

Bearer Re-establishment

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Feature Summary and Revision History

Summary Data

Applicable Product(s) or Functional Area	• P-GW • SAEGW
Applicable Platform(s)	• ASR 5500 • VPC-DI • VPC-SI
Feature Default	Disabled - Configuration Required
Related Changes in This Release	Not applicable
Related Documentation	• *Command Line Interface Reference* • *P-GW Administration Guide* • *SAEGW Administration Guide*

Table 1: Revision History

Revision Details	Release
First introduced	21.19

Introduction to Bearer Re-establishment

A UE Relay Network comprises of multiple RAN and EPC nodes.

In some deployments, one MME can play the role of both User-UE MME and Relay-UE MME.

In a UE Relay network, System Architecture Evolution Gateways (SAEGWs) are deployed to play the role of combined 'Relay-UE's SGW/P-GW'. The SAEGWs are configured using only local-policy (that is no connection to PCRF).

As part of initial attach request from Relay Node UE, P-GW (in the aforementioned SAEGW) creates dedicated bearers (for example, QCI-1 for GBR and QCI5 for non-GBR) on top of the default bearer (for example, QCI6). This is done based on an appropriate local policy configuration which is described in later sections of this chapter.

When RF condition degrades, Relay Node UE loses the RRC connection to macro eNB. As a result, macro eNB initiates an S1 Release procedure with abnormal cause (for example, 'Radio Connection with UE lost' or 'unspecified'). For these type of causes MME typically preserves non-GBR bearer and deletes GBR bearers. As a result, GBR bearers (for example, QCI-1 bearer) is deleted by the MME.

After the RRC Connection is re-established, the Relay Node UE sends Service Request to the MME. The MME sends Initial Context Setup Request to macro eNB to set up the previously preserved non-GBR bearers. The MME does not re-establish the GBR bearer since it was not preserved. As a result, Relay Node UE does not have the GBR bearer until a full re-attach procedure occurs.

Since GBR bearer is not re-established, the GBR traffic is carried over the default non-GBR bearer and the voice performance is degraded.

Using this feature SAEGW is able to re-establish the previously deleted GBR bearer when MME sends the Modify Bearer Request to re-establish the preserved the non-GBR bearers.

How it Works

SAEGW re-establishes the previously deleted GBR bearer when MME sends the Modify Bearer Request, to re-establish the preserved non-GBR bearers.

This is achieved in SAEGW using two different mechanisms:

- Forwarding the Modify Bearer Request from SGW to P-GW
- P-GW to invoke local policy with a new event restore-bearers

Enabling Modify Bearer Request Forward from S-GW to P-GW

Use the following configuraion to enable forced forwarding of Modify Bearer Request from S-GW to P-GW:

```
configure
   context context_name
      sgw-service service_name
         enable-bearer-restore
         end
```

In S-GW service, whenever **enable-bearer-restore** option is set, modify bearer request is forwarded by S-GW to P-GW. It happens when the S-GW service is under SAEGW service.

For example:

```
config
   context ingress
     sgw-service sgw-service
        enable-bearer-restore
```

Note

- Without this CLI, S-GW only forwards the Modify Bearer Request message to P-GW if certain conditions are met. For example. RAT change, TimeZone change, ULI change, Handover indication flag, and so on as per 3GPP specifications.
- To avoid forwarding Modify Bearer Requests unnecessarily to P-GW, **enable-bearer-restore** should only be used when local policy is configured for **restore-bearer** event as described in next section.

P-GW Invokes Local Policy with New Event Restore-Bearers

A list of events supported under `eventbase` is enhanced with `restore-bearers`. This event is invoked when P-GW gets a Modify Bearer Request from S-GW. If local policy configuration has the **restore-bearer** event under **eventbase** then corresponding rules are applied.

Use the following configuration to re-establish missing bearers under local policy:

```
configure
   local-policy-service local_policy_name
      eventbase eventbase_name
         [ no ] rule priority integer
            event restore-bearers ruledef ruledef_name actiondef actiondef_name
            end
```

Following is an example for local policy configuration:

```
  local-policy-service local_policy
    ruledef apn_apn2
      condition priority 100 apn match apn2.com
    #exit

ruledef apn_apn1
      condition priority 100 apn match apn1.com
    #exit

    ruledef ded_bearer_creation_fail
      condition priority 100 apn match apn2.com
      condition priority 200 cause-code match 72 73 90 100 110
    #exit

    actiondef apn2_newcall
      action priority 100 allow-session
      action priority 500 activate-rule name apn2_dedicated_grp_of_rd
      action priority 600 activate-rule name apn2_qci1_dedicated_grp_of_rd
    #exit

    actiondef apn2_restore_bearer_config
      action priority 100 allow-session
      action priority 500 activate-rule name apn2_dedicated_grp_of_rd
```

```
      action priority 600 activate-rule name apn2_qci1_dedicated_grp_of_rd
    #exit

    actiondef apn2_retry_dedicated_bearer
      action priority 500 activate-rule name apn2_dedicated_grp_of_rd
      action priority 600 activate-rule name apn2_qci1_dedicated_grp_of_rd
      action priority 700 retry-count 4
      action priority 2000 allow-session
    #exit

actiondef apn1_newcall
      action priority 100 allow-session
    #exit

eventbase default
      rule priority 100 event new-call ruledef apn_apn1 actiondef apn1_newcall
      rule priority 200 event new-call ruledef apn_apn2 actiondef apn2_newcall
     rule priority 400 event rule-report-status ruledef ded_bearer_creation_fail actiondef
 apn2_retry_dedicated_bearer
      rule priority 600 event restore-bearers ruledef apn_apn2 actiondef
apn2_restore_bearer_config
    #exit
```

The key point in the above configuration is that both "new-call" and "restore-bearers" events, the actiondefs comprise of same actions. As a result, any missing bearer (such as a QCI-1 GBR bearer) is established.

At the time of "new-call" event, both QCI-1 (GBR) and QCI-5 (non-GBR) bearers are created. At the time of "restore-bearer" event, local policy will return actions to create both QCI-1 and QCI-5 bearers but since QCI-5 bearer already exists (as it was preserved), only QCI-1 bearer is established.

Show Commands and Outputs

show saegw-service statistics all

The output of this command displays the number of times SGW forwards modify bearer request to PGW due to flag enable-bearer-restore:

The output of this command includes the following fields:

MBR:— Displays the Dynamic User Plane Selection Statistics:

- Attempted — Displays the number of modify bearer request attempts between S-GW and P-GW due to flag enable bearers restore.
- Successful— Displays the total number of succesful modify bearer request between S-GW and P-GW due to flag enable bearers restore.
- Failure — Displays the total number of failure modify bearer request between S-GW and P-GW due to flag enable bearers restore.
- Mismatch DNS response — Displays mismatch DNS repsonse between S-GW and P-GW due to flag enable bearers restore.
- Negative DNS response — Displays negative DNS repsonse between S-GW and P-GW due to flag enable bearers restore.
- DNS timed out —Displays DNS timed out between S-GW and P-GW due to flag enable bearers restore.

show local-policy statistics all

The output of this command displays the list of events under event-base local-policy when S-GW sends modify bearer request to P-GW.

The output of this command includes the following fields:

Restore Bearers — Displays the restore-bearer enable and disable in local policy configuration.