Cloud Native BNG Control Plane Statistics Reference Guide, Release 2021.03.0

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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

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About this Guide

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

This preface describes how the *Cisco Cloud Native BNG Control Plane Metrics Reference* is organized and its document conventions.

• Conventions Used, on page v

Conventions Used

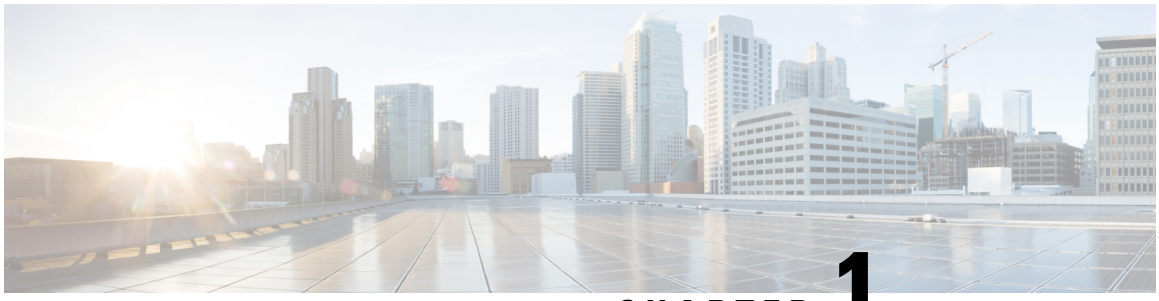
The following tables describe the conventions used throughout this documentation.

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:`

About this Guide

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



CHAPTER 1

Cloud Native BNG Control Plane Interface for Metrics

Summary Data

Table 1: Summary Data

Applicable Product(s) or FunctionalArea	Cloud Native Broadband Network Gateway
Applicable Platform(s)	SMI
Feature Default Setting	Enabled – Always-on
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Feature Description

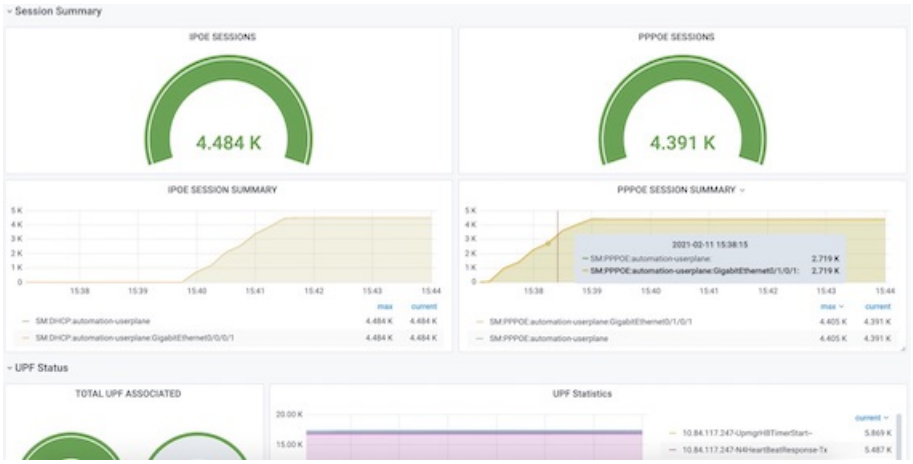
The Cisco Cloud Native Broadband Network Gateway uses Prometheus for gathering statistics/counters from its microservices.

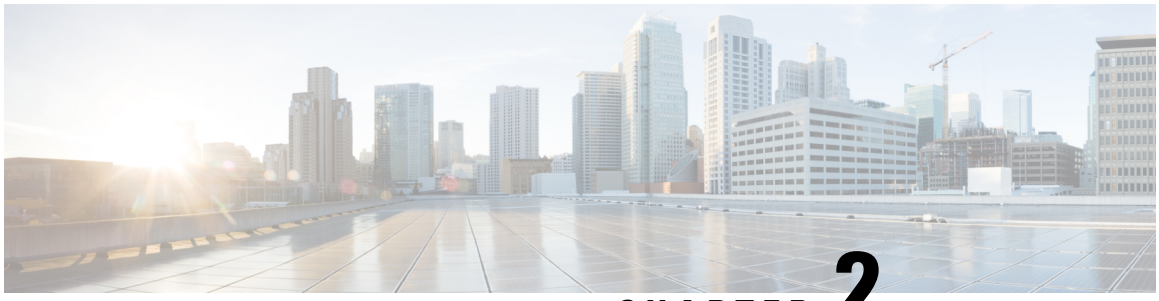
Grafana is used as the user interface to view metrics. It pulls the data from the Prometheus data store. Default graphs for KPI are available using Grafana for rendering a graphical view of the statistics with timelines.

For each microservice, counters and a set of labels are defined. Counters are incremented/decremented with the set of labels depending on the functionality.

The following snapshot is a sample of the Grafana dashboard.

Figure 1: Grafana Dashboard





CHAPTER 2

Cloud Native BNG Control Plane Metrics

CNBNG PPP LCP Packet statistics Category

PPP_LCP_packet_events_total

Description: Total number of PPP LCP packets transmitted and received

Sample Query:
`'PPP_LCP_packet_events_total{PacketType="Conf-Req",Routername="asr9k-1",PortID="Bundle-Ether1.1"}'`

Labels:

- Label: `PacketType`

  Label Description: Packet type

  Example: Conf-Req, Conf-Ack, Conf-Nak, Conf-Rej, Term-Req, Term-Ack, Proto-Rej, Code-Rej, Echo-Req, Echo-Rep

- Label: `Direction`

  Label Description: Transmitted or Received packet

  Example: Tx, Rx

- Label: `Routername`

  Label Description: UPF Name

  Example: Any string

- Label: `PortID`

  Label Description: Access interface Name

  Example: Any string

CNBNG Accounting Session details Category

db_records_total

Description: Current number of Subscriber regardless of accounting enable or not

Sample Query: `'db_records_total{session_type="Charging"}'`

Labels:

- Label: `session_type`

  Label Description: Session type

  Example: Charging, Charging:<upf>

CNBNG Accounting message current statistics Category

Accounting_message_current

Description: Current number of Start/Stop/Interim Message triggered towards Server and Waiting for Response

Sample Query: `'Accounting_message_current{acct_type="Start",upf="asr9k-1",service_name="qos1"}'`

Labels:

- Label: `acct_type`

  Label Description: Accounting Packet type

  Example: Start, Interim, Stop

- Label: `acct_level`

  Label Description: Accounting category

  Example: Session, Service

- Label: `upf`

  Label Description: UPF Name

  Example: Any string

- Label: `service_name`

  Label Description: Name of service

  Example: Any string

CNBNG Accounting message total statistics Category

Accounting_message_total

Description: Total number of Start/Stop/Interim Message trigger towards Radius Server

Sample Query: `'Accounting_message_total{acct_type="Start",upf="asr9k-1",service_name="qos1"}'`

Labels:

- Label: `acct_type`

  Label Description: Accounting Packet type

  Example: Start, Interim, Stop

- Label: `acct_level`

  Label Description: Accounting category

  Example: Session, Service

- Label: `upf`

  Label Description: UPF Name

Example: Any string

- Label: `aaa_profile`

  Label Description: AAA profile used

  Example: Any string

- Label: `service_name`

  Label Description: Name of service

  Example: Any string

- Label: `status`

  Label Description: Status of accounting request

  Example: Attempt, Success, Failure

CNBNG Accounting session statistics Category

Charging_subscriber_total

Description: Total number of Subscriber regardless of accounting enable or not

Sample Query: `'Charging_subscriber_total{upf="asr9k-1"}'`

Labels:

- Label: `upf`

  Label Description: UPF Name

  Example: Any string

CNBNG DHCP Session Statistics Category

db_records_total

Description: Current number of DHCP sessions

Sample Query: `'db_records_total{session_type="dhcp:ipoe"}'`

Labels:

- Label: `session_type`

  Label Description: Session type

  Example: dhcp:ipoe, dhcp:ipoe:<upf>, dhcp:ipoe:<upf>:<intf>, dhcp:pppoe, dhcp:pppoe:<upf>, dhcp:pppoe:<upf>:<intf>, dhcp:afi:dual, dhcp:afi:ipv4, dhcp:afi:ipv6, dhcp:ipv4-state:<state>, dhcp:ipv6-addr-state:<state>, dhcp:ipv6-pfx-state:<state>

CNBNG DHCPv4 Packet Statistics Category

DHCPv4_packet_stats

Description: Total DHCPv4 packet statistics

Sample Query:
`'DHCPv4_packet_stats{pkt_type="Discover",upf="asr9k-1",port_id="Bundle-Ether1.1"}'`

Labels:

- Label: `pkt_type`

  Label Description: Packet type

  Example: Discover, Request, Release, Decline, Inform, Offer, Ack, Nak

- Label: `direction`

  Label Description: Transmitted or Received packet

  Example: In, Out

- Label: `upf`

  Label Description: UPF Name

  Example: Any string

- Label: `port_id`

  Label Description: Access interface Name

  Example: Any string

- Label: `vrf`

  Label Description: VRF Name

  Example: Any string

CNBNG DHCPv6 Packet Statistics Category

DHCPv6_packet_stats

Description: Total DHCPv6 packet statistics

Sample Query: `'DHCPv6_packet_stats{pkt_type="Solicit",upf="asr9k-1",port_id="Bundle-Ether1.1"}'`

Labels:

- Label: `pkt_type`

  Label Description: Packet type

  Example: Solicit, Request, Renew, Rebind, Release, Decline, Inform, Advertise, Reply

- Label: `direction`

Label Description: Transmitted or Received packet

Example: In, Out

- Label: `upf`

  Label Description: UPF Name

  Example: Any string

- Label: `port_id`

  Label Description: Access interface Name

  Example: Any string

- Label: `vrf`

  Label Description: VRF Name

  Example: Any string

CNBNG IPAM Address Events Current Counter Category

IPAM_address_allocations_current

Description: Current state of IPAM Address allocations

Sample Query:

```
'IPAM_address_allocations_current{pool="p1",allocationType="dynamic",addressType="IPv4",upf="dp1"}'
```

Labels:

- Label: `pool`

  Label Description: name of the pool associated with the request

  Example: Any string

- Label: `allocationType`

  Label Description: type of allocation associated with the request

  Example: static/dynamic

- Label: `addressType`

  Label Description: address type associated with the request

  Example: IPv4/IPv6NA/IPv6PD

- Label: `upf`

  Label Description: upf identifier associated with the request

  Example: Any string

- Label: `grInstId`

  Label Description: GR instance ID

  Example: GR instance ID

CNBNG IPAM Address Events Total Counter Category

IPAM_address_events_total

Description: Total number of IPAM Address events

Sample Query:
`'IPAM_address_events_total{pool="p1",eventType="Allocation",allocationType="dynamic",addressType="IPv4",upf="dp1"}'`

Labels:

- Label: `pool`

  Label Description: name of the pool associated with the request

  Example: Any string

- Label: `eventType`

  Label Description: type of event associated with the request

  Example: Allocation/Release

- Label: `allocationType`

  Label Description: type of allocation associated with the request

  Example: static/dynamic

- Label: `addressType`

  Label Description: address type associated with the request

  Example: IPv4/IPv6NA/IPv6PD

- Label: `upf`

  Label Description: upf identifier associated with the request

  Example: Any string

- Label: `grInstId`

  Label Description: GR instance ID

  Example: GR instance ID

CNBNG IPAM Chunk Events Current Counter Category

IPAM_chunk_allocations_current

Description: Current state of IPAM Address Chunk allocations

Sample Query: `'IPAM_chunk_allocations_current{pool="p1",addressType="IPv4",upf="dp1"}'`

Labels:

- Label: `pool`

Label Description: name of the pool associated with the request

Example: Any string

- Label: `addressType`

  Label Description: address type associated with the request

  Example: IPv4/IPv6NA/IPv6PD

- Label: `upf`

  Label Description: upf identifier associated with the request

  Example: Any string

- Label: `grInstId`

  Label Description: GR instance ID

  Example: GR instance ID

CNBNG IPAM Chunk Events Total Counter Category

IPAM_chunk_events_total

Description: Total number of IPAM Address Chunk events

Sample Query:
`'IPAM_chunk_events_total{pool="p1",eventType="Allocation",addressType="IPv4",upf="dp1"}'`

Labels:

- Label: `pool`

  Label Description: name of the pool associated with the request

  Example: Any string

- Label: `eventType`

  Label Description: type of event associated with the request

  Example: Allocation/Release

- Label: `addressType`

  Label Description: address type associated with the request

  Example: IPv4/IPv6NA/IPv6PD

- Label: `upf`

  Label Description: upf identifier associated with the request

  Example: Any string

- Label: `grInstId`

  Label Description: GR instance ID

  Example: GR instance ID

CNBNG PFCP and GTPU packet statistics Category

bng_proto_dhcp_total

Description: Total number of GTPU DHCP packets received/transmitted

Sample Query: `'bng_proto_dhcp_total{pkt_type="Gtpu",message_name="IPoE", upf="asr9k-1"}'`

Labels:

- Label: `pkt_type`

  Label Description: Type of packet

  Example: Gtpu

- Label: `message_direction`

  Label Description: Transmitted or received packet

  Example: inbound, outbound

- Label: `status`

  Label Description: Status of packet processing

  Example: accepted, discarded, decode-error, encode-error

- Label: `message_name`

  Label Description: IPoE message type

  Example: IPoE

- Label: `upf`

  Label Description: upf identifier associated with the request

  Example: Any string

bng_proto_pppoe_total

Description: Total number of GTPU PPPOE packets received/transmitted

Sample Query: `'bng_proto_pppoe_total{pkt_type="Gtpu",message_name="PPPoE", upf="asr9k-1"}'`

Labels:

- Label: `pkt_type`

  Label Description: Type of packet

  Example: Gtpu

- Label: `message_direction`

  Label Description: Transmitted or received packet

  Example: inbound, outbound

- Label: `status`

Label Description: Status of packet processing

Example: accepted, discarded, decode-error, encode-error

- Label: `message_name`

  Label Description: PPPoE message type

  Example: PPPoE

- Label: `upf`

  Label Description: upf identifier associated with the request

  Example: Any string

bng_proto_udp_total

Description: Total number of PFCP/GTPU packets received/transmitted

Sample Query:
`'bng_proto_udp_total{pkt_type="Pfcp",message_name="n4_session_establishment_req"}'`

Labels:

- Label: `pkt_type`

  Label Description: Type of packet

  Example: Pfcp, Gtpu

Labels:

- Label: `message_direction`

  Label Description: Transmitted or received packet

  Example: inbound, outbound

- Label: `status`

  Label Description: Status of packet processing

  Example: accepted, discarded, decode-error, encode-error

- Label: `transport_type`

  Label Description: Initial or retransmitted request

  Example: original, retransmitted

- Label: `message_name`

  Label Description: pfcp/gtpu message type

  Example: n4_session_establishment_req, n4_session_establishment_res, n4_session_modification_req, gtpu_bng_control_packet, gtpu_bng_control_packet_dhcp, gtpu_bng_control_packet_pppoe

- Label: `upf`

  Label Description: upf identifier associated with the request

  Example: Any string

CNBNG PPP CHAP Packet statistics Category

PPP_LCP_CHAP_packet_events_total

Description: Total number of PPP LCP CHAP packets transmitted and received

Sample Query:

```
'PPP_LCP_CHAP_packet_events_total{PacketType="Challenge",Routername="asr9k-1",PortID="Bundle-Ether1.1"}'
```

Labels:

- Label: `PacketType`

  Label Description: Packet type

  Example: Challenge, Response, Rep-Success, Rep-Fail

- Label: `Direction`

  Label Description: Transmitted or Received packet

  Example: Tx, Rx

- Label: `Routername`

  Label Description: UPF Name

  Example: Any string

- Label: `PortID`

  Label Description: Access interface Name

  Example: Any string

CNBNG PPP IPCP Packet statistics Category

PPP_IPCP_packet_events_total

Description: Total number of PPP IPCP packets transmitted and received

Sample Query:

```
'PPP_IPCP_packet_events_total{PacketType="Conf-Req",Routername="asr9k-1",PortID="Bundle-Ether1.1"}'
```

Labels:

- Label: `PacketType`

  Label Description: Packet type

  Example: Conf-Req, Conf-Ack, Conf-Nak, Term-Req, Term-Ack, Proto-Rej, Code-Rej, Conf-Rej

- Label: `Direction`

  Label Description: Transmitted or Received packet

  Example: Tx, Rx

- Label: `Routername`

  Label Description: UPF Name

  Example: Any string

- Label: `PortID`

  Label Description: Access interface Name

  Example: Any string

CNBNG PPP IPCPV6 Packet statistics Category

PPP_IPV6CP_packet_events_total

Description: Total number of PPP IPv6CP packets transmitted and received

Sample Query:

```
'PPP_IPV6CP_packet_events_total{PacketType="Conf-Req",Routername="asr9k-1",PortID="Bundle-Ether1.1"}'
```

Labels:

- Label: `PacketType`

  Label Description: Packet type

  Example: Conf-Req, Conf-Ack, Conf-Nak, Term-Req, Term-Ack, Proto-Rej, Code-Rej, Conf-Rej

- Label: `Direction`

  Label Description: Transmitted or Received packet

  Example: Tx, Rx

- Label: `Routername`

  Label Description: UPF Name

  Example: Any string

- Label: `PortID`

  Label Description: Access interface Name

  Example: Any string

CNBNG PPP PAP Packet statistics Category

PPP_LCP_PAP_packet_events_total

Description: Total number of PPP LCP PAP packets transmitted and received

Sample Query:

```
'PPP_LCP_PAP_packet_events_total{PacketType="Request",Routername="asr9k-1",PortID="Bundle-Ether1.1"}'
```

Labels:

- Label: `PacketType`

  Label Description: Packet type

  Example: Request, Ack, Nack

- Label: `Direction`

  Label Description: Transmitted or Received packet

  Example: Tx, Rx

- Label: `Routername`

  Label Description: UPF Name

  Example: Any string

- Label: `PortID`

  Label Description: Access interface Name

  Example: Any string

CNBNG PPPOE Packet statistics Category

PPPOE_packet_events_total

Description: Total number of PPPoE packets transmitted and received

Sample Query:
```
'PPPOE_packet_events_total{PacketType="PADI",Routername="asr9k-1",PortID="Bundle-Ether1.1"}'
```

Labels:

- Label: `PacketType`

  Label Description: Packet type

  Example: PADI, PADO, PADR, PADS, PADT

- Label: `Direction`

  Label Description: Transmitted or Received packet

  Example: Tx, Rx

- Label: `Routername`

  Label Description: UPF Name

  Example: Any string

- Label: `PortID`

  Label Description: Access interface Name

  Example: Any string

- Label: `Status`

  Label Description: Status of packet processing

Example: Processed | Dropped

CNBNG PPPOE Session Limits Category

PPPoE_session_limits_total

Description: Total number of PPPoE session limit hits

Sample Query: `'PPPoE_session_limits_total{profile="pppoe-prof1",limit="circuit-id"}'`

Labels:

- Label: `profile`

  Label Description: pppoe proifle name

  Example: Any string

- Label: `limit_type`

  Label Description: Type of pppoe limit

  Example: Any string

- Label: `status`

  Label Description: Status of pppoe limit

  Example: accepted, warned, rejected

CNBNG PPPOE Session Statistics Category

db_records_total

Description: Current PPPoE session count

Sample Query: `'db_records_total{session_type="PPPOE:dual"}'`

Labels:

- Label: `session_type`

  Label Description: Session type

  Example: PPPOE, PPPOE:<upf>, PPPOE:<upf>:<intf>, PPPOE:dual, PPPOE:ipv4, PPPOE:ipv6

CNBNG Radius COA and DM packet statistics Category

Radius_CoaDM_Requests_Current

Description: Current outstanding radius COA/DM requests

Sample Query: `'Radius_CoaDM_Requests_Current{radSvrIp="1.1.1.1",radMsgCode="CoaReq"}'`

Labels:

- Label: `radSvrIp`

  Label Description: Radius Server IP address

  Example: Any string

- Label: `radMsgCode`

  Label Description: Message type

  Example: CoaReq, DMReq, CoaAck, CoaNak

- Label: `grInstId`

  Label Description: GR instance ID

  Example: GR instance ID

Radius_CoaDM_Requests_Statistics

Description: Total number of radius COA & DM packets sent & received

Sample Query: `'Radius_CoaDM_Requests_Statistics{radSvrIp="1.1.1.1",radMsgCode="CoaReq"}'`

Labels:

- Label: `radSvrIp`

  Label Description: Radius Server IP address

  Example: Any string

- Label: `radMsgCode`

  Label Description: Message type

  Example: CoaReq, DMReq, CoaAck, CoaNak

- Label: `radPacketType`

  Label Description: Direction

  Example: Tx, Rx

- Label: `radResult`

  Label Description: Result

  Example: Success, Failure_Invalid_Request

- Label: `grInstId`

  Label Description: GR instance ID

  Example: GR instance ID

CNBNG Radius Server status Category

Radius_Server_Status

Description: Display active/inactive status of radius-server

Sample Query:
`'Radius_Server_Status{radSvrIp="1.1.1.1",radSvrPort="1812",radSvrPortType="Auth"}'`

Labels:

- Label: `radSvrIP`

  Label Description: Radius Server IP address

  Example: Any string

- Label: `radSvrPort`

  Label Description: Radius Server Port

  Example: Any string

- Label: `radSvrPortType`

  Label Description: Type of server

  Example: Auth, Acct

CNBNG Radius packet gauge statistics Category

Radius_requests_current

Description: Current outstanding radius requests

Sample Query:
`'Radius_requests_current{radSvrIp="1.1.1.1",radSvrPort="1812",radSvrPortType="Auth"}'`

Labels:

- Label: `radSvrIp`

  Label Description: Radius Server IP address

  Example: Any string

- Label: `radSvrPort`

  Label Description: Radius Server Port

  Example: Any string

- Label: `radSvrPortType`

  Label Description: Type of server

  Example: Auth, Acct

- Label: `radMsgCode`

  Label Description: Message type

  Example: AaaAuthReq, AaaAcctReq

- Label: `radPacketType`

  Label Description: Direction

  Example: Tx, Rx

- Label: `grInstId`

  Label Description: GR instance ID

  Example: GR instance ID

CNBNG Radius packet statistics Category

Radius_requests_statistics

Description: Total number of radius packets sent & received

Sample Query:
`'Radius_requests_statistics{radSvrIp="1.1.1.1",radSvrPort="1812",radSvrPortType="Auth"}'`

Labels:

- Label: `radSvrIp`

  Label Description: Radius Server IP address

  Example: Any string

- Label: `radSvrPort`

  Label Description: Radius Server Port

  Example: Any string

- Label: `radSvrPortType`

  Label Description: Type of server

  Example: Auth, Acct

- Label: `radMsgCode`

  Label Description: Message type

  Example: AaaAuthReq, AaaAcctReq

- Label: `radPacketType`

  Label Description: Direction

  Example: Tx, Retry_Tx, Rx

- Label: `radResult`

  Label Description: Result

Example: Success, Timeout, Failure_Reject, Failure_NoServer

- Label: `grInstId`

  Label Description: GR instance ID

  Example: GR instance ID

CNBNG Service usage report total statistics Category

Service_usage_report_total

Description: Total number of Usage Report Coming from PFCP per service

Sample Query:
`'Service_usage_report_total{report_type="ChargingFinalUsageReport",upf="asr9k-1",service_name="qos1"}'`

Labels:

- Label: `report_type`

  Label Description: Usage report type

  Example: ChargingFinalUsageReport, ChargingInterimUsageReport

- Label: `upf`

  Label Description: UPF Name

  Example: Any string

- Label: `aaa_profile`

  Label Description: AAA profile used

  Example: Any string

- Label: `service_name`

  Label Description: Name of service

  Example: Any string

CNBNG Session Manager Policy Rule Engine Event Status Category

smc_pre_events_status_total

Description: Total number of execution status of PRE-events.

Sample Query: `'smc_pre_events_status_total{session_type="DHCP", Upf="asr9k-1", preEvent="session-start", status="success"}'`

Labels:

- Label: `SessType`

  Label Description: Type of session

  Example: DHCP, PPPOE

- Label: `Upf`

  Label Description: UPF Name

  Example: Any string

- Label: `PortID`

  Label Description: Port Identifier

  Example: Any string

- Label: `preEvent`

  Label Description: PRE event name

  Example: session-start, session-activate, session-update, session-disconnect, account-update

- Label: `status`

  Label Description: PRE event status

  Example: success, error

- Label: `status_code`

  Label Description: PRE event status code

  Example: policySuccess, policySvmApplyFailed, policySubsProfNotFound, policyActionAuthenFailure, policyActionAuthorFailure

CNBNG Session Manager Policy Rule Engine Events Category

smc_pre_events_total

Description: Total number of PRE-events started.

Sample Query: `'smc_pre_events_total{session_type="DHCP", Upf="asr9k-1", preEvent="session-start"}'`

Labels:

- Label: `SessType`

  Label Description: Type of session

  Example: DHCP, PPPOE

- Label: `Upf`

  Label Description: UPF Name

  Example: Any string

- Label: `PortID`

Label Description: Port Identifier

Example: Any string

- Label: `preEvent`

  Label Description: PRE event name

  Example: session-start, session-activate, session-update, session-disconnect, account-update

CNBNG Session Manager Statistics Category

db_records_total

Description: Current number of IPOE/PPPOE sessions

Sample Query: `'db_records_total{session_type="SM:DHCP"}'`

Labels:

- Label: `session_type`

  Label Description: Type of session

  Example: SM:DHCP, SM:DHCP:<upf>, SM:DHCP:<upf>:<intf>, SM:PPPOE, SM:PPPOE:<upf>, SM:PPPOE:<upf>:<intf>

CNBNG Session usage report total statistics Category

Session_usage_report_total

Description: Total number of Usage Report Coming from PFCP per session

Sample Query:
`'Session_usage_report_total{report_type="ChargingFinalUsageReport",upf="asr9k-1"}'`

Labels:

- Label: `report_type`

  Label Description: Usage report type

  Example: ChargingFinalUsageReport, ChargingInterimUsageReport

- Label: `upf`

  Label Description: UPF Name

  Example: Any string

- Label: `aaa_profile`

  Label Description: AAA profile used

  Example: Any string

CNBNG UPF Status Category

UPF_Status

Description: UPF status

Sample Query: `'UPF_Status{Status="Active", UpIp="asr9k-1"}'`

Labels:

- Label: `Status`

  Label Description: Status value

  Example: Active, InActive, Deleting, Deleted

- Label: `UpIp`

  Label Description: upf identifier associated with the request

  Example: Any string