

PLMN Level Statistics for ePDG Services

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Feature Summary and Revision History

Summary Data

Applicable Product(s) or Functional Area	ePDG
Applicable Platform(s)	• ASR 5500 • ASR 5700 • VPC-DI • VPC-SI
Feature Default	Disabled - Configuration Required
Related Changes in This Release	Not Applicable
Related Documentation	• *ePDG Administartion Guide* • *Command Line Interface Reference* • *Statistics and Counters Reference,Guide*

Revision History

Revision Details	Release
ePDG supports PLMN level statistics for ePDG services.	21.23

Feature Description

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

- ePDG extracts the PLMN information, such as MCC and MNC from IMSI received in the IKE AUTH Request message.
- ePDG associates a PLMN list with epdg services to enable the collection of PLMN level statistics for all the PLMNs 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 given PLMN.
- The PLMN statistics is applicable only for the combination of Diameter-based authentication with AAA on SWm interface and GTPv2 based S2b interface.

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 ePDG Services

Use the following command to associate the PLMN List with the ePDG service. ePDG captures the statistics at PLMN level if the IMSI received during initial attach / Handoff belongs to one of the PLMNs in the associated PLMN list. Each ePDG service can have only one PLMN list associated at any given point of time. If there is a PLMN list already associated, a new PLMN list can be associated to a service only after disassociating the existing associated PLMN list.

```
configure
  context context_name
    epdg-service service_name
      [ no ] associate plmn-list  plmn_name
      end
```

Notes:

- **associate plmn-list** *plmn_name* : Associates PLMN lists with ePDG services.
- **[no] associate plmn-list** : Dis-associates the PLMN List with ePDG services and clears the existing PLMN statistics, if present for the PLMNs in the list.

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 commnad clears existing statistics if present for that PLMN.
- **mcc** *mcc_value* **mnc** *mnc_value*: Adds or removes the PLMN entry.

clear epdg-service statistics

Use the following CLI commands to clear the PLMN based statistics for all PLMNs in ePDG service.

```
clear epdg-service statistics  plmn all
clear epdg-service statistics  mcc mcc_value mnc mnc_value
```

Notes:

- **clear epdg-service statistics**: Clears ePDG service-related statistical information.
- **plmn**: Clears ePDG 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.

Configuring epdg-plmn schema

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

```
configure
   bulkstats collection
   bulkstats mode
      [no] epdg-plmn schema SchemaEPDGPlmn1 format format_string active-only
format format_string
  end
```

NOTES:

- **epdg-plmn schema format** *format_string* **active-only**: Configures ePDG-PLMN bulk statistic schema.
- **schema** *schema_name* : Enter string of size 1 to 31.

- **format** *format_string* : Designates naming convention format to use.Enter string of size 1 to 3599.
- **active-only**: Gathers statistics on active chassis only.
- **no** : Deletes bulkstats schema for PLMN level statistics.

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 epdg-service name

The outputs of the **show epdg-service name** *epdg_service_name* command displays the following details.

Field	Description
Service name	
Associated PLMN List	Displays the associated PLMN list for a specified ePDG service.

show plmn-list summary

The output of the **show plmn-list summary**command displays all the PLMN lists configured on the system.

Field	Description
Plmn-list	Displays the configured PLMN list name.
context	Displays the context name in which PLMN list is defined.

show epdg-service statistics plmn mcc mcc_value mnc mnc_value

The following table lists the output of **show epdg-service statistics plmn mcc mcc_value mnc mnc_value** command.

Field	Description
ePDG PLMN Statistics	
Setup attempts	Total number of setup attempts.
Setup Success	Total number of setup succeded.
Setup Failures	Total number of setup failed.
Active GTP UE	Total number of active GTP User equipments in the system.

Field	Description
Total Sessions	Total number of active sessions.
Handoff Sessions	Total number of successful handoff sessions.
ePDG To PGW Fallback	
Attempt	Total number of P-GW Fallback sessions attempted.
Success	Total number of P-GW Fallback sessions succeeded.
LTE to Wifi Handoff	
Attempt	Total number of LTE to Wi-Fi handoff attempted/
Success	Total number of sucessful LTE to Wi-Fi handoff sessions.
ePDG Reauthorisation	
Attempt	Total number of reauthorization attempted messages.
Success	Total number of successful ePDG reauthorization messages.
Session Disconnect reason	
Remote disconnect	Total number of Remote disconnected sessions.
Admin disconnect	Total number of Admin disconnected sessions.
Idle timeout	Total number of session disconnects due to idle timeout.
Absolute timeout	Total number of session disconnects due to abosolute timeout.
Long Duration timeout	Total number of session disconnects due to long duration timeout.
Session setup timeout	Total number of session disconnects due to setup timeout.
No resource	Total number of session disconnects due to non-availability of resources.
Auth failure	Total number of session disconnects due to authentication failure.
Flow add failure	Total number of session disconnects due to flow add failure.
Invalid dest-context	Total number of session disconnects due to invalid destination context.
Source address violation	Total number of session disconnects due to source address violation.
LMA Revocations (non-HO)	Total number of session disconnects due to LMA revocation.
Duplicate Request	Total number of session disconnects due to duplicate requests.
Addr assign failure	Total number of session disconnects due to address assignation failure.
LTE/Other handoff	Total number of session disconnects due to LTE and other handoff reasons.
Miscellaneous reasons	Total number of session disconnects due to miscellaneous reasons.

Field	Description
EAP Server Stats:	
Pass through mode:	
Total Msgs Received	Shows total number of EAP server messages received on pass through mode.
Success Received	Shows total number of successful EAP server messages received on pass through mode.
Diameter Authentication Statistics	
DER TX	Total number of DER messages transmitted.
DEA Challenge RX	Total number of DEA Challenge messages received.
DEA Accept RX	Total number of DEA Accept 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.
S2b Statistics	
GTP Attempts	.Total number of GTP attempts.
GTP Success	Total number of successful GTP sessions.
GTP Failures	Total number of failed GTP sessions.
Create Bearer Request RX	Total number of Create Bearer Request messages received.
Create Bearer Response Accepted TX	Total number of Create Bearer Response Accepted messages transmitted.
Create Bearer Request Discarded RX	Total number of Create Bearer Request Discarded messages received.
Create Bearer Response TX	Total number of Create Bearer Response transmitted.
Create Bearer Response Denied TX	Total number of Create Bearer Response Denied messages transmitted.
Delete Session Request TX	Total number of Delete session requests transmitted.
Delete Session Response Accepted RX	Total number of Delete session response accepted messages received.

Field	Description
Delete Bearer Request RX	Total number of Delete Bearer Request messages received.
Delete Bearer Response Accepted TX	Total number of Delete Bearer Response Accepted messages transmitted.
SWu Stats	
Phase 1 Auth Success	Total number of IKEv2 authentication phase 1success messages.
Phase 1 Auth Failure	Total number of IKEv2 authentication phase 1 failure messages.
Phase 1 Auth Req Sent	Total number of IKEv2 authentication phase 1 requests sent.
Total IKEA SA Deletes	
Req Sent	Total number of IKE SA delete requests sent.
Rsp Rcvd	Total number of IKE SA delete responses received.

Bulk Statistics

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

show bulkstats variables ePDG-plmn

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

Variables	Description
plmn-mcc	The PLMN MCC for which this statistic is collected. This is a key variable.
plmn-mnc	The PLMN MNC for which this statistic is collected. This is a key variable.
ePDG Service	
plmn-totsetup-success	Displays the total number of initial attach success setups of ePDG services. **Type:** Counter
plmn-tot-success-handoff	Displays the total number of successful LTE to Wifi handoffs.
plmn-tot-handoff-attempts	Displays the total number of LTE to Wifi handoff attempts.
plmn-totsetup-attempt	Displays the total number of ePDG setup sessions attempted.
plmn-totattempt-failure	Displays the total number of failure attempts of ePDG setup.

Variables	Description
plmn-totgtp-curr-ue-in-sys	Displays the total GTP active UEs in the system.
plmn-curses	Displays the total number of current ePDG sessions.
plmn-tot-success-handoff	Displays the total number of successful handoff sessions.
plmn-pgw-fallback-succeeded	Displays the total number of P-GW Fallback sessions succeeded.
plmn-pgw-fallback-attempted	Displays the total number of P-GW Fallback sessions attempted.
plmn-reauthor-success	Displays the total number of successful reauthorization.
plmn-reauthor-attempt	Displays the total number of reauthorization attempted.
plmn-eap-rxsuccsrvrpassthru	Displays the total number of EAP-Success messages received from the EAP server in pass-through mode.
plmn-eap-rxttlsrvrpassthru	Displays the total number of EAP messages received from the EAP server in pass-through mode.
plmn-sess-disconnect-remote	Displays the total number of Remote disconnect sessions.
plmn-sess-disconnect-admin	Displays the total number of Administrator disconnect sessions at PLMN level.
plmn-sess-disconnect-idle-timeout	Displays the total number of disconnect sessions due to idle timeout reasons.
plmn-sess-disconnect-abs-timeout	Displays the total number of disconnect sessions due to absolute timeout reasons.
plmn-sess-disconnect-longdur-timeout	Displays the total number of disconnect sessions due to long duration timeout.
plmn-sess-disconnect-sesssetup-timeout	Displays the total number of sessions disconnects due to setup timeout.
plmn-sess-disconnect-noresource	Displays total number of sessions disconnects due to nonavailability of resources.
plmn-sess-disconnect-authfail	Displays the total number of session disconnects due to authentication failure.
plmn-sess-disconnect-flowadd-failure	Displays the total number of session disconnects due to flow add failure.
plmn-sess-disconnect-invalid-dest	Displays the total number of session disconnects due to invalid destination context.

Variables	Description
plmn-sess-disconnect-srcaddr-violation	Displays the total number of session disconnects due to source address violation.
plmn-sess-disconnect-lmarevoc	Displays the total number of session disconnects due to LMA revocation.
plmn-sess-disconnect-dupreq	Displays the total number of sessions disconnects due to duplicate requests.
plmn-sess-disconnect-addrassign-failure	Displays the total number of sessions disconnects due to address assignation failure.
plmn-sess-disconnect-handoff	Displays the total number of sessions disconnects due to LTE and other handoff reasons.
plmn-sess-disconnect-misc	Displays the total number of sessions disconnects due to miscellaneous reasons.
SWu Stats	
plmn-ikev2-auth-p1req	Displays the total number of IKEv2 authentication phase 1 request messages.
plmn-ikev2-auth-p1succ	Displays the total number of IKEv2 authentication phase 1 success messages.
plmn-ikev2-auth-p1fail	Displays the total number of IKEv2 authentication phase 1 failure messages.
plmn-ikev2-ikesadelrep-recv	Displays the total number of IKEv2 SA delete request received.
plmn-ikev2-ikesadelrep-sent	Displays the total number of IKEv2 SA delete requests sent.
Diameter Authentication Statistics	
plmn-der-req-id-sent	Displays the total number of DER messages transmitted.
plmn-dea-chal-rcvd	Displays the total number of DEA Challenge messages received.
plmn-dea-acpt-rcvd	Displays the total number of DEA Accept messages received.
plmn-dea-rcvd	Displays the total number of DEA messages received.
plmn-diamauth-msg-rar	Displays total number of RAR messages received.
plmn-diamauth-msg-raa	Displays the total number of RAA messages transmitted.
plmn-diamauth-msg-asr	Displays the total number of ASR messages received.

Variables	Description
plmn-diamauth-msg-asa	Displays the total number of ASA messages transmitted.
plmn-diamauth-msg-str	Displays the total number of STR messages transmitted.
plmn-diamauth-msg-sta	Displays the total number of STA messages received.
S2b Statistics	
plmn-totgtp-attempt	Displays the total number of GTP attempts on S2b interface.
plmn-totgtp-success	Displays the total number of successful GTP sessions on S2b interface.
plmn-totgtp-failure	Displays the total number of failed GTP sessions.
plmn-tun-recv-crebear	Displays the total number of Create Bearer Request messages received.
plmn-tun-sent-crebearrespaccept	Displays the total number of Create Bearer Response Accepted messages transmitted.
plmn-tun-recv-crebearDiscard	Displays the total number of Create Bearer Request Discarded messages received.
plmn-tun-sent-crebearres	Displays the total number of Create Bearer Responses transmitted.
plmn-tun-sent-crebearrespdenied	Displays the total number of Create Bearer Response Denied messages transmitted.
plmn-tun-sent-delsessreq	Displays the total number of Delete session requests transmitted.
plmn-tun-recv-delsessrespaccept	Displays the total number of Delete session responses accepted messages received.
plmn-tun-recv-delbearreq	Displays the total number of Delete Bearer Request messages received.
plmn-tun-sent-delbearrespaccept	Displays the total number of Delete Bearer Response messages transmitted.
plmn-tun-recv-mbrespfail-context-not-found	Displays the total number of Modify Bearer Response Failure messages received with *Context Not Found* cause.
plmn-tun-recv-mbrespfail-service-not-supported	Displays the total number of Modify Bearer Response Failure messages received with *Service Not Supported* cause.

Variables	Description
plmn-tun-recv-mbrespfail-context-not-found-5g	Displays the total number of 5G Modify Bearer Response Failure messages received with *Context Not Found* cause.
plmn-tun-recv-mbrespfail-service-not-supported-5g	Displays the total number of 5G Modify Bearer Response Failure messages received with *Service Not Supported* cause.
plmn-tun-sent-dbrespfail-bearer-context-not-found	Displays the total number of Delete Bearer Response Failure messages transmitted with *Bearer Context Not Found* cause.
plmn-tun-sent-dbrespfail-bearer-context-not-found-5g	Displays the total number of 5G Delete Bearer Response Failure messages transmitted with *Bearer Context Not Found* cause.