**3GPP TSG-RAN WG3 Meeting #114bis-e *R3-221167***

**E-meeting, 17-26 Jan 2022**

**Title:** (TP to TS 38.413 BL CR) Multicast Session Management Over NG

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

**Agenda item:** 22.2.2

**Document Type:** Other

# 1. Introduction

In the RAN3#114e meeting, there were more agreements about multicast session management achieved:

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| --- |
| **Multicast Session Management*** **About providing mapped QoS flow and associated QoS flow information from CN to RAN, update UE associated NGAP: *PDU Session Resource Modify Request Transfer* IE and *PDU Session Resource Setup Request Transfer* IE.**
* **Introduce a non-UE associated NGAP Class1 Multicast Session Update procedure triggered by MB-SMF to support multicast session update in case the change of some of QoS parameters and/or service area.**
* **Introduce non-UE associated NGAP Class1 Multicast Session Activation procedure and Multicast Session Deactivation procedure, FFS on whether a single procedure or separate procedures should be used for activation/update/deactivation.**
* **WA: introduce new MB-SMF containers in TS 38.413, subject to SA2/CT4. Applicable for both MC and BC.**
* **Introduce one or two non-UE associated Class1 NGAP procedure(s), triggered by the gNB to implement Multicast Distribution Setup function, and Multicast Distribution Release function.**
* **For location dependent Multicast MBS service, the MBS Distribution Setup/Release procedure is used to setup/release the NG-U tunnel for an area Session.**
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In the RAN3 #114bis-e online meeting, there were further agreement achieved as:

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| --- |
| * **Introduce new MB-SMF containers in TS 38.413. Applicable for both MC and BC.**
* **Separate NGAP procedures are used to support Distribution Setup and Distribution Release.**
* **Different procedures are used for “Multicast Session Activation/Deactivation” and “Broadcast Session Start/Stop”.**
* **Define separate procedures to support both Multicast Session Activation and Multicast Session Deactivation.**
* **Define one procedure to support Multicast Session Update.**
* **Perform admission control at session activation, if needed, and RAN node either accept the activation by sending session activation response message or reject the activation by sending activation failure message.**
* **Include the MBS QoS Flow Level QoS Parameters and the MBS service area information(s) associated with the same MBS Session in the Multicast Session Update Request message.**
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In this paper, we will capture these agreements to provide the text proposal to BL CR of TS 38.413 in Section 2.

# 2. Text Proposal to BL CR of TS 38.413

## \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*First change\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 38.401: "NG-RAN; Architecture description".

[3] 3GPP TS 38.410: "NG-RAN; NG general aspects and principles".

[4] ITU-T Recommendation X.691 (07/2002): "Information technology – ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)".

[5] ITU-T Recommendation X.680 (07/2002): "Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation".

[6] ITU-T Recommendation X.681 (07/2002): "Information technology – Abstract Syntax Notation One (ASN.1): Information object specification".

[7] 3GPP TR 25.921 (version.7.0.0): "Guidelines and principles for protocol description and error handling".

[8] 3GPP TS 38.300: "NR; NR and NG-RAN Overall Description; Stage 2".

[9] 3GPP TS 23.501: "System Architecture for the 5G System; Stage 2".

[10] 3GPP TS 23.502: "Procedures for the 5G System; Stage 2".

[11] 3GPP TS 32.422: "Trace control and configuration management".

[12] 3GPP TS 38.304: "NR; User Equipment (UE) procedures in idle mode and in RRC inactive state".

[13] 3GPP TS 33.501: "Security architecture and procedures for 5G System".

[14] 3GPP TS 38.414: "NG-RAN; NG data transport".

[15] 3GPP TS 29.281: "General Packet Radio System (GPRS); Tunnelling Protocol User Plane (GTPv1-U)".

[16] 3GPP TS 36.413: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP)".

[17] 3GPP TS 36.300: "Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2".

[18] 3GPP TS 38.331: "NG-RAN; Radio Resource Control (RRC) Protocol Specification".

[19] 3GPP TS 38.455: "NG-RAN; NR Positioning Protocol A (NRPPa)".

[20] 3GPP TS 23.007: "Technical Specification Group Core Network Terminals; Restoration procedures".

[21] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA) Radio Resource Control (RRC); Protocol specification".

[22] 3GPP TS 23.041: "Technical realization of Cell Broadcast Service (CBS)".

[23] 3GPP TS 23.003: "Numbering, addressing and identification".

[24] 3GPP TS 38.423: "NG-RAN; Xn Application Protocol (XnAP)".

[25] IETF RFC 5905 (2010-06): "Network Time Protocol Version 4: Protocol and Algorithms Specification".

[26] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".

[27] 3GPP TS 33.401: "3GPP System Architecture Evolution (SAE); Security architecture".

[28] 3GPP TS 25.413: "UTRAN Iu interface RANAP signalling".

[29] 3GPP TS 36.304: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) procedures in idle mode".

[30] 3GPP TS 29.531: "5G System; Network Slice Selection Services; Stage 3".

[31] 3GPP TS 23.216: "Single Radio Voice Call Continuity (SRVCC); Stage 2".

[32] 3GPP TS 37.340: " Evolved Universal Terrestrial Radio Access (E-UTRA) and NR; Multi-connectivity; Stage 2".

[33] 3GPP TS 23.287: "Architecture enhancements for 5G System (5GS) to support Vehicle-to-Everything (V2X) services".

[34] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G System (5GS)".

[35] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[36] 3GPP TS 29.510: "5G System; Network Function Repository Services; Stage 3".

[37] CableLabs WR-TR-5WWC-ARCH: "5G Wireless Wireline Converged Core Architecture".

[38] 3GPP TS 36.401: "E-UTRAN Architecture Description".

[39] 3GPP TS 38.104: "NR; Base Station (BS) radio transmission and reception".

[40] 3GPP TS 36.423: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); X2 Application Protocol (X2AP) ".

[41] 3GPP TS 37.320: "Universal Terrestrial Radio Access (UTRA), Evolved Universal Terrestrial Radio Access (E-UTRA) and NR; Radio measurement collection for Minimization of Drive Tests (MDT); Overall description; Stage 2".

[42] 3GPP TS 36.306: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio access capabilities".

[xx] 3GPP TS 23.247: "Architectural enhancements for 5G multicast-broadcast services; Stage 2”.

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

## 8.1 List of NGAP Elementary Procedures

In the following tables, all EPs are divided into Class 1 and Class 2 EPs (see subclause 3.1 for explanation of the different classes):

Table 8.1-1: Class 1 procedures

|  |  |  |  |
| --- | --- | --- | --- |
| Elementary Procedure | Initiating Message | Successful Outcome | Unsuccessful Outcome |
| Response message | Response message |
| AMF Configuration Update | AMF CONFIGURATION UPDATE | AMF CONFIGURATION UPDATE ACKNOWLEDGE | AMF CONFIGURATION UPDATE FAILURE |
| RAN Configuration Update | RAN CONFIGURATION UPDATE | RAN CONFIGURATION UPDATE ACKNOWLEDGE | RAN CONFIGURATION UPDATE FAILURE |
| Handover Cancellation | HANDOVER CANCEL | HANDOVER CANCEL ACKNOWLEDGE |  |
| Handover Preparation | HANDOVER REQUIRED | HANDOVER COMMAND | HANDOVER PREPARATION FAILURE |
| Handover Resource Allocation | HANDOVER REQUEST | HANDOVER REQUEST ACKNOWLEDGE | HANDOVER FAILURE |
| Initial Context Setup | INITIAL CONTEXT SETUP REQUEST | INITIAL CONTEXT SETUP RESPONSE | INITIAL CONTEXT SETUP FAILURE |
| NG Reset | NG RESET | NG RESET ACKNOWLEDGE |  |
| NG Setup | NG SETUP REQUEST | NG SETUP RESPONSE | NG SETUP FAILURE |
| Path Switch Request | PATH SWITCH REQUEST | PATH SWITCH REQUEST ACKNOWLEDGE | PATH SWITCH REQUEST FAILURE |
| PDU Session Resource Modify | PDU SESSION RESOURCE MODIFY REQUEST | PDU SESSION RESOURCE MODIFY RESPONSE |  |
| PDU Session Resource Modify Indication | PDU SESSION RESOURCE MODIFY INDICATION | PDU SESSION RESOURCE MODIFY CONFIRM |  |
| PDU Session Resource Release | PDU SESSION RESOURCE RELEASE COMMAND | PDU SESSION RESOURCE RELEASE RESPONSE |  |
| PDU Session Resource Setup | PDU SESSION RESOURCE SETUP REQUEST | PDU SESSION RESOURCE SETUP RESPONSE |  |
| UE Context Modification | UE CONTEXT MODIFICATION REQUEST | UE CONTEXT MODIFICATION RESPONSE | UE CONTEXT MODIFICATION FAILURE |
| UE Context Release | UE CONTEXT RELEASE COMMAND | UE CONTEXT RELEASE COMPLETE |  |
| Write-Replace Warning  | WRITE-REPLACE WARNING REQUEST | WRITE-REPLACE WARNING RESPONSE |  |
| PWS Cancel | PWS CANCEL REQUEST | PWS CANCEL RESPONSE |  |
| UE Radio Capability Check | UE RADIO CAPABILITY CHECK REQUEST | UE RADIO CAPABILITY CHECK RESPONSE |  |
| UE Context Suspend | UE CONTEXT SUSPEND REQUEST | UE CONTEXT SUSPEND RESPONSE | UE CONTEXT SUSPEND FAILURE |
| UE Context Resume | UE CONTEXT RESUME REQUEST | UE CONTEXT RESUME RESPONSE | UE CONTEXT RESUME FAILURE |
| UE Radio Capability ID Mapping | UE RADIO CAPABILITY ID MAPPING REQUEST | UE RADIO CAPABILITY ID MAPPING RESPONSE |  |
| Distribution Setup | DISTRIBUTION SETUP REQUEST | DISTRIBUTION SETUP RESPONSE | DISTRIBUTION SETUP FAILURE |
| Distribution Release | DISTRIBUTION RELEASE REQUEST | DISTRIBUTION RELEASE RESPONSE |  |
| Multicast Session Activation | MULTICAT SESSION ACTIVATION REQUEST | MULTICAT SESSION ACTIVATION RESPONSE | MULTICAT SESSION ACTIVATION FAILURE |
| Multicast Session Deactivation | MULTICAT SESSION DEACTIVATION REQUEST | MULTICAT SESSION DEACTIVATION RESPONSE |  |
| Multicast Session Update | MULTICAST SESSION UPDATE REQUEST | MULTICAST SESSION UPDATE RESPONSE |  |

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

## 8.xx MBS Session Management Procedures

### 8.xx.c Distribution Setup

#### 8.xx.c.1 General

The purpose of the Distribution Setup procedure is to assign NG-U resources for one MBS session, or for one area session of a location dependent multicast session.

The procedure uses non-UE-associated signalling.

#### 8.xx.c.2 Successful Operation



Figure 8.xx.c.2-1: Distribution Setup: successful operation

The NG-RAN node initiates the procedure by sending a DISTRIBUTIONSETUP REQUEST message to the AMF. The AMF responds with a DISTRIBUTION SETUP RESPONSE message.

For location dependent multicast session, the NG-RAN node shall include the *MBS Area Session ID* IE in the DISTRIBUTION SETUP REQUEST message, and AMF shall provide the same value of *MBS Area Session ID* IE in the DISTRIBUTION SETUP RESPONSE message.

If the *Shared NG-U TNL Information* IE is included in the *MBS* *Distribution Setup Request Transfer* IE in the DISTRIBUTION SETUP REQUEST message, the MB-SMF shall use the included information as the downlink termination point for the shared NG-U transport.

If the *Shared NG-U TNL Information* IE is not included in the *MBS Distribution Setup Request Transfer* IE in the DISTRIBUTION SETUP REQUEST message, the MB-SMF shall interpret that the IP multicast is used for this shared NG-U transport, and include the *Shared NG-U Multicast TNL Information* IE or the *Alternative Shared NG-U Multicast TNL Information* IE in the MBS *Distribution Setup Response Transfer* IE in the DISTRIBUTION SETUP RESPONSE message.

#### 8.xx.c.3 Unsuccessful Operation



Figure 8.xx.c.3-1: Distribution Setup: unsuccessful operation.

In case the shared NG-U transport cannot be setup successfully, the AMF shall response with the DISTRIBUTION SETUP FAILURE message to the NG-RAN node with an appropriate cause value.

#### 8.xx.c.4 Abnormal Conditions

Not applicable.

### 8.xx.d Distribution Release

#### 8.xx.d.1 General

The purpose of the Distribution Release procedure is to enable the release of an already established NG-U resources for a given MBS Session, or for a given area session of the MBS session.

The procedure uses non-UE-associated signalling.

#### 8.xx.d.2 Successful Operation



Figure 8.xx.d.2-1: Distribution Release: successful operation

The NG-RAN node initiates the procedure by sending a DISTRIBUTION RELEASE REQUEST message.

Upon receipt of the DISTRIBUTION RELEASE REQUEST message, the AMF shall send the DISTRIBUTION RELEASE RESPONSE message after successfully remove the corresponding NG-U resource for the MSB Session.

For location dependent multicast session, the NG-RAN node shall include the *MBS Area Session ID* IE in the DISTRIBUTION RELEASE REQUEST message, and AMF shall provide the same value of *MBS Area Session ID* IE in the DISTRIBUTION RELEASE RESPONSE message.

If unicast shared NG-U transport is used, the NG-RAN node shall include the *Shared NG-U TNL Information* IE in the *MBS Distribution Release Request Transfer IE* in the DISTRIBUTION RELEASE REQUEST message, and the MB-SMF shall release the corresponding shared NG-U transport as specified in TS 23.247 [xx].

#### 8.xx.d.3 Unsuccessful Operation

Not applicable.

#### 8.xx.d.4 Abnormal Conditions

Not applicable.

### 8.xx.a Multicast Session Activation

#### 8.xx.a.1 General

The purpose of the Multicast Session Activation procedure is to request a NG-RAN node to activate the MBS resources of one MBS session.

The procedure uses non-UE-associated signalling.

#### 8.xx.a.2 Successful Operation



Figure 8.xx.a.2-1: Multicast Session Activation, successful operation

The AMF initiates the procedure by sending a MULTICAST SESSION ACTIVATION REQUEST message to the NG-RAN node.

Upon receipt of this message, the NG-RAN nodeactivates the MBS resources indicated in the MULTICAST SESSION ACTIVATION REQUEST message and indicates in the MULTICAST SESSION ACTIVATION RESPONSE message for which MBS Session the request was fulfilled.

#### 8.xx.a.3 Unsuccessful Operation



Figure 8.xx.a.3-1: Multicast Session Activation, unsuccessful operation

If the NG-RAN node cannot activate the MBS resources indicated in the MULTICAST SESSION ACTIVATION REQUEST message, it shall respond with a MULTICAST SESSION ACTIVATION FAILURE message with an appropriate cause value.

#### 8.xx.a.4 Abnormal Conditions

Not applicable.

### 8.xx.b Multicast Session Deactivation

#### 8.xx.b.1 General

The purpose of the Multicast Session Deactivation procedure is to request a NG-RAN node to deactivate the MBS resources of one MBS session.

The procedure uses non-UE-associated signalling.

#### 8.xx.b.2 Successful Operation



Figure 8.xx.b.2-1: Multicast Session Deactivation, successful operation

The AMF initiates the procedure by sending a MULTICAST SESSION DEACTIVATION REQUEST message to the NG-RAN node.

Upon receipt of this message, the NG-RAN nodeshall deactivate the MBS resources indicated in the MULTICAST SESSION DEACTIVATION REQUEST message and shall indicate in the MULTICAST SESSION DEACTIVATION RESPONSE message for which MBS Session the request was fulfilled.

#### 8.xx.b.3 Unsuccessful Operation

Not applicable.

#### 8.xx.b.4 Abnormal Conditions

Not applicable.

### 8.xx.c Multicast Session Update

#### 8.xx.c.1 General

The purpose of the Multicast Session Update procedure is to request NG-RAN node to update the MBS service area and/or the MBS QoS information related to a MBS session, or to an area session of a location dependent multicast session.

The procedure uses non-UE associated signalling.

#### 8.xx.c.2 Successful Operation



**Figure 8.x.c.2-1. Multicast Session Update procedure. Successful operation.**

The AMF initiates the procedure by sending a MULTICAST SESSION UPDATE REQUEST message to the NG-RAN node.

Upon receipt of the MULTICAST SESSION UPDATE REQUEST message, the NG-RAN node shall update the QoS profile and/or MBS Service Area for the multicast service and send the MULTICAST SESSION UPDATE RESPONSE message to the AMF.

For location dependent multicast session, the AMF shall include the *MBS Area Session ID* IE in the MULTICAST SESSION UPDATE REQUEST message, and the NG-RAN node shall provide the same value of *MBS Area Session ID* IE in the MULTICAST SESSION UPDATE RESPONSE message.

In case the *MBS Service Area information* IE is included in the *Multicast Session Update Request Transfer* IE in the MULTICAST SESSION UPDATE REQUEST message, the NG-RAN node shall update the stored MBS Service Area Information for that service, as specified in TS 23.247 [xx].

In case the *MBS QoS Flows To Be Setup or Modify List* IE is included in the *Multicast Session Update Request Transfer* IE in the MULTICAST SESSION UPDATE REQUEST message, the NG-RAN node shall setup or modify the MBS QoS information accordingly.

In case the *MBS QoS Flows To Be Release List* IE is included in the *Multicast Session Update Request Transfer* IE in the MULTICAST SESSION UPDATE REQUEST message, the NG-RAN node shall release the indicated MBS QoS flows.

#### 8.xx.c.3 Unsuccessful Operation

Not applicable.

#### 8.xx.c.4 Abnormal Conditions

Not applicable.

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

### 9.2.x MBS Session Management Messages

#### 9.2.x.a1 DISTRIBUTION SETUP REQUEST

This message is sent by the NG-RAN node to request the setup of the NG-U Transport for a MBS Session, or for one area session of a location dependent multicast session.

Direction: NG-RAN node → AMF

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| MBS Session ID | M |  | 9.3.1.aaa |  | YES | reject |
| MBS Area Session ID | O |  | 9.3.1.bbb |  | YES | reject |
| MBS Distribution Setup Request Transfer | M |  | OCTET STRING | Containing the *MBS Distribution Setup Request Transfer* IE specified in subclause 9.3.A.a1. | YES | reject |

#### 9.2.x.a2 DISTRIBUTION SETUP RESPONSE

This message is sent by the AMF to confirm the setup of the NG-U Transport.

Direction: AMF → NG-RAN node

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| MBS Session ID | M |  | 9.3.1.aaa |  | YES | reject |
| MBS Area Session ID | O |  | 9.3.1.bbb |  | YES | reject |
| MBS Distribution Setup Response Transfer | M |  | OCTET STRING | Containing the *MBS Distribution Setup Response Transfer* IE specified in subclause 9.3.A.a2. | YES | reject |
| Criticality Diagnostics | O |  | 9.3.1.3 |  | YES | ignore |

#### 9.2.x.a3 DISTRIBUTION SETUP FAILURE

This message is sent by the AMF to indicate that the setup of the NG-U Transport was unsuccessful.

Direction: AMF → NG-RAN node

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| MBS Session ID | M |  | 9.3.1.aaa |  | YES | reject |
| MBS Area Session ID | O |  | 9.3.1.bbb |  | YES | reject |
| MBS Distribution Setup Unsuccessful Transfer | M |  | OCTET STRING | Containing the *MBS Distribution Setup Unsuccessful Transfer* IE specified in subclause 9.3.A.a3. |  | ignore |
| Cause | M |  | 9.3.1.2 |  | YES | ignore |
| Criticality Diagnostics | O |  | 9.3.1.3 |  | YES | ignore |

#### 9.2.x.b1 DISTRIBUTION RELEASE REQUEST

This message is sent by the NG-RAN node to request the release of the NG-U Transport.

Direction: NG-RAN node → AMF

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| MBS Session ID | M |  | 9.3.1.aaa |  | YES | reject |
| MBS Area Session ID | O |  | 9.3.1.bbb |  | YES | reject |
| MBS Distribution Release Request Transfer | M |  | OCTET STRING | Containing the *MBS Distribution Release Request Transfer* IE specified in subclause 9.3.A.b1. | YES | reject |
| Cause | M |  | 9.3.1.2 |  | YES | ignore |

#### 9.2.x.b2 DISTRIBUTION RELEASE RESPONSE

This message is sent by the AMF to confirm the release of the NG-U Transport.

Direction: AMF → NG-RAN

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| MBS Session ID | M |  | 9.3.1.aaa |  | YES | reject |
| MBS Area Session ID | O |  | 9.3.1.bbb |  | YES | reject |
| Criticality Diagnostics | O |  | 9.3.1.3 |  | YES | ignore |

#### 9.2.x.c1 MULTICAST SESSION ACTIVATION REQUEST

This message is sent by the AMF to a NG-RAN node to request previously deactivated MBS resources to be re-activated.

Direction: AMF → NG-RAN node

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| MBS Session ID | M |  | 9.3.1.aaa |  | YES | reject |
| Multicast Session Activation Request Transfer | M |  | OCTET STRING | Containing the *Multicast Session Activation Request Transfer* IE specified in subclause 9.3.A.c1 | YES | reject |

#### 9.2.x.c2 MULTICAST SESSION ACTIVATION RESPONSE

This message is sent by the NG-RAN node to the AMF to indicate that the MBS resources previously deactivated have been activated.

Direction: NG-RAN node → AMF

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| MBS Session ID | M |  | 9.3.1.aaa |  | YES | reject |
| Multicast Session Activation Response Transfer | M |  | OCTET STRING | Containing the *Multicast Session Activation Response Transfer* IE specified in subclause 9.3.A.c2 | YES | reject |
| Criticality Diagnostics | O |  | 9.3.1.3 |  | YES | ignore |

#### 9.2.x.c3 MULTICAST SESSION ACTIVATION FAILURE

This message is sent by the NG-RAN node to the AMF to indicate multicast session activation failure.

Direction: NG-RAN node → AMF

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.2.13 |  | YES | reject |
| MBS Session ID | M |  | 9.3.1.aaa |  | YES | reject |
| Multicast Session Activation Unsuccessful Transfer | M |  | OCTET STRING | Containing the *Multicast Session Activation Unsuccessful Transfer* IE specified in subclause 9.3.A.c3 | YES | ignore |
| Cause | M |  | 9.3.1.2 |  | YES | ignore |
| Criticality Diagnostics | O |  | 9.3.1.3 |  | YES | ignore |

#### 9.2.x.d1 MULTICAST SESSION DEACTIVATION REQUEST

This message is sent by the AMF to a NG-RAN node to request to deactivate the MBS resources of a MBS Session.

Direction: AMF → NG-RAN node

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| MBS Session ID | M |  | 9.3.1.aaa |  | YES | reject |
| Multicast Session Deactivation Request Transfer | M |  | OCTET STRING | Containing the *Multicast Session Deactivation Request Transfer* IE specified in subclause 9.3.A.d1 | YES | reject |

#### 9.2.x.d2 MULTICAST SESSION DEACTIVATION RESPONSE

This message is sent by the NG-RAN node to the AMF to indicate that the MBS resources have been deactivated.

Direction: NG-RAN node → AMF

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| MBS Session ID | M |  | 9.3.1.aaa |  | YES | reject |
| Multicast Session Deactivation Response Transfer | M |  | OCTET STRING | Containing the *Multicast Session Deactivation Response Transfer* IE specified in subclause 9.3.A.d2 | YES | reject |
| Criticality Diagnostics | O |  | 9.3.1.3 |  | YES | ignore |

#### 9.2.x.e1 MULTICAST SESSION UPDATE REQUEST

This message is sent by the AMF to a NG-RAN node to update the MBS information.

Direction: AMF → NG-RAN node

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| MBS Session ID | M |  | 9.3.1.aaa |  | YES | reject |
| MBS Area Session ID | O |  | 9.3.1.bbb |  | YES | reject |
| Multicast Session Update Request Transfer | M |  | OCTET STRING | Containing the *Multicast Session Update Request Transfer* IE specified in subclause 9.3.A.e1 | YES | reject |

#### 9.2.x.e2 MULTICAST SESSION UPDATE RESPONSE

This message is sent by the NG-RAN node to the AMF to confirm the update of MBS information.

Direction: NG-RAN node → AMF

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| MBS Session ID | M |  | 9.3.1.aaa |  | YES | reject |
| MBS Area Session ID | O |  | 9.3.1.bbb |  | YES | reject |
| Criticality Diagnostics | O |  | 9.3.1.3 |  | YES | ignore |

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

#### 9.3.1.51 QoS Flow Identifier

This IE identifies a QoS flow within a PDU Session, or a MBS QoS flow within a MBS Session. The definition and use of the QoS Flow Identifier is specified in TS 23.501 [9].

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| QoS Flow Identifier | M |  | INTEGER (0..63, …) |  |

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

#### 9.3.1.aaa MBS Session ID

*Note: This IE will overlap with R3-221166 of Broadcast TP 38.413*

This IE indicates the TMGI uniquely identifies the MBS Service.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| TMGI | M |  | OCTET STRING (SIZE(6)) | Encoded as defined in TS 23.303. |
| NID | O |  | 9.3.3.42 |  |

#### 9.3.1.bbb MBS Area Session ID

*Note: This IE will overlap with R3-221166 of Broadcast TP 38.413*

This IE indicates the Area Session ID for MBS Session with location dependent context.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| Area Session ID | M |  | INTEGER (0 .. 255, …) |  |

9.3.1.ccc MBS Service Area information

*Note: This IE will overlap with R3-221166 of Broadcast TP 38.413*

This IE contains the MBS service area.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| **MBS Service Area Cell Item** |  | *0..<maxnoofCellsforMBS>* |  |  |
| *>>*NR CGI | M |  | 9.3.1.7 |  |
| **MBS Service Area TAI Item** |  | *0..<maxnoofTAIforMBS>* |  |  |
| *>>*TAI  | M |  | 9.3.3.11  |  |

|  |  |
| --- | --- |
| **Range bound** | **Explanation** |
| maxnoofCellsforMBS | Maximum no. of cells allowed within one MBS Service Area. Value is FFS. |
| maxnoofTAIforMBS | Maximum no. of TAs allowed within one MBS Service Area. Value is FFS. |

#### 9.3.1.ddd MBS Support Indicator

This IE indicates whether MBS is supported for the NG-RAN node.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| MBS Support Indicator | M |  | ENUMERATED (true, …) |  |

9.3.1.eee MBS Session Information To Be Setup List

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| **MBS Session Information To Be Setup List** |  | *1* |  |  |
| **>MBS Session Information To Be Setup Item** |  | *1..<maxnoofMBSSessions>* |  |  |
| >>MBS Session ID | M |  | 9.3.1.aaa |  |
| >>MBS Area Session ID | O |  | 9.3.1.bbb |  |
| **>>MBS QoS Flow To Be Setup List** |  | *1* |  |  |
| **>>>MBS QoS Flow To Be Setup Item**  | M | *1..<maxnoofMBSQoSflows>* |  |  |
| >>>>MBS QoS Flow Identifier | M |  | 9.3.1.51 |  |
| >>>>Associated Unicast QoS Flow Identifier | O |  | 9.3.1.51 |  |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofMBSSessions | Maximum no. of MBS Sessions allowed within one PDU session. Value is 4 [FFS]. |
| maxnoofMBSQoSflows | Maximum no. of MBS QoS flows allowed within one MBS session. Value is 64. |

9.3.1.fff MBS Session Information To Be Setup or Modify List

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| **MBS Session Information To Be Setup or Modify List** |  | *1* |  |  |
| **>MBS Session Information To Be Setup or Modify Item** |  | *1..<maxnoofMBSSessions>* |  |  |
| >>MBS Session ID | M |  | 9.3.1.aaa |  |
| >>MBS Area Session ID | O |  | 9.3.1.bbb |  |
| **>>MBS QoS Flow To Be Setup or Modify List** |  | *0..1* |  |  |
| **>>>MBS QoS Flow To Be Setup or Modify Item**  | M | *1..<maxnoofMBSQoSflows>* |  |  |
| >>>>MBS QoS Flow Identifier | M |  | 9.3.1.51 |  |
| >>>>Associated Unicast QoS Flow Identifier | O |  | 9.3.1.51 |  |
| >>MBS QoS Flow To Be Release List | O |  | QoS Flow List with Cause9.3.1.13 | This IE indicates the MBS QoS Flow Identifiers of the MBS QoS Flows to be released. |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofMBSSessions | Maximum no. of MBS Sessions allowed within one PDU session. Value is 4 [FFS]. |
| maxnoofMBSQoSflows | Maximum no. of MBS QoS flows allowed within one MBS session. Value is 64. |

9.3.1.ggg MBS Session Information To Be Remove List

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| **MBS Session To Be Release List** |  | *0..1* |  |  |
| **>MBS Session To Be Release Item** |  | *1..<maxnoofMBSSessions>* |  |  |
| >>MBS Session ID | M |  | 9.3.1.aaa |  |
| >>MBS Area Session ID | O |  | 9.3.1.bbb |  |
| >>Cause | M |  | 9.3.1.2 |  |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofMBSSessions | Maximum no. of MBS Sessions allowed within one PDU session. Value is 4 [FFS]. |

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

#### 9.3.4.1 PDU Session Resource Setup Request Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| PDU Session Aggregate Maximum Bit Rate | O |  | 9.3.1.102 | This IE shall be present when at least one Non-GBR QoS flow is being setup and is ignored otherwise. | YES | reject |
| //skip the unchanged part |  |  |  |  |  |  |
| Redundant Common Network Instance | O |  | Common Network Instance9.3.1.120 |  | YES | ignore |
| Redundant PDU Session Information | O |  | 9.3.1.136 |  | YES | ignore |
| MBS Session Information To Be Setup List | O |  | 9.3.1.eee |  | YES | ignore |

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

#### 9.3.4.2 PDU Session Resource Setup Response Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| DL QoS Flow per TNL Information | M |  | QoS Flow per TNL Information9.3.2.8 | NG-RAN node endpoint of the NG-U transport bearer for delivery of DL PDUs, together with associated QoS flows. | - |  |
| //skip the unchanged part |  |  |  |  |  |  |
| Used RSN Information | O |  | Redundant PDU Session Information9.3.1.136 |  | YES | ignore |
| Global RAN Node ID of Secondary NG-RAN Node | O |  | Global RAN Node ID9.3.1.5 |  | YES | ignore |
| MBS Support Indicator | O |  | 9.3.1.ddd |  | YES | ignore |

#### 9.3.4.3 PDU Session Resource Modify Request Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| PDU Session Aggregate Maximum Bit Rate | O |  | 9.3.1.102 |  | YES | reject |
| //skip the unchanged part |  |  |  |  |  |  |
| Redundant UL NG-U UP TNL Information  | O |  | UP Transport Layer Information9.3.2.2 | UPF endpoint of the NG-U transport bearer, for delivery of UL PDUs for the redundant transmission of the Redundant QoS Flow(s). | YES | ignore |
| Security Indication | O |  | 9.3.1.27 |  | YES | ignore |
| MBS Session Information To Be Setup or Modify List | O |  | 9.3.1.fff |  | YES | ignore |
| MBS Session Information To Be Remove List | O |  | 9.3.1.ggg |  | YES | ignore |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofQoSFlows | Maximum no. of QoS flows allowed within one PDU session. Value is 64. |
| maxnoofMultiConnectivity | Maximum no. of connectivity allowed for a UE. Value is 4. The current version of the specification supports up to 2 connectivity. |

#### 9.3.4.4 PDU Session Resource Modify Response Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| DL NG-U UP TNL Information | O |  | UP Transport Layer Information9.3.2.2 | NG-RAN node endpoint of the NG-U transport bearer, for delivery of DL PDUs. | - |  |
| //skip the unchanged part |  |  |  |  |  |  |
| Additional Redundant DL QoS Flow per TNL Information | O |  | QoS Flow per TNL Information List9.3.2.1 | NG-RAN node endpoint of the additional NG-U transport bearer(s) for delivery of redundant DL PDUs for split PDU session, together with associated QoS flows. | YES | ignore |
| Additional Redundant NG-U UP TNL Information | O |  | UP Transport Layer Information Pair List9.3.2.11 | NG-RAN node endpoint of the NG-U transport bearer for delivery of redundant DL PDUs corresponding to the modified UPF endpoint(s) received in the *UL NG-U UP TNL Modify List* IE of the *PDU Session Resource Modify Request Transfer* IE in case of PDU session split.  | YES | ignore |
| MBS Support Indicator | O |  | 9.3.1.ddd |  | YES | ignore |

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

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

#### 9.3.4.8 Path Switch Request Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| DL NG-U UP TNL Information | M |  | UP Transport Layer Information9.3.2.2 | NG-RAN node endpoint of the NG-U transport bearer, for delivery of DL PDUs. | - |  |
| DL NG-U TNL Information Reused | O |  | ENUMERATED (true, …) | Indicates that DL NG-U TNL Information has been reused. | - |  |
| //skip the unchanged part |  |  |  |  |  |  |
| Used RSN Information | O |  | Redundant PDU Session Information9.3.1.136 |  | YES | ignore |
| Global RAN Node ID of Secondary NG-RAN Node | O |  | Global RAN Node ID9.3.1.5 |  | YES | ignore |
| MBS Support Indicator | O |  | 9.3.1.ddd |  | YES | ignore |

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

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

#### 9.3.A MB-SMF Related IEs9.3.A.a1 MBS Distribution Setup Request Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| MBS Session ID | M |  | 9.3.1.aaa |  |
| MBS Area Session ID | O |  | 9.3.1.bbb |  |
| Shared NG-U TNL Information | O |  | UP Transport Layer Information9.3.2.2 | NG-RAN node endpoint of the NG-U transport bearer, for delivery of DL PDUs. |

#### 9.3.A.a2 MBS Distribution Setup Response Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| MBS Session ID | M |  | 9.3.1.aaa |  | YES | reject |
| MBS Area Session ID | O |  | 9.3.1.bbb |  | YES | reject |
| Shared NG-U Multicast TNL Information | O |  |  |  | YES | reject |
| >IP Multicast Address | M |  | Transport Layer Address9.3.2.4 |  | - |  |
| >IP Source Address | M |  | Transport Layer Address9.3.2.4 |  | - |  |
| >GTP DL TEID | M |  | 9.3.2.5 |  | - |  |
| Alternative Shared NG-U Multicast TNL Information | O |  |  |  | YES | ignore |
| >Alternative IP Multicast Address | M |  | Transport Layer Address9.3.2.4 |  | - |  |
| >Alternative IP Source Address | M |  | Transport Layer Address9.3.2.4 |  | - |  |
| >GTP DL TEID | M |  | 9.3.2.5 |  | - |  |

#### 9.3.A.a3 MBS Distribution Setup Unsuccessful Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| MBS Session ID | M |  | 9.3.1.aaa |  |
| MBS Area Session ID | O |  | 9.3.1.bbb |  |
| Cause | M |  | 9.3.1.2 |  |
| Criticality Diagnostics | O |  | 9.3.1.3 |  |

#### 9.3.A.b1 MBS Distribution Release Request Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| MBS Session ID | M |  | 9.3.1.aaa |  |
| MBS Area Session ID | O |  | 9.3.1.bbb |  |
| Shared NG-U TNL Information | O |  | UP Transport Layer Information9.3.2.2 | NG-RAN node endpoint of the NG-U transport bearer, for delivery of DL PDUs. |
| Cause | M |  | 9.3.1.2 |  |

#### 9.3.A.c1 Multicast Session Activation Request Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| MBS Session ID | M |  | 9.3.1.aaa |  |

#### 9.3.A.c2 Multicast Session Activation Response Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| MBS Session ID | M |  | 9.3.1.aaa |  |

#### 9.3.A.c3 Multicast Session Activation Unsuccessful Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| MBS Session ID | M |  | 9.3.1.aaa |  |
| Cause | M |  | 9.3.1.2 |  |
| Criticality Diagnostics | O |  | 9.3.1.3 |  |

#### 9.3.A.d1 Multicast Session Deactivation Request Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| MBS Session ID | M |  | 9.3.1.aaa |  |

#### 9.3.A.d2 Multicast Session Deactivation Response Transfer

This IE is transparent to the AMF.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description |
| MBS Session ID | M |  | 9.3.1.aaa |  |

#### 9.3.A.e1 Multicast Session Update Request Transfer

This IE is transparent to AMF.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |
| MBS Session ID | M |  | 9.3.1.aaa |  |
| MBS Area Session ID | O |  | 9.3.1.bbb |  |
| MBS Service Area information | O |  | 9.3.1.ccc |  |
| MBS QoS Flows To Be Setup or Modify List |  | *0..1* |  |  |
| >MBS QoS Flows To Be Setup or Modify Item |  | *1 .. <maxnoofMBSQoSFlows>* |  |  |
| >>MBS QoS Flow Identifier | M |  | 9.3.1.51 |  |
| >>MBS QoS Flow Level QoS Parameters  | M |  | 9.3.1.12 |  |
| MBS QoS Flow to Be Release List | O |  | QoS Flow List with Cause9.3.1.13 | This IE indicates the MBS QoS Flow Identifiers of the MBS QoS Flows to be released. |

|  |  |
| --- | --- |
| Range bound | Explanation |
| maxnoofMBSQoSFlows | Maximum no. of QoS Flows allowed within one MBS session. Value is 64. |

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

***//asn.1 part to be added***

## \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*End of the changes\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*