



# 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	<ul style="list-style-type: none"> <li>• S-GW</li> <li>• P-GW</li> </ul>
Applicable Platform(s)	<ul style="list-style-type: none"> <li>• ASR 5500</li> <li>• VPC-DI</li> <li>• VPC-SI</li> </ul>
Feature Default	Disabled - Configuration Required
Related Changes in This Release	Not applicable
Related Documentation	Not applicable

### Revision History

Revision Details	Release
First introduced. <b>Important</b> 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:

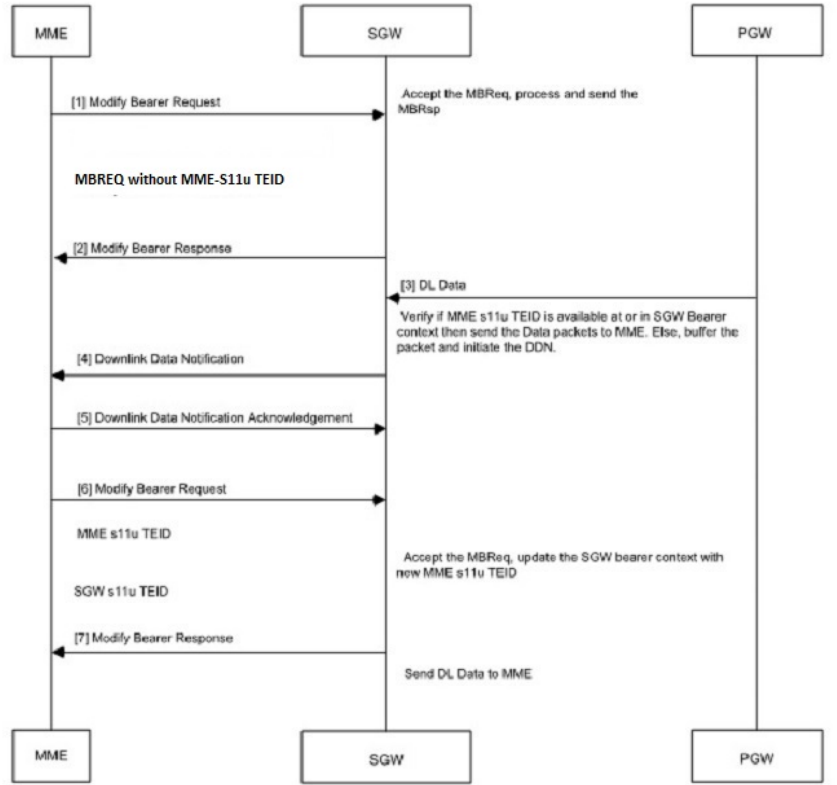
- Handling of IE validation at EGTP Protocol
- Downlink data handling
- Uplink data handling

### 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



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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	Modify 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
<b>S11-U Buffered Data Statistics Without MME TEID:</b>	
Uplink	Indicates the total number of Uplink data packets that are buffered. <b>Note</b> 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. <b>Note</b> 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
<b>Modify Bearer Request Without MME S11u TEID</b>	
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).