**3GPP TSG-RAN WG4 Meeting #116 *R4-2509278***

**Bengaluru , IN, 25th – 29th Aug, 2025**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  | **38.133** | **CR** | **Draft** | **rev** | **-** | **Current version:** | **19.1.0** |  |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network |  |

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|  |
| ***Title:***  | Draft CR to TS 38.133 on CSI-RS based L3 measurements for ATG |
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| ***Source to WG:*** | CATT |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | NR\_ATG\_enh-Core |  | ***Date:*** | 2025-08-28 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***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. | *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:*** | The requirements for CSI-RS based L3 measurements for R19 ATG need to be introduced. |
|  |  |
| ***Summary of change:*** | Revise the requirements for CSI-RS based L3 measurements defined in clause 9.10D to include the impact of DL CA for R19 ATG according to the agreements for core part. |
|  |  |
| ***Consequences if not approved:*** | The requirements for CSI-RS based L3 measurements for R19 ATG would be missed. |
|  |  |
| ***Clauses affected:*** | 9.10D |
|  |  |
|  | **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 1>

## 9.10D CSI-RS based L3 measurements for ATG

### 9.10D.1 Introduction

This clause contains general requirements on the ATG UE regarding CSI-RS based measurement reporting in RRC\_CONNECTED state. The requirements are split in intra-frequency and inter-frequency measurements requirements.

The requirements in this clause apply, provided:

- Only one MO is configured per CSI-RS frequency layer, and

- all CSI-RS resources in the same MO are configured with the same csi-rs-MeasurementBW, and

- *associatedSSB* is configured in *CSI-RS-Resource-Mobility* and detectable, and

- all CSI-RS resources in the same MO are configured with the same periodicity, and

- the number of CSI-RS resources in any duration that equals to the length of a slot is no larger than UE capability *maxNumberCSI-RS-RRM-RS-SINR*.

- When there are mixed numerologies, the length of a slot is defined based on the smallest SCS

### 9.10D.2 CSI-RS based intra-frequency measurements

#### 9.10D.2.1 Introduction

A measurement is defined as a CSI-RS based intra-frequency measurement provided that:

- the SCS of the CSI-RS resource of the neighbour cell configured for measurement is the same as the SCS of the CSI-RS resource on the serving cell indicated for measurement, and

- the CP type of the CSI-RS resource of neighbour cell configured for measurement is the same as the CP type of the CSI-RS resource of the serving cell indicated for measurement, and

- It is applied for SCS = 60KHz

- the centre frequency of the CSI-RS resource of the neighbour cell configured for measurement is the same as the centre frequency of the CSI-RS resource of the serving cell indicated for measurement

The UE shall be able to identify new intra-frequency cells and perform CSI-RSRP, CSI-RSRQ and CSI-SINR measurements of identified intra-frequency cells if carrier frequency information is provided by PCell.

No measurement gap is needed for intra-frequency CSI-RS resources measurements.

For intra-frequency CSI-RS based measurements, UE may cause scheduling restriction as specified in clause 9.10D.2.6.

Note: Extended CP for CSI-RS based measurement is not supported in this release.

#### 9.10D.2.2 Requirements applicability

The measurement of the associated SSB follows the same requirements as SSB based measurements defined in clause 9.2D.

The requirements in clause 9.10D.2 apply, provided:

- Only one intra-frequency CSI-RS layer per serving cell is configured, and

- The BW of the CSI-RS on the intra-frequency neighbor cell is within the active BWP of the UE, and

- The associated SSB of the CSI-RS resources being identified or measured are detectable, and the CSI-RS resources configured for CSI-RS based L3 measurements are measurable, and

- The bandwidth of CSI-RS resources of intra-MO is the same as that of the CSI-RS resources configured for the serving cell, and

- All CSI-RS resources on one intra-frequency layer are configured within up to two separate windows where each window is up to 5 ms, and

- for the case of single window further provided

- The periodicity of the configured CSI-RS resources is 10 ms, 20 ms or 40 ms

- for the case of two separate windows further provided

- The two windows are either both fully non-overlapped with MG or both partially overlapped with MG

- The periodicity of the configured CSI-RS resources is 20 ms or 40 ms

- The starting point of the first window is the slot boundary of the serving cell, where the corresponding slot contains the configured L3 CSI-RS resource of the serving cell in the servingCellMO with the smallest offset, and

- The starting point of the second window if configured is determined by an offset of half of the CSI-RS periodicity in slots with regards to the starting point of the first window, and

- Numerology for intra-frequency CSI-RS and data of serving cell are the same.

An intra-frequency cell shall be considered detectable when for each relevant associated SSB:

- SS-RSRP related side conditions given in clauses 10.1.2.1 for FR1, for a corresponding band,

- SS-RSRQ related side conditions given in clauses 10.1.7.1 for FR1, for a corresponding band,

- SS-SINR related side conditions given in clauses 10.1.12.1 for FR1, for a corresponding band,

- SSB\_RP and SSB Ês/Iot according to Annex B.2.2 for a corresponding band.

A CSI-RS resource shall be considered measurable when for each relevant CSI-RS resource:

- CSI-RSRP related side conditions given in clauses 10.1.2.3 for FR1, for a corresponding band,

- CSI-RSRQ related side conditions given in clauses 10.1.7.2 for FR1, for a corresponding band,

- CSI-SINR related side conditions given in clauses 10.1.12.2 for FR1, for a corresponding band,

- CSI\_RP and CSI-RS Ês/Iot according to Annex B.2.12 for a corresponding band.

#### 9.10D.2.3 Number of cells and number of CSI-RS

##### 9.10D.2.3.1 Requirements for FR1

For each intra-frequency CSI-RS layer, during each layer 1 measurement period, the UE shall be capable of performing CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements for at least:

- 32 CSI-RSs with different CSI-RS index and/or PCI on the intra-frequency layer, and

- the cells to be monitored based on CSI-RS are the same set or a subset of the cells monitored based on the layer of the associated SSB

#### 9.10D.2.4 Measurement Reporting Requirements

Note: The UE is not required to report CSI-RS based L3 measurements when the timing offset between the reference measurement timing and the target CSI-RS in one layer is larger than one CP. If the UE reports CSI-RS based L3 measurements when the timing offset exceeds one CP, the UE may not meet the CSI-RS based L3 measurement accuracy requirements for CSI-RSRP, CSI-RSRQ and CSI-SINR in TS 38.133 [2] clause 10.1, which apply only when the timing offset is no larger than one CP.

##### 9.10D.2.4.1 Periodic Reporting

Reported CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements contained in periodic measurement reports shall meet the requirements in clauses 10.1.2.3, 10.1.7.2, and 10.1.12.2.

##### 9.10D.2.4.2 Event-triggered Periodic Reporting

Reported CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements contained in event-triggered periodic measurement reports shall meet the requirements in clauses 10.1.2.3, 10.1.7.2, and 10.1.12.2.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 9.10D.2.4.3.

##### 9.10D.2.4.3 Event Triggered Reporting

Reported CSI-RSRP, CSI-RSRQ, and CSI- SINR measurements contained in event triggered measurement reports shall meet the requirements in clauses 10.1.2.3, 10.1.7.2, and 10.1.12.2.

The UE shall not send any event triggered measurement reports as long as no reporting criterion is fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 x TTIDCCH. This measurement reporting delay excludes a delay which caused by no UL resources being available for UE to send the measurement report on.

The event triggered measurement reporting delay, measured without L3 filtering shall be less than the CSI-RS based measurement defined in clause 9.10D.2.5. When L3 filtering is used an additional delay can be expected.

#### 9.10D.2.5 Intra-frequency measurements without measurement gaps

If a UE is configured with the higher layer parameters *CSI-RS-Resource-Mobility* and *associatedSSB*, the CSI-RS based measurement shall include PSS/SSS detection time of associatedSSB, the time period used to acquire the SFN information and CSI-RS based measurement period without gap.

- PSS/SSS detection time of associatedSSB is the intra-frequency TPSS/SSS\_sync\_intra in clause 9.2D.5.1.

- The time period used to acquire the SFN information is equal to 0 if the UE is indicated that the neighbour cell is synchronous with the serving cell (*deriveSSB-IndexFromCell* is enabled). Otherwise, the time period used to acquire the SFN information is TCSI-RS\_SFN\_intra as shown in table 9.10D.2.5-3 for FR1.

- If the associatedSSB, which has been detectable at least for the time period Tidentify\_intra\_with\_index defined in clause 9.2D.5.1, becomes undetectable for a period ≤ 5 seconds and then the associatedSSB becomes detectable again with the same spatial reception parameter provided the timing to that cell has not changed more than  3200/$2^{µ}$ Tc, where *µ* is the SCS configuration as defined in clause 4.2 of TS 38.211 [3], PSS/SSS detection time and time period used to acquire the SFN information are equal to 0.

The measurement period for CSI- RS based intra-frequency measurements without gaps is as shown in table 9.10D.2.5-1.

Additionally, for a given CSI-RS resource, if the associated SS/PBCH block is configured but not detected by the UE, or if CSI-RS is configured with associated SSB but not QCL-ed to the associated SSB, the UE is not required to monitor the corresponding CSI-RS resource.

Table 9.10D.2.5-1: Measurement period for intra-frequency CSI-RS based measurements without gaps(FR1)

|  |  |
| --- | --- |
| DRX cycle | T CSI-RS\_measurement\_period\_intra  |
| No DRX | max(200 ms, ceil( 5 x Kp\_CSI-RS x N1Note 3 x Klayer1\_measurement ) x CSI-RS period) x CSSFintra |
| DRX cycle≤ 320 ms | max(200 ms, ceil(1.5x 5 x Kp\_CSI-RS x N1Note 3 x Klayer1\_measurement ) x max(CSI-RS period, DRX cycle)) x CSSFintra |
| DRX cycle>320 ms | ceil( 5 x Kp\_CSI-RS x N1Note 3 x Klayer1\_measurement ) x DRX cycle x CSSFintra |
| NOTE 1: The requirements apply assuming CSI-RS configuration with {D=3 with PRBs ≥ 48}. D is frequency domain density for the 1-port CSI-RS for L3 mobility defined in clause 7.4.1 of TS 38.211 [6].NOTE 2: Kp\_CSI-RS is applicable for a UE supporting concurrent gapsNOTE 3: For ATG UE capable of *antennaArrayType-r18*, N1 = 3 when network assistance on ATG cells reference locations is provided, otherwise N1 = 4.Otherwise, N1 = 1.NOTE 4: For ATG UE capable of *antennaArrayType-r18*, for the SCC measurement, N1=1 when the network indication *skippingSCCneighbourCellMeas* is set to ‘enable’ to UE. Otherwise, N1 = 3 when network assistance information on ATG cells reference locations is provided, N1 = 4 when network assistance information on ATG cells reference locations is not provided. |

CSSFintra: it is a carrier specific scaling factor and is determined according to CSSFoutside\_gap,i in clause 9.1D.5.

For a UE not supporting *concurrentMeasGap-r17* or for a UE is supporting *concurrentMeasGap-r17* but not configured with concurrent measurement gaps,

- if the intra-frequency CSI-RS resource does not overlap with any measurement gaps, Kp\_CSI-RS=1;

- if some occasions of the intra-frequency CSI-RS resource is overlapped with measurement gaps, Kp\_CSI-RS = 1/(1- (CSI-RS resource period /MGRP)) , where CSI-RS resource period < MGRP, and the MGRP is the periodicity of the measurement gap.

- Otherwise, when UE supports concurrent measurement gaps*,* and concurrent measurement gaps are configured, Kp\_CSI-RS is the scaling factor for a CSI-RS frequency layer to be measured outside gap which is defined as Kp\_CSI-RS = Ntotal / Navailable

For a window W of duration max(CSI-RS period, MGRP\_max), where MGRP\_max is the maximum MGRP across all configured per-UE MG, and starting at the beginning of any gap occasions covering the CSI-RS resources:

Ntotal is the total number of CSI-RS resources within the window, including those overlapped with other MG occasions within the window, and

Navailable is the number of CSI-RS resources that are not overlapped with any other non-dropped MG occasion within the window W, after accounting for MG collisions by applying the selected gap collision rule.

Kp\_CSI-RS = 1 when Navailable = 0

For UE supporting *antennaArrayType-r18* on the measured carrier,

Klayer1\_measurement=1,

If the measured carrier is the SCC with *servingcellMO* configured, and the network indication *skippingSCCneighbourCellMeas* is set to ‘enable’ to UE,

Otherwise,

If inter-band carrier aggregation within FR1 is configured and

UE not capable of *antennaArrayType-r18* on the other serving carrier, or UE capable of *antennaArrayType-r18* on the other serving carrier and UE support two simultaneous separate Rx beams

- if all of the reference signals configured for RLM, BFD, CBD or L1-RSRP for beam reporting on one serving cell outside measurement gap are not fully overlapped by intra-frequency SMTC occasions or CSI-RSs occasions of same serving cell.

Otherwise,

- if all of the reference signals configured for RLM, BFD, CBD or L1-RSRP for beam reporting on any serving frequency outside measurement gap are not fully overlapped by intra-frequency SMTC occasions and CSI-RSs occasions

Klayer1\_measurement=1.5, otherwise.

If the above-mentioned reference signal configured for L1-RSRP measurement is aperiodic CSI-RS resource, longer cell identification delay would be expected.

For UE not supporting *antennaArrayType-r18* on the measured carrier, Klayer1\_measurement=1.

Table 9.10D.2.5-2: Void

Table 9.10D.2.5-3: Time period for SFN acquisition for intra-frequency CSI-RS based measurements without gaps(FR1)

|  |  |
| --- | --- |
| DRX cycle | TCSI-RS\_SFN\_intra |
| No DRX | max(200 ms, ceil(5 x Kp\_CSI-RS x N1Note 2 x Klayer1\_measurement )x SMTC period)Note 1 x CSSFintra |
| DRX cycle≤ 320 ms | max(2000 ms, ceil (1.5 x 5 x Kp\_CSI-RS x N1Note 2 x Klayer1\_measurement ) x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320 ms | Ceil(5 x Kp\_CSI-RS x N1Note 2 x Klayer1\_measurement ) x DRX cycle x CSSFintra |
| NOTE 1: If different SMTC periodicities are configured for different cells, the SMTC period in the requirement is the one used by the cell being identifiedNOTE 2: For ATG UE capable of *antennaArrayType-r18*, N1 = 3 when network assistance on ATG cells reference locations is provided, otherwise N1 = 4.Otherwise, N1 = 1.NOTE 3: For ATG UE capable of *antennaArrayType-r18*, for the SCC measurement, N1=1 when the network indication *skippingSCCneighbourCellMeas* is set to ‘enable’ to UE. Otherwise, N1 = 3 when network assistance information on ATG cells reference locations is provided, N1 = 4 when network assistance information on ATG cells reference locations is not provided. |

#### 9.10D.2.6 Scheduling availability of UE during CSI-RS based intra-frequency measurements

UE is required to be capable of measuring without measurement gaps when CSI-RS resources are completely contained in the active BWP of the UE. Note the configured CSI-RS symbol is indicated in *firstOFDMSymbolInTimeDomain* included in *CSI-RS-ResourceConfigMobility* for RRM. When UE is required to perform CSI-RS based RRM measurements, and any of the conditions in the following clauses is met, there are restrictions on the scheduling availability; otherwise, there is no scheduling restriction. Note same numerology for intra-frequency CSI-RS and data of serving cell is considered in this release.

##### 9.10D.2.6.1 Scheduling availability of UE performing CSI-RS based measurements in TDD bands

When ATG UE performs CSI-RS intra-frequency measurements in a TDD band,

- The UE is not expected to transmit PUCCH/PUSCH/SRS on configured CSI-RS resource symbols, and on 1 OFDM symbol before and after each consecutively configured CSI-RS symbols.

When TDD intra-band carrier aggregation is performed, the scheduling restrictions due to a given serving cell also apply to all other serving cells in the same band on the symbols that fully or partially overlap with the aforementioned restricted symbols.

When the ATG UE capable of *antennaArrayType-r18* performs intra-frequency neighbouring cell measurements in a TDD band,

- The UE is not expected to receive PDCCH/PDSCH/TRS/CSI-RS for CQI on configured CSI-RS resource symbols, and on 1 OFDM symbol before and after each consecutively configured CSI-RS symbols.

When intra-band carrier aggregation is performed and the ATG UE is capable of *antennaArrayType-r18,* the scheduling restrictions due to a given serving cell also apply to all other serving cells in the same band on the symbols that fully or partially overlap with the aforementioned restricted symbols.

When inter-band carrier aggregation is performed and the ATG UE supporting one common Rx beam, the scheduling restrictions due to a given serving cell also apply to another serving cell in a different band on the symbols that fully or partially overlap with the aforementioned restricted symbols.

### 9.10D.3 CSI-RS based Inter-frequency measurements

#### 9.10D.3.1 Introduction

A measurement is defined as a CSI-RS based inter-frequency measurement provided it is not defined as an intra-frequency measurement according to clause 9.10D.2.

If a UE is configured with the higher layer parameter *CSI-RS-Resource-Mobility* and the higher layer parameter *associatedSSB* is configured, the UE shall be able to identify inter-frequency cells indicated for measurement and perform CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements of identified inter-frequency cells.

When measurement gaps are needed, the UE is not expected to detect the associated SSB nor perform measurement of the CSI-RS resource configured in *CSI-RS-Resource-Mobility* on an inter-frequency measurement object which start earlier than the gap starting time + switching time, and ends later than the gap end – switching time. The switching time is 0.5 ms.

#### 9.10D.3.2 Requirements applicability

The associated SSB layer of the CSI-RS follows the same requirements as SSB based measurements defined in clause 9.3D.

The requirements in clause 9.10D.3 apply, provided:

- The associated SSB of the cell being identified or measured is detectable, and

- All CSI-RS resources on one inter-frequency layer are configured within a window of up to 5 ms, and

- The periodicity of the configured CSI-RS resources is 10 ms, 20 ms or 40 ms, and

- CSI-RS resources for measurements and the associated SSB for cell identification are configured within measurement gap.

An inter-frequency cell shall be considered detectable when for each relevant associated SSB:

- SS-RSRP related side conditions given in clauses 10.1.4.1 for FR1, for a corresponding band,

- SS-RSRQ related side conditions given in clauses 10.1.9.1 for FR1, for a corresponding band,

- SS-SINR related side conditions given in clauses 10.1.14.1 for FR1, for a corresponding band,

- SSB\_RP and SSB Ês/Iot according to Annex B.2.3 for a corresponding band.

A CSI-RS resource shall be considered measurable when for each relevant CSI-RS resource:

- CSI-RSRP related side conditions given in clauses 10.1.4.3 for FR1, for a corresponding band,

- CSI-RSRQ related side conditions given in clauses 10.1.9.2 for FR1, for a corresponding band,

- CSI-SINR related side conditions given in clauses 10.1.14.2 for FR1, for a corresponding band,

- CSI \_RP and CSI-RS Ês/Iot according to Annex B.2.13 for a corresponding band.

#### 9.10D.3.3 Number of cells and number of CSI-RS resources

##### 9.10D.3.3.1 Requirements for FR1

For each inter-frequency CSI-RS layer, during each layer 1 measurement period, the UE shall be capable of performing CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements for at least:

- 14 CSI-RSs with different CSI-RS index and/or PCI , and

- The cells to be monitored based on CSI-RS are the same set or a subset of the cells monitored based on the layer of the associated SSB.

#### 9.10D.3.4 Measurements reporting requirements

NOTE: The UE is not required to report CSI-RS based L3 measurements when the timing offset between the reference measurement timing and the target CSI-RS in one layer is larger than one CP. If the UE reports CSI-RS based L3 measurements when the timing offset exceeds one CP, the UE may not meet the CSI-RS based L3 measurement accuracy requirements for CSI-RSRP, CSI-RSRQ and CSI-SINR in TS 38.133 [2] clause 10.1, which apply only when the timing offset is no larger than one CP.

##### 9.10D.3.4.1 Periodic Reporting

Reported CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.1.4.3, 10.1.9.2 and 10.1.14.2.

##### 9.10D.3.4.2 Event-triggered Periodic Reporting

Reported CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.1.4.3, 10.1.9.2, and 10.1.14.2.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 9.10D.3.4.3.

##### 9.10D.3.4.3 Event-triggered Reporting

Reported CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.1.4.3, 10.1.9.2 and 10.1.14.2.

The UE shall not send any event triggered measurement reports, as long as no reporting criteria are fulfilled.

The measurement reporting delay is defined as the time between an event that will trigger a measurement report and the point when the UE starts to transmit the measurement report over the air interface. This requirement assumes that the measurement report is not delayed by other RRC signalling on the DCCH. This measurement reporting delay excludes a delay uncertainty resulted when inserting the measurement report to the TTI of the uplink DCCH. The delay uncertainty is: 2 × TTIDCCH. This measurement reporting delay excludes a delay which caused by no UL resources for UE to send the measurement report.

The event triggered measurement reporting delay, measured without L3 filtering shall be within CSI-RS based measurement defined in clause.When L3 filtering is used an additional delay can be expected.

#### 9.10D.3.5 Inter-frequency measurements with measurement gaps

When measurement gaps are provided, if configured with the higher layer parameters *CSI-RS-Resource-Mobility* and *associatedSSB,* the UE shall be able to identify a new detectable CSI-RS based inter-frequency cell within T CSI-RS\_identify\_inter,

 T CSI-RS\_identify\_inter = (TPSS/SSS\_sync + T CSI-RS\_measurement\_period\_inter + TCSI-RS\_SFN\_inter) ms

Where:

 TPSS/SSS\_sync is the time period used in PSS/SSS detection which is determined according to TPSS/SSS\_sync\_inter in clause9.3D.4,

TCSI-RS\_SFN\_inter is the time period used to acquire the SFN information of the cell being measured, which is shown in table 9.10D.3.5-3 for FR1,

 TCSI-RS\_measurement\_period\_inter: equal to a measurement period of CSI-RS based measurement given in table 9.10D.3.5-1.

 CSSFinter: it is a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in clause 9.1D.5 for measurement conducted within measurement gaps.

 If a UE which supports concurrent measurement gaps has been configured with concurrent measurement gaps, Kp\_CSI-RS is the scaling factor for a CSI-RS frequency layer to be measured within the associated measurement gap which is defined as Kp\_CSI-RS = Ntotal / Navailable. Kp\_CSI-RS = 1 for for UE not configured with concurrent measurement gaps.

- For a window W of duration max(CSI-RS period, MGRP\_max), where MGRP\_max is the maximum MGRP across all configured per-UE MG and per-FR1 MG within the same FR as the CSI-RS frequency layer, and starting at the beginning of any gap occasions covering the CSI-RS resources.:

- Ntotal is the total number of associated gap occasions covering CSI-RS resources within the window, including both dropped and non-dropped instances of the associated measurement gap within the window, and

- Navailable is the number of non-dropped associated gap occasions covering CSI-RS resources within the window W, after accounting for MG collisions by applying the selected gap collision rule.

- Requirements do not apply if Navailable = 0

For UE supporting *antennaArrayType-r18*,

Klayer1\_measurement=1,

- if all of the reference signals configured for RLM, BFD, CBD or L1-RSRP for beam reporting outside measurement gap are not fully overlapped by intra-frequency SMTC occasions, or

- if all of the reference signal configured for RLM, BFD, CBD or L1-RSRP for beam reporting outside measurement gap and fully-overlapped by intra-frequency SMTC occasions are not overlapped with any of the SSB symbols and the RSSI symbols, and 1 symbol before each consecutive SSB symbols and the RSSI symbols, and 1 symbol after each consecutive SSB symbols and the RSSI symbols, given that *SSB-ToMeasure* and *SS-RSSI-Measurement* are configured, where SSB symbols are indicated by the union set of *SSB-ToMeasure* from all the configured measurement objects on the same serving carrier which can be merged.and RSSI symbols are indicated by *SS-RSSI-Measurement*;

Klayer1\_measurement=1.5, otherwise.

For UE not supporting *antennaArrayType-r18*, Klayer1\_measurement=1.

Additionally, for a given CSI-RS resource, if the associated SSB is configured but not detected by the UE, or if CSI-RS configured with associated SSB but not QCL-ed to the associated SSB, the UE is not required to monitor the corresponding CSI-RS resource.

Table 9.10D.3.5-1: Measurement period for CSI-RS based inter-frequency measurements with gaps (FR1)

|  |  |
| --- | --- |
| Condition NOTE1 | T CSI-RS\_measurement\_period\_inter |
| No DRX | Max(200 ms, ceil(8 × Kp\_CSI-RS x N1Note 3 x Klayer1\_measurement ) × Max(MGRP, CSI-RS period)) × CSSFinter |
| DRX cycle ≤ 320 ms | Max(200 ms, Ceil(8 × 1.5 × Kp\_CSI-RS x N1Note 3 x Klayer1\_measurement )) × Max(MGRP, CSI-RS period, DRX cycle)) × CSSFinter |
| DRX cycle > 320 ms | Ceil(8 × Kp\_CSI-RS x N1Note 3 x Klayer1\_measurement ) × DRX cycle × CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1NOTE 2: Kp\_CSI-RS is applicable for a UE supporting concurrent gapsNOTE 3: For ATG UE capable of *antennaArrayType-r18*, N1 = 3 when network assistance on ATG cells reference locations is provided, otherwise N1 = 4.Otherwise, N1 = 1. |

Table 9.10D.3.5-2: Void

Table 9.10D.3.5-3: Time period for SFN acquisition for inter-frequency CSI-RS based measurements with gaps(FR1)

|  |  |
| --- | --- |
| Condition NOTE1 | T CSI-RS\_SFN\_inter |
| No DRX | Max(200 ms, ceil(5 × Kp\_CSI-RS x N1Note 3 x Klayer1\_measurement )× Max(MGRP, SMTC period)) × CSSFinter |
| DRX cycle ≤ 320 ms | Max(200 ms, Ceil(5 × 1.5 × Kp\_CSI-RS x N1Note 3 x Klayer1\_measurement ) × Max(MGRP, SMTC period, DRX cycle)) × CSSFinter |
| DRX cycle > 320 ms | Ceil(5 × Kp\_CSI-RS x N1Note 3 x Klayer1\_measurement )× DRX cycle × CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1NOTE 2: Kp\_CSI-RS is applicable for a UE supporting concurrent gapsNOTE 3: For ATG UE capable of *antennaArrayType-r18*, N1 = 3 when network assistance on ATG cells reference locations is provided, otherwise N1 = 4.Otherwise, N1 = 1. |

<End of Change 1>