

# 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.

For more information, see the AMF Bulk Statistics and MME Equivalent KPI Support, on page 1 chapter.

# 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