External-Id Support from S6b Interface

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	Enabled - Always On
Related Changes in This Release	Not applicable
Related Documentation	• *P-GW Administration Guide* • *SAEGW Administration Guide*

Revision History

Revision Details	Release
First introduced.	21.20

Feature Description

LTE Network Elements (NE), which supports Mobile Station International Subscriber Directory Number (MSISDN) as an identifier for UE, currently supports External-Id as an alternative ID for the MSISDNLess device. This is required to authorize Mobile Private Network (MPN) call using 3GPP External-Id for the MSISDNLess device.

External-Id is received in the Network Access Identifier (NAI) format with a maximum size of 22 characters. The operator must ensure the correct format and size of the External-Id value.

Note   An MSISDNLess UE is assigned with an International Mobile Subscriber Identity (IMSI) number.

The LTE interfaces such as Gx, Rf, S6b, and RADIUS accounting messages pass External-Id as an alternative ID of MSISDN.

Note   Gy/Rf and Gz/CDR interfaces are not required to support External-Id value.
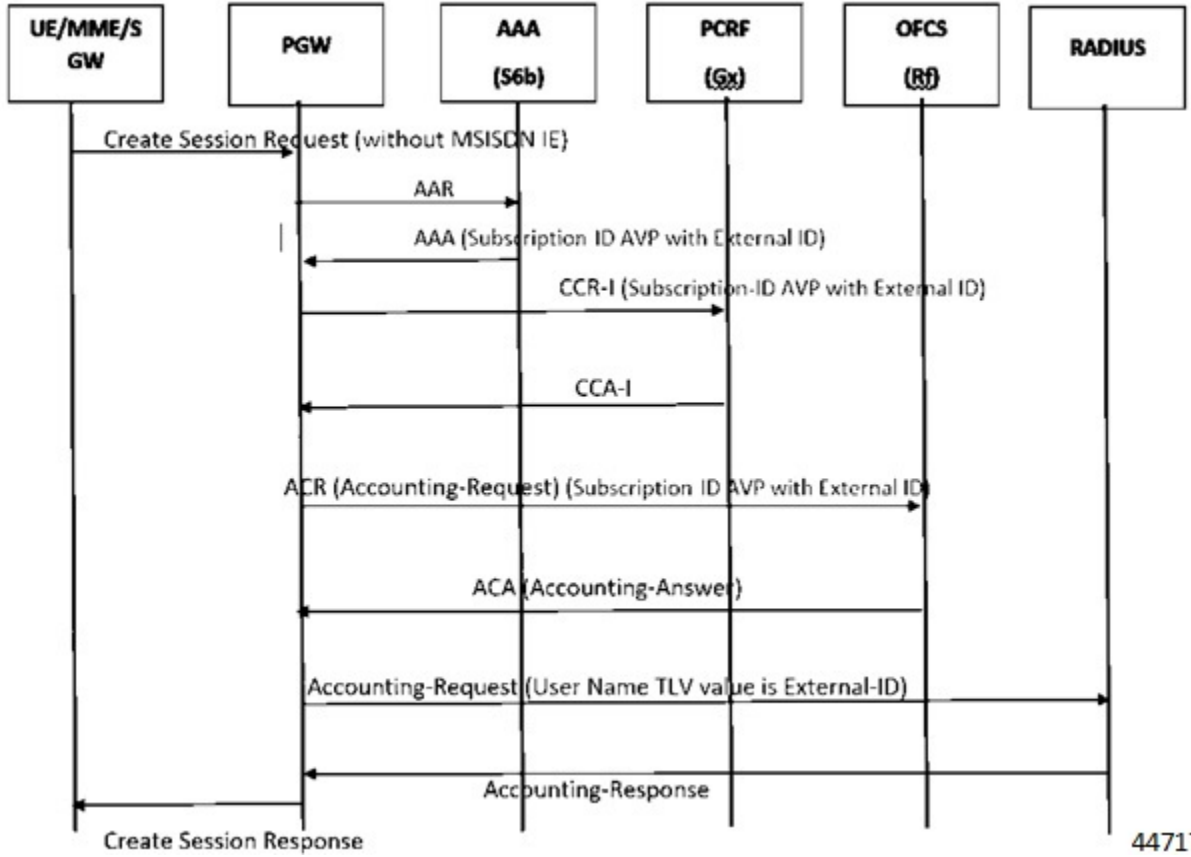
Limitations

Following are the limitations:

- External-Id value supports only E-UTRAN and E-UTRAN NB-IOT RAT types.

- External-Id is not supported for Handover scenarios. For example, LTE to 3G and LTE to Wi-Fi handovers and vice versa.

How it Works

The following call flow and procedure describes how the feature works:

Figure 1: Call flow for New Session Establishment

Table 1: Procedure

Step	Description
1	The S-GW sends a Create Session Request message with or without MSISDN IE for MSISDNLess LTE UE devices to the P-GW.
2	The P-GW receives Creation Session Request message and sends authentication/authorization request message to 3GPP AAA server over S6b interface when external authentication is enabled.
3	The P-GW receives External-Id value in subscription-Id AVP from 3GPP AAA server over S6b interface. This value inherits all the sub sessions of session or pointer. **Note** External-Id received during initial attach persists throughout the session. The External-Id that is received from the S6b server after the initial attachment is ignored.
4	P-GW propagates External-Id value to PCRF in Credit Control Request (CCR) Initial message over Gx interface for getting policies and Offline Charging System (OFCS) over Rf interface for diameter-based accounting or RADIUS accounting server.

Step	Description
5	The MME sends a Monitoring Response (SCEF Reference ID, Cause) message to the SCEF to acknowledge acceptance of the Monitoring Request and to provide the requested monitoring information or to acknowledge the deletion of the identified monitoring event configuration, if it was requested.
6	The SCEF sends a Monitoring Response (TLTRI, Cause, Monitoring Event Report) message to the SCS/AS to acknowledge acceptance of the Monitoring Request and to provide the requested monitoring information in the Monitoring Event Report parameter or to acknowledge the deletion of the identified monitoring event configuration at the time of request. **Note** At P-GW, if S6b interface is not configured for LTE call or External-Id value is not received in AAA message from 3GPP AAA server, then a call is continued and session is established

Sample Behavior Scenarios

Following are Message types and the behavior of External-Id in Gx and Rf interfaces.

Table 2: RAT Type Behavior

RAT Type	Behavior
3G	External-Id value not supported
EUTRAN	External-Id value supported
NB-IoT	External-Id value supported
Trusted-Wi-Fi	External-Id value not supported
Untrusted-Wi-Fi	External-Id value not supported
eHRPD	External-Id value not supported

Table 3: Handoff Behavior

Handoff	Behavior
E-UTRAN > **NB-IoT**	External-Id value supported
NB-IoT > **E-UTRAN**	External-Id value supported
E-UTRAN > **3G**	External-Id value not supported*
E-UTRAN > **3G** > **E-UTRAN**	External-Id value not supported*
3G > **E-UTRAN**	External-Id value not supported*
3G > **E-UTRAN** > **3G**	External-Id value not supported*

Handoff	Behavior
E-UTRAN > **Wi-Fi**	External-Id value not supported*
E-UTRAN > **Wi-Fi** > **E-UTRAN**	External-Id value not supported*
Wi-Fi > **E-UTRAN**	External-Id value not supported*
Wi-Fi > **E-UTRAN** > **Wi-Fi**	External-Id value not supported*

Note * If UE is attached with supported RAT type and moved to not supported RAT type, then external-Id is not supported for all the subsequent handovers(HO).

Monitoring and Troubleshooting

This section provides information regarding show commands and bulk statistics available to monitor and troubleshoot the External-Id feature support over S6b interface.

Show Commands and Outputs

show subscribers pgw-only full all

show subscribers pgw-only full all

The following example displays the External ID value in output:

```
Username: 0121234569085403@nai.epc.mnc023.mcc121.3gppnetwork.org
  Subscriber Type : Visitor
  Status          : Online/Active
  State           : Connected
  Connect Time    : Wed Mar 18 11:29:09 2020
  Auto Delete     : No
  Idle time       : 03h23m01s
  MS TimeZone     : n/a              Daylight Saving Time: n/a
  Access Type: gtp-pdn-type-ipv4     Network Type: IP
  Access Tech: eUTRAN                    pgw-service-name: pgw-ingress
  Callid: 00004e3c                      IMSI: 121234569085403
  MSISDN: n/a                           External ID: 9326737200@abc.com
  Interface Type: S5S8GTP          Low Access Priority: N/A
  TWAN Mode: N/A
  eMPS Bearer: No
  Emergency Bearer Type: N/A
  IMS-media Bearer: No
  S6b Auth Status: Enabled
  Access Peer Profile: default
  Acct-session-id (C1): AC100A1E00000034
  ThreeGPP2-correlation-id (C2): 004112D9 / 002sujt5
  Card/Cpu: 1/0                          Sessmgr Instance: 1
```

show subscribers saegw-only full all

The following example displays the External ID value in output:

- ```
  pgw# show subscribers saegw-only full all
  ```

```
Username           : 0214365789012345@nai.epc.mnc036.mcc214.3gppnetwork.org
  SAEGW Call mode  : Co-located
  Subscriber Type  : Visitor
  Status           : Online/Active
  State            : Connected
  Bearer State     : Active
  Connect Time     : Thu Apr 23 21:59:35 2020

  SAEGW UID        : 10001
  Idle time        : 00h04m09s
  Auto Delete      : No
  Fastpath Eligible  : No

  Callid           : 00004e21                 IMSI              : 214365789012345

  Card/Cpu         : 1/0                      Sessmgr Instance    : 1
  Source context   : ingress                  Destination context : egress
  Bearer Type      : Default                  Bearer-Id           : 5
  Access Type      : gtp-pdn-type-ipv4        Network Type        : IP
  Access Tech      : eUTRAN                   saegw-service-name  : saegw-service
  MSISDN           : n/a                      External ID       : 9900000000@abc.com

  TWAN Mode        : N/A
  eMPS Bearer      : No
  MS TimeZone      :                          Daylight Saving Time: n/a
```

show pgw service statistics all

The following example displays the External ID value in output:

```
show pgw-service statistics all
VPN Name: local
Subscribers Total:
  Active: 1
  S6b Assume Positive: 0
PDNs Total:
  Active:  1     Setup: 1
  Released:  0     Rejected: 0
Session Discovery Req statistics:
  Total IMSI+IP lookup: Total get call info evt for Rule Info:
      Attempted:  0        Attempted: 0
      Success:  0        Success: 0
      Failed:  0        Failed: 0
  Total get session info events for session sync: 0
External-Id Present Session Statistics:
  Active Sessions: 1    Total Created Sessions: 1
  Released Sessions:  0
```

show saegw-service statistics all

show saegw-service statistics all function pgw

The following example displays the External_Id value in output:

```
Subscribers Total:
  Active: 1
  S6b Assume Positive: 0
PDNs Total:
  Active: 1    Setup:  1
  Released: 0    Rejected: 0
Session Discovery Req statistics:
  Total IMSI+IP lookup:   Total get call info evt for Rule Info:
      Attempted:  0       Attempted: 0
      Success:    0       Success:   0
      Failed:     0       Failed:    0
  Total get session info events for session sync: 0
External-Id Present Session Statistics:
  Active Sessions: 1    Total Created Sessions:   1
  Released Sessions: 0
```

Bulk Statistics

This section provides information on the bulk statistics for the External-id feature suuport over s6b interface.

P-GW Schema

The following bulk statistics are added for P-GW in the P-GW schema in support of the External-id feature.

Counters	Description
external-id-active-sessions	Number of active sessions with external-id from s6b.
external-id-total-sessions	Number of total sessions with external-id from s6b.

SAEGW Schema

The following bulk statistics are added for SAEGW in the SAEGW schema in support of the External-id feature.

Counters	Description
external-id-active-sessions	Number of active sessions with external-id from s6b.
external-id-total-sessions	Number of total sessions with external-id from s6b.