



PLMN Level Statistics for SaMOG Services

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Feature Summary and Revision History

Summary Data

| | |
|--|--|
| Applicable Product(s) or Functional Area | SaMOG |
| Applicable Platform(s) | <ul style="list-style-type: none"> • ASR 5500 • ASR 5700 • VPC-DI • VPC-SI |
| Feature Default | Disabled - Configuration Required |
| Related Changes in this Release | Not Applicable |
| Related Documentation | <ul style="list-style-type: none"> • <i>SaMOG Administration Guide</i> • <i>Command Line Interface Reference</i> • <i>Statistics and Counters Reference Guide</i> |

Revision History

| Revision Details | Release |
|---|---------|
| In this release, SaMOG supports PLMN level statistics for Samog services. | 21.23 |

Feature Description

The SaMOG level statistics that are available at the SaMOG system level does not allow operators pin-point issues to certain users of the network. PLMN-based statistics is captured and displayed in the CLI and bulk statistics to help operators localize failures to a particular circle. The PLMN-based statistics allows operators to decide on the load that is generated on the SaMOG from different circles and helps in network planning.

- SaMOG extracts the PLMN information, such as Mobile Country Code (MCC) and Mobile Network Code (MNC) from International Mobile Subscriber Identity (IMSI) received in the Radius Access Request message.
- SaMOG associates PLMN list to samog-services to enable the collection of PLMN level statistics for all the PLMN's present in the list.
- Displays PLMN statistics in CLI through mandatory options of MCC and MNC.
- Facility to clear the PLMN-based statistics for all PLMNs and for a specific PLMN based on MCC and MNC.
- The PLMN statistics is applicable only for the combination of RADIUS Access-Request based triggers, EoGRE user-plane, Diameter-based authentication with AAA on STa interface and GTPv2 based S2A interface.
- Displays PLMN level statistics of all the PLMNs in the **samog-plmn schema** bulk statistics.

Configuring PLMN-list

Use the following PLMN list command to capture the statistics at PLMN level. PLMN level statistics will be captured, only if the IMSI received during initial attach / Handoff belongs to one of the PLMNs in the associated PLMN list. By default no PLMN list is configured.

```

configure
  context context_name
    plmn-list plmn_list_name
      mcc mcc_value mnc mnc_value
    end

```

- **plmn-list**: Configures a list of PLMNs (MCC and MNC) and association to samog-service is required for capturing PLMN level statistics. A maximum of 25 PLMNs are allowed in a list. You can create a maximum of 10 PLMN lists for each context.
- **plmn_list_name**: Enter a name of size 1 to 63
- **mcc** *mcc_value*: Configures the PLMN MCC in the PLMN list. Enter a number, ranging from 100 to 999.

- **mnc mnc_value**: Configures the PLMN MNC in the PLMN list. Enter a number, ranging from 00 to 999.



Note List of MCCs with 3 digit MNCs are:

300 302 310 311 312 313 316 334 338 342 344 346 348 354 356 358 360 365 376 405 708 722 732

If you enter MCC, which is present in the above list, then MNC shall be of 3 digits. If you enter a 2-digit MNC for this case, then '0' shall be prefixed to it and stored in the memory. When "show plmn-list name plmn-name" command is executed, then MNC with prefixed '0' is displayed in the output.

Similarly, if user enters MCC which is NOT present in the above list, then MNC shall be of 2 digits. If user enters a 3-digit MNC for this case (with '0' prefixed), then the prefixed '0' shall be removed and stored in the memory. When "show plmn-list name plmn-name" command is executed, then MNC without prefixed '0' is displayed in the output. If the entered MNC is more than 99, then error message is displayed.

For all other combinations, it shall be stored and displayed as it is.

Associate PLMN List to SaMOG Services

Use the following command to associate the PLMN List with the SaMOG service.

```
configure
context context_name
samog-service service_name
[ no ] associate plmn-list plmn_value
end
```

Notes:

- **associate plmn-list plmn_value** : Associates PLMN list with SaMOG services.
- **no**: Dis-associates the PLMN List with SaMOG service and clears the existing PLMN statistics, if present for that PLMN

Removing PLMN List Configuration

Use the following command to remove the PLMN list. This command stops SaMOG or ePDG from capturing the statistics at PLMN level and clears the existing PLMN statistics if present for that PLMN.

```
configure
context context_name
no plmn-list plmn_name
end
```

NOTES:

- **no plmn-list plmn_name** : Removes the PLMN list and stops the PLMN level statistics collection for that PLMN.

Add or Remove PLMN to or from PLMN list

Use the following command to add or remove PLMN to/from PLMN list.

```
configure
  context context_name
    plmn-list plmn_name
      no mcc mcc_value mnc mnc_value
    end
```

NOTES:

- **no mcc mnc**: Removes PLMN entry with MCC and MNC combination from PLMN list. This command clears existing statistics if present for that PLMN.
- **mcc *mcc_value* mnc *mnc_value***: Adds or removes the PLMN entry.

Configuring samog-plmn schema

Use the following CLI commands to create new bulkstats schema for PLMN level statistics.

```
configure
  bulkstats mode
    [ no ] samog-plmn schema schema_name [ active-only ] format format_string
  end
```

- **samog-plmn schema** : Configures SaMOG-PLMN bulk statistic schema.
schema_name allows you to enter a string of size 1 to 31.
- **active-only**: Gathers statistics on active chassis only.
- **format *format_string*** : Designates naming convention format to use. Enter string of size 1 to 3599.
- **no** : Deletes bulkstats schema for PLMN level statistics.

clear samog-service statistics

Use the following CLI commands to clear the PLMN based counters in SaMOG service for all the PLMNs or to a particular PLMN.

```
clear samog-service statistics plmn all
  clear samog-service statistics mcc mcc_value mnc mnc_value
end
```

Notes:

- **clear samog-service statistics**: Clears SAMOG service-related statistical information.
- **plmn**: Clears SAMOG service-related statistical information at PLMN.
- **all**: Clears the PLMN level statistics for all the PLMNs.
- **mcc**: Clears the PLMN level statistics for this MCC followed by MNC of PLMN. *mcc_value* allows you to enter a number, ranging from 100 to 999.

- **mnc**: Clears the PLMN level statistics for this MNC. *mnc_value* allows you to enter a number, ranging from 00 to 999.

Monitoring and Troubleshooting

This section provides information on how to monitor and troubleshoot using show commands and bulk statistics available to support this feature.

Show Commands and Outputs

This section provides information regarding show commands and their outputs for this feature.

show plmn-list name

The output of the **show plmn-list name <plmnn1>** command displays the following details:

Table 1:

| Field | Description |
|--------------------|--|
| PLMN List Context | Displays the context name under which the PLMN list is configured. |
| PLMN List name | Displays the name of the PLMN list. |
| PLMN Count in List | Displays the number of PLMNs configured in the PLMN list. |
| PLMN Details | Displays the MCC and MNC of the PLMNs configured in the PLMN list. |

show plmn-list summary

The output of the **show plmn-list summary** command displays the following details.

Table 2:

| Field | Description |
|-----------|--|
| Plmn-list | Displays the details of all the plmn lists configured . |
| context | Displays the associated PLMN list for a specified SaMOG service. |

show samog-service name

The outputs of the **show samog-service name <samog1>** command displays the following new row is added.

Table 3:

| Field | Description |
|--------------|-------------|
| Service name | |

| Field | Description |
|----------------------|--|
| Associated PLMN List | Displays the associated PLMN list for a specified SaMOG service. |

show samog-service Statistics

show samog-service statistics plmn mcc <mcc1> mnc <mnc1>

The following table lists the output of **show samog-service statistics plmn mcc <mcc1> mnc <mnc1>** command.

Table 4:

| Field | Description |
|---|--|
| PLMN Level Statistics | |
| Active GTPv2 PDNs | Total number of active GTPv2 PDN sessions received. |
| GTPv2 Sessions | Total number of GTPv2 sessions received. |
| EAP Session Statistics | |
| Attempted | Total number of EAP sessions attempted. |
| Success | Total number of EAP sessions succeeded. |
| Failure | Total number of failed EAP sessions. |
| Current | Total number of active EAP sessions. |
| S2A Statistics | |
| Create Session Request TX | Total number of Create Session Request sessions transmitted on S2A interface. |
| Create Session Response Accept RX | Total number of Create Session Response Accept messages received based on S2A interface. |
| Create Bearer Request RX | Total number of Create Bearer Request messages received. |
| Create Bearer Response Accept TX | Total number of Create Bearer Response Accept messages transmitted. |
| Delete Session Request TX | Total number of Delete session requests transmitted. |
| Delete Session Response Accept RX | Total number of Delete session responses received. |
| Delete Bearer Request RX | Total number of Delete Bearer request messages received. |
| Delete Bearer Response Accept TX | Total number of Delete Bearer response messages transmitted. |
| Diameter Authentication Statistics | |
| DER TX | Total number of DER messages transmitted. |

| Field | Description |
|-------------------------------------|--|
| DEA Accept RX | Total number of DEA Accept messages received. |
| DEA Challenge Received" | Total number of DEA Challenge messages received. |
| RAR RX | Total number of RAR messages received. |
| RAA TX | Total number of RAA messages transmitted. |
| ASR RX | Total number of ASR messages received. |
| ASA TX | Total number of ASA messages transmitted. |
| STR TX | Total number of STR messages transmitted. |
| STA RX | Total number of STA messages received. |
| DHCPv6 Statistics | |
| IPV6 RA TX | Total number of IPV6 RA messages transmitted. |
| DHCP Statistics | |
| DHCP Sessions Active | Total number of active DHCP sessions. |
| DHCP Sessions Setup | Total number of DHCP sessions that are created. |
| DHCP Sessions Released | Total number of DHCP sessions released. |
| DHCP DISCOVER RX | Total numbers of DHCP discover messages received. |
| DHCP OFFER TX | Total number of DHCP offer messages transmitted. |
| DHCP REQUEST RX | Total number of DHCP request messages received. |
| DHCP ACK TX | Total number of DHCP acknowledgment messages transmitted. |
| DHCP NAK TX | Total number of DHCP NAK messages transmitted. |
| RADIUS Accounting Statistics | |
| Accounting-Request TX | Total number of RADIUS accounting request DHCP messages transmitted. |
| Accounting-Response RX | Total number of RADIUS accounting response messages received.. |
| Accounting-Start TX | Total number of RADIUS accounting start messages transmitted. |
| Accounting-Stop TX | Total number of RADIUS accounting stop messages transmitted. |
| Accounting-Request Timeout | Total number of RADIUS accounting request messages that are timed out. |

show bulkstats variables samog-plmn

The following PLMN level statistic variables are added for the existing system level statistics.

Table 5: Bulk Statistic Variables in the SaMOG-plmn Schema

| Variables | Description | Data Type |
|--------------------------------------|---|-----------|
| plmn-mcc | Description: The MCC of the PLMN received in IMSI. This is a key variable. Type: Information | Int16 |
| plmn-mnc | Description: The MNC of the PLMN received in IMSI. This is a key variable Type: Information | String |
| plmn-mrme-access-mode-gtpv2-selected | Description: Displays the total number of sessions selected in a PLMN with network access mode as GTPv2 Triggers: Incremented whenever subscriber session is selected as P-GW (S2a over GTPv2) . Type: Counter | Int32 |
| plmn-mrme-eap-call-attempted | Description: Displays the total number of MRME EAP Sessions Attempted. Triggers: Increments whenever a EAP session establishment is attempted at PLMN level. Type: Counter | Int32 |
| plmn-mrme-eap-call-success | Description: Displays the total number EAP sessions successfully established at PLMN level. Triggers: Increments whenever a EAP session establishment is successful at PLMN level. Type: Counter | Int32 |
| plmn-mrme-eap-call-failure | Description: Displays the total number of EAP sessions that failed to be created at PLMN level. Triggers: Incremented whenever a EAP session establishment fails at PLMN level. Type: Counter | Int32 |

| Variables | Description | Data Type |
|-------------------------------------|---|-----------|
| plmn-mrme-eap-call-current | <p>Description: Displays the total number of EAP sessions currently established at PLMN level.</p> <p>Triggers: Incremented whenever a EAP session establishment is successful and decrements when session is deleted at PLMN level.</p> <p>Type: Gauge</p> | Int32 |
| plmn-cgw-sessstat-pdns-gtpv2-active | <p>Description: Displays the total number of current active GTPV2 PDN connections at PLMN level.</p> <p>Triggers: Incremented whenever a GTPv2 connection is created by SaMOG and decrements whenever GTPV2 DN connection is released by SaMOG at PLMN level.</p> <p>Type: Gauge</p> | Int32 |
| plmn-dhcp-cursersvess | <p>Description: Displays the total number of DHCP service sessions active on the system at PLMN level.</p> <p>Type: Gauge</p> | Int32 |
| plmn-sess-total-setup | <p>Description: Displays the total number of DHCP setup sessions at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-total-released | <p>Description: Displays the total number of DHCP sessions released at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-dhcp-msg-discover-rx | <p>Description: Displays the total number of DHCP discover messages received at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-dhcp-msg-offer-tx | <p>Description: Displays the total number of DHCP offer messages transmitted at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-dhcp-msg-request-rx | <p>Description: Displays the total number of DHCP request messages received at PLMN level.</p> <p>Type: Counter</p> | Int32 |

show bulkstats variables samog-plmn

| Variables | Description | Data Type |
|---|---|-----------|
| plmn-dhcp-msg-ack-tx | <p>Description: Displays the total number of DHCP acknowledgement messages transmitted at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-dhcp-msg-nak-tx | <p>Description: Displays the total number of transmitted DHCP messages that are not acknowledged.</p> <p>Type: Counter</p> | Int32 |
| plmn-cgw-sessstat-ipv6-router-advt-sent | <p>Description: Displays the total number of router advertisement messages received at PLMN level.</p> <p>Triggers: Incremented whenever router advertisement messages is sent for sessions at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-tun-sent-creseas | <p>Description: Displays the total number of initial tunnel-create session request message sent by the system at PLMN level.</p> <p>Triggers: Incremented whenever initial tunnel-create session request message is sent by the system at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-tun-recv-creseasrespaccept | <p>Description: Displays the total number of tunnel-create-session response accepted messages received by the system at PLMN level.</p> <p>Triggers: Incremented whenever create-session-response accepted message is received by the system at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-tun-recv-crebear | <p>Description: Displays the total number tunnel-create bearer request message is received by the system at PLMN level.</p> <p>Triggers: Incremented whenever create bearer session response accepted messages is received by the system at PLMN level.</p> <p>Type: Counter</p> | Int32 |

| Variables | Description | Data Type |
|---------------------------------|---|-----------|
| plmn-tun-sent-crebearrespaccept | <p>Description: Displays the total number of tunnel-create-bearer-response accepted message sent by the system at PLMN level.</p> <p>Triggers: Incremented whenever create bearer response accepted messages is sent by the system at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-tun-sent-delsessreq | <p>Description: Displays the total number of tunnel-delete-session-response-accepted messages received by the system at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-tun-recv-delsessrespaccept | <p>Description: Displays the total number of tunnel-delete-bearer-response-accepted messages sent by the system at PLMN level.</p> <p>Triggers: Incremented whenever delete bearer response messages with accepted cause is sent by the system at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-tun-recv-delbearreq | <p>Description: Displays the total number of Delete Bearer Request Initial messages received.</p> <p>Type: Counter</p> | Int32 |
| plmn-tun-sent-delbearrespaccept | <p>Description: Displays the total number of Delete Bearer Response Accepted messages transmitted.</p> <p>Type: Counter</p> | Int32 |
| plmn-der-req-id-sent | <p>Description: Displays the total number of Diameter-EAP-Request (DER) messages sent at PLMN level.</p> <p>Triggers: Incremented whenever a DER message is sent at PLMN level.</p> <p>Type: Counter</p> | Int32 |

show bulkstats variables samog-plmn

| Variables | Description | Data Type |
|-----------------------|--|-----------|
| plmn-dea-chal-rcvd | <p>Description: Displays the total number of DEA Challenge messages received at PLMN level.</p> <p>Triggers: Incremented whenever a DEA message is received with EAP challenge at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-dea-acpt-rcvd | <p>Description: Displays the total number of DEA Accept messages received at PLMN level.</p> <p>Triggers: Incremented whenever a DEA is received with Result-code value as 2001 at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-diamauth-msg-asr | <p>Description: Displays the total number of Abort-Session_Request messages received at PLMN level.</p> <p>Triggers: Incremented whenever an ASR received at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-diamauth-msg-asa | <p>Description: Displays the total number of Abort-Session-Answer-sent at PLMN level.</p> <p>Triggers: Incremented whenever an ASA is sent at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-diamauth-msg-rar | <p>Description: Displays the total number of Re-Auth-Request messages received at PLMN level.</p> <p>Triggers: Incremented whenever an RAR is received at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-diamauth-msg-raa | <p>Description: Displays the total number of Re-Auth-Answer messages sent at PLMN level.</p> <p>Triggers: Incremented whenever an RAA is sent at PLMN level.</p> <p>Type: Counter</p> | Int32 |

| Variables | Description | Data Type |
|-----------------------|---|-----------|
| plmn-diamauth-msg-str | <p>Description: Displays the total number of Session-Termination-Request (STR) messages sent at PLMN level.</p> <p>Triggers: Incremented whenever an STR is sent at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-diamauth-msg-sta | <p>Description: Displays the total number of Session-Termination-Answer (STA) messages received at PLMN level.</p> <p>Triggers: Incremented whenever an STA is received at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-acc-req-sent | <p>Description: Displays the total number of Accounting requests sent to the server at PLMN level.</p> <p>Triggers: Incremented whenever an Accounting requests sent to the RADIUS server at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-acc-rsp-rcvd | <p>Description: Displays the total number of Accounting responses received from the server at PLMN level.</p> <p>Triggers: Incremented whenever an Accounting responses is received from RADIUS server at PLMN level.</p> <p>Type: Gauge</p> | Int32 |
| plmn-acc-start-sent | <p>Description: Displays the total number of Accounting Start messages sent at PLMN level.</p> <p>Triggers: Incremented whenever an Accounting Start messages is sent at PLMN level.</p> <p>Type: Counter</p> | Int32 |

| Variables | Description | Data Type |
|----------------------|--|-----------|
| plmn-acc-stop-sent | <p>Description: Displays the total number of Accounting Stop messages sent at PLMN level.</p> <p>Triggers: Incremented whenever an Accounting Stop messages is sent at PLMN level.</p> <p>Type: Counter</p> | Int32 |
| plmn-acc-req-timeout | <p>Description: Displays the total number of Accounting requests timed out at PLMN level.</p> <p>Triggers: Incremented whenever an Accounting requests timed out at PLMN level.</p> <p>Type: Counter</p> | Int32 |

Bulk Statistics

The following bulk statistics are added to the epdg-plmn schema:

samog-plmn-schema

Table 6: Bulk Statistics Variables in the SaMOG-plmn Schema

| Variables | Description |
|--------------------------------------|---|
| plmn-mcc | The PLMN MCC context configured at the PLMN level that is currently facilitating the SaMOG Service. This is a key variable. |
| plmn-mnc | The PLMN MNC context configured at the PLMN level that is currently facilitating the SaMOG service. This is a key variable. |
| plmn-mrme-access-mode-gtpv2-selected | Indicates that the Network access mode statistics for the selected gtpv2 interface. |
| plmn-mrme-eap-call-attempted | Indicates that the total number of MRME EAP Session Attempted. |
| plmn-mrme-eap-call-success | Indicates that the total number of successful MRME EAP sessions. |
| plmn-mrme-eap-call-failure | Indicates that the total number of failed MRME EAP sessions. |
| plmn-mrme-eap-call-current | Indicates that the total number of current MRME EAP sessions. |
| plmn-cgw-sessstat-pdns-gtpv2-active | Indicates that the total number of session statistics active for PDN gtpv2 interface. |
| plmn-dhcp-curservsess | Indicates that the total number of DHCP server sessions that are active. |

| Variables | Description |
|---|--|
| plmn-sess-total-setup | Indicates that the total number of DHCP Sessions setup. |
| plmn-total-released | Indicates that the total number of DHCP sessions released. |
| plmn-dhcp-msg-discover-rx | Indicates that the total number of DHCP discover messages received. |
| plmn-dhcp-msg-offer-tx | Indicates that the total number of DHCP offer messages transmitted. |
| plmn-dhcp-msg-request-rx | Indicates that the total number of DHCP request messages received. |
| plmn-dhcp-msg-ack-tx | Indicates that the total number of DHCP acknowledgment messages transmitted. |
| plmn-dhcp-msg-nak-tx | Indicates that the total number of transmitted DHCP messages that are not acknowledged. |
| plmn-cgw-sessstat-ipv6-router-advt-sent | Indicates that the total number of router advertisement messages sent. |
| plmn-tun-sent-creseess | Indicates the total number of Create Sessions Request Initially transmitted. |
| plmn-tun-recv-creseessrespaccept | Indicates that the total number of Create Session Response Accepted messages received. |
| plmn-tun-recv-crebear | Indicates that the total number of Create Bearer Requests Initial messages received. |
| plmn-tun-sent-crebearrespaccept | Indicates that the total number of Create Bearer Response Accepted messages transmitted. |
| plmn-tun-sent-delsessreq | Indicates that the total number of Delete Session Request Initial messages transmitted. |
| plmn-tun-recv-delsessrespaccept | Indicates that the total number of Delete Session Response Accepted messages received. |
| plmn-tun-recv-delbearreq | Indicates that the total number of Delete Bearer Request Initial messages received. |
| plmn-tun-sent-delbearrespaccept | Indicates that the total number of Delete Bearer Response Accepted messages transmitted. |
| plmn-der-req-id-sent | Indicates the total number of DE Requests. |
| plmn-dea-chal-rcvd | Indicates that the total number of DEA Challenge statistics received. |
| plmn-dea-acpt-rcvd | Indicates that the total number of DEA Accept statistics received. |

| Variables | Description |
|-----------------------|---|
| plmn-diamauth-msg-asr | Indicates that the total number of Diameter authentication messages are received for ASR. |
| plmn-diamauth-msg-asa | Indicates the total number of Diameter authentication messages received for ASA. |
| plmn-diamauth-msg-rar | Indicates the total number of Diameter authentication messages received for RAR. |
| plmn-diamauth-msg-raa | Indicates that the total number of Diameter authentication messages for RAA |
| plmn-diamauth-msg-str | Indicates that the total number of Diameter authentication messages are received for STR. |
| plmn-diamauth-msg-sta | Indicates that the total number of Diameter authentication messages are received for STA. |
| plmn-acc-req-sent | Indicates that the total number of PLMN accounting requests sent. |
| plmn-acc-rsp-rcvd | Indicates that the total number of PLMN accounting responses are received. |
| plmn-acc-start-sent | Indicates that the total number of PLMN accounting start messages are sent. |
| plmn-acc-stop-sent | Indicates that the total number of PLMN accounting stop messages sent. |
| plmn-acc-req-timeout | Indicates that the total number of PLMN accounting requests timed out. |