**3GPP TSG-RAN4 Meeting #100-e *R4-2115322***

**Electronic meeting, Aug. 16 – 27, 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.133** | **CR** | **Draft** | **rev** | **1** | **Current version:** | **16.8.0** |  |
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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:*** | Draft CR on CSI-RS based measurement requirements | | | | | | | | | |
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| ***Source to WG:*** | CATT | | | | | | | | | |
| ***Source to TSG:*** | R4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_CSIRS\_L3meas-Core | | | | |  | ***Date:*** | | | 2021-08-04 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories 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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | 1. The starting point of 5ms window is only for intra-frequency measurement and should not be in the introduction section. 2. Two separate 5ms windows for intra-frequency measurementshould be also supported in FR2. 3. The SFN acquisition time for FR1 in intra-frequency measurement is missing. 4. For SSB index acquisition time in intra-frequency measurement, the intra-frequency measurement with gap and inter-frequency (i.e. TSSB\_time\_index\_intra in clause 9.2.6.2 and TSSB\_time\_index\_inter in clause 9.3.4) should not be considered. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1. Move the starting point definition of 5ms window to intra-frequency measurement section. 2. Remove the editor’s notes on two separated 5ms windows. 3. Add the SFN acquisition time in FR1. 4. For intra-frequency measurement, remove the TSSB\_time\_index\_intra in clause 9.2.6.2 and TSSB\_time\_index\_inter in clause 9.3.4 to align with other CSI-RS requirements. | | | | | | | | |
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| ***Consequences if not approved:*** | | 1. The CSI-RS based measurement requirements are incomplete. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 9.10.1, 9.10.2.2, 9.10.2.5, 9.10.3.2, 9.10.3.5 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | | Revised from R4-2111981. | | | | | | | | |

<Start of Change 1>

## 9.10 CSI-RS based L3 measurements

### 9.10.1 Introduction

This clause contains general requirements on the 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

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

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

- the associated SSB is QCLed with the corresponding CSI-RS resources in FR2, 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*.

### 9.10.2 CSI-RS based intra-frequency measurements

#### 9.10.2.1 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 or the PSCell.

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 clause9.10.2.6.

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

#### 9.10.2.2 Requirements applicability

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

The requirements in clause 9.10.2 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 5ms, and 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 20ms or 40ms, and

- The gap between two 5ms windows is half of the CSI-RS periodicity, and

- The starting point of the first 5ms 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 5ms window, if applicable, is determined by an offset of half of the CSI-RS periodicity in slots with regards to the starting point of the first 5ms 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 and 10.1.3.1 for FR1 and FR2, respectively, for a corresponding Band,

- SS-RSRQ related side conditions given in clauses 10.1.7.1 and 10.1.8.1 for FR1 and FR2, respectively, for a corresponding Band,

- SS-SINR related side conditions given in clauses 10.1.12.1 and 10.1.13.1 for FR1 and FR2, respectively, 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 and 10.1.3.3 for FR1 and FR2, respectively, for a corresponding Band,

- CSI-RSRQ related side conditions given in clauses 10.1.7.2 and 10.1.8.2 for FR1 and FR2, respectively, for a corresponding Band,

- CSI-SINR related side conditions given in clauses 10.1.12.2 and 10.1.13.2 for FR1 and FR2, respectively, for a corresponding Band,

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

#### 9.10.2.3 Number of cells and number of CSI-RS

##### 9.10.2.3.1 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

##### 9.10.2.3.2 Requirements for FR2

For one single intra-frequency CSI-RS layer in a band, 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, 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.

where this single intra-frequency layer shall be:

- PCC on which UE is configured to report CSI-RS measurement when UE is configured with SA NR operation mode with PCC in the band; or

- PSCC on which UE is configured to report CSI-RS measurement when UE is configured with EN-DC with PSCC in the band; or

- One of the SCCs on which UE is configured to report CSI-RS based measurements when neither PCC nor PSCC is in the same band, so that the selected SCC shall be an SCC where the UE is configured with CSI-RSRP measurement reporting if such SCC exists, otherwise the selected SCC is determined by UE implementation.

The UE shall also be capable of performing CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements for at least 2 CSI-RSs on serving cell for each of the other intra-frequency layer(s) in the same band.

For each FR2 band, UE is only required to measure neighbour cell CSI-RS on the CSI-RS layer, whose associated SSB should be on the same SSB layer as the one where UE is required to measure neighbour cell SSB.

#### 9.10.2.4 Measurement Reporting Requirements

##### 9.10.2.4.1 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, 10.1.3.3, 10.1.7.2, 10.1.8.2, 10.1.12.2 and 10.1.13.2.

##### 9.10.2.4.2 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, 10.1.3.3, 10.1.7.2, 10.1.8.2, 10.1.12.2 and 10.1.13.2.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 9.10.2.4.3.

##### 9.10.2.4.3 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, 10.1.3.3, 10.1.7.2, 10.1.8.2, 10.1.12.2 and 10.1.13.2.

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 9.10.2.5. When L3 filtering is used an additional delay can be expected.

#### 9.10.2.5 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 9.2.5.1.

The time period used to acquire the SFN information is TCSI-RS\_SFN\_intra as shown in Table 9.10.2.5-3 for FR1 and is intra-frequency TSSB\_time\_index\_intra in Clause 9.2.5.1 for FR2. If the UE is indicated that the neighbour cell is synchronous with the serving cell (*deriveSSB-IndexFromCell* is enabled), the time period is equal to 0. It is assumed that deriveSSB-IndexFromCell is always enabled for FR1 TDD and FR2.If the associatedSSB, which has been detectable at least for the time period Tidentify\_intra\_with\_index defined in clause 9.2.5.1, 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 Tc, PSS/SSS detection time and time period used to acquire the SFN information are equal to 0.

The measurement period for intra-frequency measurements without gaps is as shown in table 9.10.2.5-1and Table 9.10.2.5-2.

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 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 9.10.2.5-1: Measurement period for intrafrequency CSI-RS based measurements without gaps(FR1)

|  |  |
| --- | --- |
| DRX cycle | T CSI-RS\_measurement\_period\_intra |
| No DRX | max(200ms, ceil( [5] x Kp\_CSI-RS) x CSI-RS period) x CSSFintra |
| DRX cycle≤ 320ms | max(200ms, ceil(1.5x [5] x Kp\_CSI-RS) x max(CSI-RS period, DRX cycle)) x CSSFintra |
| DRX cycle>320ms | ceil( [5] x Kp\_CSI-RS) 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 TS38.211 [6]. | |

Table 9.10.2.5-2: Measurement period for intrafrequency CSI-RS based measurements without gaps(FR2)

|  |  |
| --- | --- |
| DRX cycle | T CSI-RS\_measurement\_period\_intra |
| No DRX | max(400ms, ceil(Mmeas\_period\_w/o\_gaps x Kp\_CSI-RS) x CSI-RS period) x CSSFintra |
| DRX cycle≤ 320ms | max(400ms, ceil(1.5x Mmeas\_period\_w/o\_gaps x Kp\_CSI-RS) x max(CSI-RS period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | Mmeas\_period\_w/o\_gaps 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 TS38.211 [6]. | |

Table 9.10.2.5-3: Time period for SFN acquisition for intrafrequency CSI-RS based measurements without gaps(FR1)

|  |  |
| --- | --- |
| DRX cycle | TCSI-RS\_SFN\_intra |
| No DRX | max(200ms, ceil([5] x Kp )x SMTC period)Note 1 x CSSFintra |
| DRX cycle≤ 320ms | max(2000ms, ceil (1.5 x [5] x Kp) x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | Ceil([5] x Kp) 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 identified | |

Mmeas\_period\_w/o\_gaps : For a UE supporting power class 1, Mmeas\_period\_w/o\_gaps =[40]. For a UE supporting FR2 power class 2, Mmeas\_period\_w/o\_gaps =[24]. For a UE supporting power class 3, Mmeas\_period\_w/o\_gaps =[24]. For a UE supporting power class 4, Mmeas\_period\_w/o\_gaps =[24].

CSSFintra: it is a carrier specific scaling factor and is determined according to CSSFoutside\_gap,i in clause 9.1.5.

- if intra-frequency CSI-RS resource is fully non overlapping with measurement gaps, Kp\_CSI-RS=1;

- if intra-frequency CSI-RS resource is partially overlapping with measurement gaps, Kp\_CSI-RS = 1/(1- (CSI-RS resource period /MGRP)).

#### 9.10.2.6 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.

##### 9.10.2.6.1 Scheduling availability of UE performing CSI-RS based measurements in TDD bands

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

- 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 should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with the aforementioned restricted symbols.

##### 9.10.2.6.2 Scheduling availability of UE performing CSI-RS based measurements in FR2

When the UE performs CSI-RS based intra-frequency measurements for L3 mobility management in FR2, the following restrictions apply.

- The UE is not expected to transmit PUCCH/PUSCH/SRS or receive PDCCH/PDSCH/TRS/CSI-RS for CQI on the configured CSI-RS symbol within the configured slot as indicated in *slotConfig* of the corresponding CSI-RS resource to be measured for mobility.

When intra-band carrier aggregation in FR2 is performed, the scheduling restrictions due to a given serving cell should also apply to all other serving cells in the same band on the symbols that fully or partially overlap with aforementioned restricted symbols.

When inter-band carrier aggregation in FR2 is performed, there are no scheduling restrictions on FR2 serving cells in the bands due to CSI-RSRP, CSI-RSRQ or CSI-SINR measurement on an FR2 intra-frequency cell in different bands, provided that UE is capable of independent beam management on this FR2 band pair.

### 9.10.3 CSI-RS based Inter-frequency measurements

#### 9.10.3.1 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 9.10.2.

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. When the inter-frequency cells are in FR2 and the per-FR gap is configured to the UE in EN-DC, SA NR, NE-DC and NR-DC, or the serving cells are in FR2, the inter-frequency cells are in FR2 and the per-UE gap is configured to the UE in SA NR and NR-DC, the switching time is 0.25ms. Otherwise the switching time is 0.5ms.

#### 9.10.3.2 Requirements applicability

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

The requirements in clause 9.10.3 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 5ms, 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 and 10.1.5.1 for FR1 and FR2, respectively, for a corresponding Band,

- SS-RSRQ related side conditions given in clauses 10.1.9.1 and 10.1.10.1 for FR1 and FR2, respectively, for a corresponding Band,

- SS-SINR related side conditions given in clauses 10.1.14.1 and 10.1.15.1 for FR1 and FR2, respectively, 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 and 10.1.5.3 for FR1 and FR2, respectively, for a corresponding Band,

- CSI-RSRQ related side conditions given in clauses 10.1.9.2 and 10.1.10.2 for FR1 and FR2, respectively, for a corresponding Band,

- CSI-SINR related side conditions given in clauses 10.1.14.2 and 10.1.15.2 for FR1 and FR2, respectively, for a corresponding Band,

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

#### 9.10.3.3 Number of cells and number of CSI-RS resources

##### 9.10.3.3.1 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.

##### 9.10.3.3.2 Requirements for FR2

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:

- 24 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 the associated SSB.

#### 9.10.3.4 Measurements reporting requirements

##### 9.10.3.4.1 Periodic Reporting

Reported CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.1.4.2, 10.1.5.2, 10.1.9.2, 10.1.10.2, 10.1.14.2 and 10.1.15.2.

##### 9.10.3.4.2 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 10.1.4.2, 10.1.5.2, 10.1.9.2, 10.1.10.2, 10.1.14.2 and 10.1.15.2.

The first report in event triggered periodic measurement reporting shall meet the requirements specified in clause 9.10.3.4.3.

##### 9.10.3.4.3 Event-triggered Reporting

Reported CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements contained in periodically triggered measurement reports shall meet the requirements in clauses 10.1.4.2, 10.1.5.2, 10.1.9.2, 10.1.10.2, 10.1.14.2 and 10.1.15.2.

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 9.10.3.5.When L3 filtering is used an additional delay can be expected.

#### 9.10.3.5 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 clause9.3.4,

TCSI-RS\_SFN\_inter is the time period used to acquire the SFN information of the cell being measured, which is shown in Table 9.10.3.5-3 for FR1 and equals inter-frequency TSSB\_time\_index\_inter in Clause 9.3.4 for FR2,

TCSI-RS\_measurement\_period\_inter: equal to a measurement period of CSI-RS based measurement given in table 9.10.3.5-1 and table 9.10.3.5-2.

Mmeas\_period\_inter: For a UE supporting FR2 power class 1, Mmeas\_period\_inter =8×N samples. For a UE supporting FR2 power class 2, Mmeas\_period\_inter=5×N samples. For a UE supporting FR2 power class 3, Mmeas\_period\_inter =5×N samples. For a UE supporting FR2 power class 4, Mmeas\_period\_inter = 5×N samples. Note that scaling factor N = [8]. CSSFinter: it is a carrier specific scaling factor and is determined according to CSSFwithin\_gap,i in clause 9.1.5 for measurement conducted within measurement gaps.

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 9.10.3.5-1: Measurement period for CSI-RS based inter-frequency measurements with gaps (Frequency FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | T CSI-RS\_measurement\_period\_inter |
| No DRX | Max(200ms, 8 × Max(MGRP, CSI-RS period)) × CSSFinter |
| DRX cycle ≤ 320ms | Max(200ms, Ceil(8 × 1.5) × Max(MGRP, CSI-RS period, DRX cycle)) × CSSFinter |
| DRX cycle > 320ms | 8 × DRX cycle × CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |

Table 9.10.3.5-2: Measurement period for CSI-RS based inter-frequency measurements with gaps (Frequency FR2)

|  |  |
| --- | --- |
| Condition NOTE1,2 | T CSI-RS\_measurement\_period\_inter |
| No DRX | Max(400 ms, Mmeas\_period\_inter × Max(MGRP, CSI-RS period)) × CSSFinter |
| DRX cycle ≤ 320ms | Max(400 ms, (1.5 × Mmeas\_period\_inter) × Max(MGRP, CSI-RS period, DRX cycle)) × CSSFinter |
| DRX cycle > 320ms | Mmeas\_period\_inter × DRX cycle × CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |

Table 9.10.3.5-3: Time period for SFN acuisition for interfrequency CSI-RS based measurements with gaps(Frequency FR1)

|  |  |
| --- | --- |
| Condition NOTE1,2 | T CSI-RS\_SFN\_inter |
| No DRX | Max(200ms, [5] × Max(MGRP, SMTC period)) × CSSFinter |
| DRX cycle ≤ 320ms | Max(200ms, Ceil([5] × 1.5) × Max(MGRP, SMTC period, DRX cycle)) × CSSFinter |
| DRX cycle > 320ms | [5] × DRX cycle × CSSFinter |
| NOTE 1: DRX or non DRX requirements apply according to the conditions described in clause 3.6.1  NOTE 2: In EN-DC operation, the parameters, timers and scheduling requests referred to in clause 3.6.1 are for the secondary cell group. The DRX cycle is the DRX cycle of the secondary cell group. | |

<End of Change 1>