Dedicated Bearer Support

Feature Summary and Revision History

Summary Data

Applicable Product(s) or Functional Area	SaMOG
Applicable Platform(s)	• ASR 5500 • VPC-DI • VPC-SI
Feature Default	Disabled – Configuration Required
Related Changes in This Release	Not Applicable
Related Documentation	• *ASR 5500 System Administration Guide* • *Command Line Interface Reference* • *SaMOG Administration Guide*

Revision History

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> **Note** Revision history details are not provided for features introduced before releases 21.2 and N5.5.

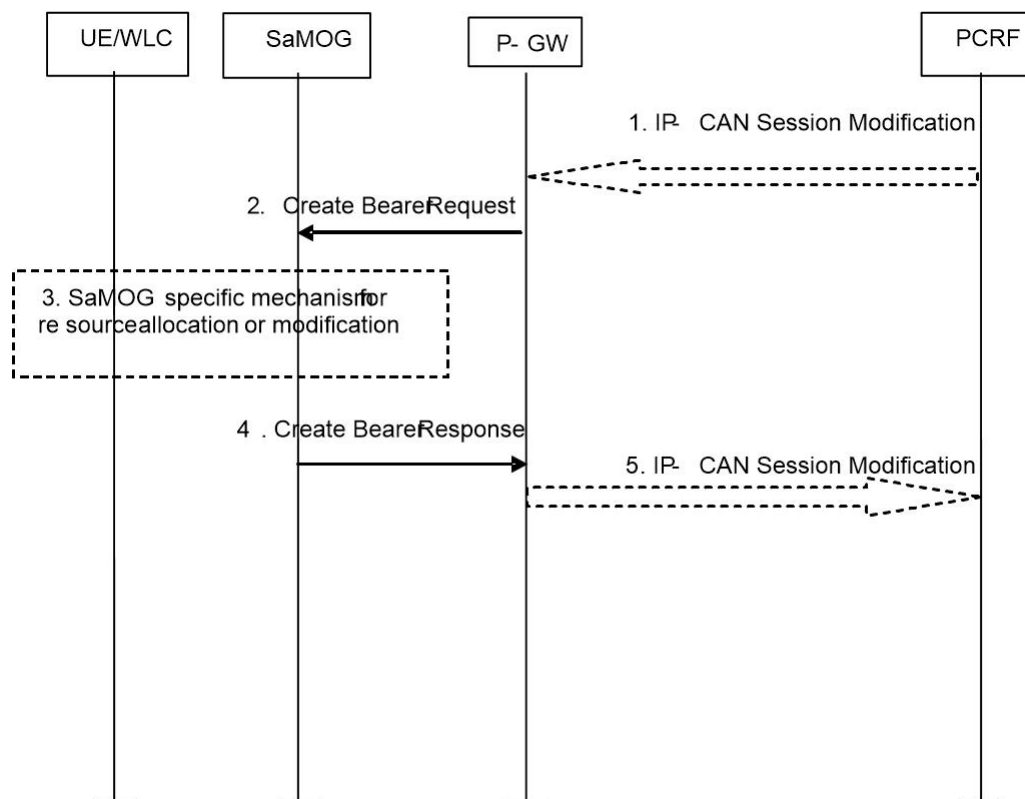| Revision Details	Release
First Introduced.	21.3

Feature Description

SaMOG supports dedicated bearer over S2A interface over GTPv2 protocol.

This release provides basic support for network initiated dedicated bearer. The additional procedures and features mentioned in release 13 3GPP TS 23.402/29.274 are not provided. SaMOG will support dedicated bearer creation in Transparent Single Mode.

Flows

This section provides various call flows that illustrate PGW and HSS initiated Bearer Modification.

PGW Initiated Bearer Modification (Dedicated Bearer Activation)
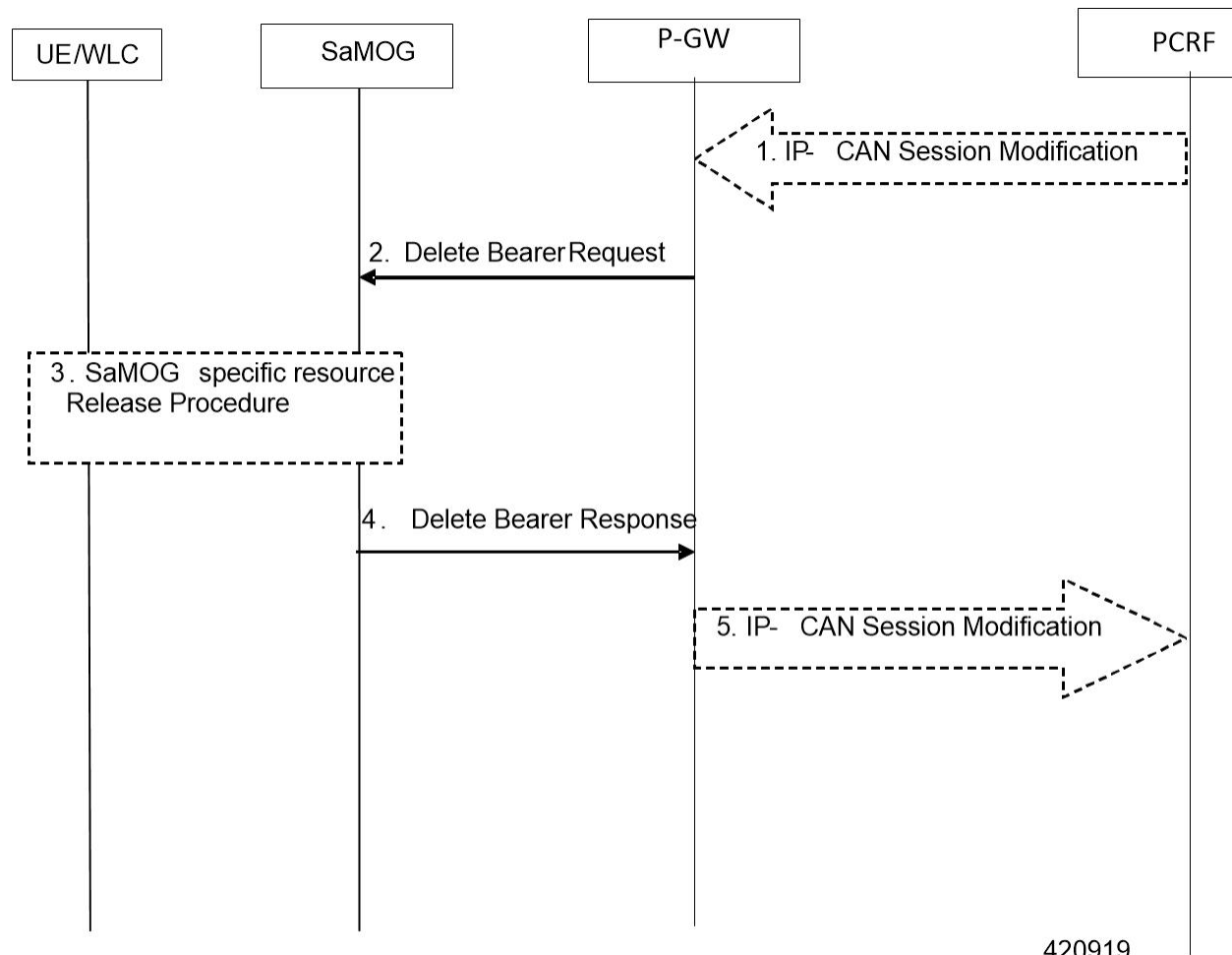

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1. If dynamic PCC is deployed, the PCRF sends a PCC decision provision (QoS policy) message to the P-GW. If the Application function, (e.g. P-CSCF) requests it. If dynamic PCC is not deployed, the PDN GW may apply local QoS policy.

2. The P-GW uses this QoS policy to assign the S2a bearer QoS, i.e., it assigns the values to the bearer level QoS parameters QCI, ARP, GBR and MBR. If this dedicated bearer is created as part of the handover from 3GPP access with GTP-based S5/S8, then the PDN GW applies the Charging ID already in use for the corresponding dedicated bearer while the UE was in 3GPP access (i.e. bearer with the same QCI and

ARP as in 3GPP access). Otherwise, the PDN GW generates a new Charging ID for the dedicated bearer. The PDN GW sends a Create Bearer Request message (IMSI, EPS bearer QoS, TFT, PDN GW Address for the user plane, PDN GW TEID of the user plane, Charging Id, LBI) to the trusted WLAN access network - SaMOG. The Linked EPS bearer Identity (LBI) is the EPS bearer Identity of the default bearer.

3. SaMOG specific resource allocation/modification procedure are executed in this step.

4. The SaMOG selects an EPS bearer Identity, un assigned to the UE. Then stores the EPS bearer Identity and links the dedicated bearer to the default bearer indicated by the Linked Bearer Identity (LBI). SaMOG uses the uplink packet filter (UL TFT) to determine the mapping of uplink traffic flows to the S2a bearer. SaMOG then acknowledges the S2a bearer activation to the PGW by sending a Create Bearer Response (EPS bearer Identity, SaMOG Address for the user plane, SaMOG TEID of the user plane) message.

5. If the dedicated bearer activation procedure was triggered by a PCC Decision Provision message from the PCRF, the PDN GW indicates to the PCRF whether the requested PCC decision (QoS policy) could be enforced or not, allowing the completion of the PCRF-Initiated IP CAN Session Modification procedure.
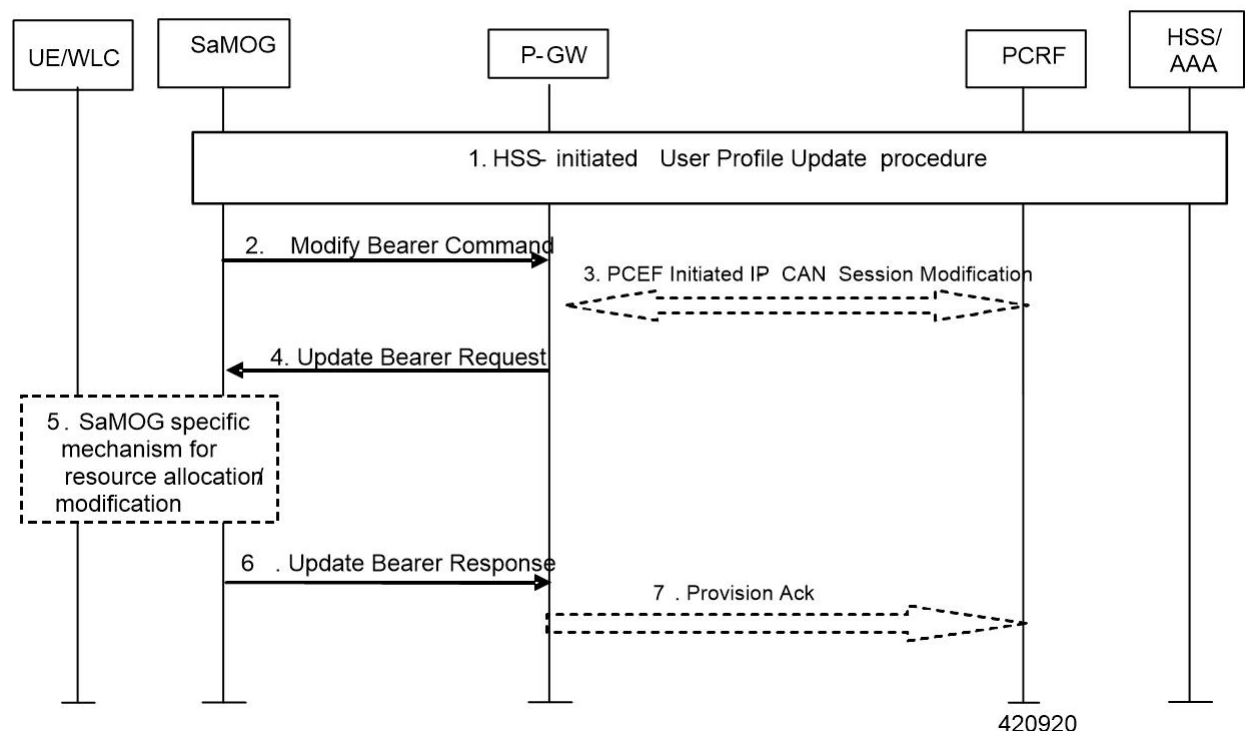
PGW Initiated Resource Allocation Deactivation

1. If dynamic PCC is deployed, the P-GW initiated Bearer Deactivation procedure may for example be triggered due to 'IP CAN session Modification procedure'. In this case, the resources associated with the PDN connection in the P-GW are released. If requested by the Application Function (e.g. P-CSCF).

2. The P-GW sends a Delete Bearer Request message (EPS Bearer Identity, Cause) to the SaMOG. This message can include an indication that all bearers belonging to that PDN connection shall be released.

3. SaMOG specific resources will be released for the bearer.

4. SaMOG deletes the bearer contexts related to the Delete Bearer Request, and acknowledges the bearer deactivation to the P-GW by sending a Delete Bearer Response (EPS Bearer Identity) message.

5. The P-GW deletes the bearer context related to the deactivated S2a bearer. If the dedicated bearer deactivation procedure was triggered by receiving a PCC decision message from the PCRF, the P-GW indicates to the PCRF whether the requested PCC decision was successfully enforced by completing the PCRF-initiated IP CAN Session Modification procedure or the PCEF initiated IP-CAN Session Modification procedure.

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> **Important** This procedure can be used to deactivate an S2a dedicated bearer or deactivate all S2a bearers belonging to a PDN address, for e.g., due to IP CAN session modification requests from the PCRF. If the default S2a bearer belonging to a PDN connection is deactivated, the P-GW deactivates all S2a bearers belonging to the PDN connection.

HSS Initiated Bearer Modification

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1. The HSS updates the User Profile. (RAR from Diameter to SaMOG)

2. If the QCI and/or ARP and/or subscribed APN-AMBR has been modified and there is a related active PDN connection with the modified QoS Profile, then SaMOG sends the Modify Bearer Command (EPS bearer Identity, EPS bearer QoS, APN AMBR) message to the P-GW. The EPS bearer Identity identifies the default bearer of the affected PDN connection. The EPS bearer QoS contains the EPS subscribed QoS profile to be updated.

3. If PCC infrastructure is deployed, the P-GW informs the PCRF about the updated EPS bearer QoS. The PCRF sends the new updated PCC decision to the P-GW.

4. The PCRF may modify the APN-AMBR and the QoS parameters (QCI and ARP) associated with the default bearer in the response to the P-GW.

5. The P-GW modifies the default bearer of each PDN connection corresponding to the APN for which subscribed QoS has been modified. If the subscribed ARP parameter has been changed, the P-GW shall also modify all dedicated S2a bearers having the previously subscribed ARP value unless superseded by PCRF decision. The P-GW then sends the Update Bearer Request (EPS bearer Identity, EPS bearer QoS, TFT, APN AMBR) message to the SaMOG.

6. SaMOG will perform resource allocation/modification procedures.

7. SaMOG acknowledges the bearer modification to the P-GW by sending an Update Bearer Response (EPS bearer Identity) message. If the bearer modification fails the P-GW deletes the concerned S2a Bearer. P-GW indicates to the PCRF whether the requested PCC decision was enforced or not by sending a Provision Ack message

Limitations

Following are the know limitations of this feature:

• Support is available only for network-initiated dedicated bearer creation.

• LI and CDR support is not provided for dedicated bearer in SaMOG.

• Dedicated bearer support for LBO flow call model is not available.

• 3GPP-24.008 length field in TFT IE is only one Octet, as a result of this maximum length can be only 256, but in update bearer (message) more packet filters can be added to increase the size of TFT up to 960 (16 * 60 = 960). In this release, SaMOG only supports 504 size TFT per bearer.

Monitoring and Troubleshooting

Dedicated Bearer Support Show Command(s) and /or Outputs

show samog service statistic

Below show command output is introduced to support SaMOG Dedicated Bearer Feature:

The following new fields are added to the output of this command to display service statistics:

QCI Stats Total:

- Attempt

- Active

- Setup

- Released

- Rejected

QCI 1:

Bearers

- Attempt

- Active

- Setup

- Released

- Rejected

QCI 2:

Bearers

- Attempt

- Active

- Setup

- Released

- Rejected

QCI 3:

Bearers

- Attempt

- Active

- Setup

- Released

- Rejected

QCI 4:

Bearers

- Attempt

- Active

- Setup

- Released

- Rejected

QCI 5:

Bearers

- Attempt

- Active

- Setup

- Released

- Rejected

QCI 6:

Bearers

- Attempt

- Active

- Setup

- Released

- Rejected

QCI 7:

Bearers

- Attempt

- Active

- Setup

- Released

- Rejected

QCI 8:

Bearers

- Attempt

- Active

- Setup

- Released

- Rejected

QCI 9:

Bearers

- Attempt
- Active
- Setup
- Released
- Rejected

Non-Std QCI:

Bearers

- Attempt
- Active
- Setup
- Released
- Rejected

show samog subscribers samog only full

The following new fields are added to the output of this command to display the SaMOG Subscribers only full statistics:

CGW Subscriber Info:

- pgw c-addr
- pgw u-addr
- cgw s2a c-addr
- cgw s2a u-addr
- cgw s2a u-addr
- pgw c-teid
- samog s2a c-teid
- UE def-gw-addr
- UE Vlan ID
- UE VMAC Address
- APN AMBR Uplink(bps)
- APN AMBR Downlink(bps)
- Accounting mode

Bearer ID:

- pgw u-teid

- samog s2a u-teid
- Charging id
- Charging chars
- Total UL Bytes Sent
- Total UL Packets Sent
- Total DL Bytes Rcvd
- Total DL Packets Rcvd

QoS:

- QCI
- APR
- PCI
- PL
- PVI
- MBR Uplink (bps)
- MBR Downlink (bps)
- GBR Uplink(bps)
- GBR Downlink(bps)

Bearer ID:

- pgw u-teid
- samog s2a u-teid
- Charging id
- Charging chars
- Total UL Bytes Sent
- Total UL Packets Sent
- Total UL Bytes Rcvd
- Total DL Packets Rcvd

QoS:

- QCI
- APR
- PCI
- PL

- PVI

- MBR Uplink(bps)

- MBR Downlink(bps)

- GBR Uplink(bps)

- GBR Downlink(bps)

Bulk Statistics

The following bulk statistics are added in the SaMOG schema for Dedicated Bearer Support:

Counter	Descreption	Trigger
cgw-sessstat-dedicated-bearer-active	Total number of current active dedicated bearers.	Increments whenever the dedicated bearer is created on SaMOG and decrements whenever the dedicated bearer is released by SaMOG.
cgw-sessstat-dedicated-bearer-setup	Total number of dedicated bearers created on SaMOG.	Increments whenever the dedicated bearer is created on SaMOG.
cgw-sessstat-dedicated-bearer-released	Total number of dedicated bearers released by SaMOG.	Increments whenever the dedicated bearer is released by SaMOG.
cgw-sessstat-dedicated-bearer-rejected	Total number of dedicated bearers rejected by SaMOG.	Increments whenever the dedicated bearer is rejected by SaMOG.
cgw-sessstat-qci1-dedicated-bearer-attempted	Total number of QCI1 dedicated bearers attempted on SaMOG.	Increments whenever there is an attempt to make a QCI1 dedicated bearer on SaMOG.
cgw-sessstat-qci1-dedicated-bearer-active	Total number of current active QCI1 dedicated bearers on SaMOG.	Increments whenever the QCI1 dedicated bearer is created on SaMOG and decrements whenever the QCI1 dedicated bearer is released by SaMOG.
cgw-sessstat-qci1-dedicated-bearer-setup	Total number of QCI1 dedicated bearers created on SaMOG.	Increments whenever the QCI1 dedicated bearer is created on SaMOG.
cgw-sessstat-qci1-dedicated-bearer-released	Total number of QCI1 dedicated bearers released by SaMOG.	Increments whenever the QCI1 dedicated bearer is released by SaMOG.

Counter	Descreption	Trigger
cgw-sessstat-qci1-dedicated-bearer-rejected	Total number of QCI1 dedicated bearers rejected by SaMOG.	Increments whenever the QCI1 dedicated bearer is rejected by SaMOG.
cgw-sessstat-qci2-dedicated-bearer-attempted	Total number of QCI2 dedicated bearers attempted on SaMOG.	Increments whenever there is an attempt to make a QCI2 dedicated bearer on SaMOG
cgw-sessstat-qci2-dedicated-bearer-active	Total number of current active QCI2 dedicated bearers on SaMOG.	SaMOG and decrements whenever the QCI2 dedicated bearer is released by SaMOG.
cgw-sessstat-qci2-dedicated-bearer-setup	Total number of QCI2 dedicated bearers created on SaMOG	Increments whenever the QCI2 dedicated bearer is created on SaMOG.
cgw-sessstat-qci2-dedicated-bearer-released	Total number of QCI2 dedicated bearers released by SaMOG.	Increments whenever the QCI2 dedicated bearer is released by SaMOG.
cgw-sessstat-qci2-dedicated-bearer-rejected	Total number of QCI2 dedicated bearers rejected by SaMOG.	Increments whenever the QCI2 dedicated bearer is rejected by SaMOG.
cgw-sessstat-qci3-dedicated-bearer-attempted	Total number of QCI3 dedicated bearers attempted on SaMOG.	Increments whenever there is an attempt to make a QCI3 dedicated bearer on SaMOG.
cgw-sessstat-qci3-dedicated-bearer-active	Total number of current active QCI3 dedicated bearers on SaMOG.	Increments whenever the QCI3 dedicated bearer is created on SaMOG and decrements whenever the QCI3 dedicated bearer is released by SaMOG.
cgw-sessstat-qci3-dedicated-bearer-setup	Total number of QCI3 dedicated bearers created on SaMOG.	Increments whenever the QCI3 dedicated bearer is created on SaMOG.
cgw-sessstat-qci3-dedicated-bearer-released	Total number of QCI3 dedicated bearers released by SaMOG.	Increments whenever the QCI3 dedicated bearer is released by SaMOG.
cgw-sessstat-qci3-dedicated-bearer-rejected	Total number of QCI3 dedicated bearers rejected by SaMOG.	Increments whenever the QCI3 dedicated bearer is rejected by SaMOG.
cgw-sessstat-qci4-dedicated-bearer-attempted	Total number of QCI4 dedicated bearers attempted on SaMOG.	Increments whenever there is an attempt to make a QCI4 dedicated bearer on SaMOG.

Counter	Descreption	Trigger
cgw-sessstat-qci4-dedicated-bearer-active	Total number of current active QCI4 dedicated bearers on SaMOG.	Increments whenever the QCI4 dedicated bearer is created on SaMOG and decrements whenever the QCI4 dedicated bearer is released by SaMOG.
cgw-sessstat-qci4-dedicated-bearer-setup	Total number of QCI4 dedicated bearers created on SaMOG.	Increments whenever the QCI4 dedicated bearer is created on SaMOG.
cgw-sessstat-qci4-dedicated-bearer-released	Total number of QCI4 dedicated bearers released by SaMOG.	Increments whenever the QCI4 dedicated bearer is released by SaMOG.
cgw-sessstat-qci4-dedicated-bearer-rejected	Total number of QCI4 dedicated bearers rejected by SaMOG.	Increments whenever the QCI4 dedicated bearer is rejected by SaMOG.
cgw-sessstat-qci5-dedicated-bearer-attempted	Total number of QCI5 dedicated bearers attempted on SaMOG.	Increments whenever there is an attempt to make a QCI5 dedicated bearer on SaMOG.
cgw-sessstat-qci5-dedicated-bearer-active	Total number of current active QCI5 dedicated bearers on SaMOG.	Increments whenever the QCI5 dedicated bearer is created on SaMOG and decrements whenever the QCI5 dedicated bearer is released by SaMOG.
cgw-sessstat-qci5-dedicated-bearer-setup	Total number of QCI5 dedicated bearers created on SaMOG.	Increments whenever the QCI5 dedicated bearer is created on SaMOG.
cgw-sessstat-qci5-dedicated-bearer-released	Total number of QCI5 dedicated bearers released by SaMOG.	Increments whenever the QCI5 dedicated bearer is released by SaMOG.
cgw-sessstat-qci5-dedicated-bearer-rejected	Total number of QCI5 dedicated bearers rejected by SaMOG.	Increments whenever the QCI5 dedicated bearer is rejected by SaMOG.
cgw-sessstat-qci6-dedicated-bearer-attempted	Total number of QCI6 dedicated bearers attempted on SaMOG.	Increments whenever there is an attempt to make a QCI6 dedicated bearer on SaMOG.

Counter	Description	Trigger
cgw-sessstat-qci6-dedicated-bearer-active	Total number of current active QCI6 dedicated bearers on SaMOG.	Increments whenever the QCI6 dedicated bearer is created on SaMOG and decrements whenever the QCI6 dedicated bearer is released by SaMOG.
cgw-sessstat-qci6-dedicated-bearer-setup	Total number of QCI6 dedicated bearers created on SaMOG.	Increments whenever the QCI6 dedicated bearer is created on SaMOG.
cgw-sessstat-qci6-dedicated-bearer-released	Total number of QCI6 dedicated bearers released by SaMOG.	Increments whenever the QCI6 dedicated bearer is released by SaMOG.
cgw-sessstat-qci6-dedicated-bearer-rejected	Total number of QCI6 dedicated bearers rejected by SaMOG.	Increments whenever the QCI6 dedicated bearer is rejected by SaMOG.
cgw-sessstat-qci7-dedicated-bearer-attempted	Total number of QCI7 dedicated bearers attempted on SaMOG.	Increments whenever there is an attempt to make a QCI7 dedicated bearer on SaMOG.
cgw-sessstat-qci7-dedicated-bearer-active	Total number of current active QCI7 dedicated bearers on SaMOG.	Increments whenever the QCI7 dedicated bearer is created on SaMOG and decrements whenever the QCI7 dedicated bearer is released by SaMOG.
cgw-sessstat-qci7-dedicated-bearer-setup	Total number of QCI7 dedicated bearers created on SaMOG.	Increments whenever the QCI7 dedicated bearer is created on SaMOG.
cgw-sessstat-qci7-dedicated-bearer-released	Total number of QCI7 dedicated bearers released by SaMOG.	Increments whenever the QCI7 dedicated bearer is released by SaMOG.
cgw-sessstat-qci7-dedicated-bearer-rejected	Total number of QCI7 dedicated bearers rejected by SaMOG.	Increments whenever the QCI7 dedicated bearer is rejected by SaMOG.
cgw-sessstat-qci8-dedicated-bearer-attempted	Total number of QCI8 dedicated bearers attempted on SaMOG.	Increments whenever there is an attempt to make a QCI8 dedicated bearer on SaMOG.

Counter	Description	Trigger
cgw-sessstat-qci8-dedicated-bearer-active	Total number of current active QCI8 dedicated bearers on SaMOG.	Increments whenever the QCI8 dedicated bearer is created on SaMOG and decrements whenever the QCI8 dedicated bearer is released by SaMOG.
cgw-sessstat-qci8-dedicated-bearer-setup	Total number of QCI8 dedicated bearers created on SaMOG.	Increments whenever the QCI8 dedicated bearer is created on SaMOG.
cgw-sessstat-qci8-dedicated-bearer-released	Total number of QCI8 dedicated bearers released by SaMOG.	Increments whenever the QCI8 dedicated bearer is released by SaMOG.
cgw-sessstat-qci8-dedicated-bearer-rejected	Total number of QCI8 dedicated bearers rejected by SaMOG.	Increments whenever the QCI8 dedicated bearer is rejected by SaMOG.
cgw-sessstat-qci9-dedicated-bearer-attempted	Total number of QCI9 dedicated bearers attempted on SaMOG.	Increments whenever there is an attempt to make a QCI9 dedicated bearer on SaMOG.
cgw-sessstat-qci9-dedicated-bearer-active	Total number of current active QCI9 dedicated bearers on SaMOG.	Increments whenever the QCI9 dedicated bearer is created on SaMOG and decrements whenever the QCI9 dedicated bearer is released by SaMOG.
cgw-sessstat-qci9-dedicated-bearer-setup	Total number of QCI9 dedicated bearers created on SaMOG.	Increments whenever the QCI9 dedicated bearer is created on SaMOG.
cgw-sessstat-qci9-dedicated-bearer-released	Total number of QCI9 dedicated bearers released by SaMOG.	Increments whenever the QCI9 dedicated bearer is released by SaMOG.
cgw-sessstat-qci9-dedicated-bearer-rejected	Total number of QCI9 dedicated bearers rejected by SaMOG.	Increments whenever the QCI9 dedicated bearer is rejected by SaMOG.
cgw-sessstat-non-std-qci-dedicated-bearer-attempted	Total number of non-standard QCI dedicated bearers attempted on SaMOG.	Increments whenever there is an attempt to make a non-standard QCI dedicated bearer on SaMOG.

Counter	Description	Trigger
cgw-sessstat-non-std-qci-dedicated-bearer-active	Total number of current active non-standard QCI dedicated bearers on SaMOG.	Increments whenever the non-standard QCI dedicated bearer is created on SaMOG and decrements whenever the non-standard QCI dedicated bearer is released by SaMOG.
cgw-sessstat-non-std-qci-dedicated-bearer-setup	Total number of non-standard QCI dedicated bearers created on SaMOG.	Increments whenever the non-standard QCI dedicated bearer is created on SaMOG.