**3GPP TSG-RAN WG2 Meeting #111 Electronic *R2-2008410***

**Online, 17 – 28 August 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **36.331** | **CR** | **4382** | **rev** | **1** | **Current version:** | **15.10.0** |  |
|  | | | | | | | | |
| *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:*** | Clarification on UL 256QAM | | | | | | | | | |
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| ***Source to WG:*** | Nokia, Nokia Shanghai Bell | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | LTE\_1024QAM\_DL-Core, TEI15 | | | | |  | ***Date:*** | | | 2020-08-21 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-15 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Based on current specification, the 256QAM in UL is allowed for UEs of category 16-20 as well as for cat. 22-26 (TS 36.306, Table 4.1A-2: Uplink physical layer parameter values set by the field ue-CategoryUL). However, it seems that the description of the *enable256QAM* IE, defined was not properly updated to consider Rel-15 UE categories 22-26. Even though allowed by the corresponding table in TS 36.306. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | The field description is updated for the *enable256QAM* IE to take into account the table described in TS 36.306, Table 4.1A-2 to avoid possible misinterpretation.  **Impact analysis**  Impacted functionality: UL 256 QAM configuration.  Impacted architectures: LTE SA,EN-DC, NGEN-DC, NE-DC  Inter-operability:   1. If the network is implemented according to the CR and the UE is not there is no problem. 2. If the UE is implemented according to the CR and the network is not, the network may not configure UL 256 QAM based on the existing field description for the Rel-15 UE categories 22-26. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | TS 36.331 field description is not aligned to the TS 36.306 resulting in possible non usage of UL 256 QAM feature. | | | | | | | | |
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| ***Clauses affected:*** | | 6.3.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **x** |  | Other core specifications | | | | TS 36.331 CR 4383 Cat A | | |
| ***affected:*** | |  |  | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  |  | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | |

*First Modified Subclause*

– *PUSCH-Config*

The IE *PUSCH-ConfigCommon* is used to specify the common PUSCH configuration and the reference signal configuration for PUSCH and PUCCH. The IE *PUSCH-ConfigDedicated* is used to specify the UE specific PUSCH configuration.

***PUSCH-Config* information element**

-- ASN1START

PUSCH-ConfigCommon ::= SEQUENCE {

pusch-ConfigBasic SEQUENCE {

n-SB INTEGER (1..4),

hoppingMode ENUMERATED {interSubFrame, intraAndInterSubFrame},

pusch-HoppingOffset INTEGER (0..98),

enable64QAM BOOLEAN

},

ul-ReferenceSignalsPUSCH UL-ReferenceSignalsPUSCH

}

PUSCH-ConfigCommon-v1270 ::= SEQUENCE {

enable64QAM-v1270 ENUMERATED {true}

}

PUSCH-ConfigCommon-v1310 ::= SEQUENCE {

pusch-maxNumRepetitionCEmodeA-r13 ENUMERATED {

r8, r16, r32 } OPTIONAL, -- Need OR

pusch-maxNumRepetitionCEmodeB-r13 ENUMERATED {

r192, r256, r384, r512, r768, r1024,

r1536, r2048} OPTIONAL, -- Need OR

pusch-HoppingOffset-v1310

INTEGER (1..maxAvailNarrowBands-r13) OPTIONAL -- Need OR

}

PUSCH-ConfigDedicated ::= SEQUENCE {

betaOffset-ACK-Index INTEGER (0..15),

betaOffset-RI-Index INTEGER (0..15),

betaOffset-CQI-Index INTEGER (0..15)

}

PUSCH-ConfigDedicated-v1020 ::= SEQUENCE {

betaOffsetMC-r10 SEQUENCE {

betaOffset-ACK-Index-MC-r10 INTEGER (0..15),

betaOffset-RI-Index-MC-r10 INTEGER (0..15),

betaOffset-CQI-Index-MC-r10 INTEGER (0..15)

} OPTIONAL, -- Need OR

groupHoppingDisabled-r10 ENUMERATED {true} OPTIONAL, -- Need OR

dmrs-WithOCC-Activated-r10 ENUMERATED {true} OPTIONAL -- Need OR

}

PUSCH-ConfigDedicated-v1130 ::= SEQUENCE {

pusch-DMRS-r11 CHOICE {

release NULL,

setup SEQUENCE {

nPUSCH-Identity-r11 INTEGER (0..509),

nDMRS-CSH-Identity-r11 INTEGER (0..509)

}

}

}

PUSCH-ConfigDedicated-v1250::= SEQUENCE {

uciOnPUSCH CHOICE {

release NULL,

setup SEQUENCE {

betaOffset-ACK-Index-SubframeSet2-r12 INTEGER (0..15),

betaOffset-RI-Index-SubframeSet2-r12 INTEGER (0..15),

betaOffset-CQI-Index-SubframeSet2-r12 INTEGER (0..15),

betaOffsetMC-r12 SEQUENCE {

betaOffset-ACK-Index-MC-SubframeSet2-r12 INTEGER (0..15),

betaOffset-RI-Index-MC-SubframeSet2-r12 INTEGER (0..15),

betaOffset-CQI-Index-MC-SubframeSet2-r12 INTEGER (0..15)

} OPTIONAL -- Need OR

}

}

}

PUSCH-ConfigDedicated-r13 ::= SEQUENCE {

betaOffset-ACK-Index-r13 INTEGER (0..15),

betaOffset2-ACK-Index-r13 INTEGER (0..15) OPTIONAL, -- Need OR

betaOffset-RI-Index-r13 INTEGER (0..15),

betaOffset-CQI-Index-r13 INTEGER (0..15),

betaOffsetMC-r13 SEQUENCE {

betaOffset-ACK-Index-MC-r13 INTEGER (0..15),

betaOffset2-ACK-Index-MC-r13 INTEGER (0..15) OPTIONAL, -- Need OR

betaOffset-RI-Index-MC-r13 INTEGER (0..15),

betaOffset-CQI-Index-MC-r13 INTEGER (0..15)

} OPTIONAL, -- Need OR

groupHoppingDisabled-r13 ENUMERATED {true} OPTIONAL, -- Need OR

dmrs-WithOCC-Activated-r13 ENUMERATED {true} OPTIONAL, -- Need OR

pusch-DMRS-r11 CHOICE {

release NULL,

setup SEQUENCE {

nPUSCH-Identity-r13 INTEGER (0..509),

nDMRS-CSH-Identity-r13 INTEGER (0..509)

}

} OPTIONAL, -- Need ON

uciOnPUSCH CHOICE {

release NULL,

setup SEQUENCE {

betaOffset-ACK-Index-SubframeSet2-r13 INTEGER (0..15),

betaOffset2-ACK-Index-SubframeSet2-r13 INTEGER (0..15) OPTIONAL, -- Need OR

betaOffset-RI-Index-SubframeSet2-r13 INTEGER (0..15),

betaOffset-CQI-Index-SubframeSet2-r13 INTEGER (0..15),

betaOffsetMC-r12 SEQUENCE {

betaOffset-ACK-Index-MC-SubframeSet2-r13 INTEGER (0..15),

betaOffset2-ACK-Index-MC-SubframeSet2-r13 INTEGER (0..15) OPTIONAL, -- Need OR

betaOffset-RI-Index-MC-SubframeSet2-r13 INTEGER (0..15),

betaOffset-CQI-Index-MC-SubframeSet2-r13 INTEGER (0..15)

} OPTIONAL -- Need OR

}

} OPTIONAL, -- Need ON

pusch-HoppingConfig-r13 ENUMERATED {on} OPTIONAL -- Need OR

}

PUSCH-ConfigDedicated-v1430 ::= SEQUENCE {

ce-PUSCH-NB-MaxTBS-r14 ENUMERATED {on} OPTIONAL, -- Need OR

ce-PUSCH-MaxBandwidth-r14 ENUMERATED {bw5} OPTIONAL, -- Need OR

tdd-PUSCH-UpPTS-r14 TDD-PUSCH-UpPTS-r14 OPTIONAL, -- Need ON

ul-DMRS-IFDMA-r14 BOOLEAN,

enable256QAM-r14 Enable256QAM-r14 OPTIONAL -- Need ON

}

PUSCH-ConfigDedicated-v1530 ::= SEQUENCE {

ce-PUSCH-FlexibleStartPRB-AllocConfig-r15 CHOICE {

release NULL,

setup SEQUENCE {

offsetCE-ModeB-r15 INTEGER (-1..3) OPTIONAL -- Cond CE-ModeB

}

},

ce-PUSCH-SubPRB-Config-r15 CHOICE {

release NULL,

setup SEQUENCE {

locationCE-ModeB-r15 INTEGER (0..5) OPTIONAL, -- Cond CE-ModeB

sixToneCyclicShift-r15 INTEGER (0..3),

threeToneCyclicShift-r15 INTEGER (0..2)

}

} OPTIONAL -- Need ON

}

PUSCH-ConfigDedicatedSCell-r10 ::= SEQUENCE {

groupHoppingDisabled-r10 ENUMERATED {true} OPTIONAL, -- Need OR

dmrs-WithOCC-Activated-r10 ENUMERATED {true} OPTIONAL -- Need OR

}

PUSCH-ConfigDedicatedSCell-v1430 ::= SEQUENCE {

enable256QAM-r14 Enable256QAM-r14 OPTIONAL -- Need OR

}

PUSCH-ConfigDedicatedScell-v1530 ::= SEQUENCE {

uci-OnPUSCH-r15 CHOICE {

release NULL,

setup SEQUENCE {

betaOffsetAUL-r15 INTEGER (0..15)

}

}

}

TDD-PUSCH-UpPTS-r14 ::= CHOICE {

release NULL,

setup SEQUENCE {

symPUSCH-UpPTS-r14 ENUMERATED {sym1, sym2, sym3, sym4, sym5, sym6} OPTIONAL, -- Need ON

dmrs-LessUpPTS-Config-r14 ENUMERATED {true} OPTIONAL -- Need OR

}

}

Enable256QAM-r14 ::= CHOICE {

release NULL,

setup CHOICE {

tpc-SubframeSet-Configured-r14 SEQUENCE {

subframeSet1-DCI-Format0-r14 BOOLEAN,

subframeSet1-DCI-Format4-r14 BOOLEAN,

subframeSet2-DCI-Format0-r14 BOOLEAN,

subframeSet2-DCI-Format4-r14 BOOLEAN

},

tpc-SubframeSet-NotConfigured-r14 SEQUENCE {

dci-Format0-r14 BOOLEAN,

dci-Format4-r14 BOOLEAN

}

}

}

PUSCH-EnhancementsConfig-r14 ::= CHOICE {

release NULL,

setup SEQUENCE {

pusch-HoppingOffsetPUSCH-Enh-r14 INTEGER (1..100) OPTIONAL, -- Need ON

interval-ULHoppingPUSCH-Enh-r14 CHOICE {

interval-FDD-PUSCH-Enh-r14 ENUMERATED {int1, int2, int4, int8},

interval-TDD-PUSCH-Enh-r14 ENUMERATED {int1, int5, int10, int20}

} OPTIONAL -- Need ON

}

}

UL-ReferenceSignalsPUSCH ::= SEQUENCE {

groupHoppingEnabled BOOLEAN,

groupAssignmentPUSCH INTEGER (0..29),

sequenceHoppingEnabled BOOLEAN,

cyclicShift INTEGER (0..7)

}

-- ASN1STOP

| ***PUSCH-Config* field descriptions** |
| --- |
| ***betaOffset-ACK-Index, betaOffset2-ACK-Index, betaOffset-ACK-Index-MC, betaOffset2-ACK-Index-MC***  Parameter: ,, and , for single- and multiple-codeword respectively, see TS 36.213 [23], Table 8.6.3-1. *betaOffset-ACK-Index* and *betaOffset2-ACK-Index* are used for single-codeword and *betaOffset-ACK-Index-MC* and *betaOffset2-ACK-Index-MC* are used for multiple-codeword. If *betaOffset2-ACK-Index* is configured; *betaOffset-ACK-Index* is used when up to 22 HARQ-ACK bits are transmitted otherwise *betaOffset2-ACK-Index* is used. If *betaOffset-ACK2-Index-MC* is configured; *betaOffset-ACK-Index-MC* is used when up to 22 HARQ-ACK bits are transmitted otherwise *betaOffset2-ACK-Index-MC* is used. One value applies for all serving cells with an uplink in a cell group (MCG or SCG or the group of cells configured to send PUCCH on the same cell in case PUCCH SCell is configured) and not configured with uplink power control subframe sets. The same value also applies for subframe set 1 of all serving cells with an uplink in that cell group and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell). |
| ***betaOffset-ACK-Index-SubframeSet2, betaOffset2-ACK-Index-SubframeSet2, betaOffset-ACK-Index-MC-SubframeSet2, betaOffset2-ACK-Index-MC-SubframeSet2***  Parameter: ,,and respectively, see TS 36.213 [23], Table 8.6.3-1. *betaOffset-ACK-Index-SubframeSet2* and *betaOffset2-ACK-Index-SubframeSet2* are used for single-codeword*, betaOffset-ACK-Index-MC-SubframeSet2*, *betaOffset2-ACK-Index-MC-SubframeSet2* are used for multiple-codeword. If *betaOffset2-ACK-Index-SubframeSet2* is configured; *betaOffset-ACK-Index-SubframeSet2* is used when up to 22 HARQ-ACK bits are transmitted otherwise *betaOffset2-ACK-Index-SubframeSet2* is used. If *betaOffset2-ACK-Index-MC-SubframeSet2* is configured; *betaOffset-ACK-Index-MC-SubframeSet2* is used when up to 22 HARQ-ACK bits are transmitted otherwise *betaOffset2-ACK-Index-MC-SubframeSet2* is used. One value applies for subframe set 2 of all serving cells with an uplink in a cell group (MCG or SCG or the group of cells configured to send PUCCH on the same cell in case PUCCH SCell is configured) and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell configured with uplink power control subframe sets). |
| ***betaOffsetAUL***  Parameter: cid:image001.png@01D3E2C5.4F0A8300 see TS 36.213 [23], clause 8.6.3. |
| ***betaOffset-CQI-Index, betaOffset-CQI-Index-MC***  Parameter: , for single- and multiple-codeword respectively, see TS 36.213 [23], Table 8.6.3-3. One value applies for all serving cells with an uplink in a cell group (MCG or SCG or the group of cells configured to send PUCCH on the same cell in case PUCCH SCell is configured) and not configured with uplink power control subframe sets. The same value also applies for subframe set 1 of all serving cells with an uplink in that cell group and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell). |
| ***betaOffset-CQI-Index-SubframeSet2, betaOffset-CQI-Index-MC-SubframeSet2***  Parameter: , for single- and multiple-codeword respectively, see TS 36.213 [23], Table 8.6.3-3. One value applies for subframe set 2 of all serving cells with an uplink in a cell group (MCG or SCG or the group of cells configured to send PUCCH on the same cell in case PUCCH SCell is configured) and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell configured with uplink power control subframe sets). |
| ***betaOffset-RI-Index, betaOffset-RI-Index-MC***  Parameter: , for single- and multiple-codeword respectively, see TS 36.213 [23], Table 8.6.3-2. One value applies for all serving cells with an uplink in a cell group (MCG or SCG or the group of cells configured to send PUCCH on the same cell in case PUCCH SCell is configured) and not configured with uplink power control subframe sets. The same value also applies for subframe set 1 of all serving cells with an uplink in that cell group and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell). |
| ***betaOffset-RI-Index-SubframeSet2, betaOffset-RI-Index-MC-SubframeSet2***  Parameter: , for single- and multiple-codeword respectively, see TS 36.213 [23], Table 8.6.3-2. One value applies for subframe set 2 of all serving cells with an uplink in a cell group (MCG or SCG or the group of cells configured to send PUCCH on the same cell in case PUCCH SCell is configured) and configured with uplink power control subframe sets (the associated functionality is common i.e. not performed independently for each cell configured with uplink power control subframe sets). |
| ***ce-PUSCH-FlexibleStartPRB-AllocConfig***  Activation of flexible starting PRB for PUSCH resource allocation in CE mode A or B. *offsetCE-ModeB* indicates starting PRB offset when flexible starting PRB for PUSCH resource allocation in CE mode B is enabled. See TS 36.212 [22] and TS 36.213 [23]. E-UTRAN does not configure this field when E-UTRA system bandwidth is 1.4 MHz. |
| ***ce-PUSCH-MaxBandwidth***  Maximum PUSCH channel bandwidth in CE mode A, see TS 36.212 [22] and TS 36.213 [23]. Value bw5 corresponds to 5 MHz. If this field is not configured, the maximum PUSCH channel bandwidth in CE mode A set to 1.4 MHz. The maximum PUSCH channel bandwidth in CE mode B is 1.4 MHz regardless of the setting of this parameter. Parameter: transmission bandwidth configuration, see TS 36.101 [42], table 5.6-1. |
| ***ce-PUSCH-NB-MaxTBS***  Activation of 2984 bits maximum PUSCH TBS in 1.4 MHz in CE mode A, see TS 36.212 [22] and TS 36.213 [23]. |
| ***ce-PUSCH-SubPRB-Config***  Activation of PUSCH sub-PRB allocation in CE mode A or B, see TS 36.211 [21], TS 36.212 [22] and TS 36.213 [23]. |
| ***cyclicShift***  Parameters: *cyclicShift*, *s*ee TS 36.211 [21], Table 5.5.2.1.1-2. |
| ***dmrs-LessUpPTS-Config***  Indicates the UE not to transmit DMRS for PUSCH in UpPTS, see TS36.211 [21], clause 5.5.2.1.2. |
| ***dmrs-WithOCC-Activated***  Parameter: *Activate-DMRS-with OCC*, see TS 36.211 [21], clause 5.5.2.1. |
| ***enable256QAM***  See TS 36.213 [23], clause 8.6.1. If *enable256QAM* is included and if uplink power control subframe sets are configured by *tpc-SubframeSet*, the field indicates (if set to TRUE) per uplink power control subframe set and DCI format 0/0A/0B and 4/4A/4B that 256QAM is allowed for UE UL categories as indicated in TS 36.306 [5], Table 4.1A-2*,* while FALSE indicates that 256 QAM is not allowed. If *enable256QAM* is included and if uplink power control subframe sets are not configured by *tpc-SubframeSet,* the field indicates (if set to TRUE) per DCI format 0/0A/0B and 4/4A/4B that 256QAM is allowed for UE UL categories as indicated in TS 36.306 [5], Table 4.1A-2*,* while FALSE indicates that 256 QAM is not allowed. |
| ***enable64QAM***  See TS 36.213 [23], clause 8.6.1. If *enable64QAM* (without suffix) is set to TRUE, it indicates that 64QAM is allowed for UE categories 5 and 8 indicated in *ue-Category* and UL categories indicated in *ue-CategoryUL* which support UL 64QAM and can fallback to category 5 or 8, see TS 36.306 [5], Table 4.1A-2 and Table 4.1A-6, while FALSE indicates that 64QAM is not allowed. If *enable64QAM-v1270* is set to TRUE, it indicates that 64QAM is allowed for UL categories indicated in *ue-CategoryUL* which support UL 64QAM but cannot fallback category 5 or 8, see TS 36.306 [5], Table 4.1A-2 and Table 4.1A-6. E-UTRAN configures *enable64QAM-v1270* only when *enable64QAM* (without suffix) is set to TRUE. |
| ***interval-ULHoppingPUSCH-Enh***  Number of consecutive absolute subframes over which PUSCH stays at the same PRBs before hopping to other PRBs. For *interval-FDD-PUSCH-Enh*, int1 corresponds to 1 subframe, int2 corresponds to 2 subframes, and so on. For *interval-TDD-PUSCH-Enh*, int1 corresponds to 1 subframe, int5 corresponds to 5 subframes, and so on. See TS 36.211 [21], clause 5.3.4. |
| ***groupAssignmentPUSCH***  Parameter: *ΔSS* See TS 36.211 [21], clause 5.5.1.3. |
| ***groupHoppingDisabled***  Parameter: *Disable-sequence-group-hopping*, see TS 36.211 [21], clause 5.5.1.3. |
| ***groupHoppingEnabled***  Parameter: *Group-hopping-enabled*, see TS 36.211 [21], clause 5.5.1.3. |
| ***hoppingMode***  Parameter: *Hopping-mode*, see TS 36.211 [21], clause 5.3.4. |
| ***locationCE-ModeB***  PRB location within the narrowband when PUSCH sub-PRB allocation is enabled in CE mode B. |
| ***nDMRS-CSH-Identity***  Parameter: , see TS 36.211 [21], clause 5.5.2.1.1. |
| ***nPUSCH-Identity***  Parameter: , see TS 36.211 [21], clause 5.5.1.5. |
| ***n-SB***  Parameter: Nsb see TS 36.211 [21], clause 5.3.4. |
| ***pusch-HoppingConfig***  For BL UEs and UEs in CE, frequency hopping activation/deactivation for unicast PUSCH, see TS 36.211 [21] |
| ***pusch-hoppingOffset***  Except for BL UEs and UEs in CE, parameter: , see TS 36.211 [21], clause 5.3.4. For BL UEs and UEs in CE, the *pusch-hoppingOffset-v1310* indicates the parameter, see TS 36.211 [21], clause 5.3.4. . In case *pusch-hoppingOffset-v1310* is signalled, the BL UEs and UEs in CE shall ignore *pusch-hoppingOffset* (i.e. without suffix). |
| ***pusch-HoppingOffsetPUSCH-Enh***  Indicates the freqeuncy domain hopping offset between PRBs for PUSCH in frequency hopping, see TS 36.211 [21], clause 5.3.4. Value 1 corresponds to 1 PRB, value 2 corresponds to 2 PRBs, and so on. |
| ***pusch-maxNumRepetitionCEmodeA***  Maximum value to indicate the set of PUSCH repetition numbers for CE mode A, see TS 36.211 [21] and TS 36.213 [23]. E-UTRAN does not configure value r8. If the field is not configured, the UE shall apply the default value as defined in TS 36.213 [23], clause 8.0. |
| ***pusch-maxNumRepetitionCEmodeB***  Maximum value to indicate the set of PUSCH repetition numbers for CE mode B, see TS 36.211 [21] and TS 36.213 [23]. |
| ***sequenceHoppingEnabled***  Parameter: *Sequence-hopping-enabled*, see TS 36.211 [21], clause 5.5.1.4. |
| ***sixToneCyclicShift, threeToneCyclicShift***  Cyclic shift for PUSCH reference signal sequence of six/three subcarriers in CE mode A or B. |
| ***symPUSCH-UpPTS***  Indicates the number of data symbols that configured for PUSCH transmission in UpPTS. Values *sym2*, *sym3*, *sym4*, *sym5* and *sym6* can be used for normal cyclic prefix, if *dmrsLess-UpPTS* is set to *true*, otherwise, values *sym2, sym3, sym4,* *sym5* can be used for normal cyclic prefix and values *sym1*, *sym2*, *sym3* and *sym4* can be used for extended cyclic prefix, see TS 36.213 [23], clause 8.6.2 and TS 36.211 [21], clause 5.3.4. |
| ***ul-DMRS-IFDMA***  Value *TRUE* indicates that the UE is configured with enhanced UL DMRS. |
| ***ul-ReferenceSignalsPUSCH***  Used to specify parameters needed for the transmission on PUSCH (or PUCCH). |

| **Conditional presence** | **Explanation** |
| --- | --- |
| *CE-ModeB* | The field is optionally present, need ON, for CE Mode B. Otherwise, the field is not present. |

*End of changes*