N26-based Handover Procedures - EPC Interworking

Feature Summary and Revision History

Summary Data

Table 1: Summary Data

Applicable Product(s) or Functional Area	AMF
Applicable Platform(s)	SMI
Feature Default Setting	Enabled - Always-on
Related Documentation	

Revision History

Table 2: Revision History

Revision Details	Release
First introduced.	2022.01.0

Feature Description

The N26 interface supports the following handover procedures:

• 5G to 4G (EPC) Handover

• 4G to 5G Handover

How it Works

This section describes how this feature works.

Call Flows

This section describes the key call flows for this feature.

5G to 4G Handover Call Flow

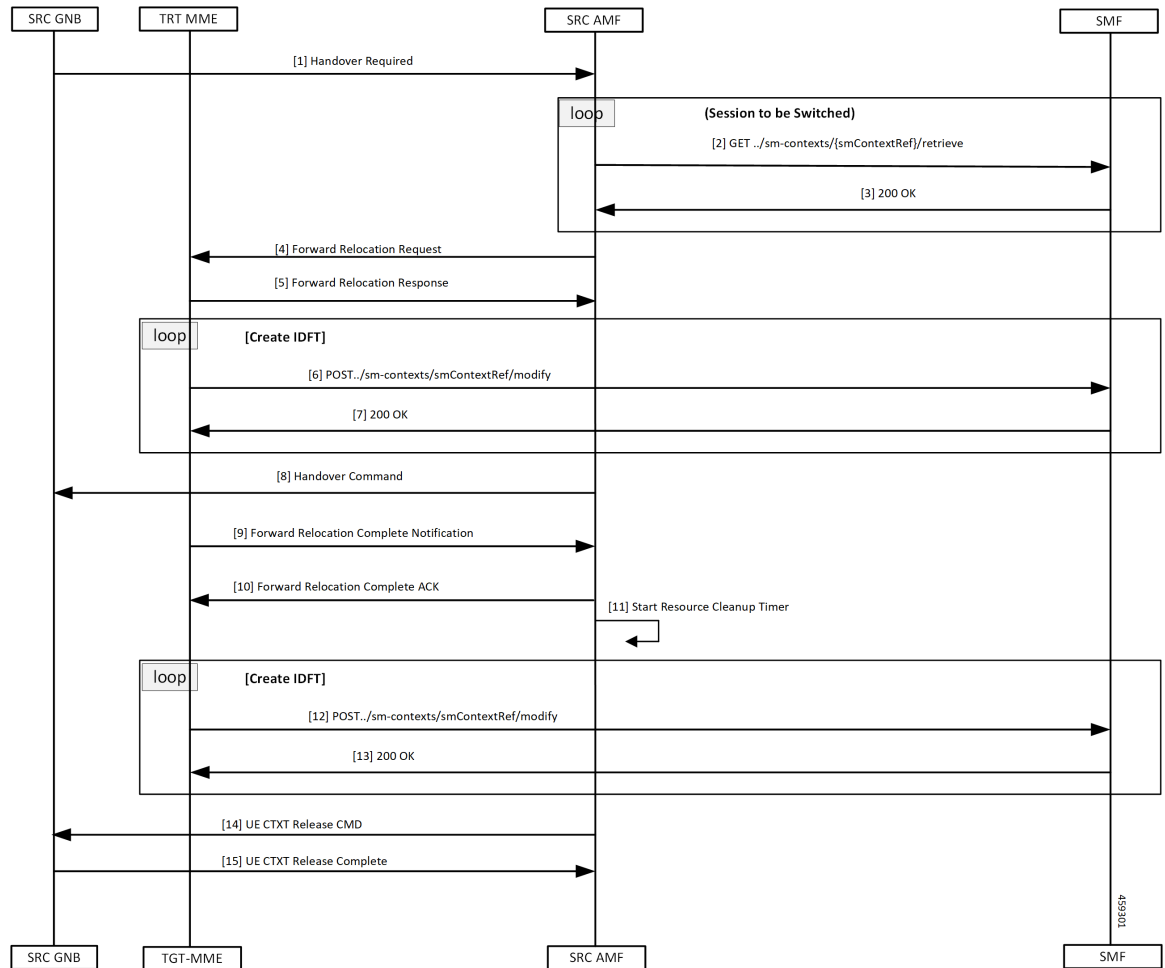This section describes the 5G to 4G handover call flow.

Table 3: 5G to 4G Handover Call Flow Description

1	The SRC GNB (source gNB) sends a Handover Required message to the SRC AMF (source AMF).
2, 3	The source AMF finds MME based on the received target ID. AMF finds the MME IP address through the AMF configuration or NRF discovery for the matching target ID.
4	When source AMF finds the IP address, it sends a Forward Relocation Request to the TGT-MME (target MME).
5	The target MME sets up resources at the enodeB, updates the S-GW, and responds to the source AMF with Forward Relocation Reponse.
6, 7	AMF requests SMF to setup Indirect Forwarding Tunnels. The SMF responds to the request from the AMF.
8	The source AMF sends a Handover Command to the source gNB.
9	As the handover completes on the MME, the target MME notifies the source AMF by sending a Forward Relocation Complete Notification.
10	The source AMF responds with a Forward Relocation Complete ACK to target MME.
11	The AMF starts a timer to clean up all the local resources and indirect tunnels.
12, 13	The AMF requests the SMF to clean up the IDFT tunnels created. The SMF responds to the AMF request.
14	The source AMF sends a UE Context Release Command to the source gNB to clean up all the resources at source gNB.
15	The source gNB responds with a UE Context Release Complete to the source AMF.

4G to 5G Handover Call Flow

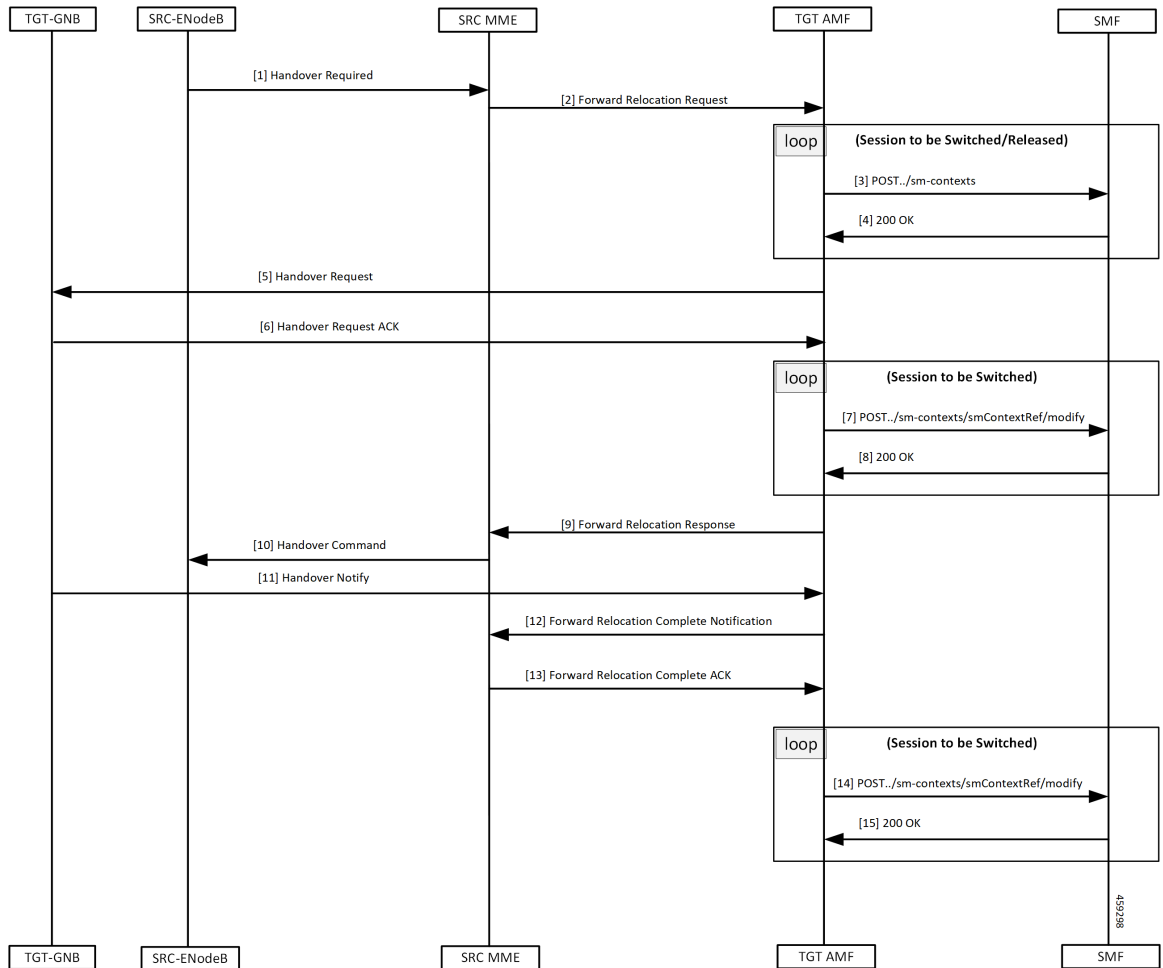This section describes the 4G to 5G handover call flow.

4G to 5G Handover Call Flow

TGT-GNB	SRC-ENodeB	SRC MME	TGT AMF	SMF

[1] Handover Required

[2] Forward Relocation Request

loop (Session to be Switched/Released)

[3] POST../sm-contexts

[4] 200 OK

[5] Handover Request

[6] Handover Request ACK

loop (Session to be Switched)

[7] POST../sm-contexts/smContextRef/modify

[8] 200 OK

[9] Forward Relocation Response

[10] Handover Command

[11] Handover Notify

[12] Forward Relocation Complete Notification

[13] Forward Relocation Complete ACK

loop (Session to be Switched)

[14] POST../sm-contexts/smContextRef/modify

[15] 200 OK

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Table 4: 4G to 5G Handover Call Flow Description

Step	Description
1	As the UE transitions to 5GC, the SRC-ENodeB (source eNB) sends a Handover Required message to the SRC MME (source MME).
2	The MME does target-ID analysis, and chooses the TGT AMF (target AMF). The source MME sends a Forward Relocation Request to the TGT AMF (target AMF).
3	The target AMF creates associations with the SMF for the PDU sessions that are acceptable on the target AMF.
4	The SMF responds to the Create Request from the target AMF.
5	The target AMF selects the TGT GNB (taget gNB) that serves the UE, and sends a Handover Request to the target GNB.
6	After the GNB has allocated resources to the UE, it responds with a Handover Request ACK to the target AMF.

Step	Description
7, 8	The target AMF updates the SMF with information from the target GNB.
8	The SMF responds to the target AMF.
9	The target AMF responds to the request from the source MME using a Forward Relocation Response message.
10	The source MME sends a Handover Command to the SRC ENodeB (source eNB) to complete the handover.
11	Target gNB sends a Handover Notify to the target AMF when the UE handover gets completed.
12	The target AMF notifies the source MME using a Forward Relocation Complete notification.
13	The source MME acknowledges the message with a Forward Relocation Complete acknowledge.
14, 15	The target AMF notifies the SMF on the completion of the handover. The SMF acknowledges the notification.

Note When AMF receives the Registration Request message, it performs the following:

- When the message is received in Uplink NAS Transport, it assumes that the HO is successful and doesn't send the Context Request to the MME.

- When the message is received in Initial UE message, it sends the Context Request to the MME.

Standards Compliance

This feature complies with the following standards specifications:

- *3GPP TS 23.401 "General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access"*

- *3GPP TS 23.502 "Procedures for the 5G System (5GS)"*

- *3GPP TS 29.274 "3GPP Evolved Packet System (EPS); Evolved General Packet Radio Service (GPRS) Tunnelling Protocol for Control plane (GTPv2-C); Stage 3"*

Limitations

N26-based handover doesn't support the following:

- Handling of PGW-C-initiated and SMF-initiated N2 request by AMF, when other handover is in progress

- Non-IP PDN type

- Home routed roaming

- Direct tunneling

- Emergency fallback

- N3 Interworking Function

In this release, AMF doesn't capture GTPC messages as part of `monitor subscriber` output.

Feature Configuration

Configuring this feature involves the following steps:

- Configure 4G to 5G handover—This configuration provides the commands for the handover between EPC to 5GC. For more information, refer to .

- Configure 5G to 4G handover—This configuration provides the commands for the handover between 5GC to EPC. For more information, refer to.

Configuring the Handover from 4G to 5G

To configure this feature, use the following configuration:

```
config
   amf-global
      call-control-policy policy_name
         default-slice name n26 sst sst_value sdt sdt_value
         end
```

NOTES:

- **call-control-policy** *policy_name*—Specify the policy name.

- **default-slice name n26 sst** *sst_value* **sdt** *sdt_value*—Specify the Slice/Service type (SST) value and Slice Differentiator Type (SDT) value respectively. SST value must be an integer in the range of 0-255. SDT value must be a string.

Configuration Example

The following is an example configuration.

```
config
  amf-global
    call-control-policy ccp1
       default-slice name n26 sst 12 sdt 123456
          end
```

Configuring the Handover from 5G to 4G

To configure this feature, use the following configuration:

```
config
   amf-services service_name
      peer-mme tai-match priority priority_value mcc mcc_value mnc mnc_value tac
tac_value [ to end_tac_value ] address mme_address
        exit
```

```
     instance instance-id instance_id
        endpoint protocol
           vip-ip ip_address
           exit
        endpoint gtp
           nodes node_replicas
           retransmission { max-retry maximum_number_of_retries | timeout
retransmission_timeout_value }
           end
```

NOTES:

- **peer-mme tai-match priority** *priority_value* **mcc** *mcc_value* **mnc** *mnc_value* **tac** tac_value **[to** *end_tac_value* **] address** *mme_address*

  - **peer-mme tai-match priority** *priority_value*—Specify the priority value.

  - **mcc** *mcc_value*—Specify the three-digit Mobile Country Code. Must be an integer with three digits.

  - **mnc** *mnc_value*—Specify the two or three-digit Mobile Country Network. Must be an integer with three digits.

  - **tac** *tac_value*—Specify the Tracking Area Code value. Must be an integer in the range of 1-65535.

  - **to** *end_tac_value*—Specify the Tracking Area Code range for peer MME.

  - **address** *mme_address*—Specify the peer MME address.

- **nodes** *node_replicas*—Specify the replica nodes for resiliency.

- **max-retry** *maximum_number_of_retries*—Specify the number of request retry attempts. Must be an integer in the range 0–5 (default value: 3). To disable retransmission, set this value to zero (0).

- **timeout** *retransmission_timeout_value*—Specify the retransmission interval in seconds. Must be an integer in the range 0–10 (default value: 2). To disable retransmission, set this value to zero (0).

Configuration Example

The following is an example configuration.

```
config
   amf-services amf1
      peer-mme tai-match priority 1 mcc 311 mnc 480 tac 30 address 209.165.200.224
      exit
   instance instance-id
      endpoint protocol
         vip-ip 209.165.200.225
         exit
      endpoint gtp
         nodes 1
         retransmission timeout 2 max-retry 5
         end
```