3GPP TSG-RAN WG4 Meeting #95-e R4-2008680

Electronic Meeting, 25 May – 5 Jun., 2020

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
|  |
|  | **38.133** | **CR** | **0668** | **rev** | **1** | **Current version:** | **16.3.0** |  |
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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 |  | Core Network |  |

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| ***Title:***  | CR on active spatial relation switching delay (section 8.12) |
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| ***Source to WG:*** | Mediatek Inc. |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_newRAT-Core |  | ***Date:*** | 2020-06-02 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***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 canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)Rel-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:*** | Active spatial relation switching delay section is missing. |
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| ***Summary of change:*** | Active spatial relation switching delay are specified. |
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| ***Consequences if not approved:*** | The specification is not complete. |
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| ***Clauses affected:*** | 8.12 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** | **X** |  |  Test specifications | TS 38.533 |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

Start of Change

## 8.12 Active spatial relation switch delay

8.12.1 Introduction

The requirements in this clause apply for a UE configured with one or more spatial relation configurations on serving cell in MR-DC or standalone NR. There is no requirement when the UE is requested to switch to a spatial relation with the higher layer parameter spatialRelationInfo associated to SRS. UE shall complete the switch of active spatial relation within the delay defined in this clause when the UE is requested to switch to a spatial relation with the higher layer parameter *spatialRelationInfo* associated to a DL RS.

8.12.2 Known conditions for spatial relation when associated with DL-RS

The spatial relation associated to DL RS is known if the following conditions are met:

- During the period from the last transmission of the DL RS resource used for the L1-RSRP measurement reporting for the target spatial relation to the completion of active spatial relation, where the DL RS resource for L1-RSRP measurement is the DL RS in target spatial relation or QCLed to the target spatial relation with QCL type-D.

- Spatial relation switch command is received within 1280 ms upon the last transmission of the DL RS resource for beam reporting or measurement

- The UE has sent at least 1 L1-RSRP report for the target spatial relation before the spatial relation switch command

- The DL RS configured in spatial relation remains detectable during the spatial relation switching period

- SNR of the DL RS configured in spatial relation ≥ -3dB

- The SSB associated with the spatial relation remain detectable during the spatial relation switching period

- SNR of the SSB associated with the spatial relation ≥ -3dB

Otherwise, the spatial relation is unknown.

8.12.3 MAC-CE based spatial relation switch delay

If the target spatial relation associated to DL RS is known, upon receiving PDSCH carrying MAC-CE activation command in slot n, UE shall be able to transmit PUCCH with target spatial relation or target semi-persistent SRS of the serving cell on which spatial relation switch occurs at the first slot that is after slot n+ THARQ + $3N\_{slot}^{subframe,µ}$+ [Tfirst-SSB + TSSB-proc / *NR slot length*].

Where THARQ is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3];

[Tfirst-SSB is time to first SSB transmission after MAC CE command is decoded by the UE;

TSSB-proc = 2 ms.]

If the target spatial relation associated to DL RS is unknown, upon receiving PDSCH carrying MAC-CE activation command in slot n, UE shall be able to transmit PUCCH with target spatial relation or target semi-persistent SRS of the serving cell on which spatial relation switch occurs at the first slot that is after slot n+ THARQ +$3N\_{slot}^{subframe,µ}$ + TL1-RSRP + [(Tfirst-SSB+ TSSB-proc) / *NR slot length*].

Where T L1-RSRP is the time for L1-RSRP measurement, defined as

- TL1-RSRP\_Measurement\_Period\_SSB for SSB as specified in clause 9.5.4.1,

- with the assumption of M=1

- with TReport = 0

- TL1-RSRP\_Measurement\_Period\_CSI-RS for CSI-RS as specified in clause 9.5.4.2

 - configured with higher layer parameter *repetition* set to ON

- with the assumption of M=1 for periodic CSI-RS

- for aperiodic CSI-RS if number of resources in resource set at least equal to *MaxNumberRxBeam*

- with TReport = 0

[Tfirst-SSB is time to first SSB transmission after L1-RSRP measurement. The SSB shall be the QCL-TypeA or QCL-TypeC to DL RS configured in target spatial relation.]

8.12.4 DCI based spatial relation switch delay

If the target spatial relation associated to DL RS is known, when a UE receives the DCI triggering aperiodic SRS at slot n with the higher layer parameter *spatialRelationInfo*, UE shall be able to transmit aperiodic SRS with target spatial relation of the serving cell on which spatial relation switch occurs at the first slot that is after slot, where, *k* is configured via higher layer parameter *slotOffset*[2]for each triggered SRS resources set and is based on the subcarrier spacing of the triggered SRS transmission, *µSRS* and *µPDCCH* are the subcarrier spacing configurations for triggered SRS and PDCCH carrying the triggering command respectively in TS 38.214 [26].

The known condition for spatial relation associated to DL RS defined in clause 8.12.2 is applied.

8.12.5 RRC based spatial relation switch delay

If the target spatial relation associated to DL RS is known, upon receiving PDSCH carrying RRC activation command at slot n, UE shall be able to transmit target periodic SRS with spatial relation of the serving cell on which periodic SRS with spatial relation reconfigured occurs at the first slot that is after slot n+ TRRC\_processing +[(Tfirst-SSB + TSSB-proc) / *NR slot length*]. Where TRRC\_processing is the RRC processing delay, Tfirst-SSB, TSSB-proc are defined in clause 8.12.3.

[Tfirst-SSB is time to first SSB transmission after RRC processing by the UE; The SSB shall be the QCL-TypeA or QCL-TypeC to DL RS configured in target spatial relation.]

If the target spatial relation associated to DL RS is unknown, upon receiving PDSCH carrying RRC activation command at slot n, UE shall be able to transmit target periodic SRS with spatial relation of the serving cell on which periodic SRS with spatial relation reconfigured occurs at the first slot that is after slot n+ TRRC\_processing  +TL1-RSRP +[ (Tfirst-SSB + TSSB-proc) / *NR slot length*]. Where TRRC\_processing is the RRC processing delay, and TL1-RSRP are defined in clause 8.10.3.

[Tfirst-SSB is time to first SSB transmission after L1-RSRP measurement;

The SSB shall be the QCL-TypeA or QCL-TypeC to DL RS configured in target spatial relation.]

End of Change