

# Overcharging Protection

Overcharging Protection helps to avoid charging subscribers for dropped downlink packets while the UE is in idle-mode.


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# Feature Description

For Non-GBR (Guaranteed Bit Rate) 4G bearers, the P-GW is not aware when the UE loses radio coverage, and will continue to forward and charge downlink packets, which can result in overcharging of subscribers. 3GPP does not specify a standard solution to deal with such scenarios.

A typical example is when a subscriber drives into a tunnel while having an active download session. Downlink packets will be counted in P-GW before discarded later in S-GW due to the UE not responding to paging.

The subscriber may lose coverage while connected to a particular MME/S-GW and later regain coverage in the same or diiferent MME/S-GW.

The subscriber may lose coverage in 4G and regain coverage in 2G/3G, or vice versa.

Gn and S3/S4 based network architecture may be used in the case of Loss of Radio Coverage.

A valid license key is required to enable Overcharge Protection on the MME. Contact your Cisco Account or Support representative for information on how to obtain a license.

## Relationships to Other Features

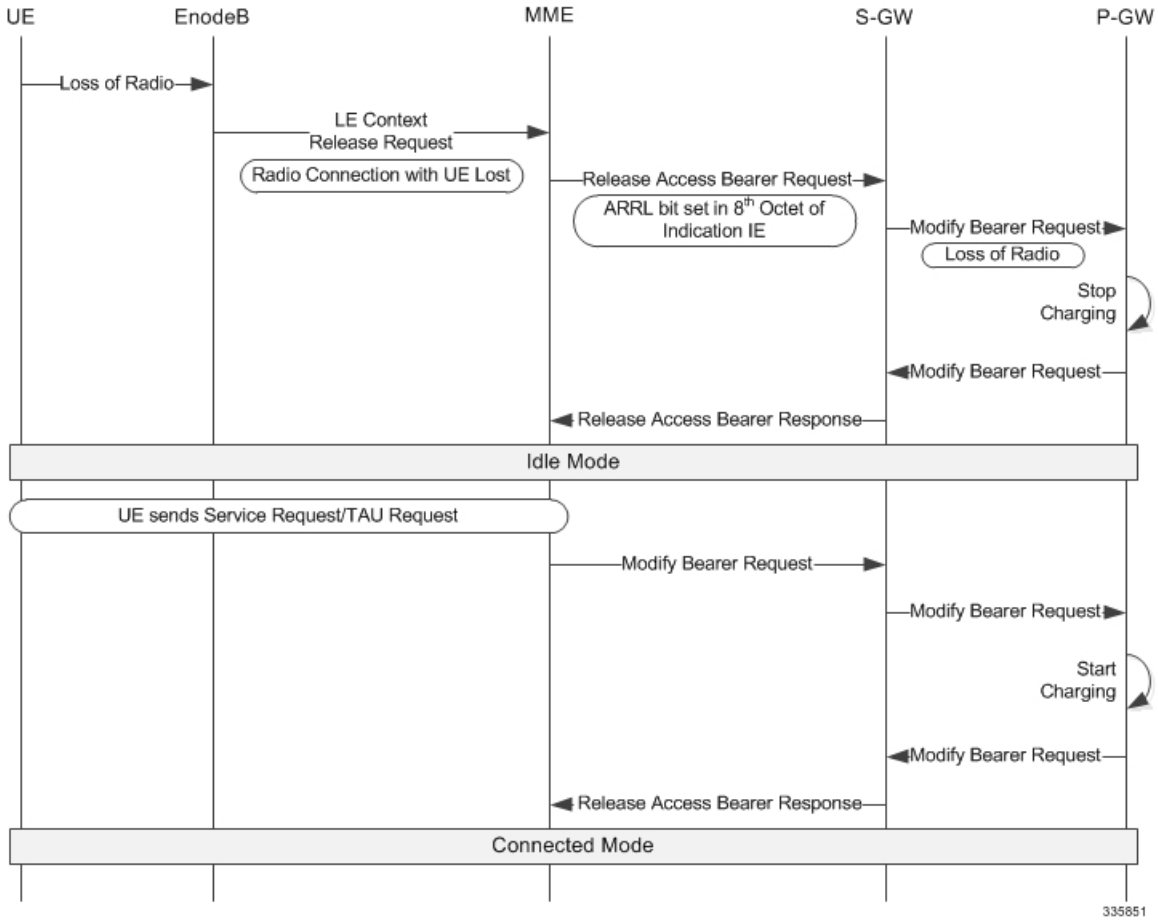
Overcharging protection on the MME requires separate overcharging protection licenses on the S-GW and P-GW.

# How It Works

## Call Flows

The following diagram depicts the call flow when a UE loses radio access, and then later regains access, as it relates to overcharging protection.

***Figure 1: Overcharging Protection Call Flow***




Overcharging protection in MME is triggered by a UE Context Release Request from the eNodeB. This request can come to MME when UE is in EMM connected/connecting mode.

On receiving the UE Context Release Request, the MME checks the radio cause in the received message against the configured overcharging protection cause code.

If the configured cause code matches the received cause code, the MME sends Loss of Radio Contact using ARRL (Abnormal Release of Radio Link) bit in the Release Access Bearer Request (GTPv2 message) to the S-GW. The ARRL (Abnormal Release of Radio Link) is bit 7 in the 8th Octet of Indication IE of Release Access Bearer Req message.

On Receiving ARRL indication in Release Access Bearer Request , the S-GW will inform the P-GW to stop charging.

When the radio contact is resumed in the 4G network, the Modify Bearer Req will enable the P-GW to start charging again.

The ARRL bit is supported only in Release Access Bearer Request message by MME.

# Configuring Overcharge Protection

## Enabling Overcharging Protection

To enable overcharging protection for a specific MME service, issue the following commands:

```
configure
  context context_name
    mme-service svc_name
      policy overcharge-protection s1ap-cause-code-group group_name
      end
```

To disable overcharging protection:

```
no policy overcharge-protection
```

## Configuring S1AP Cause Code Group and Cause Code

To configure the S1AP Cause Code Group and S1AP cause code "Radio Connection With UE Lost (21)":

```
configure
  lte-policy
    cause-code-group group_name protocol s1ap
      class radio cause radio_cause_code
      end
```

Notes:

- For example, to define a cause code group for the code "Radio Connection With UE Lost", enter: **class radio cause 21**

## Verifying the Overcharge Protection Configuration

The **Overcharge Protection** field has been added to the output of **show mme-service name** *service_name* to display the configuration of this feature, either "Not configured" or showing the configured S1-AP cause code group name:

```
Policy Inter-RAT Indirect Fwd Tunnels    : Never
Policy Inter-RAT Ignore SGSN ContextID   : Disabled
Policy S1-Reset                          : Idle-Mode-Entry
Overcharge Protection                    : Cause Code Group grp1
```