**3GPP TSG-RAN WG2 Meeting #117-e R2-22xxxxx**

**Online, 21st February– 3rd March 2022**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **37.340** | **CR** | **0296** | **rev** | **1** | **Current version:** | **16.8.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network |  |

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| ***Title:*** | Capture RAN2 agreements on CP-UP separation support in NR eIAB | | | | | | | | | |
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| ***Source to WG:*** | vivo (Rapporteur) | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_IAB\_enh-Core | | | | |  | ***Date:*** | | | 2022-3-2 |
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| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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)* | |
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| ***Reason for change:*** | | Capture RAN2 agreements on CP-UP separation support in NR eIAB. | | | | | | | | |
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| ***Summary of change:*** | | Introduction of CP-UP separation support in NR eIAB based on RAN2 agreements as follows:   * SRB2 can be used for F1-C transport in CP/UP-separation scenario * Split SRB2 can be used for F1-C transport in CP/UP-separation scenario 2 (FFS other cases) * NR DLInformationTransfer and ULInformationTransfer messages can be enhanced to transfer F1-C related packets in CP/UP separation. * F1-C over RRC and F1-C over BAP should not be supported simultaneously on the same parent link. * The configuration of F1-C traffic on the indication of the the leg(s) used for transferring the F1-C traffic is configured to IAB-MT by a new field, e.g., *f1c-TransferPath-r17* ENUMERATED {MCG, SCG, both}. * It is not necessary for IAB-node to be aware whether the gNB allows “F1 over BAP” or only allows “F1-C over RRC” during cell (re)selection, in case the gNB broadcasts *iab-Support*. * ONLY SRB2 is used for F1-C transport in CP/UP-separation scenario 1. * ONLY split SRB2 is used for F1-C transport in CP/UP-separation scenario 2 * The network is allowed to configure the *primaryPath* to SCG for the IAB-MT * The IAB-MT should always follow the primary path configuration for all the RRC messages, regardless of whether F1-C information or IAB-unrelated information are contained * Type-2 indication by a dual-connected node is triggered when the node detects BH RLF on a BH link and it cannot perform re-routing for any traffic, i.e. NR RLF for ENDC scenario. * For these cases, the Type-2 indication is handled in the same way as for the case when both links go down. * Type-2/3 indication MAY be propagated, if the situation in the node doing the propagation is such that all BAP links are affected by the condition (e.g. single connected) (additional decision if to propagate or not can be left for implementation). * Type-2/3 indication is not propagated if the situation in the node doing the propagation is such that some BAP links are un-affected by the condition (e.g. dual connected). | | | | | | | | |
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| ***Consequences if not approved:*** | | CP-UP separation is not supported in NR eIAB. | | | | | | | | |
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| ***Clauses affected:*** | | 7.6 Split SRB  7.11 F1-C transfer over E-UTRA  7.xx F1-C transfer over NR  10.10.2 MR-DC with 5GC  10.15 F1-C Traffic Transfer | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

*First Modified Subclause*

7.6 Split SRB

Split SRB is supported for both SRB1 and SRB2 (split SRB is not supported for SRB0 and SRB3) in all MR-DC cases. RRC PDUs on split SRB are ciphered and integrity protected using NR PDCP.

Split SRB can be configured by the MN in Secondary Node Addition and/or Modification procedure, with SN configuration part provided by the SN. A UE can be configured with both split SRB and SRB3 simultaneously. SRB3 and the SCG leg of split SRB can be independently configured. If SRB2 is configured as split SRB for NR-DC, the network can configure the *primaryPath* to SCG for the IAB-MT.

For the split SRB, the selection of transmission path in downlink depends on network implementation. For uplink, the UE is configured via MN RRC signalling whether to use MCG path or duplicate the transmission on both MCG and SCG.

*Next Modified Subclause*

7.11 F1-C transfer over E-UTRA

In EN-DC, the F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet can be transferred between IAB-donor and IAB-node via E-UTRA, if configured by IAB-donor, as specified in TS 38.331 [4]. When both E-UTRA and NR are configured to transfer the F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet, it is up to the IAB implementation when to select the E-UTRA. SRB2 is used for transporting the F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet between IAB-MT and MN [10], and the F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet is transferred as a container via X2-AP between MN and SN, see TS 36.423 [9]. BH RLF detection indication is triggered when the node detects BH RLF on NR link (i.e., BH RLF on SCG leg) and it cannot perform re-rerouting for any traffic. In such case BH RLF detection indication and BH RLF recovery indication may be propagated.

7.XX F1-C transfer in NR-DC

In NR-DC, the F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet can be transferred via BAP sublayer or via SRB between the IAB-node and the corresponding non-F1-termination node (as specified in TS 38.401 [7]), as specified in TS 38.331 [4]. When both MCG and SCG are configured to transfer the F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet, it is up to the IAB implementation for path selection. Two scenarios are supported, as shown in Figure 7.XX-1. BH RLF detection indication is triggered when the node detects BH RLF on both links and it cannot perform re-routing for any traffic. BH RLF detection indication and BH RLF recovery indication may not be propagated if the situation in the node which doing the propagation is such that some BH links are un-affected by the BH RLF. BH RLF detection indication and BH RLF recovery indication may not propagated if the situation in the node which doing the propagation is such that some such that all BAP links are affected by the BH RLF



**Figure 7.XX-1: F1-C transfer in NR-DC; a) Scenario 1; b) Scenario 2**

**Scenario 1**: IAB-node exchanges F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet with the SN (F1-termination node as specified in TS 38.401 [7]) using NR access link via MN (non-F1-termination node), and exchange F1-U traffic using backhaul link(s) with SN. SRB2 is used for transporting the F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet between IAB-MT and MN (see TS 38.331 [4]), and the F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet is transferred as a container via XnAP between MN and SN, see TS 38.423 [5].

**Scenario 2**: IAB-node exchanges F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet with the MN (F1-termination node) using NR access link via SN (non-F1-termination node), and exchange F1-U traffic using backhaul link(s) with MN. Split SRB2 is used for transporting the F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet between IAB-MT and SN (see TS 38.331 [4]), and the F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet is transferred as a container via XnAP between SN and MN, see TS 38.423 [5].

The F1-AP message encapsulated in SCTP/IP or the F1-C related (SCTP/)IP packet can be transferred either over BAP sublayer or over SRB, but the two mechanisms cannot be supported simultaneously on the same parent link. The F1-AP message encapsulated in SCTP/IP or the F1-C related (SCTP/)IP packet is transferred over BAP sublayer, if the BH RLC channel used for transferring the F1-C traffic is configured on the cell group indicated for F1-C traffic transfer according to TS 38.331 [4]. If SRB2 is configured as split SRB, the network is allowed to configure the *primaryPath* to SCG for the IAB-MT and the IAB-MT should always follow the primary path configuration for all the RRC messages, regardless of whether F1-C information or IAB-unrelated information are contained RRC messages.

*Next Modification*

10.10.2 MR-DC with 5GC

The RRC Transfer procedure is used to deliver an RRC message, encapsulated in a PDCP PDU between the MN and the SN (and vice versa) so that it may be forwarded to/from the UE using split SRB. The RRC transfer procedure is also used for:

- providing a SN measurement report, failure information report, SN UE assistance information or CPC execution completion from the UE to the SN;

- providing MCG failure information from the UE to the MN via the SN and an RRC reconfiguration, or release, or an inter-RAT handover command from the MN to the UE via the SN.;

- providing F1-C traffic from an IAB-node to the MN via the SN, or F1-C traffic from the MN to an IAB-node via the SN.

Additional details of the RRC transfer procedure are defined in TS 38.423 [5].

**Split SRB:**

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**Figure 10.10.2-1: RRC Transfer procedure for split SRB (DL operation)**

Figure 10.10.2-1 shows an example signaling flow for DL RRC Transfer in case of the split SRB:

1. The MN, when it decides to use the split SRBs, starts the procedure by initiating the RRC Transfer procedure. The MN encapsulates the RRC message in a PDCP PDU and ciphers with own keys.

NOTE: The usage of the split SRBs shall be indicated in the Secondary Node Addition procedure or Modification procedure.

2. The SN forwards the RRC message to the UE.

3. The SN may send PDCP delivery acknowledgement of the RRC message forwarded in step 2.

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**Figure 10.10.2-2: RRC Transfer procedure for split SRB (UL operation)**

Figure 10.10.2-2 shows an example signaling flow for UL RRC Transfer in case of the split SRB:

1. When the UE provides response to the RRC message, it sends it to the SN.

2. The SN initiates the RRC Transfer procedure, in which it transfers the received PDCP PDU with encapsulated RRC message.

**SN measurement report, failure information report, SN UE assistance information or CPC execution completion:**

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**Figure 10.10.2-3: RRC Transfer procedure for SN measurement report, failure information report, SN UE assistance informatio**n or **CPC execution completion**

Figure 10.10.2-3 shows an example signaling flow for RRC Transfer in case of the forwarding of the SN measurement report, failure information report, SN UE assistance information or CPC execution completion from the UE:

1. When the UE sends an SN measurement report, failure information report, SN UE assistance information, or CPC execution completion it sends it to the MN in a container called *ULInformationTransferMRDC* as specified in TS 38.331 [4].

2. The MN initiates the RRC Transfer procedure, in which it transfers the received SN measurement report, failure information, SN UE assistance information or CPC execution completion as an octet string.

**MCG failure information and RRC Reconfiguration / RRC Release / inter-RAT handover command over SRB3:**

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**Figure 10.10.2-4: RRC Transfer procedure for MCG failure information**

Figure 10.10.2-4 shows an example signaling flow for RRC Transfer in case of the forwarding of the MCG failure information from the UE:

1. When the UE sends *MCGFailureInformation* over SRB3, it sends it to the SN in a container called *ULInformationTransferMRDC* as specified in TS 38.331 [4].

2. The SN initiates the RRC Transfer procedure, in which it transfers the received *MCGFailureInformation* as an octet string.

3. The MN initiates the RRC Transfer procedure, in which it transfers the *RRCConnectionReconfiguration*, or *RRCReconfiguration*, or *RRCConnectionRelease*, or *RRCRelease*, or *MobilityFromNRCommand*, or *MobilityFromEUTRACommand* as an octet string.

4. The SN sends the received RRC message to the UE in a container called *DLInformationTransferMRDC*, as specified in TS 38.331 [4].

**F1-C traffic transfer:**

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**Figure 10.10.2-X: Scenario 2: F1-C is transported between IAB-MT and MN (F1-termination node) in NR-DC**

1. The IAB-MT sends a F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet to the SN (non-F1-termination node) via split SRB2 in a container within *ULInformationTransfer* encapsulated in a PDCP PDU as specified in TS 38.331 [4].

2. The SN initiates the RRC Transfer procedure, in which it transfers the received PDCP PDU (*ULInformationTransfer* message) including F1-AP message.

3. When the MN (F1-termination node) sends a F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet, it starts the procedure by initiating the RRC Transfer procedure, if split SRB2 is determined to be used and usage of SCG path is determined. The MN sends the F1-AP message to the SN in a container within *DLInformationTransfer* encapsulated in a PDCP PDU specified in TS 38.331 [4].

4. The SN forwards the encapsulated *DLInformationTransfer* in a PDCP PDU as specified in TS 38.331 [4] to IAB-MT.

*Next Modification*

10.15 F1-C Traffic Transfer

In EN-DC/NR-DC, the F1-C Traffic Transfer message is sent by the MN to the SN or by the SN to MN to transfer the F1-C traffic to and from an IAB-node.

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**Figure 10.15-1: F1-C Traffic Transfer procedure in EN-DC**

1. When the IAB-MT sends a F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet, it sends it to the MN in a container within *ULInformationTransfer* as specified in TS 36.331 [10].

2. The MN initiates the F1-C Traffic Transfer procedure, in which it transfers the received F1-AP message encapsulated in (SCTP/)IP or F1-C related (SCTP/)IP packet as an octet string.

3. When the SN sends a F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet, it sends it to the MN as an octet string through the F1-C Traffic Transfer procedure.

4. The MN sends the received F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet to the IAB-MT in a container within *DLInformationTransfer* as specified in TS 36.331 [10].

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**Figure 10.15-XX: Scenario 1: F1-C is transported between IAB-MT and SN (F1-termination node) in NR-DC**

1. The IAB-MT sends a F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet to the MN (non-F1-termination node) via SRB2 in a container within *ULInformationTransfer* as specified in TS 38.331 [4].

2. The MN initiates the F1-C Traffic Transfer procedure, in which it transfers the received F1-AP message encapsulated in (SCTP/)IP or F1-C related (SCTP/)IP packet as an octet string.

3. The SN (F1-termination node) sends a F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet to the MN as an octet string through the F1-C Traffic Transfer procedure.

4. The MN sends the received F1-AP message encapsulated in SCTP/IP or F1-C related (SCTP/)IP packet to the IAB-MT via SRB2 in a container within *DLInformationTransfer* as specified in TS 38.331 [4].

*End of Changes*