3GPP TR 29.875 V1.2.0 (2010-05)

Technical Report

3rd Generation Partnership Project;
Technical Specification Group Core Network and Terminals;
Interworking Proxy (IWP) between GTP based
and PMIP based interfaces
Release 9

Keywords
LTE, EPC, interworking, GTP, PMIP

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Contents

Foreword

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1 Scope

The present document is to evaluate the feasibility of introduction of an Interworking Proxy (IWP) between GTP-based S8 and, PMIP-based S8 and S9 interfaces as described in 3GPP TS 23.402 [2] Annex A. This evaluation will be based on the study of various concrete interworking deployment scenarios for which an IWP may be used. For each scenario, it will be analysed how the IWP fulfils the specific interworking requirements and performs the mapping of procedures and the corresponding parameter handling. The U-plane Interworking will also be analysed for each scenario.

The present document will study the mechanism for the interworking scenarios, e.g. IWP selection, message binding.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[<seq>]   <doctype> <#>[([up to and including]{yyyy[-mm]|V<a[.b[.c]]>}[onwards])]: "<Title>".

[1]   3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2]   3GPP TS 23.402: "Architecture enhancements for non-3GPP accesses".

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

[4]   3GPP TS 23.203: "Policy and charging control architecture".

[5]   3GPP TS 29.212: "Policy and charging control over Gx reference point".

[6]   3GPP TS 29.215: "Policy and Charging Control (PCC) over S9 reference point".

[7]   3GPP TS 29.274: "3GPP Evolved Packet System (EPS); Evolved General Packet Radio Service (GPRS) Tunnelling Protocol for Control plane (GTPv2-C); Stage 3".

[8]   3GPP TS 29.275: "Proxy Mobile IPv6 (PMIPv6) based Mobility and Tunnelling protocols; Stage 3".

[9]   3GPP TS 23.060: "Technical Specification Group Services and System Aspects; General Packet Radio Service (GPRS); Stage 2".

3 Definitions, symbols and abbreviations

3.1 Definitions

3.2 Symbols

For the purposes of the present document, the following symbols apply:

Symbol format

<symbol>   <Explanation>

3.3   Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

IWP   Interworking Proxy

4   General

4.1   Requirements

In order for PLMNs to avoid any dependency on other PLMNs for roaming service upon using IWP, the following requirements shall be fulfilled when investigating possible solutions:

- No impact on S-GW / P-GW selection function in MME

- No impact on vPCRF (or DRA) selection function in S-GW with S8-PMIP

- No impact on hPCRF (or DRA) selection function in vPCRF

- No impact on S8 and S9 protocols

- No new functionality is required in hPCRF or in P-GW

- No additional mechanism is needed in local DNS

4.2   Interworking Scenarios

4.2.1   Scenario One: Interworking between PMIP based vPLMN and GTP based hPLMN

This interworking scenario is for a PMIP-based S8 vPLMN (i.e. S-GW and vPCRF) connected to a GTP-based S8 hPLMN (i.e. P-GW). This interworking scenario will apply to the following network deployment situations:

Editor's Note: Each scenarios described below needs to be analyzed.

4.2.1.1   PMIP-based vPLMN with PCC is connected to GTP-based hPLMN with PCC
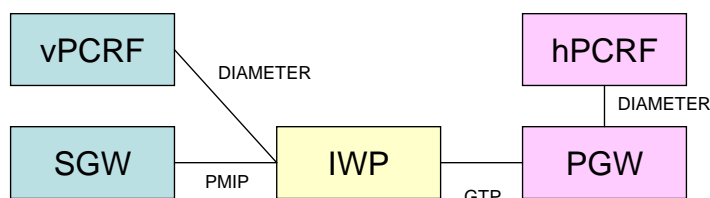
Figure 4.2.1-1: PMIP vPLMN with PCC and GTP hPLMN with PCC

4.2.1.2   PMIP-based vPLMN with PCC is connected to GTP-based hPLMN without PCC
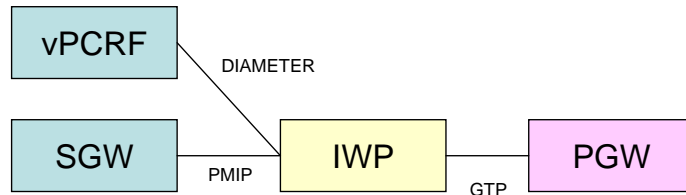
Figure 4.2.1-2: PMIP vPLMN with PCC and GTP hPLMN without PCC

4.2.1.3   PMIP-based vPLMN without PCC is connected to GTP-based hPLMN with PCC
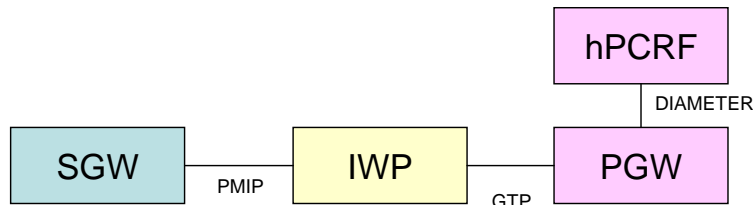
Figure 4.2.1-3: PMIP vPLMN without PCC and GTP hPLMN with PCC

4.2.1.4   PMIP-based vPLMN without PCC is connected to GTP-based hPLMN without PCC
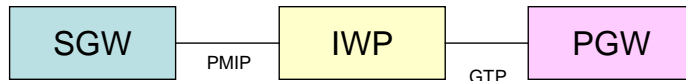
Figure 4.2.1-4: PMIP vPLMN without PCC and GTP hPLMN without PCC

4.2.1.5   U-plane considerations for PMIP-based S8 vPLMN and GTP-based S8 hPLMN
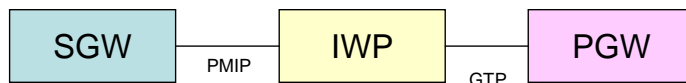
Figure 4.2.1-5: PMIP tunnel and GTPv1-U tunnel

A PMIP tunnel is established between the S-GW and the IWP. A GTPv1-U tunnel is also established between the IWP and the P-GW. When the default bearer is created on the PMIP side (i.e., the GRE-tunnel on the PMIP side is established), the IWP establishes the corresponding GTP tunnel on the GTP side. If an additional GTP tunnel with the same PDN connection is created on the GTP side the IWP shall map the new GTP tunnel to the same GRE-key tunnel. If different QoS treatment of packets belonging to different GTP tunnels are needed then different DSCP values in the inner header (also copied to the outer header) of the tunneled packets can be used over the PMIP based interface.

4.2.2   Scenario Two: Interworking between GTP based vPLMN and PMIP based hPLMN

This interworking scenario is for a GTP-based vPLMN (i.e. S-GW) is connected to PMIP-based hPLMN (i.e. P-GW and hPCRF). This interworking scenario will apply the following network deployment situations:

Editor's Note: Each scenarios described below needs to be analyzed.

4.2.2.1 GTP-based vPLMN is connected to PMIP-based hPLMN with PCC
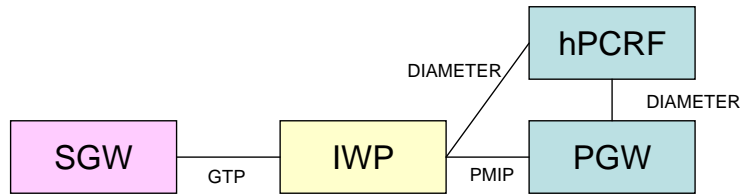
Figure 4.2.2-1: GTP vPLMN and PMIP hPLMN with PCC

4.2.2.2 GTP-based vPLMN is connected to PMIP-based hPLMN without PCC
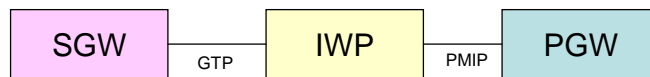
Figure 4.2.2-2: GTP vPLMN and PMIP hPLMN without PCC

4.2.2.3 U-Plane considerations for GTP-based S8 vPLMN connected to PMIP-based S8 vPLMN
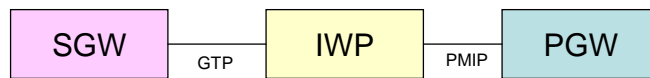
Figure 4.2.2-3: GTPv1-U tunnel and PMIP tunnel

A GTPv1-U tunnel is established between the S-GW and the IWP. A PMIP tunnel is established between the IWP and the P-GW. When the default bearer is created on the GTP side, the IWP sends a PBU to establish the corresponding GRE-tunnel on the PMIP side. If an additional GTP tunnel with the same PDN connection is created on the GTP side the IWP shall map the new GTP tunnel to the same GRE-key tunnel. If different QoS treatment of packets belonging to different GTP tunnels are needed then different DSCP values in the inner header (also copied to the outer header) of the tunneled packets can be used over the PMIP based interface. Likewise, if there is a QoS change of a PDN connection on the PMIP side of IWP, the IWP shall carry out the corresponding change of the EPS bearer on the GTP side of IWP.

There is a many-to-one mapping between an EPS bearer and the per UE, per PDN tunnel between IWP and PGW as described in 3GPP TS 23.402[2], subclause 4.10.3.

4.2.3 Handover scenarios

There are possible some handover scenarios need to be considered with IWP. This clause introduces possible handover scenarios and each scenario has technical analysis.

4.2.3.1 General

The table shows the cases of possible Handover scenarios.

	With S-GW change	Without S-GW change
Intra PLMN HOs	No problems are foreseen to prevent that the IWP supports this scenario. For the scenario when hPLMN S8 is PMIP and vPLMN S8 is GTP, then IWP needs to act as emulating two MAGs toward P-GW for one or more GTP tunnels toward source S-GW and target S-GW. There is PCC signaling between PCRF and IWP via S9 and the corresponding information on the GTP side is	

	conveyed inside GTP signaling between S-GW and IWP.			

Inter PLMN HOs	vPLMN S8 change(e.g. PMIP to GTP)		vPLMN S8 without change(e.g. PMIP to PMIP)	
	Both PLMN supports IWP	Only one PLMN supports IWP	Both PLMN supports IWP	Only one PLMN supports IWP
	The current SA2 specification dose not support the Handovers with different S8 variants. P-GW or IWP on behalf of P-GW, is not able to handle the bearers between GTP tunnels and GRE tunnels because the bearers are established on the different QOS basis. Therefore this scenario is not able to be covered by IWP.		IWP can support this scenario. In this scenario, the IWP which the target vPLMN is going to connect should be the same IWP as connected from source vPLMN because the PBU or modify bearer request message from target PLMN includes the IWP address as P-GW address which is located on the hPLMN. For the scenario when hPLMN S8 is PMIP and vPLMN S8 is GTP, then IWP needs to act as emulating two MAGs toward P-GW for one or more GTP tunnels toward source S-GW and target S-GW. There is PCC signaling between PCRF and IWP via S9 and the corresponding information on the GTP side is conveyed inside GTP signaling between S-GW and IWP.	It might be possible for IWP to support this scenario. The messages such as modify bearer request/PBU from the target PLMN is destined to IWP address as P-GW address but the target PLMN does not support to connect IWP, e.g. there is no physical connection or no agreement to connect to IWP. It leads to failed handover and the connections are disconnected. UE might need to initiate a new Attach procedure to re-establish the connection.

Table 4.2.3.1-1:Handover scenarios

4.2.3.2   Intra PLMN HOs

4.2.3.2.1   Intra PLMN HOs with S-GW change

No problems are foreseen to prevent that the IWP supports this scenario. For the scenario when hPLMN S8 is PMIP and vPLMN S8 is GTP, the IWP needs to act as emulating two MAGs toward P-GW for one or more GTP tunnels toward source S-GW and target S-GW. There is PCC signaling between PCRF and IWP via S9 and the corresponding information on the GTP side is conveyed inside GTP signaling between S-GW and IWP.
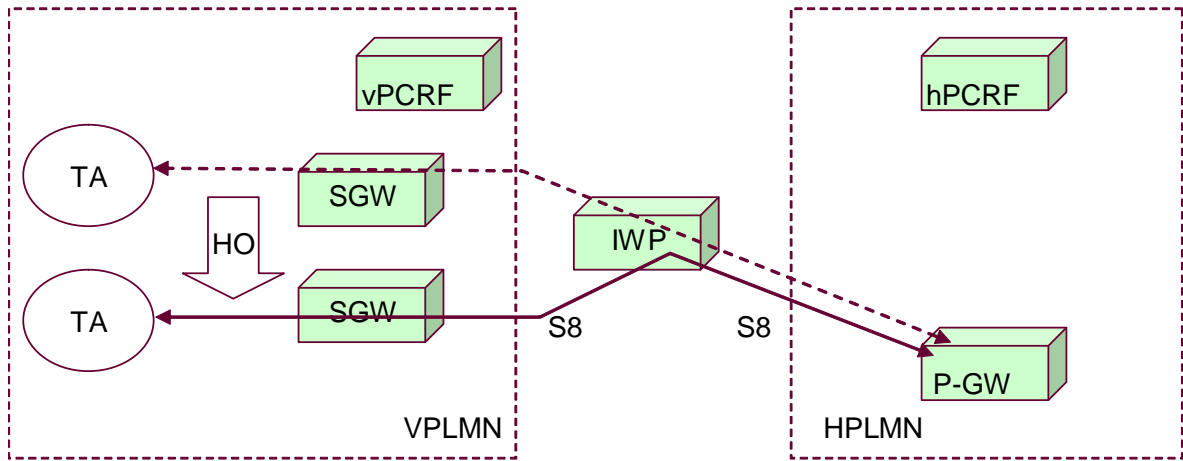
Figure 4.2.3.2.1-1: Intra PLMN HOs with S-GW change

4.2.3.2.2 Intra PLMN HOs without S-GW change

No problems are foreseen to prevent that the IWP supports this scenario. For the scenario when hPLMN S8 is PMIP and vPLMN S8 is GTP, the IWP needs to act as emulating two MAGs toward P-GW for one or more GTP tunnels toward source S-GW and target S-GW. There is PCC signaling between PCRF and IWP via S9 and the corresponding information on the GTP side is conveyed inside GTP signaling between S-GW and IWP.
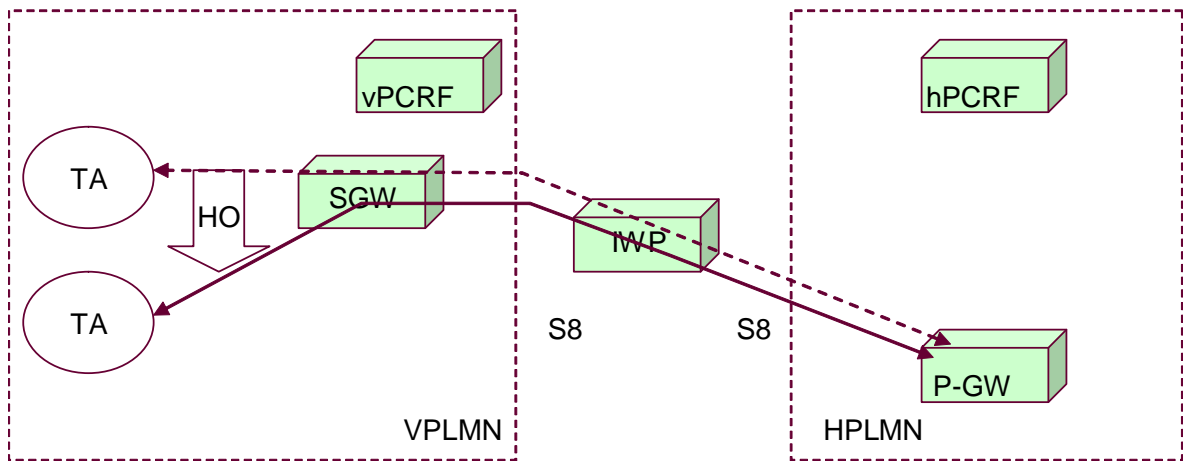
Figure 4.2.3.2.2-1: Intra PLMN HOs without S-GW change

4.2.3.3 Inter PLMN HOs

4.2.3.3.1 Inter PLMN HOs with vPLMN S8 change

The current SA2 specification does not support Handovers with different S8 variants. P-GW, IWP in this case, is not able to handle the bearers between GTP tunnels and GRE tunnels because the bearers are established on different QoS basis. Therefore IWP is not able to cover this scenario.
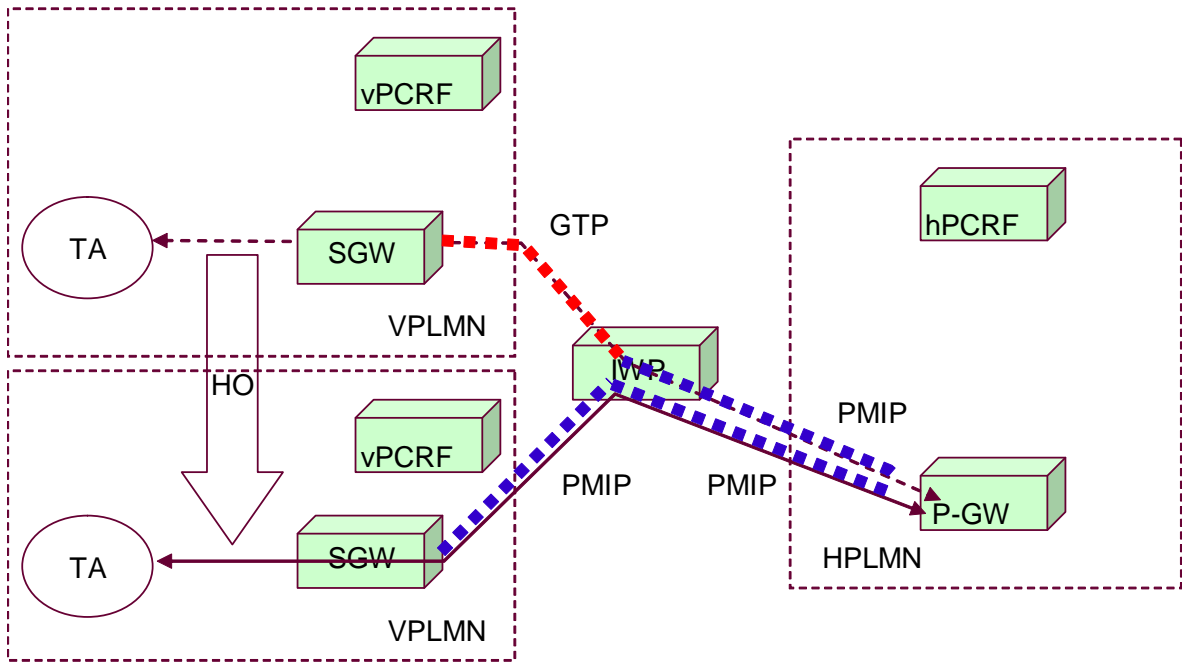
Figure 4.2.3.3.1-1: Inter PLMN HOs with vPLMN S8 change

4.2.3.3.2 Inter PLMN HOs without vPLMN S8 change

4.2.3.3.2.1 Inter PLMN HOs vPLMN with S8 change and both PLMN support IWP

The IWP can support this scenario. In this scenario, the IWP which the target vPLMN is going to connect should be the same IWP as connected from source vPLMN because the PBU or modify bearer request message from target PLMN includes the IWP address as P-GW address which is located on the hPLMN. For the scenario when hPLMN S8 is PMIP and vPLMN S8 is GTP, the IWP needs to act as emulating two MAGs toward P-GW for one or more GTP tunnels toward source S-GW and target S-GW. There is PCC signaling between PCRF and IWP via S9 and the corresponding information on the GTP side is conveyed inside GTP signaling between S-GW and IWP.
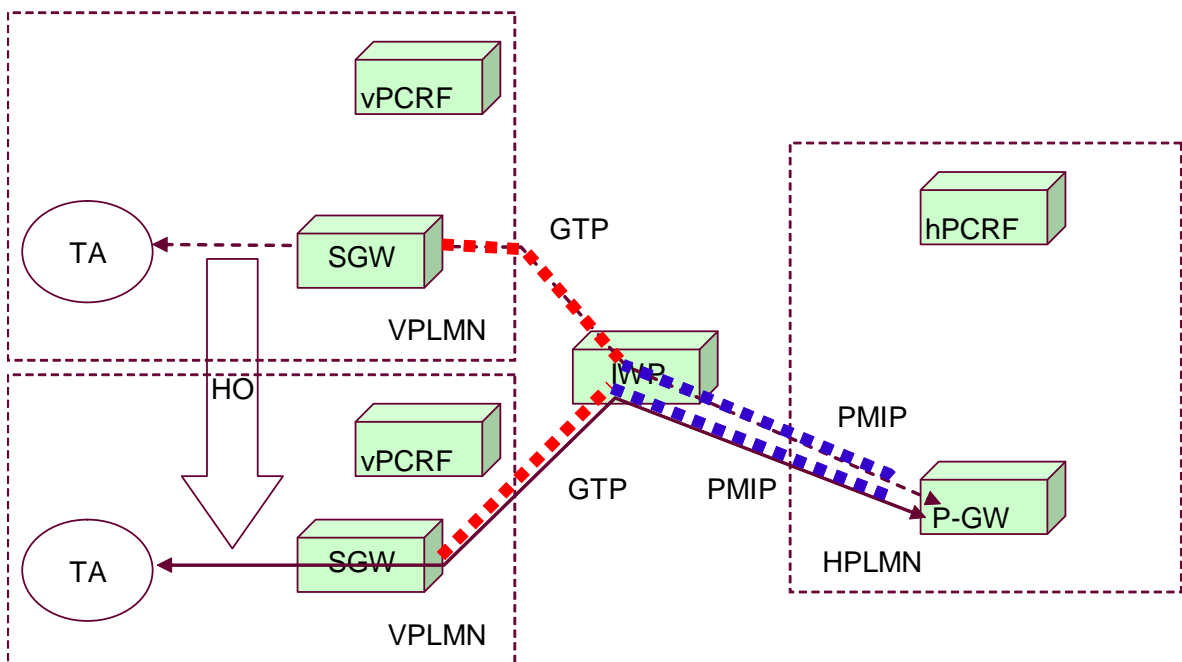
Figure 4.2.3.3.2.1-1: Inter PLMN HOs vPLMN S8 change and both PLMN support IWP

4.2.3.3.2.2 Inter PLMN HOs vPLMN S8 change and only one PLMN support IWP

It might be impossible for the IWP to support this scenario. The messages such as modify bearer request/PBU from the target PLMN is destined to IWP address as P-GW address but the target PLMN does not support to connect IWP e.g. no physical connection, no agreement to connect the IWP. It leads to failed Handover and the connections are disconnected. UE might need to initiate Attach procedure again to re-establish the connection.
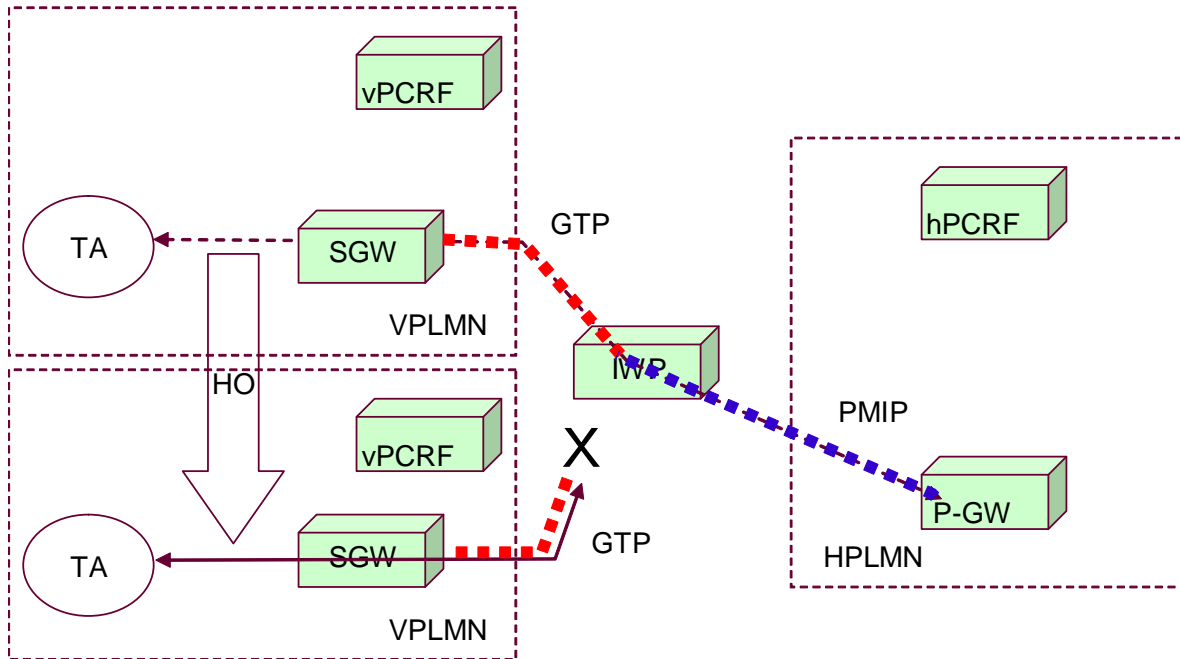
Figure 4.2.3.3.2.2-1: Inter PLMN HOs vPLMN S8 change and only one PLMN support IWP

4.3 Functional description of Interworking Proxy

IWP functions include:

-   Message binding of S8-PMIP and S9-Diameter messages in order to perform message conversion

-   Message conversion from S8-PMIP and S9-Diameter into S8-GTPv2 message

-   Message conversion from S8-GTPv2 into S8-PMIP and S9-Diameter message

-   User Plane Protocol Conversion from S8-GTP into S8-PMIP

-   User Plane Protocol Conversion from S8-PMIP into S8-GTP

Editor's Note: It is FFS if other functions are required

5 The Interworking Proxy Mechanisms

5.1 Interworking Proxy selection

5.1.1 3GPP access scenario

To send PMIP or GTP messages from S-GW to P-GW, the IWP address shall be set as the P-GW address. To achieve this, the DNS mechanism in MME does not require any extra functions: the IWP address only needs to be pre-configured as P-GW address for a particular APN.
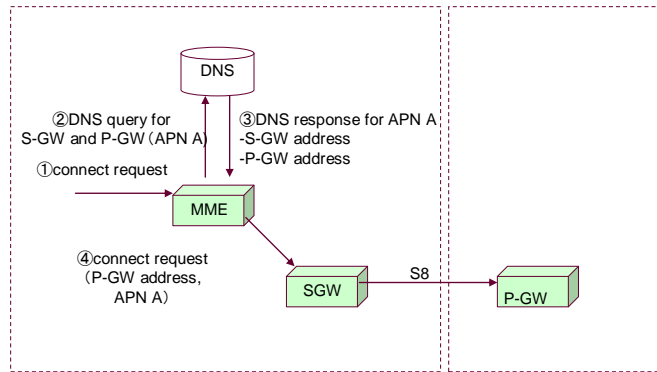
Figure 5.1.1.1: MME resolves P-GW address (no IWP)
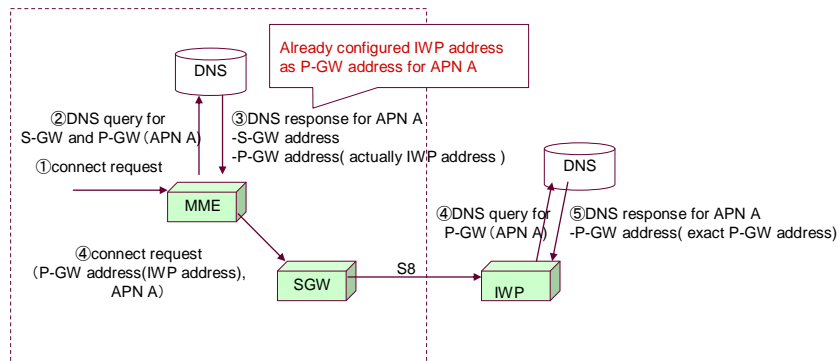
Figure 5.1.1.2: MME resolves P-GW address and returned IWP address as P-GW's (IWP)

According to the APN and the UE identity, the vPCRF knows the current situation is home routed or local breakout. In the home routed situation, the vPCRF selects an IWP and the IWP address shall be set as the hPCRF address in the DNS. In the Local Breakout situation, the vPCRF will directly send messages to the hPCRF in the hPLMN (as in the scenarios in section 4.2.1.1 and section 4.2.2.1).
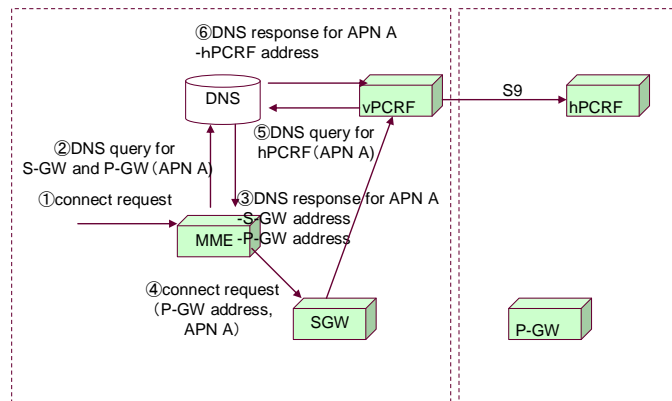
Figure 5.1.1.3: vPCRF (vPCRF resolves hPCRF)
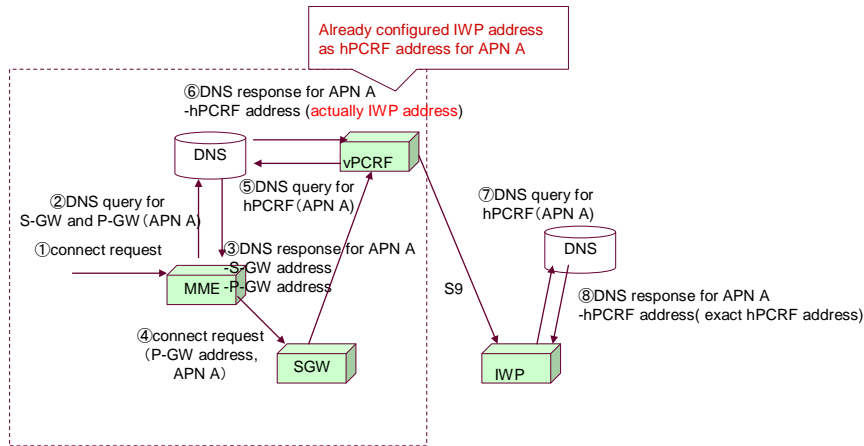
Figure 5.1.1.4: vPCRF resolves hPCRF address and returned IWP address as hPCRF address (IWP)

5.1A IP Address Allocation Mechanism

5.1A.0 General

The goal of this section is to discuss the various IP Address Allocation Mechanism in the case of IWP.

5.1A.1 IPv4 Deferred Address Allocation Mechanism

It is possible for a UE to request a Deferred IPv4 address allocation in case of PDP Type IPv4 or IPv4v6. Then, the UE can request an IPv4 address by using DHCPv4 (cf. draft-ietf-netlmm-pmip6-ipv4-support-17).

Things to consider:

> DHCPv4 server can be collocated with the MAG or with the LMA. In case of 3GPP access, the DHCPv4 server can not be collocated with the SGW which acts as a MAG.

> UE can be in 3GPP or in Non-3GPP access

> UE can request IPv4 or IPv4v6 PDP Type

5.1A.1.1 DHCPv4 Server in the MAG

5.1A.1.1.1 Non-3GPP Access case with PDP Type IPv4v6

The DHCPv4 server is collocated within the MAG which is collocated with the Non-3GPP AGW. In this case, the DHCP signaling triggers PMIP6 signaling for that the P-GW allocates the IPv4 address. This is illustrated in the figure below.
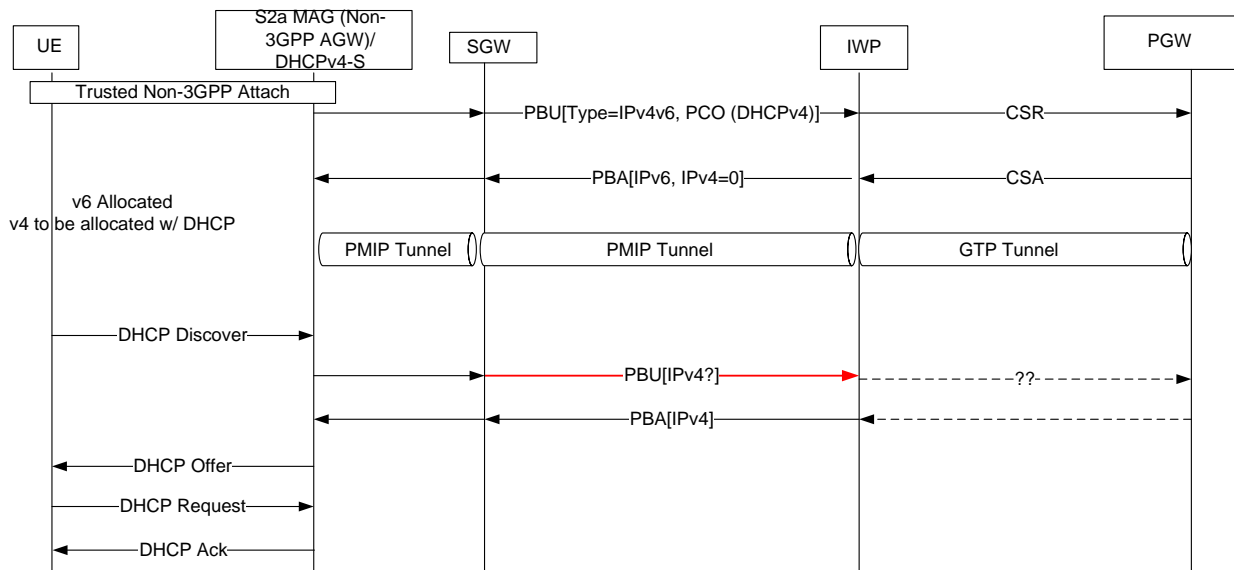
Figure 5.1A.1.1.1-1: IPv4 Deferred Address Allocation - DHCPv4 server collocated with MAG

As shown on this figure, the issue is when the IWP receives the second PBU (in red) which requests the IPv4 address for this UE. Note that in the previous step, the PGW had received a GTPv2 CREATE SESSION REQUEST (CSR) containing the PCO which indicates that the UE is willing to use DHCPv4 for IPv4 address allocation. Thus, the PGW has only allocated an IPv6 prefix. As it is a S8-GTP-Based, the PGW is waiting for a DHCPv4 Discover from the UE over the GTP Tunnel.

The following approaches are foreseen to solve the issue:

   #1: The IWP performs the DHCP procedure with the P-GW instead of the UE.

   #2: Define/Modify a GTPv2 message to convert the PBU request. Note however, the P-GW is expecting a DHCP request.

   #3: IPv4 Deferred not allowed

5.1A.1.1.1.1   Approach 1:

The IWP performs the DHCP procedure with the P-GW instead of the UE.

It appears that the first approach is simpler. No modifications on PGW are expected.

5.1A.1.1.1.2   Approach 2:

The second approach is to define or modify a GTPv2 message to convert the PBU.

The second approach is not desirable; it would require change on GTPv2 and on the PGW.

5.1A.1.1.1.3   Approach 3

The third approach is to not allow deferred IPv4 address allocation mechanism.

This is restrictive: IPv4 deferred address allocation may be useful to economize IPv4 addressing.

5.1A.1.1.2   Non-3GPP Access with PDP Type IPv4

In this case, as the PGW has not allocated any IPv4 address, the IWP can not respond with a PBA to the first incoming PBU. As a consequence, the attach procedure fails.

5.1A.1.2   DHCPv4 server collocated with the LMA

In this case, the DHCPv4 server is collocated with the PGW. The MAG acts then as a DHCP Relay.

In this case the Approach #1 also works. IWP acts a s DHCP server from the MAG's point of view but acts as a DHCP relay from the LMA's point of view.

5.1A.2 IPv6 Stateless Address Auto-configuration

The IPv6 Stateless Address Auto configuration when IWP is used is FFS.

5.1.2 Non-3GPP access scenario

5.1.2.1 General

In the non-3GPP access scenario, only the "chained case" is considered for the IWP. This scenario is illustrated below.
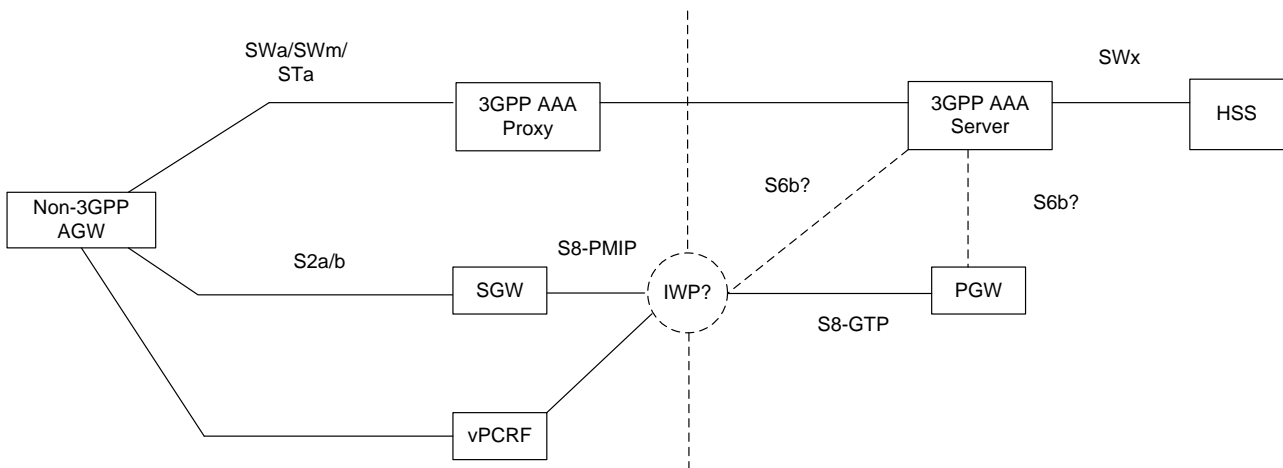
Figure 5.1.2-1: Chained scenario with IWP

In the 3GPP TS 23.402 [2], the PGW selection is done by the Non-3GPP AGW and PGW selection information are provided to the 3GPP AAA Proxy.

The PGW selection information includes:

- The PDN GW identity, which is a logical name (FQDN) or IP address and an APN; or

- an APN and an indication whether the allocation of a PDN GW from the visited PLMN is allowed or a PDN GW from the home PLMN shall be allocated.

This PGW selection information is then provided to the Non-3GPP AGW. The AGW is then in charge of selecting the PGW and to provide it to the SGW.

 In the case of IWP, the PMIP message must be sent to the IWP which will convert it in a GTP message.

For this purpose, the 3GPP AAA Server shall provide the IWP selection information (instead of PGW selection information) to the 3GPP AAA proxy.

The Non-3GPP AGW will then perform the IWP selection and provide the IWP identity to the SGW.

The IWP shall perform PGW selection by using DNS procedures based on the APN received.

Editor's Notes: The use of Wildcard APN is FFS in such scenario.

Editor's Note: It is FFS if the S6b interface is need in Chained scenario with IWP. If it is needed, in particular to update the AAA/HSS, it is FFS if it is to be supported by the IWP or by the PGW. Note this would be against one of the requirement of this TR which was to not add specific behavior into existing nodes.

5.1.2.2 S6b Interface for non-3GPP case and IWP

The non-3GPP access Architecture is as illustrated on the figure 5.1.2.2-1:
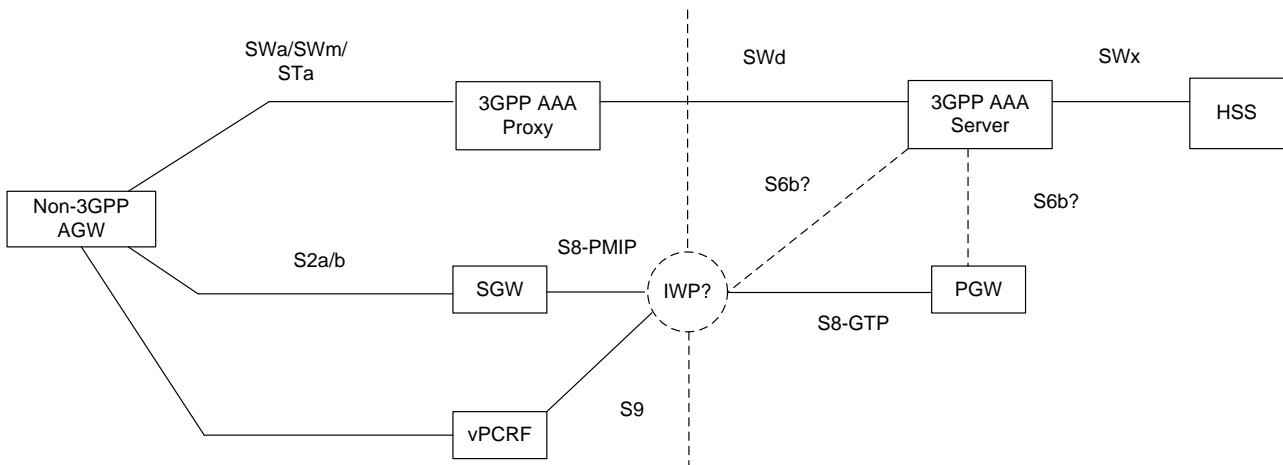
Figure 5.1.2.2-1: Non-3GPP Access Architecture with an IWP - Chained case

As illustrated, it is not clear at this point if an S6b interface is needed, and in the positive case, where to locate it.

In the (normal) chained scenario with S2a/b, the S6b interface is used in particular to update the 3GPP AAA server with the PGW information. The 3GPP AAA server then uses SWx to update the HSS with this PGW information. Then, if the UE performs a handover to 3GPP access, the HSS will provide to the MME the P-GW which was used in Non-3GPP Access. This is the basic behaviour which allows inter-system mobility between Non-3GPP and 3GPP.

In the case of IWP, the PGW is GTP-based which implies that this S6b is normally not implemented in the PGW.

The following approaches are foreseen to solve the issue:

5.1.2.2.1   Approach 1

The first approach is to not solve the issue.

It implies that Inter-system mobility is not supported if an IWP is used.

5.1.2.2.2   Approach 2

In this approach, the S8-GTP-based PGW implements the S6b interface.

This contradicts one of the working assumptions which is to not add new functionality to existing Network Entities.

The PGW will update the 3GPP AAA with its identity. When the UE handovers to 3GPP, the MME/SGSN will receive the PGW (instead of the IWP). The handover will fail.

5.1.2.2.3   Approach 3

In this approach, the IWP supports the S6b interface towards AAA infrastructure.

In the case the IWP is not located in the HPLMN, it exists two possible architectures:

The IWP has an S6b interface towards the 3GPP AAA Proxy.

The IWP has an S6b interface towards the 3GPP AAA server. In this case, it can be highlighted that S6b is not a Roaming Interface.

5.2 Message binding procedures for S9-PCC and S8 protocols

5.2.1 QoS provisioning in 3GPP access case

5.2.1.1 Review of on-path model and off-path model

NOTE: Assumption: PMIP based S-GW toward GTP based P-GW scenario.

In the stage2 specification, there are the concepts of "on-path model" and "off-path model" for conveying QoS information between S-GW and P-GW (related specifications are TS23.401, TS23.402 and TS23.203).

In off-path model, the protocol for S5/S8 interface, PMIP doesn't convey the QoS information, therefore PCC procedures using PCRF are used to convey the QoS information between S-GW to P-GW.
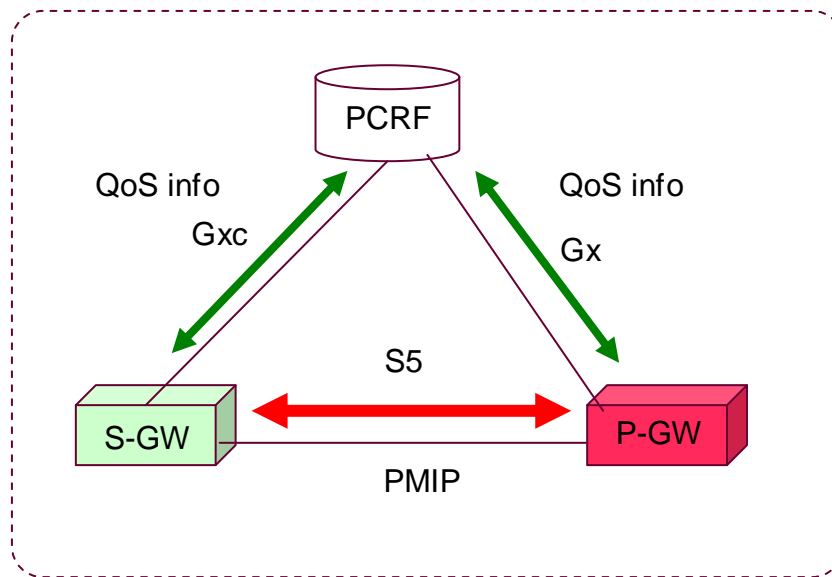
Figure 5.2.1.1.1: off-path model

In on-path model, the protocol for S5/S8 interface, GTP embeds QoS information and mobility management into one protocol. P-GW only has connection with PCRF.
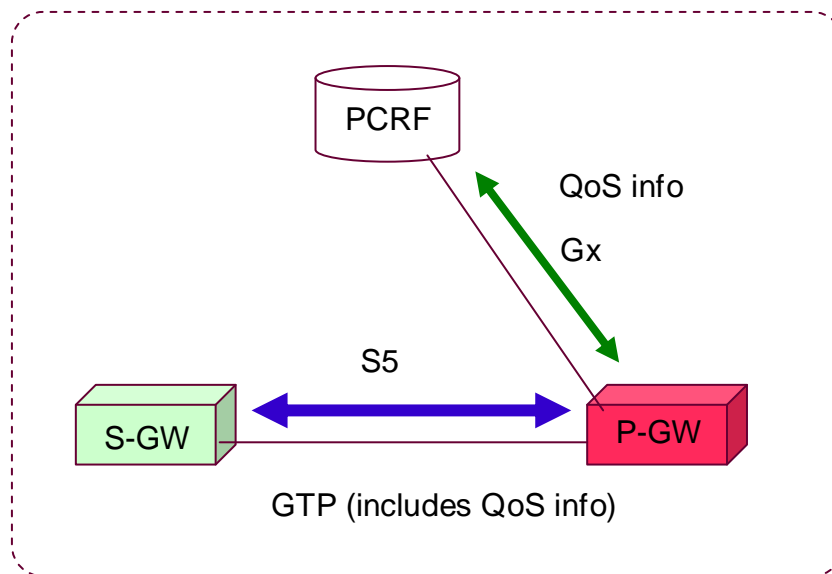
Figure 5.2.1.1.2: on-path model

5.2.1.2 on-path and off-path combined model with IWP scenario

Considering S8 PMIP case i.e. roaming case, S9 interface between vPCRF and hPCRF is used to convey the QoS information with Diameter. In Attach call flow, S-GW in the roaming network obtains appropriate QoS information for a user via S9 before sending PBU toward P-GW in the home network.
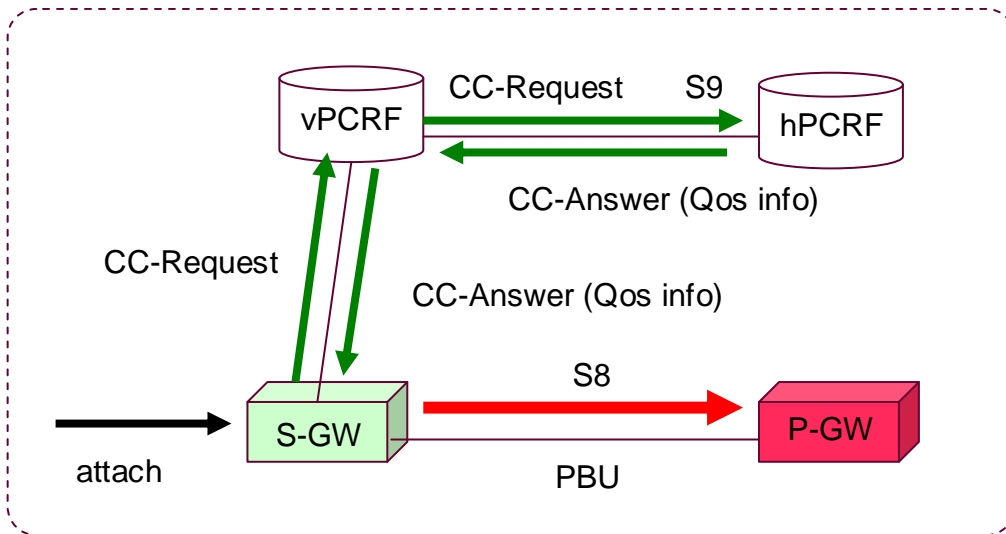
Figure 5.2.1.2.1: Example Attach call flow with S8 PMIP case (off-path model)

One of the IWP scenarios described in the clause 4 of the TR, PMIP-based S-GW in the roaming network connects via IWP toward GTP-based P-GW in the home network. The on-path and off-path combined model for above IWP scenario is shown below.
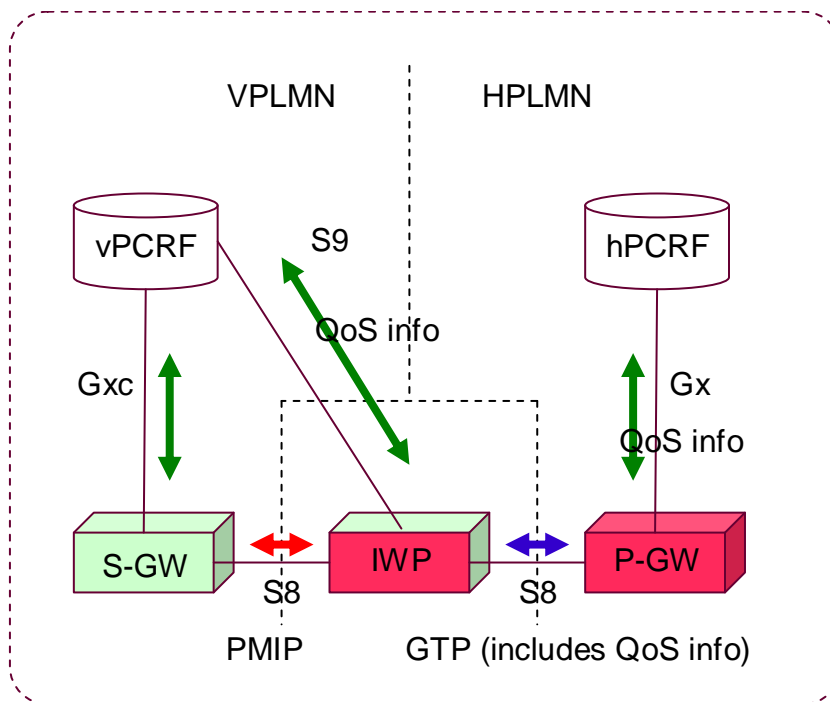
Figure 5.2.1.2.2: on-path and off-path combined model in IWP scenario

In this case, during Attach flow, S-GW can not download appropriate QoS information for a particular user before sending PBU from S-GW to IWP, because IWP doesn't have QoS information for the user..
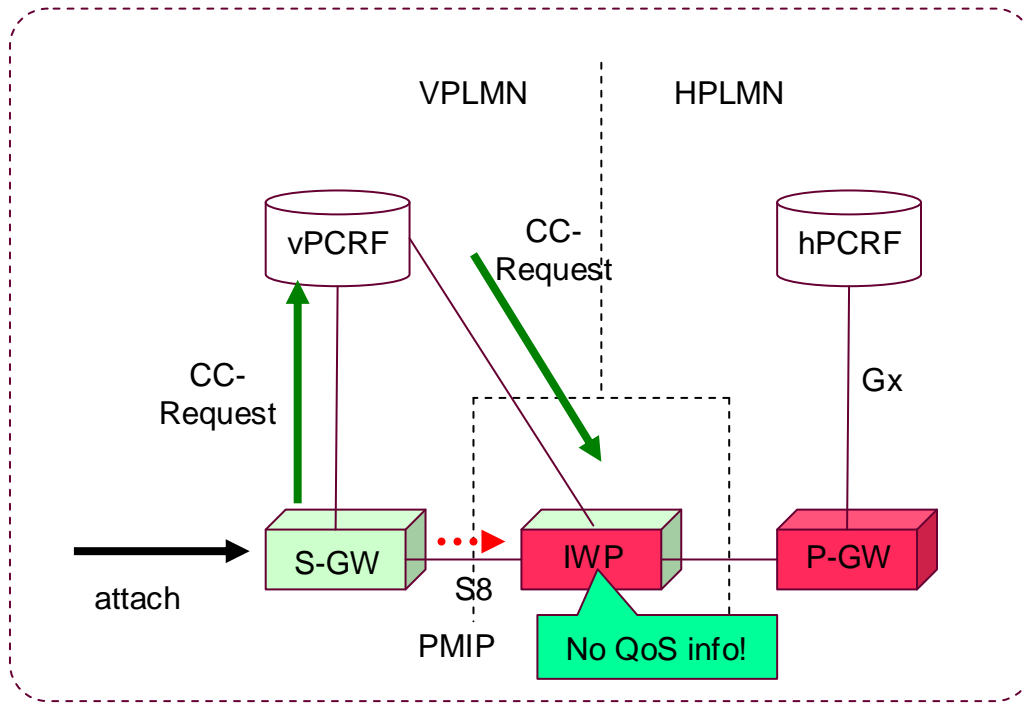
Figure 5.2.1.2.3: IWP doesn't have QoS information to return in CC-Answer to achieve PMIP scenario for S-GW in vPLMN

If GTP-based P-GW is used in the home network and PMIP-based S-GW is used in the visited network, hPCRF and vPCRF aren't connected directly because GTP protocol on S8 could include QoS information. Therefore IWP have no way to obtain QoS information via direct link to hPCRF, in other word, hPCRF don't have S9 interface.

5.2.1.3 Alternative 1 – provisional QoS

To send Proxy Binding Update from S-GW in vPLMN to IWP, it needs to execute PCC procedure in advance to get QoS information. In that scenario, IWP don't have appropriate QoS information at that step. Therefore to solve this problem, it is proposed that IWP stores the QoS information which is not obtained from hPCRF during the procedures, but provisional QoS information that are pre-configured based on e.g. inter-operator agreement.
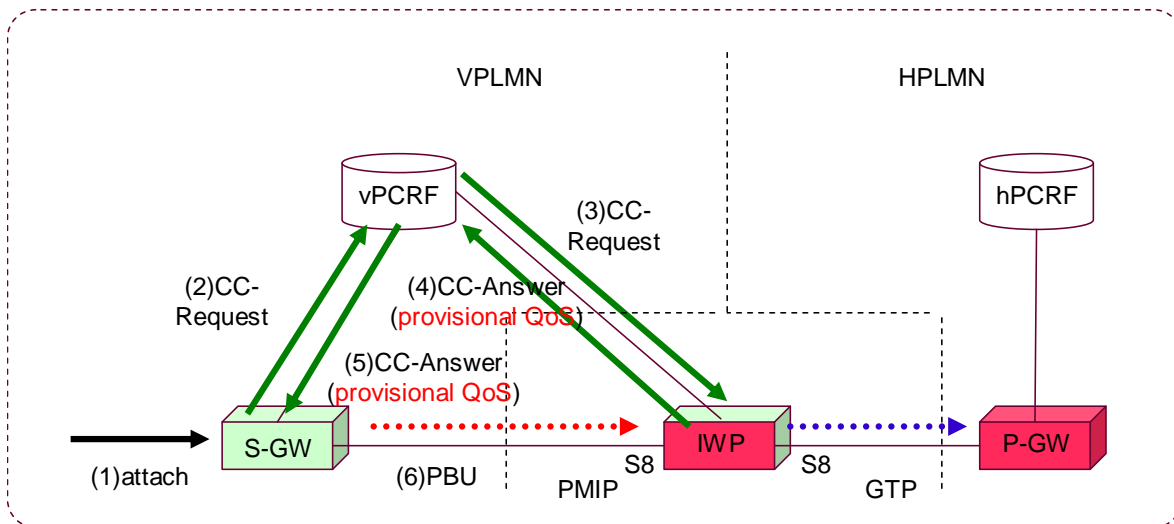
Figure 5.2.1.3.1: IWP returns provisional QoS in CC-Answer during attach procedure

However if S-GW keeps using such provisional QoS information, there could be undesirable situation from service point of view e.g. real QoS could be higher than provisional information. Therefore, after established bearer on S8 interface, provisional QoS information in S-GW has to be updated by real QoS information obtained from hPCRF during attach procedures sent from P-GW to S-GW through IWP.
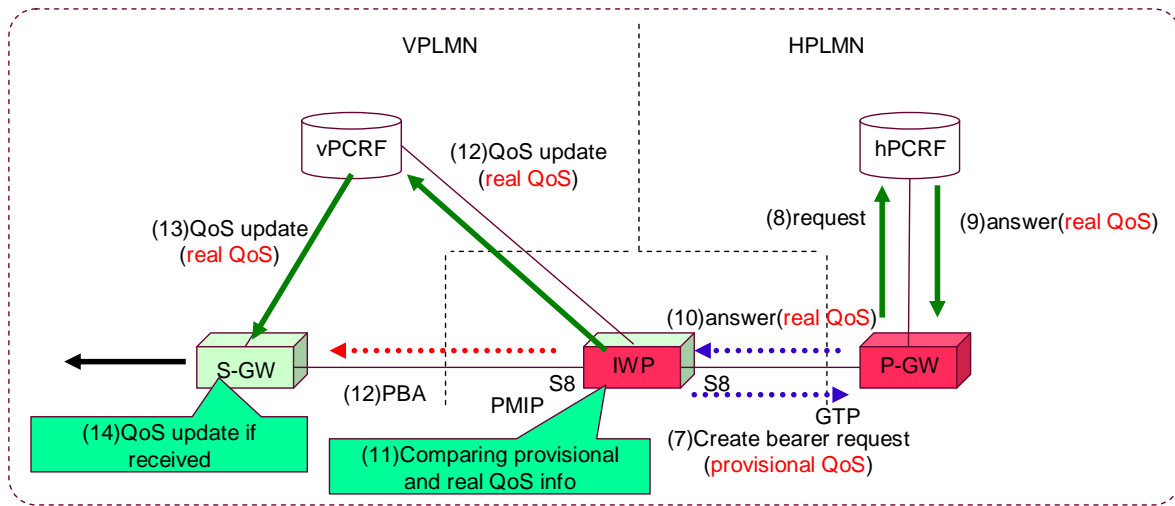
Figure 5.2.1.3.2: IWP compares provisional and real QoS and sends QoS update request to vPCRF if needed

6 Mapping of procedures between GTP and PMIP

6.0 General

This section deals with the mapping of procedures between GTP and PMIP.

In the non-3GPP case, the VPLMN is PMIP-based while the HPLMN is GTP-based. As a consequence, the process of mapping is as follows:

All the UE-initiated procedures in non-3GPP access (as described in 3GPP TS 23.402 [2]) must be mapped to S8-GTP-based procedures (as described in 3GPP TS 23.401 [3]).

All the Network-initiated procedures for S8-GTP-based HPLMN must be mapped to corresponding non-3GPP access procedures.

The table below indicates the procedures which must be handled and corresponding section in the TR.

Procedures	Handled in
Non-3GPP UE Initiated Procedures (coming from TS 23.402 [2])	
Attach	6.1.1.2
Detach and PDN Disconnection	6.1.2.2
UE-initated Resource Request and Release	6.1.3A (Bearer Creation), 6.1.4A (Bearer Modification), 6.1.2.2 (Bearer Deletion)
UE-initated connectivity to additional PDN	6.1.1.2
Non-3GPP access initiated IPv4 address Delete procedure	FFS
GTP-based HPLMN Network Initiated Procedures (coming from TS 23.401 [3])	
Network Triggered Service Request	6.1.3.2
HSS-initiated Detach Procedure	6.1.2.2? (FFS)
PGW[/HSS] Initiated bearer modification w/[W/o] bearer QoS	6.1..4

Update	
Bearer Deactivation	6.1.3.2

Table 6.0-1: Non-3GPP Procedures for IWP

6.1 Mapping of procedures between GTP and PMIP with PCC support

6.1.1 PDN Connection Creation

This section applies to the following procedures:

- E-UTRAN Initial Attach

- UE requested PDN connectivity

The IWP needs to successfully complete any parallel PMIP and PCC signalling exchange before continuing with the next step on the GTP side.

6.1.1.1 3GPP access scenario

6.1.1.1.1 PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

The mapping of procedures for this scenario is shown in figure 6.1.1.1.1-1:

Figure 6.1.1.1.1-1: Mapping of Initial Attach Procedure for PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

NOTE 1:   The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.

NOTE 2:   The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3:   The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1.   Based on the condition described in 3GPP TS23.402 [2], the S-GW which is located on vPLMN decides to initiate Gateway Control Session Establishment Procedures to communicate with hPCRF through vPCRF with S9 appropriate procedure for the Initial Attach. During this procedure, how to obtain the IWP address as hPCRF address by vPCRF is described in section 5.1. The purpose of this step is to convey the appropriate QoS information between the S-GW and (h)PCRF in advance, however in this scenario, hPCRF doesn't have S9 interface therefore the IWP is not able to simulate S9 interface, obtain and return a correct value of QoS for a user to the S-GW. To solve this situation, the solution is to apply the mechanism introduced in section 5 named "provisional QoS" approach. The main idea of this approach is that the IWP returns "provisional QoS value" to the S-GW during Gateway Control Session Establishment Procedures and S9 appropriate procedure so that the S-GW could precede next step i.e. sending Proxy Binding Update.

NOTE 4:   It is FFS whether further PCC related consideration is needed during step1.

2. The S-GW which is located on vPLMN intends to send Proxy Binding Update to the P-GW which is located on hPLMN. That result the S-GW sends the message to the IWP. The IWP address itself is already sent to S-GW before the step1 by MME in 3GPP access case, by non-3GPP AGW in non-3GPP access case.

3. The IWP sends Create Session Request to the P-GW which is located on hPLMN. How to obtain the P-GW address is described in section 5.1. The P-GW initiates IP-CAN Session Establishment Procedure between hPCRF.

5. The P-GW sends Create Session Response to the IWP. This message may include the QoS value from hPCRF. This value might be different with the provisional QoS value.

6. The IWP sends Proxy Binding Ack to the S-GW.

7. With the QoS value stored in step1, the IWP compares the QoS values which are provisional and real one. If the values are different e.g. real QoS value requires higher level more than provisional one, the IWP indicates the fact within the Gateway Control and QoS Rules Provision Procedure to re-setup QoS value inside the S-GW through vPCRF with S9 appropriate procedure.

6.1.1.1.2 GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

The mapping of procedures for this scenario is shown in figure 6.1.1.1.2-1:
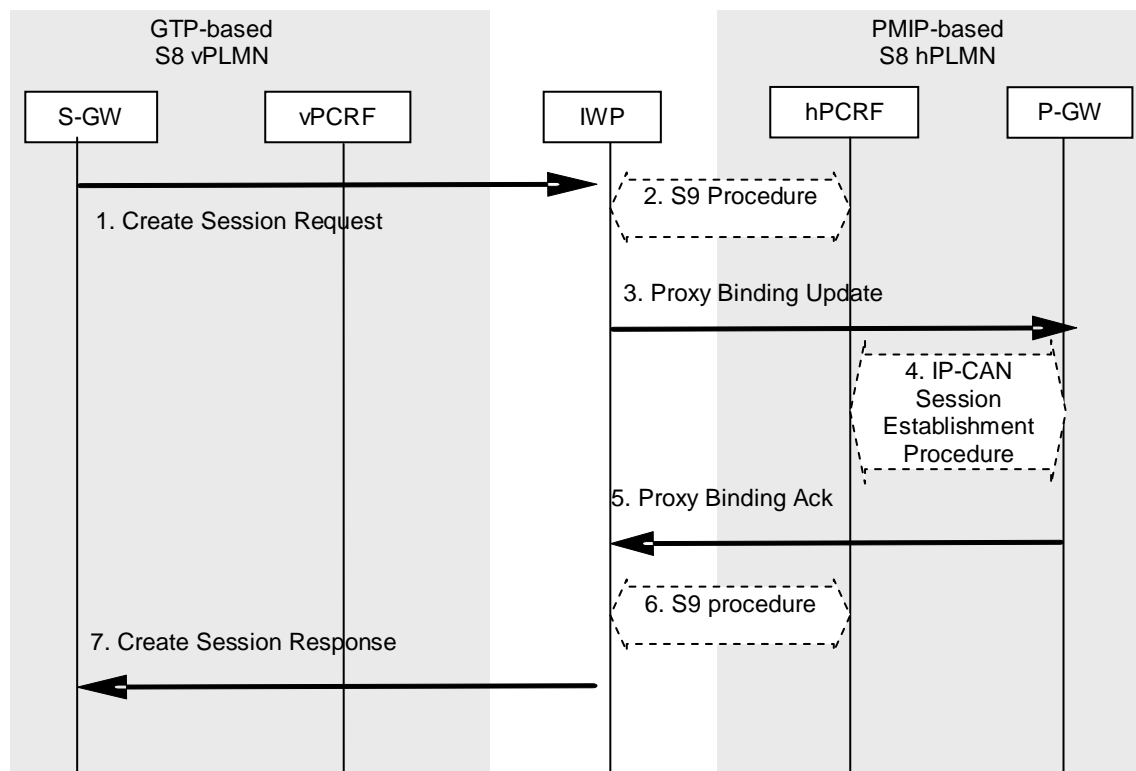
Figure 6.1.1.1.2-1: Mapping of Initial Attach Procedure for GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

NOTE 1: The details of procedures before step1 and after step7 for vPLMN and hPLMN are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4].

NOTE 2: The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3: The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1. The S-GW which is located on vPLMN intends to initiate Create Session Request to P-GW which is located on hPLMN via GTP-based S8 interface based on the condition described in 3GPP TS23.401 [3]. The IWP address itself is already sent to S-GW before the step1 by MME in 3GPP access case. That result the S-GW sends the message to IWP.

2. After receiving Create Session Request, the IWP initiates S9 appropriate procedure act as triggered by Gateway Control Session Establishment which is initiated by S-GW to align with the procedures described in 3GPP TS23.402 [2] between hPCRF via S9 interface. How to obtain the real hPCRF address is described in section5.1.

3. The IWP sends Proxy Binding Update to the P-GW which is located on hPLMN via PMIP-based S8 interface. How to obtain the real P-GW address is described in section5.1. The P-GW which is located on hPLMN interacts with hPCRF for IP-CAN Session Establishment Procedures.

5. The P-GW sends Proxy Binding Ack to the IWP.

6. The IWP interacts with hPCRF by S9 appropriate procedure act as vPCRF.

7. The IWP sends Create Session Response with the results of step6 which might be appropriate QoS information.

6.1.1.2 non-3GPP access scenario

In the non-3GPP access scenario, the only possible scenario is a PMIP-based S8 VPLMN and GTP-based S8 hPLMN. Moreover, only the chained-case scenario is handled since it is the only scenario where an S8 interface is present. The mapping of procedures is described on the Figure 6.1.1.2-1.

This clause assumes that PCC is deployed in the VPLMN.
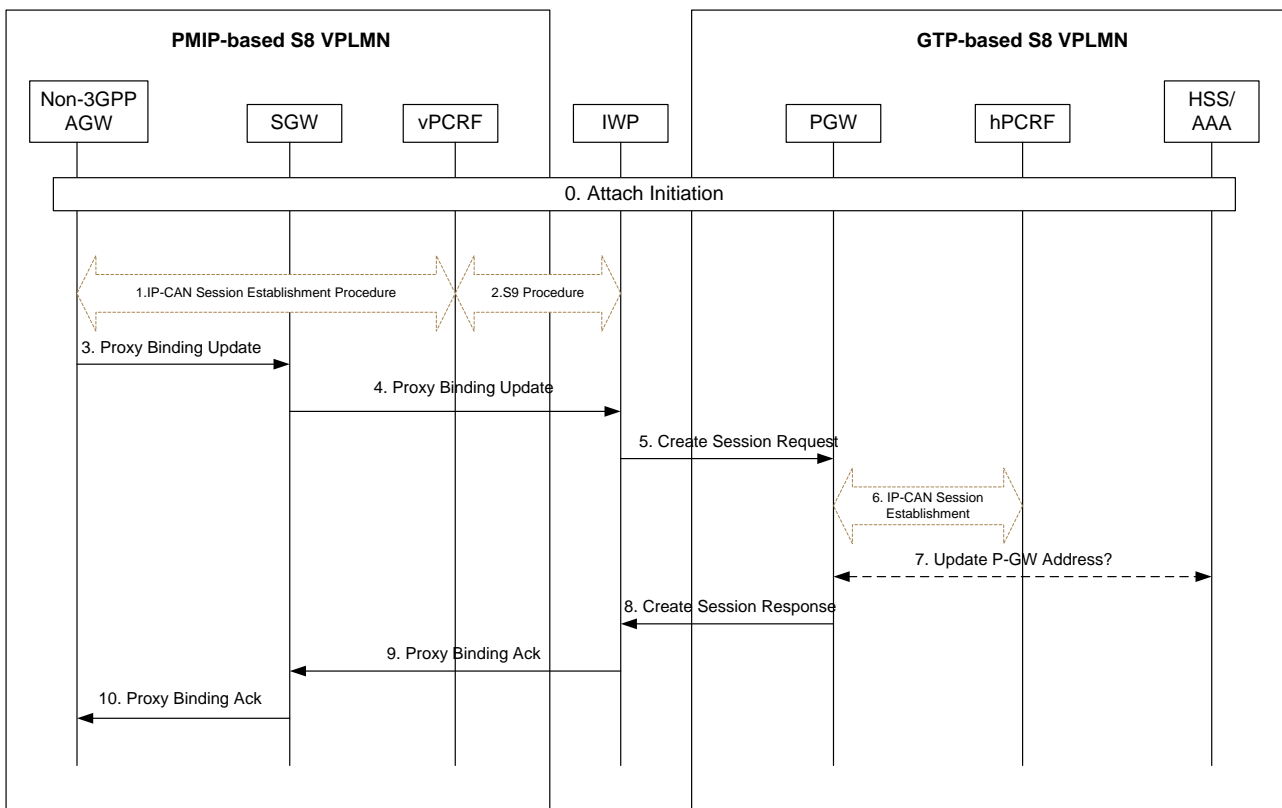
Figure 6.1.1.2-1: PDN Connection Creation for non-3GPP case

0. The Attach Initiation is as described in the 3GPP TS 23.402 [2]. However, the IWP identity is provided as a PGW identity to the 3GPP AAA Proxy. The S-GW selection is performed by the 3GPP AAA Proxy. At the end, the P-GW and S-GW identity are provided to the non-3GPP AGW.

1. The MAG function of the non-3GPP AGW interacts with the vPCRF using the IP-CAN Session Establishment Procedure as described in 3GPP TS 23.203 [4].

2. The vPCRF interacts with the IWP using S9 procedures.

3. The MAG function of the Non-3GPP AGW sends a Proxy Binding Update (MN-NAI, Lifetime, Access Technology Type, Handover Indicator, APN, GRE Key for downlink traffic, IWP address, Additional Parameters) message to the S-GW in the VPLMN.

4. The S-GW sends a corresponding Proxy Binding Update (MN-NAI, Lifetime, Access Technology Type, Handover Indicator, APN, GRE Key for downlink traffic, IWP address, Additional Parameters) to the IWP.

5. The IWP selects a P-GW as described in clause 5.1.2 and allocates an EPS Bearer-Id.. The IWP sends a corresponding Create Session Request message (IMSI, MSISDN, APN, IWP Address for the user plane, IWP TEID of the user plane, IWP TEID of the control plane, RAT type, Default EPS Bearer QoS, PDN Type, PDN Address, subscribed APN-AMBR, EPS Bearer Identity, Protocol Configuration Options, Handover Indication, ME Identity, User Location Information (ECGI), User CSG Information, MS Info Change Reporting support indication, Selection Mode, Charging Characteristics, Trace Reference, Trace Type, Trigger Id, OMC Identity, Maximum APN Restriction, Dual Address Bearer Flag) to the selected P-GW.

   QoS Policy Information are received from the vPCRF and mapped into corresponding GTPv2 IEs.

6. If PCC is deployed in the HPLMN, the P-GW performs an IP-CAN Session Establishment procedure as defined in 3GPP TS 23.203 [4]. This may lead to the establishment of a number of dedicated bearers between the P-GW and the IWP following the procedures defined in clause xxx.

7. See the Editor's Note

Editor's Note: It is FFS if the P-GW shall behave as in 3GPP TS 23.401 or 3GPP TS 23.402. In the latter case, the P-GW informs the 3GPP AAA server of its identity. The 3GPP AAA server then conveys this information to the HSS for the UE.

Editor's Note: If it is agreed that the IWP or P-GW shall have an S6b interface towards the 3GPP AAA server, it is FFS how it knows when to perform related procedures. As an example, the RAT-Type may be used for this purpose.

8. The P-GW creates a new entry in its EPS bearer context table and generates a Charging-Id. The P-GW returns a Create Session Response (PDN GW Address for the user plane, PDN GW TEID of the user plane, PDN GW TEID of the control plane, PDN Type, PDN Address, EPS Bearer Identity, EPS Bearer QoS, Protocol Configuration Options, Charging Id, Prohibit Payload Compression, APN Restriction, Cause, MS Info Change Reporting Action (Start) (if the PDN GW decides to receive UE's location information and/or User CSG information during the session), APN-AMBR) to the IWP.

   The PDN address is allocated by the P-GW as described in clause 4.7.2 and 4.7.3 in 3GPP TS 23.402[2].

9. The IWP creates a binding cache entry for the PMIPv6 tunnel towards the S-GW and sends a Proxy Binding Acknowledgement (MN NAI, Lifetime, UE Address Info, GRE Key for uplink traffic, Charging Id, Additional parameters). The parameters included in this message are obtained from the Create Session Response message received in step 8. At this point, the IWP establishes the internal forwarding state for the concatenation of the PMIPv6 tunnel and the GTP-U tunnel.

10. The S-GW processes the Proxy Binding Acknowledgement and creates a binding cache entry for the PMIPv6 tunnel towards the AGW. At this point, the S-GW establishes the internal forwarding state for the concatenation of the PMIPv6 tunnels. The S-GW sends a corresponding Proxy Binding Acknowledgement (MN NAI, Lifetime, UE Address Info, GRE Key for uplink traffic, Charging Id, Additional parameters) message to the AGW.

6.1.2   S-GW Initiated PDN Connection Deletion

This section applies to the following procedures:

   - EUTRAN Initial Attach

   - UE, HSS or MME Initiated Detach

   - UE or MME Requested PDN Disconnection

The IWP needs to successfully complete any parallel PMIP and PCC signalling exchange before continuing with the next step on the GTP side.

6.1.2.1 3GPP access scenario

6.1.2.1.1 PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

The mapping of procedures for this scenario is shown in figure 6.1.2.1.1-1:

Figure 6.1.2.1.1-1: Mapping of Detach Procedure for PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

NOTE 1: The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.

NOTE 2: The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3: The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1. Based on the condition described in 3GPP TS23.402 [2], the S-GW which is located on vPLMN decides to initiate Gateway Control Session Termination Procedure to communicate with hPCRF through vPCRF with S9 appropriate procedure for the Detach. The IWP returns appropriate result for Gateway Control Session Termination Procedure to vPCRF on behalf of hPCRF.

NOTE 4: It is FFS whether further PCC related consideration is needed during step1.

2. The S-GW sends Proxy Binding Update with lifetime set to 0 to the IWP.

3. The IWP sends Delete Session Request to the P-GW which is located on hPLMN.

4. The P-GW sends Delete Session Response to the IWP

5. The P-GW initiates IP-CAN Session Termination Procedure between hPCRF.

6. The IWP sends Proxy Binding Ack to the S-GW.

NOTE 5: This step may be occurred before step5 or performed in parallel with step5.

6.1.2.1.2 GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

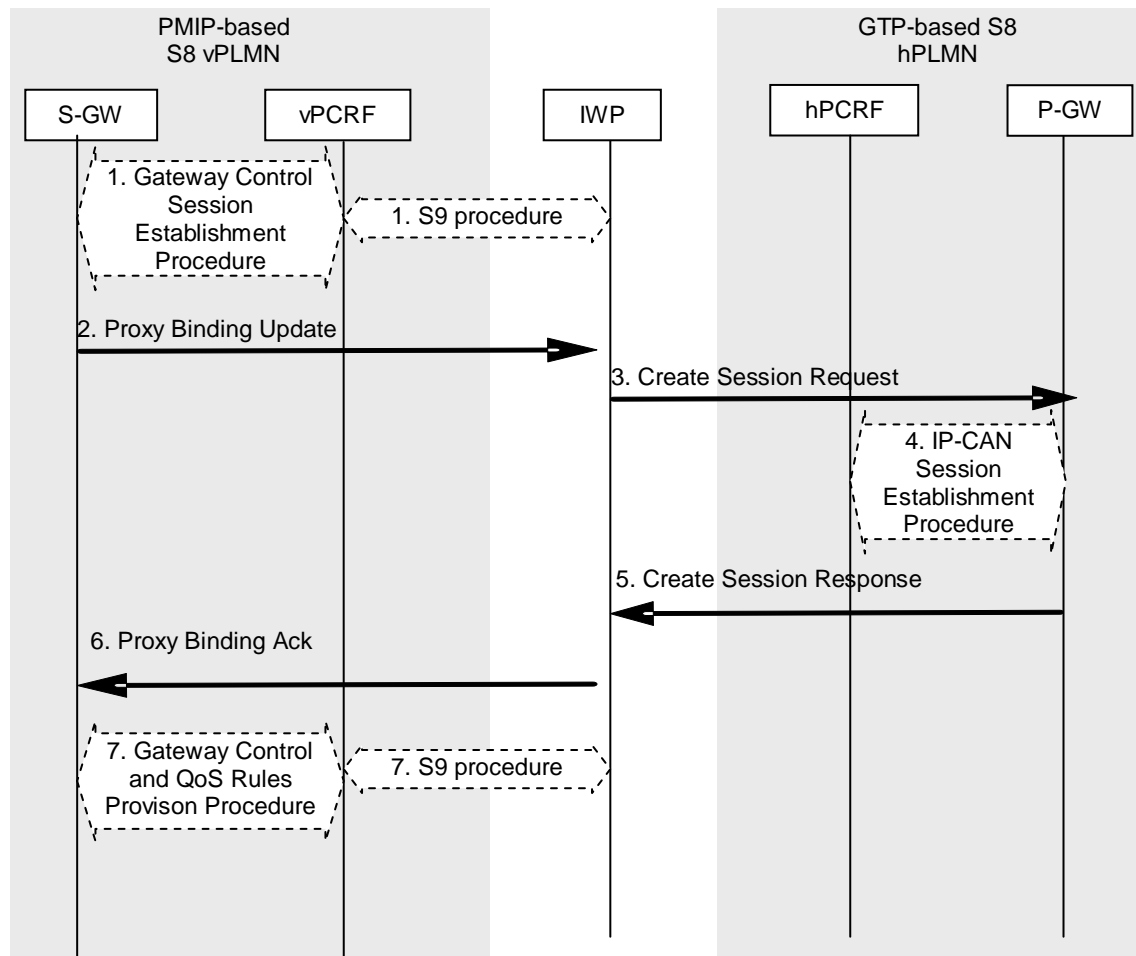The mapping of procedures for this scenario is shown in figure 6.1.2.1.2-1:

Figure 6.1.2.1.2-1: Mapping of Detach Procedure for GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

NOTE 1: The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.

NOTE 2: The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3: The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1. The S-GW which is located on vPLMN intends to initiate Delete Session Request to P-GW which is located on hPLMN via GTP-based S8 interface based on the condition described in 3GPP TS23.401 [3]. Then, the S-GW sends the message to IWP.

2. After receiving Delete Bearer Request, the IWP initiates S9 procedure act as triggered by Gateway Control Session Establishment which is initiated by S-GW to align with the procedures described in 3GPP TS23.402 [2] between hPCRF via S9 interface.

3. The IWP sends Proxy Binding Update with lifetime set to 0 to the P-GW which is located on hPLMN via PMIP-based S8 interface.

4. The P-GW which is located on hPLMN interacts with hPCRF for IP-CAN Session Termination Procedures.

5. The P-GW sends Proxy Binding Ack to the IWP.

6. The IWP sends Delete Session Response with the results of step5.

6.1.2.2 non-3GPP access scenario

This clause describes the UE/ePDG/Trusted non-3GPP access Network-Initiated detach procedure for PMIP-based S8 VPLMN and GTP-based S8 hPLMN. It is assumed that PCC is deployed in VPLMN.
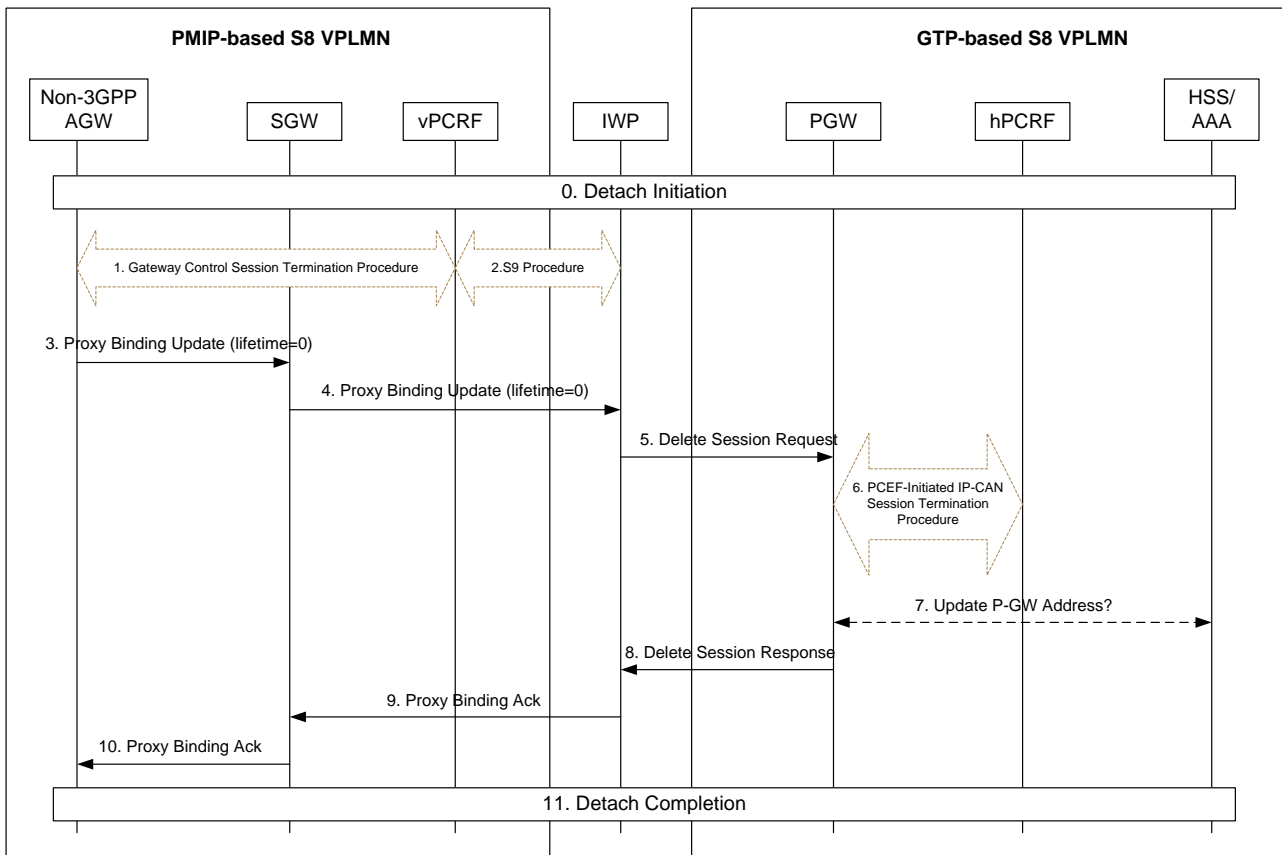
Figure 6.1.2.2-1: UE/ePDG/Trusted Non-3GPP AN Initiated Detach Procedure for chained PMIP-based roaming scenario with an IWP

0. The UE or Non-3GPP Access network triggers either detach or PDN disconnection from a specific PDN by an access technology specific procedure

1. The AGW initiates the Gateway Control Session Termination Procedure with the vPCRF as specified in 3GPP TS 23.203 [4].

2. The vPCRF interacts with the IWP using S9 procedure.

3. The MAG in the AGW sends a Proxy Binding Update (MN NAI, APN, lifetime=0) message to the S-GW with a lifetime value set to zero, indicating de-registration.

4. The S-GW deletes all existing entries implied in the Proxy Binding Update message from its Binding Cache and releases all associated resources (e.g. GRE tunnel) and sends a corresponding Proxy Binding Update message to the IWP.

5. The IWP deletes all existing entries implied in the Proxy Binding Update message from its Binding Cache and releases all associated resources (e.g. GRE tunnel) and sends a corresponding Delete Session Request to the P-GW in the HPLMN.

6. If PCC is deployed in the HPLMN, the P-GW employs an IP-CAN Session Termination procedure as defined in 3GPP TS 23.203 [4] with the hPCRF to indicate to the PCRF that the EPS Bearer(s) are released.

7. It is FFS if the P-GW shall inform the AAA Server/HSS to remove the P-GW information for the UE (as in 3GPP TS 23.402 [2] clause 6.4.1.2).

8. The P-GW acknowledges by sending a Delete Session Response to the IWP.

9. The IWP sends a Proxy Binding Ack (MN-NAI, APN, lifetime=0) to the S-GW in the VPLMN.

10. The S-GW sends a corresponding Proxy Binding Ack to the MAG function in the AGW.

11. The detach procedure is completed.

6.1.3 Dedicated Bearer Activation initiated by P-GW

6.1.3.1 3GPP access scenario

6.1.3.1.1 PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

The mapping of procedures for this scenario is shown in figure 6.1.3.1.1-1:

Figure 6.1.3.1.1-1: Mapping of Dedicated Bearer Activation initiated by P-GW Procedure for PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

NOTE 1: The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.

NOTE 2: The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3: The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1. The hPCRF sends a PCC decision provision (QoS policy) message to the P-GW which is located on hPLMN. This corresponds to the initial steps of the PCRF-Initiated IP-CAN Session Modification procedure with P-GW.

2. With QoS policies which are result of step1, the P-GW initiates Create Bearer Request to the IWP.

3-4. After the IWP receives Create Bearer Request from the P-GW which is located on hPLMN, the IWP decides to initiate S9 procedure which triggers Gateway Control and QoS policy Rules Provision Procedure with QoS policy which is included in step2 between the S-GW which is located on vPLMN through vPCRF.

5-6. After completion of creating bearer with UE, the S-GW which is located on vPLMN initiates to finish Gateway Control and QoS policy Rules Provision Procedure with vPCRF and vPCRF initiates S9 appropriate procedure with IWP.

7. After the IWP finishes Gateway Control and QoS policy Rules Provision Procedure with vPCRF, the IWP initiates to send Create Bearer Response to the P-GW which is located on hPLMN and allocates the EPS Bearer Identity.

8. The P-GW which is located on hPLMN finishes the IP-CAN Session Modification procedure with hPCRF.

6.1.3.1.2   GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

The mapping of procedures for this scenario is shown in figure 6.1.3.1.2-1:

Figure 6.1.3.1.2-1: Mapping of Dedicated Bearer Activation Procedure for GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

NOTE 1:   The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.

NOTE 2:   The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3:   The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1.   The hPCRF initiates S9 procedure which triggers the Gateway Control and QoS Rules Provision Procedure by sending a message with the QoS rules and Event Trigger information to the S-GW which is located on vPLMN. NOTE: It is FFS whether further PCC related consideration is needed during step1.

2.   The IWP sends Create Bearer Request with QoS policy which is result of step1 to the S-GW which is located on vPLMN.

3.   After completion of the creating bearer with UE, the S-GW which is located on vPLMN sends Create Bearer Response to the IWP.

4.   After receives Create Bearer Response, the IWP initiates S9 procedure act as triggered by Gateway Control and QoS Rules Provision Procedure with hPCRF.

5.   After step4, hPCRF initiates PCC Rules Provision Procedure between P-GW.

6.1.3.2   non-3GPP access scenario

As per clause 6.6.1 in 3GPP TS 23.402 [2], the P-GW Initiated Dedicated Bearer activation (with or without Bearer QoS update) only applies to S2a i.e. Trusted-Non-3GPP access. The procedure corresponds to the Network-Initiated Dynamic PCC on S2a in stage 2. This scenario with an IWP is illustrated below.

Figure 6.1.3.2-2:

1.   If dynamic PCC is deployed, the PCRF sends a PCC decision provision (QoS policy) message to the PDN GW. This corresponds to the initial steps of the PCRF-Initiated IP-CAN Session Modification procedure or to the PCRF response in the PCEF initiated IP-CAN Session Modification procedure as defined in TS 23.203 [6], up to the point that the PDN GW requests IP-CAN Bearer Signalling. If dynamic PCC is not deployed, the PDN GW may apply local QoS policy.

2.   The PDN GW uses this QoS policy to assign the EPS Bearer QoS, i.e., it assigns the values to the bearer level QoS parameters QCI, ARP, GBR and MBR; see clause 4.7.3. The PDN GW sends a Create Bearer Request

message (IMSI, PTI, EPS Bearer QoS, TFT, S5/S8 TEID, Charging Id, LBI, Protocol Configuration Options) to the IWP, the Linked EPS Bearer Identity (LBI) is the EPS Bearer Identity of the default bearer.

3. The IWP initiates the Gateway Control and QoS Policy Rules Provision Procedure specified in TS 23.203 [19] by sending a message with the QoS rules and Event Trigger information to the vPCRF.

4. The vPCRF sends the corresponding message to the Trusted Non-3GPP IP access.

5. The Trusted Non-3GPP IP Access enforces the rules provisioned to it, and establish all necessary resources and configuration in the non-3GPP access system.

6. The Trusted Non-3GPP IP Access responds to the vPCRF indicating its ability to enforce the rules provisioned to it.

7. The vPCRF sends the corresponding message to the IWP.

8. A new GTP-U Tunnel is created between the IWP and the P-GW in the HPLMN. However, there is not a new PMIPv6 Tunnel in the VPLMN. The IWP must internal relay forwarding between the new GTP-U Tunnel and the existing PMIPv6 Tunnel. The IWP acknowledges the bearer activation in the non-3GPP access to the P-GW by sending a Create Bearer Response (EPS Bearer Identity, S5/S8-TEID) message and allocates the EPS Bearer Identity.

9. If the dedicated bearer activation procedure was triggered by a PCC Decision Provision message from the PCRF, the PDN GW indicates to the PCRF whether the requested PCC decision (QoS policy) could be enforced or not, allowing the completion of the PCRF-Initiated IP-CAN Session Modification procedure or the PCEF initiated IP-CAN Session Modification procedure as defined in TS 23.203 [6], after the completion of IP-CAN bearer signalling.

6.1.3A   Dedicated Bearer Activation initiated by S-GW

6.1.3A.1   General

This section applies to the following procedures:

-    UE requested bearer resource modification

-    UE-initiated Resource Request (and Release) on S2a (only for non-3GPP access scenario)

NOTE 1 : As the section title is Dedicated Bearer Activation initiated by S-GW/Non-3GPP AGW, the UE-initiated Resource Release on S2a is not handled here.6.1.3A.2   3GPP access scenario

6.1.3A.2.1   PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

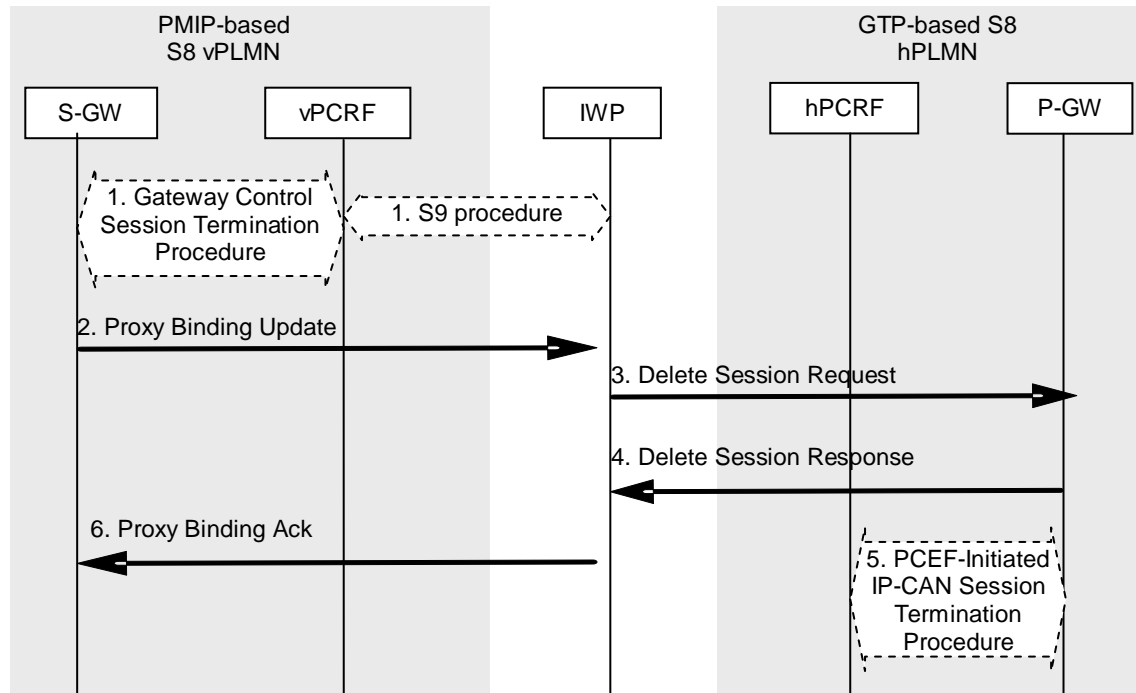The mapping of procedures for this scenario is shown in figure 6.1.3A.2.1-1:

Figure 6.1.3A.2.1-1: Mapping of S-GW initiated Dedicated Bearer Activation Procedure for PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

NOTE 1: The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.

NOTE 2: The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3: The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1. The S-GW which is located on vPLMN initiates Gateway Control and QoS policy Rules Request with vPCRF to request QoS change to the hPCRF as an Event Report.

2. The vPCRF initiates S9 appropriate procedure with IWP.

3. After the IWP finishes S9 procedure which is requesting QoS change to the hPCRF, the IWP decides to initiate Bearer Resource Command message to P-GW which is located on hPLMN and allocates the PTI in the Bearer Resource Command message.

4. The P-GW sends a PCC decision provision (QoS policy) message to the hPCRF which is located on hPLMN. This corresponds to the initial steps of the PCEF-Initiated IP-CAN Session Modification procedure with P-GW.

5. The steps after step4 are same as section 6.1.3.1.1 figure 6.1.3.1.1-1: step2 to step7.

6. The P-GW which is located on hPLMN finishes the IP-CAN Session Modification procedure with hPCRF.

6.1.3A.2.2   GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

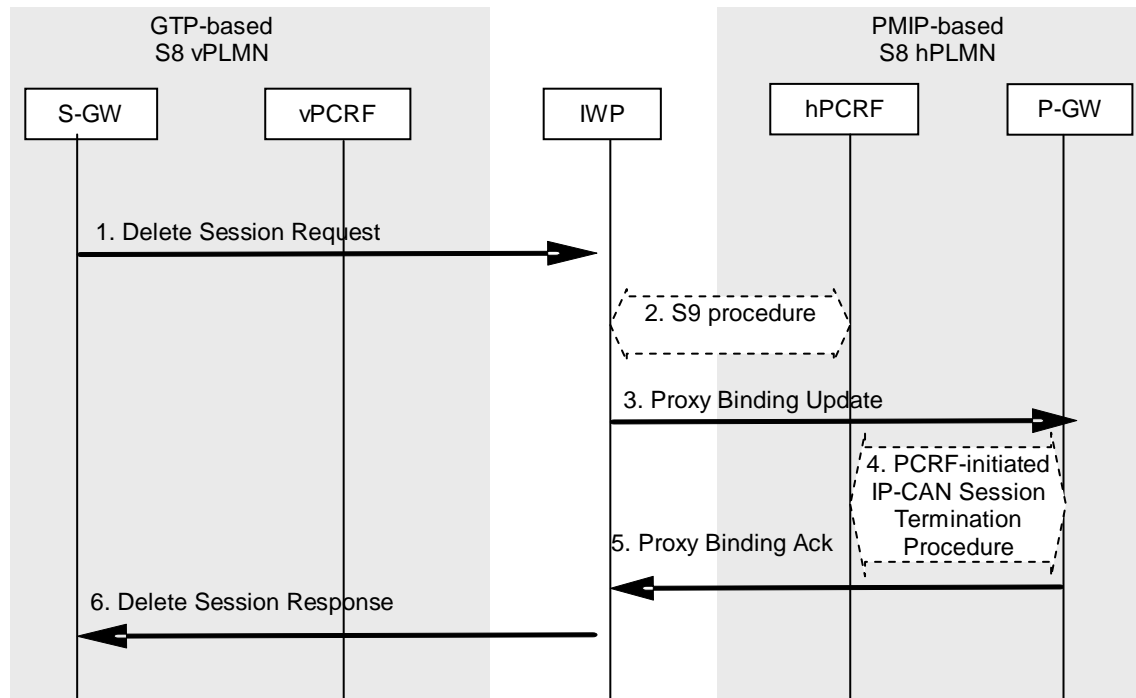The mapping of procedures for this scenario is shown in figure 6.1.3A.2.2-1:

Figure 6.1.3A.2.2-1: Mapping of S-GW initiated Dedicated Bearer Activation Procedure for GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

NOTE 1:   The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.

NOTE 2:   The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3:   The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1.   The S-GW initiates Bearer Resource Request which intends to invoke the Dedicated Bearer Activation Procedure to the IWP.

2.   The IWP initiates S9 procedure with hPCRF act as triggered by Gateway Control and QoS Rules Request from S-GW to request QoS change to the hPCRF as an Event Report.

3.   The steps after step2 are same as section 6.1.3.1.2 figure 6.1.3.1.2-1: step1 to step5.

6.1.3A.3   Non-3GPP access scenario

The mapping of procedures for this scenario is shown in the figure 6.1.3A.3-1. Note that this is valid only for the S2a case. This section only considers the case where the UE requests resource.

Note that the whole procedure is initiated by Non-3GPP AGW and not by the S-GW (compared to the 3GPP access case).
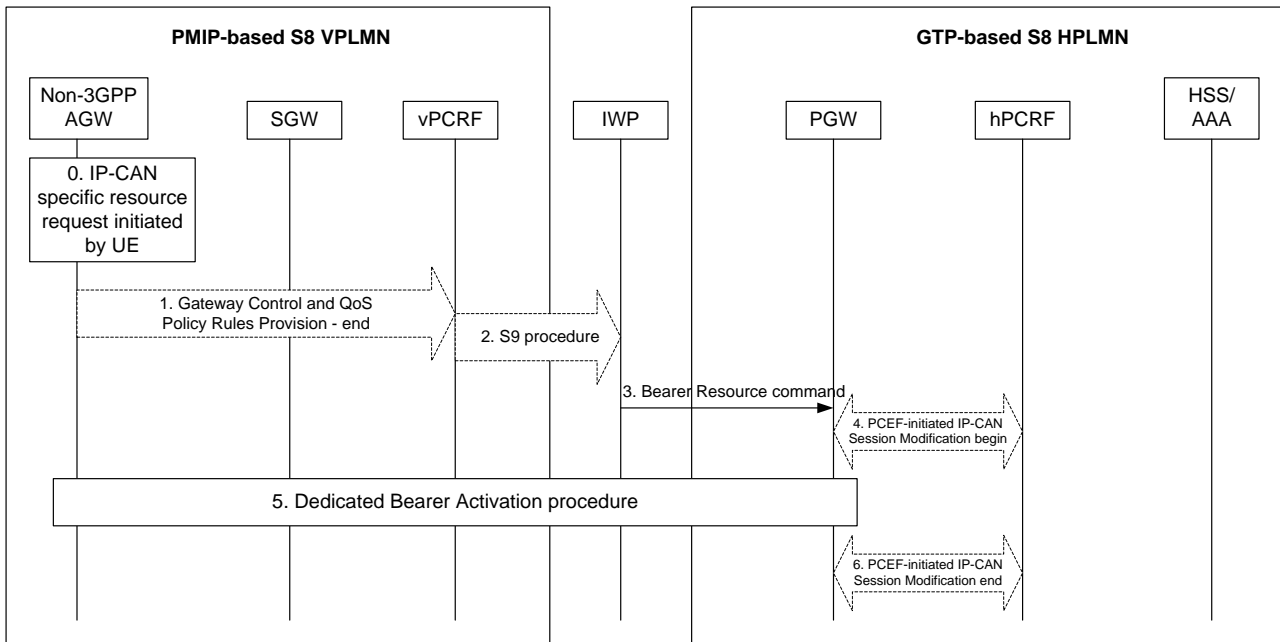
Figure 6.1.3A.3-1 Mapping of UE-initiated Request

0. The trusted non-3GPP IP access receives an IP-CAN specific resource allocation request initiated by the UE.

1. The trusted non-3GPP IP access initiates the Gateway Control and QoS Policy Rules Request Procedure as specified in TS 23.203 [4]. The trusted non-3GPP IP access provides the UE request as an Event Report to the vPCRF.

2. The vPCRF initiates S9 appropriate procedure with IWP

3. Based on the S9 procedure with the vPCRF, the IWP decides to initiate Bearer Resource Command message to the P-GW which is located in the HPLMN.

4. The P-GW starts a PCEF-Initiated IP-CAN Session Modification procedure with the hPCRF.

5. A Dedicated Bearer Activation procedure as described in section 6.1.3.2

6. The P-GW finishes the PCEF-Initiated IP-CAN Session Modification procedure.

6.1.4   P-GW Initiated Bearer Modification

This section applies to the following procedures:

-   PGW Initiated Bearer Modification with Bearer QoS Update

-   PGW Initiated EPS Bearer Modification

6.1.4.1   3GPP access scenario

6.1.4.1.1   PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

The mapping of procedures for this scenario is shown in figure 6.1.4.1.1-1:
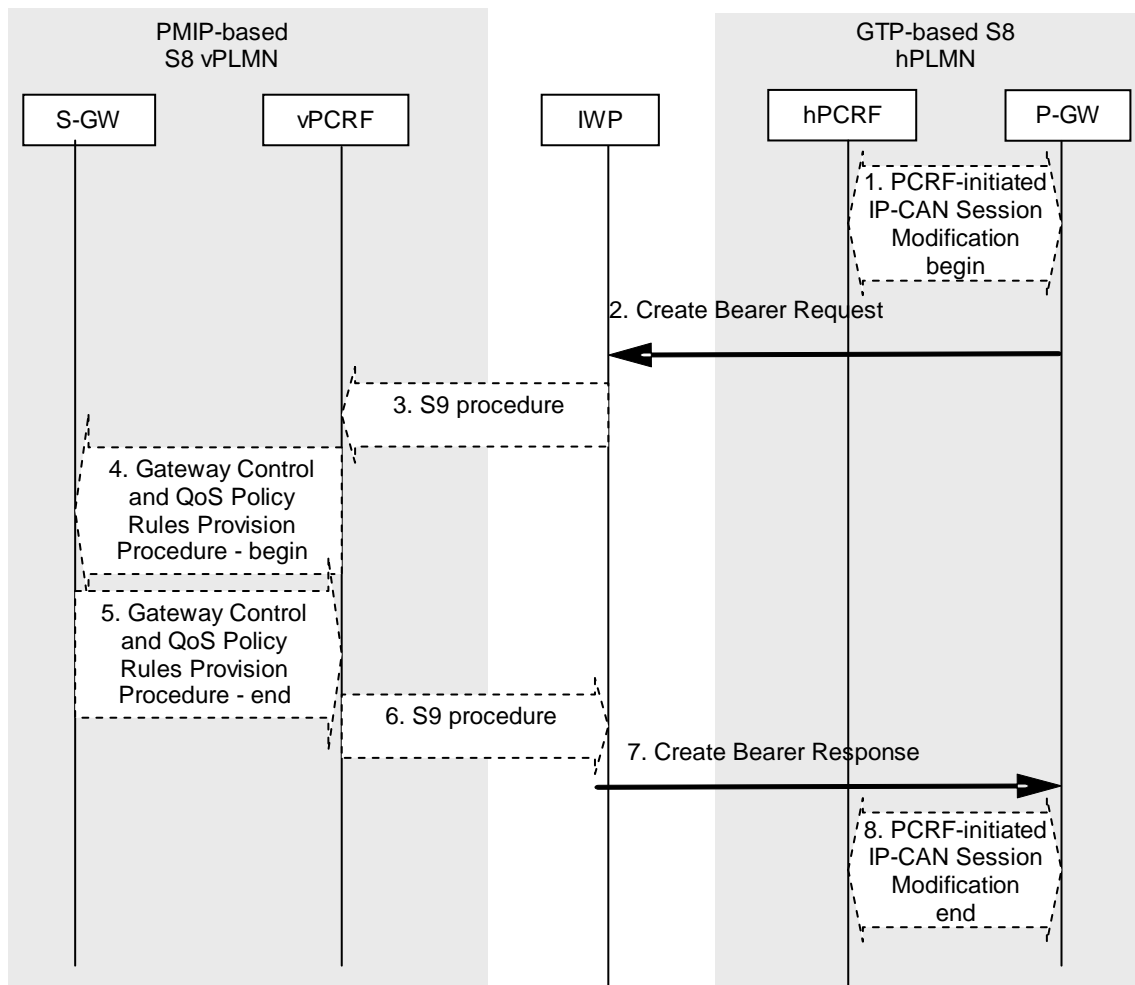
Figure 6.1.4.1.1-1: Mapping of Bearer Modification Procedure for PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

NOTE 1:   The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.

NOTE 2:   The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3:   The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1.   The hPCRF sends a PCC decision provision (QoS policy) message to the P-GW which is located on hPLMN. This corresponds to the initial steps of the PCRF-Initiated IP-CAN Session Modification procedure with P-GW.

NOTE 4:   It is FFS whether further PCC related consideration is needed during step1.

2.   With QoS policies which are result of step1, the P-GW sends Update Bearer Request to the IWP.

3-4. After the IWP receives Update Bearer Request from the P-GW which is located on hPLMN, the IWP decides to initiate S9 procedure which triggers Gateway Control and QoS policy Rules Provision Procedure with QoS policy which is included in step2 between the S-GW which is located on vPLMN through vPCRF.

5-6. After completion of modifying bearer with UE, the S-GW which is located on vPLMN initiates to finish Gateway Control and QoS policy Rules Provision Procedure with vPCRF and vPCRF initiates S9 appropriate procedure with IWP.

7. After the IWP finishes Gateway Control and QoS policy Rules Provision Procedure with vPCRF, the IWP sends Update Bearer Response to the P-GW which is located on hPLMN.

8. The P-GW which is located on hPLMN finishes the IP-CAN Session Modification procedure with hPCRF.

6.1.4.1.2 GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

The mapping of procedures for this scenario is shown in figure 6.1.4.1.2-1:
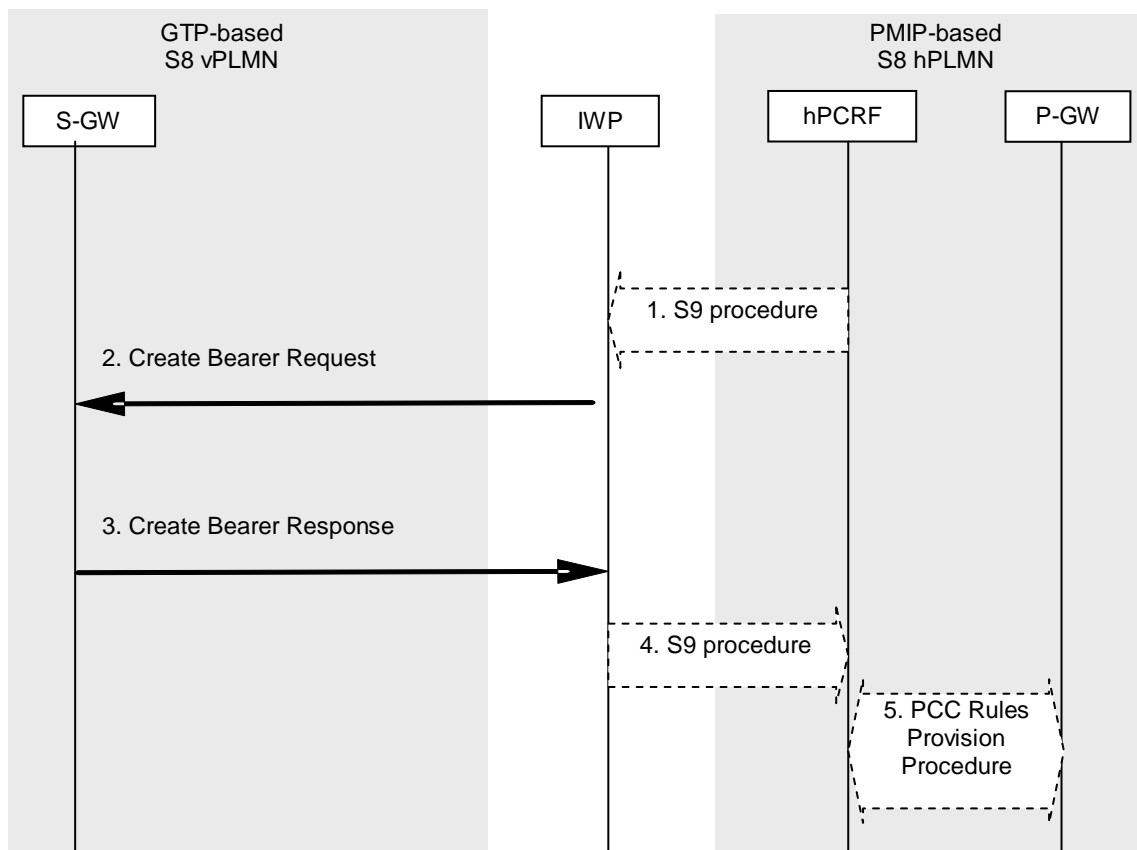
Figure 6.1.4.1.2-1: Mapping of Bearer Modification Procedure for GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

NOTE 1: The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.

NOTE 2: The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3: The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1. The hPCRF initiates S9 procedure which triggers the Gateway Control and QoS Rules Provision Procedure by sending a message with the QoS rules and Event Trigger information to the S-GW which is located on vPLMN.
   NOTE: It is FFS whether further PCC related consideration is needed during step1.

2. The IWP sends Update Bearer Request with QoS policy which is result of step1 to the S-GW which is located on vPLMN.

3. After completion of the modifying bearer with UE, the S-GW which is located on vPLMN sends Update Bearer Response to the IWP.

4. After receives Update Bearer Response, the IWP initiates S9 procedure act as triggered by Gateway Control and QoS Rules Provision Procedure with hPCRF.

5. After step4, hPCRF initiates PCC Rules Provision Procedure between P-GW.

6.1.4.2   non-3GPP access scenario

This clause describes the P-GW Initated Bearer modification in the case of chained PMIP with an IWP. This procedure is only applicable in the case of a Trusted Non-3GPP IP Access.
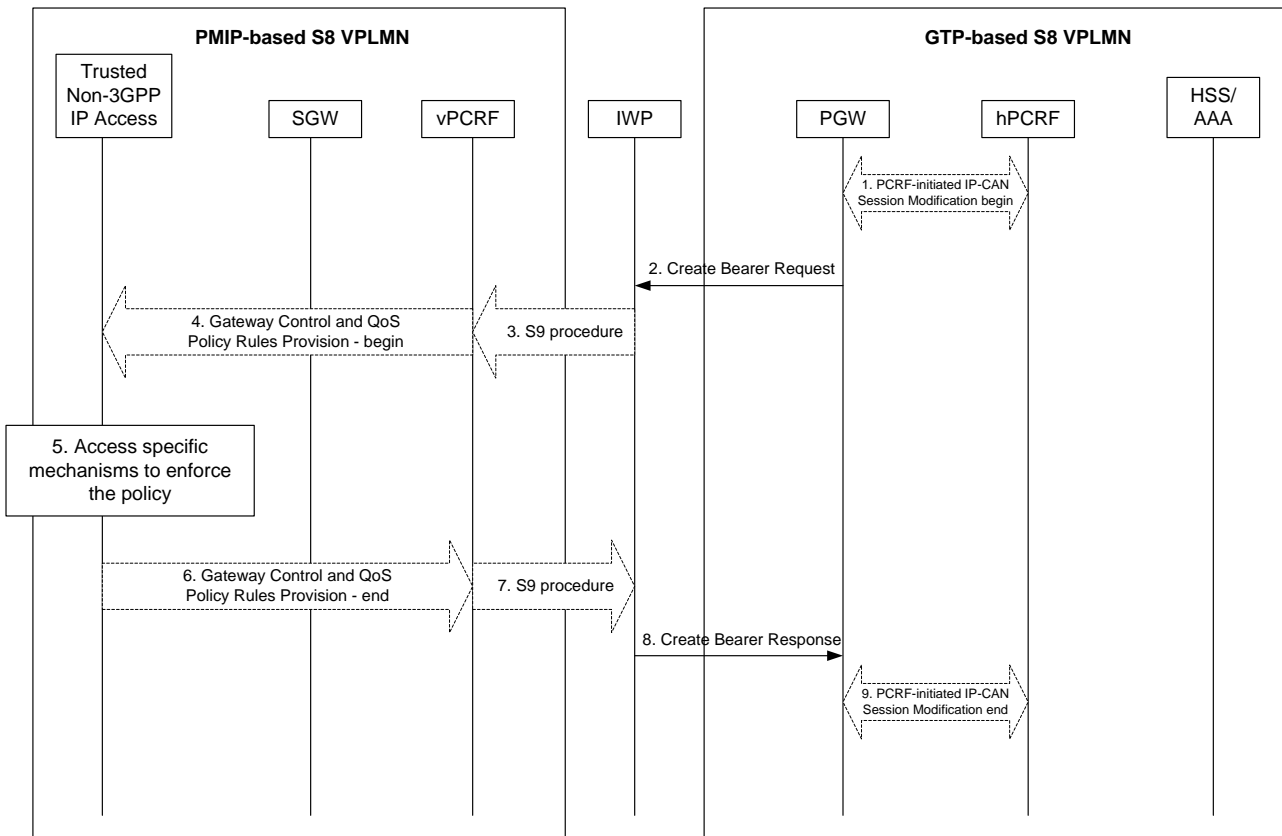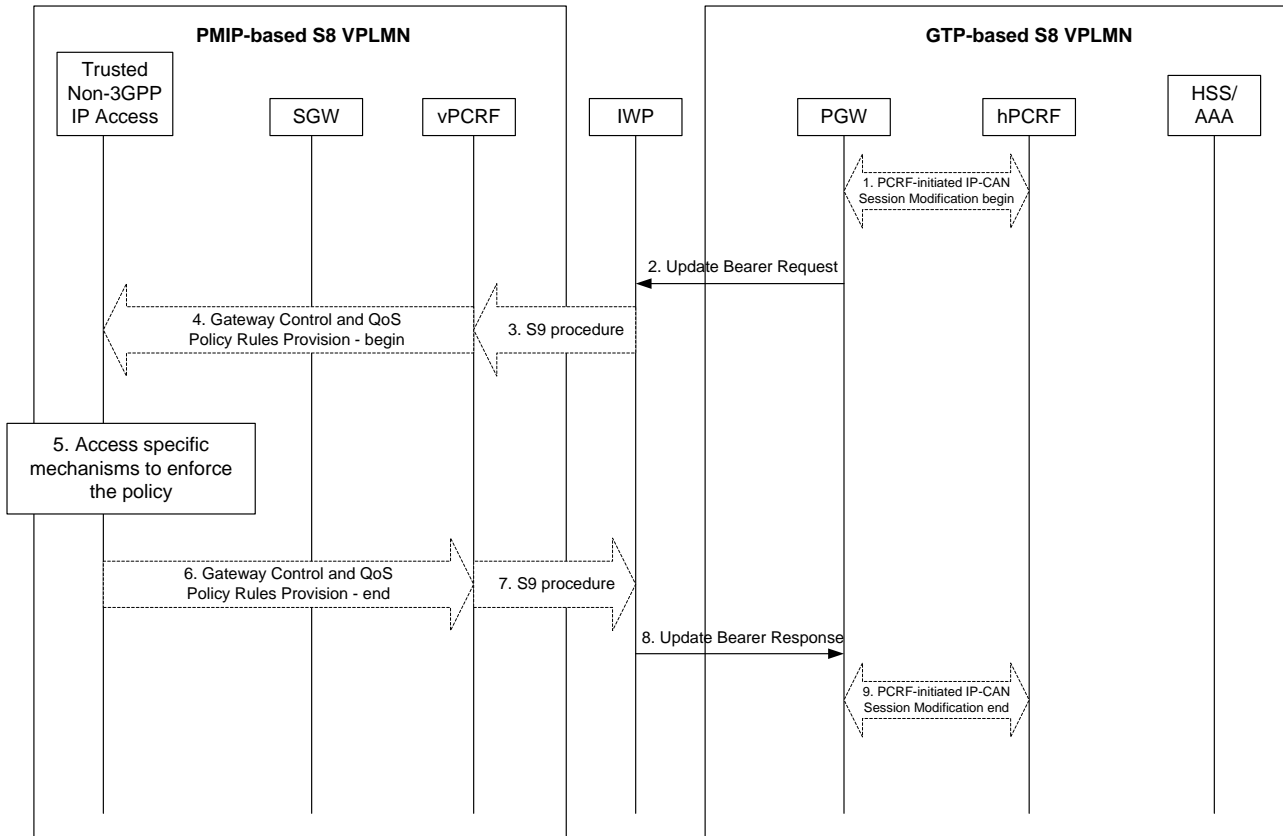

Figure 6.1.4.2-3:

1. If dynamic PCC is deployed, the PCRF sends a PCC decision provision (QoS policy) message to the PDN GW. This corresponds to the initial steps of the PCRF-Initiated IP-CAN Session Modification procedure or to the PCRF response in the PCEF initiated IP-CAN Session Modification procedure as defined in TS 23.203 [4], up to the point that the PDN GW requests IP-CAN Bearer Signalling. If dynamic PCC is not deployed, the PDN GW may apply local QoS policy.

2. The PDN GW uses this QoS policy to determine that the authorized QoS of a service data flow has changed or that a service data flow shall be aggregated to or removed from an active bearer. The PDN GW generates the TFT and updates the EPS Bearer QoS to match the traffic flow aggregate. The PDN GW then sends the Update Bearer Request (PTI, EPS Bearer Identity, EPS Bearer QoS, APN-AMBR, TFT) message to the IWP.

3. The IWP, acting as a hPCRF initiates the Gateway Control and QoS Policy Rules Provision Procedure specified in TS 23.203 [4] by sending a message with the QoS rules and Event Trigger information to the vPCRF in the Trusted non-3GPP access network.

4. The vPCRF sends the corresponding message to the Trusted non-3GPP access network.

5. The Trusted Non-3GPP IP Access enforces the rules provisioned to it, and establish all necessary resources and configuration in the non-3GPP access system, ,for eg. initiate a dedicated bearer activation, modification or deactivation, if supported. The details of this step are out of the scope of this specification.

6. The Trusted Non-3GPP IP Access responds to the vPCRF indicating its ability to enforce the rules provisioned to it

7. The vPCRF sends the corresponding message to the IWP.

8. The IWP acknowledges the bearer modification to the P-GW by sending and Update Bearer Response message.

9. If the Bearer modification procedure was triggered by a PCC Decision Provision message from the hPCRF, the PDN GW indicates to the PCRF whether the requested PCC decision (QoS policy) could be enforced or not by sending a Provision Ack message allowing the completion of the PCRF-Initiated IP-CAN Session Modification procedure or the PCEF initiated IP-CAN Session Modification procedure as defined in TS 23.203 [4], after the completion of IP-CAN bearer signalling.

6.1.4A   Bearer Modification initiated by S-GW

6.1.4A.1   General

This section applies to the following procedures:

- HSS initiated subscribed QoS modification

- UE requested bearer resource modification

- UE-initiated Request and Release procedure for S2a. In this case, the UE-initiated procedure results in a Bearer Modification in the GTP-based HPLMN.

6.1.4A.2   3GPP access scenario

6.1.4A.2.1   HSS initiated subscribed QoS modification

6.1.4A.2.1.1   PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

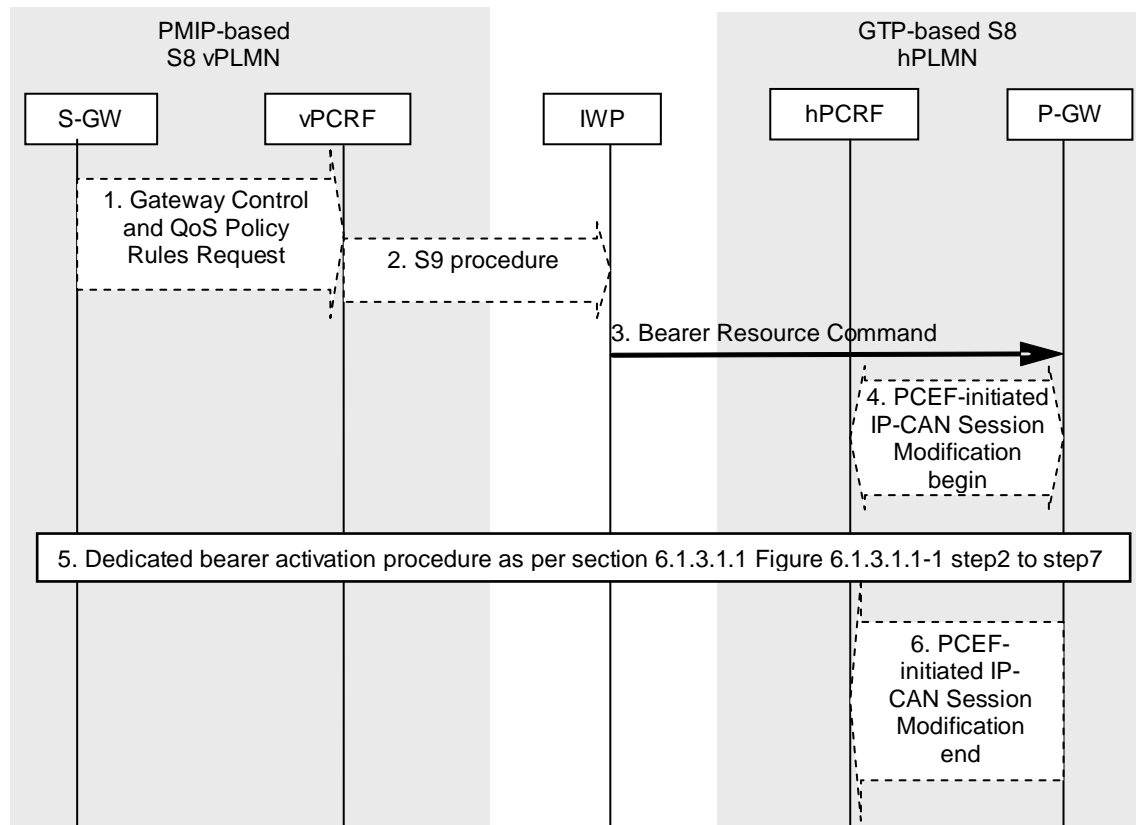The mapping of procedures for this scenario is shown in figure 6.1.4A.2.1.1-1:

Figure 6.1.4A.2.1.1-1: Mapping of S-GW Initiated Bearer Modification Procedure for PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

NOTE 1:   The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.

NOTE 2:   The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3:   The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1. The S-GW which is located on vPLMN initiates Gateway Control and QoS policy Rules Request with vPCRF to request QoS change to the hPCRF as an Event Report.

2. The vPCRF initiates S9 appropriate procedure with IWP.

3. After the IWP finishes S9 procedure which is requesting QoS change to the hPCRF, the IWP decides to initiate Modify Bearer Command message to P-GW which is located on hPLMN.

4. The P-GW sends a PCC decision provision (QoS policy) message to the hPCRF which is located on hPLMN. This corresponds to the initial steps of the PCEF-Initiated IP-CAN Session Modification procedure with P-GW.

5. The steps after step4 are same as section 6.1.4.1.1 figure 6.1.4.1.1-1: step2 to step7.

6. The P-GW which is located on hPLMN finishes the IP-CAN Session Modification procedure with hPCRF.

6.1.4A.2.1.2   GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

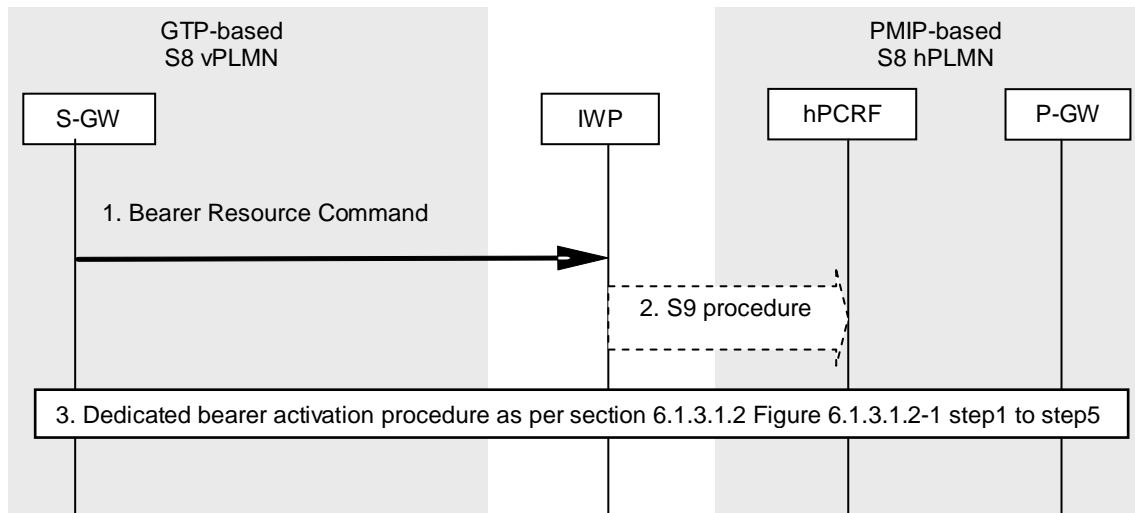The mapping of procedures for this scenario is shown in figure 6.1.4A.2.1.2-1:

Figure 6.1.4A.2.1.2-1: Mapping of S-GW Initiated Bearer Modification Procedure for GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

NOTE 1:   The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.

NOTE 2:   The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3:   The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1.   The S-GW initiates Modify Bearer Request which intends to invoke the Dedicated Bearer Modification Procedure to the IWP.

2.   The IWP initiates S9 procedure with hPCRF act as triggered by Gateway Control and QoS Rules Request from S-GW to request QoS change to the hPCRF as an Event Report.

3.   The steps after step2 are same as section 6.1.4.1.2 figure 6.1.4.1.2-1: step1 to step5.

6.1.4A.2.2   UE requested bearer resource modification

6.1.4A.2.2.1   PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

The mapping of procedures for this scenario is shown in figure 6.1.4A.2.2.1-1:

Figure 6.1.4A.2.2.1-1: Mapping of S-GW Initiated Bearer Modification Procedure for PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

NOTE 1:   The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.
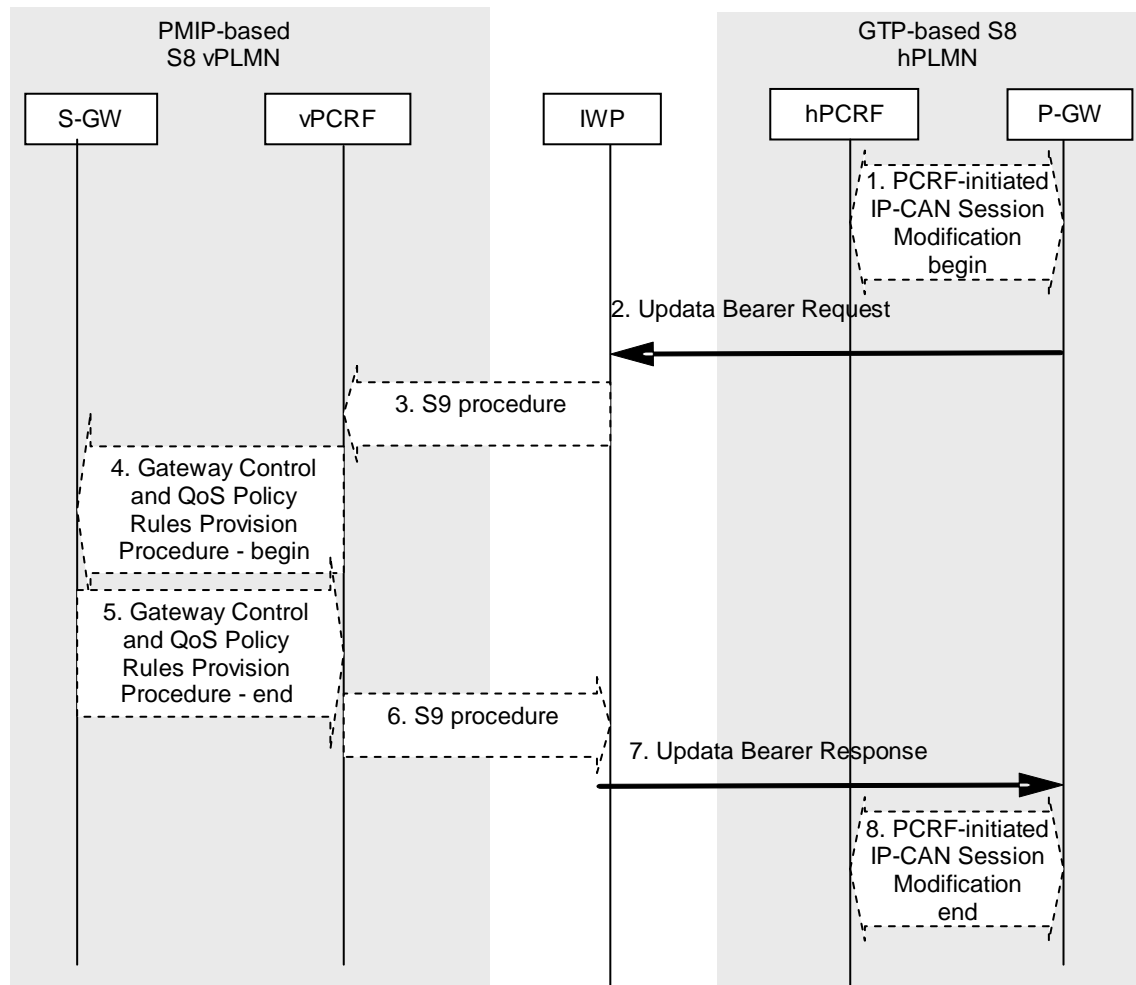
NOTE 2:   The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3:   The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1.   The S-GW which is located on vPLMN initiates Gateway Control and QoS policy Rules Request with vPCRF to request QoS change to the hPCRF as an Event Report.

2.   The vPCRF initiates S9 appropriate procedure with IWP.

3.   After the IWP finishes S9 procedure which is requesting QoS change to the hPCRF, the IWP decides to initiate Bearer Resource Command message to P-GW which is located on hPLMN and allocates the PTI in the Bearer Resource Command message.

4.   The P-GW sends a PCC decision provision (QoS policy) message to the hPCRF which is located on hPLMN. This corresponds to the initial steps of the PCEF-Initiated IP-CAN Session Modification procedure with P-GW.

5.   The steps after step4 are same as section 6.1.4.1.1 figure 6.1.4.1.1-1: step2 to step7.

6.   The P-GW which is located on hPLMN finishes the IP-CAN Session Modification procedure with hPCRF.

6.1.4A.2.2.2   GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

The mapping of procedures for this scenario is shown in figure 6.1.4A.2.2.2-1:

Figure 6.1.4A.2.2.2-1: Mapping of S-GW Initiated Bearer Modification Procedure for GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

NOTE 1: The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.

NOTE 2: The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3: The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1. The S-GW initiates Bearer Resource Request which intends to invoke the Dedicated Bearer Modification Procedure to the IWP.

2. The IWP initiates S9 procedure with hPCRF act as triggered by Gateway Control and QoS Rules Request from S-GW to request QoS change to the hPCRF as an Event Report.

3. The steps after step2 are same as section 6.1.4.1.2 figure 6.1.4.1.2-1: step1 to step5.

6.1.4A.3   Non-3GPP Access Scenario

The mapping of procedures for this scenario is shown in the figure 6.1.4A.3-1.

Note that the whole procedure is initiated by Non-3GPP AGW and not by the S-GW (compared to the 3GPP access case).
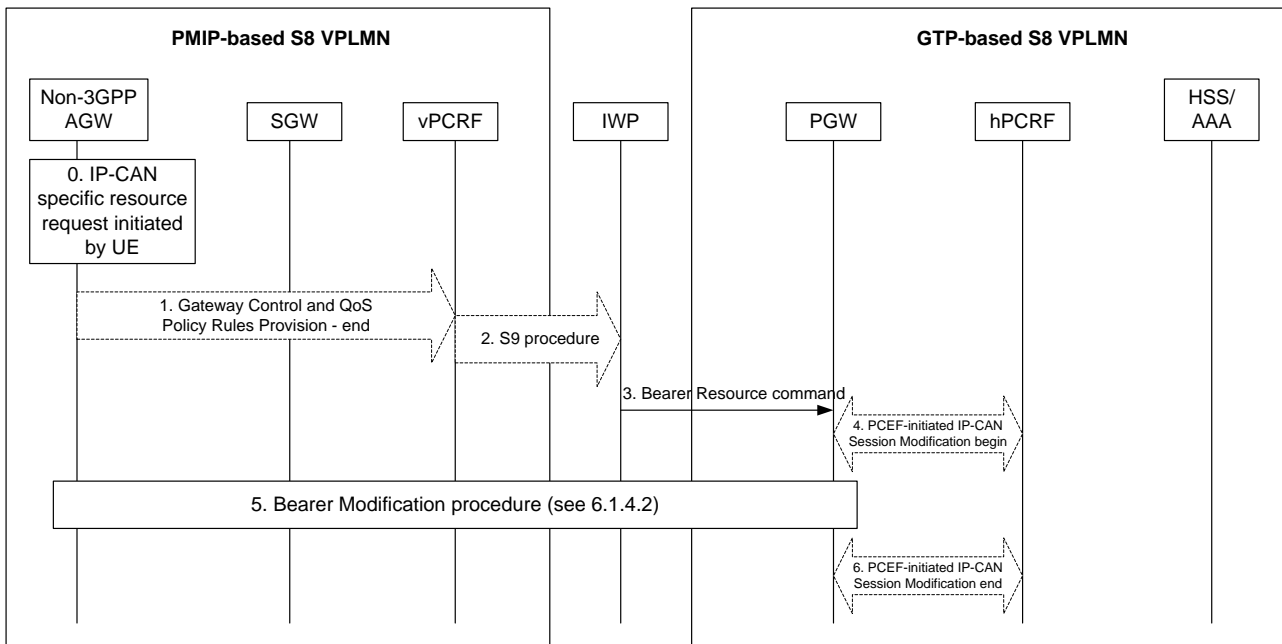
Figure 6.1.4A.3-1 Mapping of UE-initiated Request to Bearer Modification

0. The trusted non-3GPP IP access receives an IP-CAN specific resource allocation request initiated by the UE.

1. The trusted non-3GPP IP access initiates the Gateway Control and QoS Policy Rules Request Procedure as specified in TS 23.203 [4]. The trusted non-3GPP IP access provides the UE request as an Event Report to the vPCRF.

2. The vPCRF initiates S9 appropriate procedure with IWP.

3. Based on the S9 procedure with the vPCRF, the IWP decides to initiate Bearer Resource Command message to the P-GW which is located in the HPLMN.

4. The P-GW starts a PCEF-Initiated IP-CAN Session Modification procedure with the hPCRF.

5. A Bearer Modification procedure as described in section 6.1.4.2

6. The P-GW finishes the PCEF-Initiated IP-CAN Session Modification procedure.

6.1.5   P-GW Initiated Dedicated Bearer Deactivation

6.1.5.1   3GPP access scenario

6.1.5.1.1   PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

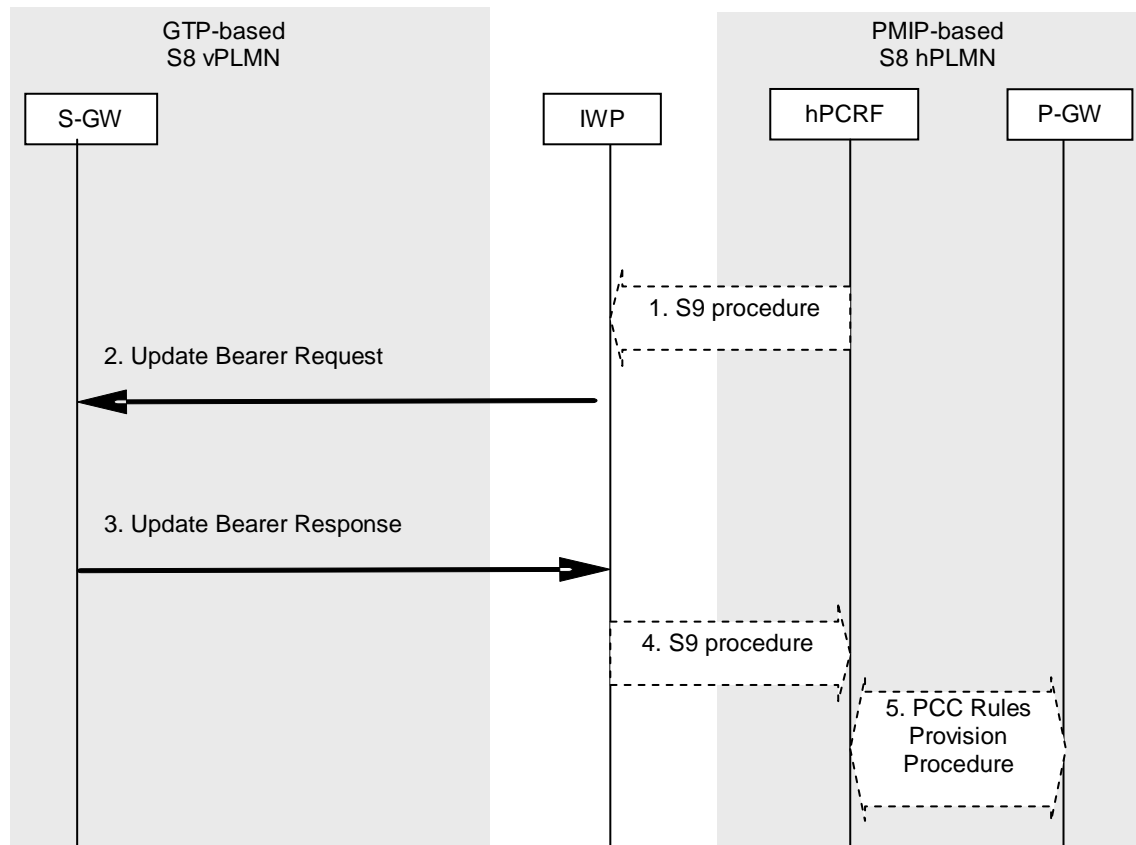The mapping of procedures for this scenario is shown in figure 6.1.5.1.1-1:

Figure 6.1.5.1.1-1: Mapping of Dedicated Bearer Deactivation Procedure for PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

NOTE 1: The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.

NOTE 2: The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3: The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1. The hPCRF sends a PCC decision provision (QoS policy) message to the P-GW which is located on hPLMN. This corresponds to the initial steps of the PCRF-Initiated IP-CAN Session Modification procedure with P-GW.

NOTE 4: It is FFS whether further PCC related consideration is needed during step1.

2. With QoS policies which is result of step1, the P-GW initiates Delete Bearer Request to S-GW.

3-4. After the IWP receives Delete Bearer Request from the P-GW which is located on hPLMN, the IWP decides to initiate S9 procedure which triggers Gateway Control and QoS policy Rules Provision Procedure with QoS policy which is included in step2 between the S-GW which is located on vPLMN through vPCRF.

5-6. After completion of deleting bearer with UE, the S-GW which is located on vPLMN initiates to finish Gateway Control and QoS policy Rules Provision Procedure with vPCRF and vPCRF initiates S9 appropriate procedure with IWP.

7. After the IWP finishes Gateway Control and QoS policy Rules Provision Procedure with vPCRF, the IWP initiates to send Delete Bearer Response to the P-GW which is located on hPLMN.

8. The P-GW which is located on hPLMN finishes the IP-CAN Session Modification procedure with hPCRF.

6.1.5.1.2   GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

The mapping of procedures for this scenario is shown in figure 6.1.5.1.2-1:
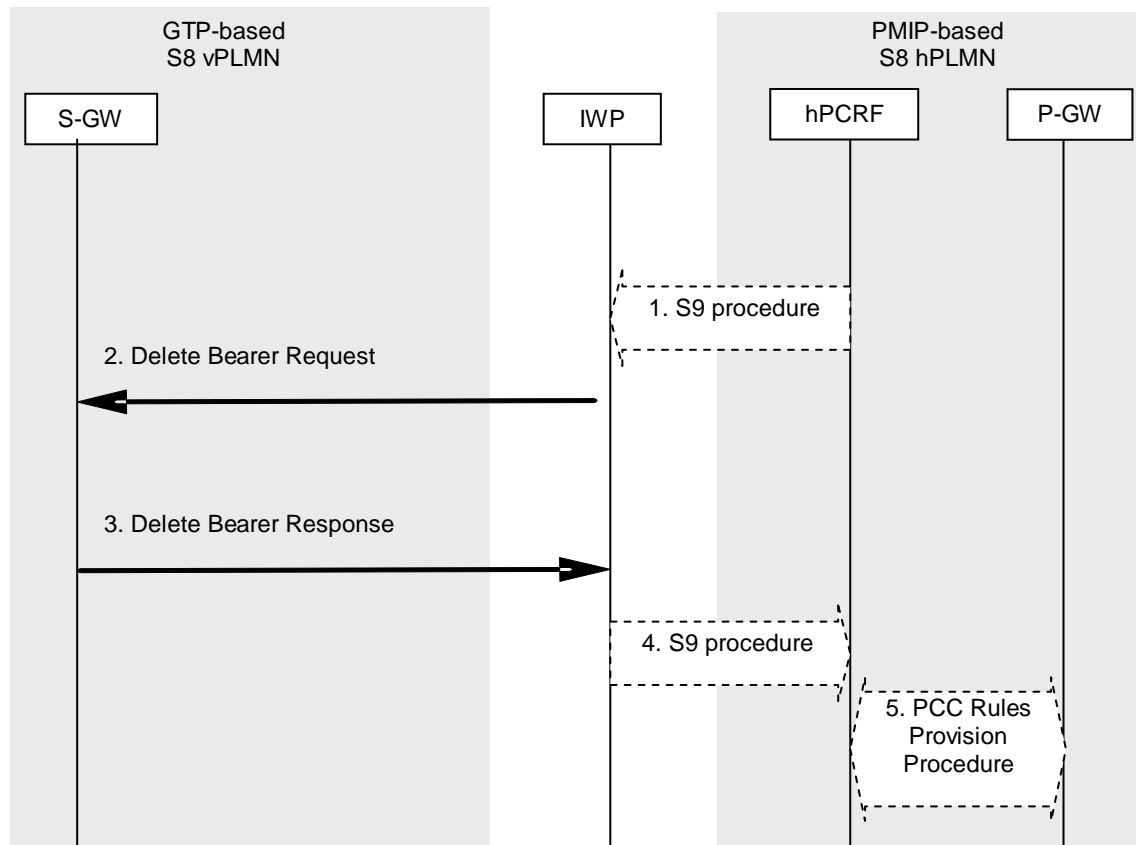
Figure 6.1.5.1.2-1: Mapping of Dedicated Bearer Deactivation Procedure for GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

NOTE 1:   The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.

NOTE 2:   The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3:   The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1. The hPCRF initiates S9 procedure which triggers the Gateway Control and QoS Rules Provision Procedure by sending a message with the QoS rules and Event Trigger information to the S-GW which is located on vPLMN. NOTE: It is FFS whether further PCC related consideration is needed during step1.

2. After the finish of Gateway Control and QoS Rules Provision Procedure with hPCRF, the IWP sends Delete Bearer Request with QoS policy which is result of step1 to the S-GW which is located on vPLMN.

3. After completion of the deleting bearer with UE, the S-GW which is located on vPLMN sends Delete Bearer Response to the IWP.

4. After receives Delete Bearer Response, the IWP initiates to finish the Gateway Control and QoS Rules Provision Procedure with hPCRF.

5. After step4, hPCRF initiates PCC Rules Provision Procedure between P-GW.

6.1.5.2   non-3GPP access scenario

This clause describes the P-GW Initiated Dedicated Bearer Deactivation. This procedure is only applicable in the case of a Trusted Non-3GPP IP Access.
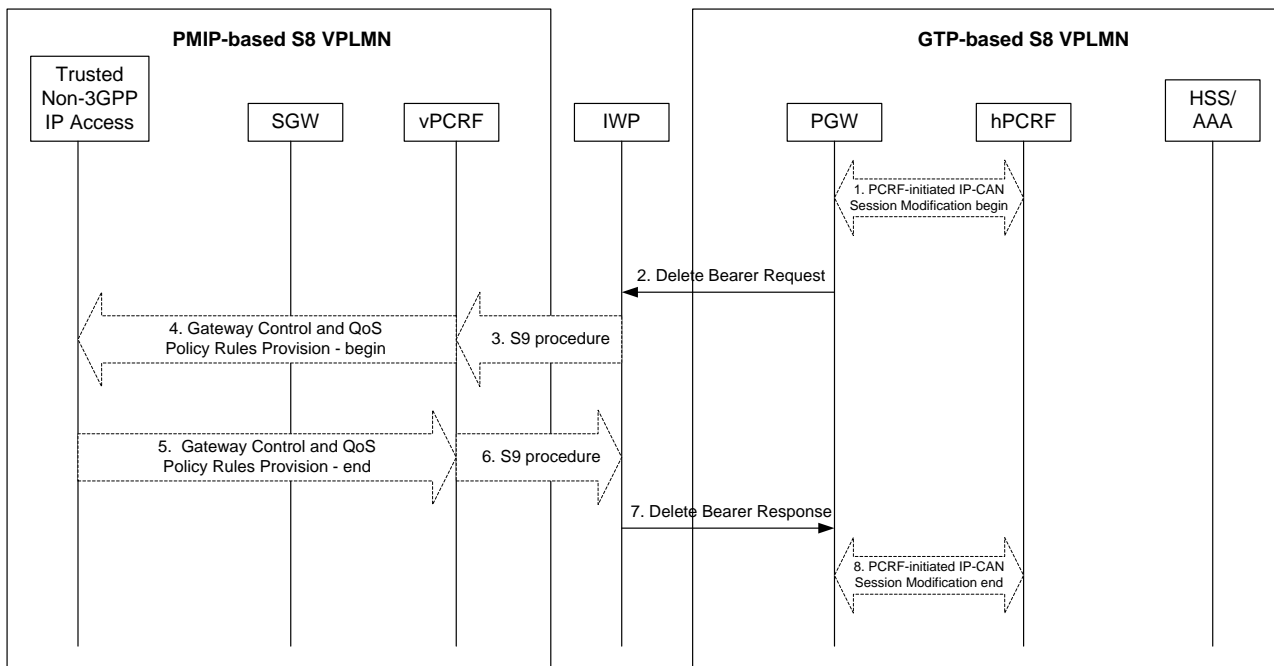
Figure 6.1.5.2-4: non-3GPP access scenario

1. If dynamic PCC is not deployed in the HPLMN, the PDN GW is triggered to initiate the Bearer Deactivation procedure due to e.g. a QoS policy. Optionally, the hPCRF sends QoS policy to the PDN GW. This corresponds to the initial steps of the PCRF-initiated IP-CAN Session Modification procedure or the response to the PCEF initiated IP-CAN Session Modification procedure as defined in TS 23.203 [4], up to the point that the PDN GW requests IP-CAN Bearer Signalling. If dynamic PCC is not deployed, the PDN GW may apply local QoS policy.

2. The PDN GW sends a Delete Bearer Request (PTI, EPS Bearer Identity, Causes) message to the IWP.

3-4. After the IWP receives a Delete Bearer Request from the P-GW, the IWP initiates S9 procedure with the vPCRF. This trigger a Gateway Control and QoS Policy Rules Provision with the Trusted Non-3GPP IP Access.

5-6. The Trusted Non-3GPP IP Access finishes the Gateway Control and QoS Policy Rules Provision   with the vPCRF. The vPCRF sends corresponding message to the IWP.

7. The IWP acknowledges the Bearer deactivation by sending a Delete Bearer Response to the P-GW.

8. The PDN GW deletes the bearer context related to the deactivated EPS bearer. If the dedicated bearer deactivation procedure was triggered by receiving a PCC decision message from the PCRF, the PDN GW indicates to the PCRF whether the requested PCC decision was successfully enforced by completing the PCRF-initiated IP-CAN Session Modification procedure or the PCEF initiated IP-CAN Session Modification procedure as defined in TS 23.203 [4], proceeding after the completion of IP-CAN bearer signalling.

6.1.5A   Dedicated Bearer Deactivation initiated by S-GW

6.1.5A.1   General

This section applies to the following procedures:

- MME Initiated Dedicated Bearer Deactivation

- UE requested bearer resource modification

- UE-initiated Request & Release procedure for S2a. Indeed, the UE-initiated Release results in the deactivation of corresponding bearer.

6.1.5A.2 3GPP access scenario

6.1.5A.2.1 MME Initiated Dedicated Bearer Deactivation

6.1.5A.2.1.1 PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

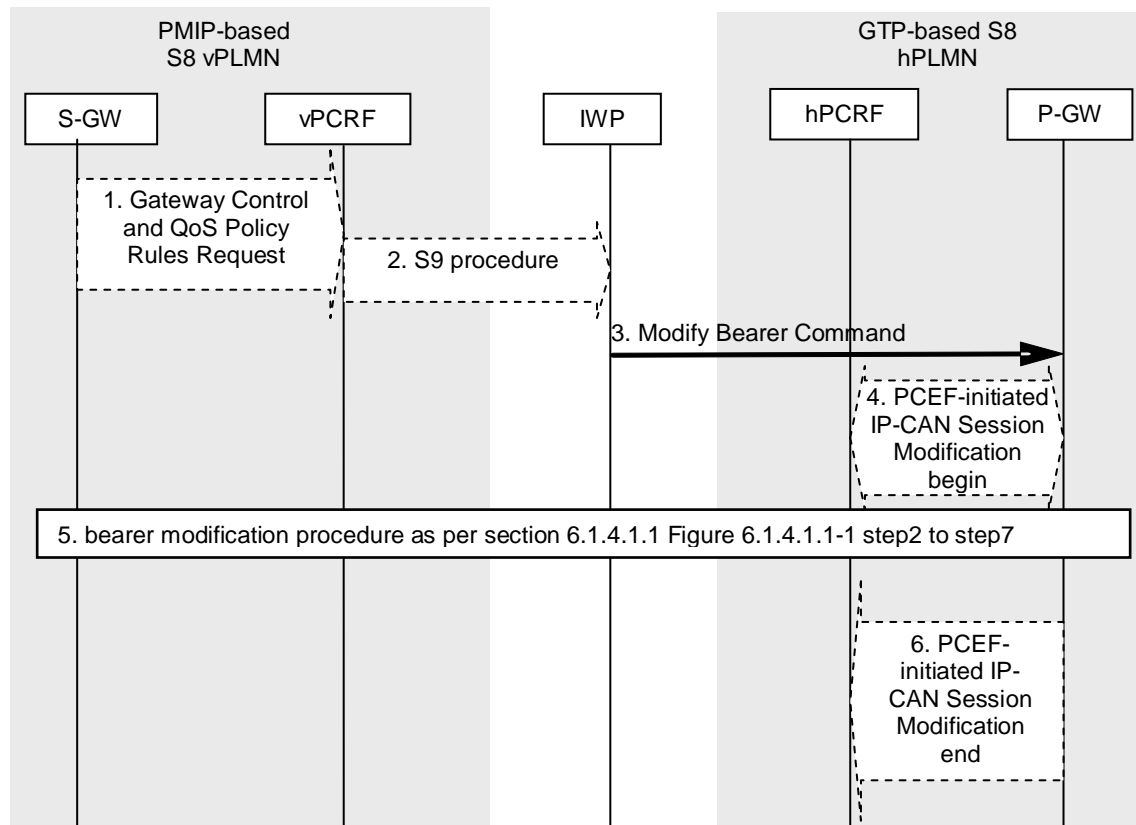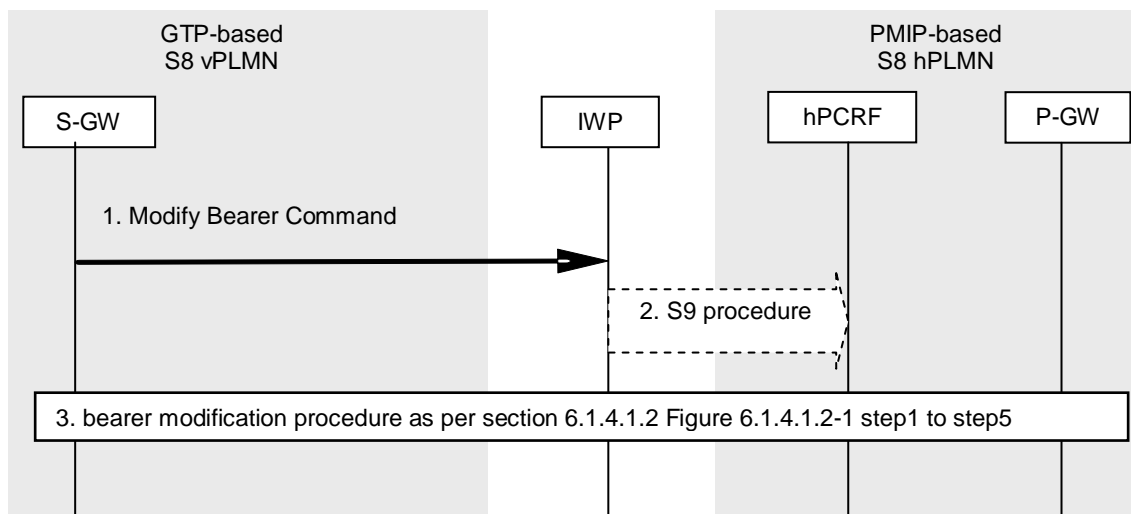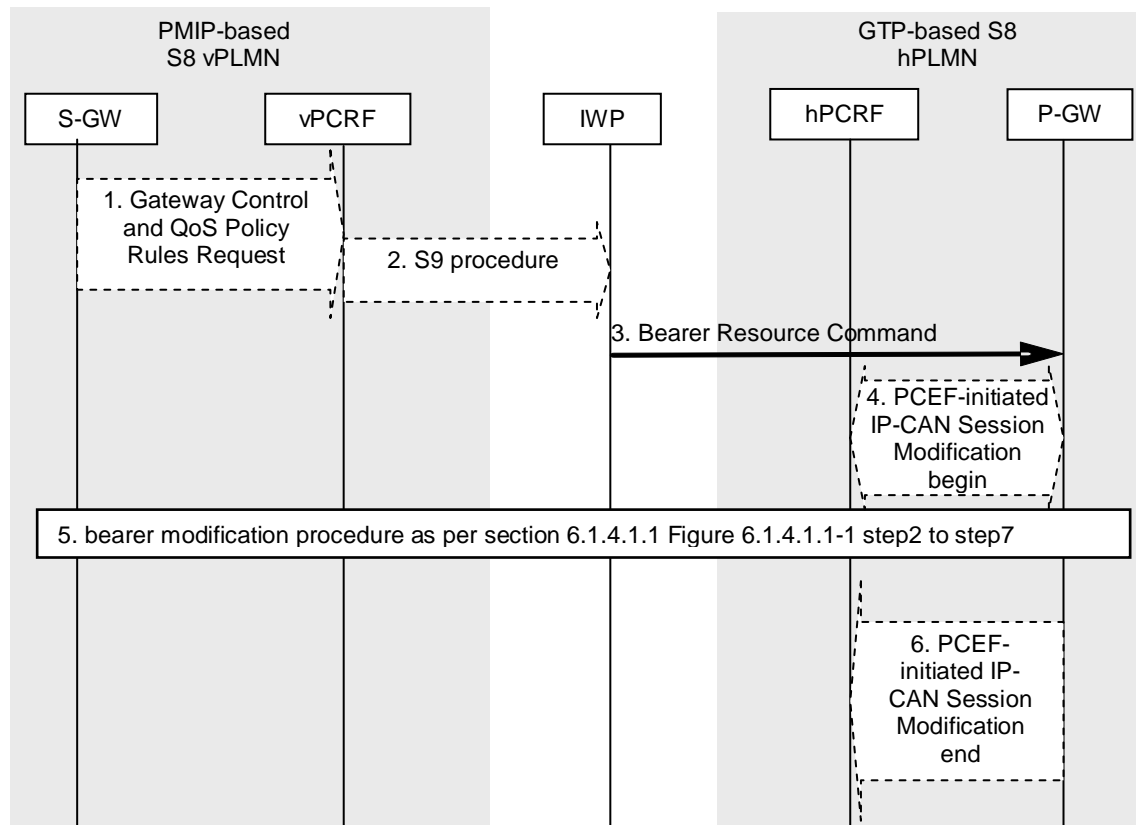The mapping of procedures for this scenario is shown in figure 6.1.5A.2.1.1-1:

Figure 6.1.5A.2.1.1-1: Mapping of S-GW Initiated Bearer Deactivation Procedure for PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

NOTE 1: The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.

NOTE 2: The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3: The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1. The S-GW which is located on vPLMN initiates Gateway Control and QoS policy Rules Request with vPCRF to request QoS change to the hPCRF as an Event Report.

2. The vPCRF initiates S9 appropriate procedure with IWP.

3. After the IWP finishes S9 procedure which is requesting QoS change to the hPCRF, the IWP decides to initiate Delete Bearer Command message to P-GW which is located on hPLMN.

4. The P-GW sends a PCC decision provision (QoS policy) message to the hPCRF which is located on hPLMN. This corresponds to the initial steps of the PCEF-Initiated IP-CAN Session Modification procedure with P-GW.

5. The steps after step3 are same as section 6.1.5.1.1 figure 6.1.5.1.1-1: step2 to step7.

6. The P-GW which is located on hPLMN finishes the IP-CAN Session Modification procedure with hPCRF.

6.1.5A.2.1.2 GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

The mapping of procedures for this scenario is shown in figure 6.1.5A.2.1.2-1:
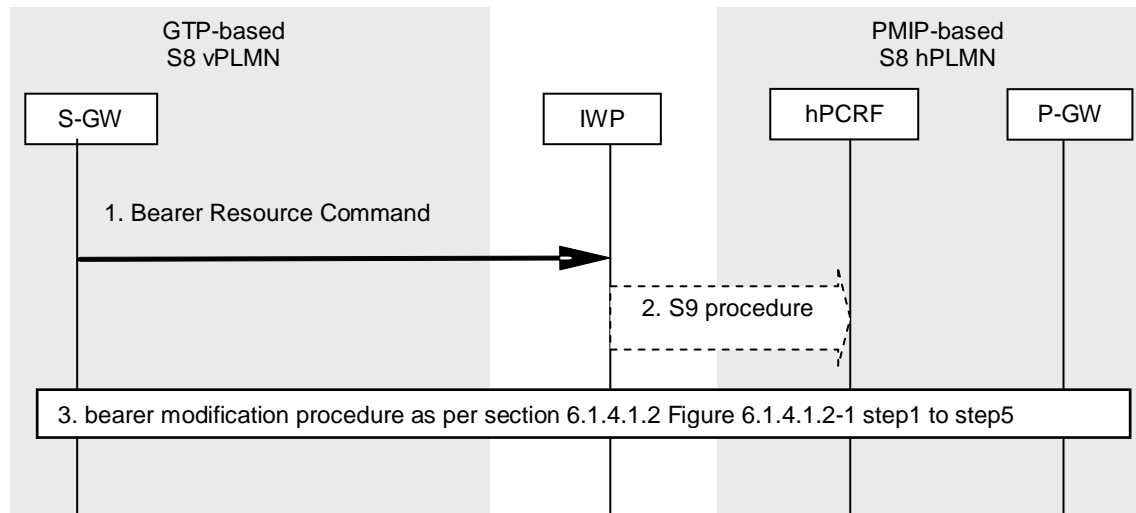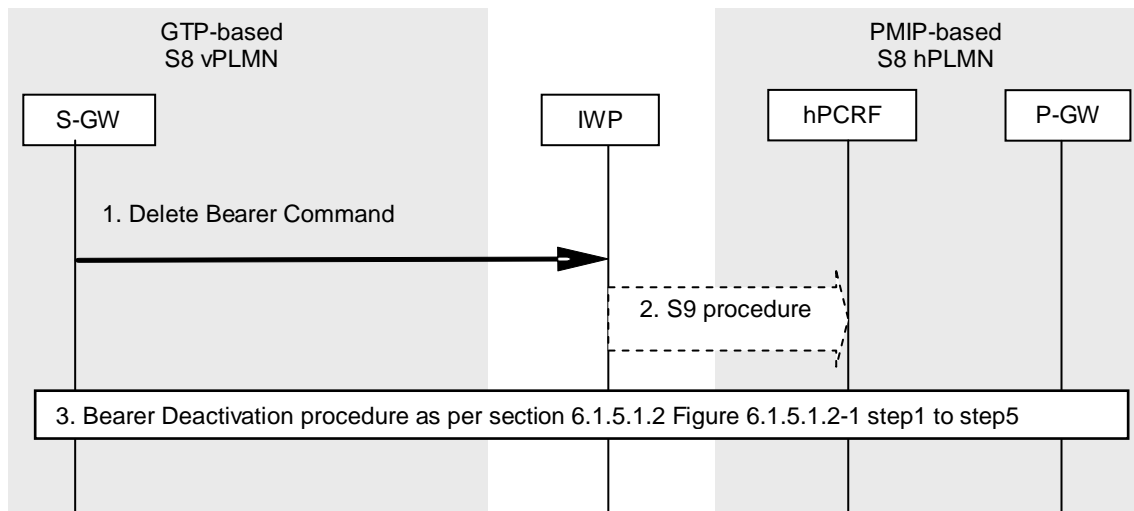

Figure 6.1.5A.2.1.2-1: Mapping of S-GW Initiated Bearer Deactivation Procedure for GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

NOTE 1: The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.

NOTE 2: The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3: The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1. The S-GW initiates Delete Bearer Command which intends to invoke the Dedicated Bearer Deactivation Procedure to the IWP.

2. The IWP initiates S9 procedure with hPCRF act as triggered by Gateway Control and QoS Rules Request from S-GW to request QoS change to the hPCRF as an Event Report.

3. The steps after step2 are same as section 6.1.5.1.2 figure 6.1.5.1.2-1: step1 to step5.

6.1.5A.2.2 UE requested bearer resource modification

6.1.5A.2.2.1 PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

The mapping of procedures for this scenario is shown in figure 6.1.5A.2.2.1-1:
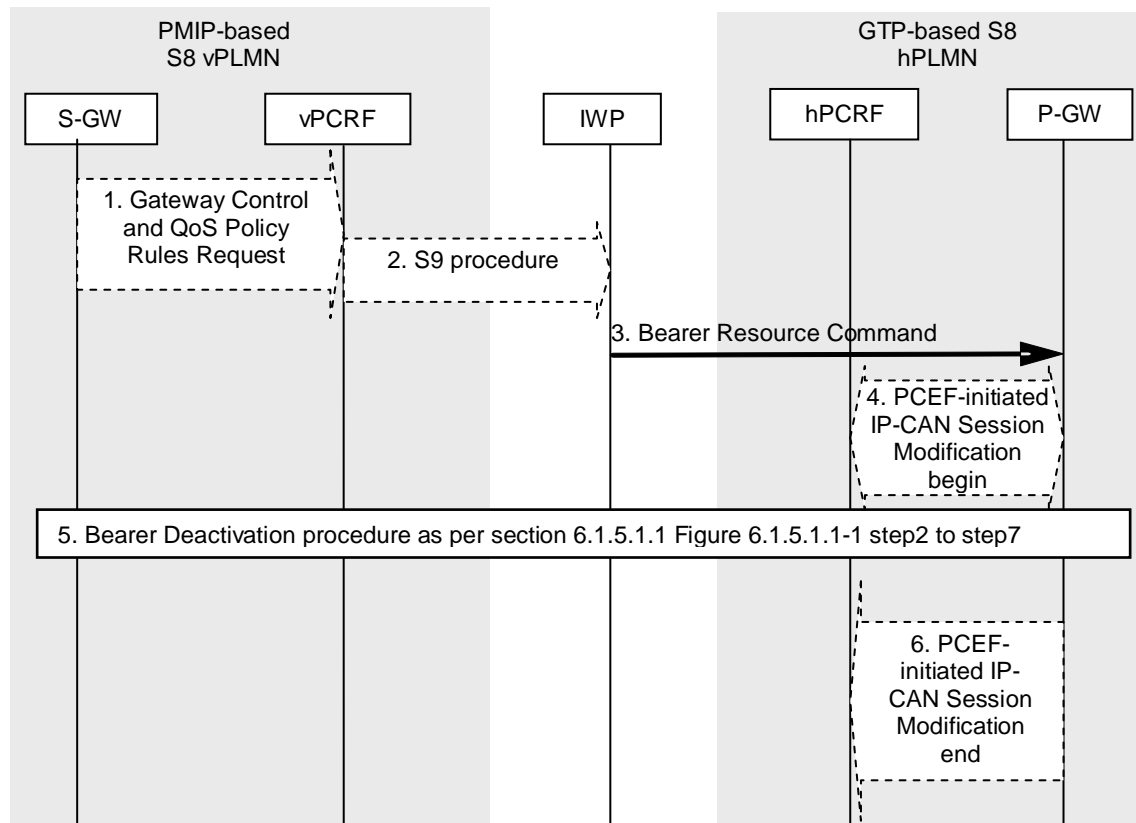
Figure 6.1.5A.2.2.1-1: Mapping of S-GW Initiated Bearer Deactivation Procedure for PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

NOTE 1: The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.

NOTE 2: The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3: The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1. The S-GW which is located on vPLMN initiates Gateway Control and QoS policy Rules Request with vPCRF to request QoS change to the hPCRF as an Event Report.

2. The vPCRF initiates S9 appropriate procedure with IWP.

3. After the IWP finishes S9 procedure which is requesting QoS change to the hPCRF, the IWP decides to initiate Bearer Resource Command message to P-GW which is located on hPLMN and allocates the PTI in the Bearer Resource Command message.

4. The P-GW sends a PCC decision provision (QoS policy) message to the hPCRF which is located on hPLMN. This corresponds to the initial steps of the PCEF-Initiated IP-CAN Session Modification procedure with P-GW.

5. The steps after step3 are same as section 6.1.5.1.1 figure 6.1.5.1.1-1: step2 to step7.

6. The P-GW which is located on hPLMN finishes the IP-CAN Session Modification procedure with hPCRF.

6.1.5A.2.2.2 GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

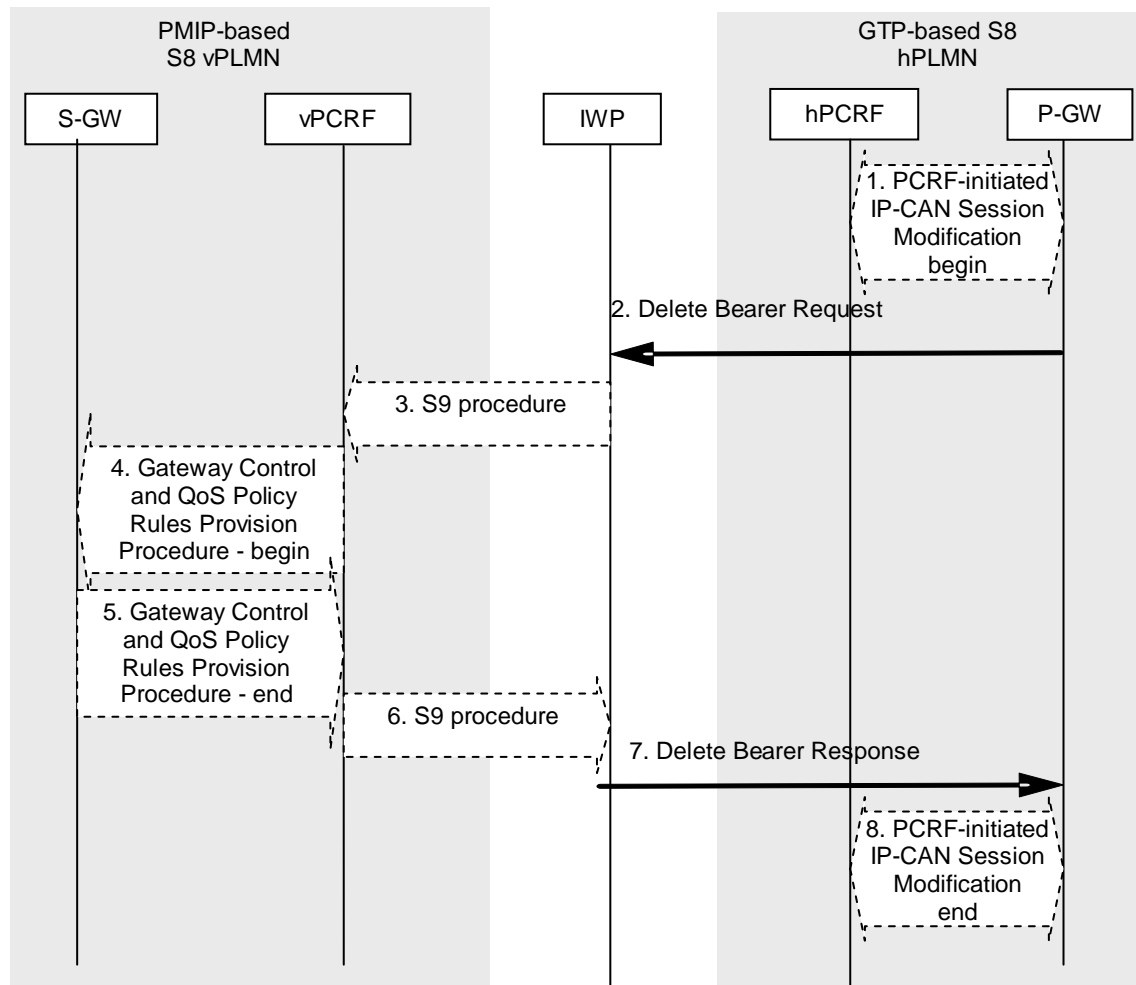The mapping of procedures for this scenario is shown in figure 6.1.5A.2.2.2-1:
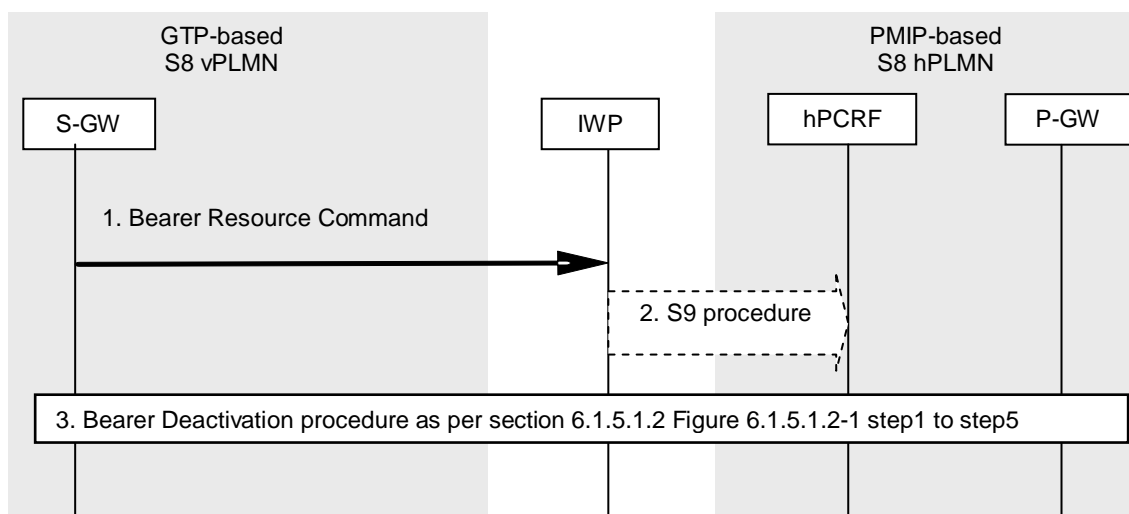
Figure 6.1.5A.2.2.2-1: Mapping of S-GW Initiated Bearer Deactivation Procedure for GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

NOTE 1: The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401 [3], TS23.402 [2] and TS23.203 [4], and are not shown in this clause.

NOTE 2: The details of PCC related procedures are described in 3GPP TS23.203 [4], 3GPP TS29.212 [5] and 3GPP TS29.215 [6].

NOTE 3: The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

1. The S-GW initiates Bearer Resource Request which intends to invoke the Dedicated Bearer Deactivation Procedure to the IWP.

2. The IWP initiates S9 procedure with hPCRF act as triggered by Gateway Control and QoS Rules Request from S-GW to request QoS change to the hPCRF as an Event Report.

3. The steps after step2 are same as section 6.1.5.1.2 figure 6.1.5.1.2-1: step1 to step5.

6.1.5A.3 Non-3GPP Access Scenario

As explained in the section 6.1.5A.1, the UE-initiated release procedure for S2a can result in the deactivation of the corresponding bearer in the GTP-based HPLMN. This is illustrated by the figure 6.1.5A.3-1.

Note that the whole procedure is initiated by Non-3GPP AGW and not by the S-GW (compared to the 3GPP access case).
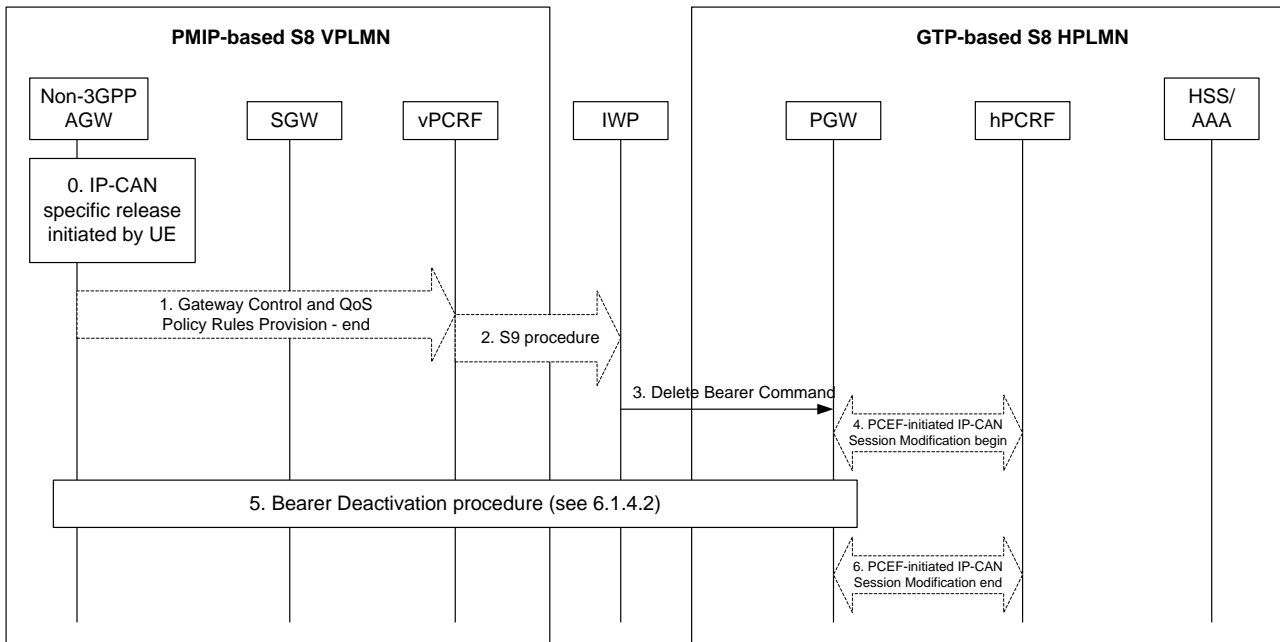
Figure 6.1.5A.3-1 Mapping of UE-initiated Request Release to Bearer Deactivation

0. The trusted non-3GPP IP access receives an IP-CAN specific resource release request initiated by the UE.

1. The trusted non-3GPP IP access initiates the Gateway Control and QoS Policy Rules Request Procedure as specified in TS 23.203 [4]. The trusted non-3GPP IP access provides the UE request as an Event Report to the vPCRF.

2. The vPCRF initiates S9 appropriate procedure with IWP

3. Based on the S9 procedure with the vPCRF, the IWP decides to send a Delete Bearer Command message to the P-GW which is located in the HPLMN.

4. The P-GW starts a PCEF-Initiated IP-CAN Session Modification procedure with the hPCRF.

5. A Bearer Deactivation procedure as described in section 6.1.5.2

6. The P-GW finishes the PCEF-Initiated IP-CAN Session Modification procedure.

6.1.6 Location Management and Handover Procedures

6.1.6.1 General

The IWP needs to successfully complete any parallel PMIP and PCC signalling exchange before continuing with the next step on the GTP side.

6.1.6.2 3GPP access scenario

6.1.6.2.0 General

This section applies to location management procedures including TAU/RAU, intra-3GPP handover and other procedures where Modify Bearer messages may be sent between S-GW and P-GW.

This section applies to the following procedures:

- Tracking Area Update procedure

  - Gn/Gp SGSN to MME Tracking Area Update

- Routeing Area Update with MME interaction

- Gn/Gp SGSN to S4 SGSN Routing Area Update

- Inter SGSN Routeing Area Update Procedure and Combined Inter SGSN RA / LA Update to S4 SGSNs

- Combined RA / LA Update in the Case of Inter SGSN RA Update Procedure

- Iu mode RA Update Procedure

- Inter RAT handover

  - E-UTRAN to UTRAN Iu mode Inter RAT handover

  - E-UTRAN to GERAN A/Gb mode Inter RAT handover

- Intra RAT handover

  - X2 based handover

  - S1 based handover

  - Serving RNS Relocation Procedure

    - Combined Hard Handover and SRNS Relocation Procedure

    - Combined Cell / URA Update and SRNS Relocation Procedure

    - Enhanced Serving RNS Relocation

- Intersystem Change

  - Iu mode to A/Gb mode Intra SGSN Change

  - A/Gb mode to Iu mode Intra SGSN Change

  - Iu mode to A/Gb mode Inter-SGSN Change

  - A/Gb mode to Iu mode Inter-SGSN Change

- Paging Response with no established user plane on S4

6.1.6.2.1   Location Management and Handover Procedures with Serving GW Relocation

6.1.6.2.1.1   PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

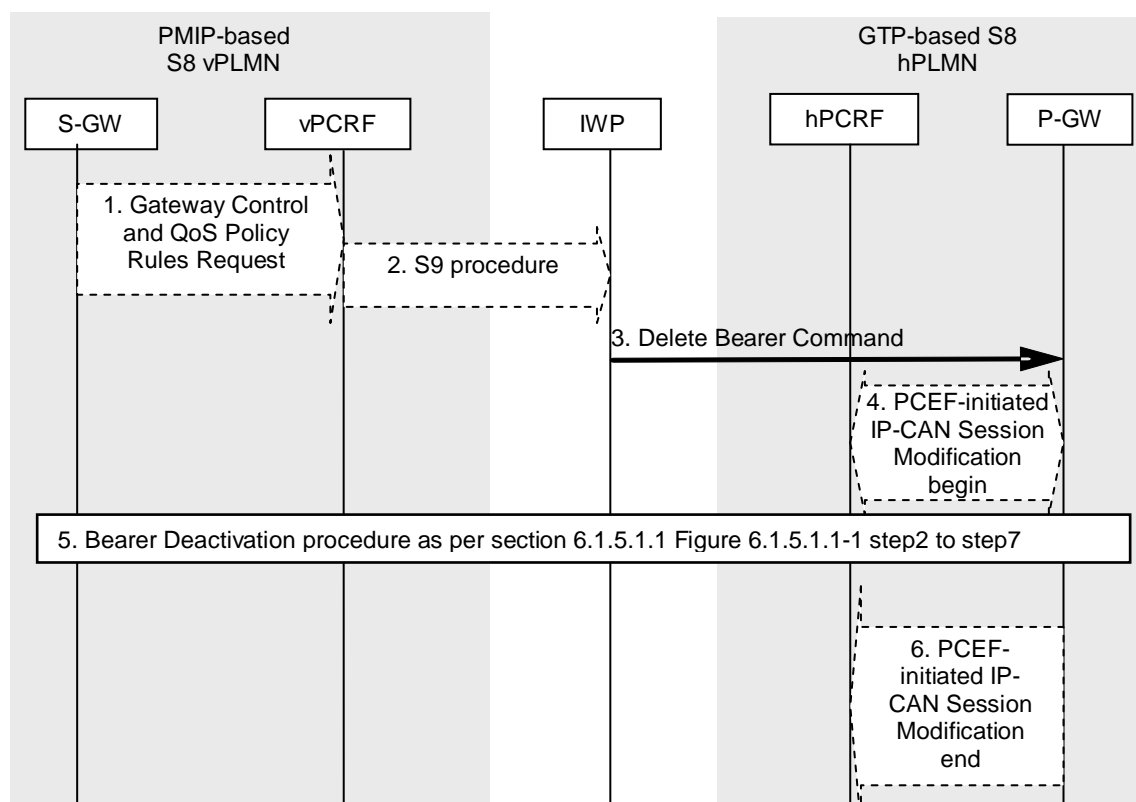The mapping of procedures for this scenario is shown in figure 6.1.6.2.1.1-1:

Figure 6.1.6.2.1.1-1: Mapping of Location Management and Handover Procedures with Serving GW Relocation for PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

NOTE1: The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and hPCRF are described in 3GPP TS 23.401[3], TS 23.402 [2] and TS 23.203[4], and are not shown in this clause.

NOTE2: The details of PCC related procedures are described in 3GPP TS 23.203[4], 3GPP TS 29.212[5] and 3GPP TS 29.215[6].

NOTE3: The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

The optional interaction steps between the gateways and the PCRF in the procedures in Figure 6.1.6.2.1.1-1 only occur if dynamic policy provisioning is deployed. Otherwise policy may be statically configured with the gateway.

1. The new S-GW which is located on vPLMN initiates Gateway Control Session Establishment Procedures as specified in TS 23.203 [4], in order to communicate with hPCRF through vPCRF with S9 appropriate procedure. As part of the procedure the Serving GW informs the PCRF of the new RAT type. The PCRF sends information to the Serving GW enabling bearer binding and other behavior.

NOTE4: It is FFS whether further PCC related consideration is needed during step1.

2. The new S-GW which is located on vPLMN intends to send Proxy Binding Update to the P-GW which is located on hPLMN. That results the new S-GW sending the message to the IWP. The IWP address itself is already sent to the new S-GW before the step1 by MME.

3. If the RAT type has changed or the User Location Information IE is received, the IWP informs the P-GW about the change by sending Modify Bearer Request to the P-GW which is located on hPLMN.

NOTE5: IWP should complete the step1 and step2 to precede this step.

4. If dynamic PCC is deployed, and RAT type information needs to be conveyed from the PDN GW to the PCRF, then the PDN GW shall send RAT type information to the PCRF by means of an IP CAN Session Modification procedure as defined in TS 23.203 [4].

5. The P-GW sends Modify Bearer Response to the IWP.

6. The IWP sends Proxy Binding Ack to the new S-GW.

7. The old S-GW initiates the Gateway Control Session Termination Procedure with the PCRF as specified in TS 23.203 [4]. The old S-GW ceases to perform Bearer Binding and associated policy controlled functions.

NOTE6: Step 7 occurs when the old S-GW receives a Delete Session Request message from the MME as specified in TS 23.401 [3], TS 23.402 [2].

6.1.6.2.1.2 GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

The mapping of procedures for this scenario is shown in figure 6.1.6.2.1.2-1:
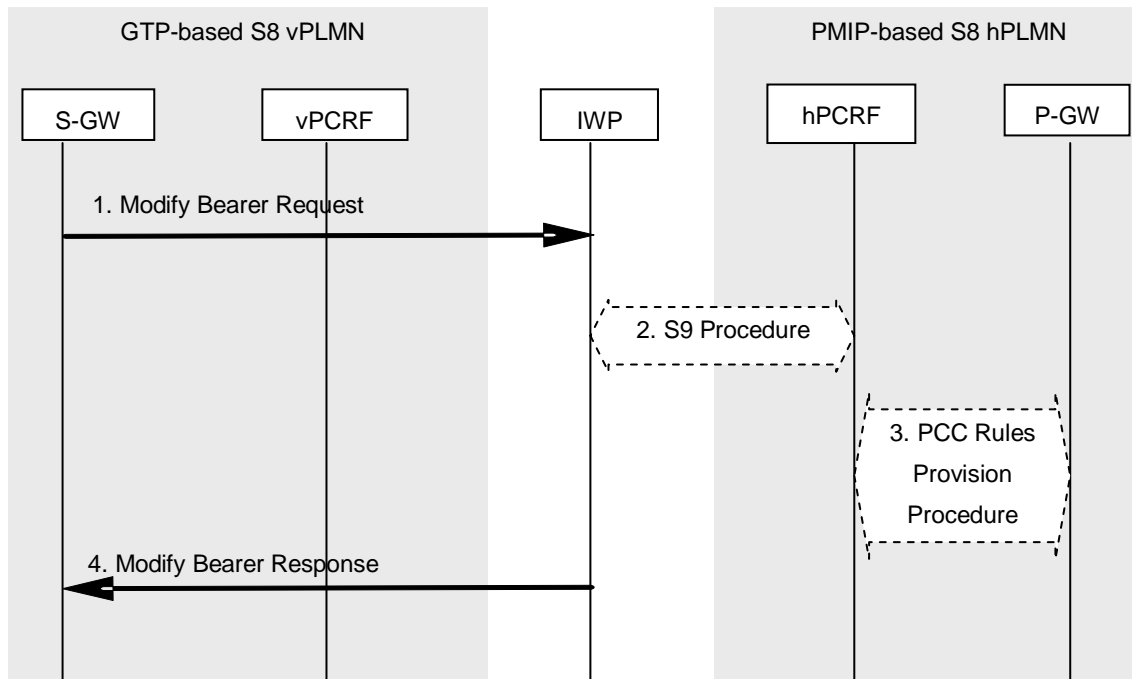
**Figure 6.1.6.2.1.2-1: Mapping of Location Management and Handover Procedures with Serving GW Relocation for GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario**

NOTE1: The details of procedures before step 1 and after step 6 for vPLMN and hPLMN are described in 3GPP TS 23.401 [3], TS 23.402 [2] and TS 23.203 [4].

NOTE2: The details of PCC related procedures are described in 3GPP TS 23.203 [4], 3GPP TS 29.212 [5] and 3GPP TS 29.215 [6].

NOTE3: The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

The optional interaction steps between the gateways and the PCRF in the procedures in Figure 6.1.6.2.1.2-1 only occur if dynamic policy provisioning is deployed. Otherwise policy may be statically configured with the gateway.

1. The S-GW which is located on vPLMN intends to send Modify Bearer Request to P-GW which is located on hPLMN via GTP-based S8 interface based on the condition described in 3GPP TS 23.401 [3]. The IWP address itself is already sent to S-GW before the step 1 by MME in 3GPP access case. That results the S-GW sending the message to IWP. This step may inform the change of for example for S-GW relocation or the RAT type that e.g. can be used for charging.

2. After receiving Modify Bearer Request, the IWP initiates S9 appropriate procedure acting as triggered by Gateway Control Session Establishment which is initiated by S-GW to align with the procedures described in 3GPP TS 23.402 [2] between hPCRF via S9 interface.

3. The PCRF sends an updated policy to the P-GW by initiating the Policy and Charging Rules Provision Procedure as specified in TS 23.203 [4] if the PCC rules have changed based on the RAT type reported in step 2. Further, the hPCRF notifies the PDN GW of the change in RAT and the UE Location Information IE (if this has been received from the MME preceding step 1).

4. The IWP sends Modify Bearer Response to the S-GW with the results of step5.

6.1.6.2.2 Location Management and Handover Procedures without Serving GW Relocation

6.1.6.2.2.1 PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

The mapping of procedures for this scenario without S-GW relocation is shown in figure 6.1.6.2.2.1-1:
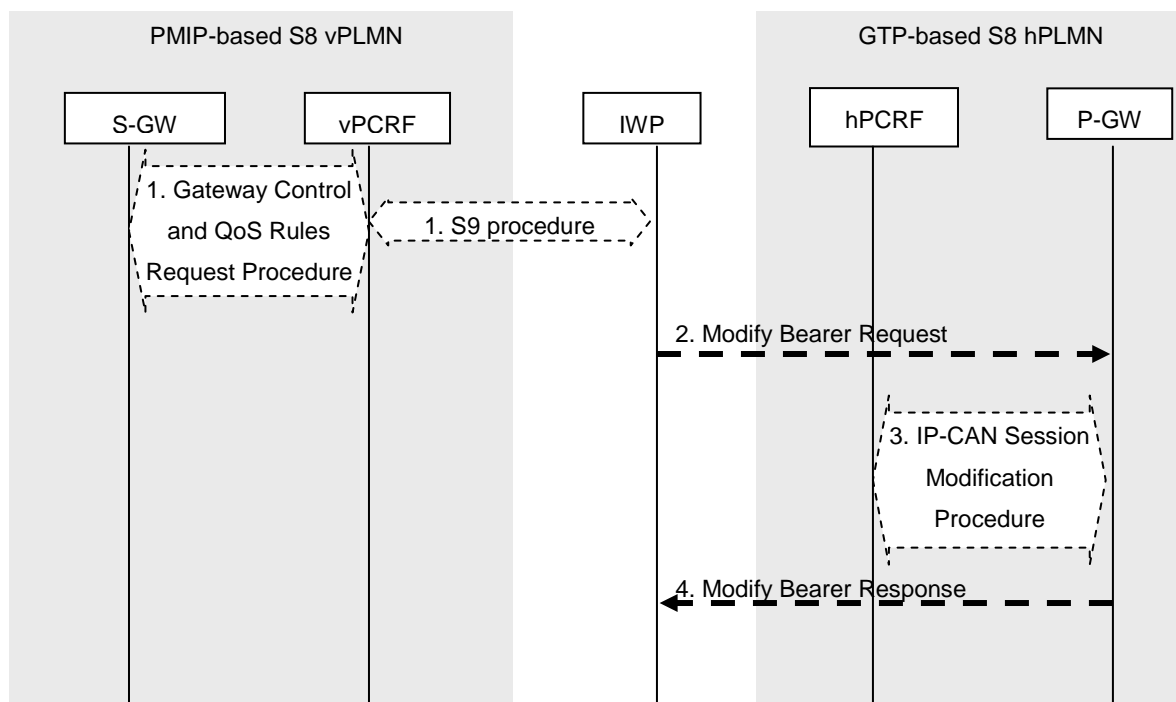

Figure 6.1.6.2.2.1-1: Mapping of Location Management and Handover Procedures without Serving GW Relocation for PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

NOTE1: The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and hPCRF are described in 3GPP TS23.401[3], TS23.402 [2] and TS23.203[4], and are not shown in this clause.

NOTE2: The details of PCC related procedures are described in 3GPP TS23.203[4], 3GPP TS29.212[5] and 3GPP TS29.215[6].

NOTE3: The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

The optional interaction steps between the gateways and the PCRF in the procedures in Figure 6.1.6.2.2.1-1 only occur if dynamic policy provisioning is deployed. Otherwise policy may be statically configured with the gateway.

1. The S-GW which is located on vPLMN initiate the Gateway Control and QoS Policy Rules Request Procedure as specified in TS 23.203 [4], in order to inform the hPCRF through vPCRF with S9 appropriate procedure about the change of RAT type and UE Location Information IE (if this has been received from the MME preceding step 1).

NOTE4: It is FFS whether further PCC related consideration is needed during step1.

2. If the RAT type has changed or the User Location Information IE is received, the IWP informs the P-GW about the change by sending Modify Bearer Request to the P-GW which is located on hPLMN.

3. If dynamic PCC is deployed, and RAT type information needs to be conveyed from the P-GW to the PCRF, the P-GW shall send this information by initiating IP-CAN Session Modification Procedure as defined in TS 23.203 [4].

4. The P-GW sends Modify Bearer Response to the IWP.

6.1.6.2.2.2 GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

The mapping of procedures for this scenario without S-GW relocation is shown in figure 6.1.6.2.2.2-1:
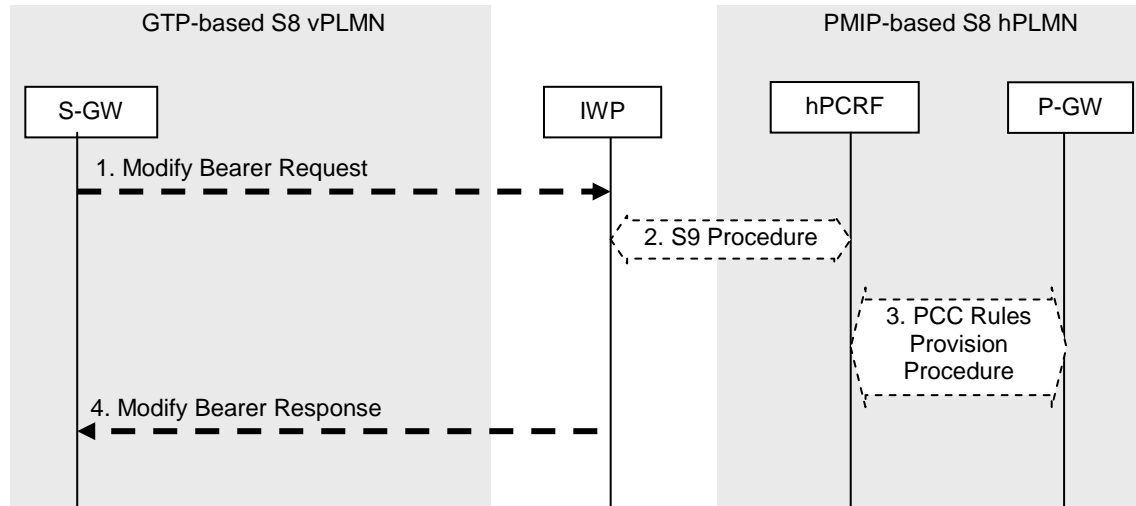
Figure 6.1.6.2.2.2-1: Mapping of Location Management and Handover Procedures without Serving GW Relocation for GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

NOTE1: The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401[3], TS23.402 [2] and TS23.203[4], and are not shown in this clause.

NOTE2: The details of PCC related procedures are described in 3GPP TS23.203[4], 3GPP TS29.212[5] and 3GPP TS29.215[6].

NOTE3: The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

The optional interaction steps between the gateways and the PCRF in the procedures in Figure 6.1.6.2.2.2-1 only occur if dynamic policy provisioning is deployed. Otherwise policy may be statically configured with the gateway.

1. If the RAT type has changed or the S-GW has received the User Location Information IE from the MME, the S-GW informs the PDN GW(s) about the change of this information that e.g. can be used for charging, by sending Modify Bearer Request to P-GW which is located on hPLMN via GTP-based S8 interface. The IWP address itself is already sent to S-GW before the step1 by MME in 3GPP access case. That results the S-GW sending the message to IWP.

2. After receiving Modify Bearer Request, the IWP initiates S9 appropriate procedure acting as triggered by Gateway Control and QoS Rules Request Procedure which is initiated by S-GW to align with the procedures described in 3GPP TS23.402 [2] between hPCRF via S9 interface.

3. The PCRF updates the PCC rules at the P-GW by initiating the PCC Rules Provision Procedure as specified in TS 23.203 [4] if the PCC rules have changed based on the RAT type reported in step 2. Further, the hPCRF notifies the P-GW of the change in RAT and the UE Location Information IE (if this has been received from the MME preceding step 1. Step 3 may be initiated before step 2 completes.

4. The IWP sends Modify Bearer Response to the S-GW.

6.1.6.3 Non-3GPP Access scenario

The corresponding stage 2 3GPP TS 23.402 [2] does not describe any Location Management or Handover Procedures in the case of Non-3GPP Access.

6.1.6.4 Handovers between 3GPP and Non-3GPP Access

6.1.6.4.1 General

The aim of this section is to document handovers between 3GPP and Non-3GPP access in case an IWP is on S8.

6.1.6.4.2 PMIP-based S8 only VPLMN and GTP-based S8 HPLMN

In this scenario, the VPLMN only uses PMIP on S8 interface. It is illustrated on the figure below.
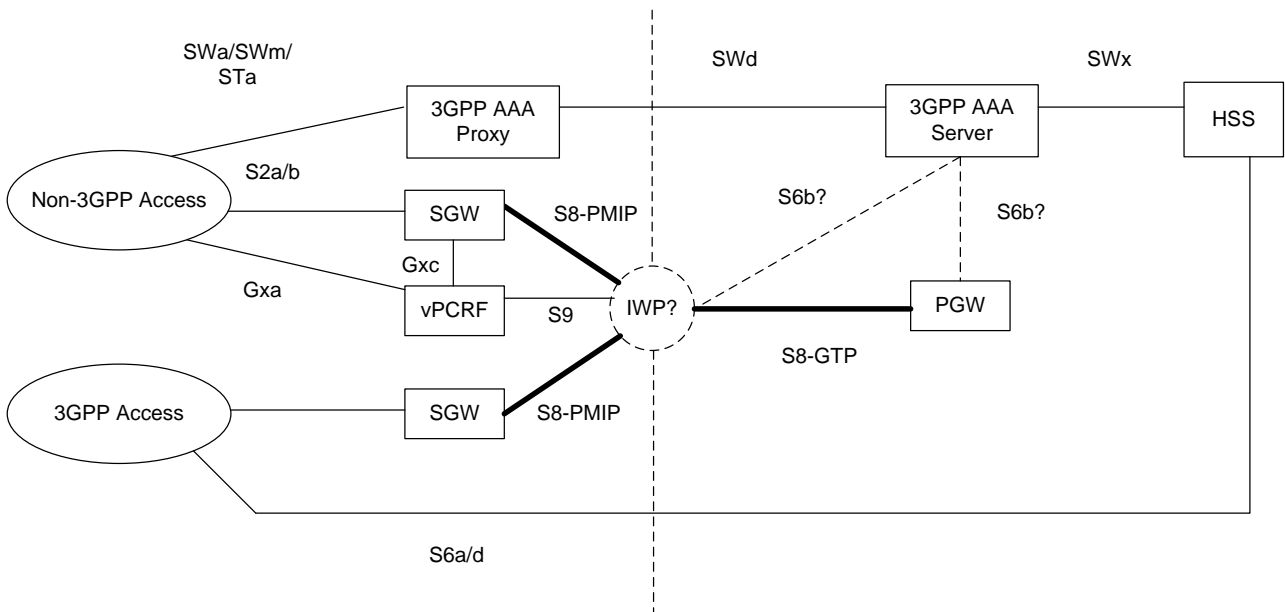
Figure 6.1.6.4.2-5 PMIP-based S8 VPLMN and GTP-based S8 HPLMN

It is FFS where the S6b is located.

6.1.7 UE-triggered Service Request

6.1.7.1 3GPP access scenario

This section applies to the following procedures:

- UE triggered Service Request;

- Network triggered Service Request.

6.1.7.1.1 PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

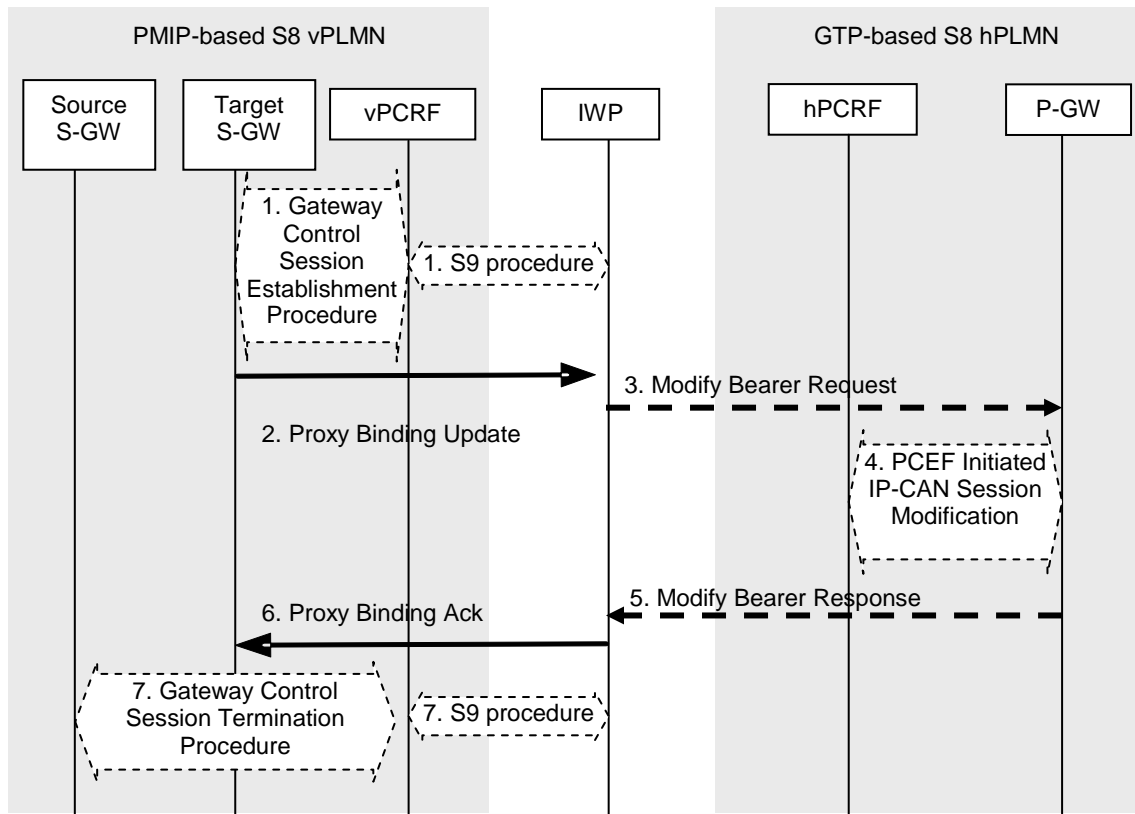The mapping of procedures for this scenario is shown in figure 6.1.7.1.1-1:
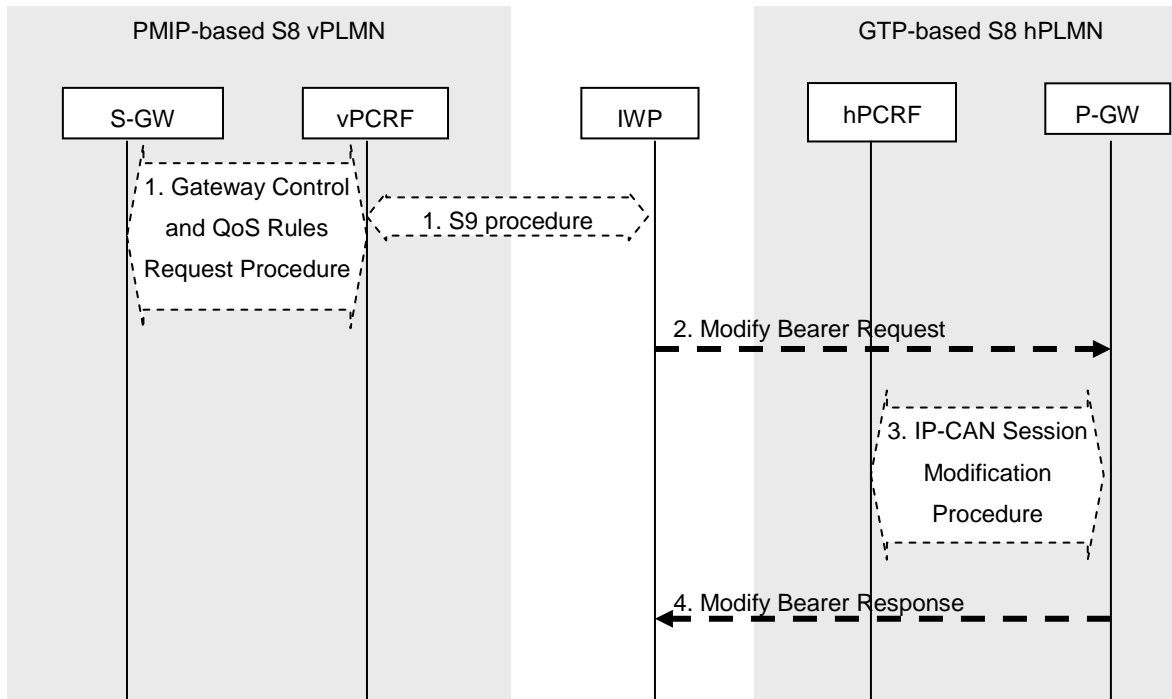
Figure 6.1.7.1.1-1: Mapping of UE-triggered Service Request for PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario

NOTE: The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401[3], TS23.402 [2] and TS23.203[4], and are not shown in this clause.

NOTE: The details of PCC related procedures are described in 3GPP TS23.203[4], 3GPP TS29.212[5] and 3GPP TS29.215[6].

NOTE: The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

The optional interaction steps between the gateways and the PCRF in the procedures in Figure 6.1.7.1.1-1 only occur if dynamic policy provisioning is deployed. Otherwise policy may be statically configured with the gateway.

1. The S-GW which is located on vPLMN initiate the Gateway Control and QoS Policy Rules Request Procedure as specified in TS 23.203 [4], in order to inform the hPCRF through vPCRF with S9 appropriate procedure about the change of RAT type and UE Location Information IE (if this has been received from the MME preceding step 1).

NOTE: It is FFS whether further PCC related consideration is needed during step1.

2. If the RAT type has changed or the User Location Information IE is received, the IWP informs the P-GW about the change by sending Modify Bearer Request to the P-GW which is located on hPLMN.

3. If dynamic PCC is deployed, and RAT type information or UE location information needs to be conveyed from the P-GW to the PCRF, the P-GW shall send this information by initiating IP-CAN Session Establishment Procedure as defined in TS 23.203 [4].

4. The P-GW sends Modify Bearer Response to the IWP.

6.1.7.1.2   GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

The mapping of procedures for this scenario without S-GW relocation is shown in figure 6.1.7.1.2-1:
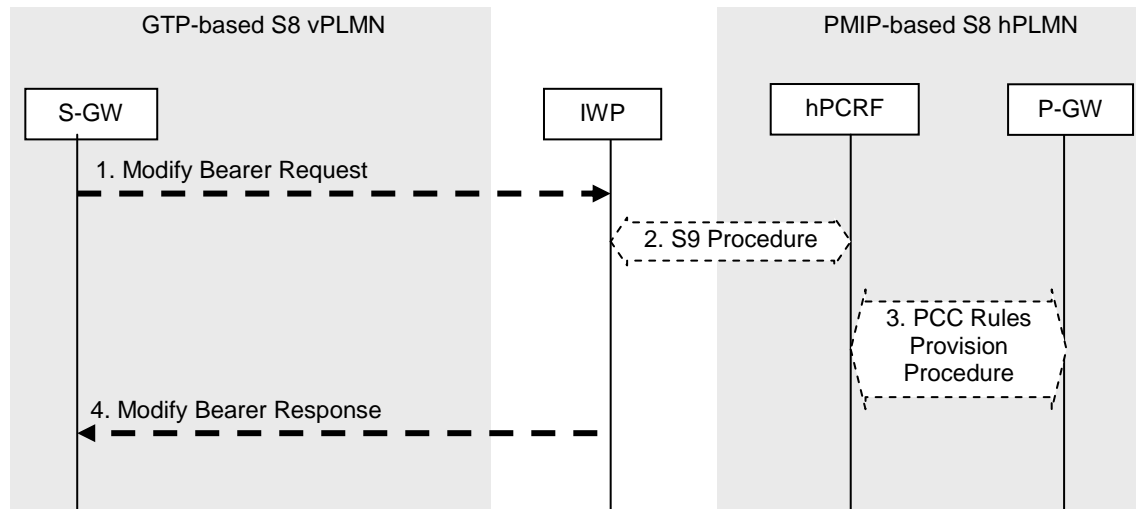
Figure 6.1.7.1.2-1: Mapping of UE-triggered Service Request for GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario

NOTE: The details of procedures for the S-GW with entities except IWP and vPCRF and the details of procedures for the P-GW with entities except IWP and vPCRF are described in 3GPP TS23.401[3], TS23.402 [2] and TS23.203[4], and are not shown in this clause.

NOTE: The details of PCC related procedures are described in 3GPP TS23.203[4], 3GPP TS29.212[5] and 3GPP TS29.215[6].

NOTE: The IWP needs to manage the ongoing sessions e.g. bindings of messages of S8 and S9 with TEID in GTP side, with IMSI, APN and IP address for the particular user in PMIP side.

The optional interaction steps between the gateways and the PCRF in the procedures in Figure 6.1.7.1.2-1 only occur if dynamic policy provisioning is deployed. Otherwise policy may be statically configured with the gateway.

1. If the RAT type has changed or the S-GW has received the User Location Information IE from the MME, the S-GW informs the PDN GW(s) about the change of this information that e.g. can be used for charging, by sending Modify Bearer Request to P-GW which is located on hPLMN via GTP-based S8 interface. The IWP address itself is already sent to S-GW before the step1 by MME in 3GPP access case. That results the S-GW sending the message to IWP.

2. After receiving Modify Bearer Request, the IWP initiates S9 appropriate procedure acting as triggered by Gateway Control and QoS Rules Request Procedure which is initiated by S-GW to align with the procedures described in 3GPP TS23.402 [2] between hPCRF via S9 interface.

3. The PCRF updates the PCC rules at the PDN GW by initiating the PCC Rules Provision Procedure as specified in TS 23.203 [4] if the PCC rules have changed based on the RAT type reported by the Serving GW in step 2. Further, the hPCRF notifies the PDN GW of the change in RAT and the UE Location Information IE (if this has been received from the MME preceding step 2. Step 3 may be initiated before step 2 completes.

4. The IWP sends Modify Bearer Response to the S-GW.

6.1.7.2   Non-3GPP Access scenario

The UE-triggered Service Request Procedure is not described in the 3GPP TS 23.402 [2]. As a consequence, this procedure is not mapped in this TR for the Non-3GPP access scenario case.

6.1.8   P-GW Initiated Resource Allocation Deactivation

6.1.8.1   Non-3GPP Access Scenario

This procedure is not applicable for Non-3GPP Access Scenario. Indeed, in this scenario, the HPLMN is GTP-based and the 3GPP TS 23.401 does not define such procedure.

6.2   Mapping of procedures between GTP and PMIP without PCC support

7   Mapping of parameters between GTP and PMIP

7.1   Mapping of parameters between GTP and PMIP with PCC support

7.1.1   General

This section is to describe the parameter mapping for each message based on the stage 3 parameters defined in 3GPP TS 29.274 [7], 3GPP TS 29.275 [8], 3GPP TS 29.212 [5] and 3GPP TS 29.215 [6]. The description of message mapping below is based on per procedure basis.

The symbol "N/A" in source message column of the tables below means that there is no corresponding parameter in the source message to map into the mentioned parameter in the target message. For this case, this parameter in the target message shall be either absent or structured locally by the IWP. The symbol "N/A" in target message column of the tables below means that some parameter carried in the source message is not needed to be mapped into the target message. For this case, this parameter in the source message shall be either ignored or saved locally in the IWP.

7.1.2   Parameters Mapping in PDN Connection Creation

7.1.2.1   GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario with PCC

7.1.2.1.1   GTP-Create Session Request to PMIP-Proxy Binding Update and Diameter-CC-Request

The IE/AVP mapping from GTP-Create Session Request to PMIP-Proxy Binding Update is listed as table below. The following table shows only the necessary IEs of GTP-Create Session Request to construct PMIP-Proxy Binding Update message:

Table 7.1.2.1.1-1: IE Mapping from GTP-Create Session Request to PMIP-Proxy Binding Update

IEs in Source Create Session Request	Target Proxy Binding Update IEs	Comments

IMSI	Mobile Node Identifier Option	
PDN Address Allocation (PAA)	IPv6 Home Network Prefix Option	This IE is used, if the PDN Type in PAA is IPv6
N/A	Link-local Address	IWP locally assigns all zero (e.g. during Initial Attach)
Handover Indication in Indication Flags IE	Handoff Indicator Option	The value is set to 1, in the case of Attach.
RAT Type	Access Technology Type Option	
N/A	Timestamp Option	IWP locally assigns the value
N/A	GRE key option	IWP locally assigns the value
PDN Address Allocation (PAA)	IPv4 Home Address option	This IE is used, if the PDN Type in PAA is IPv4
Access Point Name (APN)	Service Selection Mobility Option	
Protocol Configuration Option (PCO)	Protocol Configuration Options	
N/A	PDN GW IP Address	Not applicable, because this IE is only used in the chaining case.
SGW-FQ-CSID	Fully Qualified PDN Connection Set Identifier	
MME-FQ-CSID	Fully Qualified PDN Connection Set Identifier	
Selection Mode	Selection Mode	
Charging Characteristics	Charging Characteristics	
Serving Network	Serving Network	
ME Identity (IMEI)	Mobile Equipment Identity	
MSISDN	MSISDN	

Editor's note: In Rel-9 PMIP will carry default bearer ID from SGW to PGW (sent from MME). This new parameters are yet to be defined in CT4. The table needs to be updated once CT4 creates Rel-9 PMIP.

The IE/AVP mapping from GTP-Create Session Request to Diameter-CC-Request (CCR) is performed just as PMIP-based S-GW creates Diameter-CCR from GTP-CSR which is sent from MME to S-GW.

The only difference from GTP- Create Session Request used over Gxc and S9 which IWP should care is the presence of Multiple-BBERF-Action and 'subsession' related AVPs. The creation of S9 message from Gxc message is performed as so implemented in vPCRF.

Editor's Note: The above contents may need to be checked by CT3.

7.1.2.1.2 PMIP-Proxy Binding Acknowledgement and Diameter-Re-Auth-Request to GTP-Create Session Response

The IE/AVP mapping from PMIP-Proxy Binding Acknowledgement and Diameter-Re-Auth-Request to GTP-Create Session Response is listed as table below. The following table shows only the necessary IEs of PMIP-Proxy Binding Acknowledge message and Diameter-Re-Auth-Request to construct GTP-Create Session Response:

Table 7.1.2.1.2 -1: IE Mapping from PMIP-Proxy Binding Acknowledgement and Diameter-Re-Auth-Request to Create Session Response

IEs in Source Proxy Binding Ack and Source Re-Auth-Request	Target Create Session Response IEs	Comments
(PBU) Status	Cause	
N/A	PGW S5/S8 F-TEID for PMIP based interface or for GTP based Control Plane interface	IWP locally assigns the value.
(PBU) IPv6 Home Network Prefix option/IPv4 Home Address option	PDN Address Allocation (PAA)	If only IPv6 HNP Option is used, IPv6 is used. If only IPv4 HA Option is used, IPv4 is used. If both IPv4 and v6 HA Option is used, IPv4v6 is used.
(PBU) APN Restriction	APN Restriction	
(PBU) Protocol Configuration Options	Protocol Configuration Options (PCO)	
N/A	Bearer Contexts created	IWP locally uses the Bearer Context already received over Create Session Request procedure (FFS)
N/A	Recovery	IWP locally assigns the value.
N/A	Charging Gateway Name	IWP locally assigns the value.
N/A	Charging Gateway Address	IWP locally assigns the value.
(PBU) Fully Qualified PDN Connection Set Identifier	PGW-FQ-CSID	
N/A	Private Extension	Not used
(RAR) Aggregate Maximum Bit Rate (APN-AMBR)	Aggregate Maximum Bit Rate (APN-AMBR)	

Table 7.1.2.1.2-2: IE/AVP mapping from PMIP-Proxy Binding Acknowledgement/Diameter-Re-Auth-Request to Bearer Context IE in GTP-Create Session Response

IEs in Source Proxy Binding Acknowledgement and Source Re-Auth-Request	Target Bearer Context IEs	Comments
N/A	EPS Bearer ID	See Editor's Note below the table.
Status	Cause	
N/A for LTE accesses (RAR) TFT-Packet-Filter-Information for GPRS (e.g. UTRAN/GERAN)	TFT	It's FFS how IWP generates TFT in case of E-UTRAN.
N/A	S5/S8-U PGW F-TEID	IWP assigns the TEID of IWP
(RAR) QoS-Information	Bearer Level QoS	
Charging ID	Charging ID	
N/A	Bearer Flags	Not used

Editor's Note: The parameter "Linked EPS bearer ID" is not used on if Visited network is Rel-8. For Rel-9, SGW sends default bearer ID received from the MME, if multiple PDN connections to the same APN is supported. However the protocol for this hasn't been specified yet, so the table needs to be updated when REL-9 PMIP protocol is created.

7.1.2.2 PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario with PCC

7.1.2.2.1 PMIP-Proxy Binding Update and Diameter-CC-Request to GTP-Create Session Request

The IE/AVP mapping from PMIP-Proxy Binding Update and Diameter-CC-Request to GTP-Create Session Request is listed as table below:

Table 7.1.2.2.1-1: IE/AVP Mapping from PMIP-Proxy Binding Update and Diameter-CC-Request to GTP-Create Session Request

IEs in Source Proxy Binding Update and CC-Request	Target Create Session Request IEs	Comments
(PBU) Mobile Node Identifier Option	IMSI	
(PBU) MSISDN	MSISDN	
(PBU) Mobile Equipment Identity	ME Identity (IMEI)	
(CCR) 3GPP-User-Location-Info AVP	User Location Information (ULI)	
(PBU) Serving Network	Serving Network	
(PBU) Access Technology Type Option	RAT Type	
	Indication Flags	See table 7.1.A.3-3.
N/A	Sender F-TEID for Control Plane	IWP locally assigns the TEID of IWP.
N/A	PGW S5/S8 Address for Control Plane or PMIP	IWP locally assigns all zero.
(PBU) Service Selection Mobility Option	Access Point Name (APN)	
(PBU) Selection Mode	Selection Mode	
(PBU) IPv6 Home Node Prefix Option, or IPv4 Home Node Prefix Option	PDN Type	If only IPv6 HNP Option is used, IPv6 is used. If only IPv4 HNP Option is used, IPv4 is used. If both IPv4 and v6 HNP Option is used, IPv4v6 is used.
(PBU) IPv6 Home Node Prefix Option, or IPv4 Home Node Prefix Option	PDN Address Allocation (PAA)	If only IPv6 HNP Option is used, IPv6 is used. If only IPv4 HNP Option is used, IPv4 is used. If both IPv4 and v6 HNP Option is used, IPv4v6 is used.
Maximum APN Restriction	Maximum APN Restriction	
(CCR) APN-Aggregate-Max-Bitrate-DL AVP and APN-Aggregate-Max-Bitrate-UL AVP	Aggregate Maximum Bit Rate (APN-AMBR)	
N/A	Linked EPS Bearer ID	See Editor's note below the table.
(PBU) Protocol Configuration Option	Protocol Configuration Options (PCO)	
N/A	Bearer Contexts to be created	
	Trace Information	Not used
N/A	Recovery	IWP locally assigns the value.
(PBU) Fully Qualified PDN Connection Set Identifier	MME-FQ-CSID	
(PBU) Fully Qualified PDN Connection Set Identifier	SGW-FQ-CSID	
N/A	UE Time Zone	The IE is not used on PMIP, thus there's no requirement to use this parameter.
(PBU) Charging Characteristics	Charging Characteristics	
N/A	Private Extension	Not used

Editor's Note: The parameter "Linked EPS bearer ID" is allocated by the IWP if Visited network is Rel-8. For Rel-9, SGW sends default bearer ID received from the MME, if multiple PDN connections to the same APN is supported. However the protocol for this hasn't been specified yet, so the table needs to be updated when REL-9 PMIP protocol is created.

Table 7.1.2.2.1-2: IE/AVP Mapping from PMIP-Proxy Binding Update / Diameter-CC-Request IEs/AVPs to Bearer Context IE in GTP-Create Session Request

IEs in Source CC-Request and Source Proxy Binding Update	Target Bearer Context IEs	Comments
N/A (See note)	EPS Bearer ID	See Editor's Note below the table.
N/A for LTE accesses (CCR) TFT-Packet-Filter-Information for GPRS (e.g. UTRAN/GERAN)	TFT	It's FFS how IWP generates TFT in case of E-UTRAN.
N/A	S5/S8-U SGW F-TEID	IWP locally assigns the TEID of IWP
(CCR) QoS-Information	Bearer Level QoS	
N/A	Bearer Flags	Not used

Editor's Note: The parameter "Linked EPS bearer ID" is allocated by the IWP if Visited network is Rel-8. For Rel-9, SGW sends default bearer ID received from the MME, if multiple PDN connections to the same APN is supported. However the protocol for this hasn't been specified yet, so the table needs to be updated when REL-9 PMIP protocol is created.

Editor's Note: The above contents may need to be checked by CT3.

Table 7.1.2.2.1-3: IE/AVP Mapping from PMIP-Proxy Binding Update / CC-Request IEs/AVPs to Indication Flags IEs in GTP-Session Create Request

IEs in Source CC-Request and Source Proxy Binding Update	Target Indication Flags IEs	Comments
N/A	S5/S8 Protocol Indicator	IWP deduces the protocol and assigns GTP.
N/A	Dual Address Bearer Flag	This parameter is not used in PMIP based S5/S8. Thus this flag is not used.
(PBU) Handoff Indicator option	Handover Indication	
N/A	Operation Indication	Not used during Attach.
N/A	Piggybacking Supported	PMIP does not support piggyback. So this flag is not used.
N/A	Change Reporting Support Indication	PMIP does not support Change Reporting. So this flag is not used.

7.1.2.2.2   GTP-Create Session Response to PMIP-Proxy Binding Acknowledgement and Diameter-Re-Auth-Request

The IE/AVP mapping from GTP-Create Session Response to PMIP-Proxy Binding Acknowledgement and Diameter-Re-Auth-Request is listed as table below. The following table shows only the necessary IEs of GTP-Create Session Response to construct PMIP-Proxy Binding Acknowledge message and Diameter-Re-Auth-Request:

Table 7.1.2.2.2-1: IE/AVP Mapping from GTP-Create Session Response to PMIP-Proxy Binding Acknowledgement and Diameter-Re-Auth-Request

IEs in Source Create Session Response	Target Proxy Binding Acknowledgement IEs	Comments
PDN Address Allocation (PAA)	IPv6 Home Network Prefix option/IPv4 Home Address option	If only IPv6 HNP Option is used, IPv6 is used. If only IPv4 HA Option is used, IPv4 is used. If both IPv4 and v6 HA Option is used, IPv4v6 is used.
RAT Type	Access Technology Type option	
Access Point Name (APN)	Service Selection Mobility Option	
Protocol Configuration Options (PCO)	Protocol Configuration Options	
APN Restriction	APN Restriction	
Cause	Status	
PDN Type in PAA	PDN Type Indication	
PGW-FQ-CSID	Fully Qualified PDN Connection Set Identifier	
Charging ID	Charging ID	
N/A	Link-local Address	IWP locally assigns the value.
N/A	Handoff Indicator option	
N/A	Timestamp option	IWP locally assigns the value.
N/A	GRE key option	IWP locally assigns the value.
N/A	3GPP Specific PMIPv6 Error Code	IWP locally assigns the value.
IEs in Target Re-Auth-Request		
Aggregate Maximum Bit Rate (APN-AMBR)	Aggregate Maximum Bit Rate (APN-AMBR)	
Bearer lever QoS	QoS information	IWP creates QoS information AVP from Bearer level QoS parameters.

7.1.3 Parameters Mapping in S-GW Initiated PDN Connection Deletion

7.1.3.1 GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario with PCC

7.1.3.1.1 GTP-Delete Session Request to PMIP-Proxy Binding Update and Diameter-CC-Request message

The IE/AVP mapping from GTP-Delete Session Request to PMIP-Proxy Binding Update and Diameter-CC-Request message is listed as table below. The following table shows only the necessary IEs of GTP-Delete Session Request to construct PMIP-Proxy Binding Update and Diameter-CC-Request message:

Table 7.1.3.1.1-1: IE/AVP mapping from GTP-Delete Session Request to PMIP-Proxy Binding Update / Diameter-CC-Request

IEs in Source Delete session Request	Target Proxy Binding Update IEs	Comments
N/A	Mobile Node Identifier option	IWP sets this IE as the IMSI of UE.
N/A	Access Technology Type option	IWP sets this IE as the RAT Type
Access Point Name (APN)	Service Selection Mobility Option	
Protocol Configuration Options (PCO)	Protocol Configuration Options	
N/A	IPv6 Home Network Prefix option	IWP locally assigns the value.
N/A	IPv4 Home Address option	IWP locally assigns the value.
N/A	Handoff Indicator option	IWP locally assigns the value.
N/A	Timestamp option	IWP locally assigns the value.
IEs in Target CC-Request		
User Location Information (ULI)	3GPP-User-Location-Info AVP	

Editor's note: In Rel-9 PMIP will carry default bearer ID from SGW to PGW (sent from MME). This new parameters are yet to be defined in CT4. The table needs to be updated once CT4 creates Rel-9 PMIP.

7.1.3.1.2 PMIP-Proxy Binding Acknowledgement to GTP-Delete Session Response

The IE/AVP mapping from PMIP-Proxy Binding Acknowledgement and S9 message to GTP-Delete Session Response is listed as table below. The following table shows only the necessary IEs of PMIP-Proxy Binding Acknowledgement message to construct GTP-Delete Session Response:

Table 7.1.3.1.2-1: IE mapping between PMIP-Proxy Binding Acknowledgement and GTP-Delete Session Response

IEs in Source Proxy Binding Acknowledgement	Target Delete Session Response IEs	Comments
Status	Cause	
N/A	Recovery	IWP locally assigns the value.
Protocol Configuration Options	Protocol Configuration Options (PCO)	

7.1.3.2 PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario with PCC

7.1.3.2.1 PMIP-Proxy Binding Update and CC-Request to GTP-Delete Session Request

The IE/AVP mapping from PMIP-Proxy Binding Update and Diameter-CC-Request message to GTP-Delete Session Request is listed as table below. The following table shows only the necessary IEs of PMIP-Proxy Binding Update and Diameter-CC-Request message to construct GTP-Create Session Request:

Table 7.1.3.2.1-1: IE mapping from PMIP-Proxy Binding Update and Diameter-CC-Request to GTP-Delete Session Request

IEs in Source Proxy Binding Update	Target Delete Session Request IEs	Comments
Service Selection Mobility Option	Access Point Name (APN)	
Protocol Configuration Options	Protocol Configuration Options (PCO)	
PDN Connection ID	Linked EPS Bearer ID	
	Indication Flags	It is FFS how Indication Flags are constructed.
IEs in Source CC-Request		
3GPP-User-Location-Info AVP	User Location Information (ULI)	

Editor's Note: A new table needs to be added for Indication flag.

7.1.3.2.2   GTP-Delete Session Response to PMIP-Proxy Binding Acknowledgement

The IE mapping from GTP-Delete Session Response to PMIP-Proxy Binding Acknowledgement and S9 message is listed as table below. The following table shows only the necessary IEs of GTP-Delete Session Response to construct PMIP-Proxy Binding Acknowledgement:

Table 7.1.3.2.2-1: IE mapping from GTP-Delete Session Response to PMIP-Proxy Binding Acknowledgement

IEs in Source Delete Session Response	Target Proxy Binding Acknowledgement IEs	Comments
Cause	Status	
N/A	Mobile Node Identifier option	IWP locally assigns the IMSI of UE
N/A	Access Technology Type option	IWP locally assigns the RAT Type
N/A	Service Selection Mobility Option	Copied from corresponding field of PBU.
Protocol Configuration Options (PCO)	Protocol Configuration Options	
N/A	IPv6 Home Network Prefix option	If it is present in the corresponding PBU, set to the IPv6 Home Network Prefix allocated to the UE's PDN connection based on the selected PDN.
	IPv4 Home Address Acknowledgement option	If it is present in the corresponding PBU, set to the IPv4 Home Address allocated for the UE's PDN connection based on the selected PDN.
N/A	Handoff Indicator option	Copied from corresponding field of PBU.
N/A	Timestamp option	Copied from corresponding field of PBU, or set to the current time of IWP in case of timestamp error.
N/A	3GPP Specific PMIPv6 Error Code	IWP locally assigns the value.

7.1.4   Parameters Mapping in Dedicated Bearer Activation Initiated by PGW

7.1.4.1   GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario with PCC

7.1.4.1.1   Diameter-Re-Auth-Request to GTP-Create Bearer Request

The IE/AVP mapping from Diameter-Re-Auth-Request to GTP-Create Bearer Request is listed as table below. The following table shows only the necessary IEs of Diameter-Re-Auth-Request to construct GTP-Create Bearer Request:

Table 7.1.4.1.1-1: IE mapping from Diameter-Re-Auth-Request to Create Bearer Request

IEs in Source Re-Auth-Request	Target Create Bearer Request IEs	Comments
N/A	Procedure Transaction Id (PTI)	IWP locally assigns the value.
PDN Connection ID	Linked Bearer Identity (LBI)	
N/A	Protocol Configuration Options (PCO)	
	Bearer Contexts	
N/A	PGW-FQ-CSID	IWP locally assigns the value..
N/A	Change Reporting Action	IWP includes this IE according to the Event Trigger in S9 message.

Table 7.1.4.1.1-2: IE mapping from Diameter-Re-Auth-Request IEs/AVPs to GTP-Bearer Context IE

IEs in Source Re-Auth-Request	Target Bearer Context IEs	Comments
PDN Connection ID	EPS Bearer ID	
N/A for LTE accesses (RAR) TFT-Packet-Filter-Information for GPRS (e.g. UTRAN/GERAN)	TFT	It's FFS how IWP generates TFT in case of E-UTRAN.
N/A	S5/8-U PGW F-TEID	IWP allocates this IE.
QoS information	Bearer Level QoS	IWP needs to convert these two IEs to construct this Bearer level QoS.
N/A	Charging ID	IWP allocates this IE.

7.1.4.1.2 GTP-Create Bearer Response to Diameter-Re-Auth-Answer

The IE/AVP mapping from GTP- Create Bearer Response to Diameter-Re-Auth-Answer is listed as table below. The following table shows only the necessary IEs of GTP- Create Bearer Response to construct Diameter-Re-Auth-Answer:

Table 7.1.4.1.2-1: IE/AVP mapping from GTP-Create Bearer Response to Diameter-Re-Auth-Answer

IEs in Source Create Bearer Response	IEs in Target Re-Auth-Answer	Comments
Linked Bearer Identity (LBI)	PDN Connection ID	
Bearer Level QoS	QoS information	
Cause	Result	

Editor's Note: The above contents may need to be checked by CT3.

7.1.4.2 PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario with PCC

7.1.4.2.1 GTP-Create Bearer Request to Diameter-Re-Auth-Request

The IE/AVP mapping from GTP- Create Bearer Request to Diameter-Re-Auth-Request is listed as table below. The following table shows only the necessary IEs of GTP- Create Bearer Request to construct Diameter-Re-Auth-Request:

Table 7.1.4.2.1-1: IE/AVP mapping from GTP-Create Bearer Request to Diameter-Re-Auth-Request

IEs in Source Create Bearer Request	IEs in Target Re-Auth-Request	Comments
Bearer Level QoS	QoS information	IWP needs to convert these two IEs to construct this QoS information.
EPS Bearer ID	PDN Connection ID	

7.1.4.2.2 Diameter-Re-Auth-Answer mapping to GTP-Create Bearer Response

The IE/AVP mapping from Diameter-Re-Auth-Answer to GTP- Create Bearer Response is listed as table below. The following table shows only the necessary IEs of Diameter-Re-Auth-Answer to construct GTP- Create Bearer Response:

Table 7.1.4.2.2-1: IE/AVP mapping from Diameter-Re-Auth-Answer to GTP-Create Bearer Response

IEs in Source Re-Auth-Answer	Target Create Bearer Response IEs	Comments
Result	Cause	
	Bearer Contexts	See Table 7.1.4.4-2
N/A	Recovery	IWP locally assigns the value
N/A	MME-FQ-CSID	PMIP-based architecture does not use this value thus this IE is not used.
N/A	SGW-FQ-CSID	IWP locally assigns the value
N/A	Protocol Configuration Options (PCO)	It is FFS how this IE will be created.

Table 7.1.4.2.2-2: IE/AVP mapping from Diameter-Re-Auth-Answer to Bearer Context IE in GTP-Create Bearer Response

IEs in Source Re-Auth-Answer	Target Bearer Context IEs	Comments
PDN Connection ID	EPS Bearer ID	IWP allocates this IE and connects it with the PDN Connection ID.
QoS information	Bearer Level QoS	
Result	Cause	
N/A	S5/8-U SGW F-TEID	IWP locally assigns the value

7.1.5 Parameters Mapping in Dedicated Bearer Activation Initiated by SGW

7.1.5.1 GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario with PCC

7.1.5.1.1 GTP-Bearer Resource Command to Diameter-CC-Request

The IE/AVP mapping from GTP-Bearer Resource Command to Diameter-CC-Request is listed as table below. The following table shows only the necessary IEs of GTP-Bearer Resource Command to Diameter-CC-Request:

Table 7.1.5.1.1-1: IE/AVP mapping from GTP-Bearer Resource Command to Diameter-CC-Request

IEs in Source Bear Resource Command	AVPs in Target CC-Request	Comments
RAT Type	RAT-Type	Detailed value mapping is FFS.
Serving Network	3GPP-SGSN-MCC-MNC	
Flow Quality of Service (Flow QoS)	QoS-Information	
User Location Information (ULI)	3GPP-User-Location-Info	
Traffic Aggregate Description (TAD)	Packet-Filter-Information	
Linked EPS Bearer ID (LBI)	PDN-Connection-ID	

7.1.5.2 PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario with PCC

7.1.5.2.1 Diameter-CC-Request to GTP-Bearer Resource Command

The IE/AVP mapping from Diameter-CC-Request to GTP-Bearer Resource Command is listed as table below. The following table shows only the necessary IEs of Diameter-CC-Request to GTP-Bearer Resource Command:

Table 7.1.5.2.1-1: IE/AVP mapping from Diameter-CC-Request to GTP-Bearer Resource Command

AVPs in Source Diameter-CC-Request	IEs in GTP-Bearer Resource Command	Comments
PDN-Connection-ID	Linked EPS Bearer ID (LBI)	
Not available	Procedure Transaction Id (PTI)	IWP assigns the value locally.
QoS-Information	Flow Quality of Service (Flow QoS)	
Packet-Filter-Information	Traffic Aggregate Description (TAD)	
RAT-Type	RAT Type	
3GPP-SGSN-MCC-MNC	Serving Network	
3GPP-User-Location-Info	User Location Information (ULI)	
Not available	Change Reporting Support Indication Flag	PMIP does not support Change Reporting. So this flag can not be used. The functional impact due to this limitation is FFS.

7.1.6 Parameters Mapping in P-GW Initiated Bearer Modification Initiated by PGW

7.1.6.1 GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario with PCC

7.1.6.1.1 Diameter-Re-Auth-Request to GTP-Update Bearer Request

The IE/AVP mapping from Diameter-Re-Auth-Request to GTP- Update Bearer Request is listed as table below. The following table shows only the necessary IEs of Diameter-Re-Auth-Request to construct GTP- Update Bearer Request:

Table 7.1.6.1.1-1: IE/AVP mapping from Diameter-Re-Auth-Request to GTP-Update Bearer Request

IEs in Source Re-Auth-Request	Target Update Bearer Request IEs	Comments
N/A	Procedure Transaction Id (PTI)	IWP copied from corresponding IE of Bearer Resource Command
Aggregate Maximum Bit Rate (APN-AMBR)	Aggregate Maximum Bit Rate (APN-AMBR)	
N/A	Protocol Configuration Options (PCO)	It is FFS how PCO is constructed.
	Bearer Contexts	See Table 7.1.6.1.1-2
N/A	PGW-FQ-CSID	IWP locally assigns the value.
N/A	Change Reporting Action	IWP includes this IE according to the Event Trigger in S9 message.

Table 7.1.6.1.1-2: IE/AVP Mapping from Diameter-Re-Auth-Request to Bearer Context in GTP-Update Bearer Request

IEs in Source Re-Auth-Request	Target Bearer Context IEs	Comments
PDN Connection ID	EPS Bearer ID	
N/A for LTE accesses (RAR) TFT-Packet-Filter-Information for GPRS (e.g. UTRAN/GERAN)	TFT	It's FFS how IWP generates TFT in case of E-UTRAN.
N/A	S5/8-U PGW F-TEID	IWP locally assigns the value.
QoS information	Bearer Level QoS	IWP needs to convert these two IEs to construct this Bearer level QoS.

7.1.6.1.2   GTP- Update Bearer Response to Diameter-Re-Auth-Answer

The IE/AVP mapping from GTP- Update Bearer Response to Diameter-Re-Auth-Answer is listed as table below. The following table shows only the necessary IEs of GTP- Update Bearer Response to construct Diameter-Re-Auth-Answer:

Table 7.1.6.1.2-1: IE/AVP mapping from GTP-Update Bearer Response to Diameter-Re-Auth-Answer

IEs in Source Update Bearer Response	Target Re-Auth-Answer IEs	Comments
EPS Bearer ID	PDN Connection ID	
Bearer Level QoS	QoS information	
Cause	Result	

Editor's Note: The above contents may need to be checked by CT3.

7.1.6.2   PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario with PCC

7.1.6.2.1   GTP-Update Bearer Request to Diameter-Re-Auth-Request

The IE/AVP mapping from GTP- Update Bearer Request to Diameter-Re-Auth-Request is listed as table below. The following table shows only the necessary IEs of GTP- Update Bearer Request to construct Diameter-Re-Auth-Request:

Table 7.1.6.2.1-1: IE/AVP mapping from Update Bearer Request to Diameter-Re-Auth-Request

IEs in Source Update Bearer Request	Target Re-Auth-Request IEs	Comments
Bearer Level QoS	QoS information	IWP needs to convert these two IEs to construct this QoS information.
EPS Bearer ID	PDN Connection ID	

Editor's Note: The above contents may need to be checked by CT3.

7.1.6.2.2   Diameter-Re-Auth-Answer mapping to GTP- Update Bearer Response

The IE/AVP mapping from Diameter-Re-Auth-Answer to GTP- Update Bearer Response is listed as table below. The following table shows only the necessary IEs of Diameter-Re-Auth-Answer to construct GTP- Update Bearer Response:

Table 7.1.6.2.2-1: IE/AVP mapping from Diameter-Re-Auth-Answer to GTP-Update Bearer Response

IEs in Source Re-Auth-Answer	Target Update Bearer Response IEs	Comments
Result	Cause	
	Bearer Contexts	See Table 7.1.6.2.2-2
N/A	Recovery	
N/A	MME-FQ-CSID	
N/A	Protocol Configuration Options (PCO)	

Table 7.1.6.1.2-2: IE/AVP Mapping from Re-Auth-Answer to Bearer Context IEs in GTP-Update Bearer Response

IEs in Source Re-Auth-Answer	Target Bearer Context IEs	Comments
PDN Connection ID	EPS Bearer ID	IWP allocates this IE and connects it with the PDN Connection ID.
Result	Cause	

7.1.7　Parameters Mapping in P-GW Initiated Bearer Modification Initiated by SGW

7.1.7.1　GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario with PCC

7.1.7.1.1　GTP-Modify Bearer Command to Diameter-CC-Request

The IE/AVP mapping from GTP-Modify Bearer Command to Diameter-CC-Request is listed as table below. The following table shows only the necessary IEs of GTP-Modify Bearer Command to Diameter-CC-Request:

Table 7.1.7.1.1-1: IE/AVP mapping from GTP-Modify Bearer Command to Diameter-CC-Request

IEs in Source Modify Bear Command	AVPs in Target CC-Request	Comments
APN-Aggregate Maximum Bit Rate (APN-AMBR)	APN-Aggregate Maximum Bit Rate (APN-AMBR)	
Bearer level QoS	QoS-Information	

7.1.7.1.2　GTP-Bearer Resource Command to Diameter-CC-Request

The IE/AVP mapping from GTP-Bearer Resource Command to Diameter-CC-Request is listed as table below. The following table shows only the necessary IEs of GTP-Bearer Resource Command to Diameter-CC-Request:

Table 7.1.7.1.2-1: IE/AVP mapping from GTP-Bearer Resource Command to Diameter-CC-Request

IEs in Source Bear Resource Command	AVPs in Target CC-Request	Comments
Flow Quality of Service (Flow QoS)	QoS-Information	
Traffic Aggregate Description (TAD)	Packet-Filter-Information	

7.1.7.2　PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario with PCC

7.1.7.2.1　Diameter-CC-Request to GTP-Modify Bearer Command

The IE/AVP mapping from Diameter-CC-Request to GTP-Modify Bearer Command is listed as table below. The following table shows only the necessary IEs of Diameter-CC-Request: to GTP-Modify Bearer Command

Table 7.1.7.2.1-1: IE/AVP mapping from Diameter-CC-Request to GTP-Modify Bearer Command

AVPs in Source CC-Request	IEs in Target Modify Bear Command	Comments
APN-Aggregate Maximum Bit Rate (APN-AMBR)	APN-Aggregate Maximum Bit Rate (APN-AMBR)	
PDN-Connection-ID	EPS Bearer ID	
QoS-Information	Bearer level QoS	

7.1.7.2.2　Diameter-CC-Request to GTP-Bearer Resource Command

The IE/AVP mapping from Diameter-CC-Request to GTP-Bearer Resource Command is listed as table below. The following table shows only the necessary IEs of Diameter-CC-Request to GTP-Bearer Resource Command:

Table 7.1.7.2.2-1: IE/AVP mapping from Diameter-CC-Request to GTP-Bearer Resource Command

AVPs in Source Diameter-CC-Request	IEs in Target GTP-Bearer Resource Command	Comments
Not available	EPS Bearer ID (EBI)	It is FFS how / if this IE will be created
Not available	Procedure Transaction Id (PTI)	IWP assigns the value locally.
QoS-Information	Flow Quality of Service (Flow QoS)	
Packet-Filter-Information	Traffic Aggregate Description (TAD)	
Not available	Linked EPS Bearer ID(LBI)	It is FFS how / if this IE will be created.
Not available	RAT Type	It is FFS how / if this IE will be created

7.1.8 Parameters Mapping in P-GW Initiated Bearer Deactivation Initiated by PGW

7.1.8.1 GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario with PCC

7.1.8.1.1 Diameter-Re-Auth-Request to GTP- Delete Bearer Request

The IE/AVP mapping from Diameter-Re-Auth-Request to GTP- Delete Bearer Request is listed as table below. The following table shows only the necessary IEs of Diameter-Re-Auth-Request to construct GTP- Delete Bearer Request:

Table 7.1.8.1.1-1: IE/AVP mapping from Diameter-Re-Auth-Request to GTP-Delete Bearer Request

IEs in Source Re-Auth-Request	Target Delete Bearer Request IEs	Comments
N/A	Procedure Transaction Id (PTI)	IWP copied from corresponding IE of Bearer Resource Command.
PDN Connection ID	Linked EPS Bearer ID (LBI)	
N/A	EPS Bearer IDs	IWP locally assigns the value
N/A	Failed Bearer Contexts	It is FFS how this IE is mapped.
Result	Cause	
N/A	Protocol Configuration Options (PCO)	Not used.
N/A	PGW-FQ-CSID	IWP allocates this IE.

Table 7.1.8.1.1-2: IE/AVP mapping from Diameter-Re-Auth-Request to Bearer Contexts in GTP-Delete Bearer Request

IEs in Source Re-Auth-Request	Target Bearer Context IEs	Comments
PDN Connection ID	EPS Bearer ID	
Result	Cause	

7.1.8.1.2 GTP- Delete Bearer Response to Diameter-Re-Auth-Answer message

The IE/AVP mapping from GTP- Delete Bearer Response to Diameter-Re-Auth-Answer is listed as table below. The following table shows only the necessary IEs of GTP- Delete Bearer Response to construct Diameter-Re-Auth-Answer:

Table 7.1.8.1.2-1: IE/AVP mapping from GTP-Delete Bearer Response to Diameter-Re-Auth-Answer

IEs in Source Delete Bearer Response	Target Re-Auth-Answer IEs	Comments
EPS Bearer ID	PDN Connection ID	
Cause	Result	

7.1.8.2 PMIP-based S8 vPLMN and PMIP-based S8 hPLMN scenario with PCC

7.1.8.2.1 GTP-Delete Bearer Request to Diameter-Re-Auth-Request

The IE/AVP mapping from GTP- Delete Bearer Request to Diameter-Re-Auth-Request is listed as table below. The following table shows only the necessary IEs of GTP- Delete Bearer Request to construct Diameter-Re-Auth-Request:

Table 7.1.8.2.1-1: IE/AVP mapping from GTP-Delete Bearer Request to Diameter-Re-Auth-Request

IEs in Source Delete Bearer Request	IEs in Target Re-Auth-Request	Comments
Linked Bearer ID	PDN Connection ID	

Editor's Note: The above contents may need to be checked by CT3.

7.1.8.2.2 Diameter-Re-Auth-Answer to GTP- Delete Bearer Response

The IE/AVP mapping from Diameter-Re-Auth-Answer to GTP- Delete Bearer Response is listed as table below. The following table shows only the necessary IEs of Diameter-Re-Auth-Answer to construct GTP- Delete Bearer Response:

Table 7.1.8.2.2-1: IE/AVP mapping from Diameter-Re-Auth-Answer to GTP-Delete Bearer Response

IEs in Source Re-Auth-Answer	Target Delete Bearer Response IEs	Comments
Result	Cause	
PDN Connection ID	Linked EPS Bearer ID (LBI)	
	Bearer Contexts	
N/A	Recovery	IWP locally assigns the value.
N/A	MME-FQ-CSID	PMIP does not used this IE, so this IE is not used.
N/A	SGW-FQ-CSID	IWP locally assigns the value.
N/A	Protocol Configuration Options (PCO)	It is FFS how PCO is created.

Table 7.1.8.2.2-2: Necessary Re-Auth-Answer IEs/AVPs to construct Bearer Context

IEs in Source Re-Auth-Answer	Target Bearer Context IEs	Comments
PDN Connection ID	EPS Bearer ID	IWP locally allocates this IE and connects it with the PDN Connection ID.
Result	Cause	

7.1.9 Parameters Mapping in P-GW Initiated Bearer Deactivation Initiated by SGW

7.1.9.1 GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario with PCC

7.1.9.1.1 GTP-Delete Bearer Command to Diameter-CC-Request

The IE/AVP mapping from GTP- Delete Bearer Command to Diameter-CC-Request is listed as table below. The following table shows only the necessary IEs of GTP- Delete Bearer Command to construct Diameter-CC-Request:

Table 7.1.9.1.1-1: IE/AVP mapping from GTP- Delete Bearer Command to Diameter-CC-Request

IEs in Source Delete Bear Command	AVPs in Target CC-Request	Comments
EPS Bearer ID	Packet-Filter-Information	IWP shall use the EPS Bearer ID to find the bearer context, and obtain the Packet Filters needed to be terminated in the bearer context.

7.1.9.1.2   GTP-Bearer Resource Command to Diameter-CC-Request

The IE/AVP mapping from GTP-Bearer Resource Command to Diameter-CC-Request is listed as table below. The following table shows only the necessary IEs of GTP-Bearer Resource Command to Diameter-CC-Request:

Table 7.1.9.1.2-1: IE/AVP mapping from GTP-Bearer Resource Command to Diameter-CC-Request

IEs in Source Bear Resource Command	AVPs in Target CC-Request	Comments
Traffic Aggregate Description (TAD)	Packet-Filter-Information	
Flow Quality of Service (Flow QoS)	QoS-Information	

7.1.9.2   PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario with PCC

7.1.9.2.1   Diameter-CC-Request to GTP-Delete Bearer Command

The IE/AVP mapping from Diameter-CC-Request to GTP- Delete Bearer Command is listed as table below. The following table shows only the necessary IEs of Diameter-CC-Request to GTP- Delete Bearer Command

Table 7.1.9.2.1-1: IE/AVP mapping from Diameter-CC-Request to GTP- Delete Bearer Command

AVPs in Source CC-Request	IEs in Target Delete Bear Command	Comments
Packet-Filter-Information	EPS Bearer ID	IWP shall use the Packet-Filter-Information to find the bearer context, and obtain the EPS Bearer ID needed to be terminated in the bearer context.

7.1.9.2.2   Diameter-CC-Request to GTP-Bearer Resource Command

The IE/AVP mapping from Diameter-CC-Request to GTP-Bearer Resource Command is listed as table below. The following table shows only the necessary IEs of Diameter-CC-Request to GTP-Bearer Resource Command:

Table 7.1.9.2.2-1: IE/AVP mapping from Diameter-CC-Request to GTP-Bearer Resource Command

AVPs in Source Diameter-CC-Request	IEs in Target GTP-Bearer Resource Command	Comments
Packet-Filter-Information	Traffic Aggregate Description (TAD)	
QoS-Information	Flow Quality of Service (Flow QoS)	
Not available	Linked EPS Bearer ID (LBI)	It is FFS how / if this IE will be created.
Not available	Procedure Transaction Id (PTI)	IWP assigns the value locally.
Not available	RAT Type	It is FFS how / if this IE will be created.
Not available	EPS Bearer ID	It is FFS how / if this IE will be created.
Not available	Change Reporting Supported Indication Flag	PMIP does not support Change Reporting. So this flag can not be used. The functional impact due to this limitation is FFS.

7.1.10 Parameters Mapping in Mobility Management Procedure with SGW Relocation

7.1.10.1 GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario with PCC

7.1.10.1.1 GTP-Modify Bearer Request to Diameter-CC-Request

The IE/AVP mapping from GTP- Modify Bearer Request to Diameter-CC-Request is listed as table below. The following table shows only the necessary IEs of GTP- Modify Bearer Request to construct Diameter-CC-Request:

Table 7.1.10.1.1-1: IE/AVP mapping from Modify Bearer Request to Diameter-CC-Request

IEs in Source Modify Bearer Request	Target CC-Request IEs	Comments
RAT Type	RAT-Type	Detailed Value mapping is FFS.
User Location Information	3GPP-User-Location-Info	
Bearer Level QoS	QoS-information	IWP needs to convert these two IEs to construct this QoS information.
Aggregate Maximum Bit Rate (APN-AMBR)		
User Location Information (ULI)	3GPP-User-Location-Info	

7.1.10.1.2 Diameter-CC-Answer mapping to GTP- Modify Bearer Response

The IE/AVP mapping from Diameter-CC-Answer to GTP- Modify Bearer Response is listed as table below. The following table shows only the necessary IEs of Diameter-CC-Answer to construct GTP- Modify Bearer Response:

Table 7.1.10.1.2-1: IE/AVP mapping from Diameter-CC-Answer to GTP- Modify Bearer Response

IEs in Source CC-Answer	Target Modify Bearer Response IEs	Comments
Result	Cause	Detailed Value mapping is FFS.
Not available	Bearer Contexts	IWP includes this IE in the Modify Bearer Response message according to this IE in the corresponding Modify Bearer Request message.
Not available	Recovery	IWP allocates the value locally. This IE is only used on the GTP side. IWP shall not forward the Recovery information from SGW to the PGW. There is similar Restart and Recovery functionality for the PMIP side. IWP does not combine this functionality between the GTP side and PMIP side.

7.1.10.2 PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario with PCC

7.1.10.2.1 PMIP-Proxy Binding Update and Diameter-CC-Request to GTP-Modify Bearer Request

The IE/AVP mapping from PMIP-Proxy Binding Update and Diameter-CC-Request to GTP- Modify Bearer Request is listed as table below. The following table shows only the necessary IEs of PMIP-Proxy Binding Update and Diameter-CC-Request to construct GTP-Modify Bearer Request:

Table 7.1.10.2.1-1: IE/AVP mapping from PMIP-Proxy Binding Update and Diameter-CC-Request to GTP-Modify Bearer Request

IEs in Source Proxy Binding Update and Source CC-Request	Target Modify Bearer Request IEs	Comments
(PBU) Mobile Equipment Identity	ME Identity (MEI)	
(CCR) 3GPP-User-Location-Info AVP	User Location Information (ULI)	
(PBU) Serving Network	Serving Network	
(PBU) Access Technology Type Option	RAT Type	Detailed value mapping is FFS
	Change Reporting Support Indication	PMIP does not support Change Reporting. So this flag can not be used. The functional impact due to this limitation is FFS.
Not available	Recovery	IWP locally assigns the value. This IE is only used on the GTP side. IWP shall not forward the Recovery information from SGW to the PGW. There is similar Restart and Recovery functionality for the PMIP side. IWP does not combine this functionality between the GTP side and PMIP side.
(PBU) Fully Qualified PDN Connection Set Identifier	MME-FQ-CSID	
(PBU) Fully Qualified PDN Connection Set Identifier	SGW-FQ-CSID	
(CCR) 3GPP-MS-TimeZone AVP	UE Time Zone	
Not available	Private Extension	This IE is not available for PMIP side. Therefore, the IWP shall not forward this IE to the PMIP node, the functional limitation is FFS.

7.1.10.2.2 GTP- Modify Bearer Response to PMIP-Proxy Binding Acknowledgement

The IE mapping from GTP- Modify Bearer Response to PMIP-Proxy Binding Acknowledgement is listed as table below. The following table shows only the necessary IEs of GTP- Modify Bearer Response to construct PMIP-Proxy Binding Acknowledgement:

Table 7.1.10.2.2-1: IE mapping from GTP- Modify Bearer Response to PMIP-Proxy Binding Acknowledgement

IEs in Source Modify Bearer Response	Target Proxy Binding Acknowledgement IEs	Comments
Not available	Access Technology Type option	IWP copied from corresponding field of PBU.
Not available	Mobile Node Identifier option	IWP copied from corresponding field of PBU.
Not available	Service Selection Mobility Option	IWP copied from corresponding field of PBU.
PCO	Protocol Configuration Options	
APN Restriction	APN Restriction	
Cause	Status 3GPP Specific PMIPv6 Error Code	Detailed Value mapping is FFS
PGW-FQ-CSID	Fully Qualified PDN Connection Set Identifier	
Bearer Level Charging ID	Charging ID	
Not available	Handoff Indicator option	IWP copied from corresponding field of PBU.
Not available	Timestamp option	IWP copied from corresponding field of PBU.
Not available	GRE key option	IWP locally assigns the value.
Not available	PDN Connection ID	IWP copied from corresponding field of PBU.

7.1.11 Parameters Mapping in Mobility Management Procedure without SGW Relocation

7.1.11.1 GTP-based S8 vPLMN and PMIP-based S8 hPLMN scenario with PCC

7.1.11.1.1 GTP-Modify Bearer Request to Diameter-CC-Request

The IE/AVP mapping from GTP- Modify Bearer Request to Diameter-CC-Request is listed as table below. The following table shows only the necessary IEs of GTP- Modify Bearer Request to construct Diameter-CC-Request:

Table 7.1.11.1.1-1: IE/AVP mapping from Modify Bearer Request to Diameter-CC-Request

IEs in Source Modify Bearer Request	Target CC-Request IEs	Comments
RAT Type	RAT Type	Detailed value mapping is FFS.
User Location Information	3GPP-User-Location-Info	

7.1.11.2 PMIP-based S8 vPLMN and GTP-based S8 hPLMN scenario with PCC

7.1.11.2.1 Diameter-CC-Request to GTP-Modify Bearer Request

The IE/AVP mapping from Diameter-CC-Request to GTP- Modify Bearer Request is listed as table below. The following table shows only the necessary IEs of Diameter-CC-Request to construct GTP-Modify Bearer Request:

Table 7.1.11.2.1-1: IE/AVP mapping from Diameter-CC-Request to GTP-Modify Bearer Request

IEs in Source CC-Request	Target Modify Bearer Request IEs	Comments
(CCR) 3GPP-User-Location-Info AVP	User Location Information (ULI)	
RAT Type	RAT Type	Detailed Value mapping is FFS.
Not available	Change Reporting Support Indication	PMIP does not support Change Reporting. So this flag can not be used. The functional impact due to this limitation is FFS.
Not available	Private Extension	This IE is not available for PMIP side. Therefore, the IWP shall not forward this IE to the PMIP node, the functional limitation is FFS.

7.2 Mapping of parameters between GTP and PMIP without PCC support

8 Conclusions

8.1 3GPP access

8.1.1 Handover

As discussed in subclause 4.2.3, no problems are foreseen for intra PLMN Handover scenario. And also inter PLMN Handover with vPLMN without S8 variant change and both PLMN supports IWP scenario can be also covered but if one PLMN does not support IWP, it leads to fail Handovers. The case of inter PLMN Handover with vPLMN S8 change is out of 3GPP SA2 scope. So then it is also out of scope of the IWP.

8.1.2 IWP selection

There were identified that no additional impacts to the network entities are required except the preconfigured IWP address as P-GW and/or hPCRF into local DNS server so that S-GW can find P-GW and/or vPCRF can find hPCRF without awareness of IWP configuration.

8.1.3 Procedures and Parameters mapping

No problems for procedures are foreseen at this stage. It needs to be reviewed by CT3 before conclude.

8.1.4 Conclusion

Overall conclusion is not reached yet.

8.2 Conclusion

Even though the study of the feasibility of IWP for interworking between GTP based and PMIP based S8 interfaces is not fully completed in Release 9 timeframe, it is identified that there are not enough interests to proceed this study further more at this stage in later Releases. Therefore it is decided to suspend this TR unless the requests for this study are expressed again.

The current TR includes mainly two parts, the one is 3GPP access part, and the other is non-3GPP access part. The issues which have not been finished in this feasibility study are:

- The detailed analysis of IWP mechanisms for non-3GPP access. (section 5)

- The detailed analysis of parameters mappings for 3GPP and non-3GPP access. Some FFSs and Editor's NOTE still exist. (section 7)

- The detailed review of QoS/PCC aspects from CT3

Annex A:
Change history

Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
2009-06	C4-44	C4-091919			TR Skeleton		0.0.0
2009-06	C4-44	C4-092130			Define Scope, Reference, Abbreviations section	0.0.0	0.1.0
2009-06	C4-44	C4-091922			Define Requirements section. Define Interworking Scenario section and four sub clauses for each scenario. Define functional description of Interworking Proxy section.	0.0.0	0.1.0
2009-08	C4-45	C4-092606			Add sub clause 5.1.1. IWP selection principle for 3GPP access	0.1.0	0.2.0
2009-08	C4-45	C4-092607			Add sub clause 5.2.1 QoS provisioning in 3GPP access case. Also add alternarive1, provisional QoS approach.	0.1.0	0.2.0
2009-08	C4-45	C4-092467			Editorial modification for 4.2.1 general text for Scenario one.	0.1.0	0.2.0
2009-08	C4-45	C4-092608			Add U-Plane consideration into Scope section. Add U-Plane scenario into 4.2.1.5 PMIP-based S8 vPLMN and GTP-based S8 hPLMN. Add U-Plane scenario into 4.2.2.3 GTP-based S8 vPLMN and PMIP-based S8 hPLMN.	0.1.0	0.2.0
2009-10	C4-46	C4-093186			Add sub clause 6.1.1. Mapping of procedures for "PDN Connection Creation"	0.2.0	0.3.0
2009-10	C4-46	C4-093187			Add sub clause 6.1.2. Mapping of procedures for "S-GW Initiated PDN Connection Deletion"	0.2.0	0.3.0
2009-10	C4-46	C4-093188			Add sub clause 6.1.3. Mapping of procedures for "Dedicated Bearer Activation"	0.2.0	0.3.0
2009-10	C4-46	C4-093189			Add sub clause 6.1.4. Mapping of procedures for "P-GW Initiated Bearer Modification"	0.2.0	0.3.0
2009-10	C4-46	C4-093190			Add sub clause 6.1.5. Mapping of procedures for "P-GW Initiated Dedicated Bearer Deactivation"	0.2.0	0.3.0
2009-11	C4-47	C4-093948			Add sub clause for IWP selection in Non-3GPP Access	0.3.0	0.4.0
2009-11	C4-47	C4-093949			Add sub clause for PDN Connection Creation for Non-3GPP access	0.3.0	0.4.0
2009-11	C4-47	C4-093950			Add sub clause for SGW Initiated PDN Connection Deletion for non-3GPP access	0.3.0	0.4.0
2009-11	C4-47	C4-093567			Add sub clause for Dedicated Bearer Activation for non-3GPP access	0.3.0	0.4.0
2009-11	C4-47	C4-093568			Add sub clause for P-GW Initiated Bearer Modification for non-3GPP access	0.3.0	0.4.0
2009-11	C4-47	C4-094092			Add sub clause for P-GW Initiated dedicated bearer activation for non-3GPP access	0.3.0	0.4.0
2009-11	C4-47	C4-093951			Add sub clause for mapping of procedure for S-GW Initiated Dedicated Bearer Activation with IWP for 3GPP access	0.3.0	0.4.0
2009-11	C4-47	C4-093952			Add sub clause for mapping of procedure for S-GW Initiated Bearer Modification with IWP for 3GPP access	0.3.0	0.4.0
2009-11	C4-47	C4-093953			Add sub clause for mapping of procedure for S-GW Initiated Dedicated Bearer Deactivation with IWP for 3GPP access	0.3.0	0.4.0
2009-11	C4-47	C4-094235			Add sub clause for Mapping of Location Management and Handover procedure flow procedure with IWP for 3GPP access. Add sub clause for Mapping of UE-triggered Service Request procedure for with IWP for 3GPP access.	0.3.0	0.4.0
2009-11	C4-47	C4-093955			Add sub clause for General section of mapping of parameters with IWP	0.3.0	0.4.0
2009-11	C4-47	C4-093956			Add sub clause for Mapping of parameters for the corresponding procedures with IWP as shown below: - PDN Connection Creation - S-GW Initiated PDN Connection Deletion - Dedicated Bearer Activation Initiated by PGW - P-GW Initiated Bearer Modification Initiated by PGW - P-GW Initiated Bearer Deactivation Initiated by PGW Add only sub clause, not include text for Mapping of parameters for the corresponding procedures with IWP as shown below - Dedicated Bearer Activation Initiated by SGW - P-GW Initiated Bearer Modification Initiated by SGW - P-GW Initiated Bearer Deactivation Initiated by SGW - Mobility Management Procedure with SGW Relocation - Mobility Management Procedure without SGW Relocation	0.3.0	0.4.0
2009-11	C4-47	C4-094093			Add sub clause for P-GW Initiated Resource Allocation	0.3.0	0.4.0

				Deactivation. The Non-3GPP access clause only.		
2009-12	CT-46	CP-090820		3GPP TR Presented for information in CT#46	0.4.0	1.0.0
2010-02	C4-48	C4-100642		5.1.2(non-3GPP access scenario): it is confirmed by SA2 that the assumption of TS23.401 is correct	1.0.0	1.1.0
2010-02	C4-48	C4-100724		Add contents into sub clause 7.1.10.1 and 7.1.10.2 for mapping of parameters "Mobility Management Procedure with SGW Relocation"	1.0.0	1.1.0
2010-02	C4-48	C4-100725		Add contents into sub clause 7.1.11.1 and 7.1.11.2 for mapping of parameters "Mobility Management Procedure without SGW Relocation"	1.0.0	1.1.0
2010-02	C4-48	C4-100869		5.1.1(3GPP access scenario): clarify that hPCRF and vPCRF are connected directly, without IWP, when LBO is applied.	1.0.0	1.1.0
2010-02	C4-48	C4-100727		Add contents into sub clause 7.1.5.1 and 7.1.5.2 for mapping of parameters "Dedicated Bearer Activation Initiated by SGW"	1.0.0	1.1.0
2010-02	C4-48	C4-100728		Add contents into sub clause 7.1.7.1 and 7.1.7.2 for mapping of parameters "P-GW Initiated Bearer Modification Initiated by SGW"	1.0.0	1.1.0
2010-02	C4-48	C4-100732		Add contents into sub clause 7.1.9.1 and 7.1.9.2 for mapping of parameters "P-GW Initiated Bearer Deactivation Initiated by SGW"	1.0.0	1.1.0
2010-02	C4-48	C4-100735		Clarify that the IWP allocates EBI, copies PTI from corresponding IE of Bearer Resource Command. 6.1.3.1,6.1.3.2,6,1,3A,1,6,1,4A,2,2,1,6,1,5A,2,2,1,7,1,2,2,1,7.1.6.1, 7.1.8.1	1.0.0	1.1.0
2010-02	C4-48	C4-100737		The relationship between multiple GTP tunnel and a PMIP tunnel for U-Plane. Add text into 4.2.1.5,4.2.2.3	1.0.0	1.1.0
2010-02	C4-48	C4-100738		Create sub clause 4.2.3 Handover scenarios. Handover scenario analysis	1.0.0	1.1.0
2010-02	C4-48	C4-100740		Create some issues conclusions into 8.1 3GPP access	1.0.0	1.1.0
2010-02	C4-48	C4-100741		Create sub clause 6.1.3A.3 non-3GPP access scenario for "Dedicated Bearer Activation initiated by S-GW"	1.0.0	1.1.0
2010-02	C4-48	C4-100742		Create sub clause 6.1.4A.3 non-3GPP access scenario for "Bearer Modification initiated by S-GW"	1.0.0	1.1.0
2010-02	C4-48	C4-100743		Create sub clause 6.1.5A.3 non-3GPP access scenario for "Dedicated Bearer Deactivation initiated by S-GW"	1.0.0	1.1.0
2010-02	C4-48	C4-100745		Create sub clause 6.1.6.3 non-3GPP access scenario for Location Management and Handover procedure describing that there are no scenario for non-3GPP in TS23.402. Create sub clause 6.1.6.4 Handovers between 3GPP access and non-3GPP access.	1.0.0	1.1.0
2010-02	C4-48	C4-100747		S6b interface consideration for non-3GPP in sub clause 5.1.2 non-3GPP access scenario with three possible approaches.	1.0.0	1.1.0
2010-02	C4-48	C4-100749		Add text describing that there are no UE-triggered Service Request scenario for non-3GPP in TS23.402. 6.1.7.2	1.0.0	1.1.0
2010-02	C4-48	C4-100751		Create sub clause 5.1A "IP Address Allocation Mechanism". The three possible approaches for IPv4 deferred address allocation are introduced.	1.0.0	1.1.0
2010-02	C4-48	C4-100643		Create sub clause 6.0 "General".	1.0.0	1.1.0
2010-05	C4-49	C4-101201		Stop this study. Describe the reason and open issues in sub clause 8.4.	1.1.0	1.2.0