**3GPP TSG-RAN WG2 Meeting #116-eR2-21xxxxx**

**Online, 1-12 November 2021**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.331** | **CR** | **2849** | **rev** | **1** | **Current version:** | **16.6.0** |  |
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| *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:*** | Extension of *pathlossReferenceRSs* | | | | | | | | | |
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| ***Source to WG:*** | MediaTek Inc. | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
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| ***Work item code:*** | NR\_eMIMO-Core | | | | |  | ***Date:*** | | | 2021-10-21 |
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| ***Category:*** | **F** |  | | | | | ***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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
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| ***Reason for change:*** | | The handling of the combined list from the fields *pathlossReferenceRSs* and *pathlossReferenceRSs-v1610* in *PUCCH-PowerControl* is unclear. If the UE has stored entries from both fields in the combined set, and a new value is received for *pathlossReferenceRSs-v1610* while *pathlossReferenceRSs* is absent, it is ambiguous whether the UE should replace the entire set, only the entries after index *maxNrofPUCCH-PathlossReferenceRSs*, or only the entries originally configured by *pathlossReferenceRSs-v1610*.  This is isomorphic to the ambiguity that was previously addressed for the extension of *candidateBeamRSList*, where the conclusion was that the UE remembers which entries were configured by which field, and a newly received value for the extension list affects only the entries that were configured by the extension list. | | | | | | | | |
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| ***Summary of change:*** | | It is clarified in the field description that the UE maintains knowledge of which list entries were configured by which field. When *pathlossReferenceRSs-v1610* is set to *release*, the UE releases all entries that were originally configured by *pathlossReferenceRSs-v1610*, irrespective of their current position in the stored list; when *pathlossReferenceRSs-v1610* is set to *setup*, the UE replaces all entries that were originally configured by *pathlossReferenceRSs-v1610* with the newly signalled entries.    **Impact Analysis:**  Impacted 5G architecture options:  NR-SA, NR-DC, NE-DC  Impacted functionality:  Configuration of pathloss reference signals for PUCCH power control  Interoperability issue:   * If the network implements the CR and the UE does not, the UE may store a different set of pathloss reference signals than the network intends, resulting in unexpected power control behaviour on PUCCH. * If the UE implements the CR and the network does not, the UE may store a different set of pathloss reference signals than the network intends, resulting in unexpected power control behaviour on PUCCH. | | | | | | | | |
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| ***Consequences if not approved:*** | | The UE may replace or release a different set of pathloss reference signals than the network intends, resulting in unexpected power control behaviour on PUCCH. | | | | | | | | |
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| ***Clauses affected:*** | | 6.3.2 | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **x** | Other core specifications | | | |  | | |
| ***affected:*** | |  | **X** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

### 6.3.2 Radio resource control information elements

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#### – *PUCCH-PowerControl*

The IE *PUCCH-PowerControl* is used to configure UE-specific parameters for the power control of PUCCH.

*PUCCH-PowerControl* information element

-- ASN1START

-- TAG-PUCCH-POWERCONTROL-START

PUCCH-PowerControl ::= SEQUENCE {

deltaF-PUCCH-f0 INTEGER (-16..15) OPTIONAL, -- Need R

deltaF-PUCCH-f1 INTEGER (-16..15) OPTIONAL, -- Need R

deltaF-PUCCH-f2 INTEGER (-16..15) OPTIONAL, -- Need R

deltaF-PUCCH-f3 INTEGER (-16..15) OPTIONAL, -- Need R

deltaF-PUCCH-f4 INTEGER (-16..15) OPTIONAL, -- Need R

p0-Set SEQUENCE (SIZE (1..maxNrofPUCCH-P0-PerSet)) OF P0-PUCCH OPTIONAL, -- Need M

pathlossReferenceRSs SEQUENCE (SIZE (1..maxNrofPUCCH-PathlossReferenceRSs)) OF PUCCH-PathlossReferenceRS

OPTIONAL, -- Need M

twoPUCCH-PC-AdjustmentStates ENUMERATED {twoStates} OPTIONAL, -- Need S

...,

[[

pathlossReferenceRSs-v1610 SetupRelease { PathlossReferenceRSs-v1610 } OPTIONAL -- Need M

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}

P0-PUCCH ::= SEQUENCE {

p0-PUCCH-Id P0-PUCCH-Id,

p0-PUCCH-Value INTEGER (-16..15)

}

P0-PUCCH-Id ::= INTEGER (1..8)

PathlossReferenceRSs-v1610 ::= SEQUENCE (SIZE (1..maxNrofPUCCH-PathlossReferenceRSsDiff-r16)) OF PUCCH-PathlossReferenceRS-r16

PUCCH-PathlossReferenceRS ::= SEQUENCE {

pucch-PathlossReferenceRS-Id PUCCH-PathlossReferenceRS-Id,

referenceSignal CHOICE {

ssb-Index SSB-Index,

csi-RS-Index NZP-CSI-RS-ResourceId

}

}

PUCCH-PathlossReferenceRS-r16 ::= SEQUENCE {

pucch-PathlossReferenceRS-Id-r16 PUCCH-PathlossReferenceRS-Id-v1610,

referenceSignal-r16 CHOICE {

ssb-Index-r16 SSB-Index,

csi-RS-Index-r16 NZP-CSI-RS-ResourceId

}

}

-- TAG-PUCCH-POWERCONTROL-STOP

-- ASN1STOP

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| *P0-PUCCH* field descriptions |
| ***p0-PUCCH-Value***  P0 value for PUCCH with 1dB step size. |

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| *PUCCH-PowerControl* field descriptions |
| ***deltaF-PUCCH-f0***  deltaF for PUCCH format 0 with 1dB step size (see TS 38.213 [13], clause 7.2). |
| ***deltaF-PUCCH-f1***  deltaF for PUCCH format 1 with 1dB step size (see TS 38.213 [13], clause 7.2). |
| ***deltaF-PUCCH-f2***  deltaF for PUCCH format 2 with 1dB step size (see TS 38.213 [13], clause 7.2). |
| ***deltaF-PUCCH-f3***  deltaF for PUCCH format 3 with 1dB step size (see TS 38.213 [13], clause 7.2). |
| ***deltaF-PUCCH-f4***  deltaF for PUCCH format 4 with 1dB step size (see TS 38.213 [13], clause 7.2). |
| ***p0-Set***  A set with dedicated P0 values for PUCCH, i.e., {P01, P02,... } (see TS 38.213 [13], clause 7.2). |
| ***pathlossReferenceRSs, pathlossReferenceRSs-v1610***  A set of Reference Signals (e.g. a CSI-RS config or a SS block) to be used for PUCCH pathloss estimation. Up to *maxNrofPUCCH-PathlossReference-RSs* may be configured. If the field is not configured, the UE uses the SSB as reference signal (see TS 38.213 [13], clause 7.2). The set includes Reference Signals indicated in pathlossReferenceRSs (without suffix) and in pathlossReferenceRSs-v1610. The UE maintains *pathlossReferenceRSs* and *pathlossReferenceRSs-v1610* separately: Receiving *pathlossReferenceRSs-v1610* set to *release* releases only the entries that were configured by *pathlossReferenceRSs-v1610*, and receiving *pathlossReferenceRSs-v1610* set to *setup* replaces only the entries that were configured by *pathlossReferenceRSs-v1610* with the newly signalled entries. |
| ***twoPUCCH-PC-AdjustmentStates***  Number of PUCCH power control adjustment states maintained by the UE (i.e., g(i)). If the field is present (n2) the UE maintains two power control states (i.e., g(i,0) and g(i,1)). If the field is absent, it maintains one power control state (i.e., g(i,0)) (see TS 38.213 [13], clause 7.2). |