**3GPP TSG-RAN WG3 Meeting #115-e *R3-22xxxx***

**E-meeting, 21 Feb -** **03 Mar 2022**

**Title:** (TP to TS 38.413 BL CR) Mobility between supporting nodes

**Source:** Huawei, Nokia, Nokia Shanghai Bell, Lenovo, Motorola Mobility, Qualcomm Incorporated, CBN, China Unicom, China Telecom

**Agenda item:** 22.3.1

**Document for:** other

# Introduction

In this contribution, we provide the TP to TS 38.413 (updated from R3-222168) to support mobility between MBS supporting nodes.

# TP to TS 38.413 BL CR

## \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*start of changes\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.4.1 Handover Preparation

8.4.1.1 General

The purpose of the Handover Preparation procedure is to request the preparation of resources at the target side via the 5GC. There is only one Handover Preparation procedure ongoing at the same time for a certain UE. The procedure uses UE-associated signalling.

8.4.1.2 Successful Operation

****

**Figure 8.4.1.2-1: Handover preparation: successful operation**

The source NG-RAN node initiates the handover preparation by sending the HANDOVER REQUIRED message to the serving AMF. When the source NG-RAN node sends the HANDOVER REQUIRED message, it shall start the timer TNGRELOCprep. The source NG-RAN node shall indicate the appropriate cause value for the handover in the *Cause* IE.

Upon reception of the HANDOVER REQUIRED message the AMF shall, for each PDU session indicated in the *PDU Session ID* IE, transparently transfer the *Handover Required Transfer* IE to the SMF associated with the concerned PDU session.

In case of intra-system handover, the information in the *Source to Target Transparent Container* IE shall be encoded according to the definition of the *Source NG-RAN node to Target NG-RAN node Transparent Container* IE.

If the *DL Forwarding* IE is included for a given QoS flow in the *PDU Session Resource Information Item* IE within the *Source NG-RAN node to Target NG-RAN node Transparent Container* IE of the HANDOVER REQUIRED message and it is set to "DL forwarding proposed", it indicates that the source NG-RAN node proposes forwarding of downlink data for that QoS flow.

If the *UL Forwarding* IE is included for a given QoS flow in the *PDU Session Resource Information Item* IE within the *Source NG-RAN Node to Target NG-RAN Node Transparent Container* IE of the HANDOVER REQUIRED message and it is set to "UL forwarding proposed", it indicates that the source NG-RAN node proposes forwarding of uplink data for that QoS flow.

If the *DRBs to QoS Flows Mapping List* IE is included in the *PDU Session Resource Information Item* IE within the *Source NG-RAN node to Target NG-RAN node Transparent Container* IE of the HANDOVER REQUIRED message, it implicitly indicates that the source NG-RAN node proposes forwarding of downlink data for those DRBs.

If the *QoS Flow Mapping Indication* IE for a QoS flow is included in the *Associated QoS Flow List* IE within the *DRBs to QoS Flows Mapping List* IE within the *Source NG-RAN node to Target NG-RAN node Transparent Container* IE of the HANDOVER REQUIRED message, it indicates that the source NG-RAN node has mapped only the uplink or downlink of the QoS flow to the DRB.

If there are multicast session context available at the source NG-RAN node for the UE, the source NG-RAN node shall include the *MBS Session Information Source to Target List* IE in the *Source NG-RAN Node to Target NG-RAN Node Transparent Container* IE of the HANDOVER REQUIRED message, and if applicable the *MBS Session Associated Information List* IE in the *PDU Session Resource Information Item* IE within the *Source NG-RAN node to Target NG-RAN node Transparent Container* IE of the HANDOVER REQUIRED message.

If the *MBS Mapping and Data Forwarding Request* IE is included in the *MBS Session Information Source to Target List* IE within the *Source NG-RAN Node to Target NG-RAN Node Transparent Container* IE of the HANDOVER REQUIRED message, it indicates that the source NG-RAN node proposes forwarding of downlink data for those MRBs. For each MRB for which the data forwarding is proposed, the source NG-RAN node shall also include the *MRB ID* IE and the *MRB Progress Information* IE to indicate the highest PDCP SN of the packet which has already been delivered to the UE for the MRB.

In case of intra-system handover, if the HANDOVER COMMAND message contains the *DL Forwarding UP TNL Information* IE for a given DRB within the *Data Forwarding Response DRB List* IE in the *Handover Command Transfer* IE, the source NG-RAN node shall consider that the forwarding of downlink data for this DRB is accepted by the target NG-RAN node. If the HANDOVER COMMAND message contains the *UL Forwarding UP TNL Information* IE for a given DRB in the *Data Forwarding Response DRB List* IE within the *Handover Command Transfer* IE, it means the target NG-RAN node has requested the forwarding of uplink data for this DRB.

In case direct data forwarding is applied for inter-system handover, if the *Data Forwarding Response E-RAB List* IE in the *Handover Command Transfer* IE is included in the HANDOVER COMMAND message, the source NG-RAN node shall consider that forwarding of downlink data for this E-RAB is accepted by the target eNB.

If the HANDOVER COMMAND message contains the *UL Forwarding UP TNL Information* IE for a given PDU session within the *Handover Command Transfer* IE, the source NG-RAN node shall consider that the forwarding of uplink data of the QoS flows is accepted by the target NG-RAN node.

## \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Next changes\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.4.2 Handover Resource Allocation

#### 8.4.2.1 General

The purpose of the Handover Resource Allocation procedure is to reserve resources at the target NG-RAN node for the handover of a UE. The procedure uses UE-associated signalling.

#### 8.4.2.2 Successful Operation



Figure 8.4.2.2-1: Handover resource allocation: successful operation

The AMF initiates the procedure by sending the HANDOVER REQUEST message to the target NG-RAN node.

If the *Masked IMEISV* IE is contained in the HANDOVER REQUEST message the target NG-RAN node shall, if supported, use it to determine the characteristics of the UE for subsequent handling.

//skip unchanged part

If the HANDOVER REQUEST message contains the *UE Radio Capability ID* IE, the NG-RAN node shall, if supported, use it as specified in TS 23.501 [9] and TS 23.502 [10].

If the *DAPS Request Information* IE is included for a DRB in the *Source NG-RAN Node to Target NG-RAN Node Transparent Container* IE within the HANDOVER REQUEST message, the target NG-RAN node shall consider that the request concerns a DAPS Handover for that DRB, as described in in TS 38.300 [8]. The target NG-RAN node shall include the *DAPS Response information List* IE in the *Target NG-RAN Node to Source NG-RAN Node Transparent Container* IE within the HANDOVER REQUEST ACKNOWLEDGE message, containing the *DAPS Response Information* IE for each DRB requested to be configured with DAPS Handover.

If the *Extended Connected Time* IE is included in the HANDOVER REQUEST message, the NG-RAN node shall, if supported, use it as described in TS 23.501 [9].If the *MBS Session Information Source to Target List* IE is contained in the *Source NG-RAN Node to Target NG-RAN Node Transparent Container* IE within the HANDOVER REQUEST message, the target NG-RAN node shall, if supported, establish MBS session resources as specified in TS 23.247 [xx] and TS 38.300 [9].

If the *MBS Area Session ID* IE is included in the *MBS Session Information Source to Target List* IE in the *Source NG-RAN Node to Target NG-RAN Node Transparent Container* IE within the HANDOVER REQUEST message, the target NG-RAN shall use this information as indication from which MBS Area Session ID the UE is handed over.

If the *MBS Service Area* IE is included in the *MBS Session Information Source to Target List* IE in the *Source NG-RAN Node to Target NG-RAN Node Transparent Container* IE within the HANDOVER REQUEST message, the target NG-RAN shall use this information to setup respective MBS Session Resources.

For each MRB in the *MBS Mapping and Data Forwarding Request* IE contained in the *MBS Session Information Source to Target List* IE in the *Source NG-RAN Node to Target NG-RAN Node Transparent Container* IE within the HANDOVER REQUEST message, the target NG-RAN node may also include the *MRB Progress Information* IE in the *Data Forwarding Response MRB List* IE in the *MBS Session Information Response Target to Source List* IE in the *Target NG-RAN Node to Source NG-RAN Node Transparent Container* IE within the HANDOVER REQUEST ACKNOWLEDGE message, to indicate the *PDCP SN* of the oldest packet available at the target NG-RAN node for the MRB. If the *MRB Progress Information* IE is included, the source NG-RAN node shall stop the data forwarding according to the value indicated in the *MRB Progress Information* IE received in the HANDOVER REQUEST ACKNOWLEDGE message.

**Interactions with RRC Inactive Transition Report procedure:**

If the *RRC Inactive Transition Report Request* IE is included in the HANDOVER REQUEST message and set to "subsequent state transition report", the NG-RAN node shall, if supported, send the RRC INACTIVE TRANSITION REPORT message to the AMF to report the RRC state of the UE when the UE enters or leaves RRC\_INACTIVE state.

## \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Next changes\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 8.4.4 Path Switch Request

#### 8.4.4.1 General

The purpose of the Path Switch Request procedure is to establish a UE associated signalling connection to the 5GC and, if applicable, to request the switch of the downlink termination point of the NG-U transport bearer towards a new termination point. The procedure uses UE-associated signalling.

#### 8.4.4.2 Successful Operation



Figure 8.4.4.2-1: Path switch request: successful operation

The NG-RAN node initiates the procedure by sending the PATH SWITCH REQUEST message to the AMF. Upon reception of the PATH SWITCH REQUEST message the AMF shall, for each PDU session indicated in the *PDU Session ID* IE, transparently transfer the *Path Switch Request Transfer* IE to the SMF associated with the concerned PDU session.

//skip unchanged part

If the PATH SWITCH REQUEST ACKNOWLEDGE message contains the *UE Radio Capability ID* IE, the NG-RAN node shall, if supported, use it as specified in TS 23.501 [9] and TS 23.502 [10].

If the PATH SWITCH REQUEST ACKNOWLEDGE message contains the *Alternative QoS Parameters Set List* IE, the NG-RAN node shall, if supported, use it as specified in TS 23.502 [10].

For each PDU session, if the *PDU Session Expected UE Activity Behaviour* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message, the NG-RAN node shall, if supported, handle this information as specified in TS 23.501 [9].

For location dependent multicast session, if the SMF detects that the UE has moved to another MBS service area of the MBS session, and if the NG-RAN node support MBS, the SMF shall include the *MBS Session ID* IE and the *Updated MBS Area Session ID* IE in the *MBS Area Session Information Update List* IE within *Path Switch Request Acknowledge Transfer* IE of the PATH SWITCH REQUEST ACKNOWLEDGE message.

**Interactions with RRC Inactive Transition Report procedure:**

If the *RRC Inactive Transition Report Request* IE is included in the PATH SWITCH REQUEST ACKNOWLEDGE message and set to "single RRC connected state report" and the UE is in RRC\_CONNECTED state, the NG-RAN node shall, if supported, send one RRC INACTIVE TRANSITION REPORT message to the AMF to report the RRC state of the UE.

## \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Next changes\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

####  9.3.1.29 Source NG-RAN Node to Target NG-RAN Node Transparent Container

This IE is produced by the source NG-RAN node and is transmitted to the target NG-RAN node. For inter-system handovers to 5G, the IE is transmitted from the external handover source to the target NG-RAN node.

This IE is transparent to the 5GC.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| RRC Container | M |  | OCTET STRING | Includes the RRC *HandoverPreparationInformation* message as defined in TS 38.331 [18] if the target is a gNB.Includes the RRC *HandoverPreparationInformation* message as defined in TS 36.331 [21] if the target is an ng-eNB. | - |  |
| **PDU Session Resource Information List** |  | *0..1* |  | For intra-system handovers in NG-RAN. | - |  |
| **>PDU Session Resource Information Item** |  | *1..<maxnoofPDUSessions>* |  |  | - |  |
| >>PDU Session ID | M |  | 9.3.1.50 |  | - |  |
| **>>QoS Flow Information List** |  | *1* |  |  | - |  |
| **>>>QoS Flow Information Item** |  | *1..<maxnoofQoSFlows>* |  |  | - |  |
| >>>>QoS Flow Identifier | M |  | 9.3.1.51 |  | - |  |
| >>>>DL Forwarding | O |  | 9.3.1.33 |  | - |  |
| >>>>UL Forwarding | O |  | 9.3.1.118 |  | YES | ignore |
| >>DRBs to QoS Flows Mapping List | O |  | 9.3.1.34 |  | - |  |
| **>>MBS Session Associated Information List** |  | *0..<maxnoofMBSSessions>* |  |  | YES | ignore |
| >>>MBS Session ID | M |  | 9.3.1.aaa |  | - |  |
| **>>>Associated QoS Flow Information To Be Setup List** |  | *1..<maxnoofMBSQoSflows>* |  |  | - |  |
| >>>>MBS QoS Flow Identifier | M |  | QoS Flow Identifier9.3.1.51 |  | - |  |
| >>>>Associated Unicast QoS Flow Identifier | M  |  | QoS Flow Identifier 9.3.1.51 |  | - |  |
| **E-RAB Information List** |  | *0..1* |  | For inter-system handovers to 5G. | - |  |
| **>E-RAB Information Item** |  | *1..<maxnoofE-RABs>* |  |  | - |  |
| >>E-RAB ID | M |  | 9.3.2.3 |  | - |  |
| >>DL Forwarding | O |  | 9.3.1.33 |  | - |  |
| Target Cell ID | M |  | NG-RAN CGI9.3.1.73 |  | - |  |
| Index to RAT/Frequency Selection Priority | O |  | 9.3.1.61 |  | - |  |
| UE History Information | M |  | 9.3.1.95 |  | - |  |
| SgNB UE X2AP ID | O |  | 9.3.1.127 | Allocated at the Source en-gNB | - |  |
| UE History Information from UE | O |  | 9.3.1.166 |  | YES | ignore |
| **MBS Session Information Source to Target List** |  | *0..<maxnoofMBSSessionsofUE>* |  |  | YES | ignore |
| >MBS Session ID | M |  | 9.3.1.aaa |  | - |  |
| >MBS Session Status | M |  | 9.2.3.ooo |  | - |  |
| >MBS Area Session ID | O |  | 9.3.1.bbb | MBS Area Session ID of the UE at the NG-RAN node from which the UE context is transferred | - |  |
| >MBS Service Area | O |  | 9.3.1.sss |  | - |  |
| **>MBS QoS Flow to Add List** |  | *1..<maxnoofMBSQoSFlows>* |  |  | - |  |
| *>>*MBS QoS Flow Identifier | M |  | QoS Flow Identifier9.3.1.51 |  | - |  |
| *>>*MBS QoS Flow Level QoS *Parameters* | M |  | QoS Flow Level QoS Parameters9.3.1.12 |  | - |  |
| **>MBS Mapping and Data Forwarding Request** |  | *1 .. <maxnoofMRBs>* |  |  | - |  |
| >>MRB ID | M |  | 9.3.1.kkk |  | - |  |
| **>> MBS QoS Flow List** |  | *1..<maxnoofMBSQoSflows>* |  |  | - |  |
| >>>MBS QoS Flow Identifier | M |  | QoS Flow Identifier9.3.1.51 |  | - |  |
| >>MRB Progress Information | M |  | 9.3.1.nnn | The SN information of the last packet which has already been delivered for the MRB.  | - |  |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofPDUSessions | Maximum no. of PDU sessions allowed towards one UE. Value is 256. |
| maxnoofQoSFlows | Maximum no. of QoS flows allowed within one PDU session. Value is 64. |
| maxnoofE-RABs | Maximum no. of E-RABs allowed towards one UE. Value is 256. |
| maxnoofMBSSessions | Maximum no. of MBS Sessions allowed within one PDU session. Value is 32. |
| maxnoofMBSSessionsofUE | Maximum no. of MBS sessions allowed towards one UE. Value is 8192. |
| maxnoofMBSQoSflows | Maximum no. of MBS QoS flows allowed within one MBS session. Value is 64. |

#### 9.3.1.30 Target NG-RAN Node to Source NG-RAN Node Transparent Container

This IE is produced by the target NG-RAN node and is transmitted to the source NG-RAN node. For inter-system handovers to 5G, the IE is transmitted from the target NG-RAN node to the external relocation source.

This IE is transparent to the 5GC.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| RRC Container | M |  | OCTET STRING | Includes the RRC *HandoverCommand* message as defined in TS 38.331 [18] if the target is a gNB.Includes the RRC *HandoverCommand* message as defined in TS 36.331 [21] if the target is an ng-eNB. | - |  |
| DAPS Response Information List  |  | *0..1* |  |  | YES | ignore |
| >DAPS Response Information Item |  | *1..<maxnoofDRBs>* |  |  | - |  |
| >>DRB ID | M |  | 9.3.1.53 |  | - |  |
| >>DAPS Response Information | M |  | 9.3.1.189 | Indicates the response to a requested DAPS Handover | - |  |
| **MBS Session Information Response Target to Source List** |  | *0..<maxnoofMBSSessionsofUE>* |  |  | YES | ignore |
| >MBS Session ID | M |  | 9.3.1.aaa |  | - |  |
| **>Data Forwarding Response MRB List** |  | *1..<maxnoofMRBs>* |  |  | - |  |
| >>MRB ID | M |  | 9.3.1.kkk |  | - |  |
| >>DL Forwarding UP TNL Information | M |  | UP Transport Layer Information9.3.2.2 |  | - |  |
| >>MRB Progress Information | O |  | 9.3.1.nnn | This IE includes the information of the oldest packet available at the target NG-RAN node for the MRB. | - |  |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofDRBs | Maximum no. of DRBs allowed towards one UE. Value is 32. |
| maxnoofMBSSessionsofUE | Maximum no. of MBS sessions allowed towards one UE. Value is 8192. |
| maxnoofMBSQoSFlows | Maximum no. of QoS flows allowed within one MBS session. Value is 64. |
| maxnoofMRBs | Maximum no. of MRBs. Value is 32. |

## \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Next changes\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

#### 9.3.1.kkk MRB ID

This IE contains the MRB ID.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| MRB ID | M |  | INTEGER (1..32, ...) |  |

9.3.1.nnn MRB Progress Information

This IE contains the MRB progress Information.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| **CHOICE *PDCP SN Status*** | M |  |  |  |
| >12bits |  |  |  |  |
| >> PDCP SN Length 12 | M |  | INTEGER (0..4095) |  |
| >18bits |  |  |  |  |
| >> PDCP SN Length 18 | M |  | INTEGER (0..262143) |  |

#### 9.3.1.ooo MBS Session Status

This IE indicates whether multicast session is activated or deactivated.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| MBS Session Status | M |  | ENUMERATED (activated, deactivated, …) |  |

#### 9.2.3.sss MBS Service Area

This IE contains the MBS service area.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| CHOICE Session Type | M |  |  |  |
| >location independent |  |  |  |  |
| >>MBS Service Area Information | M |  | 9.3.1.ccc |  |
| >location dependent |  |  |  |  |
| **>>MBS Service Area Information Location Dependent List** |  | *<1..maxnoofMBSServiceAreaInformation>* |  |  |
| >>>MBS Area Session ID | M |  | 9.3.1.bbb |  |
| >>>MBS Service Area Information | M |  | 9.3.1.ccc |  |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofMBSServiceAreaInformation | Maximum no. of MBS Service Area Information elements in the *MBS Service Area Information LocationDependent List* IE. Value is 256 [FFS]. |

## \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Next changes\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

#### 9.3.4.9 Path Switch Request Acknowledge Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| UL NG-U UP TNL Information | O |  | UP Transport Layer Information9.3.2.2 | UPF endpoint of the NG-U transport bearer corresponding to the *DL NG-U UP TNL Information* IE received in the *Path Switch Request Transfer* IE. | - |  |
| //skip the unchanged part |  |  |  |  |  |  |
| **QoS Flow Parameters List** |  | *0..1* |  |  | YES | ignore |
| **>QoS Flow Parameters Item** |  | *1..<maxnoofQoSFlows>* |  |  | - |  |
| >>QoS Flow Identifier | M |  | 9.3.1.51 |  | - |  |
| >>Alternative QoS Parameters Set List | O |  | 9.3.1.151 | Indicates alternative sets of QoS parameters for the QoS flow. | - |  |
| >>CN Packet Delay Budget Downlink | O |  | Extended Packet Delay Budget9.3.1.135 | Core Network Packet Delay Budget is specified in TS 23.501 [9].This IE may be present in case of GBR QoS flows and is ignored otherwise. | YES | ignore |
| >>CN Packet Delay Budget Uplink | O |  | Extended Packet Delay Budget9.3.1.135 | Core Network Packet Delay Budget is specified in TS 23.501 [9].This IE may be present in case of GBR QoS flows and is ignored otherwise. | YES | ignore |
| >>Burst Arrival Time Downlink | O |  | Burst Arrival Time9.3.1.133 | Indicates the downlink Burst Arrival Time of the TSC QoS flow | YES | ignore |
| **MBS Area Session Information Update List** |  | *0..<maxnoofMBSSessions>* |  |  | YES | ignore |
| >MBS Session ID | M |  | 9.3.1.aaa |  |  |  |
| >Updated MBS Area Session ID | M |  | MBS Area Session ID 9.3.1.bbb |  |  |  |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofQoSFlows | Maximum no. of QoS flows allowed within one PDU session. Value is 64. |
| maxnoofMBSSessions | Maximum no. of MBS Sessions allowed within one PDU session. Value is 32. |