UE	Yes	No	Yes
pusch-LBRM Indicates whether the UE supports limited buffer rate matching in UL as specified in TS 38.212.	UE	Tbd	No	Yes
pucch-Repetition-F1-3-4 Indicates whether the UE supports transmission of a PUCCH format 1 or 3 or 4 over multiple slots with the repetition factor 1, 2, 4 or 8.	UE	Yes	No	No
pusch-DifferentTB-PerSlot Indicates whether the UE supports transmission of up to two PUSCHs or up to seven PUSCHs for different transport blocks within the same slot.	CC per BPC	Tbd	No	No
pusch-HalfPi-BPSK Indicates whether the UE supports pi/2-BPSK for PUSCH. For FR1, it is optional.	UE	No	No	Yes
pusch-RepetitionMultiSlots Indicates whether the UE supports transmitting PUSCH scheduled by DCI format 0_0 or 0_1 when configured with higher layer parameter aggregationFactorIUL > 1.	UE	Tbd	No	No
ra-Type0-PUSCH Indicates whether the UE supports resource allocation Type 0 for PUSCH as specified in TS 38.214.	UE	Tbd	No	No
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.	UE	Tbd	No	No
rateMatchingResrcSetDynamic Indicates whether the UE supports receiving PDSCH with resource mapping that excludes the REs corresponding to resource sets configured with RB-symbol level granularity based on dynamic indication in the scheduling DCI as specified in TS 38.214.	UE	Tbd	No	No
rateMatchingResrcSetSemi-Static Indicates whether the UE supports receiving PDSCH with resource mapping that excludes the REs corresponding to resource sets configured with RB-symbol level granularity following the semi-static configuration as specified in TS 38.214.	UE	Tbd	No	No
scalingFactor0dot75 Indicates the scaling factor 0.75 is applied to the band in the max data rate calculation as defined in 4.1.2. If absent, the scaling factor 1 is applied to the band in the max data rate calculation.	CC per BPC	Tbd	Tbd	Tbd
scellWithoutSSB Defines whether the UE supports configuration of SCell that does not transmit SS/PBCH block.	CC per BPC	Tbd	No	No
scs-60kHz Indicates whether the UE supports 60kHz subcarrier spacing for data channel in FR1.	UE	Tbd	No	No FR1
searchSpaceSharingCA-DL Defines whether the UE supports DL PDCCH search space sharing for carrier aggregation operation.	CC per BPC	Tbd	No	No
searchSpaceSharingCA-UL Defines whether the UE supports UL PDCCH search space sharing for carrier aggregation operation.	CC per BPC	Tbd	No	No
semiOpenLoopCSI Indicates whether UE supports CSI reporting with report quantity set to 'CRI/RI/i1' as defined in Section 5.2.1.4 of TS 38.214.	UE	Tbd	No	Yes

Definitions for parameters	Per	M	FDD TDD DIFF	FR1 FR2 DIFF
semiStaticHARQ-ACK-Codebook Indicates whether the UE supports HARQ-ACK codebook constructed by semi-static configuration	UE	Yes	No	No
simultaneousTxSUL-NonSUL Indicates whether the UE supports simultaneous transmission of SRS on an SUL/non-SUL carrier and PUSCH/PUCCH/SRS/PRACH on the other UL carrier in the same cell.	CC per BPC	Tbd	No	No
spatialBundlingHARQ-ACK Indicates whether the UE supports spatial bundling of HARQ-ACK bits carried on PUCCH or PUSCH per PUCCH group. With spatial bundling, two HARQ-ACK bits for a DL MIMO data is bundled into a single bit by logical "AND" operation.	UE	Tbd	No	No
sp-CSI-ReportPUCCH Indicates whether UE supports semi-persistent CSI reporting using PUCCH formats 2, 3 and 4.	UE	No	No	No
sp-CSI-ReportPUSCH Indicates whether UE supports semi-persistent CSI reporting using PUSCH.	UE	No	No	No
srs-AssocCSI-RS Indicates whether UE supports calculation of the precoder for SRS transmission based on channel measurements using associated NZP CSI-RS resource as described in Section 6.1.1.2 of TS 38.214. UE supporting this feature shall also indicate support of non-codebook based PUSCH transmission	CC per BPC	No	No	No
srs-TxSwitch Defines whether UE supports SRS antenna port switching as defined in Section 6.2.1.2 of TS 38.214.	CC per BPC	Tbd	No	No
supportedBandwidthDL Defines maximum DL bandwidth supported per CC.	CC per BPC	Tbd	No	Tbd
supportedBandwidthUL Defines maximum UL bandwidth supported per CC.	CC per BPC	Tbd	No	Tbd
supportedBasebandProcessingCombination Defines the supported CA baseband processing combinations by the UE. Only the baseband processing combinations associated to supportedBandCombination are included. For a given band combination, multiple baseband processing combinations and fallback baseband processing combination with a higher capability can be included.	UE	Yes	No	Tbd
supportedDMRS-TypeDL Defines supported DM-RS configuration types at the UE for DL reception.	UE	Tbd	No	Yes
supportedDMRS-TypeUL Defines supported DM-RS configuration types at the UE for UL transmission. At least support of type1 is mandatory.	UE	Yes /No ?	No	Yes
supportedModulationOrderDL Defines the supported modulation scheme for DL by the UE.	CC per BPC	Tbd	No	Tbd
supportedModulationOrderUL Defines the supported modulation scheme for UL by the UE.	CC per BPC	Tbd	No	Tbd
supportedNumberTAG Defines the number of timing advance groups are supported by the UE	CC per BPC	Tbd	No	No
supportedSRS-Resources Defines support of SRS resources. The capability signalling comprising indication of: - Supported maximum number of aperiodic SRS resources that can be configured for the UE per each BWP - Supported maximum number of aperiodic SRS resources per slot in the BWP - Supported maximum number of periodic SRS resources per BWP - Supported maximum number of periodic SRS resources per slot in the BWP - Supported maximum number of semi-persistent SRS resources that can be configured for the UE per each BWP - Supported maximum number of semi-persistent SRS resources per slot in the BWP - Supported maximum number of SRS antenna port per each SRS resource	CC per BPC	Tbd	No	No
supportedSubCarrierSpacingDL Defines the supported sub-carrier spacing for DL by the UE. Note the UE shall support all mandated sub-carrier spacing for FR1/FR2.	CC per BPC	No	No	No

Definitions for parameters	Per	M	FDD TDD DIFF	FR1 FR2 DIFF
supportedSubCarrierSpacingUL Defines the supported sub-carrier spacing for UL by the UE. Note the UE shall support all mandated sub-carrier spacing for FR1/FR2.	CC per BPC	No	No	No
tdm-Pattern Indicates whether the UE supports the *tdm-Pattern for single UL transmission* associated functionality. Support is conditionally mandatory for UEs that do not support dynamic power sharing and for UEs that indicate single UL for any BC, and optional otherwise.	UE	Yes /No	Yes	Tbd
timeDurationForQCL Defines minimum number of OFDM symbols required by the UE to perform PDCCH reception and applying spatial QCL information received in DCI for PDSCH processing as described in TS 38.214 Section 5.1.5. UE shall indicate one value of the minimum number of OFDM symbols per each subcarrier spacing of 60kHz and 120kHz.	CC per BPC	Tbd	No	No FR2
tpc-PUCCH-RNTI Indicates whether the UE supports group DCI message based on TPC-PUCCH-RNTI for TPC commands for PUCCH.	UE	Tbd	No	Yes
tpc-PUSCH-RNTI Indicates whether the UE supports group DCI message based on TPC-PUSCH-RNTI for TPC commands for PUSCH.	UE	Tbd	No	Yes
tpc-SRS-RNTI Indicates whether the UE supports group DCI message based on TPC-SRS-RNTI for TPC commands for SRS.	UE	Tbd	No	Yes
twoDifferentTPC-Loop-PUCCH Indicates whether the UE supports two different TPC loops for PUCCH closed loop power control.	UE	Tbd	Yes	Yes
twoDifferentTPC-Loop-PUSCH Indicates whether the UE supports two different TPC loops for PUSCH closed loop power control.	UE	Tbd	Yes	Yes
twoFL-DMRS Defines whether the UE supports DM-RS pattern for DL reception and/or UL transmission with 2 symbols front-loaded DM-RS without additional DM-RS symbols.	UE	Tbd	No	Yes
twoFL-DMRS-TwoAdditionalDMRS Defines whether the UE supports DM-RS pattern for DL reception and/or UL transmission with 2 symbols front-loaded DM-RS with one additional 2 symbols DM-RS.	UE	Tbd	No	Yes
twoPUCCH-AnyOthersInSlot Indicates whether the UE supports transmission of two PUCCH formats in TDM in the same slot, which are not covered by 4-22 and 4-2.	UE	Tbd	No	Yes
twoPUCCH-F0-2-ConsecSymbols Indicates whether the UE supports transmission of two PUCCHs of format 0 or 2 in consecutive symbols in a slot.	UE	Tbd	Yes	Yes
twoPUCCH-Group Indicates whether two PUCCH group in CA with a same numerology across CCs for data and control channel [at a given time] is supported by the UE.	CC per BPC	Tbd	No	No
type1-3-CSS Defines whether the UE is able to receive PDCCH in a Type1-PDCCH common search space configured by dedicated RRC signaling, or in a Type3-PDCCH common search space or in a UE-specific search space, with an associated CORESET duration of 3 symbols in FR2.	CC per BPC	Yes	No	No
type1-PUSCH-RepetitionMultiSlots Indicates whether the UE supports Type 1 PUSCH transmissions with configured grant as specified in TS 38.214 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 with UL-TWG-repK value of one.	UE	Tbd	No	No
type1-PUSCH-RepetitionOneSlot Indicates whether the UE supports Type 1 PUSCH transmissions with configured grant as specified in TS 38.214 with UL-TWG-repK value equal to 2, 4, or 8 with multiple repetitions of the transport block within a 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 with UL-TWG-repK value of one.	UE	Tbd	No	No

Definitions for parameters	Per	M	FDD TDD DIFF	FR1 FR2 DIFF
type2-PUSCH-RepetitionMultiSlots Indicates whether the UE supports Type 1 PUSCH transmissions with configured grant as specified in TS 38.214 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 with UL-TWG-repK value of one.	UE	Tbd	No	No
type2-PUSCH-RepetitionOneSlot Indicates whether the UE supports Type 1 PUSCH transmissions with configured grant as specified in TS 38.214 with UL-TWG-repK value equal to 2, 4, or 8 with multiple repetitions of the transport block within a 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 with UL-TWG-repK value of one.	UE	Tbd	No	No
type2-SP-CSI-Feedback-LongPUCCH Indicates whether UE supports Type II CSI semi-persistent CSI reporting over PUCCH Formats 3 and 4 as defined in Section 5.2.4 of TS 38.214.	UE	No	No	No
uci-CodeBlockSegmentation Indicates whether the UE supports segmenting UCI into multiple code blocks depending on the payload size.	UE	Yes	No	Yes
ue-SpecificUL-DL-Assignment Indicates whether the UE supports dynamic determination of UL and DL link direction and slot format based on Layer 1 scheduling DCI and higher layer configured parameter UL-DL-configuration-dedicated as specified in TS 38.213.	CC per BPC	Tbd	No	No

4.2.8 RF parameters

Definitions for parameters	Per	M	FDD TDD DIFF
aperiodicBeamReport Indicates whether the UE supports aperiodic 'CRI/RSRP' or 'SSBRI/RSRP' reporting on PUSCH. For FR2, it is mandatory.	Band	Yes	No
asyncIntraBandENDC Indicates whether the UE supports asynchronous FDD-FDD intra-band EUTRA-NR EN-DC with MRTD and MTTD as specified in [x]. If it is not supported for FDD-FDD intra-band EUTRA-NR EN-DC, the UE supports only synchronous FDD-FDD intra-band EUTRA-NR EN-DC.	BC	Tbd	Tbd
bandCombinationsUL BIT STRING with pointers to entries in *BandCombinationParametersUL-List*. Only the UL combinations of the same number of entries as in BandAndDL-ParametersList can be pointed to.	Tbd	Yes	No
basebandProcessingCombinationMRDC Defines the supported MN and SN baseband processing combinations per supported CA and/or MR-DC band combination by the UE. The *basebandProcessingCombinationIndexMN* defines the supported baseband processing combinations in MN side and *basebandProcessingCombinationLinkedIndexSN* defines the supported baseband processing combinations in SN side, which are associated with each supported MN baseband processing combination.	Tbd	Yes	No
beamCorrespondence Indicates whether UE supports beam correspondence as defined in <TBD RAN4 >. For FR2, it is mandatory.	Band	Yes	No
beamManagementSSB-CSI-RS Defines support of SS/PBCH and CSI-RS based RSRP measurements. The capability comprises signalling of - Maximum total number of one port NZP CSI-RS resources and SS/PBCH blocks that are supported by the UE for 'CRI/RSRP' and 'SSBRI/RSRP' reporting within a slot and across all serving cells. - Maximum total number of two ports NZP CSI-RS resources and SS/PBCH blocks that are supported by the UE for 'CRI/RSRP' or 'SSBRI/RSRP' reporting within a slot and across all serving cells. - Supported density of one RE per PRB for one port NZP CSI-RS resource for RSRP reporting.	Band	Tbd	No
bwp-DiffNumerology Indicates whether the UE supports BWP adaptation up to 4 BWPs with the different numerologies.	Band	No	No
bwp-SameNumerology Defines type A/B BWP adaptation (up to 2/4 BWPs) with the same numerology.	Band	Tbd	No
ca-BandwidthClassDL Defines for NR DL, the class defined by the aggregated transmission bandwidth configuration and maximum number of component carriers supported by a UE, as specified in TS 38.101-1 [2] and TS 38.101-2 [3]	Band per BC	Yes	No
ca-BandwidthClassUL Defines for NR UL, the class defined by the aggregated transmission bandwidth configuration and maximum number of component carriers supported by a UE, as specified in TS 38.101-1 [2] and TS 38.101-2 [3]	Band per BC	Yes	No
crossCarrierScheduling Indicates whether the UE supports cross carrier scheduling operation for carrier aggregation with carrier indicator field (CIF).	Band	Tbd	No
csi-RS-MeasSCellWithoutSSB Indicates whether the UE supports CSI-RSRP and CSI-RSRQ measurement as specified in TS38.215 [ref], where CSI-RS resource is configured for a cell that does not transmit SS/PBCH block. A UE that supports this feature shall also support <Support of SCell without SS/PBCH block>.	Band	Tbd	No
diffNumerologyAcrossPUCCH-Group Indicates whether different numerology across PUCCH groups in CA is supported by the UE.	Band	Tbd	No
diffNumerologyWithinPUCCH-Group Indicates whether UE supports different numerology across carriers within a PUCCH group and a same numerology between DL and UL per carrier for data/control channel at a given time.	Band	Tbd	No

Definitions for parameters	Per	M	FDD TDD DIFF
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	Yes	No
groupBeamReporting Indicates whether UE supports RSRP reporting for the group of two reference signals.	Band	No	No
intraBandFreqSeparationDL Indicates whether the UE supports frequency separation classes to handle the total frequency span for DL for intra-band non-contiguous CA.	Band per BPC	Tbd	No
intraBandFreqSeparationUL Indicates whether the UE supports frequency separation classes to handle the total frequency span for UL for intra-band non-contiguous CA.	Band per BPC	Tbd	No
lowLatencyCSI-Feedback Indicates whether UE is capable of supporting low latency class as defined in Section [TBD] in TS 38.214.	Band	No	No
maxChannelBW-PerCC Indicates maximum channel bandwidth supported in each band for DL and UL separately and for each SCS that UE supports within a single CC, which is defined in Table 5.3.5-1 in TS38.101-1 for FR1 and Table 5.3.5-1 in TS38.101-2 for FR2.	Band	Tbd	No
maxNumberActiveTCI-PerCC Defines maximum number of TCI states that can be configured for the UE using RRC signalling. This value shall not be lower than the maximum number of TCI states supported by the UE for MAC Control Element activation.	Band	Tbd	No
maxNumberConfiguredTCIstates Defines maximum number of Transmission Configuration Indication (TCI) states for PDSCH reception that can be activated for the UE using MAC Control Element from the set of RRC configured TCI states as defined in TS 38.214 Section 5.1.5.	Band	Tbd	No
maxNumberSimultaneousSRS-PerCC Defines the number of SRS resources that can be transmitted by the UE in one OFDM symbol per each CC.	Band	Tbd	No
maxNumberCSI-RS-BFR Indicates maximal number of CSI-RS resources across all CCs for UE to monitor PDCCH quality	Band	Tbd	No
maxNumberCSI-RS-SSB-BFR Defines maximal number of different CSI-RS [and/or SSB] resources across all CCs for new beam identifications.	Band	Tbd	No
maxNumberMIMO-LayersPDSCH Indicates the maximum number of spatial multiplexing layer(s) supported by the UE for DL reception.	Band or CC in band	Tbd	No
maxNumberMIMO-LayersCB-PUSCH Indicates supported maximum number of MIMO layers at the UE for PUSCH transmission with codebook precoding. UE indicating support of this feature shall also indicate support of PUSCH codebook coherency subset.	Band or CC in band	Tbd	No
maxNumberMIMO-LayersNonCB-PUSCH Indicates supported maximum number of MIMO layers at the UE for PUSCH transmission using non-codebook precoding.	Band or CC in band	Tbd	No
maxNumberNonGroupBeamReporting Defines support of non-group based RSRP reporting using N_max reference signals.	Band	Tbd	No
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.	Band	Tbd	No
maxNumberRxTxBeamSwitchDL Defines the number of Tx and Rx beam changes UE can perform within a slot across all configured serving cells. UE shall report one value per each subcarrier spacing supported by the UE.	Band	Tbd	No
maxNumberSSB-BFR Defines maximal number of different SSBs across all CCs for UE to monitor PDCCH quality	Band	Tbd	No
modifiedMPR-Behaviour Indicates whether the UE supports modified A-MPR due to some reasons e.g. regulatory requirements change, RB restriction is replaced to A-MPR for better frequency usage efficiency.	Band	Tbd	Tbd

Definitions for parameters	Per	M	FDD TDD DIFF
multipleTCI Indicates whether the UE supports more than one configuration of *TCI-StatesPDCCH* for a PDCCH CORESET configured by dedicated RRC signaling.	Band	Tbd	No
multipleTimingAdvances Indicates whether multiple timing advances are supported by the UE. For NR CA band combination, if the band combination comprised of more than one band entry (i.e., inter-band or intra-band non-contiguous band combination), the field indicates that different timing advances on different band entries are supported. For EN-DC band combination, this field is not presented and it is mandatory for the UE supporting EN-DC band combination. In this release, up to two timing advances are supported for EN-DC band combination or NR CA band combination. Note: For NR CA, it is mandatory with IOT bit for inter-band NR CA, otherwise optional. For EN-DC, it is mandatory without IOT bit.	BC	Yes /No	No
periodicBeamReport Indicates whether UE supports periodic 'CRI/RSRP' or 'SSBRI/RSRP' reporting using PUCCH formats 2,3 and 4 in one slot. For FR2, it is mandatory.	Band	Yes	No
pdcchMonitoringAnyOccasions Defines the supported PDCCH search space monitoring occasions. withoutDCI-gap indicates whether the UE supports PDCCH search space monitoring occasions in any symbol of the slot for Type 1-PDCCH common search space configured by dedicated RRC signaling, for a Type 3-PDCCH common search space, or for a UE-specific search space with the capability of supporting at least 44, 36, 22, and 20 blind decodes in a slot for 15 kHz, 30 kHz, 60kHz, and 120 kHz subcarrier spacing values respectively. withDCI-gap indicates whether the UE supports PDCCH search space monitoring occasions in any symbol of the slot with minimum time separation between two consecutive transmissions of PDCCH scrambled with C-RNTI or CS-RNTI for Type 1-PDCCH common search space configured by dedicated RRC signaling, for a Type 3-PDCCH common search space, or for a UE-specific search space, with the capability of supporting at least 44, 36, 22, and 20 blind decodes in a slot for 15 kHz, 30 kHz, 60kHz, and 120 kHz subcarrier spacing values respectively.	Band	Tbd	No
pdsch-256QAM-FR2 Indicates whether the UE supports 256QAM for PDSCH for FR2.	Band	Tbd	No
pdsch-DifferentTB-PerSlot Defines whether the UE supports reception of up to two PDSCHs for different transport blocks with PDSCH scrambled using C-RNTI, TC-RNTI, or CS-RNTI within the same slot or whether the UE supports reception of up to seven PDSCHs for different transport blocks with PDSCH scrambled using C-RNTI or CS-RNTI within the same slot.	Band	Tbd	No
phaseCoherenceUL Indicates whether the UE can maintain phase coherence during a single transmission of a single channel, i.e. PUSCH, PUCCH, or SRS, with one or more OFDM symbol time gap when none of the following conditions are satisfied: - transmit power has changed across the gap - UE is required to receive DL signals within the gap, - other transmissions from the UE occur within the gap, - resource block allocation changes across the gap, and - resource block hopping is enabled.	Band	Tbd	No
pusch-256QAM Indicates whether the UE supports 256QAM for PUSCH. For FR1, it is optional.	Band	No	No
pusch-DifferentTB-PerSlot Defines whether the UE supports transmission of up to two PUSCHs or up to seven PUSCHs for different transport blocks within the same slot.	Band	Tbd	No
pusch-TransCoherence Defines support of the uplink codebook subset by the UE for UL precoding for PUSCH transmission as described in Section 6.1.1.1 of TS 38.214. 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	Tbd	No
scellWithoutSSB Indicates whether the UE can support configuration of SCell that does not transmit SS/PBCH block.	Band	Tbd	No
searchSpaceSharingCA-DL Defines whether the UE supports DL PDCCH search space sharing for carrier aggregation operation.	Band	Tbd	No

Definitions for parameters	Per	M	FDD TDD DIFF
searchSpaceSharingCA-UL Indicates whether the UE supports UL PDCCH search space sharing for carrier aggregation operation.	Band	Tbd	No
simultaneousRxTxInterBandCA Indicates whether the UE supports simultaneous transmission and reception in TDD-TDD and TDD-FDD inter-band NR CA.	BC	Tbd	No
simultaneousRxTxInterBandENDC Indicates whether the UE supports simultaneous transmission and reception in TDD-TDD and TDD-FDD inter-band EN-DC.	BC	Tbd	No
simultaneousTxSUL-NonSUL Indicates whether the UE supports simultaneous transmission of SRS on an SUL/non-SUL carrier and PUSCH/PUCCH/SRS/PRACH on the other UL carrier in the same cell	Band	Tbd	No
singleUL-Transmission Indicates that the UE does not support simultaneous UL transmissions as defined in TS 38.101-3 [4]. The UE may only set this bit for certain band combinations defined in TS 38.101-3 [4]. If set for a particular band combination, the bit applies to all fallback band combinations of this band combination that are defined in TS 38.101-3 [4] as being allowed to set the bit and does not apply to any other fallback band combinations defined in TS 38.101-3 [4].	BC	Tbd	No
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	No
sp-BeamReportPUSCH Indicates support of semi-persistent 'CRI/RSRP' or 'SSBRI/RSRP' reporting on PUSCH.	Band	No	No
srs-AssocCSI-RS Indicates whether UE can support calculation of the precoder for SRS transmission based on channel measurements using associated NZP CSI-RS resource as described in Section 6.1.1.2 of TS 38.214. UE supporting this feature shall also indicate support of non-codebook based PUSCH transmission.	Band	No	No
srs-TxSwitch Defines whether UE supports SRS antenna port switching as defined in Section 6.2.1.2 of TS 38.214.	Band	Tbd	No
supportedBandCombination Defines the supported CA and/or MR-DC band combinations by the UE. For each band in a band combination the UE provides the supported CA bandwidth classes for DL and/or UL. For SUL, frequency band indicator is included in *BandDL-Info* and *bandParametersDL* is absent.	UE	Yes	No
supportedBandListNR Includes the supported NR bands as defined in TS 38.101-1 [2] and TS 38.101-2 [3].	UE	Yes	No
supportedBandwidthCombinationSet Defines the supported bandwidth combination for the band combination set as defined in the 38.101-1 [X] and 38.101-2 [Y]. Field encoded as a bit map, where bit N is set to "1" if UE support Bandwidth Combination Set N for this band combination as defined in the 38.101-1 [X] and 38.101-2 [Y]. The leading / leftmost bit (bit 0) corresponds to the Bandwidth Combination Set 0, the next bit corresponds to the Bandwidth Combination Set 1 and so on.	BC	Tbd	No
supportedNumberTAG Defines the number of timing advance groups are supported by the UE	Band	Tbd	No
supportedSRS-Resources Defines support of SRS resources. The capability signalling comprising indication of: - Supported maximum number of aperiodic SRS resources that can be configured for the UE per each BWP - Supported maximum number of aperiodic SRS resources per slot in the BWP - Supported maximum number of periodic SRS resources per BWP - Supported maximum number of periodic SRS resources per slot in the BWP - Supported maximum number of semi-persistent SRS resources that can be configured for the UE per each BWP - Supported maximum number of semi-persistent SRS resources per slot in the BWP Supported maximum number of SRS antenna port per each SRS resource	Band	Tbd	No

Definitions for parameters	Per	M	FDD TDD DIFF
tdm-Pattern This field indicates whether the UE supports the *tdm-Pattern for single UL transmissionSUO case1* associated functionality. Support is conditionally mandatory for UEs that do not support dynamic power sharing and or for UEs that indicate single UL for any BC, and optional otherwise.	UE	Yes /No	Yes
timeDurationForQCL Defines minimum number of OFDM symbols required by the UE to perform PDCCH reception and applying spatial QCL information received in DCI for PDSCH processing as described in TS 38.214 Section 5.1.5. UE shall indicate one value of the minimum number of OFDM symbols per each subcarrier spacing of 60kHz and 120kHz.	Band	Tbd	No
twoPortsPTRS Defines whether UE supports PT-RS with 2 antenna ports for DL reception and/or UL transmission.	Band	No	No
twoPUCCH-Group Indicates whether two PUCCH group in CA with a same numerology across CCs for data and control channel [at a given time] is supported by the UE.	Band	Tbd	No
type1-3-CSS Indicates whether the UE supports receiving PDCCH in a Type1-PDCCH common search space configured by dedicated RRC signaling, or in a Type3-PDCCH common search space or in a UE-specific search space, with an associated CORESET duration of 3 symbols in FR2.	Band	Yes	No
ue-SpecificUL-DL-Assignment Indicates whether the UE supports dynamic determination of UL and DL link direction and slot format based on Layer 1 scheduling DCI and higher layer configured parameter UL-DL-configuration-dedicated as specified in TS 38.213.	Band	Tbd	No
ul-SharingEUTRA-NR Indicates whether the UE supports EN-DC with EUTRA-NR coexistence in UL sharing from UE perspective.	BC	No	No
ul-SwitchingTimeEUTRA-NR Indicates support of switching type between LTE UL and NR UL for EN-DC with LTE-NR coexistence in UL sharing from UE perspective. Type1 indicates UE supports switching within less than 0 us and type2 indicates UE supports switching within less than 20us.	BC	Tbd	No
uplinkBeamManagement Defines support of beam management for UL. The capability include indication of the - Maximum number of SRS resources per SRS resource set supported by the UE. - Maximum number of SRS resource sets supported by the UE.	Band	Tbd	No

4.2.9 Measurement parameters

Definitions for parameters	Per	M	FDD-TDD diff	FR1 FR2 diff
csi-RS-RLM Indicates whether the UE can perform radio link monitoring procedure based on measurement of CSI-RS as specified in TS38.213 [ref] and 38.133 [ref]. This parameter needs FR1 and FR2 differentiation.	UE	Tbd	No	Yes
csi-RSRP-AndRSRQ-MeasWithSSB Indicates whether the UE can perform CSI-RSRP and CSI-RSRQ measurement as specified in TS38.215 [ref], where CSI-RS resource is configured with an associated SS/PBCH. This parameter needs FR1 and FR2 differentiation.	UE	Tbd	No	Yes
csi-RSRP-AndRSRQ-MeasWithoutSSB Indicates whether the UE can perform CSI-RSRP and CSI-RSRQ measurement as specified in TS38.215 [ref], where CSI-RS resource is configured for a cell that transmits SS/PBCH block and without an associated SS/PBCH block. This parameter needs FR1 and FR2 differentiation.	UE	Tbd	No	Yes
csi-SINR-Meas Indicates whether the UE can perform CSI-SINR measurements based on configured CSI-RS resources as specified in TS38.215. This parameter needs FR1 and FR2 differentiation.	UE	Tbd	No	Yes
eventA-MeasAndReport Indicates whether the UE supports NR measurements and events A triggered reporting as specified in TS 38.331 [9]	UE	Yes	Yes	No
independentGapConfig This field indicates whether the UE supports two independent measurement gap configurations for FR1 and FR2 specified in TS 38.133 [5].	UE	No	Yes	No
intraAndInterF-MeasAndReport Indicates whether the UE supports NR intra-frequency and inter-frequency measurements and at least periodical reporting.	UE	Yes	Yes	No
simultaneousRxDataSSB-DiffNumerology Indicates whether the UE supports concurrent intra-frequency measurement on serving cell or neighbouring cell and PDCCH or PDSCH reception from the serving cell with a different numerology.	UE	TBD	Yes	Yes
sftd-MeasPSCell Indicates whether the UE supports SFTD measurements between the Pcell and a configured PSCell.	UE	No	Yes	No
sftd-MeasNR-Cell Indicates whether the SFTD measurement between the Pcell and the NR cells is supported by the UE which is capable of EN-DC when EN-DC is not configured.	UE	No	Yes	No
ss-SINR-Meas Indicates whether the UE can perform SS-SINR measurement as specified in TS38.215 [ref]. This parameter needs FR1 and FR2 differentiation.	UE	Tbd	No	Yes

4.2.10 Inter-RAT parameters

4.2.10.1 *eutraFDD*

This parameter defines whether the UE supports EUTRA FDD.

4.2.10.2 *eutraTDD*

This parameter defines whether the UE supports EUTRA TDD.

5 Optional features without UE radio access capability parameters

Editor's Note: Features will be added once feature lists as optional w/o capability are decided.

6 Conditionally mandatory features

Features	Condition
Skipping UL configured grant if no data to transmit.	Configured grant type ½ is supported.
multipleTimingAdvances	EN-DC is supported.
tdm-pattern	*dynamicPowerSharing* is not supported or single UL for any band combination is indicated.

7 Capability coordination in MR-DC operation

In MR-DC operation, only two nodes (one EUTRA eNB and one NR gNB) need to be considered in the EUTRA/NR capability coordination. For capabilities for which coordination is needed, it is up to the MN to make the decision on how to resolve the dependency between MN and SN configurations. The MN provides the resulting UE capabilities usable for SCG configuration to the SN. The SN is allowed to initiate the re-negotiation of capability. For capabilities for which no coordination is needed, the SN specific capabilities are just forwarded by the MN to the SN. For baseband processing combination, MN determines its own baseband processing combination to be used in MN side based on *supportedBandCombination* in MRDC container and *supportedBasebandProcessingCombination-MRDC* then determines the allowed baseband processing combination list in SN side and indicates them to SN via *SCG-ConfigInfo*. SN may request to MN different baseband processing combination to be used in SN side via *SCG-Config*.

Editor's Note: Whether to include the list of capabilities which need the coordination or to refer the other specification needs to be discussed.

Annex A (informative): Change history

Change history							
Date	**Meeting**	**TDoc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**New version**
06/2017	RAN2#98	R2-1704810				First version	0.0.1
06/2017	RAN2#NR 2	R2-1707386					0.0.2
08/2017	RAN2#99	R2-1708750					0.0.3
12/2017	RAN2#100	R2-1712587					0.0.4
12/2017	RAN2#100	R2-1714141					0.0.5
12/2017	RAN2#100	R2-1714271					0.1.0
12/2017	RAN#78	RP-172521				Submitted to RAN#78 for approval	1.0.0
12/2017	RAN#78					Upgraded to Rel-15	15.0.0
03/2018	RAN#79	RP-180440	0003	3	F	Updates on UE capabilities	15.1.0