**3GPP TSG-RAN2 Meeting #109-eR2-20xxxxx**

**Electronic meeting, 24th Feb - 6th Mar 2020**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **37.340** | **CR** |   | **rev** |  | **Current version:** | **15.8.0** |  |
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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 | **X** | Core Network |  |

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| ***Title:***  | Running CR to 37.340 for CA/DC enhancements |
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| ***Source to WG:*** | vivo, Ericsson |
| ***Source to TSG:*** | R2 |
|  |  |
| ***Work item code:*** | LTE\_NR\_DC\_CA\_enh-Core |  | ***Date:*** | 2020-02-24 |
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| ***Category:*** | **B** |  | ***Release:*** | Release 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 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-12 (Release 12)**Rel-13 (Release 13)Rel-14 (Release 14)Rel-15 (Release 15)Rel-16 (Release 16)* |
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| ***Reason for change:*** | To capture the RAN2 agreements on LTE\_NR\_DC\_CA\_enh-Core WI:**RAN2#105 agreements**:* Rel-16 early measurement configuration may contain both NR and LTE configuration, only NR configuration or only LTE configuration, to support various MR-DC and CA scenario.
* MCG failure can be indicated to the network via the SCG. FFS if via SCells.

**RAN2#105bis agreements**:* When MCG failure occurs, UE follows SCG failure-like procedure:
	+ UE does not trigger RRC connection re-establishment.
	+ UE triggers an MCG failure procedure in which a failure information message is transmitted to the network via SCG.
* MCG fast recovery targets the following use cases MCG leg RLF
* MCG failure indication should include:
	+ Available measurement results of MCG
	+ MCG link failure cause
	+ Available measurement results of SCG
	+ Available measurement results of non-serving cells
* SCG leg of the split SRB1 can be used for MCG fast recovery.

**RAN2#106 agreements**:* FFS Whether a guard timer is needed for the MCG failure indication message
* Once the MCG failure indication is triggered, the UE shall:
	+ transmit the MCG failure indication;
	+ suspend MCG transmission for all SRBs and DRBs;
	+ reset MCG-MAC;
	+ maintain the current measurement configurations from both the MN and the SN, and continue measurements based on configuration from the MN and the SN if possible.
* FFS whether switch the primaryPath to SCG is needed
* If SCG failure is detected while MCG is suspended then initiate RRC re-establishment procedure
* Upon receiving the MCG failure indication, the MN sends reconfiguration with sync or RRC Release to the UE via SRB1.
* Upon reception of reconfig with sync the UE resumes MCG transmission if suspended

**RAN2#107 agreements**:* If PDCP duplication is not activated, upon detection of MCG failure the primaryPath for split SRB1 is implicitly reconfigured to the SCG. The UE expects the network to explicitly reconfigure the primaryPath back to MCG in the MCG recovery or in a Re-establishment
* SRB3, if configured, can be used for MCG fast recovery.
* Upon sending a MCG failure indication, UE starts a timer
* Upon resumption of MCG, UE stops the timer
* Upon expiry of the timer, UE initiates RRC connection re-establishment procedure.
* Network can configure the timer value (no infinite value)
* The LTE RRCConnectionResume message (Inactive to Connected) can contain the MCG SCell configuration and the associated UE behaviour in handling the SCell configuration is the same as in the Rel-15 RRC connection reconfiguration procedure
* In NR and LTE Rel-16, the UE maintains the MCG SCell configuration upon the initiation of the resume procedure
* The RRC(Connection)Resume message contains an indication to restore/resume the MCG SCells (noting that behaviour in legacy eNBs that don't support this feature needs to be considered)
* The (LTE and NR) RRC(Connection)Resume (Inactive to Connected))message can contain the SCG configuration and the associated UE behaviour in handling the SCG configuration is the same as in the Rel-15 RRC (connection) reconfiguration procedure
* In NR and LTE Rel-16, the UE maintains the SCG configuration upon the initiation of the resume procedure
* The RRC(Connection)Resume message contains an indication to restore/resume the SCG (noting that behaviour in legacy e/gNBs that don't support this feature needs to be considered)

**RAN2#107bis agreements**:* The UE supports network-controlled suspension of the SCG in RRC\_CONNECTED
* UE behaviour for a suspended SCG is FFS
* The UE supports at most one SCG configuration, suspended or not suspended, in Rel16
* In RRC\_CONNECTED upon addition of the SCG, the SCG can be either suspended or not suspended by configuration
* Fast PCell recovery via SCell is not introduced in Rel-16
* The RRC procedure on these encapsulated messages are the same as if they had been received by SRB1
* When receiving a MN RRCRelease message encapsulated within an SN RRC message via SRB3, the UE does not send any complete message
* Split SRB1 is always used for the transmission of the MCGFailureInformation message. SRB3 is used only if split SRB1 is not configured
* MCG failure recovery can be configured by the network

**RAN2#108 agreements**:* R2 suggest to not progress this [suspended SCG] objective further in Rel-16

**RAN2#109-e agreements**:* RAN2 to confirm that, in case of SRB3, the *MCGFailureInformation* and the response to it are sent encapsulated within the *ULInformationTransferMRDC* and the *DLInformationTransferMRDC*.
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| ***Summary of change:*** | Agreements captured in RAN2. |
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| ***Consequences if not approved:*** |  |
|  |  |
| ***Clauses affected:*** | 3.1 Definitions4.2.1 Control plane7.5 SRB37.7 SCG/MCG failure handling |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  |  |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |

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| This Running CR is based on the version 15.7.0 of 37.340 |

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| ***This CR's revision history:*** |  |

START OF CHANGES

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1] and 3GPP TS 36.300 [2].

**En-gNB:** node providing NR user plane and control plane protocol terminations towards the UE, and acting as Secondary Node in EN-DC.

**Master Cell Group**: in MR-DC, a group of serving cells associated with the Master Node, comprising of the SpCell (Pcell) and optionally one or more Scells.

**Master node**: in MR-DC, the radio access node that provides the control plane connection to the core network. It may be a Master eNB (in EN-DC), a Master ng-eNB (in NGEN-DC) or a Master gNB (in NR-DC and NE-DC).

**MCG bearer**: in MR-DC, a radio bearer with an RLC bearer (or two RLC bearers, in case of CA packet duplication) only in the MCG.

**Fast MCG link recovery:** in MR-DC, an RRC procedure where the UE sends an MCG Failure Information message to the MN via the SCG upon the detection of a radio link failure on the MCG.

**MN terminated bearer:** in MR-DC, a radio bearer for which PDCP is located in the MN.

**MCG SRB**: in MR-DC, a direct SRB between the MN and the UE.

**Multi-Radio Dual Connectivity:** Dual Connectivity between E-UTRA and NR nodes, or between two NR nodes.

**Ng-eNB**: as defined in TS 38.300 [3].

**PCell**: SpCell of a master cell group.

**PSCell**: SpCell of a secondary cell group.

**RLC bearer:** RLC and MAC logical channel configuration of a radio bearer in one cell group.

**Secondary Cell Group**: in MR-DC, a group of serving cells associated with the Secondary Node, comprising of the SpCell (PSCell) and optionally one or more Scells.

**Secondary node**: in MR-DC, the radio access node, with no control plane connection to the core network, providing additional resources to the UE. It may be an en-gNB (in EN-DC), a Secondary ng-eNB (in NE-DC) or a Secondary gNB (in NR-DC and NGEN-DC).

**SCG bearer**: in MR-DC, a radio bearer with an RLC bearer (or two RLC bearers, in case of CA packet duplication) only in the SCG.

**SN terminated bearer:** in MR-DC, a radio bearer for which PDCP is located in the SN.

**SpCell**: primary cell of a master or secondary cell group.

**SRB3**: in EN-DC, NGEN-DC and NR-DC, a direct SRB between the SN and the UE.

**Split bearer:** in MR-DC, a radio bearer with RLC bearers both in MCG and SCG.

**Split PDU Session (or PDU Session split):** a PDU Session whose QoS Flows are served by more than one SDAP entities in the NG-RAN.

**Split SRB**: in MR-DC, a SRB between the MN and the UE with RLC bearers both in MCG and SCG.

**User plane resource configuration:** in MR-DC with 5GC, encompasses radio network resources and radio access resources related to either one or more PDU sessions, one or more QoS flows, one or more DRBs, or any combination thereof.

END OF CHANGES

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### 4.2.1 Control Plane

In MR-DC, the UE has a single RRC state, based on the MN RRC and a single C-plane connection towards the Core Network. Figure 4.2.1-1 illustrates the Control plane architecture for MR-DC. Each radio node has its own RRC entity (E-UTRA version if the node is an eNB or NR version if the node is a gNB) which can generate RRC PDUs to be sent to the UE.

RRC PDUs generated by the SN can be transported via the MN to the UE. The MN always sends the initial SN RRC configuration via MCG SRB (SRB1), but subsequent reconfigurations may be transported via MN or SN. When transporting RRC PDU from the SN, the MN does not modify the UE configuration provided by the SN.

In E-UTRA connected to EPC, at initial connection establishment SRB1 uses E-UTRA PDCP. If the UE supports EN-DC, regardless whether EN-DC is configured or not, after initial connection establishment, MCG SRBs (SRB1 and SRB2) can be configured by the network to use either E-UTRA PDCP or NR PDCP (either SRB1 and SRB2 are both configured with E-UTRA PDCP, or they are both configured with NR PDCP). Change from E-UTRA PDCP to NR PDCP (or vice-versa) is supported via a handover procedure (reconfiguration with mobility) or, for the initial change of SRB1 from E-UTRA PDCP to NR PDCP, with a reconfiguration without mobility before the initial security activation.

If the SN is a gNB (i.e. for EN-DC, NGEN-DC and NR-DC), the UE can be configured to establish a SRB with the SN (SRB3) to enable RRC PDUs for the SN to be sent directly between the UE and the SN. RRC PDUs for the SN can only be transported directly to the UE for SN RRC reconfiguration not requiring any coordination with the MN. Measurement reporting for mobility within the SN can be done directly from the UE to the SN if SRB3 is configured.

Split SRB is supported for all MR-DC options, allowing duplication of RRC PDUs generated by the MN, via the direct path and via the SN. Split SRB uses NR PDCP. This version of the specification does not support the duplication of RRC PDUs generated by the SN via the MN and SN paths.

In EN-DC, the SCG configuration is kept in the UE during suspension. During connection resumption, if the UE supports resuming with EN-DC, the UE can be configured to release, restore, or reconfigure the SCG configuration. Otherwise, the UE releases the SCG configuration (but not the radio bearer configuration) during resumption initiation.

In MR-DC with 5GC, the UE stores the PDCP/SDAP configuration and the SCG configuration when moving to RRC Inactive . During connection resumption, if the UE supports resuming with MR-DC, the UE can be configured to release, restore, or reconfigure the SCG configuration. Otherwise, it releases the SCG configuration.

 

Figure 4.2.1-1: Control plane architecture for EN-DC (left) and MR-DC with 5GC (right).

END OF CHANGES

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## 7.5 SRB3

SRB3 is supported in EN-DC, NGEN-DC and NR-DC, but not in NE-DC.

The decision to establish SRB3 is taken by the SN, which provides the SRB3 configuration using an SN RRC message. SRB3 establishment and release can be done at Secondary Node Addition and Secondary Node Change. SRB3 reconfiguration can be done at Secondary Node Modification procedure.

SRB3 may be used to send *SN RRC Reconfiguration*, *SN RRC Reconfiguration Complete*, *SN Measurement Report*, and *SN Failure Information* messages (i.e., in case of failure for an SCG RLC bearer), only in procedures where the MN is not involved. *SN RRC Reconfiguration Complete* messages are mapped to the same SRB as the message initiating the procedure. *SN Measurement Report* messages are mapped to SRB3, if configured, regardless of whether the configuration is received directly from the SN or via the MN. No MN RRC messages are mapped to SRB3.

If split SRB1 is not configured, SRB3 may be used by the UE to transmit to the MN an encapsulated *MCG Failure Information* message in the *ULInformationTransferMRDC* message and receive in response an encapsulated *RRC reconfiguration* message or *RRC release* message in the *DLInformationTransferMRDC* message.

SRB3 is modelled as one of the SRBs defined in TS 38.331 [4] and uses the NR-DCCH logical channel type. RRC PDUs on SRB3 are ciphered and integrity protected using NR PDCP, with security keys derived from S-KgNB. The SN selects ciphering and integrity protection algorithms for the SRB3 and provides them to the MN within the SCG Configuration for transmission to the UE.

NOTE: A NR SCG RRC message sent via E-UTRA MCG SRB is protected by E-UTRA MCG SRB security (NR security is not used in this case).

SRB3 is of higher scheduling priority than all DRBs. The default scheduling priorities of split SRB1 and SRB3 are the same.

There is no requirement on the UE to perform any reordering of RRC messages between SRB1 and SRB3.

When SCG is released, SRB3 is released.

END OF CHANGES

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## 7.7 SCG/MCG failure handling

RLF is declared separately for the MCG and for the SCG.

If radio link failure is detected for MCG, and fast MCG link recovery is configured, the UE triggers fast MCG link recovery. Otherwise, the UE initiates the RRC connection re-establishment procedure.

During fast MCG link recovery, the UE suspends MCG transmissions for all radio bearers and reports the failure with *MCG Failure Information* message to the MN via the SCG, using the SCG leg of split SRB1 or SRB3.

The UE includes in the *MCG Failure Information* message the measurement results available according to current measurement configuration of both the MN and the SN. Once the fast MCG link recovery is triggered, the UE maintains the current measurement configurations from both the MN and the SN, and continues measurements based on configuration from the MN and the SN, if possible. The UE initiates the RRC connection re-establishment procedure if it does not receive an *RRC reconfiguration* message or *RRC release* message within a certain time after fast MCG link recovery was initiated.

Upon reception of the MCG Failure Indication, the MN can send *RRC reconfiguration* message or *RRC release* message to the UE, using the SCG leg of split SRB1 or SRB3. Upon receiving an *RRC reconfiguration* message, the UE resumes MCG transmissions for all radio bearers. Upon receiving an *RRC release* message, the UE releases all the radio bearers and configurations.

The following SCG failure cases are supported:

- SCG RLF;

- SN change failure;

- For EN-DC, NGEN-DC and NR-DC, SCG configuration failure (only for messages on SRB3);

- For EN-DC, NGEN-DC and NR-DC, SCG RRC integrity check failure (on SRB3).

Upon SCG failure, if MCG transmissions of radio bearers are not suspended, the UE suspends SCG transmissions for all radio bearers and reports the SCG Failure Information to the MN, instead of triggering re-establishment. If SCG failure is detected while MCG transmissions for all radio bearers are suspended, the UE initiates the RRC connection re-establishment procedure.

In all SCG failure cases, the UE maintains the current measurement configurations from both the MN and the SN and the UE continues measurements based on configuration from the MN and the SN if possible. The SN measurements configured to be routed via the MN will continue to be reported after the SCG failure.

NOTE: UE may not continue measurements based on configuration from the SN after SCG failure in certain cases (e.g. UE cannot maintain the timing of PSCell).

The UE includes in the *SCG Failure Information* message the measurement results available according to current measurement configuration of both the MN and the SN. The MN handles the *SCG Failure Information* message and may decide to keep, change, or release the SN/SCG. In all the cases, the measurement results according to the SN configuration and the SCG failure type may be forwarded to the old SN and/or to the new SN.

END OF CHANGES

# Annex (not part of the specification): RAN2 Agreements

This Annex contains the RAN2 agreements on Rel-16 WI for “DC and CA enhancements”. The agreements are provided verbatim for reference.This annex shall be removed once the WI is completed.

## RAN2#105

**Agreements:**

For IDLE/INACTIVE

1. Rel-16 early measurement configuration may contain both NR and LTE configuration, only NR configuration or only LTE configuration, to support various MR-DC and CA scenario. FFS on details. IDLE mode and INACTIVE mode details will be discussed separately
2. NR early measurement configuration should include NR specific measurement parameters configurations.
3. Available beam and cell level measurement results can be included in early measurement reporting if configured.

**Agreements:**

**•** MCG failure can be indicated to the network via the SCG. FFS if via SCells.

• FFS how the failure is indicated, which SRBs, and which failure case the fast MCG failure recovery.

• We will aim to have a unified solution for the failure cases that we want to address.

## RAN2#105bis

**Agreements for MCG fast recovery:**

0 MCG fast recovery targets all MRDC architecture options

1: When MCG failure occurs, UE follows SCG failure-like procedure:

i. UE does not trigger RRC connection re-establishment.

ii. UE triggers an MCG failure procedure in which a failure information message is transmitted to the network via SCG.

2: MCG fast recovery targets the following use cases MCG leg RLF

FFS: Other uses cases. Can consider in future whether the mechanism can be also be applied in the case of other MCG failures.

3 MCG fast recovery can only be triggered after AS security has been activated and the SRB2 and at least one DRB have been setup

4 MCG failure indication should include:

i. Available measurement results of MCG

ii. MCG link failure cause

iii. Available measurement results of SCG

iv. Available measurement results of non-serving cells

5: For MCG failure indication, new RRC message in introduced, e.g. MCGFailureInformation.

6: SCG leg of the split SRB1 can be used for MCG fast recovery.

FFS: If configured, SRB3 can be used for MCG fast recovery. Priority is to complete the solution based on split SRB1

7: New SRB is not introduced for MCG fast recovery

## RAN2#106

**Agreements**

1: Fast MCG recovery is not supported in case (intra and inter-RAT) handover failure

2: Fast MCG recovery is not supported in case of integrity check failure

3: Fast MCG recovery is not supported in case of RRC connection reconfiguration failure

**Agreements**

FFS Whether a guard timer is needed for the MCG failure indication message

1 Once the MCG failure indication is triggered, the UE shall:

- transmit the MCG failure indication;

− suspend MCG transmission for all SRBs and DRBs;

− reset MCG-MAC;

− maintain the current measurement configurations from both the MN and the SN, and continue measurements based on configuration from the MN and the SN if possible.

FFS whether switch the primaryPath to SCG is needed

2 If SCG failure is detected while MCG is suspended then initiate RRC re-establishment procedure

3 Upon receiving the MCG failure indication, the MN sends reconfiguration with sync or RRC Release to the UE via SRB1.

4 Upon reception of reconfig with sync the UE resumes MCG transmission if suspended

## RAN2#107

Agreements

1: For per-frequency SSB measurement configuration reuse the IE structure that is currently used in SIBs for cell reselection purposes.

2: The legacy SSB measurement configurations in NR SIB2/4 and LTE SIB24 are reused for NR early measurements performed in frequencies which are candidates of cell selection/reselection, i.e. not introduce new measurement configurations in NR/LTE SIB for these SSBs.

3: Same as LTE euCA, NR frequency list (not the SSB measurement configuration) can be different between RRC release and SIB. The frequency list, if provided, in RRC release message overrides the one provided in SIB.

4 For per frequency SSB measurement configuration for purpose of only early measurements, it can be included in both RRC release message and SIB. If provided in RRC release message, it overrides the one provided in SIB in the cell where the RRC Release message is received. (

FFS How UE manages the situation when an SSB measurement configuration for a given frequency is provided in SIB of the current cell and was also provided RRC Release (in an earlier cell).

**Agreements**

7: As in LTE euCA, the indication whether to report RSRP, RSRQ or both can be indicated in both RRC release message and SIB. If provided in RRC release, it overrides the one in SIB.

8: Similar to LTE euCA, the indication of beam reporting type (i.e. whether to, not report beam results, report only the beam index, or report both beam index and results) can be indicated in both RRC release message and SIB. If provided in RRC release, it overrides the one in SIB.

9: NR early measurement configuration is included in a new NR SIB.

10: NR early measurement configuration is included in LTE SIB5 (i.e. the SIB including LTE early measurement configurations)

11: It is not necessary to specify CSI-RS based early measurements for the case of SCell with SSB in Rel-16.

12: It is not necessary to specify CSI-RS based early measurements for the case of SCell without SSB in Rel-16.

13: In NR early measurement configuration, the UE can be configured with maximum number for beam reporting and only beams above configured threshold for cell quality derivation are required to be reported (as NR CONNECTED measurements).

14 Do not support the network provide information on network’s support of CA/DC between frequencies to assist the UE to determine which frequencies to provide NR early measurement in Rel-16.

15 Do not support a mechanism to prevent outdated early measurement reporting in Rel-16

Agreements:

1 Upon the reception of the RRCSetup message in response to RRCSetupRequest or RRCResumeRequest (while T331 is running), the UE stops T331, and deletes the dedicated idle mode measurement configuration, if any.

2: Upon the reception of the RRCReject message in response to RRCSetupRequest or RRCResumeRequest (while T331 is running), the UE keeps performing the idle mode measurements.

3: During a 2-step resume (i.e. RRCRelease in response to RRCResumeRequest), the network can release or reconfigure the idle mode measurements.

FFS whether this is delta or complete replace

4: Upon the expiry of T331 while in IDLE or INACTIVE mode, the UE deletes the dedicated idle mode measurement configuration, if any.

5: The UE deletes the early measurement results after it has successfully reported them to the network (i.e. in UEInformationResponse or RRCResumeComplete).

Agreements (Activation of SCells is not addressed by these agreements - to be discussed separately)

1 The LTE RRCConnectionResume message (Inactive to Connected) can contain the MCG SCell configuration and the associated UE behaviour in handling the SCell configuration is the same as in the Rel-15 RRC connection reconfiguration procedure.

2 In NR and LTE Rel-16, the UE maintains the MCG SCell configuration upon the initiation of the resume procedure.

3 The RRC(Connection)Resume message contains an indication to restore/resume the MCG SCells (noting that behaviour in legacy eNBs that don't support this feature needs to be considered).

4 The (LTE and NR) RRC(Connection)Resume (Inactive to Connected))message can contain the SCG configuration and the associated UE behaviour in handling the SCG configuration is the same as in the Rel-15 RRC (connection) reconfiguration procedure.

5 In NR and LTE Rel-16, the UE maintains the SCG configuration upon the initiation of the resume procedure.

6 The RRC(Connection)Resume message contains an indication to restore/resume the SCG (noting that behaviour in legacy e/gNBs that don't support this feature needs to be considered).

**Agreements**

1: Upon sending a MCG failure indication, UE starts a timer.

2: Upon resumption of MCG, UE stops the timer.

3: Upon expiry of the timer, UE initiates RRC connection re-establishment procedure.

4: Network can configure the timer value (no infinite value)

Agreements

1 If a UE is configured with split SRB1 with PDCP duplication, there is no need to switch the primaryPath upon detection of MCG failure since MCG failure indication will be transmitted via SCG RLC bearer of split SRB1.

2 If PDCP duplication is not activated, upon detection of MCG failure the primaryPath for split SRB1 is implicitly reconfigured to the SCG. The UE expects the network to explicitly reconfigure the primaryPath back to MCG in the MCG recovery or in a Re-establishment

**Agreements**

1: SRB3, if configured, can be used for MCG fast recovery.

2: For MCG fast recovery via SRB3, MCG Failure Information message in UL (same message as for SRB1 case) is encapsulated by the UE into an SN RRC message.

3: For MCG fast recovery via SRB3, the MN response message in DL (either a reconfiguration with sync or release message) is encapsulated by the SN in an SN RRC message.

FFS Transmission of the complete message

## RAN2#107bis

* There is a validity area, and the action when the UE exits the validity area is that the UE stops all early measurements.
* Validity area is configured by means of dedicated RRC signaling
* Validity area can be configured by means of: Lists of PCIs; Lists of CellIdentity;
* When UE reselects to a cell that is not part of the validity area (for any of the configured frequencies/cells) while *measIdleDuration* is running, UE should stop measurement. UE stops the timer. WA that the UE also clears the entire early measurement configuration.
* The RRC release message can include SSB measurement configuration. It is assumed that information provided for cell reselection by broadcast is not provided in the RRC release message.
* No UE requirements will be specified for what UE shall do upon reselection to a cell broadcasting for some frequency an SSB measurement configuration that differs from the values received in the RRC release message i.e. UE may stop early performing measurements for concerned frequency
* If the UE has not received a dedicated SSB configuration, the UE does early measurements based on SIB.
* Based on RAN1/RAN4 reply LS, introduce ‘dormancy’ behaviour for NR SCell, i.e. the UE stops monitoring PDCCH on SCell but continue performing CSI measurements, AGC and beam management, if configured.
* RAN2 confirms that UE “dormancy” operation is part of SCell activated state (i.e. not as part of SCell deactivated state)
* Chair: R2 will need to wait for R1 progress
* The benefit of P1 seems to be to avoid the potential failure that occur if the UE resumes SCG out of coverage of the SCG (SCG failure)
* Direct SCell activation (setting the SCell state to activated or deactivated) in resume message is supported, if R4 can confirm that there are no blocking issues from their point of view
* When the UE resumes to a cell included in the stored SCG, particular functionality for swapping of MCG and SCG configurations is not considered for Rel16
* New conditions/triggers for resuming directly to the SN are not considered in Rel16.

**R2 assumes the following (can be slightly modified due to progress on Scell dormancy):**

* The UE supports network-controlled suspension of the SCG in RRC\_CONNECTED.
* UE behaviour for a suspended SCG is FFS
* The UE supports at most one SCG configuration, suspended or not suspended, in Rel16.
* In RRC\_CONNECTED upon addition of the SCG, the SCG can be either suspended or not suspended by configuration.
* We don’t attempt this kind of enhancements (Common Cell Configuration for Signalling Reduction) in Rel-16 in WI CADC enh.
* Fast PCell recovery via SCell is not introduced in Rel-16.
* We add no functionality for optimized RRC re-establishment to SN RAT in Rel-16
* No further mechanisms are introduced to resolve outstanding UL/DL RRC deadlock messages situation upon the triggering of MCG failure recovery
* For MCG fast recovery via SRB3, the MCGFailureInformation message in UL is encapsulated in the ULInformationTransferMRDC message
* A new RRC message, i.e., DLInformationTransferMRDC, is introduced in order to allow the SN to encapsulate (for SRB3) the MN response (i.e., RRCReconfiguration or RRCRelease message) to be send to the UE
* The RRC procedure on these encapsulated messages are the same as if they had been received by SRB1
* When receiving a MN RRCRelease message encapsulated within an SN RRC message via SRB3, the UE does not send any complete message
* Split SRB1 is always used for the transmission of the MCGFailureInformation message. SRB3 is used only if split SRB1 is not configured
* MCG failure recovery can be configured by the network.

## RAN2#108

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| * Upon entering RRC CONNECTED mode, the UE stops validity timer T331 (if running) and deletes the dedicated idle mode measurement configuration (if configured).
* After moving to another RAT due to inter-RAT cell reselection, the UE stops validity timer T331 (if running) and deletes the dedicated idle mode measurement configuration (if configured)
* While transition from NR INACTIVE mode to NR IDLE mode, the UE keeps the validity timer T331 (if running) and the dedicated idle mode measurement configuration (if configured), i.e. just continue.
* While transition from LTE INACTIVE mode to LTE IDLE mode, the UE keeps the validity timer T331 (if running) and the dedicated idle mode measurement configuration (if configured), i.e. just continue.
* When UE reselects to a cell that is not part of the validity area, the UE stops the validity timer and also clears the entire early measurement configuration.
* For the early measurements during a 2-step resume:

**if *RRCConnectionRelease* does not include idle/inactive measurement configuration, the UE keeps the configuration and T331 continues running (i.e. no action);****if *RRCConnectionRelease* includes idle/inactive measurement configuration, the new configuration completely replaces the old configuration (incl timer which would be started).****if *RRCConnectionRelease* includes an release indication, the UE releases the old configuration, stops timer.**  |

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| * The validity area is defined as a carrier list (which could be different from the carriers to be measured during RRC\_IDLE/INACTIVE) with optional PCI list per carrier.
* The early measurement results are sorted by RSRP unless only RSRQ is configured as reporting quantity.
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| * The validity area cannot include IRAT cells
* If, for a frequency for which SSB config was provided by broadcast @ initial configuration, reselected cell does not broadcast SSB config the UE is not required to measure concerned frequency while camping on concerned cell (but should re-attempt following another re-selection)
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| * Measurement for Cell reselection (304) and early measurements are independent.
* In case UE cannot find suitable cell to camp or in anycell selection does not trigger stopping T331 or deleting early measurement configuration (no need to capture in the TS).
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| * The NR Rel-16 early measurement reporting solution is introduced in LTE
* a. The network can request (in RRCConnectionResume) the UE to send early measurements
* b. The UE can include early measurements in RRCConnectionResumeComplete.
* If a UE is released by an eNB which only configures bcast LTE early measurements and then reselects to an eNB which broadcasts both LTE and NR idle/inactive measurement configurations, the UE shall apply these NR configurations
* A new indication is introduced in SIB2 to indicate that the UE can perform NR early measurements while camped on the cell.
* At least one indication is introduced in RRCConnectionResume to indicate that the UE shall include the LTE and/or NR early measurements in RRCConnectionResumeComplete.
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| * We use BWP model as agreed/assumed in R1.
* R2 confirm that The dormant BWP is not configured with PDCCH monitoring, this is done by the IE pdcch-Config being absent in the BWP configuration.
* The dormant BWP is configured only when the SCell is configured with at least one other UE-specific RRC configured BWP (i.e., a ‘regular BWP’). There can be only one configured dormant BWP for an SCell.
* UE determines via RRC configuration, which DL BWP among the UE-specific RRC configured BWPs is the dormant BWP
* Upon entering dormancy, the UE clears/suspends any uplink grants (type 1 and type2) associated with the SCell.
* In dormancy SCell, the UE doesn’t perform RACH.
* In dormancy SCell, aperiodic CSI/SRS via self-carrier scheduling is not allowed.
* WA: If in dormancy SCell, aperiodic CSI via cross-carrier scheduling is not allowed, FFS for SRS
* As dormant state in LTE euCA, SCell dormancy is not applicable to the PUCCH SCell.
* Send LS to R1 cc R4 informing of agreements, stating that this is not finished and e.g. SRS transmissions on the dormancy SCell is still FFS (no action)
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| * The guard timer for fast MCG link recovery should be configured via dedicated signalling, it is configured by the MN.
* The configuration of guard timer implicitly indicates that the feature of fast MCG link recovery is enabled by the network, and that the UE shall initiate the procedure.

General: * For fast MCG recovery, R2 assumes this is now finished (w.r.t functionality)
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| * Under async CA, clarify that the UE uses SFN of primary cell (i.e. PCell or PSCell) within the same cell group for the calculation of HARQ Process ID in SPS/CG, i.e. no change of rel-15 legacy UE behaviour.
* Under async CA, clarify that the UE uses SFN of primary cell (i.e. PCell or PSCell) within the same cell group for calculation of downlink/uplink assignment occurrences of SPS/CG, i.e. no change of rel-15 legacy UE behaviour.
* Under async CA, clarify that the UE uses SFN of primary cell (i.e. PCell or PSCell) within the same cell group for DRX on-duration determination, i.e. no change of rel-15 legacy UE behaviour.
* R2 assumes that SFN from Pcell is used for SI reception, thus no impact to SI reception
* R2 assumes that SFN from Pcell is used for Rel-15 DRX, thus no impact to Rel-15 DRX.
* R2 assumes that SFN from Pcell is used for UP operation (CG, DRX etc), thus no impact to UP.
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