

AMF Bulk Statistics and MME Equivalent KPI Support

- Feature Summary and Revision History, on page 1
- Feature Description, on page 1
- How it Works, on page 2
- OAM Support, on page 2

Feature Summary and Revision History

Summary Data

Table 1: Summary Data

Applicable Products or Functional Area	AMF
Applicable Platforms	SMI
Feature Default Setting	Enabled – Always-on
Related Documentation	Not Applicable

Revision History

Table 2: Revision History

Revision Details	Release
First introduced.	2022.01.0

Feature Description

The bulk statistics and Key Performance Indicators (KPIs) are used for analyzing the AMF performance.

The following is a list of applicable bulk statistics:

- **Gauge:**
  - A snapshot value that shows the statistic at the time of reporting.
  - These statistics values can increment or decrement continuously.
  - **Example:** The number of current PDP contexts, simultaneous Active EPS Bearers, and so on
- **Counter:**
  - A historic value that shows the statistic accumulated for a specific time range.
  - These statistics values can only increment except in the following two scenarios:
    - **Rollover:** Where a counter exceeds its maximum value and rolls over to zero.
    - **Reset:** Where a counter is manually reset to zero.
  - **Example:** The total number of CSR requests received.

How it Works

This section describes how this feature works.

Bulk statistics allows you to configure various schemas for collecting statistics from the system. It also offloads those statistics to a collector for offline review and analysis. They are further processed for the following scenarios:

- Controlling the statistics gathering and reporting
- Collecting and transferring on both the active and the standby chassis
- Providing specific requirements for more selective statistics obtained on standby
- Acting as a subset of the total statistics collected over a specific timeline

OAM Support

This section describes operations, administration, and maintenance support for this feature.

Supported Service Request Counters

All scenarios are supported as per the required references. The following table lists various supported service request counters and their descriptions.

Table 3: Supported Service Request Counters

Name	Description	Trigger
Sctp Outgoing SCTPPacket stats	The total number of SCTP packets sent. Retransmitted DATA chunks are included.	Increments when the AMF sends the SCTP packet to the gNB.
Sctp Incoming SCTPPacket stats	The total number of SCTP packets received. Duplicates are included.	Increments when the AMF receives the SCTP packet from the gNB.
Sctp Init stats	The total number of times that AMF received SCTP INIT and association reached to established state.	Increments when the AMF received SCTP INIT and SCTP association is successfully established.
Sctp Shutdowns stats	The total number of times that associations terminated gracefully from AMF side or gNB.	Increments when the gNB is disconnected from the AMF.
Sctp Fragmented Message stats	The total number of user messages that needs to be fragmented due to the presence of the MTU.	Increments when the SCTP message is fragmented, due to the presence of the MTU.
Sctp Reassembled Message stats	The total number of user messages reassembled, after converting into DATA chunks.	Increments when the SCTP message is reassembled, due to the data fragment received from the gNB.
Ausf Ue eapaka rsp	The total number of EAPAKA or EAP-AKA or EAP-AKA-Prime responses received by the AMF.	Increments when the AMF receives an EAPAKA or EAP-AKA or EAP-AKA-Prime response for the eap-session request.
Ausf Ue eapaka cfm	The total number of EAPAKA or EAP-AKA or EAP-AKA-Prime authorization confirmation sent by the AMF.	Increments when the AMF sends AUSF EAPAKA or EAP-AKA or EAP-AKA-Prime CFM to AUSF.
Ausf Autentication Cfm Rsp Stats	The total numbers of 5g-aka confirm response received from the AUSF.	Increments when the AMF receives 5g-aka authentication confirm response.
Ausf Autentication Cfm Stats	The total numbers of 5g-aka confirm requests sent to the AUSF.	Increments when the AMF sends 5g-aka authentication confirm request to the AUSF.
Ausf Autentication Req Stats	The total number of AUSF authentication requests sent by the AMF.	Increments when the AMF receives authentication request.
Ausf Autentication Rsp Stats	The total number of AUSF authentications responses received by the AMF.	Increments when the AMF receives authentication response from the AUSF.

Name	Description	Trigger
Authentication Mac Failed	The total number of authentication MAC failures received during UE authentications.	Increments when the N1 authentication rejection is sent due to the MAC failure.
Authentication Reject	The total number of authentication rejections sent by the AMF.	Increments when the 5g-aka authentication fails.
Authentication Sync Failed	The total number of AMF authentication rejections due to the sync failure.	Increments when the N1 authentication rejection is sent due to the sync failure.
Ebi Fail Bearers Not Found	The total number of failures in EPS Bearer ID setup failed due to Bearer ID not found.	Increments when the EPS bearer ID allocation fails as the bearer ID isn't found.
Ebi Fail Invalid Pdu Session	The total number of failures due to PDU session ID not found.	Increments when the EPS bearer ID allocation fails as the PDU session ID isn't present.
Ebi Rejected No N26	The total number of failures due to the restriction of EPS bearer ID allocation.	Increments when the EBI allocation failure happens, due to the EBI allocation restriction.
Gnb Ics Fail Stats	The total number of initial context setup requests failed.	Increments when the AMF ICS fails.
Gnb Ics Req Stats	Total number of initial context setup requests sent by the AMF.	Increments when the AMF sends ICS requests.
Gnb Ics Rsp Stats	The total number of initial context setup responses received.	Increments when the AMF receives ICS responses.
Pcf Delete Req Stats	The total numbers of PCF delete requests sent during the PDU release deregistration procedure. It's triggered during clear subscriber process.	Increments when the AMF tried to clear the subscriber requests towards the UDM and the PCF.
Pcf Delete Rsp Stats	The total numbers of PCF delete responses received during the PDU release deregistration procedure.	Increments when the AMF tries to clear the subscriber response towards the UDM and the PCF.
Udm Pcscf Restor Req Stats	The total number of PCSCF restoration requests sent to the UDM.	Increments when the AMF sends the PCSCF restoration request to the UDM.
Udm Pcscf Restor Rsp Stats	The total number of PCSCF restoration responses received from the UDM.	Increments during the PDU modification process, when the PDU map doesn't have an entry, when the AMF receives the PCSCF restoration notification from the UDM.

Name	Description	Trigger
Udm Registration Req Stats	The total number of UDM registration requests sent.	Increments when the AMF sends the UDM registration request.
Udm Registration Rsp Stats	The total number of UDM registration responses received by the AMF.	Increments when the AMF receives the UDM registration response.
Udm Subscriber Data Req Stats	The total number of subscriber data requests sent to the UDM.	Increments when the AMF sends the subscriber data request to the UDM.
Udm Subscriber Data Rsp Stats	The total number of subscriber data response received from the UDM.	Increments when the AMF receives the subscriber data response.
Udm Subscriber Notify Req Stats	The total numbers of subscriber notify requests sent to the UDM.	Increments when subscriber notify requests are sent to the UDM, during the UDM registration procedure.
Udm Subscriber Notify Rsp Stats	The total number of subscribers notify responses received by the AMF.	Increments when the AMF receives the UDM subscriber notify response.
Udm Unsubscriber Notify Req Stats	The total numbers of UDM unsubscriber notify requests sent to the UDM.	During deregistration process, it's the total number of unsubscribe requests sent to the UDM.
Udm Unsubscriber Notify Rsp Stats	The total numbers of UDM response unsubscriber notify statistics received by the UDM.	During deregistration process, it's the total number of unsubscribe responses received from the UDM.
Ue Authentication Req Stats	The total number of UE authentication requests sent.	During the UE authentication procedure, this is incremented, when the UE authentication request is sent.
Ue Authentication Rsp Stats	The total number of UE authentication responses received.	During the UE authentication procedure, this is incremented, when the UE authentication response is received.
Ue Configuration Update Cmd	The total number of UE configuration update commands sent by the AMF.	Increments when the AMF sends the UE configuration update command.
Ue Configuration Update Complete	The total number of UE configuration update responses received with completion note of the procedure.	Increments when the AMF receives the UE config update response, for completion.
Ue Security Cmd Req Stats	The total number of security mode CMD sent from the AMF towards the UE.	Increments when the AMF sends the security mode command to the UE.

Name	Description	Trigger
Ue Security Cmd Rsp Stats	The total number of security mode complete messages received by the AMF.	Increments when the AMF receives the security mode completed messages.
Gtpc Rx Context Ack	The total number of GTPC contexts ACK received from the MME.	Increments when the AMF receives the context ACK from the MME.
Gtpc Rx Context Req	The total number of GTPC context requests received from the MME.	Increments when the AMF receives the GTPC context request from the MME.
Gtpc Rx Context Rsp	The total number of GTPC context request responses received from the MME.	Increments when the AMF receives the GTPC context response from the MME.
Gtpc Rx Fwd Reloc Cmp Ack	The total number of GTPC forward relocations complete ACK received from the MME.	Increments when the AMF receives the GTPC forward relocation complete ACK is received from the MME.
Gtpc Rx Fwd Reloc Req	The total number of GTPC forward relocation requests received from the MME.	Increments when the AMF receives the GTPC forward relocation request from the MME.
Gtpc Rx Fwd Reloc Rsp	The total number of GTPC forward relocation responses received from the MME.	Increments when the AMF receives the GTPC forward relocation response from the MME.
Gtpc Rx Identification Req	The total number of GTPC identification requests received from the MME.	Increments when the AMF receives the GTPC identification requests from the MME.
Gtpc Rx Identification Rsp	The total number of GTPC identification responses received from the MME.	Increments when the AMF receives the GTPC identification response from the MME.
Gtpc Rx Reloc Cancel Req	The total numbers of GTPC cancel requests received from the MME.	Increments when the AMF receives the GTPC cancel request from the MME.
Gtpc Rx Reloc Cancel Rsp	The total numbers of GTPC cancel response received from the MME.	Increments when the AMF receives the GTPC cancel response from the peer MME.
Gtpc Tx Context Ack	The total number of GTPC contexts ACK sent to the MME.	Increments when the AMF sends the GTPC context ACK to the MME.
Gtpc Tx Context Req	The total number of GTPC context requests sent to the MME.	Increments when the AMF sends the GTPC context request to the MME.
Gtpc Tx Context Rsp	The total number of GTPC context responses sent to the MME.	Increments when the AMF sends the GTPC context response to the MME.

Name	Description	Trigger
Gtpc Tx Fwd Reloc Cmp Ack	The total number of GTPC forward relocations complete ACK sent to the MME.	Increments when the AMF sends the GTPC forward relocation complete ACK to the MME.
Gtpc Tx Fwd Reloc Cmp Notf	The total number of GTPC forward relocation complete notifications sent to the MME.	Increments when the AMF sends the GTPC forward relocation complete notification to the MME.
Gtpc Tx Fwd Reloc Req	The total number of GTPC forward relocation requests sent to the MME.	Increments when the AMF sends the GTPC forward relocation request to the MME.
Gtpc Tx Fwd Reloc Rsp	The total number of GTPC forward relocation responses sent to the MME.	Increments when the AMF sends the GTPC forward relocation response to the MME.
Gtpc Tx Identification Req	The total number of GTPC identification requests sent to the MME.	Increments when the AMF sends the GTPC identification request to the MME.
Gtpc Tx Reloc Cancel Req	The total numbers of GTPC cancel relocation requests sent to the MME.	Increments when the AMF sends the GTPC relocation cancel request to the MME.
Gtpc Tx Reloc Cancel Rsp	The total number of GTPC relocations cancel response sent to the MME.	Increments when the AMF sends the GTPC relocation cancel response to the MME.
Gtpc Tx Req	The total number of context requests or identification request failures towards the MME.	Increments when there's a failure in sending the GTPC context request or identification request, due to the peer MME not ready, or epsnas container not present, and so on.
Nas In Identity Response	The total number of identity responses received from the UE.	Increments when the AMF recieves an identity response from the UE.
Nas In Ue Deregistration Accept	The total number of network initiated deregistration received.	Increments when the network initiated deregistration is received.
Nas Out Identity Request Imei	The total number of identity requests with IMEI as matching value.	Increments when the IMEI-based identity request is sent.
Nas Out Identity Request Suci	The total number of identity requests with SUCI as matching value.	Increments when the SUCI-based identity request is sent.
Ngap Dl Handover Command Msg	The total number of handover commands sent to the source gNB.	Increments when the AMF sends the handover command to the source gNB.

Name	Description	Trigger
Ngap Dl Handover Preparation Failure Msg	The total number of handovers prepare failure sent by the AMF.	Increments when the AMF sends the handover preparation failure to the gNB.
Ngap Dl Handover Request Msg	The total number of handover request messages sent to the gNB.	Increments when the AMF sends the handover request message to the gNB.
Ngap Ul Handover Cancel Msg	The total numbers of handover cancel requests received from the gNB.	Increments when the AMF receives the handover cancel request from the gNB.
Ngap Ul Handover Request Ack Msg	The total number of handover ACK messages received by the AMF.	Increments when the AMF recieves the handover ACK message from the gNB.
Ngap Ul Handover Required Msg	The total number of handover required messages received by the AMF.	Increments when the AMF receives the handover required message from the gNB.
Smf Sm Ctxt Create Req	The total numbers of SMF SM context create request sent to the SMF.	Increments when the AMF sends the SM context create request to the SMF.
Smf Sm Ctxt Create Rsp	The total number of SM contexts create response received from the SMF.	Increments when the AMF receives the SM context create response from the SMF.
Smf Sm Ctxt Retrieve Req	The total number of SM contexts retrieve request sent to the SMF.	Increments when the AMF sends the message to retrieve the context.
Smf Sm Ctxt Update Req	The total number of SMF context updates request sent to the SMF.	Increments when the AMF sends the SM context update request to the SMF.
Smf Sm Ctxt Update Rsp	The total number of SM context update responses received for the update contexted data from the SMF.	Increments when the AMF receives the SM context update response from the SMF.
Udm Initiated Dereg Request	The total number of UDM initiated deregistration request received.	Increments when the AMF receives the UDM initiated deregistration request.
Udm Initiated Dereg Response	The total number of UDM initiated deregistration responses sent to the UDM.	Increments when the AMF sends the UDN-initiated deregistration responses to the SMF.

Bulk Statistics Support

The following are supported bulk statistics in AMF for Attempted, Success, and Failure scenarios:

- Registration
- All procedures and features