**3GPP TSG-RAN4 Meeting # 112 *R4-2413086***

**Maastricht, Netherlands, 19th – 23rd August, 2024**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
|  |
|  | **38.133** | **CR** | **4896** | **rev** |  | **Current version:** | **18.6.0** |  |
|  |
| *For* ***[HE](http://www.3gpp.org/3G_Specs/CRs.htm%22%20%5Cl%20%22_blank)******[LP](http://www.3gpp.org/3G_Specs/CRs.htm%22%20%5Cl%20%22_blank)*** *on using this form: comprehensive instructions can be found at <http://www.3gpp.org/Change-Requests>.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network |  |

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|  |
| ***Title:***  | CR on R18 multi-Rx link recovery procedures |
|  |  |
| ***Source to WG:*** | ZTE Corporation, Sanechips |
| ***Source to TSG:*** | R4 |
|  |  |
| ***Work item code:*** | [NR\_FR2\_multiRX\_DL-Core] |  | ***Date:*** | 2024-08-09 |
|  |  |  |  |  |
| ***Category:*** | F |  | ***Release:*** | Rel-18 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
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| ***Reason for change:*** | In last meeting, some progress regarding CBD was achieved, we revise the relevant clauses to align the agreements.Furthermore, there is some redundant or incorrect description in 38.133, we refine such description. |
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| ***Summary of change:*** | 1. Revise the relevant clauses to align the agreements achieved in last meeting;
2. Refining the redundant or incorrect description.
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| ***Consequences if not approved:*** | Not align with the progress |
|  |  |
| ***Clauses affected:*** | 8.5.1, 8.5.7.3, 8.18.2.2, 8.18.5.2, 8.18.6.1, 8.18.6.2, 8.18.8.3 |
|  |  |
|  | **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>

## 8.5 Link Recovery Procedures

### 8.5.1 Introduction

The UE shall assess the downlink radio link quality of a serving cell based on the reference signal in the set  as specified in TS 38.213 [3] in order to detect beam failure on:

- PCell in SA, NR-DC, or NE-DC operation mode,

- PSCell in NR-DC and EN-DC operation mode,

- SCell in SA, NR-DC, NE-DC or EN-DC operation mode,

- Deactivated PSCell in NR-DC and EN-DC operation mode

The RS resource configurations in the set  on PCell, PSCell or deactivated PSCell (if configured with *bfd-and-RLM* with value *true*) can be periodic CSI-RS resources and/or SSBs. RS resource configuration in the set  on SCell shall be periodic CSI-RS. UE is not required to perform beam failure detection outside the active DL BWP unless the UE supports *bwpOperationMeasWithoutInterrupt-r18*, provided that the SSB is within the configured UE-specific CBW. UE is not required to meet the requirements in clause 8.5.2 and 8.5.3 if UE does not have set . UE is not required to perform beam failure detection on a deactivated SCell, and also not required to perform beam failure detection on resources which is implicitly configured for a deactivated SCell. When more than 2 periodic CSI-RS resources on a CC are configured in the set  for current SCell or implicitly configured in the set  for other SCell, it is up to UE implementation to select two of CSI-RS resources in active BWP in current CC to perform beam failure detection. UE is not required to perform beam failure detection on a SCell on which  is not configured.

On each RS resource configuration in the set , the UE shall estimate the radio link quality and compare it to the threshold Qout\_LR for the purpose of accessing downlink radio link quality of the serving cell beams.

When a CORESET that the UE uses for monitoring PDCCH includes two TCI states and the UE is provided *sfnSchemePdcch* set to 'sfnSchemeA' or 'sfnSchemeB', the UE shall estimate a single downlink radio link quality to derive a single SNR and compare it to the single thresholds Qout\_LR for the purpose of accessing downlink radio link quality of the serving cell beams. How to compute the single SNR based on two active TCI states is up to UE implementation.

The threshold Qout\_LR is defined as the level at which the downlink radio level link of a given resource configuration on set  cannot be reliably received and shall correspond to the BLERout = 10% block error rate of a hypothetical PDCCH transmission. For SSB based beam failure detection, Qout\_LR\_SSB is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.5.2.1-1. For CSI-RS based beam failure detection, Qout\_LR\_CSI-RS is derived based on the hypothetical PDCCH transmission parameters listed in Table 8.5.3.1-1.

Upon request the UE shall deliver configuration indexes from the set as specified in TS 38.213 [3] , to higher layers, and the corresponding L1-RSRP measurement provided that the measured L1-RSRP is equal to or better than the threshold Qin\_LR, which is indicated by higher layer parameter *rsrp-ThresholdSSB*. The UE applies the Qin\_LR threshold to the L1-RSRP measurement obtained from an SSB. The UE applies the Qin\_LR threshold to the L1-RSRP measurement obtained for a CSI-RS resource after scaling a respective CSI-RS reception power with a value provided by higher layer parameter *powerControlOffsetSS*. The RS resource configurations in the set  can be periodic CSI-RS resources or SSBs or both SSB and CSI-RS resources. UE is not required to perform candidate beam detection outside the active DL BWP unless the UE supports *bwpOperationMeasWithoutInterrupt-r18*, provided that the SSB is within the configured UE-specific CBW. UE is not required to perform candidate beam detection on a SCell on which  is not configured.

For a deactivated SCG, the UE may be provided via an RRC reconfiguration message with *tci-info* for PDCCH/PDSCH reception at the transition from deactivated SCG to activated SCG while the SCG is deactivated. After the reception of the RRC reconfiguration message the UE shall perform the BFD on the PSCellof the deactivated SCG using the TCI states accroding to *tci-info* specified in clause 6.3.2 in TS38.331[2]*.*

For UE supporting *ncd-SSB-BWP-Wor-r18*, the SSB and SMTC in this section applies for both CD-SSB and NCD-SSB if it is not additional specified. If SSB in the active DL BWP of serving cell *i* is NCD-SSB, for serving cell *i* the requirements in clause 8.1 apply provided that serving cell *i* is PCell or activated PSCell.

# <End of Change #1>

# ~~<Start of Change #2>~~

### ~~8.5.2 Requirements for SSB based beam failure detection~~

#### ~~8.5.2.2 Minimum requirement~~

~~UE shall be able to evaluate whether the downlink radio link quality on the configured SSB resource in set  estimated over the last T~~~~Evaluate\_BFD\_SSB~~ ~~ms period becomes worse than the threshold Q~~~~out\_LR\_SSB~~ ~~within T~~~~Evaluate\_BFD\_SSB~~ ~~ms period.~~

~~The value of T~~~~Evaluate\_BFD\_SSB~~ ~~is defined in Table 8.5.2.2-1 or Table 8.5.2.2-4 (deactivated PSCell) for FR1.~~

~~The value of T~~~~Evaluate\_BFD\_SSB~~ ~~is defined in Table 8.5.2.2-2 or Table 8.5.2.2-5 (deactivated PSCell) for FR2 with scaling factor N, where~~

~~N =~~ *~~2,4, or 6~~* ~~for serving cell in FR2-1 for UE supporting~~ *~~fastBeamSweepingMultiRx-r18~~*

~~according to the conditions in clause 3.6.19,~~

~~N=8 for other cases in FR2-1, and~~

~~N=12 for FR2-2,~~

~~for FR2 power classes other than power class 6 or for FR2 power class 6 when~~ *~~highSpeedMeasFlagFR2-r17~~* ~~is not configured.~~

~~The value of T~~~~Evaluate\_BFD\_SSB~~ ~~is defined in Table 8.5.2.2-5 (deactivated PSCell) for FR2 with scaling factor N=8 for FR2-1 and N=12 for FR2-2, for FR2 power classes other than power class 6 or for FR2 class 6 when~~ *~~highSpeedMeasFlagFR2-r17~~* ~~is not configured.~~

~~The value of T~~~~Evaluate\_BFD\_SSB~~ ~~is defined in Table 8.5.2.2-3 for FR2 power class 6 UE configured with~~ *~~highSpeedMeasFlagFR2-r17~~*~~.~~

**~~--- Unchanged text in this clause is omitted ---~~**

# ~~<End of Change #2>~~

# ~~<Start of Change #3>~~

### ~~8.5.3 Requirements for CSI-RS based beam failure detection~~

#### ~~8.5.3.3 Measurement restrictions for CSI-RS beam failure detection~~

~~The SSB mentioned in this clause can be associated with either the serving cell PCI or a PCI different from serving cell PCI.~~

~~The UE is required to be capable of measuring CSI-RS for BFD without measurement gaps. The UE is required to perform the CSI-RS measurements with measurement restrictions as described in the following scenarios.~~

~~For both FR1 and FR2, when the CSI-RS for BFD measurement is in the same OFDM symbol as SSB for RLM, BFD, CBD or L1-RSRP measurement, UE is not required to receive CSI-RS for~~ ~~BFD measurement in the PRBs that overlap with an SSB.~~

~~For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has same SCS than CSI-RS for BFD measurement, the UE shall be able to perform CSI-RS measurement without restrictions.~~

~~For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has different SCS than CSI-RS for BFD measurement, the UE shall be able to perform CSI-RS measurement with restrictions according to its capabilities:~~

~~- If the UE supports~~ *~~simultaneousRxDataSSB-DiffNumerology~~* ~~the UE shall be able to perform CSI-RS measurement without restrictions.~~

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

~~For FR1, when the CSI-RS for BFD measurement is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement, UE shall be able to measure the CSI-RS for BFD measurement without any restriction.~~

~~For FR2, when the CSI-RS for BFD measurement on one CC is in the same OFDM symbol as SSB for RLM, BFD or L1-RSRP measurement on the same CC or different CCs in the same band, or in the same symbol as SSB for CBD measurement on the same CC or different CCs in the same band when beam failure is detected, UE is required to measure one of but not both CSI-RS for BFD measurement and SSB. Longer measurement period for CSI-RS based BFD measurement is expected, and no requirements are defined.~~

~~For UE incapable of [~~*~~capability of measurement with RTD>CP~~*~~] and for UE capable of [~~*~~capability of measurement with RTD>CP~~*~~],~~

~~- For both FR1 and FR2, when the CSI-RS for BFD measurement fully or partially overlaps with the OFDM symbol as SSB from candidate LTM neighbor cell for intra-frequency L1-RSRP measurement or inter-frequency L1-RSRP measurement without gap, UE is not required to receive CSI-RS for BFD measurement in the PRBs that overlap with an SSB.~~

~~- For FR1, when the CSI-RS for BFD measurement fully or partially overlaps with the OFDM symbol as SSB from candidate LTM neighbor cell for intra-frequency L1-RSRP measurement or inter-frequency L1-RSRP measurement without gap, if CSI-RS and SSB have different SCS and UE does not support simultaneousRxDataSSB-DiffNumerology, UE is required to measure one of but not both CSI-RS for BFD measurement and SSB. Longer measurement period for CSI-RS based BFD is expected, and no requirements are defined.~~

~~- For FR2, when the CSI-RS for BFD measurement on one CC fully or partially overlaps with the OFDM symbol as SSB from candidate LTM neighbor cell for intra-frequency L1-RSRP measurement or inter-frequency L1-RSRP measurement without gap in the same band, UE is required to measure one of but not both CSI-RS for BFD measurement and SSB. Longer measurement period for CSI-RS based BFD is expected, and no requirements are defined.~~

~~For FR2, when the CSI-RS for BFD measurement on one CC is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band,~~

~~- In the following cases, UE is required to measure one of but not both CSI-RS for BFD measurement and the other CSI-RS. Longer measurement period for CSI-RS based BFD measurement is expected, and no requirements are defined.~~

~~- The CSI-RS for BFD measurement or the other CSI-RS in a resource set configured with repetition ON, or~~

~~- The other CSI-RS is configured in set  and beam failure is detected, or~~

~~- The two CSI-RS-es are not QCL-ed w.r.t. QCL-TypeD, or the QCL information is not known to UE,~~

~~- Otherwise, UE shall be able to measure the CSI-RS for BFD measurement without any restriction.~~

~~For FR2-1, when the first CSI-RS for BFD measurement is in the same OFDM symbol as the second CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same serving cell according to the conditions in clause 3.6.19, the UE supporting~~ *~~schedulingMeasurementRelaxation-r18~~* ~~is required to measure both the first and the second CSI-RSs without measurement restrictions, provided the following conditions are met:~~

~~- Both CSI-RSs are not in any CSI-RS resource set with repetition ON, and~~

~~- One CSI-RS has same QCL source as the active TCI state of one PDSCH, and the other CSI-RS has same QCL source as the active TCI state of the other PDSCH, and~~

~~- [The two CSI-RS resources and both PDSCHs are overlapped on the same OFDM symbol], and~~

~~- Resources of the active TCI states for the two PDSCHs have been reported as a resource group in Rel-17 group-based RSRP report.~~

~~Editor’s note 1: FFS remove the condition [The two CSI-RS resources and both PDSCHs are overlapped on the same OFDM symbol]~~

# ~~<End of Change #3>~~

# ~~<Start of Change #4>~~

### ~~8.5.5 Requirements for SSB based candidate beam detection~~

#### ~~8.5.5.2 Minimum requirement~~

~~Upon request the UE shall be able to evaluate whether the L1-RSRP measured on the configured SSB resource in set  estimated over the last T~~~~Evaluate\_CBD\_SSB~~ ~~ms period becomes better than the threshold Q~~~~in\_LR~~ ~~provided SSB\_RP and SSB Ês/Iot are according to Annex Table B.2.4.1 for a corresponding band.~~

~~The UE shall monitor the configured SSB resources using the evaluation period in table 8.5.5.2-1 and 8.5.5.2-2 corresponding to the non-DRX mode, if the configured DRX cycle ≤ 320ms.~~

~~The value of T~~~~Evaluate\_CBD\_SSB~~ ~~is defined in Table 8.5.5.2-1 for FR1.~~

~~The value of T~~~~Evaluate\_CBD\_SSB~~ ~~is defined in Table 8.5.5.2-2 for FR2 with scaling factor N, where~~

~~N =~~ *~~2,4 or 6~~* ~~for serving cell in FR2-1 if the UE supports~~ *~~fastBeamSweepingMultiRx-r18~~*

~~according to the conditions in clause 3.6.19.,~~

~~N=8 for other cases in FR2-1, and~~

~~N=12 for FR2-2.~~

**~~--- Unchanged text in this clause is omitted ---~~**

# ~~<End of Change #4>~~

# ~~<Start of Change #5>~~

### ~~8.5.6 Requirements for CSI-RS based candidate beam detection~~

#### ~~8.5.6.2 Minimum requirement~~

~~Upon request the UE shall be able to evaluate whether the L1-RSRP measured on the configured CSI-RS resource in set  estimated over the last T~~~~Evaluate\_CBD\_CSI-RS~~ ~~[ms] period becomes better than the threshold Q~~~~in\_LR~~ ~~within T~~~~Evaluate\_CBD\_CSI-RS~~ ~~[ms] period provided CSI-RS Ês/Iot is according to Annex Table B.2.4.2 for a corresponding band.~~

~~The UE shall monitor the configured CSI-RS resources using the evaluation period in table 8.5.6.2-1 and 8.5.6.2-2 corresponding to the non-DRX mode, if the configured DRX cycle ≤ 320ms.~~

~~The value of T~~~~Evaluate\_CBD\_CSI-RS~~ ~~is defined in Table 8.5.6.2-1 for FR1.~~

~~The value of T~~~~Evaluate\_CBD\_CSI-RS~~ ~~is defined in Table 8.5.6.2-2 for FR2 with scaling factor N, where~~

~~N =~~ *~~2,4 or 6~~* ~~for serving cell in FR2-1 if the UE supports~~ *~~fastBeamSweepingMultiRx-r18~~*

 ~~according to the conditions in clause 3.6.19~~

~~N=8 for other cases in FR2-1, and~~

~~N=12 for FR2-2.~~

**~~--- Unchanged text in this clause is omitted ---~~**

# ~~<End of Change #5>~~

# <Start of Change #6>

### 8.5.7 Scheduling availability of UE during beam failure detection

#### 8.5.7.3 Scheduling availability of UE performing beam failure detection on FR2

The following scheduling restriction applies due to beam failure detection.

- For the case where no RSs are provided for BFD, or when CSI-RS is configured for BFD is explicitly configured and is type-D QCLed with active TCI state for PDCCH or PDSCH, and the CSI-RS is not in a CSI-RS resource set with repetition ON

- There are no scheduling restrictions due to beam failure detection performed based on the CSI-RS.

- For the case when UE supporting schedulingMeasurementRelaxation-r18 in FR2-1 is configured to receive two PDSCH transmission occasions from two different QCL sources on the cell according to the conditions in clause 3.6.19, there are no scheduling restrictions for the PDSCHs due to beam failure detection performed based on the CSI-RS, when following conditions are met:

- the CSI-RS configured for BFD is not in a CSI-RS resource set with repetition ON, and

- the CSI-RS configured for BFD has same QCL source as the active TCI state of one of PDSCHs and has different QCL-TypeD from the other PDSCH, and

- [The two CSI-RS resources and both PDSCHs are overlapped on the same OFDM symbol], and

- Resources of the active TCI states for the two PDSCHs have been reported as a resource group in Rel-17 group-based RSRP report

- Otherwise

- For FR2-1 or the BFD-RS is not using 480 kHz SCS or 960 kHz SCS on FR2-2, the UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on BFD-RS resource symbols to be measured for beam failure detection.

- For FR2-2 and the BFD-RS is using 480 kHz SCS or 960 kHz SCS, the UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on BFD-RS resource symbols to be measured for beam failure detection, and on one data symbol before each BFD-RS symbol to be measured and one data symbol after each BFD-RS symbol to be measured.

When intra-band carrier aggregation in FR2 is performed, the scheduling restrictions on FR2 serving PCell or PSCell apply to all serving cells in the same band on the symbols that fully or partially overlap with 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 beam failure detection performed on FR2 serving cell(s) in different band(s), provided that UE is capable of independent beam management on this FR2 band pair. Additionally, there is no scheduling restriction if the UE is configured with different numerology between SSB on one FR2 band and data on the other FR2 band provided the UE is configured for IBM operation for the band pair.

For FR2, if following conditions are met,

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

- The gap between UE’s reception of PDCCH that UE monitors in the Type2-PDCCH CSS set and that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots,

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

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

# <End of Change #6>

# <Start of Change #7>

## 8.18 TRP specific Link Recovery Procedures

### 8.18.2 Requirements for TRP specific SSB based beam failure detection

#### 8.18.2.2 Minimum requirement

UE shall be able to evaluate whether the downlink radio link quality on the configured SSB resource in two sets $\overbar{q}\_{0,0}$ and $\overbar{q}\_{0,1}$ estimated over the last TEvaluate\_BFD\_SSB ms period becomes worse than the threshold Qout\_LR\_SSB within TEvaluate\_BFD\_SSB ms period.

The value of TEvaluate\_BFD\_SSB is defined in Table 8.18.2.2-1 for FR1.

The value of TEvaluate\_BFD\_SSB is defined in Table 8.18.2.2-2 for FR2 with scaling factor N, where

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

N=8 for other cases in FR2.

**--- Unchanged text in this clause is omitted ---**

# <End of Change #7>

# ~~<Start of Change #8>~~

### ~~8.18.3 Requirements for CSI-RS based beam failure detection~~

#### ~~8.18.3.2 Minimum requirement~~

~~UE shall be able to evaluate whether the downlink radio link quality on the CSI-RS resource in two sets~~ $\overbar{q}\_{0,0}$ ~~and~~ $\overbar{q}\_{0,1}$ ~~estimated over the last T~~~~Evaluate\_BFD\_CSI-RS~~ ~~ms period becomes worse than the threshold Q~~~~out\_LR\_CSI-RS~~ ~~within T~~~~Evaluate\_BFD\_CSI-RS~~ ~~ms period.~~

~~The value of T~~~~Evaluate\_BFD\_CSI-RS~~ ~~is defined in Table 8.18.3.2-1 for FR1.~~

~~The value of T~~~~Evaluate\_BFD\_CSI-RS~~ ~~is defined in Table 8.18.3.2-2 for FR2 with N=1. The requirements of T~~~~Evaluate\_BFD\_CSI-RS~~ ~~apply provided that the CSI-RS for BFD is not in a resource set configured with repetition ON. The requirements shall not apply when the CSI-RS resource in the active TCI state of CORESET is the same CSI-RS resource for BFD and the TCI state information of the CSI-RS resource is not given, wherein the TCI state information means QCL Type-D to SSB for L1-RSRP or CSI-RS with repetition ON.~~

~~For UE supporting [~~*~~musim-GapPreference-r17]~~* ~~and is configured with one or more per-UE periodic MUSIM gaps,~~

~~- P value for an BFD CSI-RS resource to be measured is defined as~~

~~- N~~~~total~~ ~~/ N~~~~outside\_MG~~ ~~in FR1~~

~~- P~~~~sharing factor~~ ~~\* N~~~~total~~ ~~/ N~~~~outside\_MG~~ ~~in FR2 with N~~~~available~~ ~~= 0~~

~~- N~~~~total~~ ~~/ N~~~~available~~ ~~in FR2 with N~~~~available~~ ~~> 0~~

~~- For a window W of duration max(T~~~~CSI-RS,~~ ~~SMTC period, MGRP\_max), where MGRP max is the maximum MGRP across all configured per-UE periodic MUSIM gaps, per-UE measurement gaps and per-FR measurement gaps within the same FR as serving cell, and starting at the beginning of any configured BFD CSI-RS resource occasion:~~

~~- N~~~~total~~ ~~is the total number of configured BFD CSI-RS resource occasions within the window, including those overlapped with MUSIM gap occasions or SMTC occasions within the window, and~~

~~- N~~~~outside\_MG~~ ~~is the number of configured BFD CSI-RS resource occasions that are not overlapped with any MUSIM gap occasions within the window W~~

~~- N~~~~available~~ ~~is the number of configured BFD CSI-RS resource occasions that are not overlapped with any non-dropped MUSIM gap occasions nor any SMTC occasion within the window W~~

~~- T~~~~CSI-RS~~ ~~is periodicity of the target CSI-RS resource for BFD.~~

~~When the configured aperiodic MUSIM gap is overlapping with configured BFD CSI-RS resource occasions, longer evaluation period would be expected.~~

~~Requirements in this clause do not apply when N~~~~outside MG~~ ~~= 0 due to fully overlapping between target CSI-RS resource for BFD and MUSIM gap occasions within the window W.~~

~~Otherwise, when UE is not configured with periodic MUSIM gap(s) or not supporting MUSIM gap capability,~~

~~For FR1,~~

~~-~~ $P=\frac{1}{1−\frac{T\_{CSI−RS}}{MGRP}}$~~, when in the monitored cell there are measurement gaps configured for intra-frequency, inter-frequency or inter-RAT measurements, which are overlapping with some but not all occasions of the CSI-RS.~~

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

~~For FR2,~~

~~- P = 1, when the BFD-RS resource is not overlapped with measurement gap and also not overlapped with SMTC occasion.~~

~~-~~ $P=\frac{1}{1−\frac{T\_{CSI−RS}}{MGRP}}$~~, when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is not overlapped with SMTC occasion (T~~~~CSI-RS~~ ~~< MGRP)~~

~~-~~ $P=\frac{1}{1−\frac{T\_{CSI−RS}}{T\_{SMTCperiod}}}$~~, when the BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion (T~~~~CSI-RS~~ ~~< T~~~~SMTCperiod~~~~).~~

~~- P = P~~~~sharing factor~~~~, when the BFD-RS resource is not overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC occasion (T~~~~CSI-RS~~ ~~= T~~~~SMTCperiod~~~~).~~

~~-~~ $P=\frac{1}{1−\frac{T\_{CSI−RS}}{MGRP} − \frac{T\_{CSI−RS}}{T\_{SMTCperiod}}}$~~, when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion (T~~~~CSI-RS~~ ~~< T~~~~SMTCperiod~~~~) and SMTC occasion is not overlapped with measurement gap and~~

~~- T~~~~SMTCperiod~~ ~~≠ MGRP or~~

~~- T~~~~SMTCperiod~~ ~~= MGRP and T~~~~CSI-RS~~ ~~< 0.5 × T~~~~SMTCperiod~~

~~-~~ $P=\frac{P\_{sℎaring factor}}{1−\frac{T\_{CSI−RS}}{MGRP}}$~~, when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is partially overlapped with SMTC occasion (T~~~~CSI-RS~~ ~~< T~~~~SMTCperiod~~~~) and SMTC occasion is not overlapped with measurement gap and T~~~~SMTCperiod~~ ~~= MGRP and T~~~~CSI-RS~~ ~~= 0.5 × T~~~~SMTCperiod~~

~~-~~ $P=\frac{1}{1−\frac{T\_{CSI−RS}}{T\_{SMTCperiod}}}$~~, when the BFD-RS resource is partially overlapped with measurement gap (T~~~~CSI-RS~~ ~~< MGRP) and the BFD-RS resource is partially overlapped with SMTC occasion (T~~~~CSI-RS~~ ~~< T~~~~SMTCperiod~~~~) and SMTC occasion is partially or fully overlapped with measurement gap.~~

~~-~~ $P=\frac{P\_{sℎaring factor}}{1−\frac{T\_{CSI−RS}}{MGRP}}$~~, when the BFD-RS resource is partially overlapped with measurement gap and the BFD-RS resource is fully overlapped with SMTC occasion (T~~~~CSI-RS~~ ~~= T~~~~SMTCperiod~~~~) and SMTC occasion is partially overlapped with measurement gap (T~~~~SMTCperiod~~ ~~< MGRP)~~

~~where,~~

~~- P~~~~sharing factor~~ ~~= 1, if the BFD-RS resource outside measurement 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 with 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,~~

~~- P~~~~sharing factor~~ ~~= 3, otherwise.~~

 ~~If the high layer in TS 38.331 [2] signaling of~~ *~~smtc2~~* ~~is configured, T~~~~SMTCperiod~~ ~~corresponds to the value of higher layer parameter~~ *~~smtc2~~*~~; Otherwise T~~~~SMTCperiod~~ ~~corresponds to the value of higher layer parameter~~ *~~smtc1~~*~~. T~~~~SMTCperiod~~ ~~is the shortest SMTC period among all CCs in the same FR2 band, provided the SMTC offset of all CCs in FR2 have the same offset.~~

~~Note: The overlap between CSI-RS for BFD and SMTC means that CSI-RS for BFD is within the SMTC window duration.~~

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

~~For either an FR1 or FR2 serving cell, longer BFD evaluation period would be expected during the period T~~~~identify\_CGI~~ ~~when the UE is requested to decode an NR CGI.~~

~~For either an FR1 or FR2 serving cell, longer BFD evaluation period would be expected during the period T~~~~identify\_CGI,E-UTRAN~~ ~~when the UE is requested to decode an LTE CGI.~~

~~The values of M~~~~BFD~~ ~~used in Table 8.18.3.2-1 and Table 8.18.3.2-2 are defined as~~

~~- M~~~~BFD~~ ~~= 10, if the CSI-RS resource(s) in the two sets~~ $\overbar{q}\_{0,0}$ ~~and~~ $\overbar{q}\_{0,1}$ ~~used for BFD is transmitted with Density = 3 and over the bandwidth ≥ 24 PRBs.~~

~~The values of P~~~~BFD~~ ~~used in Table 8.18.3.2-1 and Table 8.18.3.2-2 are defined as~~

 ~~For each CSI-RS resource in the two sets~~ $\overbar{q}\_{0,0}$ ~~and~~ $\overbar{q}\_{0,1}$ ~~configured for PCell or PSCell in EN-DC or NE-DC or SA; or PCell in NR-DC~~

~~- P~~~~BFD~~ ~~= 1.~~

~~For each CSI-RS resource in the two sets~~ $\overbar{q}\_{0,0}$ ~~and~~ $\overbar{q}\_{0,1}$ ~~configured for PSCell in NR-DC~~

~~P~~~~BFD~~ ~~= 2 if UE is configured for beam failure detection on SCell, 1 otherwise.~~

 ~~For each CSI-RS resource in the two sets~~ $\overbar{q}\_{0,0}$ ~~and~~ $\overbar{q}\_{0,1}$ ~~configured for a SCell~~

~~- P~~~~BFD~~ ~~= Z in EN-DC or NE-DC or SA.~~

~~- P~~~~BFD~~ ~~= 2\* Z in NR-DC.~~

~~Where Z is the number of band(s) on which UE is performing beam failure detection only for SCell.~~

~~For UE not supporting~~ *~~schedulingMeasurementRelaxation-r18~~*~~, the values of P~~~~TRP~~ ~~in table 8.18.3.2-2 is defined as 2, if SSB/CSI-RS resources in the two sets~~ $\overbar{q}\_{0,0}$ ~~and~~ $\overbar{q}\_{0,1}$ ~~are overlapped, else it is 1.~~

~~For FR2-1, for UE supporting~~ *~~schedulingMeasurementRelaxation-r18~~*~~, according to the conditions described in clause 3.6.19, the value of P~~~~TRP~~ ~~in table 8.18.3.2-2 is defined as 1, when:~~

~~- CSI-RS resources in the two sets~~ $\overbar{q}\_{0,0}$ ~~and~~ $\overbar{q}\_{0,1}$ ~~are not overlapped, or~~

~~- CSI-RS resources in the two sets~~ $\overbar{q}\_{0,0}$ ~~and~~ $\overbar{q}\_{0,1}$ ~~are overlapped and the following conditions are met:~~

~~- Both CSI-RSs are not in any CSI-RS resource set with repetition ON~~

~~- The two CSI-RS resources in the two sets~~ $\overbar{q}\_{0,0}$ ~~and~~ $\overbar{q}\_{0,1}$ ~~for beam failure detection [and both PDSCH] are overlapped on the same OFDM symbol.~~

~~- [The CSI-RS in set~~ $\overbar{q}\_{0,0}$ ~~has same QCL source as the active TCI state of one PDSCH, and the CSI-RS in set~~ $\overbar{q}\_{0,1}$ ~~has same QCL source as the active TCI state of the other PDSCH]~~

~~- Resources of the active TCI states for the two PDSCHs have been reported as a resource group in Rel-17 group-based RSRP report.~~

~~- [FFS how to capture UE is activated with multi-Rx operation]~~

~~- else, the value of P~~~~TRP~~ ~~is 2.~~

~~Table 8.18.2-1: Evaluation period T~~~~Evaluate\_BFD\_CSI-RS~~ ~~for FR1~~

|  |  |
| --- | --- |
| ~~Configuration~~ | ~~T~~~~Evaluate\_BFD\_CSI-RS~~ ~~(ms)~~  |
| ~~no DRX~~ | ~~Max(50, Ceil(M~~~~BFD~~ ~~× P × P~~~~BFD~~~~) × T~~~~CSI-RS~~~~)~~ |
| ~~DRX cycle ≤ 320ms~~ | ~~Max(50, Ceil(1.5 × M~~~~BFD~~ ~~× P × P~~~~BFD~~~~) × Max(T~~~~DRX~~~~, T~~~~CSI-RS~~~~))~~ |
| ~~DRX cycle > 320ms~~ | ~~Ceil(M~~~~BFD~~ ~~× P × P~~~~BFD~~~~) × T~~~~DRX~~ |
| ~~Note: T~~~~CSI-RS~~ ~~is the periodicity of CSI-RS resource in the two sets~~ $\overbar{q}\_{0,0}$ ~~and~~ $\overbar{q}\_{0,1}$~~. T~~~~DRX~~ ~~is the DRX cycle length.~~ |

**~~Table 8.18.3.2-2: Evaluation period T~~~~Evaluate\_BFD\_CSI-RS~~ ~~for FR2~~**

|  |  |
| --- | --- |
| ~~Configuration~~ | ~~T~~~~Evaluate\_BFD\_CSI-RS~~ ~~(ms)~~  |
| ~~no DRX~~ | ~~Max(50, Ceil(M~~~~BFD~~ ~~× P × N × P~~~~BFD~~~~\*P~~~~TRP~~~~) × T~~~~CSI-RS~~~~)~~ |
| ~~DRX cycle ≤ 320ms~~ | ~~Max(50, Ceil(1.5 × M~~~~BFD~~ ~~× P × N × P~~~~BFD~~~~\*P~~~~TRP~~~~) × Max(T~~~~DRX~~~~, T~~~~CSI-RS~~~~))~~ |
| ~~DRX cycle > 320ms~~ | ~~Ceil(M~~~~BFD~~ ~~× P × N × P~~~~BFD~~~~\*P~~~~TRP~~~~) × T~~~~DRX~~ |
| ~~Note: T~~~~CSI-RS~~ ~~is the periodicity of CSI-RS resource in the two sets~~ $\overbar{q}\_{0,0}$ ~~and~~ $\overbar{q}\_{0,1}$~~. T~~~~DRX~~ ~~is the DRX cycle length.~~ |

#### ~~8.18.3.3 Measurement restrictions for CSI-RS beam failure detection~~

~~The SSB mentioned in this clause can be associated with either the serving cell PCI or a PCI different from serving cell PCI.~~

~~The UE is required to be capable of measuring CSI-RS for BFD without measurement gaps. The UE is required to perform the CSI-RS measurements with measurement restrictions as described in the following scenarios.~~

~~For both FR1 and FR2, when the CSI-RS for BFD measurement is in the same OFDM symbol as SSB for RLM, BFD, CBD or L1-RSRP measurement, UE is not required to receive CSI-RS for BFD measurement in the PRBs that overlap with an SSB.~~

~~For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has same SCS than CSI-RS for BFD measurement, the UE shall be able to perform CSI-RS measurement without restrictions.~~

~~For FR1, when the SSB for RLM, BFD, CBD or L1-RSRP measurement is within the active BWP and has different SCS than CSI-RS for BFD measurement, the UE shall be able to perform CSI-RS measurement with restrictions according to its capabilities:~~

~~- If the UE supports~~ *~~simultaneousRxDataSSB-DiffNumerology~~* ~~the UE shall be able to perform CSI-RS measurement without restrictions.~~

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

~~For FR1, when the CSI-RS for BFD measurement is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement, UE shall be able to measure the CSI-RS for BFD measurement without any restriction.~~

~~For FR2, when the CSI-RS for BFD measurement on one CC is in the same OFDM symbol as SSB for RLM, BFD or L1-RSRP measurement on the same CC or different CCs in the same band, or in the same symbol as SSB for CBD measurement on the same CC or different CCs in the same band when beam failure is detected, UE is required to measure one of but not both CSI-RS for BFD measurement and SSB. Longer measurement period for CSI-RS based BFD measurement is expected, and no requirements are defined.~~

~~For UE incapable of [capability of measurement with RTD>CP] and for UE capable of [capability of measurement with RTD>CP],~~

~~- For both FR1 and FR2, when the CSI-RS for BFD measurement fully or partially overlaps with the OFDM symbol as SSB from candidate LTM neighbor cell for intra-frequency L1-RSRP measurement or inter-frequency L1-RSRP measurement without gap, UE is not required to receive CSI-RS for BFD measurement in the PRBs that overlap with an SSB.~~

~~- For FR1, when the CSI-RS for BFD measurement fully or partially overlaps with the OFDM symbol as SSB from candidate LTM neighbor cell for intra-frequency L1-RSRP measurement or inter-frequency L1-RSRP measurement without gap, if CSI-RS and SSB have different SCS and UE does not support simultaneousRxDataSSB-DiffNumerology, UE is required to measure one of but not both CSI-RS for BFD measurement and SSB. Longer measurement period for CSI-RS based BFD is expected, and no requirements are defined.~~

~~- For FR2, when the CSI-RS for BFD measurement on one CC fully or partially overlaps with the OFDM symbol as SSB from candidate LTM neighbor cell for intra-frequency L1-RSRP measurement or inter-frequency L1-RSRP measurement without gap in the same band, UE is required to measure one of but not both CSI-RS for CBD measurement and SSB. Longer measurement period for CSI-RS based BFD is expected, and no requirements are defined.~~

~~For FR2, when the CSI-RS for BFD measurement on one CC is in the same OFDM symbol as another CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band,~~

~~- In the following cases, UE is required to measure one of but not both CSI-RS for BFD measurement and the other CSI-RS. Longer measurement period for CSI-RS based BFD measurement is expected, and no requirements are defined.~~

~~- The CSI-RS for BFD measurement or the other CSI-RS in a resource set configured with repetition ON, or~~

~~- The other CSI-RS is configured in two sets~~ $\overbar{q}\_{1,0}$ ~~and~~ $\overbar{q}\_{1,1}$ ~~and beam failure is detected, or~~

~~- The two CSI-RS-es are not QCL-ed w.r.t. QCL-TypeD, or the QCL information is not known to UE,~~

~~- Otherwise, UE shall be able to measure the CSI-RS for BFD measurement without any restriction.~~

~~For FR2-1, there is no measurement restriction allowed for UE supporting~~ *~~schedulingMeasurementRelaxation-r1~~*~~8 according to the conditions described in clause 3.6.19, and the UE is required to measure both the CSI-RS for BFD and the other CSI-RS for RLM, BFD or L1-RSRP measurement, provided the following conditions are met:~~

~~- Both CSI-RSs are not in any CSI-RS resource set with repetition ON~~

~~- [FFS: The two CSI-RS resources are overlapped on the same OFDM symbol.]~~

~~- [The two CSI-RS resources and both PDSCH are overlapped on the same OFDM symbol.]~~

 ~~Editor’s note: FFS whether CSI-RS need to overlap with PDSCH for measurement restriction~~

~~- The CSI-RS and both of the PDSCHs are on the same OFDM symbol(s).~~

~~- One CSI-RS has same QCL source as the active TCI state of one PDSCH, and the other CSI-RS has same QCL source as the active TCI state of the other PDSCH~~

~~- Resources of the active TCI states for the two PDSCHs have been reported as a resource group in Rel-17 group-based RSRP report.~~

~~- [FFS how to capture UE is activated with multi-Rx operation]~~

~~When two CSI-RSs for BFD measurements are from different sets~~ $\overbar{q}\_{0,0}$ ~~and~~ $\overbar{q}\_{0,1}$~~, UE shall be able to perform measure both CSI-RSs for BFD measurements.~~

# ~~<End of Change #8>~~

# <Start of Change #9>

### 8.18.5 Requirements for SSB based candidate beam detection

#### 8.18.5.2 Minimum requirement

Upon request the UE shall be able to evaluate whether the L1-RSRP measured on the configured SSB resource in the two sets $\overbar{q}\_{1,0}$ and $\overbar{q}\_{1,1}$,estimated over the last TEvaluate\_CBD\_SSB ms period becomes better than the threshold Qin\_LR provided SSB\_RP and SSB Ês/Iot are according to Annex Table B.2.4.1 for a corresponding band.

The UE shall monitor the configured SSB resources using the evaluation period in table 8.18.5.2-1 and 8.18.5.2-2 corresponding to the non-DRX mode, if the configured DRX cycle ≤ 320ms.

The value of TEvaluate\_CBD\_SSB is defined in Table 8.18.5.2-1 for FR1.

The value of TEvaluate\_CBD\_SSB is defined in Table 8.18.5.2-2 for FR2 with scaling factor N=8.~~, where~~

~~N = [TBD] in FR2-1 if the UE supports [fast beam sweeping capability] [additional conditions FFS], according to the conditions described in clause 3.6.x, The UE is activated with multi-Rx operation when the UE is configured with Rel-17 group-based beam reporting.~~

~~N=8 for other cases in FR2.~~

For UE supporting [*musim-GapPreference-r17]* and is configured with one or more per-UE periodic MUSIM gaps,

- P value for an CBD SSB 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(TSSB, SMTC period, MGRP\_max), where MGRP max is the maximum MGRP across all configured per-UE periodic MUSIM gaps, per-UE measurement gaps and per-FR measurement gaps within the same FR as serving cell, and starting at the beginning of any configured CBD SSB resource occasion:

- Ntotal is the total number of configured CBD SSB resource occasions within the window, including those overlapped with MUSIM gap occasions or SMTC occasions within the window, and

- Noutside\_MG is the number of configured CBD SSB resource occasions that are not overlapped with any MUSIM gap occasions within the window W

- Navailable is the number of configured CBD SSB resource occasions that are not overlapped with any non-dropped MUSIM gap occasions nor any SMTC occasion within the window W

- TSSB is periodicity of the target SSB resource for CBD.

When the configured aperiodic MUSIM gap is overlapping with configured CBD SSB resource occasions, longer evaluation period would be expected.

Requirements in this clause do not apply when Noutside MG = 0 due to fully overlapping between target SSB resource for CBD and MUSIM gap occasions within the window W.

Otherwise, when UE is not configured with periodic MUSIM gap(s) or not supporting MUSIM gap capability,

**--- Unchanged text in this clause is omitted ---**

# <End of Change #9>

# <Start of Change #10>

### 8.18.6 Requirements for CSI-RS based candidate beam detection

#### 8.18.6.2 Minimum requirement

Upon request the UE shall be able to evaluate whether the L1-RSRP measured on the configured CSI-RS resource in sets $\overbar{q}\_{1,0}$ and $\overbar{q}\_{1,1}$ estimated over the last TEvaluate\_CBD\_CSI-RS [ms] period becomes better than the threshold Qin\_LR within TEvaluate\_CBD\_CSI-RS [ms] period provided CSI-RS Ês/Iot is according to Annex Table B.2.4.2 for a corresponding band.

The UE shall monitor the configured CSI-RS resources using the evaluation period in table 8.18.6.2-1 and 8.18.6.2-2 corresponding to the non-DRX mode, if the configured DRX cycle ≤ 320ms.

The value of TEvaluate\_CBD\_CSI-RS is defined in Table 8.18.6.2-1 for FR1.

The value of TEvaluate\_CBD\_CSI-RS is defined in Table 8.18.6.2-2 for FR2 with scaling factor N=8.~~, where~~

~~N = [TBD] in FR2-1 if the UE supports [fast beam sweeping capability] [additional conditions FFS], according to the conditions described in clause 3.6.x. The UE is activated with multi-Rx operation when the UE is configured with Rel-17 group-based beam reporting., and~~

~~N=8 for other cases in FR2.~~

For UE supporting [*musim-GapPreference-r17]* and is configured with one or more per-UE periodic MUSIM gaps,

- P value for an CBD 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(TCSI-RS, SMTC period, MGRP\_max), where MGRP max is the maximum MGRP across all configured per-UE periodic MUSIM gaps, per-UE measurement gaps and per-FR measurement gaps within the same FR as serving cell, and starting at the beginning of any configured CBD CSI-RS resource occasion:

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

- Noutside\_MG is the number of configured CBD CSI-RS resource occasions that are not overlapped with any MUSIM gap occasions within the window W

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

- TCSI-RS is periodicity of the target CSI-RS resource for CBD.

When the configured aperiodic MUSIM gap is overlapping with configured CBD CSI-RS resource occasions, longer evaluation period would be expected.

Requirements in this clause do not apply when Noutside MG = 0 due to fully overlapping between target CSI-RS resource for CBD and MUSIM gap occasions within the window W.

Otherwise, when UE is not configured with periodic MUSIM gap(s) or not supporting MUSIM gap capability,

**--- Unchanged text in this clause is omitted ---**

# <End of Change #10>

# <Start of Change #11>

### 8.18.8 Scheduling availability of UE during TRP specific beam failure detection

#### 8.18.8.3 Scheduling availability of UE performing TRP specific beam failure detection on FR2

The following scheduling restriction applies due to TRP specific beam failure detection.

- For FR2-1, for UE supporting *schedulingMeasurementRelaxation-r1*8 according to the conditions described in clause 3.6.19, if CSI-RS for BFD and the other CSI-RS for tracking or for CQI in the same or overlapping OFDM symbol are configured with different QCL-TypeD in the cell and the following conditions apply:

- The CSI-RS is not in a CSI-RS resource set with repetition ON.

- The CSI-RS has same QCL source as the active TCI state of one of the PDSCHs and has different QCL-TypeD from the other PDSCH.

- The CSI-RS and both of the PDSCHs are on the same OFDM symbol(s), or the CSI-RS and one of the PDSCHs with different QCL typeD are on the same OFDM symbol(s) when partially overlapping PDSCHs are scheduled, and

- Resources of the active TCI states for the two PDSCHs have been reported as a resource group in Rel-17 group-based RSRP report.

- There are no scheduling restrictions due to TRP specific beam failure detection performed based on the CSI-RS.

- Otherwise

- The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on BFD-RS resource symbols to be measured for TRP specific beam failure detection.

When intra-band carrier aggregation in FR2 is performed, the scheduling restrictions on FR2 serving PCell or PSCell apply to all serving cells in the same band on the symbols that fully or partially overlap with 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 beam failure detection performed on FR2 serving cell(s) in different band(s), provided that UE is capable of independent beam management on this FR2 band pair. Additionally, there is no scheduling restriction if the UE is configured with different numerology between SSB on one FR2 band and data on the other FR2 band provided the UE is configured for IBM operation for the band pair.

For FR2, if following conditions are met,

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

- The gap between UE’s reception of PDCCH that UE monitors in the Type2-PDCCH CSS set and that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots,

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

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

# <End of Change #11>

# ~~<Start of Change #12>~~

### ~~8.18.9 Scheduling availability of UE during TRP specific candidate beam detection~~

#### ~~8.18.9.3 Scheduling availability of UE performing L1-RSRP measurement on FR2~~

~~The following scheduling restriction applies due to TRP specific candidate beam detection~~

~~- The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH, CSI-RS for tracking or CSI-RS for CQI on reference symbols to be measured for TRP specific candidate beam detection.~~

~~- This scheduling restriction on receiving PDSCH and another CSR-RS does not apply for FR2-1, for UE supporting [TBD - multi-rx capability] according to the conditions described in clause 3.6.x, if CSI-RS for CBD and the other CSI-RS for tracking or for CQI in the same or overlapping OFDM symbol are configured with different QCL-TypeD in the cell and the following conditions apply:~~

~~- The CSI-RS is not in a CSI-RS resource set with repetition ON.~~

~~- The CSI-RS has same QCL source as the active TCI state of one of the PDSCHs and has different QCL-TypeD from the other PDSCH.~~

~~- The CSI-RS and both of the PDSCHs, or the CSI-RS and one of the PDSCHs with different QCL typeD when partially overlapping PDSCHs are scheduled, are on the same OFDM symbol(s).~~

~~- Resources of the active TCI states for the two PDSCHs have been reported as a resource group in Rel-17 group-based RSRP report.~~

~~- There are no scheduling restrictions due to TRP specific beam failure detection performed based on the CSI-RS.~~

~~- Otherwise~~

~~- The UE is not expected to transmit PUCCH, PUSCH or SRS or receive PDCCH, PDSCH or CSI-RS for tracking or CSI-RS for CQI on BFD-RS resource symbols to be measured for TRP specific beam failure detection.~~

~~When intra-band carrier aggregation in FR2 is configured, the scheduling restrictions on to one serving cell apply to all serving cells in the same band on the symbols that fully or partially overlap with 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 candidate beam detection performed on FR2 serving cell(s) in different band(s), provided that the FR2 serving cell(s) and the FR2 serving cell(s) for candidate beam detection are in a FR2 band pair and UE is capable of independent beam management on this FR2 band pair. Additionally, there is no scheduling restriction if the UE is configured with different numerology between SSB on one FR2 band and data on the other FR2 band provided the UE is configured for IBM operation for the band pair.~~

~~For FR2, if following conditions are met,~~

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

~~- The gap between UE’s reception of PDCCH that UE monitors in the Type2-PDCCH CSS set and that notifies system information update, and the PDCCH that UE monitors in the Type0-PDCCH CSS set, is greater than 2 slots,~~

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

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

# ~~<End of Change #12>~~