



# Seamless Session Handover

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## Feature Description

### Overview

This feature enables SaMOG to switch the access type (PMIPv6/EoGRE) seamlessly and preserve the session when subscribers move between access points with different session trigger types.

The SaMOG Gateway can:

- Seamlessly switch the access type from PMIPv6 (PMIPv6-based session creation) to EoGRE, based on the DHCP Discover, DHCP Request, or Direct Data Traffic on the EoGRE tunnel.
- Seamlessly switch the access type from EoGRE (DHCP trigger-based session creation) to PMIPv6, based on the PBU message from the AP.

## How Seamless Session Handover Works

### Flows

#### PMIPv6 to EoGRE (DHCP-triggered) Handover

The figure below shows the detailed handover procedure from PMIPv6 to EoGRE (DHCP-triggered).

Figure 1: PMIPv6 to EoGRE (DHCP-triggered) Handover Call Flow

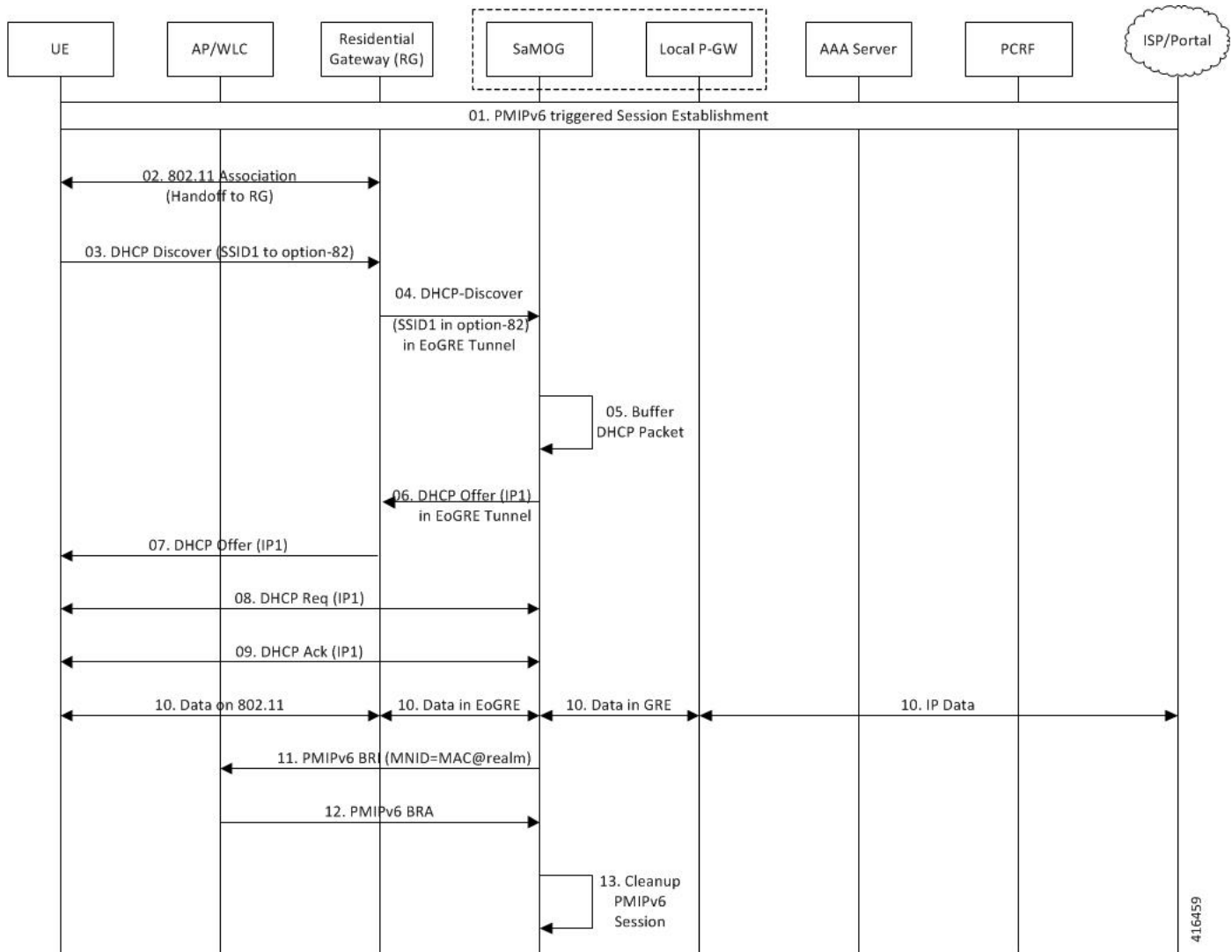


Table 1: PMIPv6 to EoGRE (DHCP-triggered) Handover

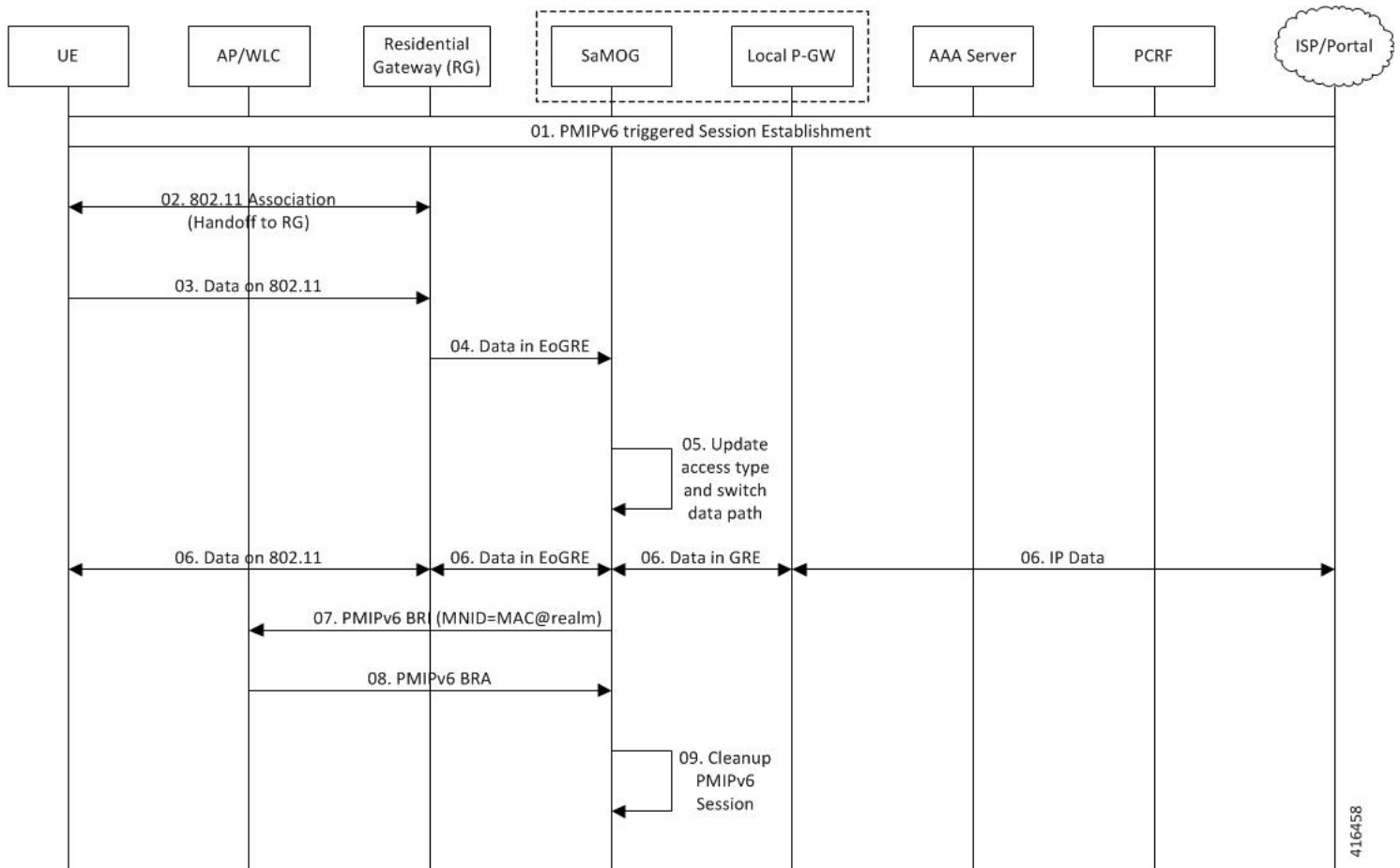
Step	Description
01	PMIPv6-triggered session is established. For more information on the PMIPv6-based session establishment, refer the <i>PMIPv6-based Session Creation</i> section of this guide.  As the TWAN profile for DHCP-triggered session is associated with the MRME service, EoGRE (UE MAC) based flows are installed during the PMIPv6-triggered session setup.
02	UE moves (hand-off) to a new Residential Gateway (RG) that supports EoGRE.
03	UE send a DHCP-DISCOVER message towards the Residential Gateway (RG).
04	The RG forwards the DHCP-DISCOVER message to SaMOG on the EoGRE tunnel.

Step	Description
05	SaMOG detects that the UE has moved to a new RG (hand-off) and switches the data path from the PMIPv6 GRE tunnel to EoGRE tunnel for the UE session. SaMOG also updates the session type to EoGRE/DHCP-triggered.
06	SaMOG assigns the same IP address allocated during the PMIPv6 session to UE. DHCP-OFFER message is sent to the RG on the EoGRE tunnel.
07	RG forwards the DHCP-OFFER message to the UE.
08	A DHCP-Request message is sent from the UE to SaMOG (through the RG).
09	SaMOG sends a DHCP Ack message to the UE (through the RG).
10	Data is transferred between the UE and ISP (through SaMOG and the RG).
11	SaMOG initiates a clean-up of the previous PMIPv6 access side session with the old AP/WLC. SaMOG sends a Binding Revocation Indication (BRI) message to the old AP/WLC.
12	The old AP/WLC sends a BRI Ack message to SaMOG.
13	SaMOG cleans up the PMIPv6 session.

## PMIPv6 to EoGRE (data-triggered) Handover

The figure below shows the detailed handover procedure from PMIPv6 to EoGRE (data-triggered).

Figure 2: PMIPv6 to EoGRE (data-triggered) Handover Call Flow



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Table 2: PMIPv6 to EoGRE (data-triggered) Handover

Step	Description
01	PMIPv6-triggered session is established. For more information on the PMIPv6-based session establishment, refer the <i>PMIPv6-based Session Creation</i> section of this guide.  As the TWAN profile for DHCP-triggered session is associated with the MRME service, EoGRE (UE MAC) based flows are installed during the PMIPv6-triggered session setup.
02	UE moves (hand-off) to a new Residential Gateway (RG) that supports EoGRE.
03	UE continues to send data traffic through the new RG.
04	RG forwards the data traffic to SaMOG through the EoGRE tunnel.
05	SaMOG detects that the UE has moved to a new RG (hand-off) and switches the data path from the PMIPv6 GRE tunnel to EoGRE tunnel for the UE session. SaMOG also updates the session type to EoGRE/DHCP-triggered.
06	Data is transferred between the UE and ISP (through SaMOG and the RG).

Step	Description
07	SaMOG initiates a clean-up of the previous PMIPv6 access side session with the old AP/WLC. SaMOG sends a Binding Revocation Indication (BRI) message to the old AP/WLC.
08	The old AP/WLC sends a BRI Ack message to SaMOG.
09	SaMOG cleans up the PMIPv6 session.

## EoGRE to PMIPv6 (PBU-triggered) Handover

The figure below shows the detailed handover procedure from EoGRE to PMIPv6 (PBU-triggered).

Figure 3: EoGRE to PMIPv6 (PBU-triggered) Handover Call Flow

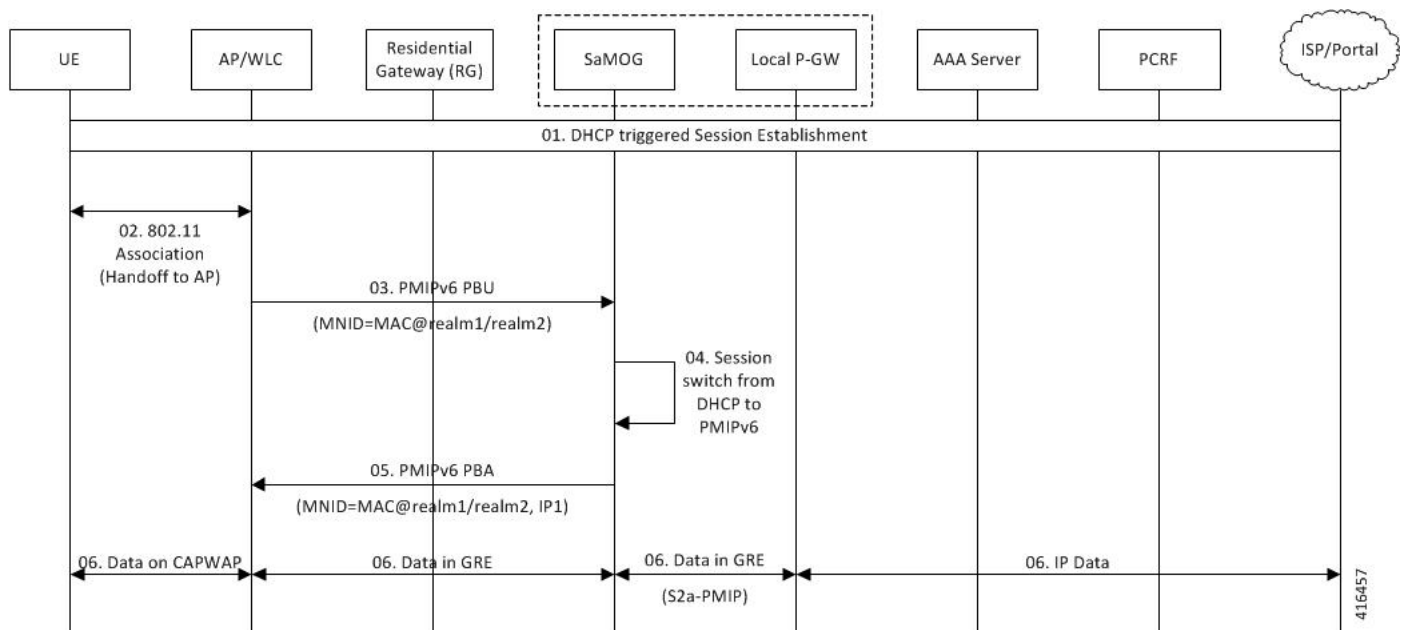


Table 3: EoGRE to PMIPv6 (PBU-triggered) Handover

Step	Description
01	DHCP-triggered session is established. For more information on DHCP trigger-based session, refer the <i>DHCP-Trigger Based Session Creation</i> chapter of the <i>SaMOG Administration Guide</i> .
02	UE moves (hand-off) to a new AP/WLC that supports the PMIPv6 access type.
03	The AP/WLC initiates a PBU message towards SaMOG on behalf of the UE (NAI is <MAC> or <MAC>@relam).
04	SaMOG receives the PBU message and detects that UE has moved to new AP (hand-off). SaMOG switches the data path from the EoGRE tunnel to a PMIPv6 GRE tunnel for the UE session, and also updates the session type to PMIPv6 triggered.

Step	Description
05	SaMOG initiates a PBA message towards the AP/WLC.
06	Data is transferred between the UE and ISP (through SaMOG).

## Limitations

### Architectural Limitations

- This feature supports RADIUS-based authentication between SaMOG and the 3GPP AAA Server. Diameter-based authentication is currently not supported.
- This feature supports PMIPv6-based S2a interface towards the local gateway. GTPv1 and GTPv2 are currently not supported.
- Only IPv4 address allocation is supported for the UE. IPv6 and IPv4v6 PDN types are currently not supported.
- All interfaces towards all external nodes will be IPv4 address only. IPv6 transport on any interface with external nodes is currently not supported.
- The AP will not convey the user location and SSID information to SaMOG.

## Monitoring and Troubleshooting Seamless Session Handover

### Show Command(s) and/or Outputs

#### show samog-service statistics

The following fields are available to the output of the **show samog-service statistics** command in support of this feature:

```

Handoff Statistics:
PMIP to PMIP Handoff Stats:
  Received:          0          Accepted:          0
  Denied:            0
DHCP to DHCP Handoff Stats:
  Received:          0          Accepted:          0
  Denied:            0
PMIP to EoGRE Handoff Requests:
  Received:          0          Accepted:          0
  Denied:            0
EoGRE to PMIP Handoff Requests:
  Received:          0          Accepted:          0
  Denied:            0

```

**Table 4: show samog-service statistics Command Output Descriptions**

Field	Description
<b>Handoff Statistics:</b>	
<b>PMIP to PMIP Handoff Stats:</b>	
Received	Total number of PMIPv6 PBUs received for handoff for an existing PMIP session.
Accepted	Total number of PMIPv6 PBUs for Handoff accepted for an existing PMIP session.
Denied	Total number of PMIPv6 PBUs for handoff denied for an existing PMIP session.
<b>DHCP to DHCP Handoff Stats:</b>	
Received	Total number of DHCP Discover messages received during handoff for an existing DHCP session.
Accepted	Total number of DHCP Discover messages accepted during handoff for an existing DHCP session.
Denied	Total number of DHCP Discover messages denied during handoff for an existing DHCP session.
<b>PMIP to EoGRE Handoff Requests:</b>	
Received	Total number of EoGRE handoff messages received for a PMIP session.
Accepted	Total number of EoGRE handoff messages accepted for a PMIP session.
Denied	Total number of EoGRE handoff messages denied for a PMIP session.
<b>EoGRE to PMIP Handoff Requests:</b>	
Received	Total number of PMIP handoff messages received for an EoGRE session.
Accepted	Total number of PMIP handoff messages accepted for an EoGRE session.
Denied	Total number of PMIP handoff messages denied for an EoGRE session.

## Seamless Session Handover Bulk Statistics

The following bulk statistics in the SaMOG schema provide information on seamless handovers between access types for a session:

Variable	Description	Data Type
cgw-binding-update-handoff-req-total-received	<p><b>Description:</b> Total number of PMIPv6 PBUs received for handoff for an existing PMIP session.</p> <p><b>Triggers:</b> Increments whenever PMIPv6 PBU is received by SaMOG for handoff.</p> <p><b>Availability:</b> Per SaMOG Service</p> <p><b>Type:</b> Counter</p>	Int32
cgw-binding-update-handoff-req-total-accepted	<p><b>Description:</b> Total number of PMIPv6 PBUs for Handoff accepted for an existing PMIP session.</p> <p><b>Triggers:</b> Increments whenever PMIPv6 PBU is accepted by SaMOG for handoff.</p> <p><b>Availability:</b> Per SaMOG Service</p> <p><b>Type:</b> Counter</p>	Int32
cgw-binding-update-handoff-req-total-denied	<p><b>Description:</b> Total number of PMIPv6 PBUs for handoff denied for an existing PMIP session.</p> <p><b>Triggers:</b> Increments whenever PMIPv6 PBU received by SaMOG for handoff denied during processing.</p> <p><b>Availability:</b> Per SaMOG Service</p> <p><b>Type:</b> Counter</p>	Int32
cgw-sessstat-dhcp-disc-handoff-received	<p><b>Description:</b> Total number of DHCP Discover messages received during handoff for an existing DHCP session.</p> <p><b>Triggers:</b> Increments whenever a DHCP Discover message is received by SaMOG during handoff.</p> <p><b>Availability:</b> Per SaMOG Service</p> <p><b>Type:</b> Counter</p>	Int32
cgw-sessstat-dhcp-disc-handoff-accepted	<p><b>Description:</b> Total number of DHCP Discover messages accepted during handoff for an existing DHCP session.</p> <p><b>Triggers:</b> Increments whenever a DHCP Discover message is accepted by SaMOG during handoff.</p> <p><b>Availability:</b> Per SaMOG Service</p> <p><b>Type:</b> Counter</p>	Int32
cgw-sessstat-dhcp-disc-handoff-denied	<p><b>Description:</b> Total number of DHCP Discover messages denied during handoff for an existing DHCP session.</p> <p><b>Triggers:</b> Increments whenever a DHCP Discover message is denied by SaMOG during handoff.</p> <p><b>Availability:</b> Per SaMOG Service</p> <p><b>Type:</b> Counter</p>	Int32



Variable	Description	Data Type
cgw-sessstat-pmip-to-eogre-handoff-received	<p><b>Description:</b> Total number of EoGRE handoff messages received for a PMIP session.</p> <p><b>Triggers:</b> Increments whenever an EoGRE message is received by SaMOG for an existing PMIP session.</p> <p><b>Availability:</b> Per SaMOG Service</p> <p><b>Type:</b> Counter</p>	Int32
cgw-sessstat-pmip-to-eogre-handoff-accepted	<p><b>Description:</b> Total number of EoGRE handoff messages accepted for a PMIP session.</p> <p><b>Triggers:</b> Increments whenever an EoGRE message is accepted by SaMOG for handoff from a PMIP session.</p> <p><b>Availability:</b> Per SaMOG Service</p> <p><b>Type:</b> Counter</p>	Int32
cgw-sessstat-pmip-to-eogre-handoff-denied	<p><b>Description:</b> Total number of EoGRE handoff messages denied for a PMIP session.</p> <p><b>Triggers:</b> Increments whenever an EoGRE message is denied by SaMOG for handoff from a PMIP session.</p> <p><b>Availability:</b> Per SaMOG Service</p> <p><b>Type:</b> Counter</p>	Int32
cgw-sessstat-eogre-to-pmip-handoff-received	<p><b>Description:</b> Total number of PMIP handoff messages received for an EoGRE session.</p> <p><b>Triggers:</b> Increments whenever a PMIP message is received by SaMOG for an existing EoGRE session.</p> <p><b>Availability:</b> Per SaMOG Service</p> <p><b>Type:</b> Counter</p>	Int32
cgw-sessstat-eogre-to-pmip-handoff-accepted	<p><b>Description:</b> Total number of PMIP handoff messages accepted for an EoGRE session.</p> <p><b>Triggers:</b> Increments whenever a PMIP message is accepted by SaMOG for handoff from an EoGRE session.</p> <p><b>Availability:</b> Per SaMOG Service</p> <p><b>Type:</b> Counter</p>	Int32
cgw-sessstat-eogre-to-pmip-handoff-denied	<p><b>Description:</b> Total number of PMIP handoff messages denied for an EoGRE session.</p> <p><b>Triggers:</b> Increments whenever a PMIP message is denied by SaMOG for handoff from an EoGRE session.</p> <p><b>Availability:</b> Per SaMOG Service</p> <p><b>Type:</b> Counter</p>	Int32

