



Troubleshooting Information

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Feature Summary and Revision History

Summary Data

Table 1: Summary Data

Applicable Product(s) or FunctionalArea	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Not Applicable
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 2: Revision History

Revision Details	Release
Added Troubleshooting information for RADIUS, Roaming, and Option-3x features.	2021.01.0
First introduced.	Pre-2020.02.0

clear Commands

clear subscriber

Table 3: clear subscriber Command Output Description

Field	Description
all	Clears all the sessions.
amf	Clears subscriber based on AMF address.
chf	Clears subscriber based on CHF address.
dnn	Clears subscriber based on DNN value.
gtp-peer	Clears subscriber based on GTP-PEER address.
ipv4-pool	Clears subscriber based on IPv4 pool name.
ipv4-range	Clears subscriber based on IPv4 address-range.
ipv6-pool	Clears subscriber based on IPv6 pool name.
ipv4-range	Clears subscriber based on IPv6 prefix-range.
ipv6-range	Clears subscriber based on IPv6 prefix-range.
namespace	Clears subscriber based on the respective namespace. Default: none.
pcf	Clears subscriber based on PCF address.
policy	Clears subscriber based on policy information.
purge	Clears true, if purged locally.
sgw	Clears subscriber based on the S-GW address.
smf	Clears subscriber based on the SMF address.
supi	Clears subscriber based on the SUPI value.
	The output modifiers.

clear subscriber supi imsi <imsi_value>

Table 4: clear subscriber supi imsi <imsi_value> Command Output Description

Field	Description
ebi	Clears subscriber based on EPS bearer ID.

Field	Description
imsi	Clears subscriber based on IMSI.
purge	Clears true, if purged locally.
	Output modifier.

clear subscriber supi imsi <imsi_value> psid <psid_value>

Table 5: clear subscriber supi imsi <imsi_value> psid <psid_value> Command Output Description

Field	Description
ebi	Clears subscriber based on EPS bearer ID.
imsi	Clears subscriber based on IMSI.
psid	Clears subscriber based on Service ID.
purge	Clears true, if purged locally.
	Output modifier.

show Commands

show helm

The **show helm** command displays the version information for the SMF system image.

show peers all

This command displays the list of external inbound and outbound connections established by SMF.

Table 6: show peers all Command Output Description

Field	Description
additionalDetails	Displays the additional details.
connectedTime	Displays the connected time.
direction	Displays the direction.
podInstance	Displays the pod instance.
rpc	Displays the interface RPC.
type	Displays the interface type.

Field	Description
	Displays the output modifiers.

show subscriber

This commands displays the existing show subscriber CLI output with the newly added CLI output.

Table 7: show subscriber Command Output Description

Field	Description
all	Displays the information for all SUPIs or IMEIs.
amf	Displays the AMF address.
chf	Displays the CHF address.
count	Displays the number of sessions.
debug	Displays the debugging information.
dnn	Displays the DNN value.
gtp-peer	Displays the GTP-peer address.
namespace	Displays the product namespace under which to search. Default: none.
pcf	Displays the PCF address.
rat	Displays the RAT type as 4G or 5G.
supi	Displays the SUPI value.
udm	Displays the UDM address.
upf	Displays the UPF address.
	The output modifiers.

show subscriber count

This command displays the CLI options for the count CLI command.

Table 8: show subscriber count Command Output Description

Field	Description
all	Displays all the SUPIs.
amf	Displays the AMF address.
chf	Displays the CHF address.

Field	Description
dnn	Displays the DNN value.
gtp-peer	Displays the GTP-peer address.
pcf	Displays the PCF address.
rat	Displays the RAT type as 4G or 5G.
supi	Displays the specific SUPI value.
udm	Displays the UDM address.
upf	Displays the UPF address.
	Displays the output modifiers.

show subscriber count all

This command displays the total number of sessions for all the SUPIs.

Table 9: show subscriber count all Command Output Description

Field	Description
	Displays the output modifiers.

show subscriber count chf <chf_address>

This command displays the total number of sessions for the specified parameters.

Table 10: show subscriber count chf <chf_address> Command Output Description

Field	Description
amf	Displays the AMF address.
dnn	Displays the DNN value.
gtp-peer	Displays the GTP-peer address.
pcf	Displays the PCF address.
rat	Displays the RAT type as 4G or 5G.
udm	Displays the UDM address.
upf	Displays the UPF address.
	Displays the output modifiers.

```
show subscriber count chf <chf_address> dnn <dnn_value>
```

show subscriber count chf <chf_address> dnn <dnn_value>

This command displays the total number of sessions for the specified parameters.

Table 11: show subscriber count chf <chf_address> dnn <dnn_value> Command Output Description

Field	Description
amf	Displays the AMF address.
gtp-peer	Displays the GTP-peer address.
pcf	Displays the PCF address.
rat	Displays the RAT type as 4G or 5G.
udm	Displays the UDM address.
upf	Displays the UPF address.
	Displays the output modifiers.

show subscriber count supi <supi_value>

This command displays the total number of sessions for the specific SUPI value.

Table 12: show subscriber count supi <supi_value> Command Output Description

Field	Description
	Displays the output modifiers.

show subscriber debug-info supi <supi_value>

This command displays the debug information for the specific SUPI value where the PSID value is optional.

Table 13: show subscriber debug-info supi <supi_value> Command Output Description

Field	Description
psid	Displays the Provider Service Identifier.

show subscriber debug-info supi <supi_value> psid <psid_value>

This command displays the debug information for the specific SUPI and PSID combination.

Table 14: show subscriber debug-info supi <supi_value> psid <psid_value> Command Output Description

Field	Description
	Displays the output modifiers.



Note Currently, the SMF does not validate the serving PLMN received on N11 interface. Also, the SMF does not validate the UE PLMN when the N11 smContextCreate or GTP createSessionRequest is received.

The PLMN value received in the NSSAI included in the PCO request remain the same as the PLMN configured on the SMF.

show subscriber supi <supi_value> psid <psid_value> full

This command displays detailed subscriber information.

Table 15: show subscriber supi <supi_value> psid <psid_value> full Command Output Description

Field	Description
sessTimeStamp	Connected time of the session.
callDuration	Call duration.
commonId	Call ID equivalent for the session (common ID).
ipPool, ipv6Pool	IP pool from which the address has been allocated.
linkedEbi	Linked EBI for a session.
snssai	sNssai details.
smfIwkEpsInd	SMF EPS IWK decision based on AMF and UDM data.
TotalNumberOfPdrs	Number of associated PDRs.
TotalNumberOfFars	Number of associated FARs.
TotalNumberOfQers	Number of associated QERs.
TotalNumberOfUrrs	Number of associated URRs.
upfSeid	Remote SEID for a particular UPF session.
epsInterworking Indication	EPS interworking indication status of AMF.
ebi	ERAB ID allocated for each flow.
revalidationTime	Revalidation timer information for a session.

SMF Monitoring

This section provides information on CLI commands for monitoring the health of 5G SMF.

SMF Data Collection Method

The SMF application CLI data is collected at the following levels:

- SMF Application CLI:
 - SMF Ops-Center CLI
 - CEE Ops-Center CLI

Application CLI

The following table lists the CLI commands to be executed on the SMF Ops-Center for RADIUS.

CLI Command	Description	Comments
show subscriber supi <i>supi_id</i> full	Displays detailed subscriber information.	Additional information for accounting, authentication, and RADIUS URR is added.
show ipam dp <i>dp-name</i> ipv4-addr	Displays IPAM data plane allocation for a specific UPF.	Additional information added to display VRF tag and static pool.
show ipam dp <i>dp-name</i> ipv6-prefix	Displays range of IPv6 pool allocated to the UPF.	Additional information added to display VRF tag and static pool.
show radius	Displays RADIUS endpoint accounting and authentication statistics.	
show radius dyn-auth	Displays statistics for RADIUS Disconnect/COA from RADIUS endpoint.	CoA is not supported in the SMF releases 2020.04 and 2021.01.
show radius acct-server	Displays RADIUS endpoint accounting statistics.	Per server details can also be fetched.
show radius auth-server	Displays RADIUS endpoint authentication statistics.	Per server details can also be fetched.
show endpoint	Displays internal and external connections.	Additional RADIUS-specific endpoint information is added.
show peers	Displays the list of external inbound and outbound connections established by the SMF.	Additional information for RADIUS Authentication and Accounting server is added.

CEE Ops-Center CLI

The following table lists the CLI commands to be executed on the CEE Ops-Center.

CLI Command	Description	Comments
show alerts active	Displays active alerts.	New alerts are added for RADIUS.

CLI Command	Description	Comments
show bulk-stats current	Displays bulk statistics.	New bulk statistics are added for RADIUS.

SMF Data Collection - CLI Output

SMF Ops-Center CLI Commands

The CLI execution fails due to various reasons. In such cases, the output of the CLI contains the word "Error". The Validation Criteria looks for "Error" in a case-insensitive search.

The following are examples.

```
***** LASMF006 - show sessions commit-pending *****
Error: 'sessions commit-pending': Error in callback: java.lang.IllegalStateException:
Expected BEGIN_OBJECT but was STRING at line 1 column 1 path $

***** LASMF006 - show running-status *****
Error: application timeout
```

Subscriber Details for RADIUS-specific Information

The **show subscriber supi *supi_id* full** CLI command displays the subscriber details for RADIUS-specific use cases.

```
[unknown] smf# show subscriber supi imsi-123456789012345 full
subscriber-details
{
...
"alwaysOn": "None",
  "dcnr": "None",
  "wps": "Wps Session",
  "ratType": "NR",
  "idleTimeout": 600,      << can be overwritten from Radius in Auth Resp
  "sessTimeout": 1200,   << can be overwritten from Radius in Auth Resp

  "radiusEpInfo": "198.18.1.20:1812",
  "authAlg": "pap-default",
  "authStatus": "Authenticated"
...
...
  "accountingEnabled": "true",
  "n40ChargingEnabled": "true",
  "acctSessId": "198.15.1.40016777221"
...
...
"upfServData": {
  "numberOfTunnels": 2,
  "smfSeid": 72057615828912656,
  "UPState": "Activated",
  "urrInfo": [
    {
      "id": 2147483657,
      "chgName": "radiusurr",
      "method": {
        "duration": "false",
```

```

    "volume": "true",
    "event": "false"
  },

```

Subscriber Details for Roaming-specific Information

The **show subscriber supi *supi_id* nf-service smf full** CLI command displays the roaming status of a UE.

```

[unknown-smf] smf# show subscriber supi imsi-123456789012345 nf-service smf full
subscriber-details
{
...
  "authStatus": "Unauthenticated",
  "roamingStatus": "Vistor LBO",    <<< In-Roamer UE Roaming Status
  "uePlmnId": {
    "mcc": "123",
    "mnc": "456"
  }
...
  "authStatus": "Unauthenticated",
  "roamingStatus": "Roamer",      <<< Out-Roamer UE Roaming Status
  "uePlmnId": {
    "mcc": "123",
    "mnc": "456"
  }
...
  "authStatus": "Unauthenticated",
  "roamingStatus": "Homer",
  "uePlmnId": {
    "mcc": "123",
    "mnc": "456"
  }
}

```

Subscriber Details with DCNR and Presence Reporting Enabled

The **show subscriber nf-service smf supi *supi_id* full** CLI command displays the DCNR active session with presence reporting enabled for the Option-3x feature.

```

[unknown] smf# show subscriber nf-service smf supi imsi-310260789012345 full
subscriber-details
{
  "subResponses": [
    {
      "status": true,
      "genericInfo": {
        "supi": "imsi-310260789012345",
        "pei": "imei-123456786666660",
        "pduSessionId": 5,
        "pduSesstype": "Ipv4PduSession",
        "accessType": "3GPP_ACCESS",
        "dnn": "fast.t-mobile.com",
        "plmnId": {
          "mcc": "123",
          "mnc": "456"
        }
      },
...
      "alwaysOn": "None",
      "dcnr": "Enabled",
      "wps": "Non-Wps Session",
      "ratType": "EUTRA",
      "ueType": "NR Capable UE",
      "iwkEpsInd": true,

```

```

    "sessTimeStamp": "2021-01-12 12:40:39.931012285 +0000 UTC",
    "callDuration": "4m25.36784895s",
    "ipPool": "poolv4",
    "commonId": 16777223,
    "linkedEbi": 5,
    "smfIwkEpsInd": true,
    "snssai": {
      "sd": "Abf123",
      "sst": 1
    },
    "authStatus": "Unauthenticated",
    "roamingStatus": "Roamer",
    "uePlmnId": {
      "mcc": "310",
      "mnc": "260"
    }
  },
  "policySubData": {
    "TotalDynamicRules": 2,
    "TotalFlowCount": 2,
    "TotalNonGBRFlows": 1,
    "TotalGBRFlows": 1,
    ...
    "presenceReporting": "Enabled",
    "praList": [
      {
        "praId": "0x80000b",
        "presenceState": "Inactive"
      },
      {
        "praId": "0x800000",
        "presenceState": "InArea"
      },
      {
        "praId": "0x80000a",
        "presenceState": "OutOfArea"
      }
    ]
  },
  ...
}
]
}

```

Range of IPv4 Allocated to UPF

The **show ipam dp *dp_name* ipv4-addr** CLI command displays the IP pool chunks allocated to UPF. This includes the VRF tag information and details such as whether the pool defined is a static or dynamic pool.

```
[unknown] smf# show ipam dp 198.18.1.3 ipv4-addr
```

```

=====
Flag Indication: S(Static) O(Offline)
N/P Indication: N(Native InstId) P(Peer InstId)
=====
StartAddress      EndAddress      AllocContext  Route          N/P  Utilization  Flag
=====
16.0.0.0          16.0.0.31      v4pool3(vrf3@ISP) 16.0.0.0/27   -
S
16.0.0.0          16.0.0.31      v4pool4(vrf4@ISP) 16.0.0.0/27   -
S

```

Range of IPv6 Allocated to UPF

```

16.0.0.32      16.0.0.63      v4pool3(vrf3@ISP) 16.0.0.32/27      -
S
16.0.0.32      16.0.0.63      v4pool4(vrf4@ISP) 16.0.0.32/27      -
S
16.0.0.64      16.0.0.95      v4pool3(vrf3@ISP) 16.0.0.64/27      -
S
16.0.0.64      16.0.0.95      v4pool4(vrf4@ISP) 16.0.0.64/27      -
S
16.0.0.96      16.0.0.127     v4pool3(vrf3@ISP) 16.0.0.96/27      -
S
16.0.0.96      16.0.0.127     v4pool4(vrf4@ISP) 16.0.0.96/27      -
S
16.0.0.128     16.0.0.159     v4pool4(vrf4@ISP) 16.0.0.128/27     -
S
16.0.0.160     16.0.0.191     v4pool4(vrf4@ISP) 16.0.0.160/27     -
S
16.0.0.192     16.0.0.223     v4pool4(vrf4@ISP) 16.0.0.192/27     -
S
16.0.0.224     16.0.0.255     v4pool4(vrf4@ISP) 16.0.0.224/27     -
S
=====

```

Range of IPv6 Allocated to UPF

The **show ipam dp *dp_name* ipv6-prefix** CLI command displays the IP pool chunks allocated to UPF. This includes the VRF tag information and details such as whether the pool defined is a static or dynamic pool.

[unknown] smf# show ipam dp 198.18.1.3 ipv6-prefix

```

=====
Flag Indication: S(Static) O(Offline)
N/P Indication: N(Native InstId) P(Peer InstId)
=====
StartAddress      EndAddress      AllocContext      Route
N/P  Utilization  Flag
=====
3001:db0::        3001:db0:0:3fff::  v6pool4(vrf4@ISP) 3001:db0::/50      -
S
3001:db0::        3001:db0:0:3fff::  v6pool3(vrf3@ISP) 3001:db0::/50      -
S
3001:db0:0:4000:: 3001:db0:0:7fff::  v6pool4(vrf4@ISP) 3001:db0:0:4000::/50 -
S
3001:db0:0:4000:: 3001:db0:0:7fff::  v6pool3(vrf3@ISP) 3001:db0:0:4000::/50 -
S
=====
[unknown] smf#

```

RADIUS Endpoint Authentication and Accounting Statistics

The **show radius** CLI command displays statistics for RADIUS Authentication and Accounting from RADIUS endpoint.

[unknown] smf# show radius

```

radius
-----
Server: 198.18.1.20, port: 1812, status: up, port-type: Auth
3 requests, 0 pending, 0 retransmits
2 accepts, 0 rejects, 1 timeouts
0 bad responses, 0 bad authenticators
0 unknown types, 0 dropped, 1 ms latest rtt
-----
Server: 10.84.115.45, port: 1813, status: up, port-type: Acct

```

```

3 requests, 0 pending, 6 retransmits
0 responses, 3 timeouts
0 bad responses, 0 bad authenticators
0 unknown types, 0 dropped, 0 ms latest rtt
-----
Server: 198.18.1.20, port: 1813, status: up, port-type: Acct
5 requests, 0 pending, 3 retransmits
3 responses, 2 timeouts
0 bad responses, 0 bad authenticators
0 unknown types, 0 dropped, 6 ms latest rtt
-----
[unknown] smf#

```

[unknown] smf# show radius acct-server

```

-----
Server: 10.84.115.45, port: 1813, status: up, port-type: Acct
3 requests, 0 pending, 6 retransmits
0 responses, 3 timeouts
0 bad responses, 0 bad authenticators
0 unknown types, 0 dropped, 0 ms latest rtt
-----
Server: 198.18.1.20, port: 1813, status: up, port-type: Acct
5 requests, 0 pending, 3 retransmits
3 responses, 2 timeouts
0 bad responses, 0 bad authenticators
0 unknown types, 0 dropped, 6 ms latest rtt
-----

```

[unknown] smf#

[unknown] smf# show radius auth-server

```

-----
Server: 198.18.1.20, port: 1812, status: up, port-type: Auth
3 requests, 0 pending, 0 retransmits
2 accepts, 0 rejects, 1 timeouts
0 bad responses, 0 bad authenticators
0 unknown types, 0 dropped, 1 ms latest rtt
-----

```

[unknown] smf#

RADIUS Endpoint Disconnect Message and CoA Statistics

The **show radius-dyn-auth** CLI command displays statistics for RADIUS Disconnect Message and CoA from RADIUS endpoint.

```

[unknown] smf# show radius-dyn-auth
radius-dyn-auth
-----
IP: 198.18.1.20
-----
COA:
0 total-requests      0 inprocess-requests
  0 retry-request-drops 0 invalid-requests
  0 bad-authenticators  0 internal-errors
0 ack-sent             0 nak-sent
-----
DISCONNECT:
2 total-requests      0 inprocess-requests
  0 retry-request-drops 0 invalid-requests
  0 bad-authenticators  0 internal-errors
1 ack-sent             1 nak-sent
-----
UnknownTypesRcvd: 0
-----
[unknown] smf#

```

External Inbound and Outbound Connections

The **show peers all** CLI command fetches the list of external inbound and outbound connections established by the SMF.

```
[unknown] smf# show peers all | include Radius
RadiusServer -      10.84.115.45:1813  Outbound  radius-ep-0  Udp  18 hours  Radius
  Status: Active,Type: Acct  1
RadiusServer -      198.18.1.20:1812  Outbound  radius-ep-0  Udp  17 hours  Radius
  Status: Active,Type: Auth  1
RadiusServer -      198.18.1.20:1813  Outbound  radius-ep-0  Udp  17 hours  Radius
  Status: Active,Type: Acct  1
[unknown] smf#
```

Internal and External Connections

The **show endpoint info** CLI command fetches the list of internal and external connections established by the SMF.

```
[unknown] smf# show endpoint all | include Radius
Radius:198.18.1.4:  198.18.1.4:3799  Udp  Started  RADIUS  false  18 hours
<none>  1
[unknown] smf#
```

Status of Pods

The **show running-status** CLI command fetches the current status of pods. This is analogous to the K8 **kubectl get pods -n <>** CLI command.

```
[unknown] smf# show running-status | include radius
radius-ep-0      Started      19 hours
[unknown] smf#
```

Configuration Errors

The **show config-error** CLI command displays the validation criteria — Pass (if there are no entries) or Failed.

```
[unknown] smf# show config-error | include radius
[unknown] smf#
```

CEE Ops-Center CLI Commands

RADIUS Alerts

The RADIUS endpoint for MVNO/PAPN flow supports new alerts. Some basic alerts are listed below. The same alerts can be enhanced based on RAT or as required by the users.

RADIUS EP Down Alert

Use the following example to configure alerts related to RADIUS EP Down.

```
alerts rules group RadiusEP
rule Radius_Server_Down
  expression "sum by (namespace, radSvrIP, radSvrPort)
(Radius_Server_Status{radSvrPortType=~\"Auth|Acct\"} < 1)"
  duration 15m
  severity major
  type "Processing Error Alarm"
  annotation summary
  value "\"Radius Server: {{ $labels.radSvrIP }}, Port: {{ $labels.radSvrPort }} in namespace:
{{ $labels.namespace }} is DOWN for more than 15min.\""
```

```
exit
exit
```

RADIUS Accounting Establishment Failure Threshold Alert

Use the following example to configure alerts related to RADIUS Accounting Establishment Failure threshold.

```
alerts rules group RadiusEP
  rule Radius_Acct_Establish_SR
    expression "sum by (namespace)
(increase(Radius_Requests_Statistics{radMsgCode=\"RadiusAcctReq\", procType=\"PDU Session
Establishment\", radPacketType=\"Rx\", radResult=\"Success\"}[5m])) / sum by (namespace)
(increase(Radius_Requests_Statistics{radMsgCode=\"RadiusAcctReq\", procType=\"PDU Session
Establishment\", radPacketType=\"Tx\"}[5m])) < 0.80"
    severity major
    type "Communications Alarm"
    annotation summary
    value "This alert is fired when the percentage of successful Radius Accounting Establish
responses received is lesser than threshold"
    exit
    exit
```

RADIUS Accounting Release Failure Threshold Alert

Use the following example to configure alerts related to RADIUS Accounting Release Failure threshold.

```
rule Radius_Acct_Release_SR
  expression "sum by (namespace)
(increase(Radius_Requests_Statistics{radMsgCode=\"RadiusAcctReq\", procType=\"PDU Session
Release\", radPacketType=\"Rx\", radResult=\"Success\"}[5m])) / sum by (namespace)
(increase(Radius_Requests_Statistics{radMsgCode=\"RadiusAcctReq\", procType=\"PDU Session
Release\", radPacketType=\"Tx\"}[5m])) < 0.80"
  severity major
  type "Communications Alarm"
  annotation summary
  value "This alert is fired when the percentage of successful Radius Accounting Release
responses received is lesser than threshold"
  exit
  exit
```

RADIUS Authentication Failure Threshold Alert

Use the following example to configure alerts related to RADIUS Authentication Failure threshold.

```
rule Radius_Auth_SR
  expression "sum by (namespace)
(increase(Radius_Requests_Statistics{radMsgCode=\"SecondaryAuthenReq\", procType=\"PDU
Session Establishment\", radPacketType=\"Rx\", radResult=\"Success\"}[5m])) / sum by
(namespace) (increase(Radius_Requests_Statistics{radMsgCode=\"SecondaryAuthenReq\",
procType=\"PDU Session Establishment\", radPacketType=\"Tx\"}[5m])) < 0.80"
  severity major
  type "Communications Alarm"
  annotation summary
  value "This alert is fired when the percentage of successful Radius Authentication
Request responses received is lesser than threshold"
  exit
  exit
```

RADIUS Disconnect Message Failure Threshold Alert

Use the following example to configure alerts related to RADIUS Disconnect Message Failure threshold.

```

rule Radius_Disconnect_Message_SR
  expression "sum by (namespace)
  (increase(Radius_CoaDM_Requests_Statistics{radMsgCode=\"DisconnectACK\", radPacketType=\"Tx\",
  radResult=\"Success\"}[5m])) / sum by
  (namespace) (increase(Radius_CoaDM_Requests_Statistics{radMsgCode=\"DisconnectRequest\",
  radPacketType=\"Rx\"}[5m])) < 0.80"
  severity major
  type "Communications Alarm"
  annotation summary
  value "This alert is fired when the percentage of successful Disconnect Message (DM)
  responses sent is lesser than threshold"
  exit
  exit
  exit

```

RADIUS Server RTT Alert

Use the following example to configure alerts related to RADIUS server RTT.

```

rule Radius_Server_RTT
  expression "sum by (namespace, radSvrIP, radSvrPort)
  (Radius_Server_Rtt_ms{radSvrPortType=~\"Auth|Acct\"} > 5)"
  duration 15m
  severity warning
  type "Communications Alarm"
  annotation summary
  value "\"RTT for Radius Server: {{ $labels.radSvrIP }}, Port: {{ $labels.radSvrPort }}
  in namespace: {{ $labels.namespace }} is more than 5 ms.\""
  exit
  exit

```

RADIUS Accounting Start Initial Message Failure Threshold Alert

Use the following example to configure alerts related to RADIUS Accounting Start Initial Message Failure threshold.

```

rule Radius_Acct_Start_SR
  expression "sum by (namespace)
  (increase(radius_accounting_message_stats{procedure_type=\"radius_initial\",
  status=\"success\"}[5m])) / sum by (namespace)
  (increase(radius_accounting_message_stats{procedure_type=\"radius_initial\",
  status=\"attempted\"}[5m])) < 0.80"
  severity major
  type "Processing Error Alarm"
  annotation summary
  value "This service based alert is fired when the percentage of successful Radius
  Accounting Start successful response received is lesser than threshold"
  exit
  exit

```

RADIUS Accounting Interim/Update Message Failure Threshold Alert

Use the following example to configure alerts related to RADIUS Accounting Interim/Update Message Failure threshold.

```

rule Radius_Acct_Interim_SR
  expression "sum by (namespace)
  (increase(radius_accounting_message_stats{procedure_type=\"radius_update\",
  status=\"success\"}[5m])) / sum by (namespace)
  (increase(radius_accounting_message_stats{procedure_type=\"radius_update\",
  status=\"attempted\"}[5m])) < 0.80"
  severity major
  type "Processing Error Alarm"

```



```

        annotation summary
        value "This service based alert is fired when the percentage of successful Radius
Accounting Interim Update successful response received is lesser than threshold"
    exit
exit

```

RADIUS Accounting Stop/Terminate Message Failure Threshold Alert

Use the following example to configure alerts related to RADIUS Accounting Stop/Terminate Message Failure threshold.

```

rule Radius_Acct_Stop_SR
    expression "sum by (namespace)
(increase(radius_accounting_message_stats{procedure_type=\"radius_terminate\",
status=\"success\"}[5m])) / sum by (namespace)
(increase(radius_accounting_message_stats{procedure_type=\"radius_terminate\",
status=\"attempted\"}[5m])) < 0.80"
    severity major
    type "Processing Error Alarm"
    annotation summary
        value "This service based alert is fired when the percentage of successful Radius
Accounting Stop successful response received is lesser than threshold"
    exit
exit

```

RADIUS Authentication Type Message Failure Threshold Alert

Use the following example to configure alerts related to RADIUS Authentication Type Message Failure threshold.

```

rule Radius_Auth_Type_SR
    expression "sum by (namespace, radius_auth_algorithm)
(increase(radius_authentication_message_stats{radius_auth_algorithm=\"radius_auth_algorithm.*\",
status=\"success\"}[1m])) / sum by (namespace)
(increase(radius_authentication_message_stats{radius_auth_algorithm=\"radius_auth_algorithm.*\",
status=\"attempted\"}[1m])) < 0.80"
    severity major
    type "Processing Error Alarm"
    annotation summary
        value "This alert is fired when the percentage of successful Radius Auth Type response
received is lesser than threshold"
    exit
exit

```

Roamer UE Alerts

This section describes the alerts supported for roamer UEs. These alerts can be enhanced per RAT based or as per the intent of the end user.

In-roamer UE Failure Threshold Alert

Use the following example to configure alerts related to In-roamer UE Failure Threshold.

```

alerts rules group RoamerUEs
rule In-Roamer_SR
    expression "sum by (namespace) (increase(smf_service_stats{app_name=\"smf\",
roaming_status=\"visitor-lbo\", rat_type!=\"\", status=\"Success\"}[5m])) / sum by (namespace)
(increase(smf_service_stats{app_name=\"smf\", roaming_status=\"visitor-lbo\", rat_type!=\"\",
status=\"attempted\"}[5m])) < 0.10"
    severity major
    type "Communications Alarm"
    annotation summary
        value "This alert is fired when the percentage of successful InRoamer is lesser than

```

```

threshold"
  exit
exit

```

Out-roamer UE Failure Threshold Alert

Use the following example to configure alerts related to Out-roamer UE Failure Threshold.

```

rule Radius_Acct_Release_SR
  rule Out-Roamer_SR
    expression "sum by (namespace) (increase(smf_service_stats{app_name=\"smf\",
roaming_status=\"roamer\", rat_type!=\"\", status=\"Success\"}[5m])) / sum by (namespace)
(increase(smf_service_stats{app_name=\"smf\", roaming_status=\"roamer\", rat_type!=\"\",
status=\"attempted\"}[5m])) < 0.10"
    severity major
    type "Communications Alarm"
    annotation summary
    value "This alert is fired when the percentage of successful InRoamer is lesser than
threshold"
    exit
exit

```

Option-3x: DCNR Enabled UE Alerts

This section describes the alerts supported for DCNR enabled UEs with presence-reporting enabled. These alerts can be enhanced per 4G procedure based or as per the intent of the end user.

Examples of DCNR statistics/gauges: pdn_sess_create, pdn_inter_sgw_handover, pdn_mbr, pcfr_req_ded_brr_mod, pcfr_req_ded_brr_create, pcfr_req_ded_brr_delete, delete_session_request, smf_initiated_pdn_detach, ue_req_pdn_sess_rel, and so on.

DCNR UE Attach Failure Threshold Alert

Use the following example to configure alerts related to DCNR UE Attach Failure Threshold.

```

alerts rules group DCNRUES
  rule DCNR_UE_SR
    expression "sum by (namespace) (increase(smf_service_stats{app_name=\"smf\",
dcnr=\"enable\", rat_type!=\"EUTRA\", status=\"success\",
procedure_type=\"pdn_sess_create\"}[5m])) / sum by (namespace)
(increase(smf_service_stats{app_name=\"smf\", dcnr =\"enable\", rat_type!=\"EUTRA\",
status=\"attempted\", procedure_type=\"pdn_sess_create\"}[5m])) < 0.10"
    severity major
    type "Communications Alarm"
    annotation summary
    value "This alert is fired when attach success rate of DCNR enabled UE lesser than
threshold"
    exit
exit

```

DCNR UE Attach Failure Threshold Alert with Presence Reporting

Use the following example to configure alerts related to DCNR UE Attach Failure Threshold with presence reporting enabled.

```

rule DCNR_UE_PRA_ENABLE_SR
  expression "sum by (namespace) (increase(smf_service_stats{app_name=\"smf\",
dcnr=\"enable\", rat_type!=\"EUTRA\", status=\"success\", procedure_type=\"pdn_sess_create\",
pra=\"enable\"}[5m])) / sum by (namespace) (increase(smf_service_stats{app_name=\"smf\",
dcnr =\"enable\", rat_type!=\"EUTRA\", status=\"attempted\",
procedure_type=\"pdn_sess_create\", pra=\"enable\"}[5m])) < 0.10"
  severity major
  type "Communications Alarm"

```

```

    annotation summary
      value "This alert is fired when attach success rate of DCNR enabled UE and presence
reporting enabled lesser than threshold "
    exit
  exit

```

show alerts

This section provides the sample output for different variants of the **show alerts** CLI command.

show alerts | include radius

```

alerts history radius_test cfb253587397
alerts history radius_test 911f84aff47c
alerts history radius_test 3ed7a5112905
alerts history radius_test 292af807b299
  source      radius-ep-n0-0
  labels      [ "namespace: smf" "pod: radius-ep-n0-0" ]
  annotations [ "summary: Container:  of pod: radius-ep-n0-0 in namespace: smf has been
restarted." ]
  source      radius-ep-n0-0
  labels      [ "name: k8s_radius-radius-ep-n0-0_smf_7f9e968a-39dc-11eb-ba84-0050569cb367_0"
"namespace: smf" "pod: radius-ep-n0-0" ]
  annotations [ "summary: Container:
k8s_radius-ep-n0-0_smf_7f9e968a-39dc-11eb-ba84-0050569cb367_0 of pod: radius-ep-n0-0
in namespace: smf has been restarted." ]
  source      radius-ep-n0-0
  labels      [ "name: k8s_POD_radius-ep-n0-0_smf_7f9e968a-39dc-11eb-ba84-0050569cb367_0"
"namespace: smf" "pod: radius-ep-n0-0" ]
  annotations [ "summary: Container:
k8s_POD_radius-ep-n0-0_smf_7f9e968a-39dc-11eb-ba84-0050569cb367_0 of pod: radius-ep-n0-0
in namespace: smf has been restarted." ]
alerts history radius_test 1c17e31c13f9
alerts history radius_test ffaabf0929
  source      radius-ep-n0-0
  labels      [ "name: k8s_POD_radius-ep-n0-0_smf_cd16807a-2f0b-11eb-ba84-0050569cb367_0"
"namespace: smf" "pod: radius-ep-n0-0" ]
  annotations [ "summary: Container:
k8s_POD_radius-ep-n0-0_smf_cd16807a-2f0b-11eb-ba84-0050569cb367_0 of pod: radius-ep-n0-0
in namespace: smf has been restarted." ]
  source      radius-ep-n0-0
  labels      [ "namespace: smf" "pod: radius-ep-n0-0" ]
  annotations [ "summary: Container:  of pod: radius-ep-n0-0 in namespace: smf has been
restarted." ]
  source      radius-ep-n0-0
  labels      [ "name: k8s_radius-ep-n0-0_smf_cd16807a-2f0b-11eb-ba84-0050569cb367_0"
"namespace: smf" "pod: radius-ep-n0-0" ]
  annotations [ "summary: Container:
k8s_radius-ep-n0-0_smf_cd16807a-2f0b-11eb-ba84-0050569cb367_0 of pod: radius-ep-n0-0
in namespace: smf has been restarted." ]
[unknown] cee#

```

show alerts active detail | include Radius

```

alerts active detail Radius_Server_Down 0fe030aba3ce
  summary "Radius Server: 198.18.1.20, Port: 1813 in namespace: smf is DOWN for more than
15min."
alerts active detail Radius_Server_Down 6f41c340311c
  summary "Radius Server: 10.84.115.45, Port: 1813 in namespace: smf is DOWN for more than
15min."
alerts active detail Radius_Server_Down 8a290c5ed1de
  summary "Radius Server: 198.18.1.20, Port: 1812 in namespace: smf is DOWN for more than
15min."

```

```
[unknown] cee#
[unknown] cee#
alerts active detail Radius_Server_Down 0fe030aba3ce
severity major
type "Processing Error Alarm"
startsAt 2020-12-11T13:30:16.874Z
source System
summary "Radius Server: 198.18.1.20, Port: 1813 in namespace: smf is DOWN for more than
15min."
labels [ "namespace: smf" "radSvrIP: 198.18.1.20" "radSvrPort: 1813" ]
alerts active detail Radius_Server_Down 6f41c340311c
severity major
type "Processing Error Alarm"
startsAt 2020-12-11T13:30:16.874Z
source System
summary "Radius Server: 10.84.115.45, Port: 1813 in namespace: smf is DOWN for more than
15min."
labels [ "namespace: smf" "radSvrIP: 10.84.115.45" "radSvrPort: 1813" ]
alerts active detail Radius_Server_Down 8a290c5ed1de
severity major
type "Processing Error Alarm"
startsAt 2020-12-11T13:30:16.874Z
source System
summary "Radius Server: 198.18.1.20, Port: 1812 in namespace: smf is DOWN for more than
15min."
labels [ "namespace: smf" "radSvrIP: 198.18.1.20" "radSvrPort: 1812" ]
```

```
[unknown] cee# show alerts active summary | include RTT
Radius_Server_RTT 1d0353b3db82 major 12-11T15:10:16 System RTT
for Radius Server: 198.18.1.20, Port: 1812 in namespace: smf is more than 5 ms.
```

[unknown] cee#

show alerts active summary | include RTT

```
Radius_Server_RTT 1d0353b3db82 major 12-11T15:10:16 System RTT
for Radius Server: 198.18.1.20, Port: 1812 in namespace: smf is more than 5 ms.
```

[unknown] cee#

show alerts active summary | include Radius

```
Radius_Server_RTT 1d0353b3db82 major 12-11T15:10:16 System RTT
for Radius Server: 198.18.1.20, Port: 1812 in namespace: smf is more than 5 ms.

Radius_Acct_Establish 520d9943d53f major 12-11T15:05:16 System This
alert is fired when the percentage of successful Radius Accounting Establish responses
received is lesser than threshold
Radius_Server_Down 0fe030aba3ce major 12-11T13:30:16 System Radius
Server: 198.18.1.20, Port: 1813 in namespace: smf is DOWN for more than 15min.

Radius_Server_Down 6f41c340311c major 12-11T13:30:16 System Radius
Server: 10.84.115.45, Port: 1813 in namespace: smf is DOWN for more than 15min.

Radius_Server_Down 8a290c5ed1de major 12-11T13:30:16 System Radius
Server: 198.18.1.20, Port: 1812 in namespace: smf is DOWN for more than 15min.
```

DCNR UE Bulk Statistics

Use the following SMF service bulk statistics to monitor the failures or issues associated with DCNR UEs.

Table 16: DCNR UE

Bulk Statistics Name	Query	Description
4G_DCNRUE_Attempted	bulk-stats query 4G_DCNRUE_Attempted expression "sum(smf_service_stats {dcnr='enable',status='attempted', rat_type='EUTRA'}) by (namespace)" exit	
4G_DCNRUE_Success	bulk-stats query 4G_DCNRUE_Success expression "sum(smf_service_stats {dcnr='enable',status='success', rat_type='EUTRA'}) by (namespace)" exit	
4G_PRA_ENABLE_Attempted	bulk-stats query 4G_PRA_ENABLE_Attempted expression "sum(smf_service_stats {pra='enable',status='attempted', rat_type='EUTRA', procedure_type!='create_session_request'}) by (namespace)" exit	
4G_PRA_ENABLE_Success	bulk-stats query 4G_PRA_ENABLE_Success expression "sum(smf_service_stats {pra='enable',status='success', rat_type='EUTRA', procedure_type!='create_session_request'}) by (namespace)" exit	

RADIUS Bulk Statistics

Use the following bulk statistics to monitor the failures or issues associated with RADIUS authentication, RADIUS accounting, and Disconnect Message requests.

Table 17: RADIUS Accounting Message (Per endpoint)

Bulk Statistics Name	Query	Description
Radius_EP_Acct_Establish_Attempt	bulk-stats query Radius_EP_Acct_Establish_Attempt expression "sum(Radius_Requests_Statistics {radMsgCode='RadiusAcctReq', procType=~'PDN Connect PDU Session Establishment', radPacketType='Tx'}) by (namespace,dnn)" label dnn exit	Total number of Accounting Requests attempted by MVNO subscribers during session establishment.
Radius_EP_Acct_Establish_Success	bulk-stats query Radius_EP_Acct_Establish_Success expression "sum(Radius_Requests_Statistics {radMsgCode='RadiusAcctReq', procType=~'PDN Connect PDU Session Establishment', radPacketType='Rx', radResult='Success',dnn!=""}) by (namespace,dnn)" label dnn exit	Total number of successful Accounting Requests from MVNO subscribers during session establishment.
Radius_EP_Acct_Establish_Failure	bulk-stats query Radius_EP_Acct_Establish_Failure expression "sum(Radius_Requests_Statistics {radMsgCode='RadiusAcctReq', procType=~'PDN Connect PDU Session Establishment', radPacketType='Rx', radResult!='Success'}) by (namespace,dnn)" label dnn exit	Total number of failed Accounting Requests from MVNO subscribers during session establishment.

Bulk Statistics Name	Query	Description
Radius_EP_Acct_Release_Attempt	<pre>bulk-stats query Radius_EP_Acct_Release_Attempt expression "sum (Radius_Requests_Statistics {radMsgCode='RadiusAcctReq', procType=~'PDU Session Release.* PDN Disconnect', radPacketType='Tx'}) by (namespace,dnn)" label dnn exit</pre>	<p>Total number of Accounting Requests attempted by MVNO subscribers during session release.</p>
Radius_EP_Acct_Release_Success	<pre>bulk-stats query Radius_EP_Acct_Release_Success expression "sum(Radius_Requests_Statistics {radMsgCode='RadiusAcctReq', procType=~'PDU Session Release.* PDN Disconnect', radPacketType='Rx', radResult='Success'}) by (namespace,dnn)" label dnn exit</pre>	<p>Total number of successful Accounting Requests from MVNO subscribers during session release.</p>
Radius_EP_Acct_Release_Failure	<pre>bulk-stats query Radius_EP_Acct_Release_Failure expression "sum(Radius_Requests_Statistics {radMsgCode='RadiusAcctReq', procType=~'PDU Session Release.* PDN Disconnect', radPacketType='Rx', radResult!='Success'}) by (namespace,dnn)" label dnn exit</pre>	<p>Total number of failed Accounting Requests from MVNO subscribers during session release.</p>

Bulk Statistics Name	Query	Description
Radius_EP_Acct_Release_Type_Attempt	<pre>bulk-stats query Radius_EP_Acct_Release_Type_Attempt expression "sum(Radius_Requests_Statistics {radMsgCode='RadiusAcctReq', procType=~'PDU Session Release.* PDN Disconnect', radPacketType='Tx'}) by (namespace, procType)" label procType exit</pre>	Total number of Accounting Requests attempted by MVNO subscribers for a particular release type.
Radius_EP_Acct_Release_Type_Success	<pre>bulk-stats query Radius_EP_Acct_Release_Type_Success expression "sum(Radius_Requests_Statistics {radMsgCode='RadiusAcctReq', procType=~'PDU Session Release.* PDN Disconnect', radPacketType='Rx', radResult!='Success'}) by (namespace, procType)" label procType exit</pre>	Total number of successful Accounting Requests from MVNO subscribers for a particular release type.
Radius_EP_Acct_Release_Type_Failure	<pre>bulk-stats query Radius_EP_Acct_Release_Type_Failure expression "sum(Radius_Requests_Statistics {radMsgCode='RadiusAcctReq', procType=~'PDU Session Release.* PDN Disconnect', radPacketType='Rx', radResult!='Success'}) by (namespace, procType)" label procType exit</pre>	Total number of failed Accounting Requests from MVNO subscribers for a particular release type.

Bulk Statistics Name	Query	Description
Radius_EP_Acct_Establish_Retry_Attempt	<pre>bulk-stats query Radius_EP_Acct_Establish _Retry_Attempt expression "sum(Radius_Requests_Statistics {radMsgCode='RadiusAcctReq', procType=~'PDN Connect PDU Session Establishment', radPacketType='Retry_Tx'}) by (namespace,dnn)" label dnn exit</pre>	Total number of Accounting Retry Requests attempted by MVNO subscribers during session establishment.
Radius_EP_Acct_Release_Retry_Attempt	<pre>bulk-stats query Radius_EP_Acct_Release _Retry_Attempt expression "sum(Radius_Requests_Statistics {radMsgCode='RadiusAcctReq', procType=~'PDU Session Release.* PDN Disconnect', radPacketType='Retry_Tx'}) by (namespace,dnn)" label dnn exit</pre>	Total number of Accounting Retry Requests attempted by MVNO subscribers during session release.

Table 18: RADIUS Accounting Message (Per SMF service)

Bulk Statistics Name	Query	Description
Radius_Acct_Initial_Attempt_Svc	<pre>bulk-stats query Radius_Acct_Initial_Attempt_Svc expression "sum (radius_accounting_message_stats {procedure_type='radius_initial', status='attempted'}) by (namespace)" exit</pre>	Total number of subscribers with RADIUS Accounting Initial/Start Attempt from service endpoint.
Radius_Acct_Initial_Success_Svc	<pre>bulk-stats query Radius_Acct_Initial_Success_Svc expression "sum (radius_accounting_message_stats {procedure_type='radius_initial', status='success'}) by (namespace)" exit</pre>	Total number of subscribers with RADIUS Accounting Initial/Start Success from service endpoint.

Bulk Statistics Name	Query	Description
Radius_Acct_Initial_Failure_Svc	bulk-stats query Radius_Acct_Initial_Failure_Svc expression "sum (radius_accounting_message_stats {procedure_type='radius_initial', status!~'success attempted'}) by (namespace)" exit	Total number of subscribers with RADIUS Accounting Initial/Start Failure from service endpoint.
Radius_Acct_Terminate_Attempt_Svc	bulk-stats query Radius_Acct_Terminate_Attempt_Svc expression "sum (radius_accounting_message_stats {procedure_type='radius_terminate', status='attempted'}) by (namespace)" exit	Total number of subscribers with RADIUS Accounting Terminate/Stop Attempt from service endpoint.
Radius_Acct_Terminate_Success_Svc	bulk-stats query Radius_Acct_Terminate_Success_Svc expression "sum (radius_accounting_message_stats {procedure_type='radius_terminate', status='success'}) by (namespace)" exit	Total number of subscribers with RADIUS Accounting Terminate/Stop Success from service endpoint.
Radius_Acct_Terminate_Failure_Svc	bulk-stats query Radius_Acct_Terminate_Failure_Svc expression "sum (radius_accounting_message_stats {procedure_type='radius_terminate', status!~'success attempted'}) by (namespace)" exit	Total number of subscribers with RADIUS Accounting Terminate/Stop Failure from service endpoint.
Radius_Acct_Update_Attempt_Svc	bulk-stats query Radius_Acct_Update_Attempt_Svc expression "sum (radius_accounting_message_stats {procedure_type='radius_update', status='attempted'}) by (namespace)" exit	Total number of subscribers with RADIUS Accounting Update/Interim Attempt from service endpoint.

Bulk Statistics Name	Query	Description
Radius_Acct_Update_Success_Svc	bulk-stats query Radius_Acct_Update_Success_Svc expression "sum (radius_accounting_message_stats {procedure_type='radius_update', status='success'}) by (namespace)" exit	Total number of subscribers with RADIUS Accounting Update/Interim Success from service endpoint.
Radius_Acct_Update_Failure_Svc	bulk-stats query Radius_Acct_Update_Failure_Svc expression "sum (radius_accounting_message_stats {procedure_type='radius_update', status!~'success attempted'}) by (namespace)" exit	Total number of subscribers with RADIUS Accounting Update/Interim Failure from service endpoint.

Table 19: Disconnect Message

Bulk Statistics Name	Query	Description
Radius_EP_DM_Attempt	bulk-stats query Radius_EP_DM_Attempt expression "sum (Radius_CoaDM_Requests_Statistics {radMsgCode='DisconnectRequest', radPacketType='Rx'}) by (namespace,radSvrIP)" label radSvrIP exit	Total number of RADIUS Disconnect Message Attempts
Radius_EP_DM_Success	bulk-stats query Radius_EP_DM_Attempt expression "sum (Radius_CoaDM_Requests_Statistics {radMsgCode='DisconnectRequest', radPacketType='Rx'}) by (namespace,radSvrIP)" label radSvrIP exit	Total number of successful RADIUS Disconnect Messages

Bulk Statistics Name	Query	Description
Radius_EP_DM_Failure	<pre>bulk-stats query Radius_EP_DM_Failure expression "sum (Radius_CoaDM_Requests_Statistics {radMsgCode='DisconnectNAK', radPacketType='Tx', radResult='Success'}) by (namespace,radSvrIP)" label radSvrIP exit</pre>	Total number of failed RADIUS Disconnect Messages

Table 20: RADIUS Access Request (Secondary Authentication)

Bulk Statistics Name	Query	Description
Radius_EP_AccessReq_Attempt	<pre>bulk-stats query Radius_EP_AccessReq_Attempt expression "sum(Radius_Requests_Statistics {radMsgCode='SecondaryAuthenReq', procType!=", radPacketType='Tx', radResult='Success'}) by (namespace,dnn)" label dnn exit</pre>	Total number of MVNO subscribers with Access Request (secondary authentication) Attempts
Radius_EP_AccessReq_Success	<pre>bulk-stats query Radius_EP_AccessReq_Success expression "sum(Radius_Requests_Statistics {radMsgCode='SecondaryAuthenReq', procType!=", radPacketType='Rx', radResult='Success'}) by (namespace,dnn)" label dnn exit</pre>	Total number of MVNO subscribers with successful Access Requests (secondary authentication)

Bulk Statistics Name	Query	Description
Radius_EP_AccessReq_Failure	<pre>bulk-stats query Radius_EP_AccessReq_Failure expression "sum(Radius_Requests_Statistics {radMsgCode='SecondaryAuthenReq', radPacketType='Rx', radResult!='Success'}) by (namespace,dnn)" label dnn exit</pre>	Total number of MVNO subscribers with failed Access Requests (secondary authentication)

Roamer UE Bulk Statistics

Use the following SMF service bulk statistics to monitor the failures or issues associated with Roamer UEs.

Table 21: Roamer UE

Bulk Statistics Name	Query	Description
4G_In-Roamers_Attempted	<pre>bulk-stats query 4G_In-Roamers_Attempted expression "sum(smf_service_stats {roaming_status='visitor-lbo', status='attempted',rat_type='EUTRA'}) by (namespace)" exit</pre>	
4G_In-Roamers_Success	<pre>bulk-stats query 4G_In-Roamers_Success expression "sum(smf_service_stats {roaming_status='visitor-lbo', status='success',rat_type='EUTRA'}) by (namespace)" exit</pre>	
4G_Out-Roamers_Attempted	<pre>bulk-stats query 4G_Out-Roamers_Attempted expression "sum(smf_service_stats {roaming_status='roamer', status='attempted',rat_type='EUTRA'}) by (namespace)" exit</pre>	
4G_Out-Roamers_Success	<pre>bulk-stats query 4G_Out-Roamers_Success expression "sum(smf_service_stats {roaming_status='roamer', status='success',rat_type='EUTRA'}) by (namespace)" exit</pre>	

Bulk Statistics Name	Query	Description
5G_In-Roamers_Attempted	bulk-stats query 5G_In-Roamers_Attempted expression "sum(smf_service_stats {roaming_status='visitor-lbo', status='attempted',rat_type='NR'}) by (namespace)" exit	
5G_In-Roamers_Success	bulk-stats query 5G_In-Roamers_Success expression "sum(smf_service_stats {roaming_status='visitor-lbo', status='success',rat_type='NR'}) by (namespace)" exit	
5G_Out-Roamers_Attempted	bulk-stats query 5G_Out-Roamers_Attempted expression "sum(smf_service_stats {roaming_status='roamer', status='attempted',rat_type='NR'}) by (namespace)" exit	
5G_Out-Roamers_Success	bulk-stats query 5G_Out-Roamers_Success expression "sum(smf_service_stats {roaming_status='roamer', status='success',rat_type='NR'}) by (namespace)" exit	
WiFi_In-Roamers_Attempted	bulk-stats query WiFi_In-Roamers_Attempted expression "sum(smf_service_stats {roaming_status='visitor-lbo', status='attempted',rat_type='WLAN'}) by (namespace)" exit	
WiFi_In-Roamers_Success	bulk-stats query WiFi_In-Roamers_Success expression "sum(smf_service_stats {roaming_status='visitor-lbo', status='success',rat_type='WLAN'}) by (namespace)" exit	
WiFi_Out-Roamers_Attempted	bulk-stats query WiFi_Out-Roamers_Attempted expression "sum(smf_service_stats {roaming_status='roamer', status='attempted',rat_type='WLAN'}) by (namespace)" exit	

Bulk Statistics Name	Query	Description
WiFi_Out-Roamers_Success	bulk-stats query WiFi_Out-Roamers_Success expression "sum(smf_service_stats {roaming_status='roamer', status='success',rat_type='WLAN'}) by (namespace)" exit	

Show Bulk Statistics

Use the **show bulk-stats** command to view the list of all configured bulk statistics.

RADIUS Bulk Statistics

The following is a sample output of the bulk stats related to the RADIUS feature.

```
[unknown] cee# show bulk-stats | include Radius
smf      Radius_EP_Acct_Establish_Attempt      System  19.0
smf      Radius_EP_Acct_Establish_Failure     System  9.0
smf      Radius_EP_Acct_Establish_Retry_Attempt System  11.0
smf      Radius_EP_Acct_Establish_Success   System  10.0
smf      Radius_EP_Acct_Release_Attempt    System  19.0
smf      Radius_EP_Acct_Release_Failure     System  18.0
smf      Radius_EP_Acct_Release_Retry_Attempt System  37.0
smf      Radius_EP_Acct_Release_Success   System  1.0
smf      Radius_EP_Acct_Release_Type_Attempt System  19.0
smf      Radius_EP_Acct_Release_Type_Failure System  18.0
smf      Radius_EP_Acct_Release_Type_Success System  1.0
smf      Radius_EP_DM_Attempt             System  14.0
smf      Radius_EP_DM_Failure             System  9.0
smf      Radius_EP_DM_Success             System  5.0
smf      Radius_EP_SecondaryAuth_Attempt  System  16.0
smf      Radius_EP_SecondaryAuth_Success  System  16.0

[unknown] cee# show bulk-stats current | include Radius | exclude smf-data | exclude smf-ims

smf      Radius_Acct_Initial_Attempt_Svc      System  3.0
smf      Radius_Acct_Initial_Success_Svc      System  3.0
smf      Radius_Acct_Terminate_Attempt_Svc    System  3.0
smf      Radius_Acct_Terminate_Success_Svc    System  3.0
smf      Radius_EP_Acct_Establish_Attempt     System  3.0
smf      Radius_EP_Acct_Establish_Failure     System  1.0
smf      Radius_EP_Acct_Establish_Retry_Attempt System  3.0
smf      Radius_EP_Acct_Establish_Success     System  2.0
smf      Radius_EP_Acct_Release_Attempt       System  3.0
smf      Radius_EP_Acct_Release_Failure       System  2.0
smf      Radius_EP_Acct_Release_Retry_Attempt System  6.0
smf      Radius_EP_Acct_Release_Success       System  1.0
smf      Radius_EP_Acct_Release_Type_Attempt  PDU Session Release - AMF initiated
1.0
smf      Radius_EP_Acct_Release_Type_Attempt  PDU Session Release - RADIUS initiated
1.0
smf      Radius_EP_Acct_Release_Type_Attempt  PDU Session Release - Admin initiated
1.0
smf      Radius_EP_Acct_Release_Type_Failure  PDU Session Release - AMF initiated
1.0
smf      Radius_EP_Acct_Release_Type_Failure  PDU Session Release - Admin initiated
1.0
```

```

smf      Radius_EP_Acct_Release_Type_Success      PDU Session Release - AMF initiated
1.0
smf      Radius_EP_Acct_Release_Type_Success      PDU Session Release - Admin initiated
1.0
smf      Radius_EP_DM_Attempt                    System 2.0
smf      Radius_EP_DM_Failure                    System 1.0
smf      Radius_EP_DM_Success                    System 1.0
smf      Radius_EP_SecondaryAuth_Attempt         System 2.0
smf      Radius_EP_SecondaryAuth_Success         System 2.0
    
```

Roaming Bulk Statistics

The following is a sample output for the config based bulkstats related to the Roaming feature.

```

[unknown] cee# show bulk-stats | include Roam | include cmsgw
cmsgw     4G_In-Roamers_Attempted      System 0.0
cmsgw     4G_In-Roamers_Success        System 0.0
cmsgw     4G_Out-Roamers_Attempted     System 0.0
cmsgw     5G_In-Roamers_Attempted     System 0.0
cmsgw     5G_In-Roamers_Success        System 0.0
cmsgw     5G_Out-Roamers_Attempted     System 0.0
cmsgw     5G_Out-Roamers_Success       System 0.0
cmsgw     WiFi_In-Roamers_Attempted   System 0.0
cmsgw     WiFi_In-Roamers_Success     System 0.0
cmsgw     WiFi_Out-Roamers_Attempted   System 3.0
cmsgw     WiFi_Out-Roamers_Success     System 4.0
[unknown] cee#
    
```

Option-3x Bulk Statistics

The following is a sample output for the config based bulkstats related to the Option-3x feature.

```

[unknown] cee# show bulk-stats | include DCNR
smf      4G_DCNRUE_Attempted           System 147.0
smf      4G_DCNRUE_Success             System 130.0
[unknown] cee#
[unknown] cee# show bulk-stats | include PRA
smf      4G_PRA_ENABLE_Attempted       System 107.0
smf      4G_PRA_ENABLE_Success         System 107.0
[unknown] cee#
    
```

Grafana Charts

The Grafana charts can be used for monitoring based on the RADIUS endpoint or Service endpoint.

- RADIUS endpoint for call flows involving RADIUS Authentication, Accounting, and Disconnect Message.
- Service endpoint for accounting flows specific to Accounting Initial/Interim/Terminate packets.

Error Logs

This section explains the basic error conditions and the related logs to debug the failures.

Option-3x Feature

This section provides the basic error conditions and logs that are captured to debug the failures for the roaming feature.

DCNR Disabled UE or 4G capable UE only

The following example displays the error log for DCNR disabled UE or 4G capable UE only.

```
2021/01/24 10:11:22.648 smf-service [ERROR] [GenericGtpMsg.go:1811] [smf-service.smf-app.sgw]
  secRatUsageRpt recvd wrongly for DNCR disbled UE, ignoring report
2020/12/19 13:17:17.834 smf-service [ERROR] [GenericGtpMsg.go:1834] [smf-service.smf-app.sgw]
  secRatUsageRpt recvd wrongly for 4gOnly UE, ignoring report
```

Secondary RAT Usage with invalid EBI

The following example displays the error log for secondary RAT usage with invalid EBI.

```
2021/01/24 11:38:18.917 smf-service [DEBUG] [GenericGtpMsg.go:1824] [smf-service.smf-app.sgw]
  Secondary Rat Data Usage Report Recvd
2021/01/24 11:38:18.917 smf-service [WARN] [IntMethods.go:137] [smf-service.Policy.gen] Qos
  Flow not found with EBI [8]
2021/01/24 11:38:18.917 smf-service [ERROR] [GenericGtpMsg.go:1853] [smf-service.smf-app.sgw]
  Qfi invalid in secRatUsageRpt
```

Secondary RAT Usage invalid RAT Type

The following example displays the error log for secondary RAT usage with invalid RAT type.

```
2021/01/24 11:42:21.474 smf-service [DEBUG] [GenericGtpMsg.go:1824] [smf-service.smf-app.sgw]
  Secondary Rat Data Usage Report Recvd
2021/01/24 11:42:21.474 smf-service [ERROR] [GenericGtpMsg.go:1861] [smf-service.smf-app.sgw]
  Rat type invalid in secRatUsageRpt
```

Secondary RAT Usage with intended PGW set to zero

The following example displays the error log for secondary RAT usage with intended P-GW set to zero (IRPGW:0).

```
2021/01/24 11:33:10.390 smf-service [DEBUG] [GenericGtpMsg.go:1824] [smf-service.smf-app.sgw]
  Secondary Rat Data Usage Report Recvd
2021/01/24 11:33:10.390 smf-service [ERROR] [GenericGtpMsg.go:1865] [smf-service.smf-app.sgw]
  secRatUsageRpt.IRPGW is false
```

PRA ID received greater than four

The following example displays the error log when PRA ID received is greater than four.

```
2021/01/24 14:48:26.085 smf-service [DEBUG] [policy_types.go:659] [smf-service.Policy.gen]
  praConfig:true for dnn:fast.t-mobile.com
2021/01/24 14:48:26.085 smf-service [DEBUG] [policy_pcf.go:1939] [smf-service.Policy.gen]
  Added PRA ID: 9388618
2021/01/24 14:48:26.085 smf-service [DEBUG] [policy_pcf.go:1939] [smf-service.Policy.gen]
  Added PRA ID: 9388608
2021/01/24 14:48:26.085 smf-service [DEBUG] [policy_pcf.go:1939] [smf-service.Policy.gen]
  Added PRA ID: 8388618
2021/01/24 14:48:26.085 smf-service [DEBUG] [policy_pcf.go:1939] [smf-service.Policy.gen]
  Added PRA ID: 9388619
2021/01/24 14:48:26.085 smf-service [WARN] [policy_pcf.go:1934] [smf-service.Policy.gen]
  Max 4 PRAs allowed, ignoring the PRA-ID (8388608) from PCF
2021/01/24 14:48:26.085 smf-service [WARN] [policy_pcf.go:1934] [smf-service.Policy.gen]
  Max 4 PRAs allowed, ignoring the PRA-ID (8388619) from PCF
```

RADIUS Authentication

Authentication Request Not Responded by Server

The following is an error log for RADIUS Authentication Request not responded by the RADIUS server.

```
[smf-service-n0-0] 2020/09/17 07:14:52.921 smf-service [ERROR] [GenericAAA.go:786]
[smf-service0.smf-app.aaa] [imsi-123456789012345:5] [imsi-123456789012345:5] [16] Secondary
Authentication Failed: TIMEOUT
[smf-service-n0-0] *errors.errorString Secondary Authentication Failed: TIMEOUT
[smf-service-n0-0] /opt/workspace/smf-service/src/smf-service/vendor/wwin-github.cisco.com/
mobile-cnat-golang-lib/app-infra.git/src/app-infra/infra/Transaction.go:621 (0xd89cae)
[smf-service-n0-0]
/opt/workspace/smf-service/src/smf-service/procedures/generic/GenericAAA.go:786 (0x144fa52)
```

Call Failure at Authentication Stage

The following is a sample error log for call failure at the RADIUS authentication stage.

```
[smf-service-n0-0]
[smf-service-n0-0] 2020/09/17 07:14:52.921 smf-service [ERROR] [idlestate.go:504]
[smf-service0.smf-app.aaa] [imsi-123456789012345:5] [imsi-123456789012345:5] [16]
USER_AUTHENTICATION_OR_AUTHORIZATION_FAILED
[smf-service-n0-0] *errors.errorString USER_AUTHENTICATION_OR_AUTHORIZATION_FAILED
[smf-service-n0-0] /opt/workspace/smf-service/src/smf-service/vendor/wwin-github.cisco.com/
mobile-cnat-golang-lib/app-infra.git/src/app-infra/infra/Transaction.go:621 (0xd89cae)
[smf-service-n0-0] /opt/workspace/smf-service/src/smf-service/vendor/wwin-github.cisco.com/
mobile-cnat-golang-lib/app-infra.git/src/app-infra/infra/Transaction.go:580 (0x15d7ddc)
[smf-service-n0-0]
/opt/workspace/smf-service/src/smf-service/procedures/4g/pdnsetup/idlestate.go:537 (0x15bc4f5)
```

Authentication Request Rejected by RADIUS Server

The following is an error log for RADIUS Authentication Request rejected by RADIUS server.

```
[smf-service-n0-0] 2020/12/09 09:20:14.047 smf-service [INFO] [idlestate.go:649]
[smf-service.smf-app.aaa] [imsi-123456789012345:5] [imsi-123456789012345:5] [1] Processing
Secondary Authentication Response
[smf-service-n0-0] 2020/12/09 09:20:14.047 smf-service [ERROR] [GenericAAA.go:1173]
[smf-service.smf-app.aaa] [imsi-123456789012345:5] [imsi-123456789012345:5] [1] Secondary
Authentication Failed: REJECT
[smf-service-n0-0] 2020/12/09 09:20:14.047 smf-service [DEBUG] [Genericutil.go:681]
[smf-service.smf-app.gen] Internal Transaction Submit with BP for MessageType: 118, SLA: 0

[smf-service-n0-0] 2020/12/09 09:20:14.047 smf-service [DEBUG] [idlestate.go:169]
[smf-service.smf-app.gen] inCallStatus:9
```

```
*****
Transaction Log received from Instance: smf.radius-ep.ajay-smf1.smf.0
***** TRANSACTION: 00004 *****
TRANSACTION SUCCESS:
Txn Type           : SecondaryAuthenReq(2004)
Priority            : 1
Session State      : No_Session
LOG MESSAGES:
2020/12/09 09:20:13.756 [TRACE] [infra.message_log.core] >>>>>>>

2020/12/09 09:20:13.757 [DEBUG] [Radius.smf.AAA] Starting smf AccessRequest
2020/12/09 09:20:13.757 [DEBUG] [Radius.smf.AAA] Starting smf AccessRequest for User
[msisdn-9884886688]
2020/12/09 09:20:13.757 [DEBUG] [Radius.smf.AAA] Created new Radius Message for smf
AccessRequest
```

```

2020/12/09 09:20:13.757 [DEBUG] [Radius.smf.AAA] Selected server: 198.18.1.20:1812 ,
nasIP: 198.18.1.4 PID: 4194304
2020/12/09 09:20:13.757 [DEBUG] [Radius.smf.AAA] Sending an IPC Message to UDP proxy
[198.18.1.4]
2020/12/09 09:20:13.763 [DEBUG] [Radius.smf.AAA] PID: 4194304 - Response received on
channel
2020/12/09 09:20:13.763 [DEBUG] [Radius.smf.AAA] Authentication Result for user
[8899776655] = [REJECT]
2020/12/09 09:20:13.764 [TRACE] [infra.message_log.core] <<<<<<<<
*****

```

Authentication Response with Incorrect Authenticator

The following is an error log for RADIUS Authentication Response with incorrect authenticator.

```

[radius-ep-n0-0] ***** TRANSACTION: 00044 *****
[radius-ep-n0-0] TRANSACTION SUCCESS:
[radius-ep-n0-0] Txn Type           : RadiusUdpProxyMsg(2002)
[radius-ep-n0-0] Priority             : 1
[radius-ep-n0-0] Session State       : No_Session
[radius-ep-n0-0] LOG MESSAGES:
[radius-ep-n0-0] 2020/12/09 13:20:38.874 [TRACE] [infra.message_log.core] >>>>>>>
[radius-ep-n0-0]
[radius-ep-n0-0] 2020/12/09 13:20:38.874 [DEBUG] [Radius.smf.AAA] Response received
from udp proxy
[radius-ep-n0-0] 2020/12/09 13:20:38.874 [DEBUG] [Radius.smf.AAA] SrcIp: 198.18.1.20
SrcPort: 1812 DestIp: 198.18.1.4 DestPort: 16384
[radius-ep-n0-0] 2020/12/09 13:20:38.874 [ERROR] [Radius.smf.AAA] PID: 4194310 - Packet
dropped due to invalid authenticator
[radius-ep-n0-0] 2020/12/09 13:20:38.874 [TRACE] [infra.message_log.core] <<<<<<<
[radius-ep-n0-0]
[radius-ep-n0-0] *****

```

RADIUS Accounting

Accounting Request Timeout

The following is an error log for RADIUS Accounting Request timeout.

```

[radius-ep-n0-0] ***** TRANSACTION: 00027 *****
[radius-ep-n0-0] TRANSACTION SUCCESS:
[radius-ep-n0-0] Txn Type           : IntSmfAcctReqMsg(3)
[radius-ep-n0-0] Priority             : 1
[radius-ep-n0-0] Session State       : No_Session
[radius-ep-n0-0] LOG MESSAGES:
[radius-ep-n0-0] 2020/12/09 13:09:10.247 [TRACE] [infra.message_log.core] >>>>>>>
[radius-ep-n0-0]
[radius-ep-n0-0] 2020/12/09 13:09:10.247 [DEBUG] [Radius.smf.AAA] Starting smf
AccountingRequest
[radius-ep-n0-0] 2020/12/09 13:09:10.247 [DEBUG] [Radius.smf.AAA] Starting smf
AccountingRequest for User [msisdn-9884886688]
[radius-ep-n0-0] 2020/12/09 13:09:10.247 [DEBUG] [Radius.smf.AAA] Created new Radius
Message for smf AccountingRequest
[radius-ep-n0-0] 2020/12/09 13:09:10.247 [DEBUG] [Radius.smf.AAA] Selected server:
198.18.1.20:1813 , nasIP: 198.18.1.4 PID: 4194304
[radius-ep-n0-0] 2020/12/09 13:09:10.247 [DEBUG] [Radius.smf.AAA] Sending an IPC Message
to UDP proxy [198.18.1.4]
[radius-ep-n0-0] 2020/12/09 13:09:15.091 [DEBUG] [Radius.smf.AAA] PID: 4194304 - Response
received on channel
[radius-ep-n0-0] 2020/12/09 13:09:15.091 [ERROR] [Radius.smf.AAA] Retried MaxNumber of
times without success
[radius-ep-n0-0] 2020/12/09 13:09:15.092 [DEBUG] [Radius.smf.AAA] Int-txn Accounting
Result for user [9884886688] = [TIMEOUT]

```

```
[radius-ep-n0-0]      2020/12/09 13:09:15.092 [TRACE] [infra.message_log.core] <<<<<<<<
[radius-ep-n0-0]
[radius-ep-n0-0] *****
```

Roaming Feature

This section provides the basic error conditions and logs that are captured to debug the failures for the roaming feature.

PLMN Validation Failure

The following example displays the error log for PLMN validation failure resulting into setting the roaming status as "none".

```
2021/01/06 15:25:18.630 smf-service [DEBUG] [genericinfo.go:1597]
[smf-service.smf-app.subscriber] Set roaming status to 0
2021/01/06 15:25:18.630 smf-service [DEBUG] [genericinfo.go:2317]
[smf-service.smf-app.subscriber] Subscriber is %!s(uint32=0)
2021/01/06 15:25:18.630 smf-service [ERROR] [genericinfo.go:1082]
[smf-service.smf-app.subscriber] PLMN validation failed
2021/01/06 15:25:18.630 smf-service [DEBUG] [subscriber_policy_config.go:187]
[misc-lib.config.subscriber-policy] LookupParameters - {imsi-123456789012345
msisdn-22331010101010101 imei-123456786666660 0 123 456 intershat}
```

Homer UE Status (Homer)

The following is an example of the generic logs for UE Roaming Status.

```
2021/01/06 15:04:39.146 smf-service [DEBUG] [genericinfo.go:1597]
[smf-service.smf-app.subscriber] Set roaming status to 1
2021/01/06 15:04:39.146 smf-service [DEBUG] [genericinfo.go:2317]
[smf-service.smf-app.subscriber] Subscriber is %!s(uint32=1)
2021/01/06 15:04:39.146 smf-service [DEBUG] [subscriber_policy_config.go:187]
[misc-lib.config.subscriber-policy] LookupParameters - {imsi-123456789012345 msisdn-9999988888
imei-352099001761480 Abf123 2 310 310 intershat}
```

Out-roamer UE Status (Roamer)

The following is an example of the generic logs for out-roamer UE status.

```
2021/01/06 16:11:02.710 smf-service [DEBUG] [genericinfo.go:1597]
[smf-service.smf-app.subscriber] Set roaming status to 4
2021/01/06 16:11:02.710 smf-service [DEBUG] [genericinfo.go:2317]
[smf-service.smf-app.subscriber] Subscriber is %!s(uint32=4)
2021/01/06 16:11:02.710 smf-service [DEBUG] [subscriber_policy_config.go:187]
[misc-lib.config.subscriber-policy] LookupParameters - {imsi-123456789012345
```

In-roamer UE Status (Visitor LBO)

The following is an example of the generic logs for in-roamer UE status.

```
2021/01/06 15:54:32.323 smf-service [DEBUG] [genericinfo.go:1597]
[smf-service.smf-app.subscriber] Set roaming status to 2
2021/01/06 15:54:32.323 smf-service [DEBUG] [genericinfo.go:2317]
[smf-service.smf-app.subscriber] Subscriber is %!s(uint32=2)
2021/01/06 15:54:32.323 smf-service [DEBUG] [subscriber_policy_config.go:187]
[misc-lib.config.subscriber-policy] LookupParameters - {imsi-123456789012345
msisdn-22331010101010101 imei-123456786666660 0 310 310 intershat}
```

Generic MVNO Call Flow Error Logs

Incorrect Static IP to Pool Mapping

The following is a sample error log for incorrect static IP to pool mapping or if static IP received from RADIUS is not found with any UPF.

```
[smf-service-n0-0] 2020/09/23 07:42:25.969 smf-service [DEBUG] [rmgrutil.go:501]
[smf-service.smf-app.resource] [imsi-123456789012345:5] [imsi-123456789012345:5] [16]
response received for message NmgrRersourceMgmtResponse
[smf-service-n0-0] 2020/09/23 07:42:25.969 smf-service [INFO] [upmgrCacheApi.go:450]
[misc-lib.upmgrcache.gen] Cache doesnot have entry for UpfEpKey:
[smf-service-n0-0] 2020/09/23 07:42:25.969 smf-service [ERROR] [rmgrutil.go:73]
[smf-service.smf-app.resource] [imsi-123456789012345:5] [imsi-123456789012345:5] [16] Both
the associated nodemgr instances for upfEpKey: is down
[smf-service-n0-0] *errors.errorString Both the associated nodemgr instances for upfEpKey:
is down
[smf-service-n0-0] /opt/workspace/smf-service/src/smf-service/vendor/wwwin-github.cisco.com/
mobile-cnat-golang-lib/app-infra.git/src/app-infra/infra/Transaction.go:621 (0xd8b29e)
[smf-service-n0-0]
/opt/workspace/smf-service/src/smf-service/procedures/generic/rmgrutil.go:73 (0x14dbd61)
```

Idle Timeout-based Release

Idle Timeout Received from RADIUS

The following is a sample error log for idle timeout received from RADIUS.

```
[smf-service-n0-0] 2020/09/23 16:10:11.965 smf-service [DEBUG]
[Genericutil.go:7158] [smf-service.smf-app.gen] Idle timeout value received from Radius:
10
[smf-service-n0-0] 2020/09/23 16:10:11.965 smf-service [DEBUG]
[Genericutil.go:7168] [smf-service.smf-app.gen] Starting cp idle timer with timeout value:
10
```

Absolute Session Timeout Received from RADIUS

The following is a sample error log for absolute session timeout received from RADIUS.

```
[smf-service-n0-0] 2020/09/23 16:10:11.964 smf-service [DEBUG]
[Genericutil.go:7200] [smf-service.smf-app.gen] Session absolute timeout value
received from Radius: 200
```

Session Cleanup

The following is a sample error log for session cleanup.

```
[smf-service-n0-0] 2020/09/23 16:10:21.966 smf-service [WARN] [stateHandler.go:187]
[smf-service.smf-app.gen] [imsi-123456789012345:5] [imsi-123456789012345:5] [21]
TIMEOUT -- Cp Idle Session Timer Expired, Triggering release
```

Disconnect Message

Disconnect Message Received from Unknown Client

The following is a sample error log when disconnect message is received from an unknown client.

```
[radius-ep-n0-0]
[radius-ep-n0-0] 2020/11/25 10:30:02.960 radius-ep [INFO] [processor.go:157] [Radius.smf.Ipc]
Process continue - 2003
[radius-ep-n0-0] 2020/11/25 10:30:02.960 radius-ep [DEBUG] [coa.go:23] [Radius.smf.AAA] []
[] [11] Coa/Disconnect Req received from udp proxy
[radius-ep-n0-0] 2020/11/25 10:30:02.960 radius-ep [DEBUG] [coa.go:43] [Radius.smf.AAA] []
```

Disconnect Message Received with Invalid Session ID Key

```
[ ] [11] SrcIp: 198.18.1.20 SrcPort: 3799 DestIp: 198.18.1.4 DestPort: 3799
[radius-ep-n0-0] 2020/11/25 10:30:02.960 radius-ep [ERROR] [coa.go:253] [Radius.smf.Ipc]
Bng Coa/Disconnect req failed - Invalid Coa Client 198.18.1.20
[radius-ep-n0-0] 2020/11/25 10:30:02.960 radius-ep [ERROR] [coa.go:48] [Radius.smf.AAA] [ ]
[ ] [11] Unable to process Coa/Disconnect request - Error during init of Radius Message
Invalid Coa Client 198.18.1.20
[radius-ep-n0-0] 2020/11/25 10:30:02.960 radius-ep [DEBUG] [MasterBlueprint.go:345]
[infra.transaction.core] Last stage ( init_done ) -> Next stage ( finished )
[radius-ep-n0-0] ***** TRANSACTION: 00011 *****
[radius-ep-n0-0] TRANSACTION SUCCESS:
[radius-ep-n0-0] Txn Type : RadiusUdpProxyCoaMsg(2003)
[radius-ep-n0-0] Priority : 1
[radius-ep-n0-0] Session State : No_Session
[radius-ep-n0-0] LOG MESSAGES:
[radius-ep-n0-0] 2020/11/25 10:30:02.960 [TRACE] [infra.message_log.core] >>>>>>
[radius-ep-n0-0]
[radius-ep-n0-0] 2020/11/25 10:30:02.960 [DEBUG] [Radius.smf.AAA] Coa/Disconnect Req
received from udp proxy
[radius-ep-n0-0] 2020/11/25 10:30:02.960 [DEBUG] [Radius.smf.AAA] SrcIp: 198.18.1.20
SrcPort: 3799 DestIp: 198.18.1.4 DestPort: 3799
[radius-ep-n0-0] 2020/11/25 10:30:02.960 [ERROR] [Radius.smf.AAA] Unable to process
Coa/Disconnect request - Error during init of Radius Message Invalid Coa Client 198.18.1.20

[radius-ep-n0-0] 2020/11/25 10:30:02.960 [TRACE] [infra.message_log.core] <<<<<<<
[radius-ep-n0-0]
[radius-ep-n0-0] *****
[radius-ep-n0-0]
```

Disconnect Message Received with Invalid Session ID Key

The following is a sample error log when disconnect message is received with invalid session ID key.

```
[radius-ep-n0-0] ***** TRANSACTION: 00009 *****
[radius-ep-n0-0] TRANSACTION SUCCESS:
[radius-ep-n0-0] Txn Type : RadiusUdpProxyCoaMsg(2003)
[radius-ep-n0-0] Priority : 1
[radius-ep-n0-0] Session State : No_Session
[radius-ep-n0-0] LOG MESSAGES:
[radius-ep-n0-0] 2020/11/25 10:49:43.942 [TRACE] [infra.message_log.core] >>>>>>
[radius-ep-n0-0]
[radius-ep-n0-0] 2020/11/25 10:49:43.942 [DEBUG] [Radius.smf.AAA] Coa/Disconnect Req
received from udp proxy
[radius-ep-n0-0] 2020/11/25 10:49:43.942 [DEBUG] [Radius.smf.AAA] SrcIp: 198.18.1.20
SrcPort: 3799 DestIp: 198.18.1.4 DestPort: 3799
[radius-ep-n0-0] 2020/11/25 10:49:43.942 [DEBUG] [Radius.smf.AAA] Decoded coa message
type is DisconnectRequest
[radius-ep-n0-0] 2020/11/25 10:49:43.942 [ERROR] [Radius.smf.AAA] Unable to process
DisconnectRequest - Error during construct Invalid DNN/IPv4Addr/IPv6Pfx value
[radius-ep-n0-0] 2020/11/25 10:49:43.942 [TRACE] [infra.message_log.core] <<<<<<<
[radius-ep-n0-0]
[radius-ep-n0-0] *****
```