**3GPP TSG- Meeting #111**

Fukuoka, JP, 20 May – 24 May 2024

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  |  | **CR** | **Draft** | **rev** |  | **Current version:** |  |  |
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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 |  | Radio Access Network |  | Core Network |  |

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| ***Title:***  |  |
|  |  |
| ***Source to WG:*** | MeidaTek inc. |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** |  |
|  | *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-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
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| ***Reason for change:*** | Currently, L1-RSRP for SSB and CSI-RS apply when receive timing difference is within CP in FR2 only specified in 8.22.3 MAC-CE based downlink TCI state swithc delay for mDCI. The same limitation is needed for mDCI uplink TCI state. |
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| ***Summary of change:*** | Add applicability rule (receive timing difference is within CP) on L1-RSRP for SSB and CSI-RS in mDCI ULTCI state switching requirement.  |
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| ***Consequences if not approved:*** | Some RRM requiements of Rel-18 MIMO evolution are not accurate. |
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| ***Clauses affected:*** | 8.24.3 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** | **X** |  |  Test specifications | TS38.533 |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

<Start of the change>

### 8.24.3 MAC-CE based uplink TCI state switch delay

The requirements in this clause shall apply for UL TCI state switch using separate UL TCI state or joint TCI state of unified TCI state switch framework.

In case that source RS in UL TCI state or joint TCI state is associated with a PCI different from that of the serving cell, the requirements in this clause shall apply if the cell with different PCI satisfies the known cell condition defined in 8.24.1. If the known cell condition is not met, longer delay may be expected.

In case of joint TCI state switch, UE is not expected to transmit on UL based on the target TCI state before UE completes the DL and UL TCI state switch.

For separate UL TCI state switch or joint TCI state switch for PUCCH or PUSCH, or semi-persistent/aperiodic/periodic SRS, when *beamCorrespondenceWithoutUL-BeamSweeping* is set to 1, upon receiving PDSCH carrying MAC-CE activation command in slot n on serving cell,

- If target TCI state is known,

- If UE is not configured with 2 TAs, the UE shall be able to transmit uplink signal with the target TCI state in the slot n+THARQ + $3N\_{slot}^{subframe,µ}$ + NM*\** (Tfirst\_target-PL-RS + 4\*Ttarget\_PL-RS + 2ms) / *NR slot length*.

- If UE is configured with 2 TAs in FR1 or configured with 2TAs in FR2 and doesn’t support RTD>CP, the UE shall be able to transmit uplink signal with the target TCI state in the slot n+THARQ + $3N\_{slot}^{subframe,µ}$ + NM*\** (Tfirst\_target-PL-RS + 4\*Ttarget\_PL-RS + 2ms) / *NR slot length*.

- *FFS on additional time tracking of DL Ref RS for 2TA* TOk-ref \*(Tfirst-SSB-DLRef + 2ms)

- If target TCI state is unknown,

- If UE is not configured with 2 TAs, the UE shall be able to transmit uplink signal with the target TCI state in the slot n+THARQ + $3N\_{slot}^{subframe,µ}$ *+* (TL1-RSRP+ Tfirst\_target-PL-RS + 4\*Ttarget\_PL-RS + 2ms) / *NR slot length*.

- If UE is configured with 2 TAs in FR1 or configured with 2TAs in FR2 and doesn’t support RTD>CP, the UE shall be able to transmit uplink signal with the target TCI state in the slot n+THARQ + $3N\_{slot}^{subframe,µ}$ *+* (TL1-RSRP+ Tfirst\_target-PL-RS + 4\*Ttarget\_PL-RS + 2ms) / *NR slot length*.

- The UE shall be able to transmit with the old UL TCI state until slot n+ THARQ + $3N\_{slot}^{subframe,µ}$.

- *FFS on additional time tracking of DL Ref RS for 2TA* TOuk-ref (Tfirst-SSB-DLRef + 2ms)

Where,

- THARQ (in slot) is the timing between DL data transmission and acknowledgement as specified in TS 38.213 [3].

- NM = 1, if the target PL-RS is not maintained by the UE, 0 otherwise.

In FR2, in case that the target PL-RS associated with or included in the target UL or joint TCI state is SSB, the requirements in this clause shall apply when this target PL-RS is maintained by the UE.

- PL-RS is maintained provided:

- the target PL-RS is associated with or included in the UL or joint TCI states in the active TCI list for PUSCH/PUCCH/SRS transmissions

- There are no more than 4 different RS activated as PL-RS per serving cell among all active UL TCI states (UL or joint TCI state) for PUSCH/PUCCH/SRS transmissions

- The target pathloss reference signal remains detectable during TCI state switching period

- SNR of the target pathloss reference signal≥-3dB

- The associated SSBs with the target pathloss reference signal remain detectable during the TCI state switching period.

- SNR of the associated SSB ≥-3dB

- Tfirst\_target-PL-RS is time to first pathloss RS transmission after L1-RSRP measurement when target TCI state is unknown.

- Tfirst\_target-PL-RS is time to first pathloss RS transmission after MAC CE command is decoded by the UE for known TCI State.

- Ttarget\_PL-RS is the periodicity of the target pathloss reference signal which would be SSB or NZP CSI-RS when PL-RS is associated with serving cell

- Ttarget\_PL-RS is the periodicity of the target pathloss reference signal which would be SSB when PL-RS is associated with PCI different from serving cell

- T L1-RSRP is the time for Rx beam refinement in FR2, defined as

- TL1-RSPR\_Measurement\_Period\_SSB for SSB as specified in clause 9.5.4.1 or 9.13.4.1, when receive timing difference of the two TRPs is within CP,

- 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, when receive timing difference of the two TRPs is within CP,

- CSI-RS based L1-RSRP measurement only apply for TCI state switch when source RS is associated with serving cell

- 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

- TOk-ref = 1, if the target TCI state is known, and the RS of DL timing reference is not in the active TCI state list for PDSCH/PDCCH, 0 otherwise.

- Tfirst-SSB-DLRef is the time to first SSB after MAC CE command is decoded when target TCI state is known.

- Tfirst-SSB-DLRef is the time to first SSB after L1-RSRP measurement when target TCI state is unknown.

- TOuk-ref = 1, for CSI-RS based L1-RSRP measurement, and 0 for SSB based L1-RSRP measurement

The requirements specified in this clause are applicable if no more than 4 different RSs are activated as PL-RS per serving cell among all active UL (or joint) TCI states

Note: In FR2, the requirements when the target PL-RS is not maintained in this clause apply only when PL-RS are not overlapped or adjacent to the PL-RS of the other TRP.

<End of the change>