**3GPP TSG-RAN4 Meeting #116-bis *R4-251xxxx***

**Prague, Czech Republic, 13 – 17 October, 2025**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  |  | **CR** | xxxx | **rev** | - | **Current version:** |  |  |
|  |
| *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:***  | draftCR on L1-SINR requirements with SBFD |
|  |  |
| ***Source to WG:*** | Huawei, HiSilicon |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_duplex\_evo-Core |  | ***Date:*** | 2025-09-28 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-19 |
|  | *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)* |
|  |  |
| ***Reason for change:*** | There are some issues with counting of unavialable occasions in CSI-RS based L1-SINR requirements with SBFD: 1) the delay would extend infinitely in DRX when the CSI-RS resource has occasions on both SBFD symbols and non-SBFD symbols, and 2) the meaning of L=0 is unclear. |
|  |  |
| ***Summary of change:*** | Update the counting of unavailable occasions in L1-SINR requirements with SBFD to resolve the 2 issues above. |
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| ***Consequences if not approved:*** | CSI-RS based L1-SINR requirements with SBFD are not fully correct. |
|  |  |
| ***Clauses affected:*** | 9.8.4.1, 9.8.4.2, 9.8.4.3 |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **x** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

<Start of Change 1>

9.8.4.1 L1-SINR reporting with CSI-RS based CMR and no dedicated IMR configured

The UE shall be capable of performing L1-SINR measurements with the CSI-RS resource configured as CMR and no dedicated resource configured as IMR for L1-SINR computation, and the UE physical layer shall be capable of reporting L1-SINR measured over the measurement period of TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_Only.

The value of TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_Only is defined in table 9.8.4.1-1 for FR1 and in table 9.8.4.1-2 for FR2, where

For the value of M,

- For periodic and semi-persistent CSI-RS resources as CMR, M=1 if higher layer parameter *timeRestrictionForChannelMeasurement* is configured, and M=3 otherwise;

- For aperiodic CSI-RS resources as CMR, M=1.

For the value of N in FR2

- For periodic CSI-RS resources as CMR in a resource set configured with higher layer parameter *repetition* set to OFF, N=1. The requirements apply if *qcl-InfoPeriodicCSI-RS* is configured for all the resources in the resource set and for each resource one RS has QCL-TypeD with

- SSB for L1-RSRP or L1-SINR measurement, or

- another CSI-RS in resource set configured with repetition ON.

- For periodic CSI-RS resources as CMR in a resource set configured with higher layer parameter *repetition* set to ON, N=ceil(*maxNumberRxBeam* / Nres\_per\_set), where Nres\_per\_set is number of resources in the resource set. The requirements apply provided *qcl-InfoPeriodicCSI-RS* is configured for all resources in the resource set.

- For semi-persistent CSI-RS resources as CMR in a resource set configured with higher layer parameter *repetition* set to OFF, N=1. The requirements apply provided TCI state is provided for all resources in the resource set in the MAC CE activating the resource set and for each resource has QCL-TypeD with

- SSB for L1-RSRP or L1-SINR measurement, or

- another CSI-RS in resource set configured with repetition ON.

- For semi-persistent CSI-RS resources as CMR in a resource set configured with higher layer parameter *repetition* set to ON, N=ceil(*maxNumberRxBeam* / Nres\_per\_set), where Nres\_per\_set is number of resources in the resource set. The requirements apply provided TCI state is provided for all resources in the resource set in the MAC CE activating the resource set.

- For aperiodic CSI-RS resources as CMR in a resource set configured with higher layer parameter *repetition* set to OFF, N=1. The requriements apply provided *qcl-info* is configured for all resources in the resource set and for each resource has QCL-TypeD with

- SSB for L1-RSRP or L1-SINR measurement, or

- another CSI-RS in resource set configured with repetition ON.

- For aperiodic CSI-RS resources as CMR in a resource set configured with higher layer parameter *repetition* set to ON, N=1. UE is not required to meet the accuracy requirements in clauses 10.1.28.1 and 10.1.28.3 if number of resources in the resource set is smaller than *maxNumberRxBeam*. The requriements apply provided *qcl-info* is configured for all resources in the resource set.

For the value of L1,

1> If UE does not support *supportSBFD* or SBFD is not configured by the network

2> L1 is not applicable

1> else (if UE supports *supportSBFD* and SBFD is configured by the network)

2> if UE is configured to report L1-SINR for SBFD symbols

3> When DRX is not configured, L1 is the number of occasions of the CSI-RS resource as CMR that are overlapping with dynamic UL transmission or with non-SBFD symbols during TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_Only

3> When DRX is configured, L1 is the number of DRX cycles in which at least one occasion of the CSI-RS resource as CMR is overlapping with dynamic UL transmission or in which all occasions of the CSI-RS resource as CMR are overalapping with non-SBFD symbols during TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_Only

2> if UE is configured to report L1-SINR for non-SBFD symbols

3> When DRX is not configured, L1 is the number of occasions of the CSI-RS resource as CMR that are overlapping with SBFD symbols during TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_Only

3> When DRX is configured, L1 is the number of DRX cycles in which all occasions of the CSI-RS resource as CMR are overlapping with SBFD symbols during TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_Only

For a UE supporting *LB CA via switching,* or for a UE supporting *concurrentMeasGapsPreMG-r18* and when concurrent measurement gap(s) with Pre-MG(s) are configured, or a UE supporting *concurrentMeasGapsNCSG-r18* and when concurrent GAP(s) with NCSG(s) are configured, or a UE supporting *concurrentMeasGap-r17* or *musim-GapPreference-r17* or both concurrent measurement gap and *musim-GapPreference-r17* and when concurrent GAPs or periodic MUSIM gaps or both concurrent gaps and periodic MUSIM gaps are configured,

- a CSI-RS or an SMTC occasion is not considered to be overlapped by a gap occasion if the gap occasion is dropped according to 9.1.8 and 9.1.10,

- P value for a CSI-RS resource to be measured is defined as

- Ntotal / Noutside\_MG in FR1

- Psharing factor \* Ntotal / Noutside\_MG in FR2 with Navailable = 0

- Ntotal / Navailable in FR2 with Navailable > 0

- For a window W of duration max(TL1, xRP\_max, switching pattern periodicity), where xRP\_max is the maximum xRP across all configured per-UE GAPs or periodic MUSIM gap(s) and per-FR GAPs, and, in case of Pre-MG, all activated per-UE measurement gaps and per-FR measurement gaps, within the same FR as serving cell, and starting at the beginning of any CSI-RS resource occasion:

- Ntotal is the total number of CSI-RS resource occasions within the window, including those overlapped with GAP occasions, MUSIM gap occasions or SMTC occasions within the window,

For UEs supporting *LB CA via switching* and configured with low NR inter-band carrier aggregation:

- for the PCell L1-SINR measurement, Ntotal also includes CSI-RS resource occasions that overlap with the SDL SCell ON duration within the window,

- for the SCell L1-SINR measurement, Ntotal also includes CSI-RS resource occasions that overlap with the PCell ON duration within the window, as defined by the configured switching pattern, and

- Noutside\_MG is the number of CSI-RS resource occasions within the window W

- that are not overlapped with any non-dropped GAP occasion nor non-dropped MUSIM gap occasion or

- that are not overlapped with SDL SCell ON duration corresponding to the LB CA switching pattern, for the PCell L1-SINR measurement for a UE supporting *LB CA via switching* with low NR inter-band carrier aggregation configured or

- that are not overlapped with PCell ON duration corresponding to the LB CA switching pattern, for the SCell L1-SINR measurement for a UE supporting *LB CA via switching* with low NR inter-band carrier aggregation configured, and

- L1-SINR requirement in this clause is not applied when Noutside\_MG = 0.

- Navailable is the number of CSI-RS resource occasions that are not overlapped with any non-dropped GAP occasion, non-dropped MUSIM gap occasion nor any SMTC occasion within the window W.

- for UEs supporting *LB CA via switching*, switching pattern periodicity is the periodicity of the RRC configured semi-static switching pattern; otherwise, it is not applicable.

- a CSI-RS or an SMTC occasion is considered to be overlapped with the MUSIM gap if it overlaps a MUSIM gap occasion.

- TL1 is periodicity of the target CSI-RS.

- xRP = MGRP when configured GAP is activated Pre-MG or MG, and xRP = VIRP when configured GAP is NCSG.

Otherwise, for a UE neither supporting *concurrentMeasGap-r17* nor *concurrentMeasGapsPreMG-r18* nor *concurrentMeasGapsNCSG-r18* or when neither of the above configurations applies, i.e. concurrent measurement gaps, concurrent measurement gap(s) with Pre-MG(s) and concurrent GAP(s) with NCSG(s) and UE does not support *musim-GapPreference-r17* or when no MUSIM gaps are configured,

For the value of P in FR1,

- P=$\frac{1}{1-\frac{T\_{CSI-RS}}{xRP}}$, when in the monitored cell there are GAP configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the CSI-RS; and

- P=1 when in the monitored cell there are no GAPs overlapping with any occasion of the CSI-RS.

For the value of P in FR2,

- P=1, when CSI-RS is not overlapped with GAP and also not overlapped with SMTC occasion.

- P=$\frac{1}{1-\frac{T\_{CSI-RS}}{xRP}}$, when CSI-RS is partially overlapped with GAP and CSI-RS is not overlapped with SMTC occasion (TCSI-RS < xRP)

- P=$\frac{1}{1-\frac{T\_{CSI-RS}}{T\_{SMTCperiod}}}$, when CSI-RS is not overlapped with GAP and CSI-RS is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod).

- P is Psharing factor,, when CSI-RS is not overlapped with GAP and CSI-RS is fully overlapped with SMTC occasion (TCSI-RS = TSMTCperiod).

- P=$ \frac{1}{1-\frac{T\_{CSI-RS}}{xRP}-\frac{T\_{CSI-RS}}{T\_{SMTCperiod}}}$, when CSI-RS is partially overlapped with [measurement gap] and CSI-RS is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod) and SMTC occasion is not overlapped with GAP and

- TSMTCperiod ≠ xRP or

- TSMTCperiod = xRP and TCSI-RS < 0.5\*TSMTCperiod

- P=$\frac{P\_{sharing factor}}{1-\frac{T\_{CSI-RS}}{xRP}}$, when CSI-RS is partially overlapped with GAP and CSI-RS is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod) and SMTC occasion is not overlapped with GAP and TSMTCperiod = xRP and TCSI-RS = 0.5\*TSMTCperiod

- P=$ \frac{1}{1-\frac{T\_{CSI-RS}}{min⁡(T\_{SMTCperiod},xRP)}}$, when CSI-RS is partially overlapped with GAP (TCSI-RS < xRP) and CSI-RS is partially overlapped with SMTC occasion (TCSI-RS < TSMTCperiod) and SMTC occasion is partially or fully overlapped with GAP.

- P=$\frac{P\_{sharing factor}}{1-\frac{T\_{CSI-RS}}{xRP}}$, when CSI-RS is partially overlapped with GAP and CSI-RS is fully overlapped with SMTC occasion (TCSI-RS = TSMTCperiod) and SMTC occasion is partially overlapped with GAP (TSMTCperiod < xRP)

Where:

 Psharing factor = 1, if the CSI-RS configured for L1-SINR measurement outside gap is

 not overlapped with the SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol before each consecutive SSB symbols indicated by *SSB-ToMeasure* and 1 data symbol after each consecutive SSB symbols indicated by *SSB-ToMeasure*, given that *SSB-ToMeasure* is configured, where the *SSB-ToMeasure* is the union set of *SSB-ToMeasure* from all the configured measurement objects merged on the same serving carrier, and,

 not overlapped by the RSSI symbols indicated by *ss-RSSI-Measurement* and 1 data symbol before each RSSI symbol indicated by *ss-RSSI-Measurement* and 1 data symbol after each RSSI symbol indicated by *ss-RSSI-Measurement*, given that *ss-RSSI-Measurement* is configured.

- Psharing factor = 3, otherwise.

- TSMTCperiod = the configured SMTC1 period or SMTC2 period if configured.

- TCSI-RS = the periodicity of CSI-RS configured for L1-SINR measurement

- When a measurement gap is configured and the measurement gap is not NCSG,

- a CSI-RS is considered to be overlapped with the GAP if it overlaps a measurement gap occasion, and

- xRP = MGRP

- If the UE is configured with Pre-MG, a CSI-RS reourse or an SMTC occasion is only considered to be overlapped by the Pre-MG if the Pre-MG is activated.

- Otherwise, when NCSG measurement gap only is configured,

- a CSI-RS is considered to be overlapped with the GAP if

- it overlaps the VIL1 or VIL2 of NCSG, or

- it overlaps the ML of NCSG in FR2, and there exists a target carrier to be measured within NCSG that is intra-frequency carrier or inter-frequency carrier in the same band as the serving cell, or inter-frequency carrier in different band as the serving cell and UE does not support IBM between the target carrier and the serving cell,

- and

- xRP = VIRP

If the high layer in TS 38.331 [2] signaling of *smtc2* is configured, TSMTCperiod corresponds to the value of higher layer parameter *smtc2*; Otherwise TSMTCperiod corresponds to the value of higher layer parameter *smtc1*.

Note: The overlap between CSI-RS for L1-SINR measurement and SMTC means that CSI-RS for L1-SINR measurement is within the SMTC window duration.

For UE supporting *measurement gap occasion cancellation*, the UE is not required to perform CSI-RS measurements during the cancelled gap occasions.

When UE is configured with aperiodic MUSIM gap and the aperiodic MUSIM gap is overlapping with CSI-RS resource occasion for L1-SINR, longer evaluation period would be expected.

When UE is configured with MUSIM gap(s), and CSI-RS resource occasions for L1-SINR are fully overlapped with MUSIM gap(s) or fully overlapped with the union of MUSIM gap(s) and GAPs, no requirement applies for the CSI-RS based L1-SINR measurement.

Longer evaluation period would be expected if the combination of CSI-RS, SMTC occasion and GAP configurations does not meet previous conditions.

**Table 9.8.4.1-1: Measurement period TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_Only for FR1**

|  |  |
| --- | --- |
| **Configuration** | **TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_Only (ms)**  |
| non-DRX | max(TReport, ceil((M+L1)\*P)\* max(TCSI-RS, Tproc)) |
| DRX cycle ≤ 320 ms | max(TReport, ceil(1.5\*(M+L1)\*P)\*max(TDRX,TCSI-RS, Tproc)) |
| DRX cycle > 320 ms | ceil((M+L1)\*P)\*TDRX |
| NOTE 1: TCSI-RS is the periodicity of CSI-RS configured for L1-SINR measurement. TDRX is the DRX cycle length. TReport is configured periodicity for reporting.NOTE 2: the requirements are applicable provided that the CSI-RS resource configured for L1-SINR measurement is transmitted with Density = 3.NOTE 3: If UE indicates *needForScaledCSIProcTimeDualDL* and the CSI-RS resource for CMR is across 2 DL subbands, Tproc = 8ms; otherwise Tproc = 0. |

**Table 9.8.4.1-2: Measurement period TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_Only for FR2**

|  |  |
| --- | --- |
| **Configuration** | **TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_Only (ms)**  |
| non-DRX | max(TReport, ceil((M+L1)\*P\*N)\* max(TCSI-RS, Tproc)) |
| DRX cycle ≤ 320 ms | max(TReport, ceil(1.5\*(M+L1)\*P\*N)\*max(TDRX,TCSI-RS, Tproc)) |
| DRX cycle > 320 ms | ceil((M+L1)\*P\*N)\*TDRX |
| NOTE 1: TCSI-RS is the periodicity of CSI-RS configured for L1-SINR measurement. TDRX is the DRX cycle length. TReport is configured periodicity for reporting.NOTE 2: the requirements are applicable provided that the CSI-RS resource configured for L1-SINR measurement is transmitted with Density = 3.NOTE 3: If UE indicates *needForScaledCSIProcTimeDualDL* and the CSI-RS resource for CMR is across 2 DL subbands, Tproc = 8ms; otherwise Tproc = 0. |

9.8.4.2 L1-SINR reporting with SSB based CMR and dedicated IMR configured

The UE shall be capable of performing L1-SINR measurements with the SSB configured as CMR and dedicated resource configured as IMR for L1-SINR computation, in which the NZP-CSI-RS or CSI-IM resource configured as dedicated IMR shall be 1-to-1 mapped to SSB configured as CMR, with the same periodicity. The UE physical layer shall be capable of reporting L1-SINR measured over the measurement period of TL1-SINR\_Measurement\_Period\_SSB\_CMR\_IMR.

The requirements in this clause are not applicable if NZP-CSI-RS or CSI-IM resource configured as dedicated IMR is scheduled with different periodicity as SSB configured as CMR.

For UE supporting *On-demand SSB operation* and when OD- SSB transmission is indicated, the EMP for L1-SINR are

- the periodicity of OD-SSBs in the configured DL BWP if no first SSB transmission is configured, or

- the periodicity of the union of OD-SSBs and first SSBs if first SSBs are transmitted and the OD-SSB activation is indicated.

The value of TL1-SINR\_Measurement\_Period\_SSB\_CMR\_IMR is defined in table 9.8.4.2-1 for FR1 and in table 9.8.4.2-2 for FR2 when *highSpeedMeasFlagFR2-r17* is not configured, and defined in table 9.8.4.2-3 for FR2 power class 6 UE when *highSpeedMeasFlagFR2-r17* is configured, where

For the value of M

- For periodic or semi-persistent NZP CSI-RS or CSI-IM resource as dedicated IMR, M=1 if the higher layer parameters *timeRestrictionForChannelMeasurements* and/or *timeRestrictionForInterferenceMeasurements* are configured, and M=3 otherwise;

For the value of N in FR2

- N = 2, 4 or 6 in FR2-1 for UE supporting *fastBeamSweepingMultiRx-r1*8, according to the conditions described in clause 3.6.19,

- N = 8 otherwise.

For the value of L1,

1> If UE does not support *supportSBFD* or SBFD is not configured by the network

2> L1 is not applicable

1> else (if UE supports *supportSBFD* and SBFD is configured by the network)

2> if UE is configured to report L1-SINR for SBFD symbols

3> When DRX is not configured, L1 is the number of occasions of the CSI-RS/CSI-IM resource as IMR that are overlapping with dynamic UL transmission or with non-SBFD symbols during TL1-SINR\_Measurement\_Period\_SSB\_CMR\_IMR

3> When DRX is configured, L1 is the number of DRX cycles in which at least one occasion of the CSI-RS/CSI-IM resource as IMR is overlapping with dynamic UL transmission or in which all occasions of the CSI-RS/CSI-IM resource as IMR are overalapping with non-SBFD symbols during TL1-SINR\_Measurement\_Period\_SSB\_CMR\_IMR

2> if UE is configured to report L1-SINR for non-SBFD symbols

3> When DRX is not configured, L1 is the number of occasions of the CSI-RS/CSI-IM resource as IMR that are overlapping with non-SBFD symbols, during TL1-SINR\_Measurement\_Period\_SSB\_CMR\_IMR

3> When DRX is configured, L1 is the number of DRX cycles in which all occasions of the CSI-RS/CSI-IM resource as IMR are overlapping with non-SBFD symbols, during TL1-SINR\_Measurement\_Period\_SSB\_CMR\_IMR

P is defined as the maximum value between PCMR and PIMR, i.e., P = max(PCMR, PIMR), where

- the value of PCMR shall be derived in the same way as the value of P used for SSB based L1-RSRP measurement in clause 9.5.4.1, in which the occasions and period of the SSB for CMR shall be used instead.

- the value of PIMR shall be derived in the same way as the value of P used for CSI-RS based L1-RSRP measurement in clause 9.5.4.2, in which the occasions and period of the NZP CSI-RS for NZP-IMR or CSI-IM for ZP-IMR shall be used instead.

For UE supporting *measurement gap occasion cancellation*, the UE is not required to perform SSB measurements during the cancelled gap occasions.

Longer evaluation period would be expected if the combination of SSB, SMTC occasion and measurement gap configurations does not meet previous conditions.

For L1-SINR measurement with SSB as CMR and CSI-RS or CSI-IM as IMR, the requirement shall apply if the CSI-RS is configured as IMR with repetition field as “repetition = OFF” or CSI-IM is configured as IMR.

For L1-SINR measurement with SSB as CMR and CSI-RS/CSI-IM as IMR, no requirement shall apply if SSB occasions for CMR or CSI-RS/CSI-IM occasions for IMR are fully overlapped with the configured measurement gap

**Table 9.8.4.2-1: Measurement period TL1-SINR\_Measurement\_Period\_SSB\_CMR\_IMR for FR1**

|  |  |
| --- | --- |
| **Configuration** | **TL1-SINR\_Measurement\_Period\_SSB\_CMR\_IMR (ms)**  |
| non-DRX | max(TReport, ceil((M+L1)\*P)\* max(TSSB, Tproc)) |
| DRX cycle ≤ 320 ms | max(TReport, ceil(1.5\*(M+L1)\*P)\*max(TDRX,TSSB, Tproc)) |
| DRX cycle > 320 ms | ceil((M+L1)\*P)\*TDRX |
| NOTE 1: TSSB = ssb-periodicityServingCell is the periodicity of the SSB-Index configured for L1-SINR channel measurement if UE not supporting *On-demand SSB operation* or when OD-SSB transmission is not indicated, otherwise, TSSB = EMP of the SSB index configured for L1-SINR channel measurement. TDRX is the DRX cycle length. TReport is configured periodicity for reporting.NOTE 2: The requirements are applicable provided that the CSI-RS resource configured for interference measurement shall be 1-to-1 mapped to SSB configured for channel measurement, with the same periodicity.NOTE 3: If UE indicates *needForScaledCSIProcTimeDualDL* and the CSI-RS resource for IMR is across 2 DL subbands, Tproc = 8ms; otherwise Tproc = 0. |

**Table 9.8.4.2-2: Measurement period TL1-SINR\_Measurement\_Period\_SSB\_CMR\_IMR for FR2**

|  |  |
| --- | --- |
| **Configuration** | **TL1-SINR\_Measurement\_Period\_SSB\_CMR\_IMR (ms)**  |
| non-DRX | max(TReport, ceil((M+L1)\*P\*N)\* max(TSSB, Tproc)) |
| DRX cycle ≤ 320 ms | max(TReport, ceil(1.5\*(M+L1)\*P\*N)\*max(TDRX,TSSB, Tproc)) |
| DRX cycle > 320 ms | ceil(1.5\*(M+L1)\*P\*N)\*TDRX |
| NOTE 1: TSSB = ssb-periodicityServingCell is the periodicity of the SSB-Index configured for L1-SINR measurement if UE not supporting *On-demand SSB operation* or when OD-SSB transmission is not indicated, otherwise, TSSB = EMP of the SSB index configured for L1-SINR channel measurement. TDRX is the DRX cycle length. TReport is configured periodicity for reporting.NOTE 2: The requirements are applicable provided that the CSI-RS resource configured for interference measurement shall be 1-to-1 mapped to SSB configured for channel measurement, with the same periodicity.NOTE 3: If UE indicates *needForScaledCSIProcTimeDualDL* and the CSI-RS resource for IMR is across 2 DL subbands, Tproc = 8ms; otherwise Tproc = 0. |

**Table 9.8.4.2-3: Measurement period TL1-SINR\_Measurement\_Period\_SSB\_CMR\_IMR configured with *highSpeedMeasFlagFR2-r17* for FR2-1**

|  |  |
| --- | --- |
| **Configuration** | **TL1-SINR\_Measurement\_Period\_SSB\_CMR\_IMR (ms)**  |
| non-DRX | max(TReport, ceil((M+L1)\*P\*N1Note 3)\* max(TSSB, Tproc)) |
| DRX cycle ≤ 80 ms | max(TReport, ceil((M+L1)\*P\*N1Note 3\*M2)\*max(TDRX,TSSB, Tproc)) |
| 80 ms< DRX cycle ≤ 320 ms | max(TReport, ceil(1.5\*(M+L1)\*P\*N)\*max(TDRX,TSSB)) |
| DRX cycle > 320 ms | ceil(1.5\*(M+L1)\*P\*N)\*TDRX |
| NOTE 1: TSSB = ssb-periodicityServingCell is the periodicity of the SSB-Index configured for L1-SINR measurement. TDRX is the DRX cycle length. TReport is configured periodicity for reporting.NOTE 2: The requirements are applicable provided that the CSI-RS resource configured for interference measurement shall be 1-to-1 mapped to SSB configured for channel measurement, with the same periodicity.NOTE 3: N1 = 2 when *highSpeedMeasFlagFR2-r17* = set1; N1 = 6 when *highSpeedMeasFlagFR2-r17* = set2.NOTE 4: M2 = 1.5 if SMTC periodicity > 40 ms; otherwise M2 = 1NOTE 5: If UE indicates *needForScaledCSIProcTimeDualDL* and the CSI-RS resource for IMR is across 2 DL subbands, Tproc = 8ms; otherwise Tproc = 0. |

9.8.4.3 L1-SINR reporting with CSI-RS based CMR and dedicated IMR configured

The UE shall be capable of performing L1-SINR measurements with the CSI-RS resource configured as CMR and dedicated resource configured as IMR for L1-SINR computation, in which the NZP-CSI-RS or CSI-IM resource configured as dedicated IMR shall be 1-to-1 mapped to CSI-RS resource configured as CMR, with the same periodicity. The UE physical layer shall be capable of reporting L1-SINR measured over the measurement period of TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_IMR.

The requirements in this clause are not applicable if NZP-CSI-RS or CSI-IM resource configured as dedicated IMR is scheduled with different periodicity as CSI-RS resource configured as CMR.

The value of TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_IMR is defined in table 9.8.4.3-1 for FR1 and in table 9.8.4.3-2 for FR2, where

For the value of M,

- M=1 shall be applied if

- aperiodic NZP-CSI-RS as CMR or dedicated IMR, or

- aperiodic CSI-IM as dedicated IMR, or

- periodic and semi-persistent NZP-CSI-RS as CMR or dedicated IMR and the higher layer parameters *timeRestrictionForChannelMeasurement* and/or *timeRestrictionForInterferenceMeasurements* are configured, or

- periodic and semi-persistent CSI-IM as dedicated IMR and the higher layer parameters *timeRestrictionForChannelMeasurement* and/or *timeRestrictionForInterferenceMeasurements* are configured;

- M=3 otherwise.

For the value of N in FR2

- For periodic CSI-RS resources as CMR in a resource set configured with higher layer parameter *repetition* set to OFF, N=1. The requirements apply if *qcl-InfoPeriodicCSI-RS* is configured for all the resources in the resource set and for each resource one RS has QCL-TypeD with

- SSB for L1-RSRP or L1-SINR measurement, or

- another CSI-RS in resource set configured with repetition ON.

- For periodic CSI-RS resources as CMR in a resource set configured with higher layer parameter *repetition* set to ON, N=ceil(*maxNumberRxBeam* / Nres\_per\_set), where Nres\_per\_set is number of resources in the resource set. The requirements apply provided *qcl-InfoPeriodicCSI-RS* is configured for all resources in the resource set.

- For semi-persistent CSI-RS resources as CMR in a resource set configured with higher layer parameter *repetition* set to OFF, N=1. The requirements apply provided TCI state is provided for all resources in the resource set in the MAC CE activating the resource set and for each resource has QCL-TypeD with

- SSB for L1-RSRP or L1-SINR measurement, or

- another CSI-RS in resource set configured with repetition ON.

- For semi-persistent CSI-RS resources as CMR in a resource set configured with higher layer parameter *repetition* set to ON, N=ceil(*maxNumberRxBeam* / Nres\_per\_set), where Nres\_per\_set is number of resources in the resource set. The requirements apply provided TCI state is provided for all resources in the resource set in the MAC CE activating the resource set.

- For aperiodic CSI-RS resources as CMR in a resource set configured with higher layer parameter *repetition* set to OFF, N=1. The requriements apply provided *qcl-info* is configured for all resources in the resource set and for each resource has QCL-TypeD with

- SSB for L1-RSRP or L1-SINR measurement, or

- another CSI-RS in resource set configured with repetition ON.

- For aperiodic CSI-RS resources as CMR in a resource set configured with higher layer parameter *repetition* set to ON, N=1. UE is not required to meet the accuracy requirements in clause 10.1.28.1 and 10.1.28.3 if number of resources in the resource set is smaller than *maxNumberRxBeam*. The requriements apply provided *qcl-info* is configured for all resources in the resource set.

For the value of L1,

1> If UE does not support *supportSBFD* or SBFD is not configured by the network

2> L1 is not applicable

1> else (if UE supports *supportSBFD* and SBFD is configured by the network)

2> if UE is configured to report L1-SINR for SBFD symbols

3> When DRX is not configured, L1 is the maximum between number of occasions of the CSI-RS resource as CMR that are overlapping with dynamic UL transmission or with non-SBFD symbols and number of occasions of the CSI-RS/CSI-IM resource as IMR that are overlapping with dynamic UL transmission or with non-SBFD symbols, during TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_IMR

3> When DRX is configured, L1 is the number of DRX cycles in which at least one occasion of the CSI-RS resource as CMR or at least one occasion of the CSI-RS/CSI-IM resource as IMR is overlapping with dynamic UL transmission or in which all occasions of the CSI-RS resource as CMR or all occasions of the CSI-RS/CSI-IM resource as IMR are overalapping with non-SBFD symbols, during TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_IMR

2> if UE is configured to report L1-SINR for non-SBFD symbols

3> When DRX is not configured, L1 is the maximum between number of occasions of the CSI-RS resource as CMR that are overlapping with non-SBFD symbols and number of occasions of the CSI-RS/CSI-IM resource as IMR that are overlapping with non-SBFD symbols, during TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_IMR

3> When DRX is configured, L1 is the number of DRX cycles in which all occasions of the CSI-RS resource as CMR or at least one occasion of the CSI-RS/CSI-IM resource as IMR are overlapping with non-SBFD symbols, during TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_IMR

P is defined as the maximum value between PCMR and PIMR, i.e., P = max(PCMR, PIMR), where

- The value of PCMR and PIMR shall be derived in the same way as the value of P used for CSI-RS based L1-RSRP measurement in clause 9.5.4.2, in which the occasions and period of the CSI-RS for CMR and NZP CSI-RS for NZP-IMR or CSI-IM for ZP-IMR shall be used instead respectively.

For UE supporting *measurement gap occasion cancellation*, the UE is not required to perform CSI-RS measurements during the cancelled gap occasions.

Longer evaluation period would be expected if the combination of CSI-RS, SMTC occasion and measurement gap configurations does not meet previous conditions.

For L1-SINR measurement with CSI-RS as CMR and CSI-RS as IMR, the requirement shall apply only if CSI-RS resources as CMR and IMR are configured with the same repetition field and the number of CSI-RS resources in the resource sets for CMR and IMR are same.

For L1-SINR measurement with CSI-RS as CMR and CSI-IM as IMR, the requirement shall apply only if the number of CSI-RS resources in the resource set for CMR and the number of CSI-IM resources in the resource set for IMR are same.

For L1-SINR measurement with CSI-RS as CMR and CSI-RS/CSI-IM as IMR, no requirement shall apply if CSI-RS occasions for CMR or CSI-RS/CSI-IM occasions for IMR are fully overlapped with the configured measurement gap.

**Table 9.8.4.3-1: Measurement period TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_IMR for FR1**

|  |  |
| --- | --- |
| **Configuration** | **TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_IMR (ms)**  |
| non-DRX | max(TReport, ceil((M+L1)\*P)\*max(TCSI-RS, Tproc)) |
| DRX cycle ≤ 320 ms | max(TReport, ceil(1.5\*(M+L1)\*P)\*max(TDRX,TCSI-RS, Tproc)) |
| DRX cycle > 320 ms | ceil((M+L1)\*P)\*TDRX |
| NOTE 1: TCSI-RS is the periodicity of CSI-RS configured for L1-SINR measurement. TDRX is the DRX cycle length. TReport is configured periodicity for reporting.NOTE 2: the requirements are applicable provided that the CSI-RS resource configured for L1-SINR measurement is transmitted with Density = 3.NOTE 3: The requirements are applicable provided that the CSI-RS resource configured for interference measurement shall be 1-to-1 mapped to CSI-RS configured for channel measurement, with the same periodicity.NOTE 4: If UE indicates *needForScaledCSIProcTimeDualDL* and the CSI-RS resource for CMR or IMR is across 2 DL subbands, Tproc = 8ms; otherwise Tproc = 0. |

**Table 9.8.4.3-2: Measurement period TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_IMR for FR2**

|  |  |
| --- | --- |
| **Configuration** | **TL1-SINR\_Measurement\_Period\_CSI-RS\_CMR\_IMR (ms)**  |
| non-DRX | max(TReport, ceil((M+L1)\*P\*N)\* max(TCSI-RS, Tproc) |
| DRX cycle ≤ 320 ms | max(TReport, ceil(1.5\*(M+L1)\*P\*N)\*max(TDRX,TCSI-RS, Tproc)) |
| DRX cycle > 320 ms | ceil((M+L1)\*P\*N)\*TDRX |
| NOTE 1: TCSI-RS is the periodicity of CSI-RS configured for L1-SINR measurement. TDRX is the DRX cycle length. TReport is configured periodicity for reporting.NOTE 2: the requirements are applicable provided that the CSI-RS resource configured for L1-SINR measurement is transmitted with Density = 3.NOTE 3: The requirements are applicable provided that the CSI-RS resource configured for interference measurement shall be 1-to-1 mapped to CSI-RS configured for channel measurement, with the same periodicity.NOTE 4: If UE indicates *needForScaledCSIProcTimeDualDL* and the CSI-RS resource for CMR or IMR is across 2 DL subbands, Tproc = 8ms; otherwise Tproc = 0. |

<End of Change 2>