

Inter-MME Handover for Modify Bearer Requests without S11-U TEID

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Feature Summary an Revision History

Summary Data

Applicable Product(s) or Functional Area	• S-GW • P-GW
Applicable Platform(s)	• ASR 5500 • VPC-DI • VPC-SI
Feature Default	Disabled - Configuration Required
Related Changes in This Release	Not applicable
Related Documentation	Not applicable

Revision History

Revision Details	Release
First introduced. **Important** This feature is not validated for all customer deployment scenarios. For more information, contact your Cisco Account representative.	21.23

Feature Description

During NB-IoT/Control Plane CIoT EPS Optimization, user data gets transported or SMS messages are passed through MME. This is done by encapsulating them in Non-Access Stratum (NAS), reducing the total number of Control Plane messages when handling a short data transaction. If the Control Plane CIoT EPS Optimization applies, then the MME.

- Indicates S11 interface User Plane (S11-U) tunneling of the NAS user data and sends its own S11-U IP address and MME DL Tunnel End Point Identifier (TEID) for Downlink (DL) data forwarding to the S-GW.
- The S-GW returns a Create Session Response, for Control Plane CIoT EPS optimization, with the S-GW address for S11-U and S-GW TEID. They are used by the MME to forward the Uplink (UL) data toward the S-GW.

In such instances, there might be following constraints:

- S-GW validates Modify Bearer requests (MBR) without S11-U F-TEID.
- If there is no S11-U F-TEID in the MBR, then the S-GW rejects the Inter-MME Handover (HO), since F-TEID is considered mandatory when S11TF flag is set.

To overcome the above constraints and to address the requirements of the IoT devices, the S-GW supports Inter-MME Handover Modify Bearer Requests, without the S11-U TEID functionality, for the NB-IoT subscribers.

How it Works

When the feature is enabled under S-GW Service Configuration mode, the following validation takes place:

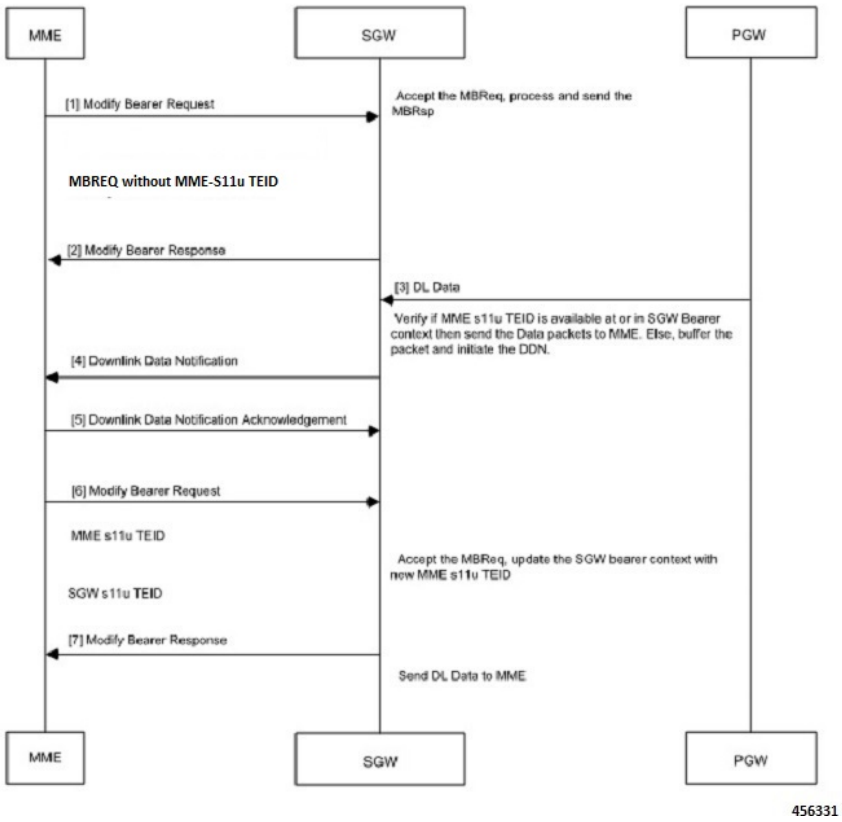
- Handling of IE validation at EGTP Protocol
- Downlink data handling
- Uplink data handling

Call Flow

Handling IE Validation at EGTP Protocol: When Handling IE validation at EGTP Protocol is enabled using the **mme-s11u-without-teid** CLI command under S-GW Service Configuration mode, and the flag is set to be TRUE (default is FALSE):

- The S11-U TEID validation is bypassed.
- The S-GW accepts the Modify Bearer Request and continues the process until handover is successful.

Figure 1: Call Flow for Handling IE Validation at EGTP Protocol



The following table explains the function between MME and S-GW during initial attach procedure.

Table 1: Procedure

Step	Description
1	User Equipment (UE) sends the initial Attach to MME and establishes Control Plane CIoT optimization S11-U EPS bearer with source MME, S-GW, and P-GW.
2	UE moves to the idle state after some time.
3	Source MME releases the S11-U tunnel with S-GW due to no activity.
4	UE moves to Active state in new eNB, and sends Tracking Area Update (TAU) request to the target MME.
5	Target MME uses TAU Request and sends Context Request to source MME.
6	Source MME provides all GTP-C GTP-U F-TEID to the new target MME in Context Response.

Step	Description
7	If the target MME did not send MME GTP-U S11-U TEID, S5/S8 related information inside the Bearer Context of the Modify Bearer Request, Modify Bearer Request from target MME reaches S-GW without any information about MME S11-U TEID and S5/S8.
8	S-GW verifies the Modify Bearer Request it finds S11-U TEID is missing in the request message. As S11-U TEID is considered as mandatory IE, if S11TF flag is set in Modify Bearer Request message. S-GW does not reject modify Bearer Request even if MME S11TF flag is set but MME S11-U-Teid is not present whenever the feature CLI is enabled.

Downlink Data Handling: S-GW receives the Downlink data from P-GW. If MME S11-U TEID is not available in the S-GW bearer context or if the S11-U interface is inactive, the S-GW buffers the DL packets and initiates Downlink Data Notification to MME with the following steps.

Table 2: Procedure

Step	Description
1	Modify Bearer Request Received without MME S11-U TEID.
2	Modifiy Bearer Response sent to MME includes the S-GW S11-U TEID.
3	S-GW receives downlink Data from P-GW on S5/S8 interface.
4	Downlink Data notification is sent to MME.

Uplink Data Handling: S-GW accepts the Uplink data received from the MME and forwards the data to P-GW on S5/S8 interface. For example, the following steps occur at the time of handling Uplink data when Modify Bearer Request is received without the MME S11-U TEID.

Table 3: Procedure

Step	Description
1	Modify Bearer Request is received without MME S11-U TEID.
2	Modify Bearer Response sent to MME includes the S-GW S11-U TEID.
3	Uplink Data is received from MME on S11 interface data tunnel.
4	Uplink Data is forwarded to P-GW on S5/S8 interface data tunnel.

Configuring Inter-MME Handover for Modify Bearer Requests without S11-U TEID

Use the following configuration to enable/disable the Inter-MME Handover for Modify Bearer Requests without S11-U TEID feature.

```
configure
   context context_name
     sgw-service service_name
      [ no | default ] egtp modify-bearer-req accept mme-s11u-without-teid

         end
```

NOTES:

- **default**: Disables the feature. The feature is disabled by default.
- **egtp modify-bearer-req accept mme-s11u-without-teid** : Enables the S-GW to accept MBR without S11u TEID IE present in the Request Message.
- **no**: Disables the feature.

Verifying Inter-MME Handover for Modify Bearer Requests without S11-U TEID Feature Configuration

Use the **show sgw-services name** *sgw_service* or the **show configuration** CLI command to verify if the feature is Enabled or Disabled.

Monitoring and Troubleshooting

This section provides information regarding commands available to monitor and troubleshoot the Inter-MME Handover for Modify Bearer Requests without S11-U TEID on the P-GW/S-GW.

Show Commands and Outputs

The following CLI commands are available in support of the Inter-MME Handover for Modify Bearer Requests without S11-U TEID.

show sgw-service statistics all

The output of this CLI command, and also the **show saegw-service statistics all function sgw** CLI command, has been enhanced to display the following fields.

Field	Description
S11-U Buffered Data Statistics Without MME TEID:	
Uplink	Indicates the total number of Uplink data packets that are buffered. **Note** This field is not applicable for the Inter-MME Handover Modify Bearer Requests without S11-U TEID feature.
Total Pkts	Indicates the total number of packets received from MME. **Note** This field is not applicable for the Inter-MME Handover Modify Bearer Requests without S11-U TEID feature.
Downlink	Indicates the total number of Downlink data packets that are buffered at S-GW when there is no MME S11-U TEID.

Field	Description
Total Pkts	Indicates the total number of Downlink packets buffered when there is no MME S11-U TEID.

show egtpc statistics

The output of this CLI command has been enhanced to display the following fields.

Field	Description
Modify Bearer Request Without MME S11u TEID	
Total Rx	Indicates the total number of Modify Bearer Request messages received without MME S11-U TEID Information Element (IE).
Accepted	Indicates the total number of Modify Bearer Request messages accepted without MME S11-U TEID Information Element (IE).