**3GPP TSG-RAN WG3 Meeting #123 R3-240975**

**Athens, Greece, 26 Feb-1 Mar, 2024**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.401** | **CR** | **0352** | **rev** | **1** | **Current version:** | **18.0.0** |  |
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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 | **X** | Core Network |  |

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| ***Title:*** | Miscellaneous corrections on TS 38.401 | | | | | | | | | |
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| ***Source to WG:*** | Huawei | | | | | | | | | |
| ***Source to TSG:*** | R3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_mobile\_IAB-Core | | | | |  | ***Date:*** | | | 2024-02-29 |
|  |  | | | |  | |  | | |  |
| ***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 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:*** | | Capture the agreements in RAN3 #123.  **In 38.401, revise mIAB RLF recovery procedure to include the scenario where the F1-terminating donor is different from the RRC-terminating donors. Use the relevant parts of R3-240177 and R3-240487 as the baseline.**  **As part of the CR for TS38.401 the reference to section “8.YY.1” in Figure 8.23.2-1 of 38.401 needs to be fixed.**  **38.401 to capture the behavior of the MT’s target IAB-donor when the mIAB authorization status = “non-authorized” is received during MT migration and RLF recovery.**  **Clarify on stage 2 that in presence of two logical DUs, DL traffic can be routed to the appropriate logical DU destination based on implementation, e.g., through TNL information.**  **In 38.401, add to migration of mobile IAB-MT via Xn the following:  NOTE in absence of Xn interface between the target RRC terminating CU and F1 terminating CU, the passing of the content of Xn-based signaling is up to implementation.**  **Include agreeable editorial changes to TS38.401** | | | | | | | | |
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| ***Summary of change:*** | | 1. Add descriptions of the mobile IAB-node RLF recovery procedure to support the scenario where the new CU for the RLF recovery is different from the F1 terminating CU. 2. Capture the behavior of the MT’s target IAB-donor when the mIAB authorization status = “non-authorized” is received during MT migration and RLF recovery. 3. Clarify that in presence of two logical DUs, DL traffic can be routed to the appropriate logical DU destination based on implementation, e.g., through TNL information. 4. Add a NOTE to the mobile IAB-MT migration that in absence of Xn interface between the target RRC terminating CU and F1 terminating CU, the passing of the content of Xn-based signalling is up to implementation. 5. Some editorial changes.   **Impact analysis**  Impact assessment towards the previous version of the specification (same release):  This CR has isolated impact with the previous version of the specification (same release).  This CR has impact on the functional point of view, which will impact the mobile IAB-node RLF recovery, mobile IAB-node integration, mobile IAB-MT migration, and mobile IAB-DU migration. | | | | | | | | |
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| ***Consequences if not approved:*** | | 1. The mobile IAB-node RLF recovery feature is not supported in the decoupled case. 2. The target RRC terminating CU may not correctly handle the mobile IAB authorization status in MT migration and RLF recovery. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 8.9.14, 8.9.15, 8.9.16, 8.12.3, 8.23.1, 8.23.2, 8.23.3, 8.23.4 | | | | | | | | |
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|  | | **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:*** | | Rev 1：Add changes to reflect all agreements during the online session in R3-125 | | | | | | | | |

*Start of Change*

### 8.9.14 Mobile IAB-node authorization

During the mobile IAB-node integration procedure, the RRC-terminating IAB-donor-CU receives the authorization status of the mobile IAB-node from the 5GC. During the mobile IAB-MT migration procedure and the mobile IAB-node RLF recovery procedure, the target/new RRC terminating IAB-donor-CU receives the authorization status of the mobile IAB-node from the source/initial RRC-terminating IAB-donor-CU as well as from the 5GC when performing path switch. If the authorization status is “not authorized”, the RRC-terminating IAB-donor-CU does not establish any backhaul resources. Additionally, the RRC-terminating IAB-donor-CU does not allocate any BAP address, TNL addresses or default BAP configuration for this mobile IAB-node. If the authorization status for the mobile IAB-node changes, the 5GC sends an updated authorization status to the RRC-terminating IAB-donor-CU.

In case the mobile IAB-MT and its co-located mobile IAB-DU connect to same IAB-donor-CU, and the updated authorization status received from the 5GC is “not authorized”, the IAB-donor-CU performs the following actions in the following order: it attempts to hand over the UEs served by the mobile IAB-node to other cell(s), releases the F1 interface towards the mobile IAB-DU, and then releases all backhaul resources (including the BAP address, TNL address and default BAP reconfiguration) for this mobile IAB-node.

In case the mobile IAB-MT and its co-located mobile IAB-DU connect to different IAB-donor-CUs, the RRC-terminating IAB-donor sends the updated authorization status to the F1-terminating IAB-donor-CU via the IAB TRANSPORT MIGRATION MODIFICATION REQUEST message. The F1-terminating IAB-donor-CU confirms the reception of the updated authorization status via the IAB TRANSPORT MIGRATION MODIFICATION RESPONSE message.

NOTE: In absence of Xn connectivity between the RRC-terminating IAB-donor-CU and the F1-terminating IAB-donor-CU, the passing of the authorization status is left up to implementation.

If the updated authorization status for the mobile IAB-node is set to “not authorized”, the F1-terminating IAB-donor attempts to hand over the UEs served by the mobile IAB-node to other cell(s), and then releases the F1 interface towards the mobile IAB-DU. After that, the F1-terminating IAB-donor requests from the RRC-terminating IAB-donor the release of all the offloaded traffic via the IAB TRANSPORT MIGRATION MANAGEMENT REQUEST message. The RRC-terminating IAB-donor releases the offloaded traffic and all backhaul resources (including BAP address, TNL address and default BAP reconfiguration) for this mobile IAB-node. The RRC-terminating IAB-donor may send an indication that the mobile IAB-MT can be deregistered to the AMF.

If the authorization status is changed back from “not authorized” to “authorized”, the phase 2 and phase 3 of the mobile IAB-node integration procedure as defined in clause 8.12.3 are carried out.

*Next Change*

8.9.15 IAB-donor-CU-based NR Cell Identity (NCI) (re-)configuration for mobile IAB cells

The NCIs of the cells served by a mobile IAB-DU configured by the OAM can be reconfigured by the F1-terminating IAB-donor-CU serving the mobile IAB-DU, in case of an NCI collision with cells of other gNB-DUs served by the IAB-donor-CU. The reconfiguration of NCI pertains to the reconfiguration of the cellLocalId part of the NCI, where the new cellLocalId(s) are based on a list of NCIs that has been configured at the F1-terminating IAB-donor-CU.

The value change of cellLocalId(s) shall be indicated to the OAM system of the mobile IAB-DU following the NCI reconfiguration. The mobile IAB-DU can notify OAM about the reconfigured cellLocalId(s) using notifications specified in TS 28.532 [33].

NOTE: This shall not affect the existing procedure of configuring NCGI of cells served by a stationary gNB-DU via the OAM.

8.9.16 TAC/RANAC (re-)configuration for mobile IAB

The TAC/RANAC of mobile IAB-DU’s cell is configured by the OAM, and it can be reconfigured by the OAM during the mobile IAB-node mobility. The TAC/RANAC of the mobile IAB-DU’s cell may be same as or different than the TAC/RANAC of the co-located mobile IAB-MT’s serving cell. The TAC/RANAC broadcasted by the mobile IAB-DU cell can be changed in order to reflect the mobile IAB-node’s physical location.

*Next Change*

8.12.3 Mobile IAB-node integration

During the integration, the mobile IAB-MT and the mobile IAB-DU can connect to the same IAB-donor or two different IAB-donors. The procedure for the latter case is shown in Figure 8.12.3-1.

**Figure 8.12.3-1: Decoupled mobile IAB-node integration procedure**

Phase 1: Equivalent procedure to Phase 1 of the IAB-node integration in SA mode in clause 8.12.1, where the mobile IAB-node and the RRC-terminating IAB-donor correspond to IAB-node 2 and to the IAB-donor respectively. The mobile IAB-node selects the parent node based on a mobile-IAB-specific over-the-air indication (transmitted in SIB1). The mobile IAB-MT includes a mobile-IAB-node-specific indication in the *RRCSetupComplete* message to assist the RRC-terminating IAB-donor in selecting an AMF that supports mobile IAB.

Phase 2-1: Same as Phase 2-1 of procedure in clause 8.12.1.

Phase 2-2: Same as Phase 2-2 of procedure in clause 8.12.1.

Phase 3: Mobile IAB-DU part setup. In this phase, the mobile IAB-DU is configured via the OAM. The configured information includes, e.g., the information of the F1-terminating IAB-donor-CU, to enable the mobile IAB-DU to initiate the establishment of F1-C to the F1-terminating IAB-donor-CU. The mobile IAB-DU initiates the TNL establishment, and F1 setup (as defined in clause 8.5) with the selected F1-terminating IAB-donor-CU using the default BAP routing ID and default BH RLC channel configured by the RRC-terminating IAB-donor-CU in Phase 2-1 for upstream traffic. During the F1 setup, the mobile IAB-DU includes the gNB ID of the RRC-terminating IAB-donor-CU and the BAP address of the co-located mobile IAB-MT in the F1 SETUP REQUEST message. The mobile IAB-node determines this gNB ID based on the over-the-air broadcast (SIB1) by the RRC-terminating IAB-donor.

After the F1 interface is set up, the mobile IAB-node can start serving UEs. The F1-terminating IAB-donor-CU can initiate the IAB Transport Migration Management procedure towards the RRC-terminating IAB-donor-CU as defined in clause 8.17.3.1.

*Next Change*

### 8.23.1 Migration of mobile IAB-MT via Xn handover

The mobile IAB-MT can be migrated from a source RRC-terminating IAB-donor-CU to a target RRC-terminating IAB-donor-CU using the Xn handover procedure. During this migration, the mobile IAB-DU co-located with the mobile IAB-MT is connected to an F1-terminating IAB-donor-CU, which may be the same as the source RRC-terminating IAB-donor-CU or the target RRC-terminating IAB-donor-CU, or it can be different from both the source and the target RRC-terminating IAB-donor-CU.

Figure 8.23.1-1 shows an example of mobile IAB-MT migration via Xn handover. In this example, the mobile IAB-MT is connected to the source RRC-terminating IAB-donor-CU via a source path of an IAB topology before the migration, and it is connected to the target RRC-terminating IAB-donor-CU via a target path of a different IAB topology after the migration.



Figure 8.23.1-1: Procedure for Xn-based migration of mobile IAB-MT

1. Steps 1-14 of the topology adaptation procedure in clause 8.17.3.1 are performed to conduct Xn handover of the mobile IAB-MT from the source parent IAB-node connected to the source RRC-terminating IAB-donor-CU to the target parent IAB-node connected to the target RRC-terminating IAB-donor-CU. In these steps, the mobile IAB-node corresponds to the migrating IAB-node in clause 8.17.3.1, and the mobile IAB-MT’s source and target RRC-terminating IAB-donor-CUs correspond to the respective source and target IAB-donor-CUs of clause 8.17.3.1. The source RRC-terminating IAB-donor-CU should retain the UE XnAP IDs allocated for the mobile IAB-MT as long as the mobile IAB-MT is connected.

2. Same as step 15 of the topology adaptation procedure in clause 8.17.3.1, where the F1-C connection between the co-located mobile IAB-DU and its F1-terminating IAB-donor-CU is switched to the target path using the new TNL address information of the IAB-MT. In this step, the mobile IAB-node corresponds to the migrating IAB-node, and the F1-terminating IAB-donor-CU corresponds to the source IAB-donor-CU.

3. The mobile IAB-DU passes to the F1-terminating IAB-donor-CU via F1AP the gNB ID of the target RRC-terminating IAB-donor-CU and the mobile IAB-node’s BAP address allocated by the target RRC-terminating IAB-donor-CU. In case the migration of the mobile IAB-MT occurs during mobile IAB-DU migration, each logical mobile IAB-DU passes this information to its respective F1-terminating IAB-donor-CU. The F1-terminating IAB-donor-CU retains the UE XnAP ID that it allocated to the mobile IAB-MT as long as the co-located mobile IAB-DU connects to this CU, and retains the UE XnAP ID allocated for the mobile IAB-MT by the source RRC-terminating IAB-donor-CU until the present step (step 3).

4. Steps 16-20 of the topology adaptation procedure in clause 8.17.3.1, where the F1-terminating IAB-donor-CU initiates the IAB Transport Migration Management procedure towards the target RRC-terminating IAB-donor-CU to provide the context of the offloaded traffic. The target RRC-terminating IAB-donor-CU reconfigures the BAP sublayer and/or BH RLC channels on the target path accordingly, and provides the UL BH information for UL BH reconfigurations to be conducted by the F1-terminating IAB-donor-CU on the mobile IAB-node. Then, the F1-U connections of the mobile IAB-node are migrated to the target path.

NOTE How to perform the IAB Transport Migration Management/Modification procedures and the IAB Resource Coordination procedure between the F1-terminating IAB-donor-CU and the target RRC-terminating IAB-donor-CU without an Xn connection is up to implementation.

*Next Change*

### 8.23.2 Migration of mobile IAB-MT via NG handover

The mobile IAB-MT can be migrated from a source RRC-terminating IAB-donor-CU to a target RRC-terminating IAB-donor-CU using the NG handover procedure. During this migration, the mobile IAB-DU co-located with the mobile IAB-MT is connected to an F1-terminating IAB-donor-CU, which may be the same as the source RRC-terminating IAB-donor-CU or the target RRC-terminating IAB-donor-CU, or it can be different from both the source and the target RRC-terminating IAB-donor-CU.

Figure 8.23.2-1 shows an example of mobile IAB-MT migration via NG handover. In this example, the mobile IAB-MT is connected to the source RRC-terminating IAB-donor-CU via a source path of an IAB topology before the migration, and it is connected to the target RRC-terminating IAB-donor-CU via a target path of a different IAB topology after the migration.



Figure 8.23.2-1: Procedure for NG-based migration of mobile IAB-MT

1. Similar to Step 1-14 in clause 8.17.3.1, where the NG-based handover procedure as defined in clauses 4.9.1.3.2 and 4.9.1.3.3 in TS 23.502 [32] is used instead of Xn-based handover procedure.

2. Same as step 2 to step 4 in clause 8.23.1.

NOTE How to perform the IAB Transport Migration Management/Modification procedures and the IAB Resource Coordination procedure between the F1-terminating IAB-donor-CU and the target RRC-terminating IAB-donor-CU without Xn interface is up to implementation.

*Next Change*

### 8.23.3 Mobile IAB-DU migration procedure

To support the mobile IAB-DU migration procedure, the mobile IAB-node concurrently supports two logical mobile IAB-DUs, which have F1 connections set up with the source F1-terminating IAB-donor-CU and target F1-terminating IAB-donor-CU, respectively. The mobile IAB-MT’s IAB-donor-CU may be same as either the source F1-termainting IAB-donor CU or the target F1-terminating IAB-donor-CU, or it may be different from both source and target F1-terminating IAB-donor-CUs.

The UE(s) connected to the mobile IAB-node are handed over from the cell(s) of the source logical mobile IAB-DU that have F1 set up with the source F1-terminating IAB-donor-CU to the cell(s) of the target logical mobile IAB-DU that have F1 set up with the target F1-terminating IAB-donor-CU. After the UE(s) are handed over, the F1 connection between the source logical mobile IAB-DU and the source F1-terminating IAB-donor-CU may be removed.

Figure 8.23.3-1 shows an example of the mobile IAB-DU migration procedure. In this example, the source and the target F1-terminating IAB-donor-CUs are different from the RRC-terminating IAB-donor-CU.



Figure 8.23.3-1: Mobile IAB-DU inter-CU migration procedure

1. The source F1-terminating IAB-donor-CU may send an MIAB F1 SETUP TRIGGERING message to the source logical mobile IAB-DU to initialize the F1 Setup procedure towards the target F1-terminating IAB-donor-CU. The MIAB F1 SETUP TRIGGERING message includes the gNB ID of the target F1-terminating IAB-donor-CU and the information needed to establish the TNL connection with the target F1-terminating IAB-donor-CU for F1-C.

NOTE: The mobile IAB-DU migration can also be triggered by the OAM. In this case, the OAM provides the mobile IAB-node with all information to initiate the F1 Setup procedure towards the target F1-terminating IAB-donor-CU, in which case step 1 is omitted.

2. The target logical mobile IAB-DU initiates TNL establishment and F1 setup (as defined in clause 8.5) with the target F1-terminating IAB-donor-CU. During the F1 Setup procedure, the target logical mobile IAB-DU includes the gNB ID of the RRC-terminating IAB-donor-CU, and the BAP address of the co-located mobile IAB-MT in the F1 SETUP REQUEST message.

3. The target F1-terminating IAB-donor-CU responds to the target logical mobile IAB-DU with an F1 SETUP RESPONSE message. After F1 setup with the target F1-terminating IAB-donor-CU, the target logical mobile IAB-DU can serve UEs via the target mobile IAB-DU’s activated cell(s).

4. By sending the MIAB F1 SETUP OUTCOME NOTIFICATION message, the source logical mobile IAB-DU informs the source F1-terminating IAB-donor-CU about the outcome of the F1 interface setup between the co-located target logical mobile IAB-DU and the target F1-terminating IAB-donor-CU. The source logical mobile IAB-DU may provide the source F1-terminating IAB-donor-CU with a mapping between activated cells of the source logical mobile IAB-DU and activated cells of the target logical mobile IAB-DU. If the mobile IAB-DU migration is triggered by the OAM, the gNB-ID of the target F1-terminating IAB-donor-CU is included in this message.

5. The source F1-terminating IAB-donor-CU hands over the UE from a source cell served by the source logical mobile IAB-DU to a target cell served by the target logical mobile IAB-DU. The target F1-terminating IAB-donor-CU initiates the IAB Transport Migration Management procedure towards the RRC-terminating IAB-donor-CU for offloading the UE’s traffic during this step. In case the IAB Transport Migration Management procedure is the first procedure for the mobile IAB-MT, it includes the mobile IAB-MT’s BAP address in the IAB TRANSPORT MIGRATION MANAGEMENT REQUEST message. After the completion of the UE handover, the source F1-terminating IAB-donor-CU requests from the RRC-terminating IAB-donor-CU the release of the UE’s traffic offloaded to the RRC-terminating IAB-donor-CU by initiating IAB Transport Migration Management procedure.

NOTE 1: In step 5, the sequence of procedures for UE Handover and the IAB Transport Migration Management procedure initiated by the target F1-terminating IAB-donor-CU is up to implementation.

NOTE 2: It is up to RRC-terminating IAB-donor-CU’s implementation to set up new backhaul resources or reuse the existing backhaul resources for the UE’s traffic.

NOTE 3: How to perform the IAB Transport Migration Management/Modification procedures, and the IAB Resource Coordination procedure between the target F1-terminating IAB-donor-CU and the RRC-terminating IAB-donor-CU without Xn interface is up to implementation.

NOTE 4: In presence of two logical DUs, DL traffic can be routed to the appropriate logical DU destination based on implementation, e.g., through TNL information.

6. After all the UEs are handed over, the source F1-terminating IAB-donor-CU may initiate the removal of the F1 interface towards the source logical mobile IAB-DU.

*Next Change*

### 8.23.4 Mobile IAB-node RLF recovery

When the mobile IAB-MT detects backhaul RLF, the mobile IAB-MT can perform inter-CU backhaul RLF recovery procedure to another parent node underneath a different IAB-donor-CU. In case the mobile IAB-MT and the mobile IAB-DU connect to the same IAB-donors before the backhaul RLF, the procedure is the same as defined in steps 1-18 of the IAB inter-CU backhaul RLF recovery procedure described in clause 8.17.4, where the mobile IAB-node corresponds to the Recovery IAB-node.

In case the mobile IAB-MT and the mobile IAB-DU connect to different IAB-donors before the backhaul RLF, the procedure for the backhaul RLF recovery is shown in Figure 8.23.4-X.



Figure 8.23.4-X: Procedure for RLF recovery of mobile IAB-node

1. Steps 1-17 of the backhaul RLF recovery procedure in clause 8.17.4 are performed to conduct backhaul RLF recovery of the mobile IAB-MT from the initial parent IAB-node to the new parent IAB-node. In these steps, the mobile IAB-node corresponds to the recovering IAB-node in clause 8.17.4. The initial and new RRC terminating IAB-donor-CUs correspond to the initial and new IAB-donor-CUs of clause 8.17.4, respectively.
2. Step 14 of the topology adaptation procedure in clause 8.17.3.1 is performed to configure BH resources on the new path for the mIAB-DU’s F1-C. In this step, the mobile IAB-node corresponds to the migrating IAB-node in clause 8.17.3.1, the new RRC-terminating IAB-donor-CU corresponds to the target IAB-donor-CU in clause 8.17.3.1, and the new path of the mobile IAB-node corresponds to the target path in clause 8.17.3.1.
3. Step 15 of the topology adaptation procedure in clause 8.17.3.1 is performed to redirect the mobile IAB-DU’s F1-C to the new path, and report the new F1-U TNL information to the F1-terminating IAB-donor-CU.

During this step, the mobile IAB-DU also passes the gNB ID of the new RRC-terminating IAB-donor-CU and the mobile IAB-node’s BAP address allocated by the new RRC-terminating IAB-donor-CU to the F1-terminating IAB-donor-CU.

1. Same as step 16-20 of the topology adaptation procedure in clause 8.17.3.1, where the F1-terminating IAB-donor-CU initiates IAB Transport Migration Management procedure to the new RRC-terminating IAB-donor-CU to provide the context of the offloaded traffic. The backhaul related configurations along the new path can be re-configured by the new RRC-terminating IAB-donor-CU, and the F1-U connections of the mobile IAB-node are migrated to the new path.

*End of Change*