



# Intra-MME and Inter-MME Handover Procedures

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## Feature Summary and Revision History

### Summary Data

**Table 1: Summary Data**

|                                          |                     |
|------------------------------------------|---------------------|
| Applicable Product(s) or Functional Area | cnSGW-C             |
| Applicable Platform(s)                   | SMI                 |
| Feature Default Setting                  | Enabled - Always-on |
| Related Documentation                    | Not Applicable      |

### Revision History

**Table 2: Revision History**

| Revision Details  | Release   |
|-------------------|-----------|
| First introduced. | 2021.01.0 |

## Feature Description

cnSGW-C supports Intra-MME Intra-SGW, and Inter-MME Intra-SGW handover.

# How it Works

This section describes how this feature works.

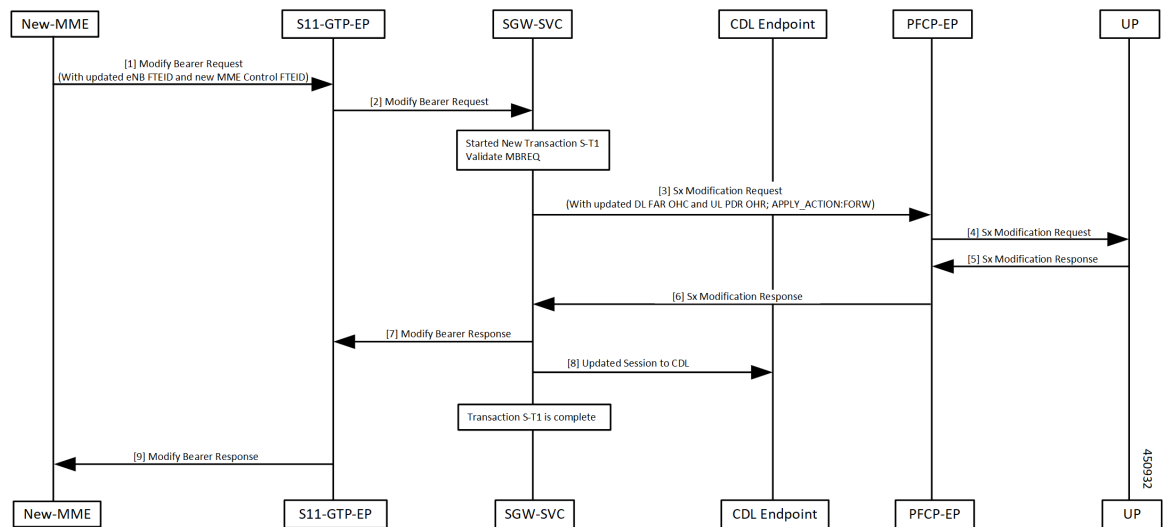
## Call Flows

This section describes the key call flows for this feature.

### Inter-MME Handover Active-Active Transition Call Flow

This section describes the Inter-MME Handover Active-Active Transition call flow.

**Figure 1: Inter-MME Handover Active-Active Transition Call Flow**



**Table 3: Inter-MME Handover Active-Active Transition Call Flow Description**

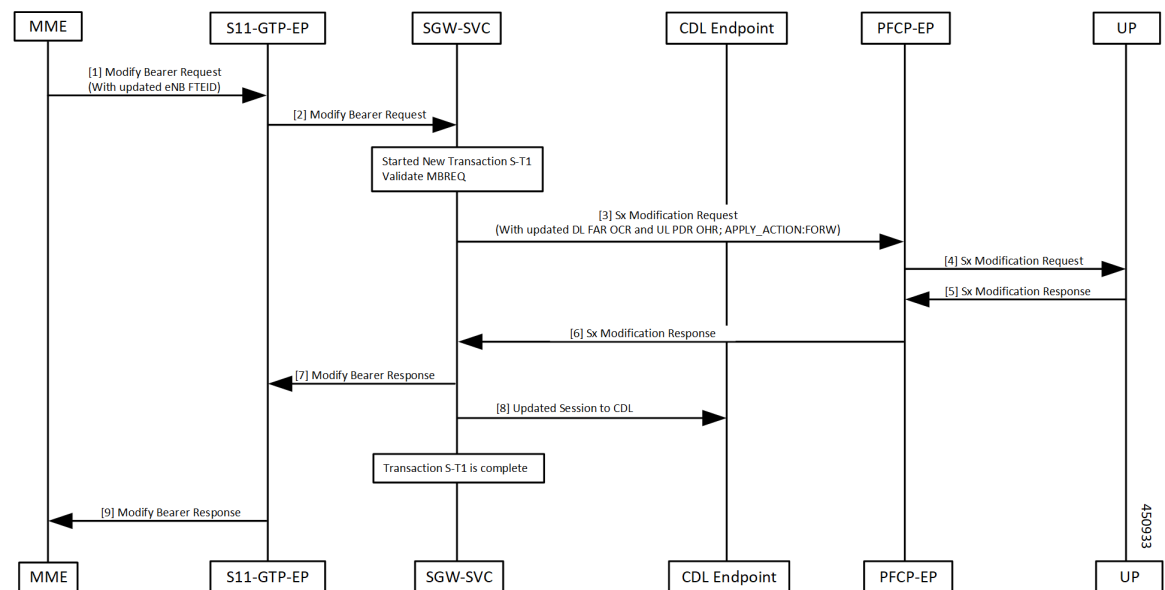
| Step | Description                                                                                                                                                                                                                            |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | New-MME sends the Modify Bearer Request to the S11-GTP-EP pod, with updated eNodeB F-TEID and new MME control F-TEID.                                                                                                                  |
| 2    | S11-GTP-EP pod forwards the Modify Bearer Request to the SGW-SVC.<br>SGW-SVC performs the following: <ul style="list-style-type: none"> <li>• Creates a new transaction S-T1</li> <li>• Validates the Modify Bearer Request</li> </ul> |
| 3    | SGW-SVC sends the the Sx Modification Request with downlink FAR OHC, uplink PDR OHR, and APPLY ACTION as FORWARD, to the PFCP-EP pod.                                                                                                  |
| 4    | PFCP-EP pod sends the Sx Modification Request to the UP.                                                                                                                                                                               |
| 5    | UP sends the Sx Modification Response to the PFCP-EP pod.                                                                                                                                                                              |

| Step | Description                                                                             |
|------|-----------------------------------------------------------------------------------------|
| 6    | PFCP-EP pod sends the Sx Modification Response to the SGW-SVC.                          |
| 7    | SGW-Service pod sends the Modify Bearer response to the S11-GTP-EP pod.                 |
| 8    | SGW-SVC sends the Updated Session to the CDL Endpoint.<br>Transaction S-T1 is complete. |
| 9    | S11-GTP-EP pod sends the Modify Bearer Response to the New-MME.                         |

## Intra-MME Handover Active-Active Transition Call Flow

This section describes the Intra-MME Handover Active-Active Transition call flow.

**Figure 2: Intra-MME Handover Active-Active Transition Call Flow**



**Table 4: Intra-MME Handover Active-Active Transition Call Flow Description**

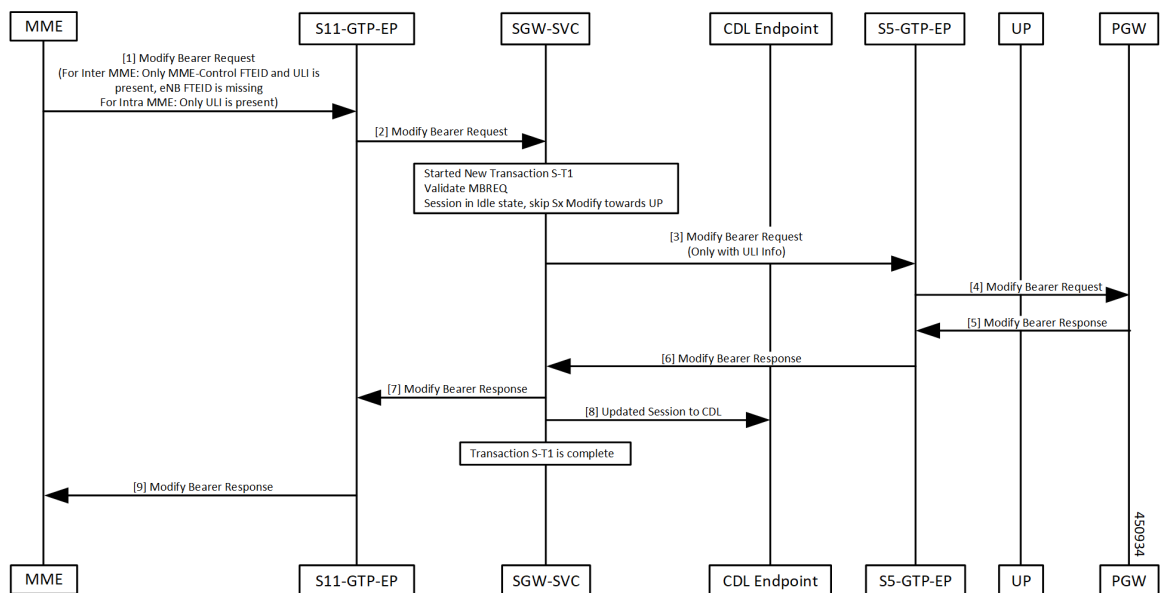
| Step | Description                                                                                                                                                                                                                 |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | MME sends the Modify Bearer Request to the S11-GTP-EP pod, with the updated eNodeB F-TEID.                                                                                                                                  |
| 2    | S11-GTP-EP pod sends the Modify Bearer Request to the SGW-SVC.<br>SGW-SVC performs the following: <ul style="list-style-type: none"> <li>Creates a new transaction S-T1</li> <li>Validates Modify Bearer Request</li> </ul> |
| 3    | SGW-SVC sends the Sx Modification Request with downlink FAR OCR, uplink PDR OHR, and APPLY ACTION as FORWARD, to the PFCP-EP pod.                                                                                           |

| Step | Description                                                                             |
|------|-----------------------------------------------------------------------------------------|
| 4    | PFCP-EP pod forwards the Sx Modification Request to the UP.                             |
| 5    | UP sends the Sx Modification Response to the PFCP-EP pod.                               |
| 6    | PFCP-EP pod sends the Sx Modification Response to the SGW-SVC.                          |
| 7    | SGW-SVC sends the Modify Bearer Response to the S11-GTP-EP pod.                         |
| 8    | SGW-SVC sends the Updated Session to the CDL Endpoint.<br>Transaction S-T1 is complete. |
| 9    | S11-GTP-EP pod sends the Modify Bearer Response to the MME.                             |

## Inter/Intra-MME Handover Idle-Idle Transition Call Flow

This section describes the Inter/Intra-MME Handover Idle-Idle Transition call flow.

**Figure 3: Inter/Intra-MME Handover Idle-Idle Transition Call Flow**



**Table 5: Inter/Intra-MME Handover Idle-Idle Transition Call Flow Description**

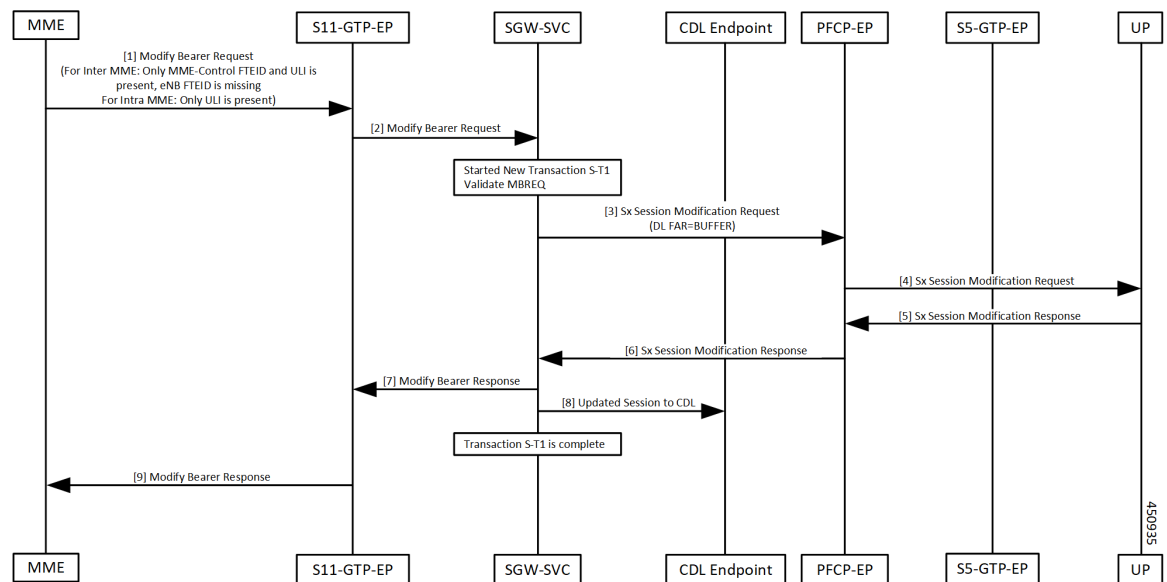
| Step | Description                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1, 2 | <p>For inter-MME, received Modify Bearer request at SGW-Service POD via S11-GTPC-EP POD with MME control F-TEID and ULI. There is no eNodeB F-TEID.</p> <p>For intra-MME, received Modify Bearer request at SGW-Service POD with only ULI present:</p> <ul style="list-style-type: none"> <li>• Create a new transaction S-T1.</li> <li>• Validate Modify Bearer request.</li> <li>• Skip Sx modification as session is in idle state.</li> </ul> |

| Step | Description                                                                                                                |
|------|----------------------------------------------------------------------------------------------------------------------------|
| 3, 4 | Received Modify Bearer request at S5 GTPC-EP POD from SGW-Service POD with ULI. Modify Bearer request is forwarded to PGW. |
| 5, 6 | Received Modify Bearer response at S5 GTPC-EP POD from PGW.<br>Modify Bearer response received at SGW-Service POD.         |
| 7    | SGW-Service POD forwards Modify Bearer response to S11 GTPC-EP POD ingress.                                                |
| 8, 9 | Session updated at CDL. Transaction S-T1 is complete. S11 GTPC-EP POD forwards Modify Bearer response to MME.              |

## Inter/Intra-MME Handover Active-Idle Transition Call Flow

This section describes the Inter/Intra-MME Handover Active-Idle transition call flow.

**Figure 4: Inter/Intra-MME Handover Active-Idle Transition Call Flow**



**Table 6: Inter/Intra-MME Handover Active-Idle Transition Call Flow Description**

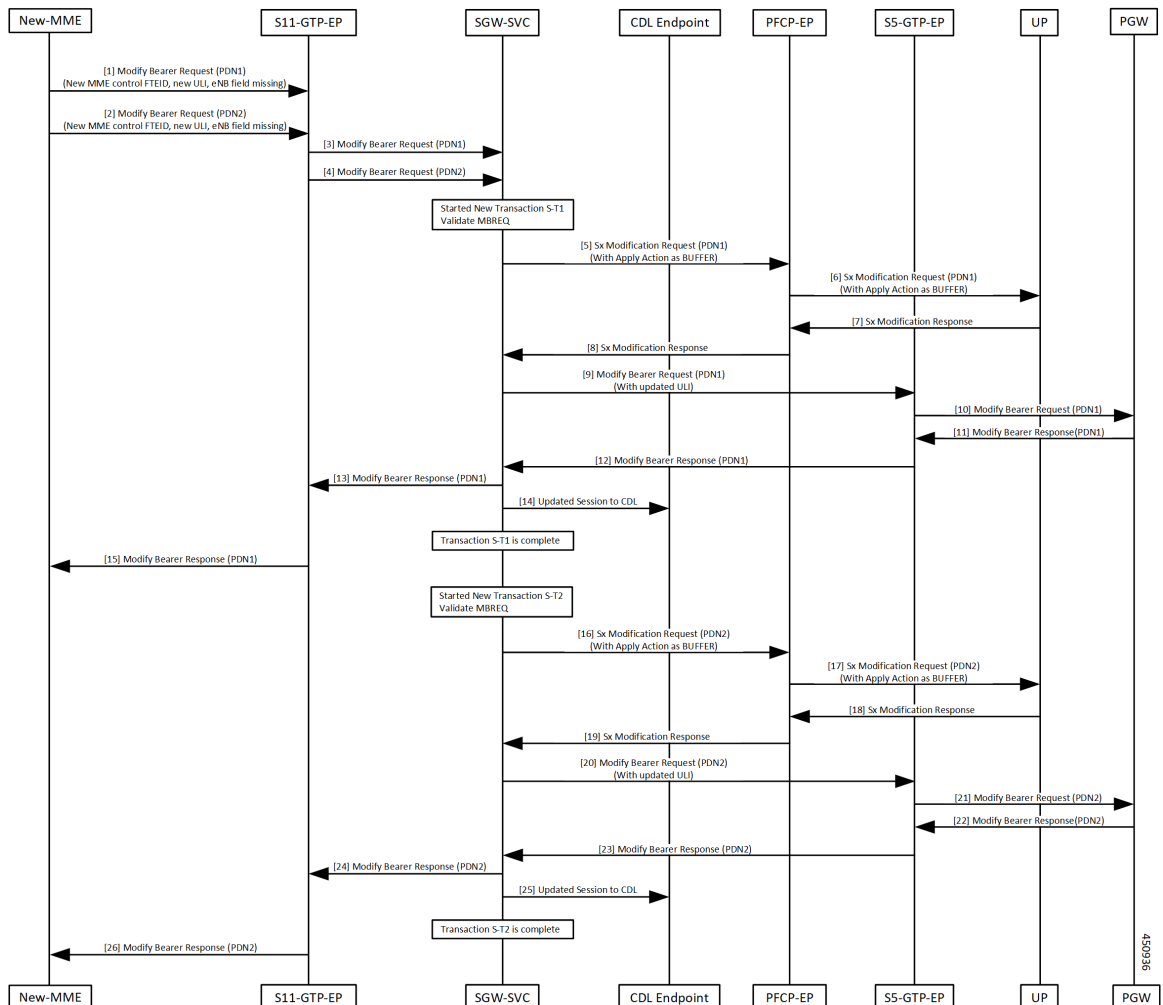
| Step | Description                                                                                                                                                                                                                                                                                                                                                                   |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1, 2 | For inter-MME, received Modify Bearer request at SGW-Service POD via S11-GTPC-EP POD with MME control F-TEID and ULI. There is no eNodeB F-TEID.<br><br>For intra-MME, received Modify Bearer request at SGW-Service POD with only ULI present: <ul style="list-style-type: none"> <li>• Create a new transaction S-T1.</li> <li>• Validate Modify Bearer request.</li> </ul> |
| 3, 4 | Received Sx Modification request at PCFP-EP POD from SGW-Service POD with downlink FAR as BUFFER. Sx Modification request is forwarded to UP.                                                                                                                                                                                                                                 |

| Step | Description                                                                                                        |
|------|--------------------------------------------------------------------------------------------------------------------|
| 5, 6 | Received Sx Modification response at at PFCP-EP POD from UP. Sx Modification response received at SGW-Service POD. |
| 7    | SGW-Service POD forwards Modify Bearer response to GTPC-EP POD ingress.                                            |
| 8, 9 | Session updated at CDL. Transaction S-T1 is complete. GTPC-EP POD forwards Modify Bearer response to MME.          |

## Inter-MME Handover and Multi-PDN Handling Active-Idle Transition with ULI Change Call Flow

This section describes the Inter-MME Handover and Multi-PDN Handling Active-Idle transition with ULI change call flow.

**Figure 5: Inter-MME Handover and Multi-PDN Handling Active-Idle Transition with ULI Change Call Flow**



Repeat the steps provided in the [Table 7: Inter-MME Handover and Multi-PDN Handling Active-Idle Transition with ULI Change Call Flow Description, on page 7](#) for PDN1 and PDN2 with respective transaction S-T1 and S-T2.

**Table 7: Inter-MME Handover and Multi-PDN Handling Active-Idle Transition with ULI Change Call Flow Description**

| Step       | Description                                                                                                                                                                                                                                                                                                            |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1, 2, 3, 4 | Received Modify Bearer request for both the PDNs (PDN1 and PDN2) at SGW-Service POD with new MME control F-TEID and new ULI. There is no eNodeB F-TEID present in Modify Bearer request. <ul style="list-style-type: none"> <li>• Create a new transaction S-T1.</li> <li>• Validate Modify Bearer request.</li> </ul> |
| 5, 6       | Received Sx Modification request from SGW-Service POD > PFCP-EP POD with APPLY ACTION as BUFFER.<br>Sx Modification request is forwarded to UP.                                                                                                                                                                        |
| 7, 8       | Received Sx Modification response from UP > PFCP-EP POD.<br>Sx Modification response received at SGW-Service POD.                                                                                                                                                                                                      |
| 9, 10      | Received Modify Bearer request from SGW-Service POD > S5 GTPC-EP POD with updated ULI.<br>Modify Bearer request is received at PGW.                                                                                                                                                                                    |
| 11, 12     | Received Modify Bearer response from PGW > S5 GTPC-EP POD.<br>Modify Bearer response received from S5 GTPC-EP POD > SGW-Service POD.                                                                                                                                                                                   |
| 13         | SGW-Service POD forwards Modify Bearer response to GTPC-EP POD ingress.                                                                                                                                                                                                                                                |
| 14, 15     | Session updated at CDL. Transaction S-T1 is complete. GTPC-EP POD forwards Modify Bearer response to MME.                                                                                                                                                                                                              |

## Inter-MME Handover with Bearer Context Marked for Removal Call Flow

This section describes the Inter-MME Handover with Bearer Context Marked for Removal call flow.

## Inter-MME Handover with Bearer Context Marked for Removal Call Flow

Figure 6: Inter-MME Handover with Bearer Context Marked for Removal Call Flow

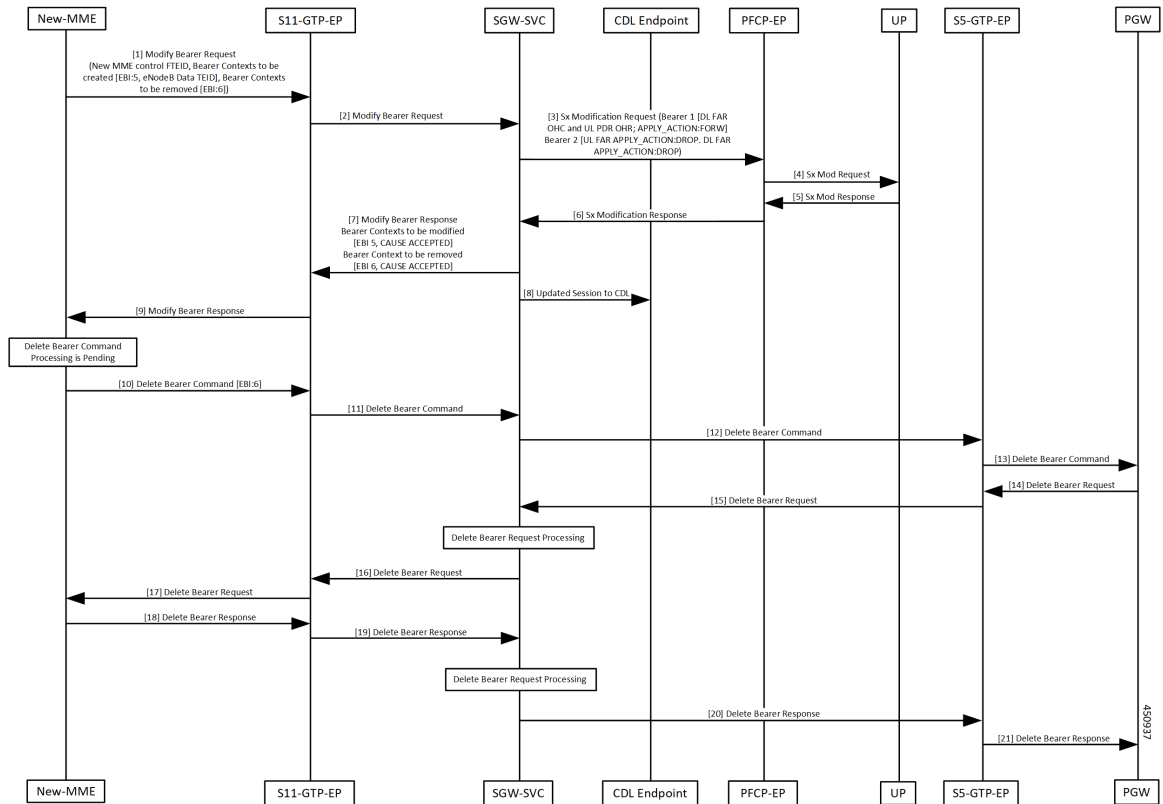


Table 8: Inter-MME Handover with Bearer Context Marked for Removal Call Flow Description

| Step | Description                                                                                                                                                                                                                                                                                                                                                 |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1, 2 | Received Modify Bearer request at SGW-Service POD with new MME control F-TEID, bearer-context-1 to be created with EBI:5, eNodeB data TEID, bearer-context-2 to be removed with EBI:6. <ul style="list-style-type: none"> <li>• Create a new transaction S-T1.</li> <li>• Validate Modify Bearer request.</li> </ul>                                        |
| 3, 4 | Received Sx Modification request from SGW-Service POD to PFCP-EP POD for: <ul style="list-style-type: none"> <li>• bearer-context-1: downlink FAR OHC, uplink PDR OHR and APPLY ACTION as FORWARD</li> <li>• bearer-context-2: uplink FAR APPLY ACTION as DROP and downlink FAR APPLY ACTION as DROP</li> </ul> Sx Modification request is forwarded to UP. |
| 5, 6 | Received Sx Modification response from UP > PFCP-EP POD.<br>Sx Modification response is received at SGW-Service POD.                                                                                                                                                                                                                                        |

| Step   | Description                                                                                                                                                                                       |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7      | SGW-Service POD forwards Modify Bearer response to GTPC-EP POD ingress with bearer context to be modified (EBI:5, cause as ACCEPTED) and bearer context to be removed (EBI:6, cause as ACCEPTED). |
| 8, 9   | Session updated at CDL. GTPC-EP POD forwards Modify Bearer response to MME.                                                                                                                       |
| 10, 11 | Received delete bearer command at SGW-Service POD with EBI:6.                                                                                                                                     |
| 12, 13 | SGW-Service POD forwards delete bearer command to S5 GTPC-EP POD.<br>Delete bearer command received at PGW.                                                                                       |
| 14, 15 | Received Delete Bearer request from PGW > S5 GTPC-EP POD.<br>Delete Bearer request received at SGW-Service POD.                                                                                   |
| 16, 17 | SGW-Service POD processes Delete Bearer request and forwards it to GTPC-EP POD ingress.                                                                                                           |
| 18, 19 | Delete Bearer response received at SGW-Service POD and processed.                                                                                                                                 |
| 20, 21 | Delete Bearer response received at S5 GTPC-EP POD.<br>Delete Bearer response is received at PGW.                                                                                                  |

## Intra-MME and Inter-MME Handover Procedures OAM Support

This section describes operations, administration, and maintenance information for this feature.

### Bulk Statistics

The following statistics are supported for the Intra-MME and Inter-MME Handover Procedures feature.

#### Intra-MME Handover

```
sgw_service_stats{app_name="smf",cluster="cn",data_center="cn",fail_reason="",
instance_id="0",interface="interface_sgw_ingress",reject_cause="",service_name="sgw-service",
sgw_procedure_type="intra_mme_handover",status="attempted",sub_fail_reason=""}
```

```
sgw_service_stats{app_name="smf",cluster="cn",data_center="cn",fail_reason="",
instance_id="0",interface="interface_sgw_ingress",reject_cause="",service_name="sgw-service",
sgw_procedure_type="intra_mme_handover",status="success",sub_fail_reason=""}
```

#### Inter-MME Handover

```
sgw_service_stats{app_name="smf",cluster="cn",data_center="cn",fail_reason="",
instance_id="0",interface="interface_sgw_ingress",reject_cause="",service_name="sgw-service",
sgw_procedure_type="inter_mme_handover",status="attempted",sub_fail_reason=""}
```

```
sgw_service_stats{app_name="smf",cluster="cn",data_center="cn",fail_reason="",  
instance_id="0",interface="interface_sgw_ingress",reject_cause="",service_name="sgw-service",  
sgw_procedure_type="inter_mme_handover",status="success",sub_fail_reason=""} 2  
Perform S1 Based SGW handover (with OI=0)
```