3GPP TSG-RAN WG4 Meeting # 102-e R4-2206940

Electronic Meeting, February 21 – March 3, 2022

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.133** | **CR** | Draft | **rev** | **-** | **Current version:** | **17.4.0** |  |
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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 for measurement restriction and scheduling availability for inter cell L1-RSRP measurement in R17 | | | | | | | | | |
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| ***Source to WG:*** | MediaTek Inc. | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_feMIMO-Core | | | | |  | ***Date:*** | | | 2022-2-28 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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)* | |
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| ***Reason for change:*** | | According to WF (R4-2202772), the new sections of measurement restriction and scheduling availability for inter-cell L1-RSRP measurement will be introduced. | | | | | | | | |
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| ***Summary of change:*** | | * New sections of measurement restriction and scheduling availability for inter-cell L1-RSRP measurement are introduced. | | | | | | | | |
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| ***Consequences if not approved:*** | | The core requirement will be incomplete. | | | | | | | | |
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| ***Clauses affected:*** | | (new) 9.12.5 and 9.12.6 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

<Start of Change 1>

### 9.12.5 Measurement restriction for L1-RSRP measurement

The UE is required to be capable of measuring SSB for L1-RSRP without measurement gaps. The UE is required to perform the SSB measurements with measurement restrictions as described in the following clauses.

Unless explicitly stated, the SSB to be measured for L1-RSRP measurement is transmitted from cell(s) with PCI different from serving cell(s).

#### 9.12.5.1 Measurement restriction for SSB based L1-RSRP

For FR1,

when the SSB for L1-RSRP measurement is in the same OFDM symbol as SSB transmitted from serving cell(s) for RLM, BFD, CBD or L1-RSRP measurement,

- UE shall be able to measure the SSB for L1-RSRP measurement without any restriction;

when the SSB for L1-RSRP measurement is in the same OFDM symbol as SSB for L1-RSRP measurement,

- UE shall be able to measure the SSB for L1-RSRP measurement without any restriction;

*Editor’s note: FFS: For the case when two SSBs from non-serving cell and serving cell, UE is required to measure one or both SSBs, i.e., whether longer measurement period is expected. It depends on whether the timing offset between serving cell and non-serving cell is less than one CP for L1-RSRP measurement within SMTC or not.*

when the SSB for L1-RSRP measurement is in the same OFDM symbol as CSI-RS transmitted from serving cell(s) for RLM, BFD, CBD or L1-RSRP measurement,

- If SSB and CSI-RS have same SCS, UE shall be able to measure the SSB for L1-RSRP measurement without any restriction;

- If SSB and CSI-RS have different SCS,

- If UE supports [*simultaneousRxDataSSB-DiffNumerology*], UE shall be able to measure the SSB for L1-RSRP measurement without any restriction;

- If UE does not support [*simultaneousRxDataSSB-DiffNumerology*], UE is required to measure one of but not both SSB for L1-RSRP measurement and CSI-RS. Longer measurement period for SSB based L1-RSRP measurement is expected, and no requirements are defined.

*Editor’s note: FFS whether the existing IE simultaneousRxDataSSB-DiffNumerology can be reused for non-serving cell.*

*Editor’s note: FFS: For the case when SSB from non-serving cell and CSI-RS from serving cell, UE is required to measure one or both RSs, i.e., whether longer measurement period is expected. It depends on whether the timing offset between serving cell and non-serving cell is less than one CP for L1-RSRP measurement within SMTC or not.*

For FR2,

when the SSB for L1-RSRP measurement on one CC is in the same OFDM symbol as SSB transmitted from serving cell(s) for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both the two SSBs. Longer measurement period for SSB based L1-RSRP measurement is expected, and no requirements are defined.

when the SSB for L1-RSRP measurement on one CC is in the same OFDM symbol as SSB for L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both the two SSBs. Longer measurement period for SSB based L1-RSRP measurement is expected, and no requirements are defined.

when the SSB for L1-RSRP measurement on one CC is in the same OFDM symbol as CSI-RS transmitted from serving cell(s) for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both SSB for L1-RSRP measurement and CSI-RS. Longer measurement period for SSB based L1-RSRP measurement is expected, and no requirements are defined.

For FR2, if the network configures same or mixed numerology between SSB for L1-RSRP measurement on one FR2 band and CSI-RS for RLM, BFD, CBD, L1-RSRP or L1-SINR measurement on the other FR2 band, UE shall be able to perform the related SSB based measurements in one band without any measurement restrictions in the other band, provided that UE is capable of independent beam management on this FR2 band pair.

*Editor’s note: FFS: the joint requirement of inter-cell BM and IBM.*

### 9.12.6 Scheduling availability of UE during L1-RSRP measurement

Scheduling availability restrictions described in the following clauses apply for the following conditions:

* when the UE is performing L1-RSRP measurement on cell(s) with PCI different from serving cell(s)

#### 9.12.6.1 Scheduling availability of UE performing L1-RSRP measurement with a same subcarrier spacing as PDSCH/PDCCH on FR1

There are no scheduling restrictions due to L1-RSRP measurement performed on SSB as RS for L1-RSRP measurement with the same SCS as PDSCH/PDCCH on serving cell(s) and cell(s) with PCI different from serving cell(s) in FR1.

*Editor’s note: FFS: extra restriction symbols for SSB symbols, and 1 data symbol before and after SSB symbols are needed for L1-RSRP measurement within SMTC. It depends on whether the timing offset between serving cell and non-serving cell is less than one CP for L1-RSRP measurement within SMTC or not.*

#### 9.12.6.2 Scheduling availability of UE performing L1-RSRP measurement with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UEs which support *[simultaneousRxDataSSB-DiffNumerology]* [14] there are no restrictions on scheduling availability due to L1-RSRP measurement based on SSB as RS for L1-RSRP measurement. For UEs which do not support [*simultaneousRxDataSSB-DiffNumerology]* [14] the following restrictions apply due to L1-RSRP measurement based on SSB configured for L1-RSRP measurement.

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on symbols corresponding to the SSB indexes configured for L1-RSRP measurement, where the transmission of PUCCH/PUSCH/SRS and reception of PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI may be on serving cell(s) and cell(s) with PCI different from serving cell(s).

*Editor’s note: FFS: extra restriction symbols for SSB symbols, and 1 data symbol before and after SSB symbols are needed for L1-RSRP measurement within SMTC. It depends on whether the timing offset between serving cell and non-serving cell is less than one CP for L1-RSRP measurement within SMTC or not.*

*Editor’s note: FFS simultaneousRxDataSSB-DiffNumerology can be reused for non-serving cell.*

When intra-band carrier aggregation in FR1 is configured, the scheduling restrictions on cell(s) with PCI different from serving cell(s) where L1-RSRP measurement is performed apply to all serving cells and cell(s) with PCI different from serving cell(s) in the same band on the symbols that fully or partially overlap with restricted symbols. When inter-band carrier aggregation within FR1 is configured, there are no scheduling restrictions on FR1 serving cell(s) and cell(s) with PCI different from serving cell(s) configured in other bands than the bands in which the serving cell where L1-RSRP measurement is performed is configured.

*Editor’s note: FFS: restriction symbols for SSB symbols, and 1 data symbol before and after SSB symbols are needed for L1-RSRP measurement within SMTC. It depends on whether the timing offset between serving cell and non-serving cell is less than one CP for L1-RSRP measurement within SMTC or not.*

#### 9.12.6.3 Scheduling availability of UE performing L1-RSRP measurement on FR2

The following scheduling restriction applies due to L1-RSRP measurement.

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on symbols corresponding to the SSB indexes configured for L1-RSRP measurement, where where the transmission of PUCCH/PUSCH/SRS and reception of PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI may be on serving cell(s) and cell(s) with PCI different from serving cell(s).

*Editor’s note: FFS: restriction symbols for SSB symbols, and 1 data symbol before and after SSB symbols are needed for L1-RSRP measurement within SMTC. It depends on whether the timing offset between serving cell and non-serving cell is less than one CP for L1-RSRP measurement within SMTC or not.*

When intra-band carrier aggregation in FR2 is performed, the scheduling restrictions on cell(s) with PCI different from serving cell(s) where L1-RSRP measurement is performed apply to all serving cells and cell(s) with PCI different from serving cell(s) in the band on the symbols that fully or partially overlap with restricted symbols.

*Editor’s note: FFS: restriction symbols for SSB symbols, and 1 data symbol before and after SSB symbols are needed for L1-RSRP measurement within SMTC. It depends on whether the timing offset between serving cell and non-serving cell is less than one CP for L1-RSRP measurement within SMTC or not.*

When inter-band carrier aggregation in FR2 is performed, there are no scheduling restrictions on FR2 serving cells in the bands due to L1-RSRP measurement performed on FR2 serving cell(s) in different band(s), provided that UE is capable of independent beam management on this FR2 band pair. Additionally, there is no scheduling restriction if the UE is configured with different numerology between SSB on one FR2 band and data on the other FR2 band provided the UE is configured for IBM operation for the band pair.

*Editor’s note: FFS the joint requirement of inter-cell BM and IBM.*

If following conditions are met,

- UE has been notified about system information update through paging,

- The gap between UE’s reception of PDCCH that UE monitors in the Type 2-PDCCH CSS set and that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots,

For the SSB and CORESET for RMSI scheduling multiplexing patterns 3, UE is expected to receive the PDCCH that UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured for L1-RSRP measurement; and

For the SSB and CORESET for RMSI scheduling multiplexing patterns 2, UE is expected to receive PDSCH that corresponds to the PDCCH that UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured for L1-RSRP measurement.

#### 9.12.6.4 Scheduling availability of UE performing L1-RSRP measurement on FR1 or FR2 in case of FR1-FR2 inter-band CA

There are no scheduling restrictions on FR1 serving cell(s) and cell(s) with PCI different from a serving cell(s) due to L1-RSRP measurement performed on FR2 cell(s) with PCI different from a serving cell(s).

There are no scheduling restrictions on FR2 serving cell(s) and cell with PCI different from a serving cell(s) due to L1-RSRP measurement performed on FR1 cell with PCI different from a serving cell(s).

### [9.12.7 Scheduling availability of UE during L1-RSRP measurement]

Scheduling availability restrictions described in the following clauses apply for the following conditions:

* when the UE is performing L1-RSRP measurement on serving cell(s)

*Editor’s note: FFS whether the new section is needed for the scheduling abvailability on non-servin cell due to L1-RSRP measurement on serving cell.*

#### 9.5.6.1 Scheduling availability of UE performing L1-RSRP measurement with a same subcarrier spacing as PDSCH/PDCCH on FR1

There are no scheduling restrictions due to L1-RSRP measurement performed on SSB and CSI-RS configured as RS for L1-RSRP measurement with the same SCS as PDSCH/PDCCH on cell(s) with PCI different from serving cell(s) in FR1.

*Editor’s note: FFS: extra restriction symbols for SSB symbols, and 1 data symbol before and after SSB symbols are needed for L1-RSRP measurement within SMTC. It depends on whether the timing offset between serving cell and non-serving cell is less than one CP for L1-RSRP measurement within SMTC or not.*

#### 9.5.6.2 Scheduling availability of UE performing L1-RSRP measurement with a different subcarrier spacing than PDSCH/PDCCH on FR1

For UEs which support *[simultaneousRxDataSSB-DiffNumerology]* [14] there are no restrictions on scheduling availability due to L1-RSRP measurement based on SSB as RS for L1-RSRP measurement. For UEs which do not support [*simultaneousRxDataSSB-DiffNumerology]* [14] the following restrictions apply due to L1-RSRP measurement based on SSB configured for L1-RSRP measurement.

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on symbols corresponding to the SSB indexes configured for L1-RSRP measurement, where the transmission of PUCCH/PUSCH/SRS and reception of PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI are on cell(s) with PCI different from serving cell(s).

When intra-band carrier aggregation in FR1 is configured, the scheduling restrictions on serving cell where L1-RSRP measurement is performed apply to all cell(s) with PCI different from serving cell(s) in the same band on the symbols that fully or partially overlap with restricted symbols. When inter-band carrier aggregation within FR1 is configured, there are no scheduling restrictions on FR1 cell(s) with PCI different from serving cell(s) configured in other bands than the bands in which the serving cell where L1-RSRP measurement is performed is configured.

*Editor’s note: FFS: restriction symbols for SSB symbols, and 1 data symbol before and after SSB symbols are needed for L1-RSRP measurement within SMTC. It depends on whether the timing offset between serving cell and non-serving cell is less than one CP for L1-RSRP measurement within SMTC or not.*

#### 9.5.6.3 Scheduling availability of UE performing L1-RSRP measurement on FR2

The following scheduling restriction applies due to L1-RSRP measurement.

- For the case where RS for L1-RSRP measurement is CSI-RS which is QCLed with active TCI state for PDCCH/PDSCH on cell(s) with PCI different from serving cell(s) and not in a CSI-RS resource set with repetition ON, and N=1 applies as specified in clause 9.5.4.2

- There are no scheduling restrictions due to L1-RSRP measurement performed based on the CSI-RS.

- Otherwise

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI on

- symbols corresponding to the SSB indexes configured for L1-RSRP measurement, and/or

- symbols corresponding to the periodic CSI-RS resource configured for L1-RSRP measurement, and/or

- symbols corresponding to the semi-perssitent CSI-RS resource configured for L1-RSRP measurement when the resource is activated, and/or

- symbols corresponding to the aperiodic CSI-RS resource configured for L1-RSRP measurement when the reporting is triggered.

- where the transmission of PUCCH/PUSCH/SRS and reception of PDCCH/PDSCH/CSI-RS for tracking/CSI-RS for CQI are on cell(s) with PCI different from serving cell(s).

When intra-band carrier aggregation in FR2 is performed, the scheduling restrictions on serving cell where L1-RSRP measurement is performed apply to all cell(s) with PCI different from serving cell(s) in the band on the symbols that fully or partially overlap with restricted symbols.

*Editor’s note: FFS: restriction symbols for SSB symbols, and 1 data symbol before and after SSB symbols are needed for L1-RSRP measurement within SMTC. It depends on whether the timing offset between serving cell and non-serving cell is less than one CP for L1-RSRP measurement within SMTC or not.*

When inter-band carrier aggregation in FR2 is performed, there are no scheduling restrictions on FR2 serving cells in the bands due to L1-RSRP measurement performed on FR2 serving cell(s) in different band(s), provided that UE is capable of independent beam management on this FR2 band pair. Additionally, there is no scheduling restriction if the UE is configured with different numerology between SSB on one FR2 band and data on the other FR2 band provided the UE is configured for IBM operation for the band pair.

*Editor’s note: FFS the joint requirement of inter-cell BM and IBM.*

If following conditions are met,

- UE has been notified about system information update through paging,

- The gap between UE’s reception of PDCCH that UE monitors in the Type 2-PDCCH CSS set and that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots,

For the SSB and CORESET for RMSI scheduling multiplexing patterns 3, UE is expected to receive the PDCCH that UE monitors in the Type0-PDCCH CSS set, and the corresponding PDSCH, on SSB symbols to be measured for L1-RSRP measurement; and

For the SSB and CORESET for RMSI scheduling multiplexing patterns 2, UE is expected to receive PDSCH that corresponds to the PDCCH that UE monitors in the Type0-PDCCH CSS set, on SSB symbols to be measured for L1-RSRP measurement.

#### 9.5.6.4 Scheduling availability of UE performing L1-RSRP measurement on FR1 or FR2 in case of FR1-FR2 inter-band CA

There are no scheduling restrictions on FR1 cell(s) with PCI different from a serving cell(s) due to L1-RSRP measurement performed on FR2 serving cell(s).

There are no scheduling restrictions on FR2 cell(s) with PCI different from a serving cell(s) due to L1-RSRP measurement performed on FR1 serving cell(s).

<End of Change 1>