



## **Ultra Cloud Core 5G Access and Mobility Management Function, Release 2024.02 - Metrics Reference**

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## About this Guide



**Note** The documentation set for this product strives to use bias-free language. For purposes of this documentation set, bias-free is defined as language that does not imply discrimination based on age, disability, gender, racial identity, ethnic identity, sexual orientation, socioeconomic status, and intersectionality. While any existing biased terms are being substituted, exceptions may be present in the documentation due to language that is hardcoded in the user interfaces of the product software, language used based on RFP documentation, or language that is used by a referenced third-party product.

This preface describes the *Ultra Cloud Core 5G Access and Mobility Management Function - Metrics Reference*, the document conventions, and the customer support details.

- [Conventions Used, on page vii](#)
- [Contacting Customer Support, on page viii](#)

## Conventions Used

The following tables describe the conventions used throughout this documentation.

Notice Type	Description
Information Note	Provides information about important features or instructions.
Caution	Alerts you of potential damage to a program, device, or system.
Warning	Alerts you of potential personal injury or fatality. May also alert you of potential electrical hazards.

Typeface Conventions	Description
Text represented as a screen display	This typeface represents displays that appear on your terminal screen, for example:  Login:

Typeface Conventions	Description
Text represented as <b>commands</b>	This typeface represents commands that you enter, for example: <b>show ip access-list</b> This document always gives the full form of a command in lowercase letters. Commands are not case sensitive.
Text represented as a <b>command variable</b>	This typeface represents a variable that is part of a command, for example: <b>show card slot_number</b> <i>slot_number</i> is a variable representing the applicable chassis slot number.
Text represented as menu or sub-menu names	This typeface represents menus and sub-menus that you access within a software application, for example: Click the <b>File</b> menu, then click <b>New</b>

## Contacting Customer Support

Use the information in this section to contact customer support.

Refer to the support area of <http://www.cisco.com> for up-to-date product documentation or to submit a service request. A valid username and password are required to access this site. Please contact your Cisco sales or service representative for additional information.





# CHAPTER 1

## AMF Metrics Reference

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### amf Metrics Reference

#### AMF AUSF Service Stats Category

##### **n12\_service\_stats**

Description: AMF Ausf service stats

Sample Query:

```
n12_service_stats(message_type='NausfUeAuthReq',status='success',reason='AUTHENTICATION_SUCCESS',roaming_status='HOME',slice_data='2-33333')
```

Labels:

- Label: `message_type`

Label Description: The message type associated with an ausf service

Example: NausfUeAuthReq, NausfUeAuthRsp, NausfUe5gAkaCnfReq, NausfUe5gAkaCnfRsp

- Label: `status`

Label Description: Overall status

Example: success, failures

- Label: `reason`

Label Description: The reason associated with an ausf service

Example: Suspend, Suspend for Async, Unable to retrieve msg from rsp, Supi mismatch, Internal Error, Sync FailedMac Failure, Auth Challenge Failed, Auth Cfm Failed, Sync Failed Exceeded, Timeout, Others, No Security Context from Peer, Peer Provided Sec Context Failed, NgKsi Already In Use, Scheduled ipc action in background, Unable to retrieve identity rsp, Unable to get Supi, AUTHENTICATION\_SUCCESS, AUTHENTICATION\_REJECTED, AV\_GENERATION\_PROBLEM, CONTEXT\_NOT\_FOUND, INVALID\_HN\_PUBLIC\_KEY\_IDENTIFIER, INVALID\_SCHEME\_OUTPUT, NETWORK\_FAILURE, SERVING\_NETWORK\_NOT\_AUTHORIZED, UNSUPPORTED\_PROTECTION\_SCHEME, UPSTREAM\_SERVER\_ERROR, USER\_NOT\_FOUND, Unable to get rsp

- Label: `slice_data`  
Label Description: slice data  
Example: 2-333333
- Label: `roaming_status`  
Label Description: Roaming Info  
Example: HOMER, ROAMER, UNKNOWN

## AMF Amf service stats Category

### n14\_service\_stats

Description: AMF AMF service stats

Sample Query:

```
n14_service_stats(message_type=\"N14TxUeContextTransferUpdate\", status=\"failures\", reason=\"Unable to get rsp\", roaming_status=\"HOMER\", slice_data=\"2-333333\")
```

Labels:

- Label: `message_type`  
Label Description: The message type associated with an amf service  
Example: N14TxUeContextCreateReq, N14RxUeContextCreateRsp, N14RxUeContextCreateReq, N14TxUeContextCreateRsp, N14TxUeContextTransferUpdate, N14RxUeContextTransferUpdateRsp, N14RxUeContextTransferUpdate, N14TxUeContextTransferUpdateRsp, N14RxUeContextTransferReq, N14TxUeContextTransferRsp, N14TxUeContextTransferReq, N14RxUeContextTransferRsp, N14RxN2InfoNotifyRequest, N14TxN2InfoNotifyResponse, N14TxN2InfoNotifyRequest, N14RxN2InfoNotifyResponse, N14N1MessageNotifyClientRequest, N14N1MessageNotifyClientResponse, N14N1MessageNotifyRequest, N14N1MessageNotifyResponse
- Label: `status`  
Label Description: Overall status  
Example: success, failures
- Label: `reason`  
Label Description: The reason associated with an amf service  
Example: Unable to get rsp, Unable to retrieve msg from rsp, Unknown Subscriber, Internal Error, Invalid Input, Invalid PduSession, Not Found, Forbidden, Internal Server Error, Gateway Timeout
- Label: `slice_data`  
Label Description: slice data  
Example: 2-333333
- Label: `roaming_status`  
Label Description: Roaming Info  
Example: HOMER, ROAMER, UNKNOWN

## AMF Attach rate throttle Category

### attach\_rate\_trottle

Description: Message level stats for rejection or drop due to throttle

Sample Query: `attach_rate_trottle{message_type=\"N1RegistrationRequest\",action=\"drop\"}`

Labels:

- Label: `message_type`

Label Description: incoming message throttled

Example: N1RegistrationRequest, GTPCFwdRelocReq, N14UeContextCreateReq

- Label: `action`

Label Description: throttled message dropped or rejected

Example: drop, reject

## AMF CBCF service\_stats Category

### n50\_service\_stats

Description: AMF CBCF service stats

Sample Query:

`n50_service_stats{message_type=\"NonueN2InfoTxfrReqData\",status=\"success\",reason=\"\"}`

Labels:

- Label: `message_type`

Label Description: The message type associated with an CBCF service

Example: NonueN2InfoTxfrReqData, NonueN2InfoTxfrRspData, NonueN2InfoSubsCreatedDataReq, NonueN2InfoSubsCreatedDataRsp, NonueN2InfoUnSubscribeReq, NonueN2InfoUnSubscribeRsp, NonueN2InfoNotifyReq, NonueN2InfoNotifyRsp

- Label: `status`

Label Description: Overall status

Example: success, failures

- Label: `reason`

Label Description: The reason associated with an CBCF service

Example: Unable to get rsp, Unable to retrieve msg from rsp, Internal Error, INVALID\_MSG\_FORMAT, INSUFFICIENT\_RESOURCES, SYSTEM\_FAILURE

## AMF DEBUG PROTO MAP STATS Category

### amf\_debug\_proto\_map\_stats

Description: Debug stats

Sample Query:

```
amf_debug_proto_map_stats(msg_type="N2UeRadioCapabilityCheckRsp",action="dropped",reason="connection_not_found")
```

Labels:

- Label: `msg_type`

Label Description: Message Type

Example: N2UeRadioCapabilityCheckRsp,N2InitialContextSetupRsp

- Label: `action`

Label Description: Action

Example: dropped

- Label: `reason`

Label Description: Reason

Example: connection\_not\_found

## AMF Disconnect stats Category

### amf\_disconnect\_stats

Description: AMF Disconnect stats counters

Sample Query: `amf_disconnect_stats{reason="disc_ue_init_dereg"}`

Labels:

- Label: `reason`

Label Description: The reason associated with an call disconnect

Example: disc\_ue\_init\_dereg, disc\_nw\_init\_dereg, Ausf\_AuthReject, Ausf\_DropPeerMsg

## AMF GMLC service\_stats Category

### n12\_service\_stats

Description: AMF GMLC service stats

Sample Query:

```
n12_service_stats(message_type="NgnlcRequestPositioningInfo",status="success",reason="",roaming_status="HOMER",slice_data="2-33333")
```

Labels:

- Label: `message_type`

Label Description: The message type associated with an GMLC service

Example: NgmlcRequestPositioningInfo, NgmlcProvidePositioningInfoRsp

- Label: `status`

Label Description: Overall status

Example: success, failures

- Label: `reason`

Label Description: The reason associated with an GMLC service

Example: Unable to get rsp, Unable to retrieve msg from rsp, Unknown Subscriber, Internal Error, Invalid Input, Invalid LCS Correlation ID

- Label: `slice_data`

Label Description: slice data

Example: 2-333333

- Label: `roaming_status`

Label Description: Roaming Info

Example: HOMER, ROAMER, UNKNOWN

## AMF LMF service\_stats Category

### **n11\_service\_stats**

Description: AMF LMF service stats

Sample Query:

```
n11_service_stats(message_type="NlmfDetermineLocReq",status="success",reason="",roaming_status="HOMER",slice_data="2-333333")
```

Labels:

- Label: `message_type`

Label Description: The message type associated with an LMF service

Example: NlmfN1N2MessageTransferReq, NlmfN1N2MessageTransferRsp, NlmfN1N2MessageTransferfailurenotifyReq, NlmfN1N2MessageTransferfailurenotifyRsp, NlmfN1MessageNotifyRequest, NlmfN1MessageNotifyResponse, NlmfDetermineLocReq, NlmfDetermineLocRsp, NlmfN2InfoNotifyRequest, NlmfN2InfoNotifyResponse, NlmfNonUEN2InfoNotifyRequest, NlmfNonUEN2InfoNotifyResponse, NlmfNonUEN2MessageTransferRequest, NlmfNonUEN2MessageTransferResponse

- Label: `status`

Label Description: Overall status

Example: success, failures

- Label: `reason`

Label Description: The reason associated with an LMF service





Labels:

- Label: `message_type`

Label Description: NGAP Message Type

Example:

`NgSetupResponse`

- Label: `asn_failures`

Label Description: Failure reason

Example: `CauseProtocolTransferSyntaxError`

## AMF NGAP ASN ENCODE ERR STATS Category

### `ngap_asn_encode_error_stats`

Description: Ngap ASN Encoding errors

Sample Query: `ngap_asn_encode_error_stats{message_type="NgSetupResponse",asn_failures=""}`

Labels:

- Label: `message_type`

Label Description: NGAP Message Type

Example:

`NgSetupResponse`

- Label: `asn_failures`

Label Description: Failure reason

Example:

## AMF NGAP service\_stats Category

### `n2_service_stats`

Description: AMF NGAP service stats

Sample Query:

`n2_service_stats{message_type="N2HandoverCommand",status="success",reason="",roaming_status="HOMER",slice_data="2-33333"}`

Labels:

- Label: `message_type`

Label Description: The message type associated with an NGAP service

Example: `N2PduSessResourceSetupRsp, N2PduSessResourceReleaseRsp, N2PduSessResourceModifyRsp, N2UeContextReleaseRequest, N2UeContextReleaseComplete, N2UplinkRanStatusTransfer, N2UeRadioCapabilityInfoInd, N2UeRadioCapabilityCheckReq, N2UeRadioCapabilityCheckRsp, N2InitialContextSetupRsp, N2InitialContextSetupFail, N2UEContextModificationRsp, N2UEContextModificationFail, NonUeN2WriteReplaceWarningReq, NonUeN2WriteReplaceWarningRsp,`



NonUeN2PWSCancelWarningReq, NonUeN2PWSCancelWarningRsp, NonUeN2PWSFailureIndication, NonUeN2PWSRestartIndication, N2NGRReset, N2UeContextReleaseCommand, N2InitialContextSetupReq, N2UEContextModificationReq, N2PduSessResouceModifyReq, N2PathSwitchReqAckMsg, N2PathSwitchReqFailureMsg, N2HandoverRequired, N2HandoverRequestAck, N2HandoverFailure, N2HandoverRequest, N2HandoverCommand, N2HandoverPreparationFailure, N2HandoverNotify, N2HandoverCancel, N2HandoverCancelAck, N2DLRanStatuTransfer, N2PathSwitchReqMsg, N2PduSessResouceReleaseCmd, Paging, N2PduSessResouceSetupReq, N2LocationReportingControl, N2LocationReport, N2LocationReportingFailureIndication, N2ReRouteNasRequest, UIUeAssociatedNRPPaTransport,DIUeAssociatedNRPPaTransport,UINonUeAssociatedNRPPaTransport,DINonUeAssociatedNRPPaTransport

- Label: `status`

Label Description: Overall status

Example: success, failures

- Label: `reason`

Label Description: The reason associated with an NGAP service

Example: Unable to get rsp, Unable to retrieve msg from rsp, Unknown Subscriber, Internal Error, Invalid Input, Invalid PduSession,Peer Info Not Avaliable,N1 mode Not Supported,Invalid Input,Mandatory IE Missing ,No connection with GNB, Suspend, Suspend for Async

- Label: `slice_data`

Label Description: slice data

Example: 2-333333

- Label: `roaming_status`

Label Description: Roaming Info

Example: HOMER, ROAMER, UNKNOWN

## AMF Nas Message Total Category

### **amf\_nas\_message\_total**

Description: The number of nas message received or sent

Sample Query:

```
amf_nas_message_total{message_direction!="inbound",message_type="Paging_Trigger_N1N2_Msg_Xfer",slice_data="2-333333"}
```

Labels:

- Label: `message_direction`

Label Description: The event type associated with nas message

Example: inbound, outbound

- Label: `slice_data`

Label Description: slice data

Example: 2-333333

- Label: `message_type`

Label Description: The message type associated with the nas message

Example: Paging\_Trigger\_N1N2\_Msg\_Xfer, N1RegRequest, N1RegRequest\_IdentityType\_SUCI, N1RegRequest\_RegType\_INITIAL\_REGISTRATION, N1RegAccept, N1RegComplete, N1RegReject, N1UnknownTypeRegReject, N1InitialRegReject, N1MobilityRegReject, N1PeriodicRegReject, N1EmergencyRegReject, N1ReservedRegReject, N1SecurityModeCommand, N1AuthenticationRsp, N1AuthenticationReq, N1AuthenticationFailure, N1AuthFail\_SyncFailure, N1AuthFail\_NgKsiInUseFailure, N1AuthFail\_MacFailure, N1AuthenticationReject, N1UeCfgUpdateComplete, N1UeCfgUpdateCommand, N1SecurityModeComplete, N1SecurityModeReject, N1DeRegAccept\_UeOriginatingDereg, N1DeRegReq\_UeOriginatingDereg, N1DeRegAccept\_UeTerminatedDereg, N1DeRegReq\_UeTerminatedDereg, N1PduEstablishmentRequest, N1PduModifyRequest, N1PduReleaseRequest, N1DINasTransport, N1UINasTransport, N1PduReject, N1ServiceRequest, N1ServiceReq\_Connected, N1ServiceReq\_Idle, N1ServiceAccept, N1ServiceReq\_SIGNALLING, N1ServiceReject, N1IdentityRequest\_Suci, N1IdentityRequest, N1IdentityResponse, N1IdentityRequest\_Imei, Paging, Paging\_Stage\_1, Paging\_TriggerType\_5qi

## AMF PCF Service Stats Category

### n15\_service\_stats

Description: AMF PCF service stats

Sample Query:

```
n15_service_stats{message_type=\"NpcfAmPolicyControlCreateReq\",status=\"failures\",reason=\"Unable to get rsp\",roaming_status=\"HOMER\",slice_data=\"2-333333\"}
```

Labels:

- Label: `message_type`

Label Description: The message type associated with an pcf service

Example: NpcfAmPolicyControlCreateReq, NpcfAmPolicyControlCreateRsp, NpcfAmPolicyControlDeleteReq, NpcfAmPolicyControlDeleteRsp

- Label: `status`

Label Description: Overall status

Example: success, failures

- Label: `reason`

Label Description: The reason associated with an pcf service

Example: Suspend, Suspend for Async, Unable to get rsp, Unable to retrieve msg from rsp, Failure in PCF Response, Others, Internal Error

- Label: `slice_data`

Label Description: slice data

Example: 2-333333

- Label: `roaming_status`

Label Description: Roaming Info

Example: HOMER, ROAMER, UNKNOWN

## AMF Procedure Seconds Category

### **amf\_procedure\_seconds**

Description: Total number of seconds took for complete procedure

Sample Query: `amf_procedure_seconds{proc_type=\"UE Registration\",status=\"success\",proc_status=\"\",slice_data=\"2-333333\"}`

Labels:

- Label: `proc_type`

Label Description: The procedure type associated with an call flow procedure

Example: UE Registration, UE DeRegistration, Pdu Create, Pdu N1N2, Pdu N2Rs, Pdu N1Rsp, Pdu Mod, UE Context Release, Pdu Notify, EBI, Paging, Service Request, Context Transfer, Context Transfer Upd, Xn Handover, N2 Handover Src, Handover to EPC, UeRadioCapInfoInd, NGRreset, N2 Handover Tgt, Handover From EPC, UeCfgUpdate, Domain Selection Info, AmfRedirection, UL DL NAS transport (SOR/SMS), LocationPosition

- Label: `status`

Label Description: The overall status of procedure

Example: success, failures, attempted

- Label: `proc_status`

Label Description: The current status of procedure

Example: ProcStatusComplete

- Label: `slice_data`

Label Description: slice data

Example: 2-333333

## AMF Procedure total Category

### **amf\_procedure\_total**

Description: Total number of procedure executed counter

Sample Query: `amf_procedure_total{proc_type=\"UE Registration\",status=\"success\",proc_status=\"\",slice_data=\"2-333333\"}`

Labels:

- Label: `proc_type`

Label Description: The procedure type associated with an call flow procedure

Example: UE Registration, UE DeRegistration, Pdu Create, Pdu N1N2, Pdu N2Rsp, Pdu N1Rsp, Pdu Mod, UE Context Release, Pdu Notify, EBI, Paging, Service Request, Context Transfer, Context Transfer

Upd, Xn Handover, N2 Handover Src, Handover to EPC, UeRadioCapInfoInd, NGRreset, N2 Handover Tgt, Handover From EPC, UeCfgUpdate, Domain Selection Info, Amf Redirection, UL DL NAS transport (SOR/SMS)

- Label: `status`

Label Description: The overall status of procedure

Example: success, failures, attempted

- Label: `proc_status`

Label Description: The current status of procedure

Example: ProcStatusComplete

- Label: `slice_data`

Label Description: slice data

Example: 2-333333

## AMF RETRANSMISSION STATS Category

### **retransmission\_stats**

Description: number of Retransmissions

Sample Query: `retransmission_stats{msg_type=\"Paging\",status=\"success\"}`

Labels:

- Label: `msg_type`

Label Description: Message Type

Example:

`retransmission_stats{msg_type=\"Paging\",status=\"success\",slice_data=\"2-333333\"}`

- Label: `status`

Label Description: overall Status

Example: success, failures, max\_retry\_exceeded

## AMF Session stats Category

### **amf\_session\_stats**

Description: AMF Session stats counters

Sample Query: `amf_session_stats{status=\"attempted\"}`

Labels:

- Label: `ueType`

Label Description: Type of the UE associated with the request

Example: homer, roamer, unknown

- Label: `status`

Label Description: UE session status indicated at AMF

Example: attempted, success, setup

## AMF Smf service stats Category

### `n11_service_stats`

Description: AMF Smf service stats

Sample Query:

```
n11_service_stats{message_type=\"N11SMContextUpdateReq\", status=\"failures\", reason=\"Unable to get rsp\", roaming_status=\"HOMER\", slice_data=\"2-333333\"}
```

Labels:

- Label: `message_type`

Label Description: The message type associated with an smf service

Example: N11SMContextUpdateReq, N11SMContextUpdateRsp, N11SMContextRetrieveRsp, N11SMContextRetrieveReq, N11SMContextCreateReq, N11SMContextCreateRsp, N11SMContextReleaseReq, N11SMContextReleaseRsp, PostAssignEbiReq, PostAssignEbiRsp, N11N1N2MessageTransferReq, N11N1N2MessageTransferRsp, N11N1N2MessageTransferfailurenotifyReq, N11N1N2MessageTransferfailurenotifyRsp, N11SMContextStatusNotifyReq, N11SMContextStatusNotifyRsp

- Label: `status`

Label Description: Overall status

Example: success, failures

- Label: `reason`

Label Description: The reason associated with an smf service

Example: Unable to get rsp, Unable to retrieve msg from rsp, Unknown Subscriber, Internal Error, Msg Timeout, Peer Info Not Available, Req Not Accepted, Sub IMSI Not Received, PGW FQDN Not Received, Mandatory IE Missing, Invalid Input, No Bearer Context, No Linked EBI, SM Context Failed for PDU, S1 mode Not Supported, SM Context PDU failed without N2smInfo, SM Context data received from SMF is NIL, N1 mode Not Supported

- Label: `slice_data`

Label Description: slice data

Example: 2-333333

- Label: `roaming_status`

Label Description: Roaming Info

Example: HOMER, ROAMER, UNKNOWN

## AMF Smsf service stats Category

### n20\_service\_stats

Description: AMF Smsf service stats

Sample Query:

```
n20_service_stats{message_type="sms_activate_response",status="success",reason="Created",slice_data="2-333333"}
```

Labels:

- Label: `message_type`

Label Description: The message type associated with an smsf service

Example: `sms_activate_request`, `sms_activate_response`, `sms_deactivate_request`, `sms_deactivate_response`, `sms_send_msg_request`, `sms_send_msg_rsp`, `sms_n1n2_message_transfer_req`, `sms_n1n2_message_transfer_rsp`, `sms_enable_ue_reachability`

- Label: `status`

Label Description: Overall status

Example: `success`, `failures`

- Label: `reason`

Label Description: The reason associated with an smsf service

Example: `Created`, `No Content`, `Gateway Timeout`, `Unknown Subscriber`

- Label: `slice_data`

Label Description: slice data

Example: `2-333333`

## AMF System Overload Status Category

### amf\_overload\_status

Description: Current system overload status

Sample Query: `amf_overload_status{}`

## AMF UDM Service Stats Category

### n8\_service\_stats

Description: AMF UDM service stats

Sample Query:

```
n8_service_stats{message_type="Nudr8chDataReq",status="failures",reason="INVALID_GUMI",roaming_status="HOMER",slice_data="2-333333"}
```

Labels:

- Label: `message_type`

Label Description: The message type associated with an udm service

Example: NudmSdmDataReq, NUdmUecmDeregisterNotificationRequest, NUdmUecmDeregisterNotificationResponse, NudmSdmUnSubscriptionReq, NudmSdmUnSubscriptionRsp, NudmPcscfRestorationReq, NudmPcscfRestorationRsp, NudmUecmRegistrationReq, NudmUecmRegistrationRsp, NudmSdmDataReq, NudmSdmDataRsp, NudmSdmSubscriptionReq, NudmSdmSubscriptionRsp, NudmSdmSorAckInfoReq, NudmSdmSorAckInfoRsp, NudmTadsReq, NudmTadsRsp

- Label: `status`

Label Description: Overall status

Example: success, failures

- Label: `reason`

Label Description: The reason associated with an udm service

Example: Suspend, Suspend for Async, Unable to get rsp, Unable to retrieve msg from rsp, Others, Internal Error, Missing Supi, Failure from Udm, SUBSCRIPTION\_WITHDRAWN, UE\_INITIAL\_REGISTRATION, CONTEXT\_NOT\_FOUND, DATA\_NOT\_FOUND, UNSUPPORTED\_RESOURCE\_URI, USER\_NOT\_FOUND, ACCESS\_NOT\_ALLOWED, INVALID\_GUAMI, NO\_PS\_SUBSCRIPTION, RAT\_NOT\_ALLOWED, ROAMING\_NOT\_ALLOWED, UNKNOWN\_5GS\_SUBSCRIPTION, UNPROCESSABLE\_REQUEST

- Label: `slice_data`

Label Description: slice data

Example: 2-333333

- Label: `roaming_status`

Label Description: Roaming Info

Example: HOMER, ROAMER, UNKNOWN

## AMF Ue Service Stats Category

### **n1\_service\_stats**

Description: AMF Ue service stats

Sample Query:

```
n1_service_stats{message_type=\"IdentityResponse\",status=\"failures\",reason=\"key Mismatch\",roaming_status=\"HOMER\",slice_data=\"2-333333\"}
```

Labels:

- Label: `message_type`

Label Description: The message type associated with an UE service

Example: N1RegRequest , N1RegAccept ,N1RegComplete , N1RegReject , N1UnknownTypeRegReject , N1InitialRegReject , N1MobilityRegReject N1PeriodicRegReject , N1EmergencyRegReject , N1ReservedRegReject , N1SecurityModeCommand , N1AuthenticationRsp , N1AuthenticationReq , N1AuthenticationFailure , N1AuthFail\_SyncFailure , N1AuthFail\_NgKsiInUseFailure ,

N1AuthFail\_MacFailure , N1AuthenticationReject N1UeCfgUpdateComplete , N1UeCfgUpdateCommand , N1SecurityModeComplete , N1SecurityModeReject , N1DeRegAccept\_UeOriginatingDereg , N1DeRegReq\_UeOriginatingDereg , N1DeRegAccept\_UeTerminatedDereg , N1DeRegReq\_UeTerminatedDereg , N1PduEstablishmentRequest , N1PduModifyRequest , N1PduReleaseRequest , N1DINasTransport , N1UINasTransport , N1PduReject , N1ServiceRequest , N1ServiceReq\_Connected , N1ServiceReq\_Idle , N1ServiceAccept , N1ServiceReq\_SIGNALLING , N1ServiceReject , N1IdentityRequest\_Suci , N1IdentityRequest , N1IdentityResponse , N1IdentityRequest\_Imei ,Paging

- Label: `status`

Label Description: Overall status

Example: success, failures

- Label: `reason`

Label Description: The reason associated with an UE service

Example: Suspend, Suspend for Async, Unable to get rsp, Unable to retrieve msg from rsp, Supi mismatch, Internal Error, Sync Failed, Timeout, Others, No Security Context from Peer, Peer Provided Sec Context Failed, NgKsi Already In Use, Scheduled ipc action in background, Unable to retrieve identity rsp, Unable to get Supi, key Mismatch

- Label: `slice_data`

Label Description: slice data

Example: 2-333333

- Label: `roaming_status`

Label Description: Roaming Info

Example: HOMER, ROAMER, UNKNOWN

## AMF collision stats Category

### **amf\_collision\_stats**

Description: Statistics for tracking and debugging the collisions encountered in AMF

Sample Query: `amf_collision_stats{action_type=\"abort_proc1\"}`

Labels:

- Label: `proc1`

Label Description: Name of the colliding procedure

Example: UERegistration\_INITIAL\_REGISTRATION, UERegistration\_MOBILITY\_REGISTRATION\_UPDATING, UERegistration\_PERIODIC\_REGISTRATION\_UPDATING, UERegistration\_EMERGENCY\_REGISTRATION, UEOwnDeRegistration, PduCreate, PduN1N2, PduN2Rsp, PduN1Rsp, PduMod, UEContextRelease, PduNotify, EBI, Paging, ServiceRequest, ContextTransfer, ContextTransferUpdate, XnHandover, N2HandoverSrc, HandoverToEPC, UeRadioCapInfoInd, GReset, N2HandoverTgt, HandoverFromEPC, UeCfgUpdate, DomainSelectionInfo,



AmfRedirection, UpLinkDownlink, LawfulIntercept, RegistrationComplete, ContextTransferEPC, RANLocation

- Label: `proc2`

Label Description: Name of the colliding procedure

Example: UERegistration\_INITIAL\_REGISTRATION, UERegistration\_MOBILITY\_REGISTRATION\_UPDATING, UERegistration\_PERIODIC\_REGISTRATION\_UPDATING, UERegistration\_EMERGENCY\_REGISTRATION, UEOOrNwDeRegistration, PduCreate, PduN1N2, PduN2Rsp, PduN1Rsp, PduMod, UEContextRelease, PduNotify, EBI, Paging, ServiceRequest, ContextTransfer, ContextTransferUpdate, XnHandover, N2HandoverSrc, HandoverToEPC, UeRadioCapInfoInd, GReset, N2HandoverTgt, HandoverFromEPC, UeCfgUpdate, DomainSelectionInfo, AmfRedirection, UpLinkDownlink, LawfulIntercept, RegistrationComplete, ContextTransferEPC, RANLocation

- Label: `action_type`

Label Description: action taken by collision resolver

Example: `abort_proc1`, `continue_proc1`, `suspend_proc1`

## ASN FAILURE MANDATORY IE MISSING Category

### `asn_failures_mandatory_ie_missing`

Description: mandatory missing Ies

Sample Query:

```
asn_failures_mandatory_ie_missing{missing_ie="MessageId",message_type="WriteReplaceWarningRequest"}
```

Labels:

- Label: `missing_ie`

Label Description: Missing IE

Example:

MessageId,SerialNumber,GlobalRANNodeBDRANNodeName,SupportedTAList,RANUEngpId,NasPdu,UserLocationInformation,Cause,ResetType

- Label: `message_type`

Label Description: Message Type

Example:

WriteReplaceWarningRequest,NgSetupRequest,RANConfigUpdate,InitialUeMessage,UINasTransport,NgapReset

## Discover Messages Time statistics Category

### `nf_discover_total_time`

Description: Discover Messages Total time statistics

Sample Query: `nf_discover_total_time{nf_type="amf",`

```
host="http://10.105.227.109:8082/nrnf-nfm/v1", result="timeoutOrRPCError"}
```

Labels:

- Label: `nf_type`  
Label Description: Network Function type  
Example: nrf, udm, amf, pcf, ausf, smf
- Label: `host`  
Label Description: End Point address  
Example: `http://10.105.227.109:8082/nrf-nfm/v1`
- Label: `result`  
Label Description: result of discover message  
Example: 200, 201, 204, success, timeout\_rpc\_error, response\_parse\_failure

## Discover Messages statistics Category

### `nf_discover_messages_total`

Description: Discover Messages statistics

Sample Query: `nf_discover_messages_total{nf_type="amf", host="http://10.105.227.109:8082/nrf-nfm/v1", result="timeouOrRPCError"}`

Labels:

- Label: `nf_type`  
Label Description: Network Function type  
Example: nrf, udm, amf, pcf, ausf, smf
- Label: `host`  
Label Description: End Point address  
Example: `http://10.105.227.109:8082/nrf-nfm/v1`
- Label: `result`  
Label Description: result of discover message  
Example: 200, 201, 204, success, timeout\_rpc\_error, response\_parse\_failure

## Marshal Failures Category

### `marshal_failures`

Description: total number of Marshal error statss

Sample Query: `marshal_failures{message_type="\SmfSmContextDelete"}`

Labels:

- Label: `message_type`

Label Description: The message type associated with Marshal failure stats

Example: AusfAuthenticationCfm, AusfAuthenticationReq, UdmDeRegistrationReq, UdmRegistrationReq, UdmSubscriptionReq, UdmUnSubscriptionReq, PcfAmfPolicyControlCreate, PcfAmfPolicyControlDelete, SmfSmContextCreate, SmfSmContextDelete, SmfSmContextUpdate, AmfCommCreateUeContext, AmfCommN1N2MessageTransfer

## N22 Service Stats Category

### n22\_service\_stats

Description: AMF N22 stats

Sample Query: `n22_service_stats{message_type=\"NssfGetNetworkSliceInformationResp\", status=\"failures\", reason=\"Unable to get rsp\"}`

Labels:

- Label: `message_type`

Label Description: The message type associated with an N22 interface

example: `NssfGetNetworkSliceInformationReq`, `NssfGetNetworkSliceInformationResp`

- Label: `status`

Label Description: Overall status

Example: success, failures

- Label: `reason`

Label Description: The reason associated with an N22 service

Example: Unable to get rsp, Unable to retrieve msg from rsp, Msg Timeout

## N26 Service Stats Category

### n26\_service\_stats

Description: AMF N26 stats

Sample Query:

`n26_service_stats{message_type=\"GTPCRxIdentificationRequest\", status=\"failures\", reason=\"N1 mode Not Supported\", roaming_status=\"HOMER\", slice_data=\"2-33333\"}`

Labels:

- Label: `message_type`

Label Description: The message type associated with an N26 service

Example: `GTPCRxIdentificationRequest`, `GTPCTxIdentificationRequest`, `GTPCRxContextRequest`, `GTPCRxContextResponse`, `GTPCRxContextAck`, `GTPCTxContextAck`, `GTPCRxFwdRelocCmpNotf`, `GTPCTxFwdRelocCmpNotf`, `GTPCRxRelocCancelReq`, `GTPCTxRelocCancelRsp`, `GTPCTxFwdRelocResponse`, `GTPCTxIdentificationResponse`

- Label: `status`

Label Description: Overall status

Example: success, failures

- Label: `reason`

Label Description: The reason associated with an N26 service

Example: Unable to get rsp, Unable to retrieve msg from rsp, Unknown Subscriber, Internal Error, Msg Timeout, Peer Info Not Available, Req Not Accepted, Sub IMSI Not Received, PGW FQDN Not Received, Mandatory IE Missing, Invalid Input, No Bearer Context, No Linked EBI, SM Context Failed for PDU, S1 mode Not Supported, SM Context PDU failed without N2smInfo, SM Context data received from SMF is NIL, N1 mode Not Supported

- Label: `slice_data`

Label Description: slice data

Example: 2-333333

- Label: `roaming_status`

Label Description: Roaming Info

Example: HOMER, ROAMER, UNKNOWN

## NF End point selections Category

### **nf\_endpoint\_selections\_total**

Description: NF End Point Selection Statistics

Sample Query: `nf_endpoint_selections_total{message_type="\SmfSmContextDelete", nf_type="\ausf", host="http://10.105.227.109:8082/nrf-nfm/v1", req="initial"}`

Labels:

- Label: `message_type`

Label Description: The message type associated with the failure stats

Example: AusfAuthenticationCfm, AusfAuthenticationReq, UdmDeRegistrationReq, UdmRegistrationReq, UdmSubscriptionReq, UdmUnSubscriptionReq, PcfAmfPolicyControlCreate, PcfAmfPolicyControlDelete, SmfSmContextCreate, SmfSmContextDelete, SmfSmContextUpdate, AmfCommCreateUeContext, AmfCommN1N2MessageTransfer

- Label: `nf_type`

Label Description: Network Function type

Example: nrf, udm, amf, pcf, ausf, smf

- Label: `host`

Label Description: End Point address

Example: `http://10.105.227.109:8082/nrf-nfm/v1`

- Label: `req`

Label Description: req type

Example: initial, fallback,

## NF failure handling stats Category

### **nf\_failure\_handling\_stats\_total**

Description: NF Failure handling stats

Sample Query:

```
nf_failure_handling_stats_total{message_type="\SmfSmContextDelete",nf_type="SMF",  
host="\http://10.105.227.109:8082/nrf-nfm/v1", req="initial", response="202",  
status="final"}
```

Labels:

- Label: `message_type`

Label Description: The message type associated with the failure stats

Example: AusfAuthenticationCfm, AusfAuthenticationReq, UdmDeRegistrationReq, UdmRegistrationReq, UdmSubscriptionReq, UdmUnSubscriptionReq, PcfAmfPolicyControlCreate, PcfAmfPolicyControlDelete, SmfSmContextCreate, SmfSmContextDelete, SmfSmContextUpdate, AmfCommCreateUeContext, AmfCommN1N2MessageTransfer

- Label: `nf_type`

Label Description: Network Function type

Example: nrf, udm, amf, pcf, ausf, smf

- Label: `host`

Label Description: End Point address

Example: `http://10.105.227.109:8082/nrf-nfm/v1`

- Label: `req`

Label Description: Request type

Example: initial, fallback,

- Label: `response`

Label Description: Response from the server

Example: 200, 201, 204, `timeout_rpc_error`,

- Label: `status`

Label Description: Status from the server

Example: retry, final

## NF management message time statistics Category

### nf\_management\_total\_time

Description: NF management messages total time taken

Sample Query: `nf_management_total_time{host=\"http://10.105.227.109:8082/nnrf-nfm/v1\", direction=\"outbound\", message_type=\"registration\", result=\"timeouOrRPCError\" }`

Labels:

- Label: `host`

Label Description: End Point address

Example: `http://10.105.227.109:8082/nnrf-nfm/v1`

- Label: `direction`

Label Description: Direction indicates about the message going out or coming in

Example: `inbound, outbound`

- Label: `message_type`

Label Description: Type of Message

Example: `registration, heartbeat, subscription, notification`

- Label: `result`

Label Description: result of discover message

Example: `200, 201, 204, success, timeout_rpc_error, response_parse_failure, request_parse_failure, invalid_notify_event, invalid_nf_instance_uri, internal_error`

## NF management messages statistics Category

### nf\_management\_stats\_total

Description: NF management messages statistics

Sample Query: `nf_management_stats_total{host=\"http://10.105.227.109:8082/nnrf-nfm/v1\", direction=\"outbound\", message_type=\"registration\", result=\"timeouOrRPCError\" }`

Labels:

- Label: `host`

Label Description: End Point address

Example: `http://10.105.227.109:8082/nnrf-nfm/v1`

- Label: `direction`

Label Description: Direction indicates about the message going out or coming in

Example: `inbound, outbound`

- Label: `message_type`

Label Description: Type of Message

Example: registration, heartbeat, subscription, notification

- Label: `result`

Label Description: result of discover message

Example: 200, 201, 204, success, timeout\_rpc\_error, response\_parse\_failure

## NRF Access Token Category

### **nf\_oauth\_messages\_total**

Description: Total AccessToken Message count

Sample Query: `nf_oauth_messages_total{nf_type=\"pcf\"}`

Labels:

- Label: `nf_type`

Label Description: Network Function type

Example: udm, amf, pcf, ausf, smf, smsf

- Label: `result`

Label Description: overall status

Example: success

## NRF Discovery Category

### **nf\_discover\_events\_total**

Description: NF Discover Stats

Sample Query: `nf_discover_events_total{nf_type=\"pcf\", response_type=\"local\"}`

Labels:

- Label: `nf_type`

Label Description: Network Function type

Example: nrf, udm, amf, pcf, ausf, smf

- Label: `response_type`

Label Description: Discovery response choosen from

Example: local, cache, expired-cache

## Security Algorithm Category

### **amf\_nas\_security\_algos\_seconds\_total**

Description: Statistic for capturing duration taken for security algorithm

Sample Query:

```
amf_nas_security_algos_seconds_total{algos_type="128-5G-IA1",status="success",reason="",algos_lang="go",message_type="N1IdentityResponse",message_direction!="inbound"}
```

Labels:

- Label: `message_type`  
Label Description: The name of the message type  
Example: N1IdentityResponse
- Label: `status`  
Label Description: Status of the application of security algorithm  
Example: success, failures
- Label: `reason`  
Label Description: The reason for failure  
Example: integrity check failed,Security Context Not Found
- Label: `algos_type`  
Label Description: The type of algorithm  
Example: 128-5G-IA1
- Label: `message_direction`  
Label Description: The direction of the message flow  
Example: inbound, outbound
- Label: `algos_lang`  
Label Description: The implementation of security algorithm  
Example: go, c

### **amf\_nas\_security\_algos\_total**

Description: Statistic for capturing counter of security algorithm

Sample Query:

```
amf_nas_security_algos_total{algos_type="128-5G-IA1",status="success",reason="",algos_lang="go",message_type="N1IdentityResponse",message_direction!="inbound"}
```

Labels:

- Label: `message_type`  
Label Description: The name of the message type  
Example: N1IdentityResponse
- Label: `status`



Label Description: Status of the application of security algorithm

Example: success, failures

- Label: `reason`

Label Description: The reason for failure

Example: integrity check failed, Security Context Not Found

- Label: `algos_type`

Label Description: The type of algorithm

Example: 128-5G-IA1

- Label: `message_direction`

Label Description: The direction of the message flow

Example: inbound, outbound

- Label: `algos_lang`

Label Description: The implementation of security algorithm

Example: go, c

## Unmarshal Failures Category

### **unmarshal\_failures**

Description: total number of Unmarshal error stats

Sample Query: `unmarshal_failures{message_type="\SmfSmContextDelete\"}`

Labels:

- Label: `message_type`

Label Description: The message type associated with Unmarshal failure stats

Example: `AusfAuthenticationCfm, AusfAuthenticationReq, UdmDeRegistrationReq, UdmRegistrationReq, UdmSubscriptionReq, UdmUnSubscriptionReq, PcfAmfPolicyControlCreate, PcfAmfPolicyControlDelete, SmfSmContextCreate, SmfSmContextDelete, SmfSmContextUpdate, AmfCommCreateUeContext, AmfCommN1N2MessageTransfer`





## CHAPTER 2

# KPI Support for Multiple Replicas

- [Feature Summary and Revision History, on page 27](#)
- [Feature Description, on page 27](#)
- [OAM Support, on page 28](#)

## Feature Summary and Revision History

### Summary Data

*Table 1: Summary Data*

Applicable Product(s) or Functional Area	AMF
Applicable Platform(s)	SMI
Feature Default Setting	Enabled - Always-on
Related Documentation	Not Applicable

### Revision History

*Table 2: Revision History*

Revision Details	Release
First introduced.	2021.04.0

## Feature Description

This feature supports the following statistics:

- Procedural
- Service-based Interface (SBI)

- Session
  - gNB ID
  - Tracking Area (TA)

## OAM Support

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

### Procedural Statistics

The following procedural statistics are supported.

Metrics	Description	Labels
procedure_execution_seconds_total	Total time in seconds for executing the procedure.	<ul style="list-style-type: none"> <li>• execution_stage</li> <li>• msg_type</li> <li>• proc_name</li> <li>• sub_proc_name</li> </ul>
procedure_service_total	Total number of procedures executed in service.	proc_name
procedure_service_duration_seconds_total	Total time in seconds for executing the procedure in service pod.	proc_name
procedure_service_duration_histogram_total	Histogram time bins for executing the procedure in service pod.	<ul style="list-style-type: none"> <li>• proc_name</li> <li>• bin</li> </ul>
sub_procedure_service_total	Total number of sub procedures executed in service.	<ul style="list-style-type: none"> <li>• msg_type</li> <li>• proc_name</li> <li>• sub_proc_name</li> </ul>
sub_procedure_service_duration_seconds_total	Total time in seconds for executing the sub procedure in service pod.	<ul style="list-style-type: none"> <li>• msg_type</li> <li>• proc_name</li> <li>• sub_proc_name</li> </ul>
sub_procedure_service_duration_histogram_total	Histogram time bins for executing the sub procedure in service pod.	<ul style="list-style-type: none"> <li>• msg_type</li> <li>• proc_name</li> <li>• sub_proc_name</li> <li>• bin</li> </ul>

## SBI Statistics

The following SBI statistics are supported.

Metrics	Description	Labels
rpc_response_total	Total number of Remote Process Call (RPC) responses received.	<ul style="list-style-type: none"> <li>• background</li> <li>• dest_host</li> <li>• dest_set</li> <li>• interface</li> <li>• method_name</li> <li>• msg_type</li> <li>• namespace</li> <li>• proc_name</li> <li>• retry</li> <li>• rpc_name</li> <li>• service_name</li> <li>• stage</li> <li>• status</li> <li>• status_code</li> <li>• sub_proc_name</li> <li>• txn_type</li> </ul>

## Session Statistics

The following session statistics are supported.

Metrics	Description	Labels
db_records_total	Total number of records present in database.	<ul style="list-style-type: none"> <li>• CipheringAlgo</li> <li>• IntegrityAlgo</li> <li>• session_type</li> </ul>

## Bulk Statistics

The following are examples of KPI Support for Multiple Replicas.

### Procedural Statistics Example

```
procedure_execution_seconds_total{app_name="amf",cluster="clu1",data_center="dc1",execution_stage="AppInfra",
instance_id="0",msg_type="N1RegistrationRequest",proc_name="UE
Registration",service_name="amf-service",
sub_proc_name="N1RegistrationRequest"} 0.004000576
```

```
procedure_service_duration_histogram_total{app_name="amf",bin="50to500ms",cluster="clu1",data_center="dc1",instance_id="0",
proc_name="UE Registration",service_name="amf-service"} 1
```

```
procedure_service_duration_seconds_total{app_name="amf",cluster="clu1",data_center="dc1",instance_id="0",
proc_name="UE Registration",service_name="amf-service"} 0.201723819
```

```
procedure_service_total{app_name="amf",cluster="clu1",data_center="dc1",instance_id="0",
proc_name="UE Registration",service_name="amf-service"} 1
```

```
sub_procedure_service_duration_histogram_total{app_name="amf",bin="50to500ms",cluster="clu1",data_center="dc1",instance_id="0",
msg_type="N1RegistrationRequest",proc_name="UE
Registration",service_name="amf-service",sub_proc_name="N1RegistrationRequest"}
1
```

```
sub_procedure_service_duration_seconds_total{app_name="amf",cluster="clu1",data_center="dc1",instance_id="0",
msg_type="N1RegistrationRequest",proc_name="UE
Registration",service_name="amf-service",sub_proc_name="N1RegistrationRequest"}
0.201668683
```

```
sub_procedure_service_total{app_name="amf",cluster="clu1",data_center="dc1",instance_id="0",msg_type="N1RegistrationRequest",
proc_name="UE
Registration",service_name="amf-service",sub_proc_name="N1RegistrationRequest"}
1
```

### Procedure Service Duration Histogram Statistics Example

```
procedure_service_duration_histogram_total{app_name="AMF",bin="<=50ms",cluster="clu1",data_center="dc1",instance_id="2",
proc_name="Pdu N1N2",service_name="amf-service"} 2
```

### Sub-procedure Service Duration Histogram Statistics Example

```
sub_procedure_service_duration_histogram_total{app_name="AMF",bin="<=50ms",cluster="clu1",
data_center="dc1",instance_id="0",msg_type="N1N2MessageTransfer",proc_name="Pdu
N1N2",service_name="amf-service",
sub_proc_name="N1N2MessageTransfer"} 1
```

```
sub_procedure_service_total{app_name="AMF",cluster="clu1",data_center="dc1",instance_id="0",
msg_type="N1N2MessageTransfer",proc_name="Pdu
N1N2",service_name="amf-service",sub_proc_name="N1N2MessageTransfer"} 1
```

### Procedure Service Statistics Example

```
procedure_service_total{app_name="AMF",cluster="clul",data_center="dc1",instance_id="2",proc_name="UE
Registration",
service_name="amf-service"} 4
```

### SBI Statistics Example

```
rpc_response_total{app_name="amf",background="false",cluster="clul",data_center="dc1",
dest_host="http://1.0.0.1:1000/nausf-auth/v1",dest_set="",instance_id="1",interface="Rest",
method_name="Authenticate",msg_type="AusfauthRequest",namespace="0",proc_name="Authentication",
retry="0",rpc_name="AUSF",service_name="amf-rest-ep",stage="init_done",status="success",status_code="201",
sub_proc_name="N1RegistrationRequest",txn_type="NausfUeAuthentication"} 1
```

```
rpc_response_total{app_name="amf",background="false",cluster="clul",data_center="dc1",
dest_host="http://1.0.0.1:1001/nudm-uecm/v1",dest_set="",instance_id="1",interface="Rest",
method_name="Register",msg_type="UdmRegRequest",namespace="0",proc_name="UDM
Registration",
retry="0",rpc_name="UDM",service_name="amf-rest-ep",stage="init_done",status="error",
status_code="RestClientUnableToSend",sub_proc_name="N1RegistrationRequest",
txn_type="NudmUecmRegistration"} 1
```

### DB Records Statistics Example

```
db_records_total{appInstanceId="0",app_name="datastore-ep",cluster="session",data_center="test",db="session",
instance_id="3232278441",service_name="datastore-ep",session_type="EmergencyRegistered:false",
sliceName="slice1",systemId=""} 1
db_records_total{appInstanceId="0",app_name="datastore-ep",cluster="session",data_center="test",db="session",
instance_id="3232278441",service_name="datastore-ep",session_type="PLMNType:HOMER",
sliceName="slice1",systemId=""} 2
db_records_total{appInstanceId="0",app_name="datastore-ep",cluster="session",data_center="test",db="session",
instance_id="3232278441",service_name="datastore-ep",session_type="UeUsageSetting:NA",
sliceName="slice1",systemId=""} 0
db_records_total{appInstanceId="0",app_name="datastore-ep",cluster="session",data_center="test",db="session",
instance_id="3232278441",service_name="datastore-ep",session_type="gnb_id:4194304123456",
sliceName="slice1",systemId=""} 0
db_records_total{appInstanceId="0",app_name="datastore-ep",cluster="session",data_center="test",db="session",
instance_id="3232278441",service_name="datastore-ep",session_type="tac:30",
sliceName="slice1",systemId=""} 0
db_records_total{appInstanceId="0",app_name="datastore-ep",cluster="session",data_center="test",db="session",
instance_id="3232278441",service_name="datastore-ep",session_type="total",
sliceName="slice1",systemId="1"} 3
```







## CHAPTER 3

# AMF Bulk Statistics and MME Equivalent KPI Support

- [Feature Summary and Revision History](#), on page 33
- [Feature Description](#), on page 33
- [How it Works](#), on page 34
- [OAM Support](#), on page 34

## Feature Summary and Revision History

### Summary Data

*Table 3: Summary Data*

Applicable Products or Functional Area	AMF
Applicable Platforms	SMI
Feature Default Setting	Enabled – Always-on
Related Documentation	

### Revision History

*Table 4: 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 5: Supported Service Request Counters

Name	Description	Trigger
<b>Sctp Outgoing SCTPPacket stats</b>	The total number of SCTP packets sent. Retransmitted DATA chunks are included.	Increments when the AMF sends the SCTP packet to the gNB.
<b>Sctp Incoming SCTPPacket stats</b>	The total number of SCTP packets received. Duplicates are included.	Increments when the AMF receives the SCTP packet from the gNB.
<b>Sctp Init stats</b>	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.
<b>Sctp Shutdowns stats</b>	The total number of times that associations terminated gracefully from AMF side or gNB.	Increments when the gNB is disconnected from the AMF.
<b>Sctp Fragmented Message stats</b>	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.
<b>Sctp Reassembled Message stats</b>	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.
<b>Ausf Ue eapaka rsp</b>	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.
<b>Ausf Ue eapaka cfm</b>	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.
<b>Ausf Authentication Cfm Rsp Stats</b>	The total numbers of 5g-aka confirm response received from the AUSF.	Increments when the AMF receives 5g-aka authentication confirm response.
<b>Ausf Authentication Cfm Stats</b>	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.
<b>Ausf Authentication Req Stats</b>	The total number of AUSF authentication requests sent by the AMF.	Increments when the AMF receives authentication request.
<b>Ausf Authentication Rsp Stats</b>	The total number of AUSF authentications responses received by the AMF.	Increments when the AMF receives authentication response from the AUSF.

<b>Name</b>	<b>Description</b>	<b>Trigger</b>
<b>Authentication Mac Failed</b>	The total number of authentication MAC failures received during UE authentications.	Increments when the N1 authentication rejection is sent due to the MAC failure.
<b>Authentication Reject</b>	The total number of authentication rejections sent by the AMF.	Increments when the 5g-aka authentication fails.
<b>Authentication Sync Failed</b>	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.
<b>Ebi Fail Bearers Not Found</b>	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.
<b>Ebi Fail Invalid Pdu Session</b>	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.
<b>Ebi Rejected No N26</b>	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.
<b>Gnb Ics Fail Stats</b>	The total number of initial context setup requests failed.	Increments when the AMF ICS fails.
<b>Gnb Ics Req Stats</b>	Total number of initial context setup requests sent by the AMF.	Increments when the AMF sends ICS requests.
<b>Gnb Ics Rsp Stats</b>	The total number of initial context setup responses received.	Increments when the AMF receives ICS responses.
<b>Pcf Delete Req Stats</b>	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.
<b>Pcf Delete Rsp Stats</b>	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.
<b>Udm Pcsf Restor Req Stats</b>	The total number of PCSCF restoration requests sent to the UDM.	Increments when the AMF sends the PCSCF restoration request to the UDM.
<b>Udm Pcsf Restor Rsp Stats</b>	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.

<b>Name</b>	<b>Description</b>	<b>Trigger</b>
<b>Udm Registration Req Stats</b>	The total number of UDM registration requests sent.	Increments when the AMF sends the UDM registration request.
<b>Udm Registration Rsp Stats</b>	The total number of UDM registration responses received by the AMF.	Increments when the AMF receives the UDM registration response.
<b>Udm Subscriber Data Req Stats</b>	The total number of subscriber data requests sent to the UDM.	Increments when the AMF sends the subscriber data request to the UDM.
<b>Udm Subscriber Data Rsp Stats</b>	The total number of subscriber data response received from the UDM.	Increments when the AMF receives the subscriber data response.
<b>Udm Subscriber Notify Req Stats</b>	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.
<b>Udm Subscriber Notify Rsp Stats</b>	The total number of subscribers notify responses received by the AMF.	Increments when the AMF receives the UDM subscriber notify response.
<b>Udm Unsubscriber Notify Req Stats</b>	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.
<b>Udm Unsubscriber Notify Rsp Stats</b>	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.
<b>Ue Authentication Req Stats</b>	The total number of UE authentication requests sent.	During the UE authentication procedure, this is incremented, when the UE authentication request is sent.
<b>Ue Authentication Rsp Stats</b>	The total number of UE authentication responses received.	During the UE authentication procedure, this is incremented, when the UE authentication response is received.
<b>Ue Configuration Update Cmd</b>	The total number of UE configuration update commands sent by the AMF.	Increments when the AMF sends the UE configuration update command.
<b>Ue Configuration Update Complete</b>	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.
<b>Ue Security Cmd Req Stats</b>	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
<b>Ue Security Cmd Rsp Stats</b>	The total number of security mode complete messages received by the AMF.	Increments when the AMF receives the security mode completed messages.
<b>Gtpc Rx Context Ack</b>	The total number of GTPC contexts ACK received from the MME.	Increments when the AMF receives the context ACK from the MME.
<b>Gtpc Rx Context Req</b>	The total number of GTPC context requests received from the MME.	Increments when the AMF receives the GTPC context request from the MME.
<b>Gtpc Rx Context Rsp</b>	The total number of GTPC context request responses received from the MME.	Increments when the AMF receives the GTPC context response from the MME.
<b>Gtpc Rx Fwd Reloc Cmp Ack</b>	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.
<b>Gtpc Rx Fwd Reloc Req</b>	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.
<b>Gtpc Rx Fwd Reloc Rsp</b>	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.
<b>Gtpc Rx Identification Req</b>	The total number of GTPC identification requests received from the MME.	Increments when the AMF receives the GTPC identification requests from the MME.
<b>Gtpc Rx Identification Rsp</b>	The total number of GTPC identification responses received from the MME.	Increments when the AMF receives the GTPC identification response from the MME.
<b>Gtpc Rx Reloc Cancel Req</b>	The total numbers of GTPC cancel requests received from the MME.	Increments when the AMF receives the GTPC cancel request from the MME.
<b>Gtpc Rx Reloc Cancel Rsp</b>	The total numbers of GTPC cancel response received from the MME.	Increments when the AMF receives the GTPC cancel response from the peer MME.
<b>Gtpc Tx Context Ack</b>	The total number of GTPC contexts ACK sent to the MME.	Increments when the AMF sends the GTPC context ACK to the MME.
<b>Gtpc Tx Context Req</b>	The total number of GTPC context requests sent to the MME.	Increments when the AMF sends the GTPC context request to the MME.
<b>Gtpc Tx Context Rsp</b>	The total number of GTPC context responses sent to the MME.	Increments when the AMF sends the GTPC context response to the MME.

<b>Name</b>	<b>Description</b>	<b>Trigger</b>
<b>Gtpc Tx Fwd Reloc Cmp Ack</b>	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.
<b>Gtpc Tx Fwd Reloc Cmp Notf</b>	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.
<b>Gtpc Tx Fwd Reloc Req</b>	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.
<b>Gtpc Tx Fwd Reloc Rsp</b>	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.
<b>Gtpc Tx Identification Req</b>	The total number of GTPC identification requests sent to the MME.	Increments when the AMF sends the GTPC identification request to the MME.
<b>Gtpc Tx Reloc Cancel Req</b>	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.
<b>Gtpc Tx Reloc Cancel Rsp</b>	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.
<b>Gtpc Tx Req</b>	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.
<b>Nas In Identity Response</b>	The total number of identity responses received from the UE.	Increments when the AMF receives an identity response from the UE.
<b>Nas In Ue Deregistration Accept</b>	The total number of network initiated deregistration received.	Increments when the network initiated deregistration is received.
<b>Nas Out Identity Request Imei</b>	The total number of identity requests with IMEI as matching value.	Increments when the IMEI-based identity request is sent.
<b>Nas Out Identity Request Suci</b>	The total number of identity requests with SUCI as matching value.	Increments when the SUCI-based identity request is sent.
<b>Ngap DI Handover Command Msg</b>	The total number of handover commands sent to the source gNB.	Increments when the AMF sends the handover command to the source gNB.

<b>Name</b>	<b>Description</b>	<b>Trigger</b>
<b>Ngap DI Handover Preparation Failure Msg</b>	The total number of handovers prepare failure sent by the AMF.	Increments when the AMF sends the handover preparation failure to the gNB.
<b>Ngap DI Handover Request Msg</b>	The total number of handover request messages sent to the gNB.	Increments when the AMF sends the handover request message to the gNB.
<b>Ngap UI Handover Cancel Msg</b>	The total numbers of handover cancel requests received from the gNB.	Increments when the AMF receives the handover cancel request from the gNB.
<b>Ngap UI Handover Request Ack Msg</b>	The total number of handover ACK messages received by the AMF.	Increments when the AMF receives the handover ACK message from the gNB.
<b>Ngap UI Handover Required Msg</b>	The total number of handover required messages received by the AMF.	Increments when the AMF receives the handover required message from the gNB.
<b>Smf Sm Ctxt Create Req</b>	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.
<b>Smf Sm Ctxt Create Rsp</b>	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.
<b>Smf Sm Ctxt Retrieve Req</b>	The total number of SM contexts retrieve request sent to the SMF.	Increments when the AMF sends the message to retrieve the context.
<b>Smf Sm Ctxt Update Req</b>	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.
<b>Smf Sm Ctxt Update Rsp</b>	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.
<b>Udm Initiated Dereg Request</b>	The total number of UDM initiated deregistration request received.	Increments when the AMF receives the UDM initiated deregistration request.
<b>Udm Initiated Dereg Response</b>	The total number of UDM initiated deregistration responses sent to the UDM.	Increments when the AMF sends the UDM-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





## CHAPTER 4

# MIB Reference

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- [CISCO-CNEE-MIB, on page 43](#)
- [CISCO-SMI, on page 43](#)

## CISCO-CNEE-MIB

This is the MIB module for the Cisco Cloud Native Execution Environment (CNEE) platform. This MIB only handles notifications from the CNEE.



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**Note** The Cisco Cloud Native Execution Environment (CNEE) MIB (CISCO-CNEE-MIB.my) uses definitions that are defined in the Cisco Enterprise Structure of Management Information (SMI) MIB (CISCO-SMI.my).

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For more information, see the "*UCC Subscriber Microservice Infrastructure - Operations Guide*" > "SMI MIB Reference" chapter.

## CISCO-SMI

This is the Structure of Management Information for the Cisco Enterprise.



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**Note** The Cisco Cloud Native Execution Environment (CNEE) MIB (CISCO-CNEE-MIB.my) uses definitions that are defined in the Cisco Enterprise Structure of Management Information (SMI) MIB (CISCO-SMI.my).

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For more information, see the "*UCC Subscriber Microservice Infrastructure - Operations Guide*" > "SMI MIB Reference" chapter.

