Support for Presence Reporting Area and Extended QOS on Offline Charging Interface for P-GW and SAEGW

Feature Summary and Revision History

Summary Data

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

Revision History

Revision Details	Release
This release supports Diameter offline charging on Rf interface for P-GW and SAEGW.	21.20.5

Feature Description

P-GW and SAEGW supports the following Attribute Value Pairs (AVP) and functionalities in diameter offline charging (RF) interface.

- **Originating-User-Location-Info** –This AVP holds value of 3GPP **User-Location-Info** AVP at the Packet Switch (PS) Information AVP in the Rf accounting (ACR) message for Long-Term Evolution (LTE) and General Packet Radio Service (GPRS).

- **Originating BSID** –This AVP holds value of 3GPP2-BSID AVP for Enhanced High-Rate Packet Data (eHRPD) at the PS Information AVP in the Rf accounting (ACR) message.

- **Grouped QoS-Information AVP with 5G-related sub-AVPs**– This AVP is enhanced with extended bit rates using 5G related sub AVP's. The 5G related sub AVP's are available at Service Data Container (SDC) level and **APN-AMBR** AVP values at PS level.

- **Presence Reporting Area Information** –P-GW and SAEGW supports the core network of signle and Multi Presence Reporting Area (PRA) information for only LTE and GPRS at Service Data Container (SDC) level in Rf accounting (ACR) message.

- **Change-Condition** –This AVP holds value of 24 for **Change of UE Presence in Presence Reporting Area** at SDC level in Rf accounting (ACR) message.

Limitations

The following are the limitations:

- User Equipment (UE) Dedicated Presence Reporting Area is not supported.

- Presence-Reporting-Area-Element-List AVP not supported. This AVP is applicable only for UE-Dedicated PRA support.

Handling Single and Multi-Presence Reporting Area on Rf Interface

During an IP-CAN session, the Policy and Charging Rules Function (PCRF) determines whether the reports for change of the UE presence in the Presence Reporting Area (PRA) are required for an IP-CAN session. If the reporting is required for the IP-CAN session, the PCRF provides PRA information AVP, which contains the PRA identifier within the **Presence-Reporting-Area-Identifier** AVP to the P-GW. The PCRF activates the reporting changes of the UE presence in the PRA by subscribing to the**CHANGE_OF_UE_PRESENCE_IN_PRESENCE_REPORTING_AREA_REPORT** event trigger at the P-GW at any time during the entire IP-CAN session.

When the UE enters or leaves the PRA, P-GW reports the
CHANGE_OF_UE_PRESENCE_IN_PRESENCE_REPORTING_AREA change condition in Rf messages
(ACR-Interim). In addition, the P-GW reports the PRA identifier within **Presence-Reporting-Area-Identifier**
AVP included in `Presence-Area-Information` AVP when UE is inside the PRA.

Handling both single and multiple Presence Reporting Area

To handle both single and multiple PRA:

- Add the **Change of UE Presence in Presence Reporting Area** value in **Change-Condition** AVP at
  SDC level every time when change of UE presence in PRA is received from access side along with other
  change conditions.

- P-GW includes:

    - extended MBR, GBR and APN-AMBR AVP values, if it received from PCRF or access side, to
      send in the accounting messages at SDC level

    - extended APN-AMBR AVP values, if it received from access or PCRF side, to send in the accounting
      messages at PS level

- Set the **Originating-User-Location-Info** AVP value during session creation for LTE/S4-SGSN RAT
  type when ULI IE received from access side and send value in ACR-Start message over Rf interface.
  Once Originating-User-Location-Info value is set, same value is sent in subsequent messages irrespective
  of any type of Hand Over (HO) for P-GW service.

- Set the **Originating-BSID** AVP value during session creation for eHRPD RAT type and send value in
  the ACR-Start message over Rf interface. Once Originating-BSID value is set, same value is sent in
  subsequent messages irrespective of any type of HO for P-GW service.

> **Note** Originating-User-Location-Info AVP and Originating-BSID AVP values are not
> supported during session creation for 3G and WI-FI RAT types.

PRA Information IE are present in following messages:

- Create Session Request

- Create Bearer Response

- Modify Bearer Request

- Update Bearer Response

Behavior Matrix

The following table describes message type behavior for E-UTRAN.

Table 1: E-UTRAN

Message Type	Presence-Reporting-Area-Information AVP	Originating-User-Location-Info AVP	Originating-BSID AVP
Create-Session-Request	-	ACR-Start	ACR-Start
Modify-Bearer-Request	ACR-Interim	ACR-Interim	ACR-Interim
Create-Bearer-Response	ACR-Interim .	ACR-Interim	ACR-Interim
Delete-Session-Request	ACR-Stop	ACR-Stop	ACR-Stop
Delete-Bearer-Command	ACR-Interim/Stop	ACR-Interim/Stop	ACR-Interim/Stop
Update-Bearer-Response	ACR-Interim	ACR-Interim	ACR-Interim
Delete-bearer-Request	ACR-Interim/Stop	ACR-Interim/Stop	ACR-Interim/Stop

The following table describes RAT type behavior.

Table 2: RAT Type

RAT Type	Presence-Reporting-Area-Information AVP	Originating-User-Location-Info AVP	Originating-BSID AVP
3G/2G	Not Supported	Supported	Not Supported
E-UTRAN	Supported	Supported	Not Supported
NB-IOT	Not Supported .	Not Supported	Not Supported
Trusted-Wifi	Not Supported	Not Supported	Not Supported
Untrusted-Wifi	Not Supported	Not Supported	Not Supported
eHRPD	Not Supported	Not Supported	Supported

The following table describes Handoff expected behavior.

Table 3: Handoff

Handoff	Presence-Reporting-Area-Information AVP	Originating-User-Location-Info AVP	Originating-BSID AVP
E-UTRAN --> NB-IOT	Not Supported	Supported	Not Supported
NB-IOT --> E-UTRAN	Not Supported	Not Supported	Not Supported
E-UTRAN->3G/2G	Not Supported .	Supported	Not Supported

Handoff	Presence-Reporting-Area-Information AVP	Originating-User-Location-Info AVP	Originating-BSID AVP
E-UTRAN->3G2G->E-UTRAN	Not Supported	Supported	Not Supported
3G2G->E-UTRAN	Not Supported	Supported	Not Supported
3G2G->E-UTRAN->3G2G	Not Supported	Supported	NotSupported
E-UTRAN-->WIFI	Not Supported	Supported	Not Supported
E-UTRAN->WIFI->E-UTRAN	Supported	Supported	Not Supported
WIFI->E-UTRAN	Supported	Not Supported	Not Supported
WIFI->E-UTRAN->WIFI	Not Supported	Not Supported	Not Supported
E-UTRAN --> eHRPD --> E-UTRAN	Supported	Supported	Not Supported
eHRPD --> E-UTRAN	Supported	Not Supported	Not Supported
eHRPD --> E-UTRAN --> eHRPD	Not Supported	Not Supported	Supported

Configuring IMS Authorization Service at Context Level

Use the following example to configure IMS Authorization service at context level for IMS subscribers in LTE/ GPRS networks.

```
configure
    context <context_name>
        ims-auth-service <imsa_service_name>
            policy-control
                diameter origin endpoint <endpoint_name>
                diameter dictionary <dictionary>
                diameter encode-supported-features
extended-bw-newradio multiple-pra cno-uli
                diameter host-select table { 1 | 2 } algorithm
round-robin
                diameter host-select row-precedence <precedence_value>
table { 1 | 2 } host <primary_host_name> [ realm <primary_realm_id> ] [ secondary
 host <secondary_host_name> [ realm <secondary_realm_id> ] ] [ -noconfirm ]
                exit
```

Notes:

- *<context_name>* must be the name of the context where you want to enable IMSA service.

- *<imsa_service_name>* must be the name of the IMSA service to be configured for Rf interface authentication.

- **extended-bw-newradio**: Enables Extended Bandwidth with New-Radio feature.

- **multiple-pra** : Enables Multiple Presence Reporting Area Information Reporting feature.

- **cno-uli** : Enables Presence Reporting Area Information Reporting feature.

Configuring AAA Group

Use the following configuration commands to configure the Accounting group for Rf interface.

```
configure
    context context_name
        aaa group group_name
          diameter accounting dictionary  {aaa-custom4 | aaa-custom3}
          diameter accounting endpoint rf
          diameter accounting server  rf_server priority 1
        exit
```

Notes:

- **aaa group** *group_name*: Specifies the AAA server group. *group_name* must be an alphanumeric string of 1 through 63 characters.

- **diameter accounting dictionary** *{aaa-custom4 | aaa-custom3}* : Enables aaaa-custom4 and aaa-custom3 diameter accounting dictionaries.

  > **Note** The Presence Reporting Area (PRA) and Extended QOS on Offline Charging Interface feature supports only {aaa-custom4 | aaa-custom3} dictionaries.

- **diameter accounting endpoint** : Enables diameter accounting endpoint on Rf interface.

- **diameter accounting server** *rf_server priority 1*: Enables multiple rf server priorities.