**3GPP TSG- Meeting #**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  |  | **CR** |  | **rev** | **1** | **Current version:** |  |  |
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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 | **X** | Core Network |  |

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| ***Title:*** |  | | | | | | | | | |
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| ***Source to WG:*** |  | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
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| ***Work item code:*** |  | | | | |  | ***Date:*** | | | 2023-2-28 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | F |  | | | | | ***Release:*** | | |  |
|  | *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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | According to chapter 6 of TS 38.213 and RAN1 LS (R2-2203893), the index(es) of the BFD-RS set included in the enhanced BFR MAC CE can be *failureDetectionSet1* and *failureDetectionSet2* or the index(es) determined based on CORESETs.  However, as captured in chapter 6.1.3.43 of TS 38.321, the description for field *ID* may be understood that the BFD-RS set ID is included in the enhanced BFR MAC CE only when the Serving cell is configured with two BFD-RS sets explicitly, i.e. via *failureDetectionSet1-r17* and *failureDetectionSet2-r17*. It means that when the Serving cell is configured with two BFD-RS sets implicitly, the field *ID* may be set to 0. There is misalignment between TS 38.213 and TS 38.321 on the ID of BFD-RS set. | | | | | | | | |
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| ***Summary of change:*** | | The following changes are suggested:   * In 5.17, add the description on “the Serving cell is configured with two BFD-RS sets”; * In 6.1.3.43, add a reference to TS38.213 for implicit configuration in the description of field *ID*   **Impact Analysis**  Impacted 5G architecture options: NR SA, (NG)EN-DC, NE-DC and NR-DC  Impacted functionality: Beam failure recovery  Inter-operability:  1. If the network is implemented according to the CR and the UE is not, in case that a serving cell is configured with 2 BFD-RS sets implicitly, the UE cannot provide BFD-RS set/TRP infomration correclty;  2. If the UE is implemented according to the CR and the network is not, in case that a serving cell is configured with 2 BFD-RS sets implicitly, the network cannot understand BFD-RS set/TRP infomration correclty. | | | | | | | | |
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| ***Consequences if not approved:*** | | The TRP/BFD-RS set corresponding to candidate beam in enhanced BFR MAC CE cannot be provided to the network and thus the beam failure for the TRP/BFD-RS set cannot be recovered. | | | | | | | | |
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| ***Clauses affected:*** | | 5.17, 6.1.3.43 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | | R2-2301024 | | | | | | | | |

## 5.17 Beam Failure Detection and Recovery procedure

The MAC entity may be configured by RRC per Serving Cell or per BFD-RS set with a beam failure recovery procedure which is used for indicating to the serving gNB of a new SSB or CSI-RS when beam failure is detected on the serving SSB(s)/CSI-RS(s). Beam failure is detected by counting beam failure instance indication from the lower layers to the MAC entity. If *beamFailureRecoveryConfig* is reconfigured by upper layers during an ongoing Random Access procedure for beam failure recovery for SpCell, the MAC entity shall stop the ongoing Random Access procedure and initiate a Random Access procedure using the new configuration. The Serving cell is configured with two BFD-RS sets if and only if *candidateBeamRS-List2-r17* is configured for the active DL BWP of the Serving cell. When the SCG is deactivated, the UE performs beam failure detection on the PSCell if *bfd-and-RLM* is set to *true*.

RRC configures the following parameters in the *beamFailureRecoveryConfig*, *beamFailureRecoverySpCellConfig*, *beamFailureRecoverySCellConfig* and the *radioLinkMonitoringConfig* for the Beam Failure Detection and Recovery procedure:

- *beamFailureInstanceMaxCount* for the beam failure detection (per Serving Cell or per BFD-RS set of Serving Cell configured with two BFD-RS sets);

- *beamFailureDetectionTimer* for the beam failure detection (per Serving Cell or per BFD-RS set of Serving Cell configured with two BFD-RS sets);

- *beamFailureRecoveryTimer* for the beam failure recovery procedure for SpCell;

- *rsrp-ThresholdSSB*: an RSRP threshold for the SpCell beam failure recovery;

- *rsrp-ThresholdBFR*: an RSRP threshold for the SCell beam failure recovery or for the beam failure recovery of BFD-RS set of Serving Cell;

- *powerRampingStep*: *powerRampingStep* for the SpCell beam failure recovery;

- *powerRampingStepHighPriority*: *powerRampingStepHighPriority* for the SpCell beam failure recovery;

- *preambleReceivedTargetPower*: *preambleReceivedTargetPower* for the SpCell beam failure recovery;

- *preambleTransMax*: *preambleTransMax* for the SpCell beam failure recovery;

- *scalingFactorBI*: *scalingFactorBI* for the SpCell beam failure recovery;

- *ssb-perRACH-Occasion*: *ssb-perRACH-Occasion* for the SpCell beam failure recovery using contention-free Random Access Resources;

- *ra-ResponseWindow*: the time window to monitor response(s) for the SpCell beam failure recovery using contention-free Random Access Resources;

- *prach-ConfigurationIndex*: *prach-ConfigurationIndex* for the SpCell beam failure recovery using contention-free Random Access Resources;

- *ra-ssb-OccasionMaskIndex*: *ra-ssb-OccasionMaskIndex* for the SpCell beam failure recovery using contention-free Random Access Resources;

- *ra-OccasionList*: *ra-OccasionList* for the SpCell beam failure recovery using contention-free Random Access Resources;

- *candidateBeamRSList*: list of candidate beams for SpCell beam failure recovery;

- *candidateBeamRS-List-r16*: list of candidate beams for SCell beam failure recovery or list of candidate beams for beam failure recovery of a Serving Cell for BFD-RS set one;

- *candidateBeamRS-List2-r17*: list of candidate beams for beam failure recovery of a Serving Cell for BFD-RS set two.

The following UE variables are used for the beam failure detection procedure:

- *BFI\_COUNTER* (per Serving Cell or per BFD-RS set of Serving Cell configured with two BFD-RS sets): counter for beam failure instance indication which is initially set to 0.

The MAC entity shall for each Serving Cell configured for beam failure detection:

1> if the Serving Cell is configured with two BFD-RS sets:

2> if beam failure instance indication for a BFD-RS set has been received from lower layers:

3> start or restart the *beamFailureDetectionTimer* of the BFD-RS set;

3> increment *BFI\_COUNTER* of the BFD-RS set by 1;

3> if *BFI\_COUNTER* of the BFD-RS set >= *beamFailureInstanceMaxCount*:

4> trigger a BFR for this BFD-RS set of the Serving Cell;

2> if BFR is triggered for both BFD-RS sets of the SpCell and the Beam Failure Recovery procedure is not successfully completed for any of the BFD-RS sets:

3> initiate a Random Access procedure (see clause 5.1) on the SpCell;

2> if the Serving Cell is SpCell and the Random Access procedure initiated for beam failure recovery of both BFD-RS sets of SpCell is successfully completed (see clause 5.1):

3> set *BFI\_COUNTER* of each BFD-RS set of SpCell to 0.

3> consider the Beam Failure Recovery procedure successfully completed.

2> if the *beamFailureDetectionTimer* of this BFD-RS set expires; or

2> if *beamFailureDetectionTimer*, *beamFailureInstanceMaxCount*, or any of the reference signals used for beam failure detection is reconfigured by upper layers or by the BFD-RS Indication MAC CE associated with a BFD-RS set of the Serving Cell:

3> set *BFI\_COUNTER* of the BFD-RS set to 0.

2> if a PDCCH addressed to C-RNTI indicating uplink grant for a new transmission is received for the HARQ process used for the transmission of the Enhanced BFR MAC CE or Truncated Enhanced BFR MAC CE which contains beam failure recovery information of this BFD-RS set of the Serving Cell:

3> set *BFI\_COUNTER* of the BFD-RS set to 0;

3> consider the Beam Failure Recovery procedure successfully completed for this BFD-RS set and cancel all the triggered BFRs of this BFD-RS set of the Serving Cell.

2> if the Serving Cell is SCell and the SCell is deactivated as specified in clause 5.9:

3> set *BFI\_COUNTER* of each BFD-RS set of SCell to 0;

3> consider the Beam Failure Recovery procedure successfully completed and cancel all the triggered BFRs of all BFD-RS sets of the Serving Cell.

1> else:

2> if beam failure instance indication has been received from lower layers:

3> start or restart the *beamFailureDetectionTimer*;

3> increment *BFI\_COUNTER* by 1;

3> if *BFI\_COUNTER* >= *beamFailureInstanceMaxCount*:

4> if the Serving Cell is SCell:

5> trigger a BFR for this Serving Cell;

4> else if the Serving Cell is PSCell and, the SCG is deactivated:

5> if beam failure of the PSCell has not been indicated to upper layers since the SCG was deactivated or since the deactivated SCG was last reconfigured with BFD-RS:

6> indicate beam failure of the PSCell to upper layers.

NOTE: After beam failure is indicated to upper layers, the UE may stop the *beamFailureDetectionTimer* and lower layer beam failure indication while *BFI\_COUNTER* >= *beamFailureInstanceMaxCount* for the deactivated SCG.

4> else:

5> initiate a Random Access procedure (see clause 5.1) on the SpCell.

2> if the *beamFailureDetectionTimer* expires; or

2> if *beamFailureDetectionTimer*, *beamFailureInstanceMaxCount*, or any of the reference signals used for beam failure detection is reconfigured by upper layers associated with this Serving Cell:

3> set *BFI\_COUNTER* to 0.

2> if the Serving Cell is SpCell and the Random Access procedure initiated for SpCell beam failure recovery is successfully completed (see clause 5.1):

3> set *BFI\_COUNTER* to 0;

3> stop the *beamFailureRecoveryTimer*, if configured;

3> consider the Beam Failure Recovery procedure successfully completed.

2> else if the Serving Cell is SCell, and a PDCCH addressed to C-RNTI indicating uplink grant for a new transmission is received for the HARQ process used for the transmission of the MAC CE for BFR which contains beam failure recovery information of this Serving Cell; or

2> if the SCell is deactivated as specified in clause 5.9:

3> set *BFI\_COUNTER* to 0;

3> consider the Beam Failure Recovery procedure successfully completed and cancel all the triggered BFRs for this Serving Cell.

The MAC entity shall:

1> if the Beam Failure Recovery procedure determines that at least one BFR has been triggered and not cancelled for an SCell for which evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed and if none of the Serving Cell(s) of this MAC entity are configured with two BFD-RS sets:

2> if UL-SCH resources are available for a new transmission and if the UL-SCH resources can accommodate the BFR MAC CE plus its subheader as a result of LCP:

3> instruct the Multiplexing and Assembly procedure to generate the BFR MAC CE.

2> else if UL-SCH resources are available for a new transmission and if the UL-SCH resources can accommodate the Truncated BFR MAC CE plus its subheader as a result of LCP:

3> instruct the Multiplexing and Assembly procedure to generate the Truncated BFR MAC CE.

2> else:

3> trigger the SR for SCell beam failure recovery for each SCell for which BFR has been triggered, not cancelled, and for which evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed.

1> if the Beam Failure Recovery procedure determines that at least one BFR for any BFD-RS set has been triggered and not cancelled for an SCell for which evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed; or

1> if the Beam Failure Recovery procedure determines that at least one BFR for only one BFD-RS set has been triggered and not cancelled for an SpCell for which evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed; or

1> if the Beam Failure Recovery procedure determines that at least one BFR has been triggered and not cancelled for an SCell for which evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed and if at least one Serving Cell of this MAC entity is configured with two BFD-RS sets:

2> if UL-SCH resources are available for a new transmission and if the UL-SCH resources can accommodate the Enhanced BFR MAC CE plus its subheader as a result of LCP:

3> instruct the Multiplexing and Assembly procedure to generate the Enhanced BFR MAC CE.

2> else if UL-SCH resources are available for a new transmission and if the UL-SCH resources can accommodate the Truncated Enhanced BFR MAC CE plus its subheader as a result of LCP:

3> instruct the Multiplexing and Assembly procedure to generate the Truncated Enhanced BFR MAC CE.

2> else:

3> trigger the SR for beam failure recovery of each BFD-RS set for which BFR has been triggered, not cancelled, and for which evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed;

3> trigger the SR for SCell beam failure recovery for each SCell for which BFR has been triggered, not cancelled, and for which evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed.

All BFRs triggered for an SCell shall be cancelled when a MAC PDU is transmitted and this PDU includes a MAC CE for BFR which contains beam failure information of that SCell. All BFRs triggered for a BFD-RS set of a Serving Cell shall be cancelled when a MAC PDU is transmitted and this PDU includes an Enhanced BFR MAC CE or Truncated Enhanced BFR MAC CE which contains beam failure recovery information of that BFD-RS set of the Serving Cell.

#### 6.1.3.43 Enhanced BFR MAC CEs

The Enhanced MAC CEs for BFR consists of either:

- Enhanced BFR MAC CE; or

- Truncated Enhanced BFR MAC CE.

The Enhanced BFR MAC CE and Truncated Enhanced BFR MAC CE are identified by a MAC subheader with eLCID/LCID as specified in Table 6.2.1-2 and Table 6.2.1-2b.

The Enhanced BFR MAC CE and Truncated Enhanced BFR MAC CE have a variable size. They include a SP field, Ci bitmap (single octet or four octets), Sj bitmap (0 to 4 octets), beam failure recovery information i.e. octets containing candidate beam availability indication (AC) for BFD-RS set(s) of SpCell configured with two BFD-RS sets, and in ascending order based on *ServCellIndex*, beam failure recovery information i.e. octets containing candidate beam availability indication (AC) for BFD-RS set(s) of SCells indicated in the Ci bitmap. For Enhanced BFR MAC CE, a single octet Ci bitmap is used when the highest *ServCellIndex* of this MAC entity's SCell for which beam failure is detected for SCell or for at least one BFD-RS set of SCell and the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed is less than 8, otherwise four octets Ci bitmap is used. A MAC PDU shall contain at most one MAC CE for BFR.

For Truncated Enhanced BFR MAC CE, a single octet Ci bitmap is used for the following cases, otherwise four octets Ci bitmap is used:

- the highest *ServCellIndex* of this MAC entity's SCell for which beam failure is detected for SCell or for at least one BFD-RS set of SCell and the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed is less than 8; or

- beam failure is detected for SpCell (as specified in Clause 5.17) not configured with two BFD-RS sets, and the SpCell is to be indicated in a Truncated Enhanced BFR MAC CE and the UL-SCH resources available for transmission cannot accommodate the Truncated Enhanced BFR MAC CE with the four octets Ci bitmap plus its subheader as a result of LCP; or

- Random Access procedure is initiated for beam failure recovery of both BFD-RS sets of SpCell (as specified in Clause 5.17) configured with two BFD-RS sets and the SpCell is to be indicated in a Truncated Enhanced BFR MAC CE and the UL-SCH resources available for transmission cannot accommodate the Truncated Enhanced BFR MAC CE with the four octets Ci bitmap plus its subheader as a result of LCP.

For Enhanced BFR MAC CE and Truncated Enhanced BFR MAC CE, a single octet Sk bitmap is included if the total number of Serving Cells configured with two BFD-RS sets for which SP/Ci field set to 1 is greater than 0 and less than 9; a two octets Sk bitmap is included if the total number of Serving Cells configured with two BFD-RS sets for which SP/Ci field set to 1 is greater than 8 and less than 17; a three octets Sk bitmap is included if the total number of Serving Cells configured with two BFD-RS sets for which SP/Ci field is set to 1 is greater than 16 and less than 25; a four octets Sk bitmap is included if the total number of Serving Cells configured with two BFD-RS sets for which SP/Ci field set to 1 is greater than 24; Sk bitmap is not included if the total number of Serving Cells configured with two BFD-RS sets for which SP/Ci field is set to 1 is zero.

For Truncated Enhanced BFR MAC CE, octet(s) containing the AC field, if any, are included for SpCell first, then one octet containing the AC field is included for SCell(s) (in ascending order of the *ServCellIndex*) and then the second octet containing the AC field, if any, is included for SCell(s) (in ascending order of the *ServCellIndex*), while not exceeding the available grant size. The number of the octets containing the AC field in the Truncated Enhanced BFR MAC CE can be zero.

The fields in the Enhanced BFR MAC CEs are defined as follows:

- SP (Enhanced BFR MAC CE): This field indicates beam failure detection (as specified in clause 5.17) for the SpCell of this MAC entity and the presence of octet(s) containing the AC field if the SpCell is configured with multiple BFD-RS sets. For the SpCell configured with two BFD-RS sets, this field set to 1 indicates that beam failure is detected for at least one BFD-RS set, the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed, and the octet(s) containing the AC field is present for the SpCell; otherwise, it is set to 0. The octet(s) containing the AC field for SpCell are included before those of SCell(s). For the SpCell not configured with multiple BFD-RS sets, the SP field is set to 1 to indicate that beam failure is detected for SpCell when Enhanced BFR MAC CE is to be included into a MAC PDU as part of Random Access Procedure (as specified in 5.1.3a and 5.1.4); otherwise, it is set to 0;

- SP (Truncated Enhanced BFR MAC CE): This field indicates beam failure detection (as specified in clause 5.17) for the SpCell of this MAC entity. For the SpCell configured with two BFD-RS sets, this field set to 1 indicates that beam failure is detected for at least one BFD-RS set, the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed, and the octet(s) containing the AC field may be present for the SpCell; otherwise, it is set to 0. For the SpCell not configured with multiple BFD-RS sets, the SP field is set to 1 to indicate that beam failure is detected for SpCell when Truncated Enhanced BFR MAC CE is to be included into a MAC PDU as part of Random Access Procedure (as specified in 5.1.3a and 5.1.4); otherwise, it is set to 0;

- Ci (Enhanced BFR MAC CE): This field indicates beam failure detection (as specified in clause 5.17) and the presence of octet(s) containing the AC field for the SCell with *ServCellIndex* i as specified in TS 38.331 [5]. The Ci field set to 1 indicates that beam failure is detected for at least one BFD-RS set, the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed, and the octet(s) containing the AC field is present for the SCell with *ServCellIndex* i. The Ci field set to 0 indicates that the beam failure is either not detected for any BFD-RS set or the beam failure is detected for at least one BFD-RS set but the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has not been completed, and the octets containing the AC field is not present for the SCell with *ServCellIndex* i. The octets containing the AC field are present in ascending order based on the *ServCellIndex* and are included after the octets containing the AC field for SpCell, if any;

- Ci (Truncated Enhanced BFR MAC CE): This field indicates beam failure detection (as specified in clause 5.17) for the SCell with *ServCellIndex* i as specified in TS 38.331 [5]. The Ci field set to 1 indicates that beam failure is detected for at least one BFD-RS set, the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed, and the octet(s) containing the AC field for the SCell with *ServCellIndex* i may be present. The Ci field set to 0 indicates that the beam failure is either not detected for any BFD-RS set or the beam failure is detected for at least one BFD-RS set but the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has not been completed, and the octet(s) containing the AC field is not present for the SCell with *ServCellIndex* i;

- Sk (Enhanced BFR MAC CE): This field corresponds to the kth Serving Cell for which SP/Ci field is set to 1 and is configured with two BFD-RS sets. The Serving Cells for which SP/Ci field is set to 1 and are configured with two BFD-RS sets, are indexed sequentially starting with SpCell and followed by SCells in ascending order of *ServCellIndex* i. This field indicates whether beam failure is detected for one or both BFD-RS sets and presence of one or two octets containing the AC field of the Serving Cell. The Sk field set to 1 indicates that beam failure is detected for both the BFD-RS sets, the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed for both the BFD-RS sets, and the octets containing the AC field is present for both the BFD-RS sets, of the Serving Cell. The Sk field set to 0 indicates that beam failure is either detected for one of the BFD-RS sets and the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed or beam failure is detected for both the BFD-RS sets but the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has not been completed for both the BFD-RS sets, and the octet containing the AC field is present for only one BFD-RS set of the Serving Cell. The Sk field not mapped to any Serving Cell is set to 0;

- Sk (Truncated Enhanced BFR MAC CE): This field corresponds to the kth Serving Cell for which SP/Ci field is set to 1 and is configured with two BFD-RS sets. The Serving Cells for which SP/Ci field is set to 1 and are configured with two BFD-RS sets, are indexed sequentially starting with SpCell and followed by SCells in ascending order of *ServCellIndex* i. This field indicates whether beam failure is detected for one or both BFD-RS sets of the Serving Cell. The Sk field set to 1 indicates that beam failure is detected for both the BFD-RS sets, the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed for both the BFD-RS sets, and the octet containing the AC field is present for zero, one or two BFD-RS sets of the Serving Cell. The Sk field set to 0 indicates that beam failure is either detected for one of the BFD-RS sets and the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed or beam failure is detected for both the BFD-RS sets but the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has not been completed for both the BFD-RS sets or the octet containing the AC field is present for zero or one BFD-RS set of the Serving Cell. The Sk field not mapped to any Serving Cell is set to 0;

- AC: This field indicates the presence of the Candidate RS ID field in this octet. If at least one of the SSBs with SS-RSRP above *rsrp-ThresholdBFR* amongst the SSBs in list of candidate beams (i.e. *candidateBeamRS-List-r16* for the SCell not configured with two BFD-RS sets, *candidateBeamRS-List-r16* or *candidateBeamRS-List2-r17* for Serving Cell configured with two BFD-RS sets) or the CSI-RSs with CSI-RSRP above *rsrp-ThresholdBFR* amongst the CSI-RSs in list of candidate beams is available, the AC field is set to 1; otherwise, it is set to 0. If the AC field set to 1, the Candidate RS ID field is present. If the AC field set to 0, R bits are present instead;

- ID: This field indicates the identity of the BFD-RS set. It is set to 0 if this octet corresponds to BFD-RS set one, *failureDetectionSet1-r17* or determined by the UE as specified in TS 38.213 [6]. It is set to 1 if this octet corresponds to BFD-RS set two, *failureDetectionSet2-r17* or determined by the UE as specified in TS 38.213 [6]. For the Serving cell not configured with two BFD-RS sets, this field is set to 0;

- Candidate RS ID: This field is set to the index of an SSB with SS-RSRP above *rsrp-ThresholdBFR* amongst the SSBs in list of candidate beams (i.e. *candidateBeamRS-List-r16* for the SCell not configured with two BFD-RS sets, *candidateBeamRS-List-r16* or *candidateBeamRS-List2-r17* for Serving Cell configured with two BFD-RS sets) or to the index of a CSI-RS with CSI-RSRP above *rsrp-ThresholdBFR* amongst the CSI-RSs in the list of candidate beams. Index of an SSB or CSI-RS is the index of an entry in the list of candidate beams corresponding to the SSB or CSI-RS. Index 0 corresponds to the first entry in the list of candidate beams, index 1 corresponds to the second entry in the list and so on. The length of this field is 6 bits;

- R: Reserved bit, set to 0.



Figure 6.1.3.43-1: Enhanced BFR and Truncated Enhanced BFR MAC CE with one octet Ci field



Figure 6.1.3.43-2: Enhanced BFR and Truncated Enhanced BFR MAC CE with four octets Ci field