



Ultra Cloud Core 5G Access and Mobility Management Function, Release 2023.01 - Metrics Reference

First Published: 2023-01-24

Last Modified: 2023-01-24

Americas Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
<http://www.cisco.com>
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

THE SOFTWARE LICENSE AND LIMITED WARRANTY FOR THE ACCOMPANYING PRODUCT ARE SET FORTH IN THE INFORMATION PACKET THAT SHIPPED WITH THE PRODUCT AND ARE INCORPORATED HEREIN BY THIS REFERENCE. IF YOU ARE UNABLE TO LOCATE THE SOFTWARE LICENSE OR LIMITED WARRANTY, CONTACT YOUR CISCO REPRESENTATIVE FOR A COPY.

The Cisco implementation of TCP header compression is an adaptation of a program developed by the University of California, Berkeley (UCB) as part of UCB's public domain version of the UNIX operating system. All rights reserved. Copyright © 1981, Regents of the University of California.

NOTWITHSTANDING ANY OTHER WARRANTY HEREIN, ALL DOCUMENT FILES AND SOFTWARE OF THESE SUPPLIERS ARE PROVIDED "AS IS" WITH ALL FAULTS. CISCO AND THE ABOVE-NAMED SUPPLIERS DISCLAIM ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Any Internet Protocol (IP) addresses and phone numbers used in this document are not intended to be actual addresses and phone numbers. Any examples, command display output, network topology diagrams, and other figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses or phone numbers in illustrative content is unintentional and coincidental.

All printed copies and duplicate soft copies of this document are considered uncontrolled. See the current online version for the latest version.

Cisco has more than 200 offices worldwide. Addresses and phone numbers are listed on the Cisco website at www.cisco.com/go/offices.

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. 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 standards documentation, or language that is used by a referenced third-party product.

Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: <https://www.cisco.com/c/en/us/about/legal/trademarks.html>. Third-party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1721R)

© 2023 Cisco Systems, Inc. All rights reserved.



CONTENTS

PREFACE

[About this Guide](#) **vii**

[Conventions Used](#) **vii**

[Contacting Customer Support](#) **viii**

CHAPTER 1

[AMF Metrics Reference](#) **1**

[AMF Metrics Reference](#) **1**

[AMF AUSF Service Stats Category](#) **1**

[AMF Attach Rate Throttle Category](#) **2**

[AMF DEBUG PROTO MAP STATS Category](#) **2**

[AMF Disconnect Stats Category](#) **3**

[AMF EBI Assign Failures Category](#) **3**

[AMF Initial Context Setup Stats Category](#) **4**

[AMF METRICS NGAP MESSAGE TOTAL Category](#) **4**

[AMF NAS ASN DECODE ERR STATS Category](#) **5**

[AMF NAS ASN ENCODE ERR STATS Category](#) **5**

[AMF NAS INTEGRITY FAILURE Category](#) **6**

[AMF NGAP ASN DECODE ERR STATS Category](#) **6**

[AMF NGAP ASN ENCODE ERR STATS Category](#) **7**

[AMF NGAP DL Msg Stats Category](#) **7**

[AMF NGAP UL Msg Stats Category](#) **8**

[AMF NAS Message Total Category](#) **9**

[AMF PCF Service Stats Category](#) **10**

[AMF Procedure Seconds Category](#) **10**

[AMF Procedure Total Category](#) **11**

[AMF RETRANSMISSION STATS Category](#) **12**

[AMF Session Stats Category](#) **12**

AMF SMF Service Stats Category 13

AMF SMSF Service Stats Category 13

AMF System Overload Status Category 14

AMF UDM Service Stats Category 14

AMF UE Context Modification Stats Category 15

AMF UE Service Stats Category 16

AMF Collision Stats Category 16

ASN FAILURE MANDATORY IE MISSING Category 17

Discover Messages Time Statistics Category 18

Discover Messages Statistics Category 18

Marshal Failures Category 19

N26 Service Stats Category 19

NF Endpoint Selections Category 20

NF Failure Handling Stats Category 21

NF Management Message Time Statistics Category 22

NF Management Messages Statistics Category 22

NRF Access Token Category 23

NRF Discovery Category 23

Security Algorithm Category 24

Unmarshal Failures Category 25

CHAPTER 2

KPI Support for Multiple Replicas 27

Feature Summary and Revision History 27

 Summary Data 27

 Revision History 27

Feature Description 27

OAM Support 28

 Procedural Statistics 28

 SBI Statistics 29

 Session Statistics 29

 Bulk Statistics 29

CHAPTER 3

AMF Bulk Statistics and MME Equivalent KPI Support 33

Feature Summary and Revision History 33

Summary Data	33
Revision History	33
Feature Description	33
How it Works	34
OAM Support	34
Bulk Statistics Support	41

CHAPTER 4

MIB Reference	43
CISCO-CNEE-MIB	43
CISCO-SMI	43



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

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

- [AMF Metrics Reference, on page 1](#)

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\",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, attempted

- 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

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 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 EBI Assign Failures Category

amf_ebi_assign_failures

Description: EBI Assign failure stats

Sample Query:

```
amf_ebi_assign_failures{message_type=\"amf_ebi_rejected_no_n26\",status=\"success\",reason=\"Unable to get rsp\",slice_data=\"2-333333\"}
```

Labels:

- Label: `message_type`
Label Description: The message type associated with an ebi service
Example: `amf_ebi_rejected_no_n26, amf_ebi_fail_pdu_session_id, amf_ebi_fail_bearers_not_found`
- Label: `status`
Label Description: Overall status
Example: `success, failures`
- Label: `reason`
Label Description: The reason associated with an ebi
Example: `Unable to get rsp, Unable to retrieve msg from rsp, Unknown Subscriber, Internal Error, Msg Timeout`
- Label: `slice_data`
Label Description: slice data
Example: `2-333333`

AMF Initial Context Setup Stats Category

ics_service_stats

Description: Initial Context Setup stats

Sample Query:

```
ics_service_stats(message_type=\"N2InitialContextSetupReq\",status=\"success\",reason=\"Success\",slice_data=\"2-333333\")
```

Labels:

- Label: `message_type`

Label Description: The message type associated with an icsr service

Example: N2InitialContextSetupReq, N2InitialContextSetupRsp, N2InitialContextSetupFailure

- Label: `status`

Label Description: Overall status

Example: success, failures

- Label: `reason`

Label Description: The reason associated with an icsr

Example: Suspend, Suspend for Async, Unable to get rsp, Unable to retrieve msg from rsp, Internal Error, Success

- Label: `slice_data`

Label Description: slice data

Example: 2-333333

AMF METRICS NGAP MESSAGE TOTAL Category

amf_ngap_message_total

Description: Total number of NGAP msgs

Sample Query:

```
amf_ngap_message_total(message_direction=\"inbound\",message_type=\"N2NGSetupRsp\")
```

Labels:

- Label: `message_direction`

Label Description: Message Direction

Example: outbound,inbound

- Label: `message_type`

Label Description: Message-Type_Cause

Example:

N2RanConfigUpdateFailure,N2AmfConfigUpdate,N2DownlinkNASTransport,N2NGSetupFailure,

N2NGSetupRsp,N2ErrorIndication,N2UeContextReleaseCommand,N2InitialContextSetupReq,

N2PduSessResouceModifyReq,N2RanConfigUpdateAck,Paging,N2PduSessResouceSetupReq,
 N2PathSwitchReqAckMsg,N2PathSwitchReqFailureMsg,N2DLRanStatuTransfer,N2HandoverRequest,
 N2HandoverCommand,N2HandoverCancelAck,N2HandoverPreparationFailure,N2NGResetAck,
 N2UeRadioCapabilityCheckReq,NonUeN2WriteReplaceWarningReq,N2HandoverRequired,N2HandoverCancel,
 N2UeContextReleaseRequest,N2HandoverFailure,N2AmfConfigUpdateTimeout,N2NGSetupReq,N2InitialUeMessage,
 N2UplinkNASTransport,N2PduSessResourceSetupRsp,N2PduSessResourceReleaseRsp,N2PduSessResourceModifyRsp,
 N2ErrorIndication,N2UeContextReleaseComplete,N2InitialContextSetupRsp,N2InitialContextSetupFail,
 N2AmfConfigUpdateAck,N2AmfConfigUpdateFailure,N2RanConfigUpdate,N2PathSwitchReqMsg,
 N2HandoverRequestAck,N2HandoverNotify,N2UeRadioCapabilityInfoInd,N2UeRadioCapabilityCheckRsp,
 N2UplinkRanStatusTransfer,NonUeN2WriteReplaceWarningRsp,NonUeN2PWSCancelWarningRsp,
 NonUeN2PWSFailureIndication,NonUeN2PWSRestartIndication,N2NGReset,
 N2UeContextReleaseRequest_CauseMiscHardwareFailure,N2UeContextReleaseCommand_CauseNasDeregister,
 N2AmfOverloadStart,N2AmfOverloadStop

AMF NAS ASN DECODE ERR STATS Category

nas_asn_decode_error_stats

Description: Nas ASN Decoding errors

Sample Query:

```
nas_asn_decode_error_stats{message_type="N1RegistrationRequest",asn_failures="CauseProtocolTransferSyntaxError"}
```

Labels:

- Label: `message_type`

Label Description: Message Type

Example:

N1RegistrationRequest,N1RegistrationComplete,N1UINasTransport,N1DeRegistrationRequestUeOrigDereg,
 N1DeRegistrationAcceptUeTermDereg,N1ServiceRequest,N1AuthenticationResponse,N1SecurityModeComplete,
 N1SecurityModeReject,N1AuthenticationFailure,N1IdentityResponse,N1ConfigurationUpdateComplete

- Label: `asn_failures`

Label Description: Failure reason

Example: CauseProtocolTransferSyntaxError

AMF NAS ASN ENCODE ERR STATS Category

nas_asn_encode_error_stats

Description: Nas ASN Encoding errors

Sample Query:

```
nas_asn_encode_error_stats{message_type=\"N1AuthenticationRequest\",asn_failures=\"\"}
```

Labels:

- Label: `message_type`

Label Description: Message Type

Example:

N1AuthenticationRequest,N1AuthenticationResult,N1AuthenticationReject,N1RegistrationAccept,
N1RegistrationReject,N1DINasTransport,N1DeRegistrationAcceptUeOrigDereg,N1DeRegistrationRequestUeTermDereg,
N1ServiceAccept,N1ServiceReject,N1ConfigurationUpdateCommand,N1IdentityRequest,
N1Notification,N1SecurityModeCommand

- Label: `asn_failures`

Label Description: Failure reason

Example:

AMF NAS INTEGRITY FAILURE Category

IntegrityCheckFailure

Description: Integrity failures

Sample Query: `IntegrityCheckFailure{message_type=\"N1IdentityResponse\"}`

Labels:

- Label: `message_type`

Label Description: Message Type

Example: `Unsupported_N1_Msg,N1DeRegistrationAcceptUeTermDereg,`

`N1DeRegistrationRequestUeOrigDereg,N1IdentityResponse`

AMF NGAP ASN DECODE ERR STATS Category

ngap_asn_decode_error_stats

Description: Ngap ASN Decoding errors

Sample Query:

```
ngap_asn_decode_error_stats{message_type=\"N2NGSetupReq\",asn_failures=\"CauseProtocolTransferSyntaxError\"}
```

Labels:

- Label: `message_type`

Label Description: NGAP Message Type

Example: `N2NGSetupReq,N2InitialUeMessage,N2UplinkNASTransport,N2PduSessResourceSetupRsp,`

N2PduSessResourceReleaseRsp,N2PduSessResourceModifyRsp,N2UeContextReleaseRequest,
 N2UeContextReleaseRequest,N2ErrorIndication,N2UeContextReleaseComplete,N2InitialContextSetupRsp,
 N2AmfConfigUpdateAck,N2AmfConfigUpdateFailure,N2RanConfigUpdate,N2PathSwitchReqMsg,
 N2HandoverRequired,N2HandoverRequestAck,N2HandoverNotify,N2UeRadioCapabilityInfoInd,
 N2UeRadioCapabilityCheckRsp,N2UplinkRanStatusTransfer,NonUeN2WriteReplaceWarningRsp,
 NonUeN2PWSFailureIndication,NonUeN2PWSRestartIndication,N2NGReset,N2HandoverCancel

- 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: RanConfigUpdateFailure,DlNasTransport,NgSetupFail,NgSetupResponse,UeErrorIndication,
 UeCtxReleaseCommand,InitialContextSetupRequest,PduSessModifyRequest,PduSessReleaseCommand,
 RanConfigUpdateAck,Paging,PduSessResourceSetupRequest,PathSwitchRequestAck,PathSwitchRequestFailure,
 DownlinkRanStatusTransfer,HandoverRequest,HandoverCommand,HandoverCancelAck,HandoverPreparationFailure,
 NGResetAcknowledge,UeCapabilityCheckReq,NgAmfConfigurationUpdate

- Label: `asn_failures`

Label Description: Failure reason

Example: `message_type`

AMF NGAP DL Msg Stats Category

ngap_dl_msg_stats

Description: AMF NGAP DL msg stats

Sample Query:

`ngap_dl_msg_stats{message_type="N2HandoverCancelAck",status="success",reason="",slice_data="2-33333"}`

Labels:

- Label: `message_type`

Label Description: The message type associated with a NGAP DL msg

Example: N2HandoverCancelAck, N2HandoverRequest, N2HandoverCommand, N2HandoverPreparationFailure

- Label: `status`

Label Description: Overall status

Example: success, failures

- Label: `reason`

Label Description: The reason associated with a NGAP DL msg

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

AMF NGAP UL Msg Stats Category

`ngap_ul_msg_stats`

Description: AMF NGAP UL msg stats

Sample Query:

```
ngap_ul_msg_stats{message_type="N2HandoverFailure",status="success",reason="",slice_data="2-333333"}
```

Labels:

- Label: `message_type`

Label Description: The message type associated with a NGAP UL msg

Example: N2HandoverFailure, N2HandoverRequest, N2HandoverRequestAck, N2HandoverNotify, N2HandoverRequired, N2HandoverCancel

- Label: `status`

Label Description: Overall status

Example: success, failures

- Label: `reason`

Label Description: The reason associated with a NGAP UL msg

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

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, N1DeRegReq_UeOriginatingDereg,

N1DeRegReq_UeOriginatingDereg_NormalDereg, N1RegComplete, N1RegComplete, N1RegRequest,

N1RegRequest_IdentityType_SUCI, N1RegRequest_RegType_INITIAL_REGISTRATION, N1ServiceReq,

N1ServiceReq_Idle, N1ServiceReq_SIGNALLING, N1ServiceReq_WithPdu, PduEstablishmentReq,

PduModifyReq_NwInitiated, N1DINasTransport, N1RegistrationAccept, N1ServiceAcc, N1UINasTransport,

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=\"success\",reason=\"Unable to get rsp\",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

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, Amf Redirection

- 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

- 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: Paging,N1AuthenticationRequest,N1AuthenticationResult,N1AuthenticationReject,N1RegistrationAccept,N1RegistrationReject,N1DINasTransport,N1DeRegistrationAcceptUeOrigDereg,N1DeRegistrationRequestUeTermDereg,N1ServiceAccept,N1ServiceReject,N1ConfigurationUpdateCommand,N1IdentityRequest,N1Notification,N1SecurityModeCommand,N2MsgNgapDL,MsgNgap,N2AmfConfigUpdate

- 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=\"success\", reason=\"Unable to get rsp\", 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

- 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

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, 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="NudmSdmDataReq",status="success",reason="INVALID_GUAMI",slice_data="2-333333")
```

Labels:

- Label: `message_type`

Label Description: The message type associated with an udm service

Example: NudmSdmDataReq, NUdmUecmDeregisterNotificationRequest, NUdmUecmDeregisterNotificationResponse,

NudmSdmUnSubscriptionReq, NudmSdmUnSubscriptionRsp, NudmPscfRestorationReq, NudmPscfRestorationRsp,

NudmUecmRegistrationReq, NudmUecmRegistrationRsp, NudmSdmDataReq, NudmSdmDataRsp,

NudmSdmSubscriptionReq, NudmSdmSubscriptionRsp, NudmSdmSorAckInfoReq, NudmSdmSorAckInfoRsp

- 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

AMF UE Context Modification Stats Category

`ue_ctx_mod_service_stats`

Description: Statistics for Ue Context Modification msg

Sample Query:

```
ue_ctx_mod_service_stats{message_type="N2UEContextModificationReq",reason="",status="success"}
```

Labels:

- Label: `message_type`

Label Description: The message type associated with an UE Context Modification

Example: N2UEContextModificationReq, N2UEContextModificationRsp

- Label: `status`

Label Description: Overall status

Example: success

- Label: `reason`

Label Description: The reason associated with an UE context Modification failure

Example: Internal Error

AMF UE Service Stats Category

n1_service_stats

Description: AMF Ue service stats

Sample Query:

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

Labels:

- Label: `message_type`

Label Description: The message type associated with an UE service

Example: IdentityResponse, N1SecurityModeComplete, N1AuthenticationRsp, N1SecurityModeCommand,

N1AuthenticationReq, N1AuthFail_SyncFailure, N1AuthenticationReject, N1AuthFail_MacFailure,

IdentityRequest_Imei, IdentityRequest_Imeiv, IdentityRequest_Suci, N1DeRegAccept_UeTerminatedDereg,

N1UeConfigurationUpdCmd

- Label: `status`

Label Description: Overall status

Example: success, failures, attempted

- 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

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_procl\"}`

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`,

`UEOrNwDeRegistration`, `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`,

`UEOrNwDeRegistration`, `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,GlobalRANNodeID,RANNodeName,SupportedTAList,RanUeNgapId,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/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

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 stats

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`

N26 Service Stats Category

`n26_service_stats`

Description: AMF N26 stats

Sample Query:

`n26_service_stats{message_type="GTPCRxIdentificationRequest",status="success",reason="N1 mode Not Supported",slice_data="2-333333\}"`

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

NF Endpoint 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/nnrf-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/nnrf-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 chosen 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"> • execution_stage • msg_type • proc_name • sub_proc_name
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"> • proc_name • bin
sub_procedure_service_total	Total number of sub procedures executed in service.	<ul style="list-style-type: none"> • msg_type • proc_name • sub_proc_name
sub_procedure_service_duration_seconds_total	Total time in seconds for executing the sub procedure in service pod.	<ul style="list-style-type: none"> • msg_type • proc_name • sub_proc_name
sub_procedure_service_duration_histogram_total	Histogram time bins for executing the sub procedure in service pod.	<ul style="list-style-type: none"> • msg_type • proc_name • sub_proc_name • bin

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"> • background • dest_host • dest_set • interface • method_name • msg_type • namespace • proc_name • retry • rpc_name • service_name • stage • status • status_code • sub_proc_name • txn_type

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"> • CipheringAlgo • IntegrityAlgo • session_type

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	Not Applicable

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
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 Authentication 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 Authentication 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 Authentication Req Stats	The total number of AUSF authentication requests sent by the AMF.	Increments when the AMF receives authentication request.
Ausf Authentication 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 Pcsf 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 Pcsf 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 receives 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 DI 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 DI 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 DI 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 UI 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 UI Handover Request Ack Msg	The total number of handover ACK messages received by the AMF.	Increments when the AMF receives the handover ACK message from the gNB.
Ngap UI 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 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

- [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.



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).

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.



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).

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

