**3GPP TSG-RAN WG2 Meeting #116 Electronic *R2-2111529***

**Online, 01 – 12 November 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.331** | **CR** | **2817** | **rev** | **1** | **Current version:** | **16.6.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network | **x** | Core Network |  |

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| ***Title:*** | Duty cycle signalling for power class 1.5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | HPUE\_PC1\_5\_n77\_n78-Core | | | | |  | ***Date:*** | | | 2021-11-11 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **C** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | As per R4-2114929, RAN4 has requested a new per-band UL duty cycle capability for PC1.5 in FR1 bands. If the UE does not report the capability, the UE will mitigate MPE autonomously by P-MPR or by other means and no restriction on scheduled uplink duty cycle is requested. RAN4 suggests that this capability is per band, FR1 only, limited to devices supporting power class 1.5. RAN4 has also requested the capability to be introduced as early as possible since power class 1.5 for Band n41 was already introduced in Release 16 and defined to be release independent to Release 15. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. Add capability maxUplinkDutyCycle-PC1dot5-MPE-FR1 to BandNR   **Implementation of this CR by a Release 15 UE will not cause compatibility issues**.  **Impact analysis**  Impacted functionality: functionality impacted.  Inter-operability:   1. If the network is implemented according to the CR and the UE is not, network may not use duty cycle for the UE, and UE has to manage the MPE without that but there are no inter-operability issues. 2. If the UE is implemented according to the CR and the network is not, the network may not utilize any duty cycle for the UE, so the UE has to manage MPE witout duty cycle, but there are no inter-operability issues. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | A PC1.5 UE cannot indicate its request for UL duty cycle to mitigate MPE effects. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.3.3, Annex C | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **x** |  | Other core specifications | | | | TS38.306 CR0646 | | |
| ***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 Modified Subclause*

### 6.3.3 UE capability information elements

<UNNECESSARY PARTS OMITTED>

#### – *RF-Parameters*

The IE *RF-Parameters* is used to convey RF-related capabilities for NR operation.

*RF-Parameters* information element

-- ASN1START

-- TAG-RF-PARAMETERS-START

RF-Parameters ::= SEQUENCE {

supportedBandListNR SEQUENCE (SIZE (1..maxBands)) OF BandNR,

supportedBandCombinationList BandCombinationList OPTIONAL,

appliedFreqBandListFilter FreqBandList OPTIONAL,

...,

[[

supportedBandCombinationList-v1540 BandCombinationList-v1540 OPTIONAL,

srs-SwitchingTimeRequested ENUMERATED {true} OPTIONAL

]],

[[

supportedBandCombinationList-v1550 BandCombinationList-v1550 OPTIONAL

]],

[[

supportedBandCombinationList-v1560 BandCombinationList-v1560 OPTIONAL

]],

[[

supportedBandCombinationList-v1610 BandCombinationList-v1610 OPTIONAL,

supportedBandCombinationListSidelinkEUTRA-NR-r16 BandCombinationListSidelinkEUTRA-NR-r16 OPTIONAL,

supportedBandCombinationList-UplinkTxSwitch-r16 BandCombinationList-UplinkTxSwitch-r16 OPTIONAL

]],

[[

supportedBandCombinationList-v1630 BandCombinationList-v1630 OPTIONAL,

supportedBandCombinationListSidelinkEUTRA-NR-v1630 BandCombinationListSidelinkEUTRA-NR-v1630 OPTIONAL,

supportedBandCombinationList-UplinkTxSwitch-v1630 BandCombinationList-UplinkTxSwitch-v1630 OPTIONAL

]],

[[

supportedBandCombinationList-v1640 BandCombinationList-v1640 OPTIONAL,

supportedBandCombinationList-UplinkTxSwitch-v1640 BandCombinationList-UplinkTxSwitch-v1640 OPTIONAL

]],

[[

supportedBandCombinationList-v1650 BandCombinationList-v1650 OPTIONAL,

supportedBandCombinationList-UplinkTxSwitch-v1650 BandCombinationList-UplinkTxSwitch-v1650 OPTIONAL

]],

[[

extendedBand-n77-r16 ENUMERATED {supported} OPTIONAL

]]

}

BandNR ::= SEQUENCE {

bandNR FreqBandIndicatorNR,

modifiedMPR-Behaviour BIT STRING (SIZE (8)) OPTIONAL,

mimo-ParametersPerBand MIMO-ParametersPerBand OPTIONAL,

extendedCP ENUMERATED {supported} OPTIONAL,

multipleTCI ENUMERATED {supported} OPTIONAL,

bwp-WithoutRestriction ENUMERATED {supported} OPTIONAL,

bwp-SameNumerology ENUMERATED {upto2, upto4} OPTIONAL,

bwp-DiffNumerology ENUMERATED {upto4} OPTIONAL,

crossCarrierScheduling-SameSCS ENUMERATED {supported} OPTIONAL,

pdsch-256QAM-FR2 ENUMERATED {supported} OPTIONAL,

pusch-256QAM ENUMERATED {supported} OPTIONAL,

ue-PowerClass ENUMERATED {pc1, pc2, pc3, pc4} OPTIONAL,

rateMatchingLTE-CRS ENUMERATED {supported} OPTIONAL,

channelBWs-DL CHOICE {

fr1 SEQUENCE {

scs-15kHz BIT STRING (SIZE (10)) OPTIONAL,

scs-30kHz BIT STRING (SIZE (10)) OPTIONAL,

scs-60kHz BIT STRING (SIZE (10)) OPTIONAL

},

fr2 SEQUENCE {

scs-60kHz BIT STRING (SIZE (3)) OPTIONAL,

scs-120kHz BIT STRING (SIZE (3)) OPTIONAL

}

} OPTIONAL,

channelBWs-UL CHOICE {

fr1 SEQUENCE {

scs-15kHz BIT STRING (SIZE (10)) OPTIONAL,

scs-30kHz BIT STRING (SIZE (10)) OPTIONAL,

scs-60kHz BIT STRING (SIZE (10)) OPTIONAL

},

fr2 SEQUENCE {

scs-60kHz BIT STRING (SIZE (3)) OPTIONAL,

scs-120kHz BIT STRING (SIZE (3)) OPTIONAL

}

} OPTIONAL,

...,

[[

maxUplinkDutyCycle-PC2-FR1 ENUMERATED {n60, n70, n80, n90, n100} OPTIONAL

]],

[[

pucch-SpatialRelInfoMAC-CE ENUMERATED {supported} OPTIONAL,

powerBoosting-pi2BPSK ENUMERATED {supported} OPTIONAL

]],

[[

maxUplinkDutyCycle-FR2 ENUMERATED {n15, n20, n25, n30, n40, n50, n60, n70, n80, n90, n100} OPTIONAL

]],

[[

channelBWs-DL-v1590 CHOICE {

fr1 SEQUENCE {

scs-15kHz BIT STRING (SIZE (16)) OPTIONAL,

scs-30kHz BIT STRING (SIZE (16)) OPTIONAL,

scs-60kHz BIT STRING (SIZE (16)) OPTIONAL

},

fr2 SEQUENCE {

scs-60kHz BIT STRING (SIZE (8)) OPTIONAL,

scs-120kHz BIT STRING (SIZE (8)) OPTIONAL

}

} OPTIONAL,

channelBWs-UL-v1590 CHOICE {

fr1 SEQUENCE {

scs-15kHz BIT STRING (SIZE (16)) OPTIONAL,

scs-30kHz BIT STRING (SIZE (16)) OPTIONAL,

scs-60kHz BIT STRING (SIZE (16)) OPTIONAL

},

fr2 SEQUENCE {

scs-60kHz BIT STRING (SIZE (8)) OPTIONAL,

scs-120kHz BIT STRING (SIZE (8)) OPTIONAL

}

} OPTIONAL

]],

[[

asymmetricBandwidthCombinationSet BIT STRING (SIZE (1..32)) OPTIONAL

]],

[[

-- R1 10: NR-unlicensed

sharedSpectrumChAccessParamsPerBand-r16 SharedSpectrumChAccessParamsPerBand-r16 OPTIONAL,

-- R1 11-7b: Independent cancellation of the overlapping PUSCHs in an intra-band UL CA

cancelOverlappingPUSCH-r16 ENUMERATED {supported} OPTIONAL,

-- R1 14-1: Multiple LTE-CRS rate matching patterns

multipleRateMatchingEUTRA-CRS-r16 SEQUENCE {

maxNumberPatterns-r16 INTEGER (2..6),

maxNumberNon-OverlapPatterns-r16 INTEGER (1..3)

} OPTIONAL,

-- R1 14-1a: Two LTE-CRS overlapping rate matching patterns within a part of NR carrier using 15 kHz overlapping with a LTE carrier

overlapRateMatchingEUTRA-CRS-r16 ENUMERATED {supported} OPTIONAL,

-- R1 14-2: PDSCH Type B mapping of length 9 and 10 OFDM symbols

pdsch-MappingTypeB-Alt-r16 ENUMERATED {supported} OPTIONAL,

-- R1 14-3: One slot periodic TRS configuration for FR1

oneSlotPeriodicTRS-r16 ENUMERATED {supported} OPTIONAL,

olpc-SRS-Pos-r16 OLPC-SRS-Pos-r16 OPTIONAL,

spatialRelationsSRS-Pos-r16 SpatialRelationsSRS-Pos-r16 OPTIONAL,

simulSRS-MIMO-TransWithinBand-r16 ENUMERATED {n2} OPTIONAL,

channelBW-DL-IAB-r16 CHOICE {

fr1-100mhz SEQUENCE {

scs-15kHz ENUMERATED {supported} OPTIONAL,

scs-30kHz ENUMERATED {supported} OPTIONAL,

scs-60kHz ENUMERATED {supported} OPTIONAL

},

fr2-200mhz SEQUENCE {

scs-60kHz ENUMERATED {supported} OPTIONAL,

scs-120kHz ENUMERATED {supported} OPTIONAL

}

} OPTIONAL,

channelBW-UL-IAB-r16 CHOICE {

fr1-100mhz SEQUENCE {

scs-15kHz ENUMERATED {supported} OPTIONAL,

scs-30kHz ENUMERATED {supported} OPTIONAL,

scs-60kHz ENUMERATED {supported} OPTIONAL

},

fr2-200mhz SEQUENCE {

scs-60kHz ENUMERATED {supported} OPTIONAL,

scs-120kHz ENUMERATED {supported} OPTIONAL

}

} OPTIONAL,

rasterShift7dot5-IAB-r16 ENUMERATED {supported} OPTIONAL,

ue-PowerClass-v1610 ENUMERATED {pc1dot5} OPTIONAL,

condHandover-r16 ENUMERATED {supported} OPTIONAL,

condHandoverFailure-r16 ENUMERATED {supported} OPTIONAL,

condHandoverTwoTriggerEvents-r16 ENUMERATED {supported} OPTIONAL,

condPSCellChange-r16 ENUMERATED {supported} OPTIONAL,

condPSCellChangeTwoTriggerEvents-r16 ENUMERATED {supported} OPTIONAL,

mpr-PowerBoost-FR2-r16 ENUMERATED {supported} OPTIONAL,

-- R1 11-9: Multiple active configured grant configurations for a BWP of a serving cell

activeConfiguredGrant-r16 SEQUENCE {

maxNumberConfigsPerBWP-r16 ENUMERATED {n1, n2, n4, n8, n12},

maxNumberConfigsAllCC-r16 INTEGER (2..32)

} OPTIONAL,

-- R1 11-9a: Joint release in a DCI for two or more configured grant Type 2 configurations for a given BWP of a serving cell

jointReleaseConfiguredGrantType2-r16 ENUMERATED {supported} OPTIONAL,

-- R1 12-2: Multiple SPS configurations

sps-r16 SEQUENCE {

maxNumberConfigsPerBWP-r16 INTEGER (1..8),

maxNumberConfigsAllCC-r16 INTEGER (2..32)

} OPTIONAL,

-- R1 12-2a: Joint release in a DCI for two or more SPS configurations for a given BWP of a serving cell

jointReleaseSPS-r16 ENUMERATED {supported} OPTIONAL,

-- R1 13-19: Simultaneous positioning SRS and MIMO SRS transmission within a band across multiple CCs

simulSRS-TransWithinBand-r16 ENUMERATED {n2} OPTIONAL,

trs-AdditionalBandwidth-r16 ENUMERATED {trs-AddBW-Set1, trs-AddBW-Set2} OPTIONAL,

handoverIntraF-IAB-r16 ENUMERATED {supported} OPTIONAL

]],

[[

-- R1 22-5a: Simultaneous transmission of SRS for antenna switching and SRS for CB/NCB /BM for intra-band UL CA

-- R1 22-5c: Simultaneous transmission of SRS for antenna switching and SRS for antenna switching for intra-band UL CA

simulTX-SRS-AntSwitchingIntraBandUL-CA-r16 SimulSRS-ForAntennaSwitching-r16 OPTIONAL,

-- R1 10: NR-unlicensed

sharedSpectrumChAccessParamsPerBand-v1630 SharedSpectrumChAccessParamsPerBand-v1630 OPTIONAL

]],

[[

handoverUTRA-FDD-r16 ENUMERATED {supported} OPTIONAL,

-- R4 7-4: Report the shorter transient capability supported by the UE: 2, 4 or 7us

enhancedUL-TransientPeriod-r16 ENUMERATED {us2, us4, us7} OPTIONAL,

sharedSpectrumChAccessParamsPerBand-v1640 SharedSpectrumChAccessParamsPerBand-v1640 OPTIONAL

]],

[[

type1-PUSCH-RepetitionMultiSlots-v1650 ENUMERATED {supported} OPTIONAL,

type2-PUSCH-RepetitionMultiSlots-v1650 ENUMERATED {supported} OPTIONAL,

pusch-RepetitionMultiSlots-v1650 ENUMERATED {supported} OPTIONAL,

configuredUL-GrantType1-v1650 ENUMERATED {supported} OPTIONAL,

configuredUL-GrantType2-v1650 ENUMERATED {supported} OPTIONAL,

sharedSpectrumChAccessParamsPerBand-v1650 SharedSpectrumChAccessParamsPerBand-v1650 OPTIONAL

]],

[[

enhancedSkipUplinkTxConfigured-v1660 ENUMERATED {supported} OPTIONAL,

enhancedSkipUplinkTxDynamic-v1660 ENUMERATED {supported} OPTIONAL

]],

[[

maxUplinkDutyCycle-PC1dot5-MPE-FR1-r16 ENUMERATED {n10, n15, n20, n25, n30, n40, n50, n60, n70, n80, n90, n100} OPTIONAL

]]

}

-- TAG-RF-PARAMETERS-STOP

-- ASN1STOP

|  |
| --- |
| *RF-Parameters* field descriptions |
| ***appliedFreqBandListFilter***  In this field the UE mirrors the *FreqBandList* that the NW provided in the capability enquiry, if any. The UE filtered the band combinations in the *supportedBandCombinationList* in accordance with this *appliedFreqBandListFilter*. The UE does not include this field if the UE capability is requested by E-UTRAN and the network request includes the field *eutra-nr-only* [10]. |
| ***supportedBandCombinationList***  A list of band combinations that the UE supports for NR (and NR-DC, if requested). The *FeatureSetCombinationId*:s in this list refer to the *FeatureSetCombination* entries in the *featureSetCombinations* list in the *UE-NR-Capability* IE. The UE does not include this field if the UE capability is requested by E-UTRAN and the network request includes the field *eutra-nr-only* [10]. |
| ***supportedBandCombinationListSidelinkEUTRA-NR***  A list of band combinations that the UE supports for NR sidelink communication only, for joint NR sidelink communication and V2X sidelink communication, or for V2X sidelink communication only. The UE does not include this field if the UE capability is requested by E-UTRAN (see TS 36.331[10]) and the network request includes the field *eutra-nr-only*. |
| ***supportedBandCombinationList-UplinkTxSwitch***  A list of band combinations that the UE supports dynamic uplink Tx switching for NR UL CA and SUL. The *FeatureSetCombinationId*:s in this list refer to the *FeatureSetCombination* entries in the *featureSetCombinations* list in the *UE-NR-Capability* IE. The UE does not include this field if the UE capability is requested by E-UTRAN and the network request includes the field *eutra-nr-only* [10]. |

*Next Modified Subclause*

Annex C (normative): List of CRs Containing Early Implementable Features and Corrections

This annex lists the Change Requests (CRs) whose changes may be implemented by a UE of an earlier release than which the CR was approved in (i.e. CRs that contain on their coversheets the sentence "Implementation of this CR from Rel-N will not cause interoperability issues").

Table C-1: List of CRs Containing Early Implementable Features and Corrections

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| TDoc Number (RP-xxxxxx): CR Title | CR Number(s) | CR Revision Number(s) | Earliest Implementable Release | Additional Information |
| RP-200335: Correction on usage of access category 2 for UAC for RNA update | 1141 | 2 | Release 15 |  |
| RP-201185: Introduction of signalling for high-speed train scenarios | 1464 | 5 | Release 15 |  |
| RP-201216: Release-16 UE capabilities based on RAN1, RAN4 feature lists and RAN2 | 1665 | 2 | Release 15 | Early implementation part is referring to the aspect covered by R2-2006203: Extension of CSI-RS capabilities per codebook type |
| RP-202768: UE behaviour when UL 7.5KHz shift is not supported | 2107 | 2 | Release 15 |  |
| RP-202790: Correction on uac-AccessCategory1-SelectionAssistanceInfo | 2130 | 1 | Release 15 |  |
| RP-211483: Clarification on the initiation of RNA update | 2581 | 1 | Release 15 |  |
| RP-201190: Introduction of eCall over IMS for NR | 1670 | - | Release 15 |  |
| RP-212598: Distinguishing support of extended band n77 | 2810 | 2 | Release 15 |  |
| RP-21xxxx: Duty cycle signalling for power class 1.5 | 2817 | - | Release 15 |  |

*End of Changes*