

# Junos® OS

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## OpenConfig User Guide

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Juniper Networks, Inc.  
1133 Innovation Way  
Sunnyvale, California 94089  
USA  
408-745-2000  
[www.juniper.net](http://www.juniper.net)

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*Junos® OS OpenConfig User Guide*

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# About This Guide

Use this guide to configure and model both configurational and operational data of your switches and routers using OpenConfig data models.

# 1

CHAPTER

## OpenConfig Overview

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# OpenConfig Overview

OpenConfig is a collaborative effort in the networking industry to move toward a more dynamic, programmable method for configuring and managing multivendor networks. OpenConfig supports the use of vendor-neutral data models to configure and manage the network. These data models define the configuration and operational state of network devices for common network protocols or services. The data models are written in YANG, a standards-based, data modeling language that is modular, easy to read, and supports remote procedure calls (RPCs). Using industry standard models greatly benefits an operator with devices in a network from multiple vendors. The goal of OpenConfig is for operators to be able to use a single set of data models to configure and manage all the network devices that support the OpenConfig initiative.

OpenConfig for Junos OS supports the YANG data models and uses RPC frameworks to facilitate communications between a client and the router. You have the flexibility to configure your router directly by using Junos OS, or by using a third-party schema, such as OpenConfig. OpenConfig modules define a data model through its data, and the hierarchical organization of and constraints on that data. Each module is uniquely identified by a namespace URL to avoid possible conflicts with the Junos OS name.

The configuration and operational statements in Junos OS have corresponding path statements in OpenConfig. The following is a list of data modules for which mapping of OpenConfig and Junos OS configuration and operational statements is supported:

- BGP
- Interfaces
- LACP
- LLDP
- Local routing
- MPLS
- Network instance
- Platform
- Routing policy
- VLAN

When you configure OpenConfig statements on devices running Junos OS, the following features are *not* supported:

- Using `configure batch` or `configure private` mode
- Configuring statements under the `[edit groups]` hierarchy

For more information on the OpenConfig initiative, see <http://www.openconfig.net/>.

## RELATED DOCUMENTATION

[OpenConfig Data Model Version | 3](#)

*Understanding YANG on Devices Running Junos OS*

[NETCONF XML Management Protocol Developer Guide](#)

# OpenConfig Data Model Version

[Table 1 on page 3](#) lists the OpenConfig data model versions.

**Table 1: OpenConfig Data Model Versions**

OpenConfig Data Model	Junos OS Release Starting Support	OpenConfig Supported Version	Supported Platform
<ul style="list-style-type: none"> <li>• AAA (<code>openconfig-aaa.yang</code>)</li> <li>• AAA Types (<code>openconfig-aaa-types.yang</code>)</li> <li>• AAA TACACS (<code>openconfig-aaa-tacacs.yang</code>)</li> <li>• AAA RADIUS (<code>openconfig-aaa-radius.yang</code>)</li> </ul>	19.3	0.4.1	Juniper Networks ACX Series, EX Series, MX Series, PTX Series, and QFX Series



Table 1: OpenConfig Data Model Versions (Continued)

OpenConfig Data Model	Junos OS Release Starting Support	OpenConfig Supported Version	Supported Platform
BFD (openconfig-bfd.yang)	22.3R1 Junos	0.2.2	ACX710, ACX5448, MX150, MX204, MX240, MX480, MX960, MX2008, MX2010, MX2020, MX10003, MX10008, MX10016, PTX1000. and PTX10002 routers
	22.3R1 Junos OS Evolved	0.2.2	ACX7100-32C, ACX7100-48L, PTX10001-36MR, PTX10003, PTX10008, and PTX10016 routers
<ul style="list-style-type: none"><li>• BGP (openconfig-bgp.yang)</li><li>• BGP NEIGHBOR (openconfig-bgp-neighbor.yang)</li><li>• BGP POLICY (openconfig-bgp-policy.yang)</li><li>• BGP TYPES (openconfig-bgp-types.yang)</li></ul>	16.1	2.0.1	Juniper Networks MX Series and PTX Series
	17.1	2.1.1	
	17.2		Juniper Networks MX Series, PTX Series, and QFX Series
	18.4	4.0.1	
<ul style="list-style-type: none"><li>• BGP COMMON (openconfig-bgp-common.yang)</li><li>• BGP COMMON MULTIPROTOCOL (openconfig-bgp-common-multiprotocol.yang)</li></ul>	17.1	2.1.1	Juniper Networks MX Series and PTX Series
	17.2		Juniper Networks MX Series, PTX Series, and QFX Series

Table 1: OpenConfig Data Model Versions (Continued)

OpenConfig Data Model	Junos OS Release Starting Support	OpenConfig Supported Version	Supported Platform
<ul style="list-style-type: none"> <li>BGP COMMON STRUCTURE (openconfig-bgp-common-structure.yang)</li> <li>BGP GLOBAL (openconfig-bgp-global.yang)</li> <li>BGP PEER GROUP (openconfig-bgp-peer-group.yang)</li> </ul>	18.4	4.0.1	
BGP ERRORS (openconfig-bgp-errors.yang)	18.4	4.0.1	Juniper Networks MX Series and PTX Series
EXTENSIONS (openconfig-metadata.yang)	22.3R1 Junos OS Evolved	0.1.0	Juniper Networks PTX10003, PTX10004, PTX10008, and PTX10016 routers
<ul style="list-style-type: none"> <li>GRE TUNNEL INTERFACE (openconfig-if-tunnel.yang)</li> <li>(openconfig-if-ip.yang )</li> </ul>	22.2R1 Junos	0.1.1	MX204, MX240, MX304, MX480, MX960, MX10003, MX10004, MX10008, MX10016, MX2010, and MX2020 routers
	22.2R1 Junos	3.0.0	
<ul style="list-style-type: none"> <li>IF IP (openconfig-if-ip.yang )</li> </ul>	16.1	1.0.1	Juniper Networks MX Series and PTX Series
	22.2R1 Junos Evolved	3.0.0	PTX10001-36MR,PTX10003, PTX10004,PTX10008, and PTX10016 routers

Table 1: OpenConfig Data Model Versions *(Continued)*

OpenConfig Data Model	Junos OS Release Starting Support	OpenConfig Supported Version	Supported Platform
<ul style="list-style-type: none"> <li>IF AGGREGATE (openconfig-if-aggregate.yang)</li> <li>IF IP EXT (openconfig-if-ip-ext.yang)</li> </ul>	16.1	1.0.1	Juniper Networks MX Series and PTX Series
IGMP (openconfig-igmp.yang)	23.2	0.3.0	Junos OS—ACX Series, EX Series, MX Series and QFX Series.  Junos OS Evolved—ACX Series, PTX Series and QFX Series.
INTERFACES (openconfig-interfaces.yang)	16.1	1.0.1	Juniper Networks MX Series and PTX Series
	22.2R1 Junos Evolved	2.5.0	PTX10001-36MR,PTX10003, PTX10004,PTX10008, and PTX10016 routers
<ul style="list-style-type: none"> <li>IF ETHERNET (openconfig-if-ethernet.yang)</li> </ul>	16.1	2.8.1	All Junos and Junos Evolved platforms supporting JTI
INET TYPES (openconfig-inet-types.yang)	17.3	0.1.0	Juniper Networks MX Series, PTX Series, and QFX Series
IKE INTERFACES (openconfig-ike.yang)	18.1R3	1.0.0	Juniper Networks MX Series
<ul style="list-style-type: none"> <li>ISIS ( openconfig-isis.yang)</li> </ul>	17.4	0.2.1	Juniper Networks MX Series and PTX Series

Table 1: OpenConfig Data Model Versions (Continued)

OpenConfig Data Model	Junos OS Release Starting Support	OpenConfig Supported Version	Supported Platform
<ul style="list-style-type: none"> <li>• ISIS LSDB TYPES (openconfig-isis-lsdb-types.yang)</li> <li>• ISIS LSP (openconfig-isis-lsp.yang)</li> <li>• ISIS POLICY (openconfig-isis-policy.yang)</li> <li>• ISIS ROUTING (openconfig-isis-routing.yang)</li> <li>• ISIS TYPES (openconfig-isis-types)</li> </ul>	18.4	0.3.3	
LACP (openconfig-lacp.yang)	16.1, 17.1	1.0.2	Juniper Networks MX Series and PTX Series
	17.2		Juniper Networks MX Series, PTX Series, and QFX Series
	18.2	1.1.0	
LACP (openconfig-lacp.yang)	20.4R1 Evolved	1.1.1	Juniper Networks PTX10001-36MR, PTX10003, PTX10004, PTX10008, and PTX10016 routers.
	22.1R1		Juniper Networks ACX5448, MX10003, and PTX10008 routers and QFX5110, and QFX10002 switches.

Table 1: OpenConfig Data Model Versions *(Continued)*

OpenConfig Data Model	Junos OS Release Starting Support	OpenConfig Supported Version	Supported Platform
<ul style="list-style-type: none"> <li>• LLDP (<b>openconfig-lldp.yang</b>)</li> <li>• LLDP TYPES (<b>openconfig-lldp-types.yang</b>)</li> </ul>	16.1	0.1.0	Juniper Networks MX Series and PTX Series
LLDP ( <b>openconfig-lldp.yang</b> )	21.4R1 Evolved	0.2.1	Juniper Networks PTX10008 and PTX10016 routers
LOCAL ROUTING ( <b>openconfig-local-routing.yang</b> )	16.1, 17.1	1.0.0	Juniper Networks MX Series and PTX Series
	17.2, 20.2R1 Junos OS Evolved		Juniper Networks MX Series, PTX Series, and QFX Series
MACsec ( <b>openconfig-macsec</b> )	22.1R1 Evolved	0.2.0	Juniper Networks PTX10008 and PTX10016 routers. Only physical MACsec is supported.
MPLS ( <b>openconfig-mpls.yang</b> )	16.1	1.0.0	Juniper Networks MX Series and PTX Series
	17.2	1.0.1	Juniper Networks MX Series, PTX Series, and QFX Series
	17.3		
	17.4	2.2.0	
<ul style="list-style-type: none"> <li>• MPLS IDP (<b>openconfig-mpls-ldp.yang</b>)</li> <li>• MPLS IGP (<b>openconfig-mpls-igp.yang</b>)</li> </ul>	16.1	1.0.0	Juniper Networks MX Series and PTX Series
	17.2		Juniper Networks MX Series, PTX Series, and QFX Series

Table 1: OpenConfig Data Model Versions (Continued)

OpenConfig Data Model	Junos OS Release Starting Support	OpenConfig Supported Version	Supported Platform
<ul style="list-style-type: none"> <li>• MPLS RSVP (<code>openconfig-mpls-rsvp.yang</code>)</li> <li>• MPLS SR (<code>openconfig-mpls-sr.yang</code>)</li> <li>• MPLS STATIC (<code>openconfig-mpls-static.yang</code>)</li> <li>• MPLS TE (<code>openconfig-mpls-te.yang</code>)</li> <li>• MPLS TYPES (<code>openconfig-mpls-types.yang</code>)</li> </ul>	17.4	2.2.0	
NETWORK INSTANCE ( <code>openconfig-network-instance.yang</code> )	17.3, 20.2R1 Junos OS Evolved	0.4.0	Juniper Networks ACX Series, EX Series, MX Series, PTX Series, and QFX Series
NETWORK INSTANCE ( <code>openconfig-network-instance.yang</code> )	22.2 Junos OS Evolved	0.16.1	ACX7100-32C, ACX7100-48L, PTX10001-36MR, PTX10003, PTX10004, PTX10008, PTX10016 routers and QFX5130-32CD and QFX5130-48C switches
<ul style="list-style-type: none"> <li>• NETWORK INSTANCE I3 (<code>openconfig-network-instance-i3.yang</code>)</li> <li>• NETWORK INSTANCE TYPES (<code>openconfig-network-instance-types.yang</code>)</li> </ul>	17.2X75	0.4.0	Juniper Networks MX Series, PTX Series, and QFX Series

Table 1: OpenConfig Data Model Versions (Continued)

OpenConfig Data Model	Junos OS Release Starting Support	OpenConfig Supported Version	Supported Platform
NETWORK INSTANCE I2 ( <a href="#">openconfig-network-instance-l2.yang</a> )	22.2 Junos OS Evolved	0.16.1	ACX7100-32C, ACX7100-48L, PTX10001-36MR, PTX10003, PTX10004, PTX10008, PTX10016 routers and QFX5130-32CD and QFX5130-48C switches
	24.3 Junos OS Evolved	0.4.0	Juniper Networks ACX7024, ACX7024X, ACX7100-32C, ACX7100-48L, ACX7332, ACX7348, ACX7509, MX Series, PTX Series, and QFX Series
OSPF ( <a href="#">openconfig-ospfv2.yang</a> )	22.4 Junos	0.3.1	ACX5448, ACX7100, MX150, MX204, MX240, MX480, MX960, MX10003, MX10008, MX10016, MX2008, MX2010, MX2020 and PTX1000 routers.
	22.4 Junos OS Evolved		PTX10001-36MR, PTX10008 and PTX10016 routers.
P4RT INTERFACE ( <a href="#">openconfig-p4rt.yang</a> )	22.2 Junos OS Evolved	0.2.0	PTX10008 and PTX10016 routers.
PIM ( <a href="#">openconfig-pim.yang</a> )	23.2	0.4.2	Junos OS—ACX Series, EX Series, MX Series and QFX Series.  Junos OS Evolved—ACX Series, PTX Series and QFX Series.
PIPELINE COUNTERS ( <a href="#">openconfig-platform-pipeline-counters.yang</a> )	22.4 Junos OS Evolved	0.2.1	PTX10001-36MR, PTX10004, PTX10008 and PTX10016 routers.

Table 1: OpenConfig Data Model Versions *(Continued)*

OpenConfig Data Model	Junos OS Release Starting Support	OpenConfig Supported Version	Supported Platform
<ul style="list-style-type: none"> <li>PLATFORM (<b>openconfig-platform.yang</b>)</li> <li>PLATFORM TYPES (<b>openconfig-platform-types.yang</b>)</li> </ul>	16.1	0.3.0	Juniper Networks MX Series and PTX Series
PLATFORM TRANSCEIVERS ( <b>openconfig-platform-transceiver.yang</b> )	19.1	0.1.0	Juniper Networks MX Series
	22.2R1 Junos OS Evolved	0.8.0	PTX10001-36MR, PTX10003, PTX10004, PTX10008, and PTX10016 routers
POLICY TYPES ( <b>openconfig-policy-types.yang</b> )	16.1, 17.1	2.0.0	Juniper Networks MX Series and PTX Series
	17.2		Juniper Networks MX Series, PTX Series, and QFX Series
QOS ( <b>openconfig-qos.yang</b> )	22.2R1 Junos OS and 22.2R1 Junos OS Evolved	0.3.0	MX150, MX204, MX480, MX960, MX2008, MX2010, MX2020, MX10003, MX10008, MX10016, PTX1000, PTX3000, PTX5000, PTX10001, PTX10001-36MR, PTX10002, PTX10003, PTX10004, PTX10008, and PTX10016
	24.2R1 Junos OS	0.9.1	MX Series
SUPPORTING QOS ( <b>openconfig-pf-forwarding-policies.yang</b> )	22.2R1 Junos OS Evolved		PTX10001-36MR, PTX10003, PTX10004, PTX10008, and PTX10016 routers



Table 1: OpenConfig Data Model Versions (Continued)

OpenConfig Data Model	Junos OS Release Starting Support	OpenConfig Supported Version	Supported Platform
<ul style="list-style-type: none"> <li>RIB BGP (<b>openconfig-rib-bgp.yang</b>)</li> <li>RIB BGP EXT (<b>openconfig-rib-bgp-ext.yang</b>)</li> <li>RIB BGP TYPES (<b>openconfig-rib-bgp-types.yang</b>)</li> </ul>	16.1	0.2.0	Juniper Networks MX Series and PTX Series
	17.2		Juniper Networks MX Series, PTX Series, and QFX Series
ROUTING POLICY ( <b>openconfig-routing-policy.yang</b> )	16.1	2.0.0	Juniper Networks MX Series and PTX Series
	17.2		Juniper Networks MX Series, PTX Series, and QFX Series
	20.3	2.0.1	EX2300, EX3400, EX4300, EX4600, and EX9200 switches
RPC API ( <b>openconfig-rpc-api.yang</b> )	19.1	0.1.0	Juniper Networks MX Series, PTX Series, and QFX Series
sFlow <ul style="list-style-type: none"> <li>OpenConfig translation (<b>openconfig-sampling.yang</b>)</li> <li>OpenConfig telemetry (<b>openconfig-sampling-sflow.yang</b>)</li> </ul>	23.4R1 Junos OS Evolved	1.0.0	PTX10001-36MR, PTX10003, PTX10004, PTX10008, and PTX10016 routers
SEGMENT ROUTING ( <b>openconfig-segment-routing.yang</b> )	17.3	0.0.3	Juniper Networks MX Series and PTX Series

Table 1: OpenConfig Data Model Versions *(Continued)*

OpenConfig Data Model	Junos OS Release Starting Support	OpenConfig Supported Version	Supported Platform
SYSTEM LOGGING MODEL ( <code>openconfig-system-logging.yang</code> )	21.4R1 Evolved	0.3.1	PTX10008 and PTX10016 routers
	22.1R1		ACX5448, MX240, MX480, MX960, MX10003, MX10008, MX10016, MX2008, MX2010, MX2020, and PTX10002 routers
SYSTEM MANAGEMENT MODEL ( <code>openconfig-system-management.yang</code> )	21.4R1 Evolved	0.3.0	PTX10008 and PTX10016 routers
	22.1R1		ACX5448, MX240, MX480, MX960, MX10003, MX10008, MX10016, MX2008, MX2010, MX2020, and PTX10002 routers
SYSTEM MODEL ( <code>openconfig-system.yang</code> )	21.4R1 Evolved	0.6.1	PTX10008 and PTX10016 routers
	22.1R1		ACX5448, MX240, MX480, MX960, MX10003, MX10008, MX10016, MX2008, MX2010, MX2020, and PTX10002 routers
SYSTEM TERMINAL MODEL ( <code>openconfig-system-terminal.yang</code> )	21.4R1 Evolved	0.3.1	PTX10008 and PTX10016 routers
	22.1R1		ACX5448, MX240, MX480, MX960, MX10003, MX10008, MX10016, MX2008, MX2010, MX2020, and PTX10002 routers

Table 1: OpenConfig Data Model Versions (Continued)

OpenConfig Data Model	Junos OS Release Starting Support	OpenConfig Supported Version	Supported Platform
TELEMETRY SYSTEM ( <a href="#">openconfig-telemetry.yang</a> )	16.1	0.2.0	Juniper Networks MX Series, PTX Series, and QFX Series
<ul style="list-style-type: none"> <li>TELEMETRY SYSTEM (<a href="#">openconfig-telemetry.yang</a>)</li> <li>TELEMETRY TYPE (<a href="#">openconfig-telemetry-types.yang</a>)</li> </ul>	22.2R1 Junos	Telemetry System-0.5.1	PTX10001-36MR, PTX10003, PTX10008, and PTX10016 routers and QFX5130 and QFX5220 switches
	22.2R1 Junos OS Evolved	Telemetry Type-0.4.2	PTX10001-36MR, PTX10003, PTX10008, and PTX10016 routers and QFX5130-32CD, QFX5130-48C, and QFX5220 switches
TERMINAL DEVICE ( <a href="#">openconfig-terminal-device.yang</a> )	19.1	0.3.1	Juniper Networks MX Series, PTX Series, and QFX Series
TRANSPORT TYPES ( <a href="#">openconfig-transport-types.yang</a> )	16.1	0.2.0	Juniper Networks MX Series and PTX Series
	17.1	0.3.1	
TYPES ( <a href="#">openconfig-types.yang</a> )	16.1	0.1.1	Juniper Networks MX Series and PTX Series
	17.1	0.2.0	Juniper Networks MX Series and PTX Series
	17.2		Juniper Networks MX Series, PTX Series, and QFX Series
	17.4	0.3.2	

Table 1: OpenConfig Data Model Versions (*Continued*)

OpenConfig Data Model	Junos OS Release Starting Support	OpenConfig Supported Version	Supported Platform
<ul style="list-style-type: none"> <li>VLAN CONFIGURATION SUPPORT (<code>openconfig-vlan.yang</code>)</li> <li>VLAN TYPES (<code>openconfig-vlan-types.yang</code>)</li> </ul>	16.1	1.0.1	Juniper Networks EX Series and QFX Series
<ul style="list-style-type: none"> <li>VLAN CONFIGURATION SUPPORT (<code>openconfig-vlan.yang</code>)</li> </ul>	22.2R1 Junos OS Evolved	3.2.0	PTX10001-36MR, PTX10003, PTX10004, PTX10008, and PTX10016 routers
	22.2R1 Junos OS Evolved	3.2.1	ACX7100, PTX10001-36MR, PTX10003, PTX10004, PTX10008, PTX10016 routers and QFX5130 switches.
YANG TYPES ( <code>openconfig-yang-types.yang</code> )	17.3	0.1.0	Juniper Networks MX Series, PTX Series, and QFX Series

## RELATED DOCUMENTATION

[OpenConfig Overview | 2](#)

*Understanding YANG on Devices Running Junos OS*

[NETCONF XML Management Protocol Developer Guide](#)

# Installing the OpenConfig Package

Starting in Junos OS Release 18.3R1, the Junos OS image includes the OpenConfig package; therefore, you do not need to install OpenConfig separately on your device.

By default, the OpenConfig schema is not available through CLI. To unhide the OpenConfig knob from the CLI, run the following command:

```
set system schema openconfig unhide
```



**NOTE:** The `show system yang package` command in the operational mode does not display native Junos OS OpenConfig package. This is because the Junos OS image includes the OpenConfig package.

OpenConfig package includes the following files:

- OpenConfig set of data models—Data models are written in YANG.
- Translation scripts—Translates OpenConfig configuration schemas to Junos OS configuration schemas for each supported Junos OS release.
- Deviation modules—Specifies the unsupported nodes within the schema for each supported Junos OS release.
- Augmentation module—Specifies additions to various OpenConfig specified models.
- Dynamic rendering files—Maps operational state data for each supported Junos OS release.

In releases before Junos OS Release 18.3R1, OpenConfig for Junos OS software package have the following naming convention:

```
junos-openconfig-XX.YY.ZZ.JJ-signed.tgz (Junos OS)
junos-openconfig-x86-32-XX.YY.ZZ.JJ.tgz (Junos OS with Upgraded FreeBSD)
```

where:

- *XX* represents the OpenConfig major release number.
- *YY* represents the OpenConfig minor release number.
- *ZZ* represents the OpenConfig patch release number.
- *JJ* represents the Juniper Networks release number.



**NOTE:** The `junos-openconfig-x86-32-XX.YY.ZZ.JJ.tgz` package supports both 32 and 64 bit systems.

To install the OpenConfig for Junos OS software package, use the following command:

```
request system software add
```

For example:

```
user@router> request system software add junos-openconfig-XX.YY.ZZ.JJ-signed.tgz
```

or

```
user@router> request system software add junos-openconfig-x86-32-XX.YY.ZZ.JJ.tgz
```

For more details on the OpenConfig for Junos OS software package, see Release Notes available with the package on the [Juniper Software Download website](#).

Change History Table

Feature support is determined by the platform and release you are using. Use [Feature Explorer](#) to determine if a feature is supported on your platform.

Release	Description
18.3R1	Starting in Junos OS Release 18.3R1, the Junos OS image includes the OpenConfig package; therefore, you do not need to install OpenConfig separately on your device.

RELATED DOCUMENTATION

<i>Understanding YANG on Devices Running Junos OS</i>
<a href="#">NETCONF XML Management Protocol Developer Guide</a>
<a href="#">Software Installation and Upgrade Guide</a>
<a href="#">Release Information for Junos OS with Upgraded FreeBSD</a>
<i>schema</i>

# 2

CHAPTER

## gRPC Overview

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# Understanding OpenConfig and gRPC on Junos Telemetry Interface

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Starting in Junos OS Release 16.1R3, you can use a set of remote procedure call (RPC) interfaces to configure the Junos telemetry interface and stream telemetry data using the gRPC framework. OpenConfig supports the use of vendor-neutral data models for configuring and managing multivendor networks. gRPC is an open source framework that provides secure and reliable transport of data.



**NOTE:** OpenConfig for Junos OS and gRPC are supported only on MPCs on MX Series and on PTX Series routers starting with Junos OS Release 16.1R3.

Starting with Junos OS Release 17.2R1, OpenConfig and gRPC are also supported on QFX10000 switches, QFX5200 switches, and PTX1000 routers.

Starting with Junos OS Release 17.3R1, Junos telemetry interface is supported on the Routing Control and Board (RCB) on PTX3000 routers, QFX5110 switches, and EX4600 and EX9200 switches. OpenConfig and gRPC are not supported on MX80 and MX104 routers.

Starting with Junos OS Release 17.4R1, MX2008 routers are supported.

Starting with Junos OS Release 18.3R1, ON\_CHANGE streaming of LLDP telemetry sensor information is supported through gRPC for MX Series and PTX Series routers.

Starting with Junos OS Release 18.3R1, QFX5120-48Y and EX4650 switches are also supported.

Starting with Junos OS Release 18.4R1, EX4600 switches are also supported.

Starting with Junos OS Release 18.4R1, MX480, MX960, MX2010, MX2020, MX2008 and MX-ELM routers are also supported.

Starting with Junos OS Release 19.1R1, MX Series routers operating with MS-MIC and MS-MPC, QFX10002 switches, and PTX10002 routers are also supported.

Starting in Junos OS Evolved Release 19.1R1, OpenConfig (OC) and Junos telemetry interface (JTI) are supported. Both gRPC APIs and the customer-facing CLI remain the same as for the Junos OS. As was standard for Junos OS, Network Agent (NA) and OC packages are part of the Junos OS Evolved image.

Starting with Junos OS Evolved 19.1R1, Packet Forwarding Engine sensors on PTX10003 routers are also supported.

Starting with Junos OS Release 19.2R1, SRX4100, SRX4200, SRX4600, SRX5400, SRX5600, SRX5800, and vSRX Virtual Firewall Series Services Gateways.

Starting with Junos OS Release 19.2R1, gNMI services for streaming Packet Forwarding Engine statistics is supported on MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches.

Starting with Junos OS Release 19.2R1, gNMI services for streaming statistics is supported on QFX5110, QFX5120, QFX5200 and QFX5210 switches.

Starting with Junos OS Release 19.3R1, gRPC service for exporting statistics is supported on MX Series routers hosting MPC10E-10C-MRATE and MPC10E-15C-MRATE line cards.

Starting with Junos OS Evolved Release 19.3R1, gRPC service for exporting statistics is supported on QFX5220-128C and QFX5220-32CD switches.

Starting with Junos Release 19.4R1, gRPC service for streaming Packet Forwarding Engine and Routing Engine statistics is supported on EX4300-MP switches.



**NOTE:** JTI support for PTX10008 routers is documented for Junos OS Evolved Release 19.4R1, but not supported.

Starting with Junos Release 20.R1, gNMI service for streaming telemetry sensors for Packet Forwarding Engine statistics is supported on MX2K-MPC11E line cards on MX2010 and MX2020 routers.

Starting with Junos OS Release 20.1R1, gRPC services version v1.18.0 is supported with JTI. This version includes important enhancements for gRPC. In earlier Junos OS releases, gRPC version v1.3.0 is supported with JTI.

Starting with Junos OS Evolved Release 20.2R1, gRPC service for streaming NDP statistics is supported on PTX10001 routers.

Starting with Junos OS Release 20.2R1, gRPC service for streaming Packet forwarding Engine and Routing Engine statistics is supported on EX2300, EX2300-MP, and EX3400 switches.

Starting with Junos OS Release 20.2R1, gRPC service for streaming BGP routing information base (RIB) and BGP peer statistics is supported on any platform family that supports containerized routing protocol process (cRPD). cRPD is Juniper's routing protocol process (rpd) decoupled from Junos OS and packaged as a Docker container to run in Linux-based environments.

Starting with Junos OS Release 20.2R1, ON\_CHANGE BGP peer statistics export using gRPC services and gNMI services is supported on MX960, MX2008, MX2010, MX2020, PTX1000, PTX5000, PTX10000 routers and QFX5100 and QFX5200 switches.

Starting with Junos OS Release 20.2R1, streaming BGP global, peer and perr groups statistics using gRPC services is supported on EX2300, EX3400, EX4300, EX4600, and EX9200 switches.

Starting with Junos OS Release 20.2R1, streaming revenue interface statistics through Packet Forwarding Engine sensors and pseudo interface statistics through Routing Engine sensors using gRPC services and gNMI services is supported on SRX5400, SRX5600, and SRX5800 Services Gateways..

Starting with Junos OS Release 20.2R1, streaming revenue interface statistics through Packet Forwarding Engine sensors and pseudo interface statistics through Routing Engine sensors using gRPC services and gNMI services is supported on SRX5400, SRX5600, and SRX5800 Services Gateways.

Starting with Junos OS Release 20.2R1 sensors to stream standby Routing Engine statistics are supported on MX480, MX960, MX10003, MX2010, and MX2020 routers.

Starting with Junos OS Release 20.2R1 sensors to stream EVPN statistics using gRPC services are supported with QFX5100, QFX5110, QFX5120, QFX5200, QFX10002-60C, QFX10002, QFX10008, and QFX10016 switches.

## Network Agent Software

Implementing OpenConfig with gRPC for Junos telemetry interface requires that you download and install a package called Network Agent if your Juniper Networks device is running a version of Junos OS with Upgraded FreeBSD. For all other versions of Junos OS, the Network Agent functionality is embedded in the software. Network Agent functions as a gRPC server and terminates the OpenConfig RPC interfaces. It is also responsible for streaming the telemetry data according to the OpenConfig specification. To view the OpenConfig specification for telemetry, see the [OpenConfig Telemetry specification](#). For more information about OpenConfig for Junos OS, see the [OpenConfig User Guide](#).

The Network Agent component also supports server-based Secure Sockets Layer (SSL) authentication. Client-based SSL authentication is not supported. You must install SSL certificates on your Juniper Networks device.

For information about installing the Network Agent package, see "[Installing the Network Agent Package \(Junos Telemetry Interface\)](#)" on page 52.

## Using OpenConfig for Junos OS to Enable Junos telemetry interface

OpenConfig for Junos OS specifies an RPC model to enable the Junos telemetry interface. You must download and install the OpenConfig for Junos OS package on your Juniper Networks device. This package also includes the required YANG models.

You can locate all [YANG data models](#) in a GitHub repository for a given OS and release in a single download package. The package and repository include the native configuration, state, and RPC data models and the OpenConfig and IETF data models supported by that OS. You can also access the YANG data models from the Juniper Networks download site.

Using a Web browser, navigate to the All Junos Platforms software download URL on the Juniper Networks webpage: <https://www.juniper.net/support/downloads/>. From the **Network Management** tab, scroll down to select **OpenConfig**. Select the **Software** tab. Select the appropriate version of OpenConfig module. Two versions are available, one for devices running Junos OS with Upgraded FreeBSD and

another for devices running all other versions of Junos OS. For more information, see ["Installing the OpenConfig Package" on page 15](#) and No Link Title.

The programmatic interface `OpenConfigTelemetry` that is installed by the Network Agent package defines the telemetry gRPC service. The `telemetrySubscribe` RPC specifies the following subscription parameters:

- OpenConfig path that identifies the system resource to stream telemetry data, for example:  
`interfaces/interface/state/counters/`
- Interval at which data is reported and streamed to the collector server, in milliseconds, for example:  
`sample_frequency = 4000`

The `telemetrySubscribe` RPC is used by a streaming server, or collector, to request an inline subscription for data at the specified path. The device should then send telemetry data back on the same connection as the subscription request.

## GitHub Resources

GitHub is a code hosting platform for version control and collaboration. It lets you and others work together on projects from anywhere. Juniper Networks is part of the OpenConfig community that uses GitHub to develop telemetry code and store documents. Contribute to Juniper telemetry development by creating an account on GitHub.

**Table 2: GitHub Resources**

Telemetry Resources	Description
<a href="#">Juniper telemetry on GitHub</a>	Juniper telemetry models, augments, and deviations.
<a href="#">Protobuf file</a>	Juniper protocol buffer files, organized by Junos OS Release.
<a href="#">gNMI protobuf file</a>	Juniper gNMI protocol buffer files, organized by Junos OS Release..
<a href="#">YANG models</a>	Starting in Junos OS Evolved Release 23.4R1, all YANG data models for a given OS and release are in a single download package and GitHub repository. The package and repository include the native configuration, state, and RPC data models and the OpenConfig and Internet Engineering Task Force (IETF) data models supported by that OS.

## Using gRPC to Stream Data

Per the OpenConfig specification, only gRPC-based transport is supported for streaming data. The gRPC server that is installed by the Network Agent package terminates the gRPC sessions from the management system that runs the client. RPC calls trigger the creation of Junos OS sensors that either stream data periodically or report events, which are then funneled onto the appropriate gRPC channel by Network Agent.



**NOTE:** Starting in Junos OS Release 18.2R1, when an external streaming server, or collector, provisions sensors to export data through gRPC on devices running Junos OS, the sensor configuration is committed to the `junos-analytics` instance of the ephemeral configuration database, and the configuration can be viewed by using the `show ephemeral-configuration instance junos-analytics operational` command. In earlier releases, the sensor configuration is committed to the default instance of the ephemeral configuration database.



**NOTE:** The Juniper telemetry header that was exported as part of updates is now exported as an extension header. `GnmiJuniperTelemetryHeader.proto` is used to decode the updates from Juniper devices running Junos OS Release 19.3 or earlier and `GnmiJuniperTelemetryHeaderExtension.proto` is used for devices running Junos OS Release 19.4 or later.

See [Table 3 on page 24](#) for a list and descriptions of the RPCs implemented to support the Junos telemetry interface.

**Table 3: Telemetry RPCs**

RPC Name	Description
<code>telemetrySubscribe</code>	Specify telemetry parameters and stream data for the specified list of OpenConfig paths.
<code>getTelemetrySubscriptions</code>	Retrieve the list of subscriptions that are created through <code>telemetrySubscribe</code> .
<code>cancelSubscription</code>	Unsubscribe a subscription created through <code>telemetrySubscribe</code> .

Data streamed through gRPC is formatted in OpenConfig key/value pairs in protocol buffers (gpb) messages. In this universal format, keys are strings that correspond to the path of the system resources

in the OpenConfig schema for the device being monitored. The values correspond to integers or strings that identify the operational state of the system resource, such as interface counters, and the state of the resource.



**NOTE:** Starting in Junos OS Release 18.2R1, data streamed through gRPC can be formatted as protobuf in addition to key/value pairs for OpenConfig-based routing engine (RE) sensors. These sensors are in addition to the packet forwarding engine (PFE) sensors.

The following shows the universal key/value format:

```
message KeyValue {
  string key          = 1 [(telemetry_options).is_key = true];
  uint64 int_value    = 2;
  string str_value    = 3;
  string prefix_str   = 4;
}

message TelemetryStream {
  // router name or export IP address
  required string system_id = 1 [(telemetry_options).is_key = true];

  // line card / RE (slot number)
  optional uint32 component_id = 2 [(telemetry_options).is_key = true];

  // PFE (if applicable)
  optional uint32 sub_component_id = 3 [(telemetry_options).is_key = true];

  // timestamp (common to all entries in the kv array)
  optional uint64 timestamp = 4 [(telemetry_options).is_timestamp = true];

  // key / value pairs
  repeated KeyValue kv;
}
```

The following example shows how a set of counters for an interface can be represented:

```
key = "/interfaces/counters/rx-bytes",    int_value = 1000
key = "/interfaces/counters/tx-bytes",    int_value = 2000
key = "/interfaces/counters/rx-packets", int_value = 10
```

```
key = "/interfaces/counters/rx-bytes" ,    int_value = 20
key = "/interfaces/counters/oper-state", str_value = "up"
```

The Network Agent package provides a mapping table that maps field names to the OpenConfig key strings.

## Exporting Packet Forwarding Engine Traffic Sensor Data

Starting with Junos OS Release 17.4R1, you can export Packet Forwarding Engine traffic statistics through the Junos telemetry interface for MX Series and PTX Series routers. Both UDP and gRPC are supported.

This sensor tracks reporting of Packet Forwarding Engine statistics counters and provides visibility into Packet Forwarding Engine error and drop statistics. The resource name for the sensor is `/junos/system/linecard/packet/usage/`. The OpenConfig paths report data specific to CPU, NPU and center chip (CC). The following paths are supported:

- `/components/component[name='FPC.id:NPU.id']/properties/property[name='counter']/state/value`, where FPC refers to the Flexible PIC Concentrator and NPU refers to the network processing unit (packet forwarding engine). A sample resource path is `/components/component[name='FPC0:NPU3']/properties/property[name='ts-output-pps']/state/value` where `hwds-data-error` is the counter for Hardware Discards: Data Error.
- `/components/component[name='FPC.id:CC.id']/properties/property[name='counter']/state/value`, where FPC refers to the Flexible PIC Concentrator and CC refers to the center chip. A sample resource path is `/components/component[name='FPC0:CC1']/properties/property[name='lpbk-packets']/state/value` where `lpbk-packets` is the count of Forward packets specific to FPC0, center chip 1.
- `/components/component[name='FPC.id']/properties/property[name='counter']/state/value`, where FPC refers to the Flexible PIC Concentrator. A sample resource path is `/components/component[name='FPC0']/properties/property[name='lts-input-packets']/state/value` where `lts-input-packets` is the CPU counter Local packets input.

To provision the sensor to export data through gRPC, use the `telemetrySubscribe` RPC to specify telemetry parameters. For streaming through UDP, all parameters are configured at the `[edit services analytics]` hierarchy level.

The following is a map of counters to output fields in the `show pfe statistics traffic` command or `show pfe statistics traffic detail` command (supported only on MX Series routers).

```
CPU stats: (FPCX:CPUY)
Packet Forwarding Engine local traffic statistics:
```

Local packets input	:	2
Local packets output	:	1
Software input control plane drops	:	0
Software input high drops	:	0
Software input medium drops	:	0
Software input low drops	:	0
Software output drops	:	0
Hardware input drops	:	0

#### Counter

lts-input-packets	Local packets input
lts-output-packets	Local packets output
lts-sw-input-control-drops	Software input control plane drops
lts-sw-input-high-drops	Software input high drops
lts-sw-input-medium-drops	Software input medium drops
lts-sw-input-low-drops	Software input low drops
lts-sw-output-low-drops	Software output drops

#### NPU stats: (FPCX:CCY)

Input packets:	1169	0 pps
Output packets:	0	0 pps
Fabric Input :	277235149	16078 pps
Fabric Output :	277235149	16079 pps

#### Counter

ts-input-packets	Input packets
ts-input-packets-pps	Input packets in pps
ts-output-packets	Output packets
ts-output-packets-pps	Output packets in pps
ts-fabric-input-packets	Fabric Input
ts-fabric-input-packets-pps	Fabric Input in pps
ts-fabric-output-packets	Fabric Output
ts-fabric-output-packets-pps	Fabric Output in pps

#### Packet Forwarding Engine loopback statistics:

Forward packets :	0	0 pps
Forward bytes :	0	0 bps
Drop packets :	0	0 pps
Drop bytes :	0	0 bps



```

Counter
lpbk-packets          Forward packets
lpbk-packets-pps      Forward packets pps
lpbk-packets-byte     Forward bytes
lpbk-packets-bps      Forward bytes   bps

lpbk-drop-packets     Drop packets
lpbk-drop-packets     Drop packets pps
lpbk-drop-packets     Drop bytes
lpbk-drop-packets     Drop bytes bps

```

```
Lu chips stats: FPCx:NPUY
```

```

Counter
lts-hw-input-drops
hwds-normal           Hardware discards normal discard
hwds-fabric           Hardware discards fabric drops
hwds-info-cell        Hardware discards info cell drops
hwds-timeout          Hardware discards timeour
hwds-truncated-key    Hardware discards truncated key
hwds-bits-to-test     Hardware discards bits to test
hwds-stack-underflow  Hardware discards stack underflow
hwds-stack-overflow   Hardware discards stack overflow
hwds-data-error       Hardware discards data error
hwds-extended         Hardware discards extended discard
hwds-invalid-iif      Hardware discards invalid interface
hwds-input-checksum   Hardware discards input checksum
hwds-output-mtu
hwds-inet-bad-route
hwds-inet6-bad-route
hwds-filter-discard
hwds-dlu-not-routable

```

## Delivery of Telemetry Data for AFT-Based Line Cards on MX Series Routers

Starting with Junos OS Release 20.4R1, a new concatenation of prefix and key delivery for telemetry is implemented for Modular Port Concentrator (MPC) line cards supporting Abstract Forwarding Table

(AFT) (such as MPC10E or MPC11E line cards). The OpenConfig path is split in a different manner as compared to the syntax on other line cards.

The output that follows illustrates the changes in prefix and key delivery.

Example jtimon output for a port on non-AFT LC

key: \_\_prefix\_\_

str\_value: /junos/firewall[name='CORERO-MITIGATE-xe-1/0/0.4051-i']/state/

key: counter[name='Corero-Allowed-xe-1/0/0.4051-i']/packets

uint\_value: 2935220

<<RESULT>>

path: /junos/firewall[name='CORERO-MITIGATE-xe-1/0/0.4051-i']/state/counter[name='Corero-Allowed-xe-1/0/0.4051-i']/packets

uint\_value: 2935220

Example jtimon output for a port on an AFT LC

key: \_\_prefix\_\_

str\_value: /junos/firewall[name='CORERO-MITIGATE-et-2/0/0.114-i']/state/counter[name='Corero-Allowed-et-2/0/0.114-i']/

key: packets

uint\_value: 29191907

<<RESULT>>

path: /junos/firewall[name='CORERO-MITIGATE-et-2/0/0.114-i']/state/counter[name='Corero-Allowed-et-2/0/0.114-i']/packets

uint\_value: 29191907

## Enabling “ON CHANGE” Sensor Support Through gNMI

Periodical streaming of OpenConfig operational states and counters has been supported since Junos OS Release 16.1, exporting telemetry data from Juniper equipment to an external collector. While useful in collecting all the needed information and creating a baseline “snapshot,” periodical streaming is less useful for time-critical missions. In such instances, you can configure ON\_CHANGE streaming for an external collector to receive information only when operational states experience a change in state.

To support ON\_CHANGE streaming, a new specification called gRPC Network Management Interface (gNMI) is implemented for the modification and retrieval of configurations from a network element. Additionally, the gNMI specification can be used to generate and control telemetry streams from a

network element to a data collection system. Using the new gNMI specification, one gRPC service definition can provide a single implementation on a network element for both configuration and telemetry as well as a single NMS element to interact with a device by means of telemetry and configuration RPCs.

The Junos file package (junos-telemetry-interface) includes the gnmi.proto file and GnmJuniperTelemetryHeader.proto Juniper extension for gNMI support.

Information about the RPCs supporting this feature can be found in the gNMI Proto file version 0.4.0 (the supported version) and the specification released

- [gNMI Specification: STREAM Subscription](#)
- [gNMI Specification: gNMI Protocol](#)

The telemetry RPC `subscribe` under gNMI service supports `ON_CHANGE` streaming. RPC `subscribe` allows a client to request the target to send it values of particular paths within the data tree. Values may be streamed (STREAM), sent one-off on a long-lived channel (POLL), or sent one-off as a retrieval (ONCE).

If a subscription is made for a top level container with a sample frequency of 0, leaves with `ON_CHANGE` support are streamed based on events. Other leaves will not be streamed.



**NOTE:** In order to permit a device to decide which nodes will be streamed as `ON_CHANGE` and which will `SAMPLE`, the collector must subscribe for `TARGET_DEFINED` with `sample_interval`.

## Enabling “TARGET\_DEFINED” Subscription Mode through gNMI

Starting with Junos OS Release 20.2R1, `TARGET_DEFINED` subscription mode with gRPC Network Management Interface (gNMI) services is supported for JTI on MX5, MX10, MX40, MX80, MX104, MX150, MX204, MX240, MX480, MX960, MX2008, MX2010, MX2020, MX10003, MX10008, and MX10016 routers.

Using a gNMI subscription, an external collector stipulates how sensor data should be delivered:

- `STREAMING` mode periodically streams sensor data from the DUT at a specified interval.
- `ON_CHANGE` mode sends updates for sensor data from the DUT only when data values change.
- Newly supported `TARGET_DEFINED` mode (submode 0) instructs the DUT to select the relevant mode (`STREAMING` or `ON_CHANGE`) to deliver each element (leaf) of sensor data to the external collector. When a subscription for a sensor with submode 0 is sent from the external collector to the DUT, the DUT responds, activating the sensor subscription so that periodic streaming does not

include any of the ON\_CHANGE updates. However, the DUT will notify the collector whenever qualifying ON\_CHANGE events occur.

Subscriptions will default to a periodic streaming frequency of 30 seconds unless otherwise specified by the collector in the subscription request.

The Java Script Object Notification (JSON) file below shows a sample gNMI subscription. TARGET\_DEFINED mode is set using `submode=0` for the resource (sensor) path `/interfaces/interface[name='lo0']/state`.

```
$ cat gnmi.json
{
  "dut_list":[
    {
      "port":32767,
      "rpc":["sub_request"],
      "sub_request":{
        "subscription":[
          {
            "path":"/interfaces/interface[name='lo0']/state",
            "submode":0,
            "sample_interval":30
          }
        ],
        "mode":0,
        "encoding":2
      }
    }
  ]
}

$ python ./gnmi_subscribe_client_sample.py -c ./gnmi.json -d 10.53.32.102 -l client.log
```

The Junos file package (junos-telemetry-interface) includes the `gnmi.proto` file and `GnmiJuniperTelemetryHeader.proto` Juniper extension for gNMI support.

For more information, see the gNMI specifications and gNMI protocol file here:

- [gNMI Specification: STREAM Subscription](#)
- [gNMI Specification: gNMI Protocol](#)

## Enabling “INITIAL\_SYNC” Subscription Mode through gNMI

Starting in Junos OS Release 20.2R1, INITIAL\_SYNC statistics from Packet Forwarding Engine sensors using gNMI services on MX960, MX2008, MX2010, MX2020, PTX1000, PTX5000 routers, PTX10000 line of routers, and QFX5100 and QFX5200 switches is supported.

Starting in Junos OS Evolved Release 20.4R1, INITIAL\_SYNC statistics from Packet Forwarding Engine sensors using gNMI services on QFX5130-32CD switches is supported.

When an external collector sends a subscription request for a sensor with INITIAL\_SYNC (gnmi-submode 2), the host sends all supported target leaves (fields) under that resource path at least once to the collector with the current value. This is valuable because:

- The collector has a complete view of the current state of every field on the device for that sensor path.
- Event-driven data (ON\_CHANGE) is received by the collector at least once before the next event is seen. In this way, the collector is aware of the data state before the next event happens.
- Packet Forwarding Engine sensors that contain zero counter values (zero-suppressed) that normally do not show up in streamed data are sent, ensuring that all fields from each line card (also referred to as source) are known to the collector.

INITIAL\_SYNC submode requires that at least one copy to be sent to the collector; however, sending more than one is acceptable.

Subscriptions will default to a periodic streaming frequency of 30 seconds unless otherwise specified by the collector in the subscription request.

The Java Script Object Notification (JSON) file below shows a sample gNMI subscription. INITIAL\_SYNC mode is set using `gnmi_submode 2` for the resource (sensor) path `/interfaces/`. The `gnmi_mode` is set to `0`. The protocol encoding is set to `2` for GBP.

```
{
  "influx": {
    "server": "server1",
    "port": 8086,
    "dbname": "gD40",
    "measurement": "OC",
    "user": "influx",
    "password": "influxdb",
    "recreate": true
  },
  "gnmi": {
```

```

    "mode": 0,      <---- STREAM
    "encoding": 2, <--- PROTO encoding
    "prefix": "/x/y/z"
  },
  "host": "10.10.130.73",
  "port": 10162,
  "user": "user1",
  "password": "password1",
  "cid": "cid-1jk",
  "paths":[
    {
      "path": "/interfaces/",
      "Freq": 10000000000,
      "gnmi_submode": 2    <---- SAMPLE
    }
  ]
}

```

The Junos file package (junos-telemetry-interface) includes the gnmi.proto file and GnmiJuniperTelemetryHeader.proto Juniper extension for gNMI support.

For more information, see the gNMI specifications and gNMI protocol file here:

gNMI telemetry specification gNMI protocol definition

- [gNMI Specification: STREAM Subscription](#)
- [gNMI Specification: gNMI Protocol](#)

## Enabling Client Streaming and Bidirectional Streaming of Telemetry Sensor Information

Starting with Junos OS Release 18.1R1, OpenConfig support through Remote Procedure Calls (gRPC) and JTI is extended to support client streaming and bidirectional streaming of telemetry sensor information on MX Series and PTX Series routers.

APIs are implemented in Junos based on Protobuf specifications for OpenConfig. These APIs perform configuration, operational state retrieval, and telemetry on Junos routers using gRPC as the transport mechanism.

With client streaming, the client sends a stream of requests to the server instead of a single request. The server typically sends back a single response containing status details and optional trailing metadata.

With bidirectional streaming, both client and server send a stream of requests and responses. The client starts the operation by invoking the RPC and the server receives the client metadata, method name, and deadline. The server can choose to send back its initial metadata or wait for the client to start sending requests. The client and server can read and write in any order. The streams operate completely independently.

Junos devices can be managed through API (RPC) prototypes:

- `rpc Capabilities (CapabilityRequest)`

Returns (`CapabilityResponse`). Allows the client to retrieve the set of capabilities that is supported by the target.

- `rpc Get (GetRequest)`

Returns (`GetResponse`). Retrieves a snapshot of data from the target.

- `rpc Set (SetRequest)`

Returns (`SetResponse`). Allows the client to modify the state of data on the target.

- `rpc Subscribe (stream SubscribeRequest)`

Returns (`stream SubscribeResponse`). Allows a client to request the target to send it values for particular paths within the data tree. These values may be streamed (`STREAM`) or sent one-off on a long-lived channel (`POLL`), or sent as a one-off retrieval (`ONCE`). If a subscription is made for a top-level container with a sample frequency of 0, leaves with `ON_CHANGE` support are streamed based on events. Other leaves will not be streamed.

Juniper Extension Toolkit (JET) support provides insight to users regarding the status of clients connected to JSD. JET support for gRPC includes expanding the maximum number of clients that can connect to JSD from 8 to 30 (the default remains 5). To specify the maximum number of connections, include the `max-connections` statement at the `[edit system services extension-service request-response grpc]` hierarchy level.

To provide information regarding the status of clients connected to JSD, issue the enhanced `show extension-service client information` command and include the `clients` or `servers` options. The `clients` option displays request-response client information. The `servers` option displays request-response server information.

## Enabling Streaming of Telemetry Sensor Information for SR-TE policies (BGP or Static)

Starting with Junos OS Release 18.3R1, OpenConfig support for MX Series and PTX Series through gRPC and JTI provides continuous statistics streaming via the same sensor irrespective of the route that is active (BGP or static) for a given Segment Routing Traffic Engineering (SR-TE) policy.

Support is available in Junos OS Evolved Release 21.4R1EVO for PTX10001-36MR, PTX10004, PTX10008, and PTX10016 routers.

This feature provides support for BGP [DRAFT-SRTE] and statically configured SR-TE policies at ingress routers.

To provision the sensor to export data through gRPC streaming, use the `telemetrySubscribe` RPC to specify telemetry parameters. Include the resource path `/mpls/signaling-protocols/segment-routing/` to export these statistics.

In addition to configuring the sensor, you must enable statistics collection through the Junos OS. To do this, include the statistics configuration statement at the `[edit protocols source-packet-routing telemetry]` hierarchy level. Optionally, you can limit statistics by including the `no-transit` or `no-ingress` parameter.

See *Configure a NETCONF Proxy Telemetry Sensor in Junos* for instructions on configuring a sensor.

See *Guidelines for gRPC and gNMI Sensors (Junos Telemetry Interface)* for further information about resource paths.

## Support for LSP Statistics

You can provision the LSP statistics sensor `/junos/services/label-switched-path/usage/` to monitor per-MPLS LSP statistics. Telemetry data is streamed from Junos devices and exported through JTI to external collectors at configurable intervals through gRPC without involving polling.

Initial support of this feature in Junos OS Release 15.1F6 supported ingress LSPs only when a subscription was made to `/junos/services/label-switched-path/usage/`. With bypass support added to this feature in Junos OS Release 17.4R1, this subscription now streams both ingress LSP and bypass LSP statistics to a collector.

Statistics that are streamed are similar to the output displayed by the operational mode commands `show mpls lsp bypass statistics` and `show mpls lsp ingress statistics`.

For bypass LSPs, the following are exported:

- Bypass LSP originating at the ingress router of the protected LSP.



- Bypass LSP originating at the transit router of the protected LSP.
- Bypass LSP protecting the transit LSP as well as the locally originated LSP.

When the bypass LSP is active, traffic is exported both on the bypass LSP and the ingress (protected) LSP.

To provision a sensor to export data through gRPC, use the `telemetrySubscribe` RPC to specify telemetry parameters. Streaming telemetry data through gRPC also requires the OpenConfig for Junos OS module. Both OpenConfig and Network Agent packages are bundled into the Junos OS image by default.

See *Configuring a Junos Telemetry Interface Sensor (CLI Procedure)* for information about configuring a UDP (native) sensor.

See [Table 4 on page 36](#) for the level of LSP sensor support by platform.

**Table 4: LSP Support by Platform**

Platform	Ingress LSP, UDP Feature Introduced	Ingress LSP, gRPC Stream Feature Introduced
ACX6360		
MX80/MX104	Junos OS Release 15.1F6 Junos OS Release 16.1R3 Junos OS Release 17.2R1	
MX Series with MPC	Junos OS Release 15.1F6	Junos OS Release 16.1F6 Junos OS Release 17.2F6
PTX5000 with FPC3		Junos OS Release 18.2F6
PTX3000 with FPC3	Junos OS Release 15.1F6 Junos OS Release 16.1R3 Junos OS Release 17.2R1	Junos OS Release 16.1F6 Junos OS Release 17.2F6 Junos OS Release 18.2F6

Table 4: LSP Support by Platform *(Continued)*

Platform	Ingress LSP, UDP Feature Introduced	Ingress LSP, gRPC Stream Feature Introduced
PTX Series with FPC1/2	Junos OS Release 15.1F6 Junos OS Release 16.1R3 Junos OS Release 17.2R1	Junos OS Release 16.1R3 Junos OS Release 17.2R1 Junos OS Release 18.2R1
PTX1000	Junos OS Release 16.1R3	Junos OS Release 16.1R3 Junos OS Release 17.2R1
PTX10000	Junos OS Release 17.3R1	Junos OS Release 17.3R1
PTX10001-20C		
PTX10002	Junos OS Release 19.1R1	Junos OS Release 19.1R1
VMX	Junos OS Release 17.3R1	Junos OS Release 17.3R1
MX150	Junos OS Release 17.4R1	Junos OS Release 17.4R1
EX4600	Junos OS Release 18.4R1	
EX4650	Junos OS Release 18.3R1	Junos OS Release 18.3R1
EX9200	Junos OS Release 17.3R1	
QFX10000		

**Table 4: LSP Support by Platform (Continued)**

Platform	Ingress LSP, UDP Feature Introduced	Ingress LSP, gRPC Stream Feature Introduced
QFX5200	Junos OS Release 17.2R1	Junos OS Release 17.2R1
QFX10002	Junos OS Release 19.1R1	Junos OS Release 19.1R1
QFX5100	Junos OS Release 18.2R1	Junos OS Release 18.2R1
QFX5110	Junos OS Release 18.2R1	Junos OS Release 18.2R1
QFX5120-48Y	Junos OS Release 18.3R1	Junos OS Release 18.3R1
QFX5200	Junos OS Release 18.2R1	Junos OS Release 18.2R1

## End-of-Message Notification for Routing Engine Sensors

Starting in Junos OS Release 21.2R1, we've introduced an end-of-message (EoM) Boolean flag for all JT1 Routing Engine sensors. The flag notifies the collector that the current wrap has completed for a particular sensor path. A wrap is a complete key-value data dump for all the leaves under a sensor path.

The EoM flag also enables the collector to detect when the end of wrap occurs without having to compare stream creation timestamp values that the collector receives from the packets. Comparing timestamp values is costly time-wise and delays data aggregation.

To use this feature with gRPC Network Management Interface (gNMI) transport or Remote Procedure Call (gRPC), retrieve the protobuf files from the relevant branch on the [Juniper Networks](#) download site:

- GnmiJuniperTelemetryHeaderExtension.proto (gNMI)
- agent.proto (for gRPC)

For example: <https://github.com/Juniper/telemetry/blob/master/20.3/20.3R1/protos/GnmiJuniperTelemetryHeaderExtension.proto>.

After you download and install the new protobuf files on a collector, the EoM field is present in the packets received.

## Dynamic Tunnel Statistics Support

Starting with Junos OS Release 17.4R1, you can export counter statistics for Packet Forwarding Engine dynamic tunnels to an outside collector using either native (UDP) or OpenConfig telemetry sensors through JTI.

The statistics are used to report various network element performance metrics in a scalable and efficient way, providing visibility into Packet Forwarding Engine errors and drops.

A timestamp indicating when the counters were last reset is included with all the exported data to allow collectors to determine if and when a reset event happened; for example, if the Packet Forwarding Engine hardware restarted.

Exported statistics are similar to the output of the operational mode command `show nhdb hw dynamic-ip-tunnels`.

To provision statistics export through gRPC, use the `telemetrySubscribe` RPC to create a subscription and specify telemetry parameters. Include the resource path `/junos/services/ip-tunnel[name='tunnel-name']/usage/counters[name='counter-name']/` in the subscription.

Streaming telemetry data through gRPC also requires the OpenConfig for Junos OS module. Starting in Junos OS Release 18.3R1, OpenConfig and Network Agent packages are bundled into the Junos OS image by default. Both packages support JTI.

To configure export of statistics through UDP, include the sensor `/junos/services/ip-tunnel/usage/` in the *sensor (Junos Telemetry Interface)* configuration statement at the `[edit services analytics]` hierarchy level. All parameters for UDP sensors are configured at that hierarchy level. MX80 and MX104 routers support only UDP streaming. They do not support gRPC.

## FPC and Optics Support

Starting in Junos OS Release 19.2R1, JTI supports streaming of Flexible PIC Concentrator (FPC) and optics statistics for the MX Series using Remote Procedure Calls (gRPC). gRPC is a protocol for configuration and retrieval of state information. Support includes the addition of a new process (SensorD daemon) to export telemetry data for integration with AFTTelemetry and LibTelemetry libraries in the OpenConfig model called AFT platform.

The following base resource paths are supported:

- `/junos/system/linecard/environment/`
- `/junos/system/linecard/optics/`

To provision the sensor to export data through gRPC, use the `telemetrySubscribe` RPC to specify telemetry parameters. Streaming telemetry data through gRPC also requires the OpenConfig for Junos OS module. Starting in Junos OS Release 18.3R1, OpenConfig and Network Agent packages are bundled into the Junos OS image by default. Both packages support JTI.

## Telemetry Streaming Support for ZR/ZR+ Optics on MPC 10 Linecards

Starting in Junos OS Release 24.4R1, telemetry data streaming for ZR and ZR+ optics is implemented on the MPC 10 linecards for the following leaves:

```

/components/component/transceiver/config/fec-mode - 'config'

/components/component/transceiver/state/fec-mode - 'leaf'
/components/component/transceiver/state/fec-status - leaf
/components/component/transceiver/state/module-functional-type - 'leaf'
/components/component/transceiver/state/fault-condition - leaf
/components/component/transceiver/state/fec-uncorrectable-blocks - leaf
/components/component/transceiver/state/fec-corrected-bits - leaf
/components/component/transceiver/physical-channels/channel/state/output-frequency - 'leaf'
/components/component/transceiver/physical-channels/channel/state/associated-optical-channel -
'leaf'
/components/component/optical-channel/state/frequency - 'leaf'
/components/component/optical-channel/state/line-port - 'leaf'

/components/component/optical-channel/state/output-power/ - instant/avg/min/max/interval/min-
time/max-time - 'container'
/components/component/optical-channel/state/input-power/ - instant/avg/min/max/interval/min-time/
max-time - 'container'
/components/component/optical-channel/state/laser-bias-current/ - instant/avg/min/max/interval/
min-time/max-time - 'container'
/components/component/optical-channel/state/chromatic-dispersion/ - instant/avg/min/max/interval/
min-time/max-time - 'container'
/components/component/optical-channel/state/second-order-polarization-mode-dispersion/ -
instant/avg/min/max/interval/min-time/max-time - 'container'
/components/component/optical-channel/state/polarization-dependent-loss/ - instant/avg/min/max/
interval/min-time/max-time - 'container'
/components/component/optical-channel/state/osnr/ - instant/avg/min/max/interval/min-time/max-

```

```

time - 'container'
/components/component/optical-channel/state/esnr/ - instant/avg/min/max/interval/min-time/max-
time - 'container'
/components/component/optical-channel/state/carrier-frequency-offset/ - instant/avg/min/max/
interval/min-time/max-time - 'container'
/components/component/optical-channel/state/pre-fec-ber/ - instant/avg/min/max/interval/min-time/
max-time - 'container'
/components/component/optical-channel/state/modulator-bias-xi/ - instant/avg/min/max/interval/
min-time/max-time - 'container'
/components/component/optical-channel/state/modulator-bias-xq/ - instant/avg/min/max/interval/
min-time/max-time - 'container'
/components/component/optical-channel/state/modulator-bias-yi/ - instant/avg/min/max/interval/
min-time/max-time - 'container'
/components/component/optical-channel/state/modulator-bias-yq/ - instant/avg/min/max/interval/
min-time/max-time - 'container'
/components/component/optical-channel/state/modulator-bias-x-phase/ - instant/avg/min/max/
interval/min-time/max-time - 'container'
/components/component/optical-channel/state/modulator-bias-y-phase/ - instant/avg/min/max/
interval/min-time/max-time - 'container'
/components/component/optical-channel/state/sop-roc/ - instant/avg/min/max/interval/min-time/max-
time - 'container'

```

## JTI Broadband Edge Statistics Support for Junos Fusion on MX Series

Starting in Junos OS Release 19.2R1, subscriber-based telemetry streaming is enabled when an MX router is configured for Broadband Network Gateway (BNG) and Junos Fusion where subscribers are connected through Junos Fusion Satellite devices. You can use remote procedure calls (gRPC) to export broadband edge (BBE) telemetry statistics to external collectors.

You can stream all BBE resource paths except for the following:

- `/junos/system/subscriber-management/access-network/ancp`
- `/junos/system/subscriber-management/client-protocols/l2tp`
- `/junos/system/subscriber-management/infra/network/l2tp/`

To stream BBE statistics, include a resource path starting with `/junos/system/subscriber-management/` in your gRPC subscription.

To provision the sensor to export data through gRPC, use the `telemetrySubscribe` RPC to specify telemetry parameters.

## CPU and NPU Sensor Support for MX Series Routers with MPC10E-15C-MRATE Line Cards

Junos OS Release 19.3R1 supports CPU and network processing unit (NPU) sensors on MX Series routers with MPC10E-10C-MRATE and MPC10E-15C-MRATE line cards. JTI enables the export of statistics from these sensors to outside collectors at configurable intervals using gRPC services.

Unlike the Junos kernel implementation for the CPU and NPU sensors in previous Junos releases, this feature uses the OpenConfig AFT model. Because of this, there is a difference in the resource path and key-value (kv) pair output compared to the Junos kernel output.

Use the following resource path to export statistics:

```
/junos/system/linecard/cpu/memory/
```

```
/junos/system/linecard/npu/memory/
```

```
/junos/system/linecard/npu/utilization/
```

To provision the sensor to export data through gRPC services, use the `telemetrySubscribe` RPC to specify telemetry parameters. Streaming telemetry data through gRPC also requires the OpenConfig for Junos OS module. Starting in Junos OS Release 18.3R1, OpenConfig and Network Agent packages are bundled into the Junos OS image by default. Both packages support JTI.

For more information about gRPC resource paths, see [Guidelines for gRPC Sensors \(Junos Telemetry Interface\)](#).

## Interface Express Sensor

The interface express sensor is supported by JTI to export interface operational UP and DOWN status at a user-configurable rate. This sensor leverages statistics out of the physical interface sensor, providing faster and more frequent operational status statistics. Only the physical interfaces' operational status from the Flexible PIC Concentrator (FPC) is collected and reported. Statistics from the Routing Engine interface are not reported.

You can use the sensor to export statistics either through UDP (native) export or through gRPC services.

For either export method, include the following resource path:

- `/junos/system/linecard/intf-exp/`

Junos OS Release 18.1R1 supports interface express sensor for PTX1000, PTX3000, PTX5000, and PTX10000 routers.

Junos OS Release 19.3R1 supports interface express sensor for MX960, MX2010, and MX2020 routers.

For more information about gRPC resource paths, see [Guidelines for gRPC and gNMI Sensors \(Junos Telemetry Interface\)](#).

## Standby Routing Engine Sensors for Subscribers

JTI supports streaming standby Routing Engine statistics using gRPC services. This feature is supported on both single chassis and virtual chassis unless otherwise indicated. Use this feature to better track the state of software components running on a standby Routing Engine. Statistics exported to an outside collector through the following sensors (primarily under subscriber management) provide a more complete view of the system health and resiliency state:

- Chassis role (backup or primary) sensor `/junos/system/subscriber-management/chassis` and `/junos/system/subscriber-management/chassis[chassis-index=chassis-index]` (for specifying an index for an MX Series Virtual Chassis)
- Routing Engine status and GRES notification sensor `/junos/system/subscriber-management/chassis/routing-engines/routing-engine` and `/junos/system/subscriber-management/chassis/routing-engines/routing-engine[re-index=RoutingEngineIndex]` (to specify an index number for a specific Routing Engine)
- Subscriber management process sensor `/junos/system/subscriber-management/chassis/routing-engines/process-status/subscriber-management-processes/subscriber-management-process` and `/junos/system/subscriber-management/chassis/routing-engines/process-status/subscriber-management-processes/subscriber-management-process[pid=ProcessIdentifier]` (to specify a PID for a specific process)
- Per Routing Engine DHCP binding statistics for server or relay sensor `/junos/system/subscriber-management/chassis/routing-engines/routing-engine/dhcp-bindings/dhcp-element[dhcp-type-name=RelayOrServer/v4]` and `/junos/system/subscriber-management/chassis/routing-engines/routing-engine/dhcp-bindings/dhcp-element[dhcp-type-name=RelayOrServer/v6]`
- Virtual Chassis port counter sensor `/junos/system/subscriber-management/chassis/virtual-chassis-ports/virtual-chassis-port` and `/junos/system/subscriber-management/chassis/virtual-chassis-ports/virtual-chassis-port[vcp-interface-name=vcp-interface-port-string]` (to specify the interface name). This resource path is only supported on a virtual chassis.

Junos OS Release 20.2R1 supports standby Routing Engine sensors for MX480, MX960, MX10003, MX2010, and MX2020 routers.

For more information about gRPC and gNMI resource paths, see [Guidelines for gRPC and gNMI Sensors \(Junos Telemetry Interface\)](#).



## Diameter Application Protocol and Diameter Peer Sensors for Subscribers

JTI supports streaming statistics for subscribers for the diameter application protocols Network Access Server Application (NASREQ), policy and charging rules function (PCRF), and Online Charging System (OCS). There are also new diameter peer sensors that provide response time measurements for messages exchanged between an MX router and the peer for each of the diameter applications. Statistics are exported using JTI and the Juniper AAA Model, which covers telemetry export using gRPC, gNMI, or Juniper proprietary RPC or UDP.

To stream diameter application statistics, include the resource paths:

- For NASREQ statistics, `/junos/system/subscriber-management/aaa/diameter/clients/nasreq`
- For PCRF statistics, `/junos/system/subscriber-management/aaa/diameter/clients/gx`
- For OCS statistics, `/junos/system/subscriber-management/aaa/diameter/clients/gy`

To stream response time measurements for the diameter applications, include the resource paths in a subscription or using the sensor configuration statement:

- For NASREQ measurements, `/junos/system/subscriber-management/aaa/diameter/peers/peer[peer_address='peer-address']/nasreq/response-time`
- For PCRF measurements, `/junos/system/subscriber-management/aaa/diameter/peers/peer[peer_address='peer-address']/gx/response-time`
- For OCS measurements, `/junos/system/subscriber-management/aaa/diameter/peers/peer[peer_address='peer-address']/gy/response-time`

To enable these statistics for an MX Series router for native (UDP) export, include the sensors statement at the `[edit services analytics]` hierarchy level.

To provision the sensor to export data through gNMI, use the Subscribe RPC defined in the [gnmi.proto](#) to specify request parameters.

To provision the sensor to export data through gRPC, use the `telemetrySubscribe` RPC to specify telemetry parameters. Streaming telemetry data through gRPC also requires the OpenConfig for Junos OS module. Starting in Junos OS Release 18.3R1, OpenConfig and Network Agent packages are bundled into the Junos OS image by default. Both packages support JTI.

Junos OS Release 19.3R1 supports diameter application protocol sensors for MX5, MX10, MX40, MX150, MX204, MX240, MX480, MX960, MX2008, MX2010, MX2020, MX10003, MX10008, and MX100016 routers.

For more information about gRPC and gNMI resource paths, see [Guidelines for gRPC and gNMI Sensors \(Junos Telemetry Interface\)](#).

## Interface Burst Monitoring

Junos OS Evolved Release 19.3R1 supports interface burst monitoring on Junos telemetry interface (JTI) to monitor physical interfaces for bursts on QFX5220-128C and QFX5220-32CD switches. Use interface burst monitoring to help troubleshoot problems, make decisions, and adjust resources as needed.

The sampling is done in the millisecond granularity during the export interval (window). The export interval is configured in the sensor with the subscription from the collector. When the sensor is installed, a timer is started in the Packet Forwarding Engine to poll the hardware in 30-100ms intervals. Rates in the first export batch will be 0.

The peak byte is the average of the number of bytes seen in a sampling interval. For bursts lasting less than the sampling interval, the peak byte is averaged out over the interval. Exported statistics also include the time peak bytes are detected, as well as the direction (transmit or receive). The maximum byte rate detected during the export interval among all the samples is considered as the burst. If there are multiple bursts of the same number of bytes rate in the interval, then the first occurring burst is considered as the maximum burst and the timestamp of that burst is considered as the burst timestamp.

Data for all physical interfaces that are UP is exported. Aggregate interfaces are not supported.

You can export interface burst statistics from the Juniper device to an outside collector by including the sensor `/junos/system/linecard/bmon-sw/` in a subscription using remote procedure call (gRPC) services. Only one collector is supported with this sensor.

To provision the sensor to export data through gRPC services, use the `telemetrySubscribe` RPC to specify telemetry parameters. Streaming telemetry data through gRPC also requires the OpenConfig for Junos OS module.



**NOTE:** This feature does not detect microbursts.

## Transceiver Diagnostics

Junos OS Release 19.4R1 supports transceiver diagnostic sensors for ON\_CHANGE and streaming statistics using JTI and gRPC services or gNMI services on MX960, MX2010, MX2020, PTX1000,

PTX5000, and the PTX10000 line of routers. Use transceiver diagnostics to help troubleshoot problems, make decisions, and adjust resources as needed.

This feature supports OpenConfig transceiver model **openconfig-platform-transceiver.yang** 0.5.0.

Use the base resource path **/components/component/transceiver/** in a gRPC or gNMI subscription to export statistics from the Juniper device to an outside collector.

Fields that change continuously, such as temperature, input power, and output power, and laser bias current are not supported for ON\_CHANGE.

## Physical Ethernet Interface Sensor

Junos OS Release 19.4R1 supports physical Ethernet interface statistics for ON\_CHANGE and streaming statistics using JTI and gRPC services or gNMI services on MX960, MX2020, PTX1000, and PTX5000 routers.

This feature supports OpenConfig model **openconfig-if-ethernet.yang** (physical interface level) version 2.6.2 (no configuration).

Use the base resource path **/interfaces/interface/ethernet/state/** in a gRPC or gNMI subscription to export statistics from the Juniper device to an outside collector.

## VLAN Sensors

Junos OS Release 19.4R1 supports streaming VLAN statistics for ON\_CHANGE using JTI and gRPC services on EX4650 and QFX5120 switches.

This feature supports OpenConfig model [openconfig-vlan.yang](#) configuration version 1.0.2.

Use the base resource path **/vlans/** in a gRPC subscription to export statistics from the Juniper device to an outside collector.

Other end points you can use in a subscription include:

- **/vlans/vlan/state/name**
- **/vlans/vlan/state/vlan-id**
- **/vlans/vlan/members/**
- **/vlans/vlan/members/member/interface-ref/state/interface/**

- /vlans/vlan/members/member/interface-ref/state/interface/switched-vlan/state/interface-mode
- /vlans/vlan/members/member/interface-ref/state/interface/switched-vlan/state/native-vlan
- /vlans/vlan/members/member/interface-ref/state/interface/switched-vlan/state/access-vlan
- /vlans/vlan/members/member/interface-ref/state/interface/switched-vlan/state/trunk-vlan
- /vlans/vlan/members/member/interface-ref/state/interface/vlan/state/vlan-id

### Change History Table

Feature support is determined by the platform and release you are using. Use [Feature Explorer](#) to determine if a feature is supported on your platform.

Release	Description
16.1R3	Starting in Junos OS Release 16.1R3, you can use a set of remote procedure call (RPC) interfaces to configure the Junos telemetry interface and stream telemetry data using the gRPC framework.
16.1R3	OpenConfig for Junos OS and gRPC are supported only on MPCs on MX Series and on PTX Series routers starting with Junos OS Release 16.1R3.
17.2R1	Starting with Junos OS Release 17.2R1, OpenConfig and gRPC are also supported on QFX10000 switches, QFX5200 switches, and PTX1000 routers.
17.3R1	Starting with Junos OS Release 17.3R1, Junos telemetry interface is supported on the Routing Control and Board (RCB) on PTX3000 routers, QFX5110 switches, and EX4600 and EX9200 switches.
18.4R1	Starting with Junos OS Release 18.4R1, MX480, MX960, MX2010, MX2020, MX2008 and MX-ELM routers are also supported.
19.1R1 EVO	Starting in Junos OS Evolved Release 19.1R1, OpenConfig (OC) and Junos telemetry interface (JTI) are supported. Both gRPC APIs and the customer-facing CLI remain the same as for the Junos OS. As was standard for Junos OS, Network Agent (NA) and OC packages are part of the Junos OS Evolved image.
19.1R1	Starting with Junos OS Release 19.1R1, MX Series routers operating with MS-MIC and MS-MPC, QFX10002 switches, and PTX10002 routers are also supported.
19.1R1	Starting with Junos OS Evolved 19.1R1, Packet Forwarding Engine sensors on PTX10003 routers are also supported.
19.4R1 Evolved	Starting with Junos Release 19.4R1, gRPC service for streaming Packet Forwarding Engine and Routing Engine statistics is supported on EX4300-MP switches.

20.1R1	Starting with Junos Release 20.1R1, gNMI service for streaming telemetry sensors for Packet Forwarding Engine statistics is supported on MX2K-MPC11E line cards on MX2010 and MX2020 routers.
20.1R1	Starting with Junos OS Release 20.1R1, gRPC services version v1.18.0 is supported with JTI. This version includes important enhancements for gRPC. In earlier Junos OS releases, gRPC version v1.3.0 is supported with JTI.
18.2R1	Starting in Junos OS Release 18.2R1, when an external streaming server, or collector, provisions sensors to export data through gRPC on devices running Junos OS, the sensor configuration is committed to the junos-analytics instance of the ephemeral configuration database, and the configuration can be viewed by using the show ephemeral-configuration instance junos-analytics operational command.
20.4R1 Evolved	Starting in Junos OS Evolved Release 20.4R1, INITIAL_SYNC statistics from Packet Forwarding Engine sensors using gNMI services on QFX5130-32CD switches is supported.
15.1F6	Initial support of this feature in Junos OS Release 15.1F6 supported ingress LSPs only when a subscription was made to <b>/junos/services/label-switched-path/usage/</b> .
17.4R1	Starting with Junos OS Release 17.4R1, MX2008 routers are supported.
17.4R1	Starting with Junos OS Release 17.4R1, you can export Packet Forwarding Engine traffic statistics through the Junos telemetry interface for MX Series and PTX Series routers. Both UDP and gRPC are supported.
17.4R1	With bypass support added to this feature in Junos OS Release 17.4R1, this subscription now streams both ingress LSP and bypass LSP statistics to a collector.
17.4R1	Starting with Junos OS Release 17.4R1, you can export counter statistics for Packet Forwarding Engine dynamic tunnels to an outside collector using either native (UDP) or OpenConfig telemetry sensors through JTI.
19.2R1	Starting with Junos OS Release 19.2R1, SRX4100, SRX4200, SRX4600, SRX5400, SRX5600, SRX5800, and vSRX Virtual Firewall Series Services Gateways.
19.2R1	Starting with Junos OS Release 19.2R1, gNMI services for streaming Packet Forwarding Engine statistics is supported on MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5100 and QFX5200 switches.
19.2R1	Starting with Junos OS Release 19.2R1, gNMI services for streaming statistics is supported on QFX5100, QFX5110, QFX5120, QFX5200 and QFX5210 switches.

19.2R1	Starting in Junos OS Release 19.2R1, JTI supports streaming of Flexible PIC Concentrator (FPC) and optics statistics for the MX Series using Remote Procedure Calls (gRPC).
19.2R1	Starting in Junos OS Release 19.2R1, subscriber-based telemetry streaming is enabled when an MX router is configured for Broadband Network Gateway (BNG) and Junos Fusion where subscribers are connected through Junos Fusion Satellite devices.
18.1R1	Starting with Junos OS Release 18.1R1, OpenConfig support through Remote Procedure Calls (gRPC) and JTI is extended to support client streaming and bidirectional streaming of telemetry sensor information on MX Series and PTX Series routers.
18.1R1	Starting with Junos OS Release 18.3R1, OpenConfig support through gRPC and JTI provides continuous statistics streaming via the same sensor irrespective of the route that is active (BGP or static) for a given Segment Routing Traffic Engineering (SR-TE) policy.
18.1R1	Junos OS Release 18.1R1 supports interface express sensor for PTX1000, PTX3000, PTX5000, and PTX10000 routers.
20.2R1	Starting with Junos OS Evolved Release 20.2R1, gRPC service for streaming NDP statistics is supported on PTX10001 routers.
20.2R1	Starting with Junos OS Release 20.2R1, gRPC service for streaming Packet forwarding Engine and Routing Engine statistics is supported on EX2300, EX2300-MP, and EX3400 switches.
20.2R1	Starting with Junos OS Release 20.2R1, gRPC service for streaming BGP routing information base (RIB) and BGP peer statistics is supported on any platform family that supports containerized routing protocol process (cRPD). cRPD is Juniper's routing protocol process (rpd) decoupled from Junos OS and packaged as a Docker container to run in Linux-based environments.
20.2R1	Starting with Junos OS Release 20.2R1, ON_CHANGE BGP peer statistics export using gRPC services and gNMI services is supported on MX960, MX2008, MX2010, MX2020, PTX1000, PTX5000, PTX10000 routers and QFX5100 and QFX5200 switches.
20.2R1	Starting with Junos OS Release 20.2R1, streaming BGP global, peer and perr groups statistics using gRPC services is supported on EX2300, EX3400, EX4300, EX4600, and EX9200 switches.
20.2R1	Starting with Junos OS Release 20.2R1, streaming revenue interface statistics through Packet Forwarding Engine sensors and pseudo interface statistics through Routing Engine sensors using gRPC services and gNMI services is supported on SRX5400, SRX5600, and SRX5800 Services Gateways..

20.2R1	Starting with Junos OS Release 20.2R1, streaming revenue interface statistics through Packet Forwarding Engine sensors and pseudo interface statistics through Routing Engine sensors using gRPC services and gNMI services is supported on SRX5400, SRX5600, and SRX5800 Services Gateways.
20.2R1	Starting with Junos OS Release 20.2R1 sensors to stream standby Routing Engine statistics are supported on MX480, MX960, MX10003, MX2010, and MX2020 routers.
20.2R1	Starting with Junos OS Release 20.2R1 sensors to stream EVPN statistics using gRPC services are supported with QFX5100, QFX5110, QFX5120, QFX5200, QFX10002-60C, QFX10002, QFX10008, and QFX10016 switches.
20.2R1	Starting with Junos OS Release 20.2R1, TARGET_DEFINED subscription mode with gRPC Network Management Interface (gNMI) services is supported for JTI on MX5, MX10, MX40, MX80, MX104, MX150, MX204, MX240, MX480, MX960, MX2008, MX2010, MX2020, MX10003, MX10008, and MX10016 routers.
20.2R1	Starting in Junos OS Release 20.2R1, INITIAL_SYNC statistics from Packet Forwarding Engine sensors using gNMI services on MX960, MX2008, MX2010, MX2020, PTX1000, PTX5000 routers, PTX10000 line of routers, and QFX5100 and QFX5200 switches is supported.
20.2R1	Junos OS Release 20.2R1 supports standby Routing Engine sensors for MX480, MX960, MX10003, MX2010, and MX2020 routers.
18.3R1	Starting with Junos OS Release 18.3R1, ON_CHANGE streaming of LLDP telemetry sensor information is supported through gRPC for MX Series and PTX Series routers.
18.3R1	Starting with Junos OS Release 18.3R1, QFX5120-48Y and EX4650 switches are also supported.
18.3R1	Starting with Junos OS Release 18.4R1, EX4600 switches are also supported.
18.3R1	Starting in Junos OS Release 18.3R1, OpenConfig and Network Agent packages are bundled into the Junos OS image by default. Both packages support JTI.
18.3R1	Starting in Junos OS Release 18.3R1, OpenConfig and Network Agent packages are bundled into the Junos OS image by default. Both packages support JTI.
19.3R1	Starting with Junos OS Release 19.3R1, gRPC service for exporting statistics is supported on MX Series routers hosting MPC10E-10C-MRATE and MPC10E-15C-MRATE line cards.
19.3R1	Junos OS Release 19.3R1 supports CPU and network processing unit (NPU) sensors on MX Series routers with MPC10E-10C-MRATE and MPC10E-15C-MRATE line cards.

19.3R1	Junos OS Release 19.3R1 supports interface express sensor for MX960, MX2010, and MX2020 routers.
19.3R1	Junos OS Release 19.3R1 supports diameter application protocol sensors for MX5, MX10, MX40, MX150, MX204, MX240, MX480, MX960, MX2008, MX2010, MX2020, MX10003, MX10008, and MX100016 routers.
19.3R1-Evolved	Starting with Junos OS Evolved Release 19.3R1, gRPC service for exporting statistics is supported on QFX5220-128C and QFX5220-32CD switches.
19.3R1-Evolved	Junos OS Evolved Release 19.3R1 supports interface burst monitoring on Junos telemetry interface (JTI) to monitor physical interfaces for bursts on QFX5220-128C and QFX5220-32CD switches.
19.4R1	Junos OS Release 19.4R1 supports transceiver diagnostic sensors for ON_CHANGE and streaming statistics using JTI and gRPC services or gNMI services on MX960, MX2010, MX2020, PTX1000, PTX5000, and the PTX10000 line of routers.
19.4R1	Junos OS Release 19.4R1 supports physical Ethernet interface statistics for ON_CHANGE and streaming statistics using JTI and gRPC services or gNMI services on MX960, MX2020, PTX1000, and PTX5000 routers.
19.4R1	Junos OS Release 19.4R1 supports streaming VLAN statistics for ON_CHANGE using JTI and gRPC services on EX4650 and QFX5120 switches.
change-completed	

## RELATED DOCUMENTATION

*Installing the Network Agent Package (Junos Telemetry Interface)*

[Release Information for Junos OS with Upgraded FreeBSD](#)

*Guidelines for gRPC and gNMI Sensors (Junos Telemetry Interface)*

*statistics*

*telemetry*



# Installing the Network Agent Package (Junos Telemetry Interface)

Before you begin:

- Install Junos OS Release 16.1R3 or later.
- Install the OpenConfig for Junos OS module. Using a Web browser, navigate to the All Junos Platforms software download URL on the Juniper Networks webpage: <https://www.juniper.net/support/downloads/>. From the **Network Management** tab, scroll down to select **OpenConfig**. Select the **Software** tab. Select the **OpenConfig Package (Junos with upgraded FreeBSD)**. For more information, see "[Installing the OpenConfig Package](#)" on page 15.
- Install Secure Sockets Layer (SSL) certificates of authentication on your Juniper Networks device.



**NOTE:** Only server-based SSL authentication is supported. Client-based authentication is not supported.

Starting with Junos OS Release 16.1R3, the Junos Network Agent software package provides a framework to support OpenConfig and gRPC for the Junos Telemetry Interface on MX Series routers and PTX5000 routers. The Network Agent package functions as a gRPC server that terminates the OpenConfig remote procedure call (RPC) interfaces and streams the telemetry data according to the OpenConfig specification. The Junos Network Agent package, which runs on the Routing Engine, implements local statistics collection and reports data to active telemetry stream subscribers.

Starting with Junos OS Release 17.2R1, the Junos Network Agent Package is also supported on QFX10000 switches and QFX5200 switches.

Starting with Junos OS Release 17.3R1, the Junos Network Agent Package is supported on QFX5110 switches and EX9200 switches.

Starting in Junos OS Release 18.3R1, the Junos OS image includes the Network Agent. You do not need to install Network Agent separately. This is true for Junos OS with upgraded FreeBSD and legacy Junos OS.

The Junos Network Agent is available as a separate package only for Junos OS with Upgraded FreeBSD. This package also includes the required YANG models. For other versions of Junos OS, Network Agent functionality is embedded in the software. For more information about Junos OS with Upgraded FreeBSD, see [Release Information for Junos OS with Upgraded FreeBSD](#).

Network Agent for Junos OS software package has the following naming conventions:

- **Package Name**—This is Network-Agent.
- **Architecture**—This field indicates the CPU architecture of the platforms, such as x86.
- **Application Binary Interface (ABI)**—This field indicates the “word length” of the CPU architecture. The value is 32 for 32-bit architectures.
- **Release**—This field indicates the Junos OS release number, such as 16.1R3.16.
- **Package release and spin number**—This field indicates the package version and spin number, such as C1.1.

All Junos Network Agent packages are in tarred and gzipped (.tgz) format.



**NOTE:** Each version of the Network Agent package is supported on a single release of Junos OS only. The Junos OS version supported is identified by the Junos OS release number included in the Network Agent package name.

An example of a valid Network Agent package name is:

- network-agent-x86-32-16.1R4.12-C1.1.tgz

Use the 32-bit Network Agent package for both 32-bit and 64-bit versions of Junos OS or Junos OS Evolved.

To download and install the Network Agent package:

1. Using a Web browser, navigate to the All Junos Platforms software download URL on the Juniper Networks webpage: <https://www.juniper.net/support/downloads/>.
2. Select the name of the Junos OS platform for the software that you want to download.
3. Select the release number (the number of the software version that you want to download) from the **Release** drop-down list to the right of the Download Software page.
4. Select the **Software** tab.
5. In the **Tools** section of the **Software** tab, select the **Junos Network Agent** package for the release.
6. Log in to the Juniper Networks authentication system using the username (generally your e-mail address) and password supplied by a Juniper Networks representative.
7. Download the software to a local host.
8. Copy the software to Juniper Networks device or to your internal software distribution site.
9. Install the new network-agent package on the device by issuing the `request system software add package-name` from the operational mode:

For example:

```
user@host > request system software add network-agent-x86-32-16.1R3.16-C1.0.tgz
```



**NOTE:** The command uses the `validate` option by default. This option validates the software package against the current configuration as a prerequisite to adding the software package to ensure that the device reboots successfully. This is the default behavior when the software package being added is a different release.

- 10. Issue the `show version | grep na\ telemetry` command to verify that the Network Agent package was successfully installed.

```
user@host> show version | grep na\ telemetry
JUNOS na telemetry
[20161109.201405_builder_junos_161_r3]
```

For information about configuring gRPC services on your Juniper Networks device, see *gRPC Services for Junos Telemetry Interface*.

Change History Table

Feature support is determined by the platform and release you are using. Use [Feature Explorer](#) to determine if a feature is supported on your platform.

Release	Description
18.3R1	Starting in Junos OS Release 18.3R1, the Junos OS image includes the Network Agent.
17.3R1	Starting with Junos OS Release 17.3R1, the Junos Network Agent Package is supported on QFX5110 switches and EX9200 switches.
17.2R1	Starting with Junos OS Release 17.2R1, the Junos Network Agent Package is also supported on QFX10000 switches and QFX5200 switches.
16.1R3	Starting with Junos OS Release 16.1R3, the Junos Network Agent software package provides a framework to support OpenConfig and gRPC for the Junos Telemetry Interface on MX Series routers and PTX5000 routers.

## RELATED DOCUMENTATION

| *Understanding OpenConfig and gRPC on Junos Telemetry Interface*

# gRPC Services for Junos Telemetry Interface

## IN THIS SECTION

- [Configuring gRPC for the Junos Telemetry Interface | 55](#)
- [Configuring Bidirectional Authentication for gRPC for Junos Telemetry Interface | 57](#)

## Configuring gRPC for the Junos Telemetry Interface

You can stream telemetry data for various network elements through gRPC, an open source framework for handling remote procedure calls based on TCP. The Junos Telemetry Interface relies on a so-called push model to deliver data asynchronously, which eliminates polling. For all Juniper devices that run a version of Junos OS with upgraded FreeBSD kernel, you must install the Junos Network Agent software package, which provides the interfaces to manage gRPC subscriptions. For Juniper Network devices that run all other versions of the Junos OS, this functionality is embedded in the Junos OS software. For more information about installing the Junos Network Agent package, see *Installing the Network Agent Package*.

Before you begin:

- Install Junos OS Release 16.1R3 or later on your Juniper Networks device.
- If your Juniper Networks device is running a version of Junos OS with an upgraded FreeBSD kernel, install the Junos Network Agent software package.
- Install the OpenConfig for Junos module. For more information see, "[Installing the OpenConfig Package](#)" on page 15.

To configure your system for gRPC services specify the API connection setting based on Secure Socket Layer (SSL) technology.

For example, to set the API connection:

```
[edit system services]
user@host# set extension-service request-response grpc ssl
```

For an SSL-based connection, you must specify a local-certificate name. You can rely on the default IP address (::) to enable Junos to “listen” for all IPv4 and IPv6 addresses on incoming connections. If you would rather specify an IP address, follow step 2 below.

1. Specify a local certificate-name. The certificate can be any user-defined value from the certificate configuration (not shown here). The certificate name used in this example is `jsd_certificate`:

```
[edit system services extension-service request-response grpc]
user@host# set ssl local-certificate jsd_certificate
```



**NOTE:** Enter the name of a certificate you have configured with the local *certificate-name* statement at the `[edit security certificates]` hierarchy level.

2. (Optional) Specify an IP address to listen for incoming connections. The IP address used in this example is `192.0.2.0`:

```
[edit system services extension-service request-response grpc]
user@host# set ssl ip-address 192.0.2.0
```



**NOTE:** If you do not specify an IP address, the default address of :: is used to listen for incoming connections.

## SEE ALSO

*Understanding OpenConfig and gRPC on Junos Telemetry Interface*

*Importing SSL Certificates for Junos XML Protocol Support*

## Configuring Bidirectional Authentication for gRPC for Junos Telemetry Interface

Starting with Junos OS Release 17.4R1, you can configure bidirectional authentication for gRPC sessions used to stream telemetry data. Previously, only authentication of the server, that is, Juniper device, was supported. Now the external client, that is management station that collects data, can also be authenticated using SSL certificates. The JET service process (jsd), which supports application interaction with Junos OS, uses the credentials provided by the external client to authenticate the client and authorize a connection.

Before you begin:

- If your Juniper device is running a version of Junos OS with an upgraded FreeBSD kernel, install the Junos Network Agent software package.
- Install the OpenConfig for Junos module. For more information see, "[Installing the OpenConfig Package](#)" on page 15.
- Configure the gRPC server. For more information, see *Configuring gRPC for the Junos Telemetry Interface*.

To configure authentication for the external client, that is, management station that collects telemetry data streamed from the Juniper device:

1. Enable bidirectional authentication and specify the requirements for a client certificate.

For example, to specify the strongest authentication, which requires a certificate and its validation:

```
[edit system services extension-service request-response grpc ssl]
user@host# set mutual-authentication client-certificate-request require-certificate-and-verify
```



**NOTE:** The default is no-certificate. The other options are: request-certificate, request-certificate-and-verify, require-certificate, require-certificate-and-verify.

We recommend that you use no-certificate option in a test environment only.

2. Specify the certificate authority.



**NOTE:** For the certificate authority, specify a certificate-authority profile you have configured at the [edit security pki [ca-profile](#)] hierarchy level. This profile is used to validate the certificate provided by the client.

A digital certificate provides a way of authenticating users through a trusted third-party called a certificate authority (CA). The CA validates the identity of a certificate holder and “signs” the certificate to attest that it has not been forged or altered. For more information, see *Digital Certificates Overview* and *Example: Requesting a CA Digital Certificate*.

For example, to specify a certificate-authority profile named jsd\_certificate:

```
[edit system services extention-service request-response grpc ssl mutual-authentication]
user@host# set certificate-authority jsd_certificate
```

3. Verify that an external client can successfully connect with the Juniper device through the jsd process and invoke OpenConfig RPCs.

The external client passes username and password credentials as part of metadata in each RPC. The RPC is allowed if valid credentials are used. Otherwise an error message is returned.

Change History Table

Feature support is determined by the platform and release you are using. Use [Feature Explorer](#) to determine if a feature is supported on your platform.

Release	Description
17.4R1	Starting with Junos OS Release 17.4R1, you can configure bidirectional authentication for gRPC sessions used to stream telemetry data.
17.3R1	The Junos Telemetry Interface and gRPC streaming are supported on QFX5110, EX4600, and EX9200 switches starting with Junos OS Release 17.3R1.
17.2R1	The Junos Telemetry Interface and gRPC streaming are supported on QFX10000 and QFX5200 switches, and PTX1000 routers starting with Junos OS Release 17.2R1.
16.1R3	Starting with Junos OS Release 16.1R3 on MX Series routers and PTX3000 and PTX5000 routers, you can stream telemetry data for various network elements through gRPC, an open source framework for handling remote procedure calls based on TCP.

# Guidelines for gRPC and gNMI Sensors (Junos Telemetry Interface)

## IN THIS SECTION

- Supported gRPC and gNMI Sensors | 61



**NOTE:** The logical and physical Packet Forwarding Engine interface sensors report some leaves inconsistently to the collector. For example, the subscribed path `/interfaces/interface/` producing the streamed path `/junos/system/linecard/interface/logical/usage/` reports key name leaves `parent_ae_name` and `init_time` (with underscores in the leaf name). The subscribed path `/interfaces/interface/state/` producing the streamed path `/junos/system/linecard/interface/queue/` reports key name leaves `parent-ae-name` and `init-time` (with hyphens in the leaf name).

Starting with Junos OS Release 18.3R1, ON\_CHANGE streaming of LLDP telemetry sensor information is supported through gRPC for MX Series and PTX Series routers.

Starting with Junos OS Release 18.3R1, QFX5120-48Y and EX4650 switches are also supported.

Starting with Junos OS Release 18.4R1, EX4600 switches are also supported.

Starting with Junos OS Release 18.4R1, MX480, MX960, MX2010, MX2020, MX2008 and MX-ELM routers are also supported.

Starting with Junos OS Release 18.4R1, BGP operational states are aligned and compliant with OpenConfig data model `openconfig-bgp-operational.yang`. To stream BGP operational states, use the resource path `/network-instances/network-instance/protocols/protocol/bgp/`. Previously, the path was `/bgp/`.

Starting in Junos OS Evolved Release 19.1R1, OpenConfig (OC) and Junos Telemetry Interface (JTI) are supported. Both gRPC APIs and the customer-facing CLI remain the same as for the Junos OS. As was standard for Junos OS, Network Agent (NA) and OC packages are part of the Junos OS Evolved image.

Starting with Junos OS Evolved 19.1R1, Packet Forwarding Engine sensors on PTX10003 routers are also supported.



Starting with Junos OS Release 19.2R1, SRX4100, SRX4200, SRX4600, SRX5400, SRX5600, SRX5800, and vSRX Virtual Firewall Series Services Gateways are supported.

Starting with Junos OS Release 19.2R1, gNMI services for streaming Packet Forwarding Engine statistics is supported on MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers and QFX5200 switches.

Starting with Junos OS Release 19.2R1, gNMI services for streaming statistics is supported on QFX5110, QFX5120, QFX5200 and QFX5210 switches.

Starting with Junos OS Release 19.3R1, gNMI services for streaming Packet Forwarding Engine statistics is supported on MX240, MX480 and MX960 routers.

Starting with Junos OS Release 19.3R1, gNMI services for streaming and ON\_CHANGE export of Routing Engine statistics is supported on MX960, MX2010, MX2020, PTX5000, PTX1000, and PTX10000 routers.

Starting with Junos OS Release 19.3R1, gRPC service for exporting statistics is supported on MX Series routers hosting MPC10E-10C-MRATE and MPC10E-15C-MRATE line cards. The resource paths **/junos/system/linecard/cpu/memory/**, **/junos/system/linecard/npu/memory/**, and **/junos/system/linecard/npu/utilization/** can be updated to call out individual sensors (leaves) and their respective paths for better clarity.

Starting with Junos OS Evolved Release 19.3R1, gRPC service for exporting statistics is supported on QFX5220-128C and QFX5220-32CD switches.

Starting with Junos OS Release 19.4R1, gRPC service for streaming Packet Forwarding Engine and Routing Engine statistics is supported on EX4300-MP switches.

Starting with Junos Release 20.R1, gNMI service for streaming telemetry sensors for Packet Forwarding Engine statistics is supported on MX2K-MPC11E line cards on MX2010 and MX2020 routers.

Starting with Junos OS Evolved Release 20.2R1, gRPC service for streaming NDP statistics is supported on PTX10001 routers.

Starting with Junos OS Release 20.2R1, gRPC service for streaming Packet forwarding Engine and Routing Engine statistics is supported on EX2300, EX2300-MP, and EX3400 switches.

Starting with Junos OS Release 20.2R1, gRPC service for streaming BGP routing information base (RIB) and BGP peer statistics is supported on any platform family that supports containerized routing protocol process (cRPD). cRPD is Juniper's routing protocol process (rpd) decoupled from Junos OS and packaged as a Docker container to run in Linux-based environments.

Starting with Junos OS Release 20.2R1, ON\_CHANGE BGP peer statistics export using gRPC services and gNMI services is supported on MX960, MX2008, MX2010, MX2020, PTX1000, PTX5000, PTX10000 routers and QFX5100 and QFX5200 switches.

Starting with Junos OS Release 20.2R1, streaming BGP global, peer and perr groups statistics using gRPC services is supported on EX2300, EX3400, EX4300, EX4600, and EX9200 switches.

Starting with Junos OS Release 20.2R1, streaming revenue interface statistics through Packet Forwarding Engine sensors and pseudo interface statistics through Routing Engine sensors using gRPC services and gNMI services is supported on SRX5400, SRX5600, and SRX5800 Services Gateways..

Starting with Junos OS Release 20.2R1, streaming revenue interface statistics through Packet Forwarding Engine sensors and pseudo interface statistics through Routing Engine sensors using gRPC services and gNMI services is supported on SRX5400, SRX5600, and SRX5800 Services Gateways.

Starting with Junos OS Release 20.2R1 sensors to stream standby Routing Engine statistics are supported on MX480, MX960, MX10003, MX2010, and MX2020 routers.

Starting with Junos OS Release 20.2R1 sensors to stream EVPN statistics using gRPC services are supported with QFX5100, QFX5110, QFX5120, QFX5200, QFX10002-60C, QFX10002, QFX10008, and QFX10016 switches.

Starting with Junos OS Release 20.2R1, gRPC service for exporting LDP and mLDP statistics is supported on MX Series routers.

Starting with Junos OS Evolved Release 22.3R1, sensors to stream optics statistics is supported on ACX7100-32C, ACX7100-48L, and ACX7024 routers.

Starting with Junos OS Release 22.3R1, sensors are supported on MX10004 routers.

Starting with Junos OS Release 22.4R1, sensors are supported on MX304 routers.

The <https://apps.juniper.net/ydm-explorer/> tool is the best location to search for and view information about telemetry sensors.

For information that is not yet supported by Junos YANG Data Model Explorer (mainly Packet Forwarding Engine sensors) please refer to [Table 5 on page 62](#) and [Table 6 on page 140](#).

To activate a sensor, use the corresponding resource path. Each resource path enables data streaming for the system resource globally, that is, systemwide. You can also modify each resource path, such as to specify a specific logical or physical interface. For example, to specify a specific interface, include the following at the end of the path: `[name='interface-name']`/

## Supported gRPC and gNMI Sensors

See [Table 5 on page 62](#) for a description of supported gRPC and gNMI sensors and [Table 6 on page 140](#) for a description of supported broadband edge (BBE) gRPC sensors, including the subscription path you use to provision the sensors.

Starting with Junos OS Release 20.1R1, the on-device gRPC framework is upgraded to version v1.18.0 and is applicable to both JET and JTI. This version includes important enhancements for gRPC. Earlier legacy Junos OS platform versions (non-Occam) will continue to use version v1.3.0.

Starting with Junos OS Release 20.2R1, JTI supports MX routers with dual Routing Engines or MX Series Virtual Chassis on all Packet Forwarding Engine and Routing Engine sensors currently supported on MX Series routers. The level of sensor support currently available for MX Series routers applies, whether through streaming or ON\_CHANGE statistics export, using UDP, remote procedure call (gRPC) services or gRPC Network Management Interface (gNMI) services. Additionally, JTI operational mode commands will provide details for all Routing Engines and MX Series Virtual Chassis, too.

**Table 5: gRPC Sensors**

resource path	Description
<b>/interfaces/interface/state/forwarding-viable</b>	Packet Forwarding Engine sensor for non-viable aggregated interface member links. This feature does not support non-LAG link members Starting in Junos OS Evolved Release 21.4R1, streaming statistics by means of gRPC and gNMI is supported on PTX10008 and PTX10016 routers.

Table 5: gRPC Sensors (*Continued*)

resource path	Description
<code>/junos/ike-security-associations/ike-security-association/routing-instance [name=' <i>routing-instance-name</i>']</code>	<p>Sensor for Internet Key Exchange (IKE) security statistics.</p> <p>When you configure a subscription request, use the reporting-interval parameter to configure the interval (in seconds) in which statistics are reported.</p> <p>Starting with Junos OS Release 18.1R1, MX Series routers are supported.</p> <ul style="list-style-type: none"> <li>• remote-ip</li> <li>• local-ip</li> <li>• number-ipsec-sa-created</li> <li>• number-ipsec-sa-deleted</li> <li>• number-ipsec-sa-rekey</li> <li>• exchange-type</li> <li>• in-bytes</li> <li>• in-packets</li> <li>• out-bytes</li> <li>• out-packets</li> <li>• delete-payload-received</li> <li>• delete-payload-transmitted</li> <li>• dpd-request-payload-received</li> <li>• dpd-request-payload-transmitted</li> <li>• dpd-response-payload-received</li> <li>• dpd-response-payload-transmitted</li> <li>• dpd-response-payload-missed</li> <li>• dpd-response-payload-maximum-delay</li> </ul>

Table 5: gRPC Sensors *(Continued)*

resource path	Description
	<ul style="list-style-type: none"><li>• dpd-response-seq-payload-missed</li><li>• invalid-spi-notify-received</li><li>• invalid-spi-notify-transmitted</li><li>• routing-instance</li></ul>
/junos/kernel/tcpip/rtstock	<p>Sensor for kernel routing table socket (RTSOCK) information.</p> <p>Starting with Junos OS Release 19.3R1, EX9200, EX9251, EX9253, MX240, MX480, MX960, MX2010, MX2020, vMX, PTX1000, PTX10008, PTX10016, PTX3000 with RE-PTX-X8-64G, and PTX5000 with RE-PTX-X8-64G are supported.</p> <p>You can also add the following as the end path for /junos/kernel/rtsock/:</p> <ul style="list-style-type: none"><li>• total-error-cnt</li><li>• total-veto-cnt</li></ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/memory/	<p>Sensor for CPU memory. This sensor exports the CPU and memory utilization per process and CPU usage for threads per process. The current implementation is Linux-based; therefore, the export information and gathered output format differs significantly from this sensor's performance on previous platforms.</p> <p>Supported on MX Series routers with MPC10E-10C-MRATE and MPC10E-15C-MRATE line cards starting with Junos OS Release 19.3R1 for exporting telemetry information using gRPC services. This feature provides a different level of exported statistics in comparison to previous releases because it use the OpenConfig AFT model.</p> <p>Supported on MX2010 and MX2020 routers with MX2K-MPC11E line cards starting with Junos OS Release 20.1R1 for streaming telemetry information using gRPC services.</p> <p>Supported on EX2300, EX2300-MP, and EX3400 switches starting with Junos OS Release 20.2R1 and later for streaming telemetry information using gRPC services.</p> <p>Supported on MX960, MX2008, MX2010, MX2020, PTX1000, PTX5000 routers, PTX10000 line of routers, and QFX5100 and QFX5200 switches starting with Junos OS Release 20.2R1 and later for INITIAL_SYNC statistics using gNMI services.</p> <p>The statistics exported from this sensor are found in the following operational mode commands: show system info, show system processes, and show system cpu.</p>
/junos/npu/memory	<p>Starting with Junos OS Release 19.1R1, periodic streaming on QFX10002 switches and PTX10002 routers is supported.</p>
/junos/services/health-monitor/config/	<p>Sensor for the health monitoring configuraiton.</p> <p>Starting with Junos OS Release 19.2R1, MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches are supported on gRPC and gNMI services.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/services/health-monitor/data/	<p>Sensor for health monitoring data.</p> <p>Starting with Junos OS Release 19.2R1, MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches are supported on gRPC and gNMI services.</p>
/junos/services/ip-tunnel[name='tunnel-name']/usage/counters[name='counter-name']/	<p>Sensor for Packet Forwarding Engine dynamic tunnels statistics.</p> <p>The statistics are used to report various network element performance metrics in a scalable and efficient way, providing visibility into Packet Forwarding Engine errors and drops.</p> <p>A timestamp indicating when the counters were last reset is included with all the exported data to allow collectors to determine if and when a reset event happened; for example, if the Packet Forwarding Engine hardware restarted.</p> <p>Exported statistics are similar to the output of the operational mode command <code>show nhdb hw dynamic-ip-tunnels</code>.</p> <p>Starting with Junos OS Release 17.4R1, MX Series devices are supported on gRPC services, with the exception of MX80 and MX104 routers. These routers support UDP export only for this sensor. To configure UDP export, include the sensor <code>/junos/services/ip-tunnel/usage/</code> in the <i>sensor (Junos Telemetry Interface)</i> configuration statement at the <code>[edit services analytics]</code> hierarchy level.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/services/label-switched-path/usage/	<p>Sensor for LSP statistics. On MX Series routers only, the following are also supported: bidirectional LSPs for ultimate-hop popping (UHP).</p> <p>Starting with Junos OS Release 17.2R1, QFX10000 switches and PTX1000 routers are also supported.</p> <p>Starting with Junos OS Release 17.3R1, EX9200 switches are also supported.</p> <p>Starting with Junos OS Release 17.4R1 on MX Series and PTX Series routers only, statistics for bypass LSPs are also exported. Previously, only statistics for ingress LSPs were exported.</p> <p>Starting with Junos OS Release 18.2R1, QFX5100, QFX5110, and QFX5200 switches are also supported.</p> <p>Starting with Junos OS Release 18.3R1, QFX5120-48Y and EX4650 switches are also supported.</p> <p>Starting with Junos OS Release 18.4R1, EX4600 switches are also supported.</p> <p>Starting with Junos OS Release 19.1R1, PTX10001-20C routers support RSVP bypass LSPs originating at the transit node</p> <p>Starting with Junos OS Release 19.1R1, periodic streaming on QFX10002 switches and PTX10002 routers is supported.</p> <p>Starting in Junos OS Evolved Release 19.1R1, PTX10003 routers are supported.</p> <p>Starting with Junos OS Release 19.2R1, ACX6360 routers are supported.</p> <p>Starting with Junos OS Release 19.2R1, MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches are supported on gRPC and gNMI services.</p> <p>Supported on QFX5200 switches starting with Junos OS Release 19.2R1 for streaming telemetry information using gNMI services.</p> <p>Starting with Junos OS Evolved Release 19.4R1, periodic streaming using gNMI services with PTX10003 routers is supported.</p>



Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<p>Starting with Junos OS Evolved Release 20.2R1, periodic streaming using gRPC services with PTX10001 routers is supported.</p> <p>Periodic streaming is supported on QFX5120-48YM switches starting with Junos OS Release 20.4R1.</p> <p>For bypass LSPs, the following are exported:</p> <ul style="list-style-type: none"> <li>• Bypass LSP originating at the ingress router of the protected LSP.</li> <li>• Bypass LSP originating at the transit router of the protected LSP.</li> <li>• Bypass LSP protecting the transit LSP as well as the locally originated LSP.</li> </ul> <p>When the bypass LSP is active, traffic is exported both on the bypass LSP and the ingress (protected) LSP.</p> <p><b>NOTE:</b> When you enable a sensor for LSP statistics only, you must also configure the <code>sensor-based-stats</code> statement at the <code>[edit protocols mpls]</code> hierarchy level. MX Series routers should operate in enhanced mode. If not enabled by default, include either the <code>enhanced-ip</code> statement or the <code>enhanced-ethernet</code> statement at the <code>[edit chassis network-services]</code> hierarchy level.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
<div>/junos/services/segment-routing/interface/ingress/usage/</div> <div>/junos/services/segment-routing/interface/egress/usage/</div> <div>/junos/services/segment-routing/sid/usage/</div> <div>/junos/services/segment-routing/sid/egress/usage/</div>	<p>Sensors for aggregate segment routing traffic with IS-IS or OSPF.</p> <p>This sensor is supported on MX Series and PTX5000 routers starting with Junos OS Release 17.4R1.</p> <p>Starting with Junos OS Release 19.2R1, MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches are supported on gRPC and gNMI services.</p> <p>Statistics are exported separately for each routing instance.</p> <p>The first path exports inbound traffic. The second path exports outbound traffic. The third path exports inbound segment routing traffic for each segment identifier.</p> <p>The path <code>/junos/services/segment-routing/sid/egress/usage/</code> can be used to collect SID statistics for traffic travelling towards the core.</p> <p><b>NOTE:</b> When you enable a sensor for segment routing statistics, you must also configure the <code>sensor-based-stats</code> statement at the <code>[edit protocols isis source-packet-routing]</code> or <code>[edit protocols ospf source-packet-routing]</code> hierarchy level.</p> <p>All MX and PTX5000 routers with FPC3 onwards support enhanced mode. If enhanced mode is not enabled, configure either the <code>enhanced-ip</code> statement or the <code>enhanced-ethernet</code> statement at the <code>[edit chassis network-services]</code> hierarchy level. On PTX Series routers, configure the <code>enhanced-mode</code> statement at the <code>[edit chassis network-services]</code> hierarchy level.</p> <p><b>NOTE:</b> Currently, MPLS labels correspond only to only one instance, instance 0. Since each SID corresponds to a single <code>instance_identifier</code>, no aggregation is required to be done by the collector. The <code>instance_identifier</code> is stamped as 0.</p> <p>The following end points are supported:</p> <ul style="list-style-type: none"> <li><code>/network-instances/network-instance/mpls/signaling-protocols/segment-routing/interfaces/interface/state/in-pkts</code></li> <li><code>/network-instances/network-instance/mpls/signaling-protocols/segment-routing/interfaces/interface/state/in-octets</code></li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<ul style="list-style-type: none"> <li>• /network-instances/network-instance/mpls/signaling-protocols/segment-routing/interfaces/interface/state/out-octets</li> <li>• /network-instances/network-instance/mpls/signaling-protocols/segment-routing/interfaces/interface/state/out-pkts</li> <li>• /network-instances/network-instance/mpls/aggregate-sid-counters/aggregate-sid-counter/state/in-octets</li> <li>• /network-instances/network-instance/mpls/aggregate-sid-counters/aggregate-sid-counter/state/in-pkts</li> <li>• /network-instances/network-instance/mpls/aggregate-sid-counters/aggregate-sid-counter/state/out-octets</li> <li>• /network-instances/network-instance/mpls/aggregate-sid-counters/aggregate-sid-counter/state/out-pkts</li> <li>• /network-instances/network-instance/mpls/interfaces/interface/sid-counters/sid-counter/state/in-octets</li> <li>• /network-instances/network-instance/mpls/interfaces/interface/sid-counters/sid-counter/state/in-pkts</li> <li>• /network-instances/network-instance/mpls/interfaces/interface/sid-counters/sid-counter/state/out-octets</li> <li>• /network-instances/network-instance/mpls/interfaces/interface/sid-counters/sid-counter/state/out-pkts</li> <li>• /network-instances/network-instance/mpls/interfaces/interface/sid-counters/sid-counter/forwarding-classes/forwarding-class/state/in-octets</li> <li>• /network-instances/network-instance/mpls/interfaces/interface/sid-counters/sid-counter/forwarding-classes/forwarding-class/state/in-pkts</li> <li>• /network-instances/network-instance/mpls/interfaces/interface/sid-counters/sid-counter/forwarding-classes/forwarding-class/state/out-octets</li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<ul style="list-style-type: none"> <li>• /network-instances/network-instance/mps/interfaces/interface/sid-counters/sid-counter/forwarding-classes/forwarding-class/state/out-pkts</li> </ul>
/junos/services/segment-routing/sid/egress/usage/	Sensor for segment routing statistics based on segment identifier (SID).
/junos/services/segment-routing/sid/usage/	<p>Sensors for aggregate segment routing traffic with IS-IS.</p> <p>This sensor is supported on PTX3000 routers and PTX5000 routers with FPC2 starting with Junos OS Release 19.1R1.</p> <p>Statistics are exported separately for each routing instance.</p> <p>The first path exports inbound traffic. The second path exports outbound traffic. The third path exports inbound segment routing traffic for each segment identifier.</p> <p><b>NOTE:</b> When you enable a sensor for segment routing statistics, you must also configure the <code>sensor-based-stats</code> statement at the [edit protocols isis source-packet-routing] hierarchy level.</p>
/junos/services/segment-routing/traffic-engineering/ingress/usage	<p>Packet Forwarding Engine sensor for ingress segment routing traffic engineering (SR-TE) statistics.</p> <p>/junos</p> <p>Starting in Junos OS Release 19.2R1, MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches are supported on gRPC and gNMI services.</p> <p>Starting in Junos OS Evolved Release 21.4R1, PTX10001-36MR, PTX10003, PTX10004, PTX10008, and PTX10016 routers are supported on gRPC and gNMI services.</p>

**Table 5: gRPC Sensors (Continued)**

resource path	Description
/junos/services/segment-routing/traffic-engineering/transit/usage	<p>Packet Forwarding Engine sensor for ingress segment routing traffic engineering statistics.</p> <p>Starting in Junos OS Release 19.2R1, MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches are supported on gRPC and gNMI services.</p> <p>Starting in Junos OS Evolved Release 21.4R1,PTX10001-36MR, PTX10003, PTX10004, PTX10008,and PTX10016 routers are supported on gRPC and gNMI services.</p>
/junos/services/segment-routing/traffic-engineering/tunnel/ingress/usage  /junos/services/segment-routing/traffic-engineering/tunnel/transit/usage	<p>Packet Forwarding Engine sensors for ingress and transit SR-TE statistics for uncolored LSPs.</p> <p>To configure SR-TE, see No Link Title.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/services/segment-routing/traffic-engineering/tunnel/lsp/ingress/usage/	Sensor for Segment Routing Traffic Engineering (SR-TE) per Label Switched Path (LSP) route statistics.
/junos/services/segment-routing/traffic-engineering/tunnel/lsp/transit/usage/	<p>You can stream SR-TE telemetry statistics for uncolored SR-TE policies to an outside collector. Ingress statistics include statistics for all traffic steered by means of an SR-TE LSP. Transit statistics include statistics for traffic to the Binding-SID (BSID) of the SR-TE policy.</p> <p>To enable these statistics, include the <b>per-source per-segment-list</b> option at the [edit protocols source-packet-routing telemetry statistics] hierarchy level.</p> <p>Starting in Junos OS Release 20.1R1, MX Series and PTX Series routers support streaming statistics using gRPC services.</p> <p>Starting in Junos OS Release 20.2R1, MX240, MX480, MX960, MX2010, and MX2020 with MPC-10E or MPC-11E routers support streaming statistics using gRPC services.</p> <p>When a subscription is made to these resource paths, the following output format is displayed:</p> <ul style="list-style-type: none"> <li>• /mpls/signaling-protocols/segment-routing/sr-te-per-lsp-ingress-policies/sr-te-ingress-lsp-policy\[tunnel-name='srtelosp1' and source='st' and origin='0' and distinguisher='f' and lsp-name='sr1'\]/state/counters\[name='.*'\]/packets</li> <li>• /mpls/signaling-protocols/segment-routing/sr-te-per-lsp-transit-policies/sr-te-transit-lsp-policy\[tunnel-name='srtelosp1' and source='st' and origin='0' and distinguisher='f' and lsp-name='sr1'\]/state/counters\[name='.*'\]/packets</li> </ul> <p>For the output format above, the field source, values can be ST (static tunnel) or PC (PCEP tunnel). For the field lsp-name, the value is the transit output. Other fields, such as Origin and Distinguisher are fixed for uncolored tunnels.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/system/cmerror/configuration	<p>Sensor for error monitoring configuration.</p> <p>Starting in Junos OS Release 19.2R1, MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches are supported on gRPC and gNMI services.</p>
/junos/system/cmerror/counters	<p>Sensor for error monitoring counters.</p> <p>Starting in Junos OS Release 19.2R1, MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches are supported on gRPC and gNMI services.</p>
/junos/system/linecard/bmon-sw/	<p>Sensor for interface burst monitoring.</p> <p>Starting in Junos OS Evolved Release 19.3R1, QFX5220-128C and QFX5220-32CD switches are supported for streaming statistics on gRPC services.</p> <p>You can also add the following to the end of the path to stream specific statistics for interface burst monitoring:</p> <ul style="list-style-type: none"> <li>• rx_bytes-Total number of bytes received during the export interval.</li> <li>• tx_bytes-Total number of bytes transmitted during the export interval.</li> <li>• start_ts-Start timestamp for the data collection window.</li> <li>• rx_peak_byte_rate-Maximum bytes rate per millisecond received from all the sampling intervals in the export interval.</li> <li>• rx_peak_ts-Timestamp of the first burst.</li> <li>• tx_peak_byte_rate-Maximum bytes rate per millisecond, transmitted from all the sampling intervals in the export interval.</li> <li>• tx_peak_byte_ts-Timestamp of the first transmit burst.</li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/system/linecard/cos/interface/interface-set/ output/queue/	<p>Sensor for logical interface (IFL)-set. The sensor streams queue statistics using Juniper proprietary gRPC and gNMI or by means of UDP. Zero suppression (suppressing zero values in statistics from streamed data) is also supported.</p> <p>Starting in Junos OS Release 22.3R1, MX204, MX240, MX304, MX480, MX960, MX2010, MX2020, MX10003, MX10004, MX10008, and MX10016 routers with Trio chipset EA, ZT, and YT-based fixed systems and modular systems linecards are supported.</p>



Table 5: gRPC Sensors (*Continued*)

resource path	Description
<code>/junos/system/linecard/cpu/memory/</code>	<p>Sensor for CPU memory.</p> <p><b>NOTE:</b> On PTX Series routers, FPC1 and FPC2 are not supported.</p> <p>Supported on QFX10000 switches and PTX1000 routers starting with Junos OS Release 17.2R1.</p> <p>Supported on EX9200 switches starting with Junos OS Release 17.3R1.</p> <p>Supported on QFX5100, QFX5110, and QFX5200 switches starting with Junos OS Release 18.2R1.</p> <p>Supported on QFX5120-48Y and EX4650 switches starting with Junos OS Release 18.3R1.</p> <p>Supported on EX4600 switches starting with Junos OS Release 18.4R1.</p> <p>Periodic streaming is supported on on QFX10002 switches and PTX10002 routers starting with Junos OS Release 19.1R1.</p> <p>Starting with Junos OS Release 19.2R1, MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches are supported on gRPC and gNMI services.</p> <p>Supported on QFX5200 switches starting with Junos OS Release 19.2R1 for streaming telemetry information using gNMI services.</p> <p>Periodic streaming using gRPC services is supported on EX4300-MP switches starting with Junos OS Release 19.4R1,</p> <p>Periodic streaming using gRPC services is supported on EX2300, EX2300-MP, and EX3400 switches starting with Junos OS Release 20.2R1.</p> <p>Periodic streaming is supported on QFX5120-48YM switches starting with Junos OS Release 20.4R1.</p> <p>Streaming statistics using Juniper proprietary gRPC is supported on M304 starting with Junos OS Release 22.4R1.</p> <p>You can also include the following to end of the resource path for CPU memory:</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<ul style="list-style-type: none"> <li>• [name="mem-util-&lt;memory-name&gt;-size"]/value</li> <li>• [name="mem-util-&lt;memory-name&gt;-bytes-allocated"]/value</li> <li>• [name="mem-util-&lt;memory-name&gt;-utilization"]/value</li> <li>• [name="mem-util-&lt;memory-name&gt;-&lt; app-name&gt;-allocations"]/value</li> <li>• [name="mem-util-&lt;memory-name&gt;-&lt; app-name&gt;-frees"]/value</li> <li>• [name="mem-util-&lt;memory-name&gt;-&lt; app-name&gt;-allocations-failed"]/value</li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/system/linecard/ddos/	<p>Distributed denial of service (DDoS) sensor. This sensor supports the Openconfig data model junos/ui/openconfig/yang/ and junos-ddos.yang.</p> <p>You can stream information using Juniper proprietary gRPC or UDP (native) export.</p> <p>There are 45 packet types for DDoS. To maintain a reasonably sized data stream, data is exported for all protocols that have seen traffic using the zero-suppression model.</p> <p>On QFX5000 platforms, multiple protocols can share the same CPU queue. DDoS configurations are applied at the CPU queue level. Consequently, DDoS statistics fetched from the CPU queue will return the aggregate value of all protocols using that queue. For example, if BGP, LDP, and RSVP protocols are using a particular CPU queue, but the DDoS limit is violated only by the BGP protocol, the DDoS violation reported will include all three protocols: BGP, LDP, and RSVP. This information will be exported to the collector with the DDoS sensor.</p> <p>Starting in Junos OS Release 22.1R1 EX4650, QFX5110, QFX5120-48Y, QFX5200 and QFX5210 switches are supported.</p> <p>Starting in Junos OS Evolved Release 22.3R1, PTX10001-36MR, PTX10003, PTX10004, PTX10008, PTX10016 routers are supported.</p> <p>You can also add the following leaves to the end of the path to stream specific statistics:</p> <ul style="list-style-type: none"> <li>• group_name</li> <li>• group_id</li> <li>• protocol_name</li> <li>• protocol_id</li> <li>• location</li> <li>• received</li> </ul>

Table 5: gRPC Sensors (Continued)

resource path	Description																																																																								
	<ul style="list-style-type: none"><li>• arrive-policer</li><li>• dropped-individual_policer</li><li>• dropped_aggregate_policer</li><li>• total_dropped</li><li>• final_passed</li><li>• arrival_rate</li><li>• max_arrival_rate</li><li>• pass_rate</li><li>• policer_state</li><li>• policer_violation_count</li><li>• policer_violation_start_time</li><li>• policer_violation_end_time</li><li>• policer_violation_duration</li></ul> <p>The following packet types are supported:</p> <table><tr><th>CMICQ</th><th>Channel</th><th>bwidth</th><th>burst</th><th>Qlen</th><th>Proto(s)</th></tr><tr><td>0</td><td>3</td><td>500</td><td>10</td><td>200</td><td>uncls</td></tr><tr><td>4</td><td>1</td><td>4000</td><td>200</td><td>200</td><td>vchassis</td></tr><tr><td>7</td><td>3</td><td>500</td><td>200</td><td>200</td><td>vxlan</td></tr><tr><td>8</td><td>3</td><td>1500</td><td>200</td><td>200</td><td>localnh</td></tr><tr><td>9</td><td>3</td><td>1000</td><td>200</td><td>200</td><td>vcipc-udp</td></tr><tr><td>10</td><td>3</td><td>2000</td><td>200</td><td>200</td><td>sample-source</td></tr><tr><td>11</td><td>3</td><td>2000</td><td>200</td><td>200</td><td>sample-dest</td></tr><tr><td>12</td><td>3</td><td>50</td><td>10</td><td>200</td><td>l3mtu-</td></tr><tr><td colspan="6">fail,ttl,ip-opt.</td></tr><tr><td>14</td><td>3</td><td>100</td><td>10</td><td>200</td><td>garp-reply</td></tr><tr><td>15</td><td>3</td><td>500</td><td>10</td><td>200</td><td>fw-host</td></tr></table>	CMICQ	Channel	bwidth	burst	Qlen	Proto(s)	0	3	500	10	200	uncls	4	1	4000	200	200	vchassis	7	3	500	200	200	vxlan	8	3	1500	200	200	localnh	9	3	1000	200	200	vcipc-udp	10	3	2000	200	200	sample-source	11	3	2000	200	200	sample-dest	12	3	50	10	200	l3mtu-	fail,ttl,ip-opt.						14	3	100	10	200	garp-reply	15	3	500	10	200	fw-host
CMICQ	Channel	bwidth	burst	Qlen	Proto(s)																																																																				
0	3	500	10	200	uncls																																																																				
4	1	4000	200	200	vchassis																																																																				
7	3	500	200	200	vxlan																																																																				
8	3	1500	200	200	localnh																																																																				
9	3	1000	200	200	vcipc-udp																																																																				
10	3	2000	200	200	sample-source																																																																				
11	3	2000	200	200	sample-dest																																																																				
12	3	50	10	200	l3mtu-																																																																				
fail,ttl,ip-opt.																																																																									
14	3	100	10	200	garp-reply																																																																				
15	3	500	10	200	fw-host																																																																				

Table 5: gRPC Sensors (Continued)

resource path	Description					
	16	3	500	200	200	ndpv6
	17	3	1000	200	200	dhcqv4v6
	19	3	1500	200	200	ipmc-reserved
	20	3	300	200	200	resolve
	21	3	100	10	200	l3dest-miss
	22	3	100	10	200	redirect
	23	3	300	200	200	l3nhop
	24	3	100	10	200	l3mc-sgwhit-icl
	25	3	50	10	200	martian-address
	26	3	1000	200	200	l2pt
	27	3	50	10	200	urpf-fail
	28	3	1000	300	300	ipmcast-miss
	29	2	300	10	200	nonucast-switch
	30	2	3000	200	200	
	rsvp,ldp,bgp					
	31	2	3000	200	200	unknown-
	l2mc,rip,ospf					
	32	2	1000	200	200	fip-snooping
	33	2	1000	200	200	igmp
	34	2	500	200	200	arp
	35	2	1500	200	200	pim-data
	36	2	1500	200	200	ospf-hello
	37	2	1500	200	200	pim-ctrl
	38	2	2000	200	200	isis
	39	1	250	200	200	larp
	40	1	1200	200	200	bfd
	41	1	100	10	200	ntp
	42	1	500	200	200	vchassis
	43	1	1000	200	200	
	stp,pvstp,lldp					

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/system/linecard/environment/	<p>Sensor for environmental statistics.</p> <p>When subscribing to the resource path /junos/system/linecard/environment, the prefix for the streamed path at the collector side was displaying as /junos/linecard/environment. This issue is resolved in Junos OS 23.1R1 and Junos OS Evolved 23.1R1 and the subscription path and the streamed path match to display /junos/system/linecard/environment.</p> <p>Supported on MX10008 routers starting with Junos OS Release 21.4R1 using Juniper proprietary gRPC.</p> <p>Supported on MX10004 routers starting with Junos OS Release 22.3R1 using Juniper proprietary gRPC.</p> <p>FPC environment sensor /junos/system/linecard[name=FPC0]/environment/ is supported on MX10004 routers starting with Junos OS Release 22.4R1 using Juniper proprietary gRPC and gNMI. You can stream the following endpoints:</p> <ul style="list-style-type: none"> <li>• /power-record/max-fpc-power</li> <li>• /power-record/fpc-power</li> <li>• voltage-record/voltage-sensor-name</li> <li>• voltage-record/voltage-value</li> <li>• temp-sensor-name</li> <li>• temp-record/temp-value</li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/system/linecard/fabric/	<p>Sensor for fabric statistics.</p> <p>Supported on MX10008 routers starting with Junos OS Release 22.1R1 using Juniper proprietary gRPC.</p> <p>Supported on MX10004 routers starting with Junos OS Release 22.4R1 using Juniper proprietary gRPC.</p> <p>Supported on PTX10001-36MR, PTX10003, PTX10004, PTX10008, and PTX10016 routers starting with Junos OS Evolved Release 22.4R1 using Juniper proprietary gRPC.</p> <p>Subscribe to this resource path to export the following statistics under the base path /junos/fabric-statistics/fabric-message/edges/class-stats/transmit-counts/:</p> <ul style="list-style-type: none"> <li>• packets</li> <li>• bytes</li> <li>• packets-per-second</li> <li>• bytes-per-second</li> <li>• drop-packets</li> <li>• drop-bytes</li> <li>• drop-packets-per-second</li> <li>• drop-bytes-per-second</li> <li>• queue-depth-average</li> <li>• queue-depth-current</li> <li>• queue-depth-peak</li> <li>• queue-depth-maximum</li> <li>• error-packets</li> <li>• error-packets-per-second</li> </ul>

Table 5: gRPC Sensors *(Continued)*

resource path	Description
	Supported on MX10008 routers starting with Junos OS Release 21.4R1 using Juniper proprietary gRPC.



Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/system/linecard/firewall/	<p>Sensor for firewall filter counters and policer counters. Each line card reports counters separately.</p> <p>Supported on QFX10000 switches starting with Junos OS Release 17.2R1.</p> <p>Supported on PTX1000 routers and EX9200 switches starting with Junos OS Release 17.3R1.</p> <p>Supported on QFX5100, QFX5110, and QFX5200 switches starting with Junos OS Release 18.2R1.</p> <p>Supported on QFX5120-48Y and EX4650 switches starting with Junos OS Release 18.3R1.</p> <p>Supported on EX4600 switches starting with Junos OS Release 18.4R1.</p> <p>Starting with Junos OS Release 19.1R1, periodic streaming is supported on QFX10002 switches and PTX10002 routers.</p> <p>Starting in Junos OS Evolved Release 19.1R1, PTX10003 routers are supported.</p> <p>Starting in Junos OS Release 19.2R1, MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches are supported on gRPC and gNMI services.</p> <p>Supported on QFX5200 switches starting with Junos OS Release 19.2R1 for streaming telemetry information using gNMI services.</p> <p>Supported on MX240, MX480, and MX960 routers starting with Junos OS Release 19.3R1 for exporting telemetry information using gNMI services. This feature includes support to export telemetry data for integration with AFTTelemetry and LibTelemetry libraries with the OpenConfig model openconfig-aft.</p> <p>Periodic streaming using gRPC services with EX4300-MP switches is supported starting with Junos OS Release 19.4R1.</p> <p>Periodic streaming using gNMI services with PTX10003 routers is supported starting with Junos OS Evolved Release 19.4R1.</p> <p>Periodic streaming using gNMI services on MX2K-MPC11E line cards on MX2010 and MX2020 routers is supported starting with Junos OS Release 20.1R1.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<p>Periodic streaming using gRPC services is supported on EX2300, EX2300-MP, and EX3400 switches starting with Junos OS Release 20.2R1.</p> <p>INITIAL_SYNC statistics using gNMI services is supported on MX960, MX2008, MX2010, MX2020, PTX1000, PTX5000 routers, PTX10000 line of routers, and QFX5100 and QFX5200 switches starting with Junos OS Release 20.2R1.</p> <p>Periodic streaming is supported on QFX5120-48YM switches starting with Junos OS Release 20.4R1.</p> <p><b>NOTE:</b> Hierarchical policer statistics are collected for MX Series routers only. Traffic-class counter statistics are collected for PTX Series routers and QFX10000 switches only.</p> <p>Firewall counters are exported even if the interface to which the firewall filter is attached is operationally down.</p> <p>The following OpenConfig paths are supported:</p> <ul style="list-style-type: none"> <li>• <code>junos/firewall/firewall-stats/[name='filter-name']/timestamp</code></li> <li>• <code>/junos/firewall/firewall-stats/[name='filter-name']/memory-usage/[name='memory-type']/allocated</code></li> <li>• <code>/junos/firewall/firewall-stats/[name='filter-name']/counter-stats/[name='counter-name']/packets</code></li> <li>• <code>/junos/firewall/firewall-stats/[name='filter-name']/counter-stats/[name='counter-name']/bytes</code></li> <li>• <code>/junos/firewall/firewall-stats/[name='filter-name']/policer-stats/[name='policer-name']/out-of-spec-packets</code></li> <li>• <code>/junos/firewall/firewall-stats/[name='filter-name']/policer-stats/[name='policer-name']/out-of-spec-bytes</code></li> <li>• <code>/junos/firewall/firewall-stats/[name='filter-name']/policer-stats/[name='policer-name']/offered-packets</code></li> <li>• <code>/junos/firewall/firewall-stats/[name='filter-name']/policer-stats/[name='policer-name']/offered-bytes</code></li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<ul style="list-style-type: none"> <li>• /junos/firewall/firewall-stats/[name=' <i>filter-name</i> ']/ policer-stats/[name=' <i>policer-name</i> ']/transmitted-packets</li> <li>• /junos/firewall/firewall-stats/[name=' <i>filter-name</i> ']/ policer-stats/[name=' <i>policer-name</i> ']/transmitted-bytes</li> <li>• /junos/firewall/firewall-stats/[name=' <i>filter-name</i> ']/ hierarchical-policer-stats/[name=' <i>hierarchical-policer-name</i> ']/ premium-packets (MX Series only)</li> <li>• /junos/firewall/firewall-stats/[name=' <i>filter-name</i> ']/ hierarchical-policer-stats/[name=' <i>hierarchical-policer-name</i> ']/ premium-bytes (MX Series only)</li> <li>• /junos/firewall/firewall-stats/[name=' <i>filter-name</i> ']/ hierarchical-policer-stats/[name=' <i>hierarchical-policer-name</i> ']/ aggregate-packets (MX Series only)</li> <li>• /junos/firewall/firewall-stats/[name=' <i>filter-name</i> ']/ hierarchical-policer-stats/[name=' <i>hierarchical-policer-name</i> ']/ aggregate-bytes (MX Series only)</li> </ul>
/junos/system/linecard/intf-exp/	<p>Interface express sensor.</p> <p>This sensor leverages statistics out of the physical interface sensor, providing faster and more frequent operational status statistics. Only the physical interfaces' operational status from the Flexible PIC Concentrator (FPC) is collected and reported. Statistics from the Routing Engine interface are not reported.</p> <p>Supported on PTX1000, PTX3000, PTX5000, and PTX10000 starting with Junos OS Release 18.1R1.</p> <p>Supported on MX960, MX2010, and MX2020 routers starting with Junos OS Release 19.3R1.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/system/linecard/interface/	<p>Packet Forwarding Engine sensor for physical interface traffic.</p> <p><b>NOTE:</b> For PTX Series routers, for a specific interface, queue statistics are exported for each line card. For MX series routers, interface queue statistics are exported only from the slot on which an interface is configured.</p> <p>For Aggregated Ethernet interfaces, statistics are exported for the member physical interfaces. You must aggregate the counters at the destination server, or collector.</p> <p>If a physical interface is administratively down or operationally down, interface counters are not exported.</p> <p>Issuing an operational clear command, such as <code>clear interfaces statistics all</code>, does not reset statistics exported by the line card.</p> <p>Supported on PTX Series routers starting with Junos OS Release 15.1F3. Supported on MX Series routers starting with Junos OS Release 15.1F5.</p> <p>Supported on QFX10000 switches and PTX1000 routers starting with Junos OS Release 17.2R1.</p> <p>Supported on EX9200 switches and MX150 routers starting with Junos OS Release 17.3R1.</p> <p>Supported on QFX5100, QFX5110, and QFX5200 switches starting with Junos OS Release 18.2R1.</p> <p>Supported on QFX5120-48Y and EX4650 switches starting with Junos OS Release 18.3R1.</p> <p>Supported on EX4600 switches Starting with Junos OS Release 18.4R1.</p> <p>Periodic streaming is supported on QFX10002 switches and PTX10002 routers starting with Junos OS Release 19.1R1.</p> <p>Supported on MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches with Junos OS Release 19.2R1 on gRPC and gNMI services.</p> <p>Supported on MX240, MX480, and MX960 routers starting with Junos OS Release 19.3R1 for exporting telemetry information using gNMI services. This feature includes support to export telemetry</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<p>data for integration with AFTTelemetry and LibTelemetry libraries with the OpenConfig model openconfig-aft.</p> <p>Starting with Junos OS Release 19.4R1, periodic streaming using gRPC services with EX4300-MP switches is supported.</p> <p>Periodic streaming using gNMI services on MX2K-MPC11E line cards on MX2010 and MX2020 routers is supported starting with Junos OS Release 20.1R1.</p> <p>Periodic streaming using gRPC services is supported on EX2300, EX2300-MP, and EX3400 switches starting with Junos OS Release 20.2R1.</p> <p>INITIAL_SYNC statistics using gNMI services is supported on MX960, MX2008, MX2010, MX2020, PTX1000, PTX5000 routers, PTX10000 line of routers, and QFX5100 and QFX5200 switches starting with Junos OS Release 21.4R1.</p> <p>Streaming statistics using gRPC services or gNMI services is supported on PTX10008 routers starting with Junos OS Release 20.2R1.</p> <p>Periodic streaming is supported on QFX5120-48YM switches starting with Junos OS Release 20.4R1.</p>

Table 5: gRPC Sensors *(Continued)*

resource path	Description
/junos/system/linecard/interface/logical/family/ipv4/usage/	Sensor for per-family logical interface input and output counters for IPv4 and IPv6 traffic.
/junos/system/linecard/interface/logical/family/ipv6/usage/	<p>Streaming statistics using Juniper proprietary gRPC is supported on MX304 starting with Junos OS Release 22.4R1.</p> <p>Streaming statistics using Juniper proprietary gRPC is supported on MX10008 starting with Junos OS Release 21.4R1.</p> <p>Streaming statistics using Juniper proprietary gRPC is supported on MX Series and PTX Series routers using third-generation FPCs starting with Junos OS Release 21.2R1.</p> <p>Streaming statistics using Juniper proprietary gRPC is supported on MX10004 starting with Junos OS Release 22.3R1.</p> <p>Streaming of IPv6 counters supported on PTX10001-36MR, PTX10004, PTX10008 and PTX10016 routers starting with Junos OS Evolved Release 23.2R1.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/system/linecard/interface/logical/usage	<p>Packet Forwarding Engine sensor for logical interface statistics.</p> <p><b>NOTE:</b> If a logical interface is operationally down, interface statistics continue to be exported.</p> <p>Issuing an operational clear command, such as <code>clear interfaces statistics all</code>, does not reset statistics exported by the line card.</p> <p><b>NOTE:</b> If a logical interface is operationally down, interface statistics continue to be exported.</p> <p>Issuing an operational clear command, such as <code>clear interfaces statistics all</code>, does not reset statistics exported by the line card.</p> <p><b>NOTE:</b> Locally injected packets from the Routing Engine are not exported.</p> <p><b>NOTE:</b> Locally injected packets from the Routing Engine are not exported.</p> <p>Supported in Junos OS Release 15.1F5.</p> <p>Supported QFX10000 switches starting with on Junos OS Release 17.2R1.</p> <p>Supported on EX9200 switches and MX150 routers starting with Junos OS Release 17.3R1.</p> <p>Supported on QFX5100, QFX5110, and QFX5200 switches starting with Junos OS Release 18.2R1.</p> <p>Supported on QFX5120-48Y and EX4650 switches starting with Junos OS Release 18.3R1.</p> <p>Supported on EX4600 switches starting with Junos OS Release 18.4R1.</p> <p>Starting with Junos OS Release 19.1R1, periodic streaming is supported on QFX10002 switches and PTX10002 routers.</p> <p>Supported on MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches with Junos OS Release 19.2R1 on gRPC and gNMI services.</p> <p>Supported on QFX5200 switches starting with Junos OS Release 19.2R1 for streaming telemetry information using gNMI services.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<p>Supported on MX240, MX480, and MX960 routers starting with Junos OS Release 19.3R1 for exporting telemetry information using gNMI services. This feature includes support to export telemetry data for integration with AFTTelemetry and LibTelemetry libraries with the OpenConfig model openconfig-aft.</p> <p>Starting with Junos OS Release 19.4R1, periodic streaming using gRPC services with EX4300-MP switches is supported.</p> <p>Periodic streaming using gNMI services on MX2K-MPC11E line cards on MX2010 and MX2020 routers is supported starting with Junos OS Release 20.1R1.</p> <p>Periodic streaming using gRPC services is supported on EX3400 switches starting with Junos OS Release 20.2R1.</p> <p>INITIAL_SYNC statistics using gNMI services is supported on MX960, MX2008, MX2010, MX2020, PTX1000, PTX5000 routers, PTX10000 line of routers, and QFX5100 and QFX5200 switches starting with Junos OS Release 20.2R1.</p> <p>Periodic streaming is supported on QFX5120-48YM switches starting with Junos OS Release 20.4R1.</p> <p>Supported on PTX10003 routers starting in Junos OS Evolved Release 22.3R1. Support includes the following sensors:</p> <ul style="list-style-type: none"> <li>• /junos/system/linecard/interface/logical/usage/counters/in-pkts/state/value</li> <li>• /junos/system/linecard/interface/logical/usage/counters/out-pkts/state/value</li> <li>• /junos/system/linecard/interface/logical/usage/counters/in-octets/state/value</li> <li>• /junos/system/linecard/interface/logical/usage/counters/out-octets/state/value</li> </ul> <p>Supported on virtual interfaces (lt, gr, si, lsp and ps) on MX204, MX480, MX960, MX10004, MX10008, MX10016, MX2010, and MX2020 routers starting in Junos OS Release 23.2R1.</p>



Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/system/linecard/interface/queue/	<p>Sensor for interface queue statistics.</p> <p>Starting with Junos OS Release 18.3R1, when a subscription is made to /interfaces on MX, EX, QFX, PTX, and ACX platforms, traffic and queue statistics are delivered in two separate sensors:</p> <ul style="list-style-type: none"> <li>• /junos/system/linecard/interface/traffic/</li> <li>• /junos/system/linecard/interface/queue/</li> </ul> <p>This can reduce the reap time for non-queue data for platforms supporting Virtual Output Queues (VOQ), such as PTX Series routers.</p> <p>Starting in Junos OS Release 19.2R1, MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches are supported on gRPC and gNMI services.</p> <p>Supported on MX240, MX480, and MX960 routers starting with Junos OS Release 19.3R1 for exporting telemetry information using gNMI services. This feature includes support to export telemetry data for integration with AFTTelemetry and LibTelemetry libraries with the OpenConfig model openconfig-aft.</p> <p>Periodic streaming using gNMI services on MX2K-MPC11E line cards on MX2010 and MX2020 routers is supported starting with Junos OS Release 20.1R1.</p> <p>INITIAL_SYNC statistics using gNMI services is supported on MX960, MX2008, MX2010, MX2020, PTX1000, PTX5000 routers, PTX10000 line of routers, and QFX5100 and QFX5200 switches starting with Junos OS Release 20.2R1.</p> <p>Supported on ACX7100 and ACX7509 starting in Junos OS Evolved Release 22.2R1. Support includes transmitted counters for:</p> <ul style="list-style-type: none"> <li>• packets</li> <li>• bytes</li> <li>• red drop packets</li> <li>• red drop bytes</li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<ul style="list-style-type: none"> <li>• tail drop packets</li> <li>• tail drop bytes</li> </ul> <p>Starting in Junos OS Evolved Release 22.4R1 you can stream statistics for IPv4 and IPv6 traffic statistics using the resource path / <b>junos/system/linecard/interface/traffic/</b>. Support includes transmitted counters for:</p> <ul style="list-style-type: none"> <li>• if_in_ipv4pkts</li> <li>• if_out_ipv4pkts</li> <li>• if_in_ipv6pkts</li> <li>• if_out_ipv6pkts</li> </ul> <p>Supported on virtual interfaces (lt, gr, si, lsp and ps) on MX204, MX480, MX960, MX10004, MX10008, MX10016, MX2010, and MX2020 routers starting in Junos OS Release 23.2R1.</p>
/junos/system/linecard/node-slicing/af-fab-stats/	<p>Sensor to export abstracted fabric (AF) interface-specific load-balancing and fabric queue statistics. This sensor is only supported for in node virtualization configurations on MX routers with an AF Interface as the connecting link between guest network functions (GNFs).The sensor also reports aggregated statistics across all AF interfaces hosted on a source packet forwarding engine of local guest GNFs along with the fabric statistics for all traffic ingressing from and egressing to the fabric from that the packet forwarding engine.</p> <p>Supported on MX480, MX960, MX2010, MX2020, MX2008 and MX-ELM routers with Junos OS Release 18.4R1.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/system/linecard/npu/memory/	<p>Sensor for network processing unit (NPU) memory.</p> <p>You can also add the following leaves to the end of the path to stream specific statistics:</p> <ul style="list-style-type: none"> <li>• resource_name</li> <li>• size</li> <li>• allocated</li> <li>• utilization</li> <li>• lower-threshold</li> <li>• upper-threshold</li> <li>• health</li> </ul> <p><b>NOTE:</b> Collecting telemetry statistics using the NPU memory sensor can cause high CPU cycles when gathering the MPLS ingress statistics (MPLS_Entry leaf). This, in turn, creates performance issues for the packet forwarding engine process. To correct this problem, MPLS ingress statistics are initially collected as a baseline. Statistics are updated after 30 seconds if a route is added or deleted. Otherwise, if there is no route change, statistics are fetched every hour.</p> <p>Supported on EX4650, QFX5110, QFX5120-48Y, QFX5200, and QFX5210 switches starting with Junos OS Release 21.4R1 for exporting telemetry information using gRPC or gNMI services.</p> <p>Supported on QFX5130, QFX5700, QFX5220-32CD, QFX5220-128C, QFX5130-48C, QFX5130-48CM, QFX5130E-32CD, QFX5230-64CD, QFX5240-64QD, and QFX5240-64QD switches starting with Junos OS Release 24.4R1 for exporting telemetry information using gRPC or gNMI services.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/system/linecard/npu/memory/	<p>Sensor for network processing unit (NPU) memory.</p> <p>Supported on MX Series routers with MPC10E-10C-MRATE and MPC10E-15C-MRATE line cards starting with Junos OS Release 19.3R1 for exporting telemetry information using gRPC services. This feature provides a different level of exported statistics in comparison to previous releases because it use the OpenConfig AFT model.</p> <p>Supported on MX2010 and MX2020 routers with MX2K-MPC11E line cards starting with Junos OS Release 20.1R1 for streaming telemetry information using gRPC services.</p> <p>Supported on MX304 routers using Juniper proprietary gRPC and gNMI starting with Junos OS Release 22.4R1.</p> <p>You can also add the following to the end of the path to stream specific statistics for NPU memory:</p> <ul style="list-style-type: none"> <li>• mem-util-edmem-size</li> <li>• mem-util-edmem-allocated</li> <li>• mem-util-edmem-utilization</li> <li>• mem-util-idmem-size</li> <li>• mem-util-idmem-allocated</li> <li>• mem-util-idmem-utilization</li> <li>• mem-util-bulk-dmem-size</li> <li>• mem-util-bulk-dmem-allocated</li> <li>• mem-util-bulk-dmem-utilization</li> <li>• mem-util-next-hop-edmem-size</li> <li>• mem-util-next-hop-edmem-allocated</li> <li>• mem-util-next-hop-edmem-utilization</li> <li>• mem-util-next-hop-bulk-dmem-size</li> </ul>

Table 5: gRPC Sensors *(Continued)*

resource path	Description
	<ul style="list-style-type: none"> <li>• mem-util-next-hop-bulk-dmem-allocated</li> <li>• mem-util-next-hop-bulk-dmem-utilization</li> <li>• mem-util-next-hop-idmem-size</li> <li>• mem-util-next-hop-idmem-allocated</li> <li>• mem-util-next-hop-inline-services-free-count</li> <li>• mem-util-next-hop-mobile:-timing-profile-bytes-allocated</li> <li>• mem-util-next-hop-mobile:-timing-profile-allocation-count</li> <li>• mem-util-next-hop-mobile:-timing-profile-free-count</li> <li>• mem-util-next-hop-packet-reassembly-(rw)-bytes-allocated</li> <li>• mem-util-next-hop-packet-reassembly-(rw)-allocation-count</li> <li>• mem-util-next-hop-packet-reassembly-(rw)-free-count</li> <li>• mem-util-next-hop-packet-reassembly---persistent-(rw)-bytes-allocated</li> <li>• mem-util-next-hop-packet-reassembly---persistent-(rw)-allocation-count</li> <li>• mem-util-next-hop-packet-reassembly---persistent-(rw)-free-count</li> <li>• mem-util-next-hop-ml-bundle-bytes-allocated</li> <li>• mem-util-next-hop-ml-bundle-allocation-count</li> <li>• mem-util-next-hop-ml-bundle-free-count</li> <li>• mem-util-next-hop-ddos-scf-d-params-bytes-allocated</li> <li>• mem-util-next-hop-ddos-scf-d-params-allocation-count</li> <li>• mem-util-next-hop-ddos-scf-d-params-free-count</li> <li>• mem-util-next-hop-vbf-bytes-allocated</li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<ul style="list-style-type: none"> <li>• mem-util-next-hop-vbf-allocation-count</li> <li>• mem-util-next-hop-vbf-free-count</li> <li>• mem-util-next-hop-ptp-ieee-1588-nhs-bytes-allocated</li> <li>• mem-util-next-hop-ptp-ieee-1588-nhs-allocation-count</li> <li>• mem-util-next-hop-ptp-ieee-1588-nhs-free-count</li> <li>• mem-util-next-hop-cos-bytes-allocated</li> <li>• mem-util-next-hop-cos-allocation-count</li> <li>• mem-util-next-hop-cos-free-count</li> <li>• mem-util-next-hop-inline-hash-sessions-bytes-allocated</li> <li>• mem-util-next-hop-inline-hash-sessions-allocation-count</li> <li>• mem-util-next-hop-inline-hash-sessions-free-count</li> <li>• mem-util-next-hop-inline-mdi-bytes-allocated</li> <li>• mem-util-next-hop-inline-mdi-allocation-count</li> <li>• mem-util-next-hop-inline-mdi-free-count</li> <li>• mem-util-next-hop-cos-enhanced-priority-bytes-allocated</li> <li>• mem-util-next-hop-cos-enhanced-priority-allocation-count</li> <li>• mem-util-next-hop-cos-enhanced-priority-free-count</li> <li>• mem-util-firewall-fw-bytes-allocated</li> <li>• mem-util-firewall-fw-allocation-count</li> <li>• mem-util-firewall-fw-free-count</li> <li>• mem-util-counters-fw-counter-bytes-allocated</li> <li>• mem-util-counters-fw-counter-allocation-count</li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<ul style="list-style-type: none"> <li>• mem-util-counters-fw-counter-free-count</li> <li>• mem-util-counters-fw-policer-bytes-allocated</li> <li>• mem-util-counters-fw-policer-allocation-count</li> <li>• mem-util-counters-fw-policer-free-count</li> <li>• mem-util-counters-ifd-error-cntr-bytes-allocated</li> <li>• mem-util-counters-ifd-error-cntr-allocation-count</li> <li>• mem-util-counters-ifd-error-cntr-free-count</li> <li>• mem-util-counters-nh-cntr-bytes-allocated</li> <li>• mem-util-counters-nh-cntr-allocation-count</li> <li>• mem-util-counters-nh-cntr-free-count</li> <li>• mem-util-counters-ifl-cntr-bytes-allocated</li> <li>• mem-util-counters-ifl-cntr-allocation-count</li> <li>• mem-util-counters-ifl-cntr-free-count</li> <li>• mem-util-counters-bridge-domain-counter0-bytes-allocated</li> <li>• mem-util-counters-bridge-domain-counter0-allocation-count</li> <li>• mem-util-counters-bridge-domain-counter0-free-count</li> <li>• mem-util-counters-bridge-domain-counter0-free-count</li> <li>• mem-util-counters-bridge-domain-cntr-bytes-allocated</li> <li>• mem-util-counters-bridge-domain-cntr-allocation-count</li> <li>• mem-util-counters-bridge-domain-cntr-free-count</li> <li>• mem-util-counters-sample-inline-params-bytes-allocated</li> <li>• mem-util-counters-sample-inline-params-allocation-count</li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<ul style="list-style-type: none"> <li>• mem-util-counters-sample-inline-params-free-count</li> <li>• mem-util-counters-services-counters-bytes-allocated</li> <li>• mem-util-counters-services-counters-allocation-count</li> <li>• mem-util-counters-services-counters-free-count</li> <li>• mem-util-counters-exception-counter-bytes-allocated</li> <li>• mem-util-counters-exception-counter-allocation-count</li> <li>• mem-util-counters-exception-counter-free-count</li> <li>• mem-util-counters-issu-policer-bytes-allocated</li> <li>• mem-util-counters-issu-policer-allocation-count</li> <li>• mem-util-counters-issu-policer-free-count</li> <li>• mem-util-counters-ddos-scf-d-counters-bytes-allocated</li> <li>• mem-util-counters-ddos-scf-d-counters-allocation-count</li> <li>• mem-util-counters-ddos-scf-d-counters-free-count</li> <li>• mem-util-counters-ip-reassembly-counter-bytes-allocated</li> <li>• mem-util-counters-ip-reassembly-counter-allocation-count</li> <li>• mem-util-counters-ip-reassembly-counter-free-count</li> <li>• mem-util-hash-hash-edmem-overhead-bytes-allocated</li> <li>• mem-util-hash-hash-edmem-overhead-bytes-allocated</li> <li>• mem-util-hash-hash-edmem-overhead-bytes-allocated</li> <li>• mem-util-hash-hash-edmem-overhead-bytes-allocated</li> <li>• mem-util-hash-hash-edmem-overhead-bytes-allocated</li> <li>• mem-util-hash-hash-edmem-overhead-allocation-count</li> </ul>



Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<ul style="list-style-type: none"> <li>• mem-util-hash-hash-edmem-overhead-free-count</li> <li>• mem-util-hash-hash-edmem-bkt-bytes-allocated</li> <li>• mem-util-hash-hash-edmem-bkt-allocation-count</li> <li>• mem-util-hash-hash-edmem-bkt-free-count</li> <li>• mem-util-hash-hash-edmem-rec-bytes-allocated</li> <li>• mem-util-hash-hash-edmem-rec-allocation-count</li> <li>• mem-util-hash-hash-edmem-rec-free-count</li> <li>• mem-util-hash-hash-edmem-sideband-bytes-allocated</li> <li>• mem-util-hash-hash-edmem-sideband-allocation-count</li> <li>• mem-util-hash-hash-edmem-sideband-free-count</li> <li>• mem-util-hash-hash-dmem-bkt-bytes-allocated</li> <li>• mem-util-hash-hash-dmem-bkt-allocation-count</li> <li>• mem-util-hash-hash-dmem-bkt-free-count</li> <li>• mem-util-hash-hash-dmem-rec-bytes-allocated</li> <li>• mem-util-hash-hash-dmem-rec-allocation-count</li> <li>• mem-util-hash-hash-dmem-rec-free-count</li> <li>• mem-util-hash-hash-dmem-sideband-bytes-allocated</li> <li>• mem-util-hash-hash-dmem-sideband-allocation-count</li> <li>• mem-util-hash-hash-dmem-sideband-free-count</li> <li>• mem-util-encaps-ueid-bytes-allocated</li> <li>• mem-util-encaps-ueid-allocation-count</li> <li>• mem-util-encaps-ueid-free-count</li> </ul>

Table 5: gRPC Sensors *(Continued)*

resource path	Description
	<ul style="list-style-type: none"><li>• mem-util-encaps-ueid-shared-bytes-allocated</li><li>• mem-util-encaps-ueid-shared-bytes-allocated</li><li>• mem-util-encaps-ueid-shared-allocation-count</li><li>• mem-util-encaps-ueid-shared-free-count</li><li>• mem-util-encaps-fabric-bytes-allocated</li><li>• mem-util-encaps-fabric-allocation-count</li><li>• mem-util-encaps-fabric-free-count</li><li>• mem-util-services-nh-inline-jflow-sample-rr-(svcs)-bytes-allocated</li><li>• mem-util-services-nh-inline-jflow-sample-rr-(svcs)-allocation-count</li><li>• mem-util-services-nh-inline-jflow-sample-rr-(svcs)-free-count</li><li>• mem-util-services-nh-inline-jflow-sample-nh-(svcs)-bytes-allocated</li><li>• mem-util-services-nh-inline-jflow-sample-nh-(svcs)-allocation-count</li><li>• mem-util-services-nh-inline-jflow-sample-nh-(svcs)-free-count</li></ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/system/linecard/npu/memory/	<p>Sensor for network processing unit (NPU) memory, NPU memory utilization, and total memory available for each memory type.</p> <p>Supported on QFX10000 switches and PTX1000 routers starting with Junos OS Release 17.2R1.</p> <p>Supported on EX9200 switches starting with Junos OS Release 17.3R1.</p> <p><b>NOTE:</b> Starting with Junos Release 17.4R1, FPC1 and FCP2 on PTX Series routers export data for NPU memory and NPU memory utilization. Previously, this sensor was supported only on FPC 3.</p> <p>Starting with Junos OS Release 18.3R1, EX4650 switches are supported.</p> <p>Starting with Junos OS Release 19.1R1, periodic streaming on PTX10002 routers is supported.</p> <p>Starting in Junos OS Release 19.2R1, MX960, MX2008, MX2010 and MX2020 routers and PTX1000 and PTX10000 routers are supported on gRPC and gNMI services.</p> <p>The OpenConfig path is /components/component[name="FPC&lt;fpc-id&gt;:NPU&lt;npu-id&gt;"] /properties/property/</p> <p>You can also add the following to the end of the path to stream specific statistics for NPU memory:</p> <ul style="list-style-type: none"> <li>• [name="mem-util-&lt;memory-name&gt;-size"]/value</li> <li>• [name="mem-util-&lt;memory-name&gt;-bytes-allocated"]/value</li> <li>• [name="mem-util-&lt;memory-name&gt;-utilization"]/value</li> <li>• [name="mem-util-&lt;partition-name&gt;-&lt; app-name&gt;-allocation-count"]/value</li> <li>• [name="mem-util-&lt;partition-name&gt;-&lt; app-name&gt;-bytes-allocated"]/value</li> <li>• [name="mem-util-&lt;partition-name&gt;-&lt; app-name&gt;-free-count"]/value</li> </ul> <p>You can also add the following to the end of the path to stream specific statistics for NPU:</p>

Table 5: gRPC Sensors (Continued)

resource path	Description
	<ul style="list-style-type: none"><li>• [name="util-&lt;memory-name&gt;-average-util"/&gt;/value</li><li>• [name="util-&lt;memory-name&gt;-highest-util"/&gt;/value</li><li>• [name="util-&lt;memory-name&gt;-lowest-util"/&gt;/value</li><li>• [name="util-&lt;memory-name&gt;-average-cache-hit-rate"/&gt;/value</li><li>• [name="util-&lt;memory-name&gt;-lowest-cache-hit-rate"/&gt;/value</li><li>• [name="util-&lt;packet-identifier&gt;-rate"/&gt;/value</li></ul> <p>You can also export the following statistics for NPU memory for PTX routers only</p> <ul style="list-style-type: none"><li>• pfe_name</li><li>• combined_pool_name</li><li>• combined_size</li><li>• combined_usage_cnt</li><li>• combined_utilization</li><li>• global_pool_name</li><li>• global_usage_cnt</li><li>• global_alloc_cnt</li><li>• global_free_cnt</li><li>• local_pool_name</li><li>• local_usage_cnt</li><li>• local_alloc_cnt</li><li>• local_free_cnt</li></ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/system/linecard/npu/memory/	<p>Sensor for NPU Memory utilization statistics.</p> <p>Shown below, statistics are exported for the default FPC (<b>FPC0</b>). Multiples FPCs are supported. The component values and property values are names (like interface names).</p> <p>Starting in Junos OS Evolved Release 19.4R1, streaming statistics using gRPC and gNMI services on PTX10008 routers is supported.</p> <p>Starting in Junos OS Release 20.2R1, INITIAL_SYNC statistics using gNMI services on MX960, MX2008, MX2010, MX2020, PTX1000, PTX5000 routers, PTX10000 line of routers, and QFX5100 and QFX5200 switches are supported.</p> <p>Starting in Junos OS Evolved Release 21.4R1, streaming statistics by means of gRPC and gNMI is supported on PTX10001-36MR, PTX10004, and PTX10008 routers.</p> <p>Supported on PTX10003 routers starting with Junos OS Release 22.3R1.</p> <p>Statistics are exported in the following format: /components/component[name='FPC*:NPU*']/properties/property[name=&lt;&gt;]/state/value</p> <p>The list below shows the property names:</p> <ul style="list-style-type: none"> <li>• /components-memory/component[name='FPC0:NPU17']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-kht-epp-mapid-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-kht-epp-mapid-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-kht-epp-mapid-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-kht-l2domain-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-kht-l2domain-allocated']/</li> </ul>

Table 5: gRPC Sensors (Continued)

resource path	Description
	<ul style="list-style-type: none"> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-kht-l2domain-utilizationn']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-kht-tunnell2domainhash00-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-kht-tunnell2domainhash00-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-kht-tunnell2domainhash00-utilization']/</li> <li>• :/components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-kht-tunnell2domainhash10-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-kht-tunnell2domainhash10-allocatedd']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-kht-tunnell2domainhash10-utilization']/</li> <li>• :/components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-kht-slu-my-mac-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-kht-slu-my-mac-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-kht-slu-my-mac-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-kht-dlu-idb-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-kht-dlu-idb-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-kht-dlu-idb-utilization']/ }</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-final-size']/</li> </ul>

Table 5: gRPC Sensors (Continued)

resource path	Description
	<ul style="list-style-type: none"> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-final-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-final-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-remap-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-remap-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-remap-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-refbits-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-refbits-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-refbits-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-nh-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-nh-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-nh-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-mpls-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-mpls-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-mpls-utilization']/</li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<ul style="list-style-type: none"> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-loadbal-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-loadbal-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-loadbal-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-egress-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-egress-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jnh-egress-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jtree-memory-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jtree-memory-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-jtree-memory-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-vfilter-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-vfilter-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-vfilter-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-phyfilter-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-phyfilter-allocated']/</li> </ul>



Table 5: gRPC Sensors (Continued)

resource path	Description
	<ul style="list-style-type: none"> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-phyfilter-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-action-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-action-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-action-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-tcam-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name=' mem-util-flt-tcam-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-tcam-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-fcv-blk-0-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-fcv-blk-0-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-fcv-blk-0-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-fcv-blk-1-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-fcv-blk-1-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-fcv-blk-1-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='']/</li> </ul>

Table 5: gRPC Sensors (Continued)

resource path	Description
	<ul style="list-style-type: none"> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-fcv-blk-2-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-fcv-blk-2-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-fcv-blk-2-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-fcv-blk-3-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-fcv-blk-3-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-fcv-blk-3-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-fcv-blk-4-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-fcv-blk-4-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-fcv-blk-4-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-scv-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-scv-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-scv-utilization']/</li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<ul style="list-style-type: none"> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-0-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-0-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-0-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-1-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-1-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-1-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-2-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-2-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-2-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-3-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-3-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-3-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-4-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-4-allocated']/</li> </ul>

Table 5: gRPC Sensors (Continued)

resource path	Description
	<ul style="list-style-type: none"> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-4-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-5-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-5-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-5-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-6-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-6-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-6-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-7-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-7-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-0-bank-7-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-0-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-0-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-0-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-1-size']/</li> </ul>

Table 5: gRPC Sensors (Continued)

resource path	Description
	<ul style="list-style-type: none"> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-1-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-1-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-2-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-2-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-2-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-3-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-3-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-3-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-4-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-4-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-4-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-5-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-5-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-5-utilization']/</li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<ul style="list-style-type: none"> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-6-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-6-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-6-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-7-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-7-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-beta-1-bank-7-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-alpha-0-kht-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-alpha-0-kht-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-alpha-0-kht-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-alpha-0-bft-0-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-alpha-0-bft-0-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-alpha-0-bft-0-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-alpha-0-plt-size']/</li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<ul style="list-style-type: none"> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-alpha-0-plt-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-alpha-0-plt-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-alpha-1-kht-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-alpha-1-kht-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-alpha-1-kht-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-alpha-1-bft-0-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-alpha-1-bft-0-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-alpha-1-bft-0-utilization']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-alpha-1-plt-size']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-alpha-1-plt-allocated']/</li> <li>• /components-memory/component[name='FPC0:NPU17']/properties/property[name='mem-util-flt-alpha-1-plt-utilization']/</li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/system/linecard/npu/utilization	<p>Sensor for NPU utilization on the Packet Forwarding Engine.</p> <p>Packet Forwarding Engine utilization is exported as a percentage using input notifications.</p> <p>The following packet statistics are also exported as part of this field:</p> <ul style="list-style-type: none"> <li>• Loopback (pps)</li> <li>• Recirculation (pps)</li> <li>• WAN and host inject (pps)</li> <li>• ASIC to host (pps)</li> </ul> <p>Shown below, statistics are exported for the default FPC (<b>FPC0</b>). Multiples FPCs are supported. The component values and property values are names (like interface names).</p> <p>Starting in Junos OS Evolved Release 19.4R1, streaming statistics using gRPC and gNMI services on PTX10008 routers is supported.</p> <p>The following statistics are exported:</p> <ul style="list-style-type: none"> <li>• /components-utilization/component[name='FPC0:NPU17']</li> <li>• /components-utilization/component[name='FPC0:NPU17']/properties/property[name='util-metric']</li> <li>• /components-utilization/component[name='FPC0:NPU17']/properties/property[name='util-Loopback-packet-rate']</li> <li>• components-utilization/component[name='FPC0:NPU17']/properties/property[name='util-Recirculation-packet-rate']</li> <li>• /components-utilization/component[name='FPC0:NPU17']/properties/property[name='util-Wan and Host inject-packet-rate']</li> <li>• /components-utilization/component[name='FPC0:NPU17']/properties/property[name='util-ASIC to host-packet-rate']</li> </ul>



Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/system/linecard/npu/utilization/	<p>Packet Forwarding Engine sensor for NPU processor utilization.</p> <p>Supported on MX Series routers with MPC10E-10C-MRATE and MPC10E-15C-MRATE line cards starting with Junos OS Release 19.3R1 for streaming telemetry information using gRPC services. This feature provides a different level of exported statistics in comparison to previous releases because it uses the OpenConfig AFT model.</p> <p>Supported on MX2010 and MX2020 routers with MX2K-MPC11E line cards starting with Junos OS Release 20.1R1 for streaming telemetry information using gRPC services.</p> <p>Supported on MX304 routers using Juniper proprietary gRPC and gNMI starting with Junos OS Release 22.1R1.</p> <p>Supported on MX960, MX2008, MX2010, MX2020, PTX1000, PTX5000 routers, PTX10000 line of routers, and QFX5100 and QFX5200 switches starting with Junos OS Release 20.2R1 and later for INITIAL_SYNC statistics using gNMI services.</p> <p>You can also include the following to the end of the resource path for NPU utilization:</p> <ul style="list-style-type: none"> <li>• util-metric</li> <li>• util-Disp 0 Pkts-packet-rate</li> <li>• util-Disp 0 Pkts-average-instructions-per-packet</li> <li>• util-Disp 0 Pkts-average-wait-cycles-per-packet</li> <li>• util-Disp 0 Pkts-average-cycles-per-packet</li> <li>• util-Disp 1 Pkts-packet-rate</li> <li>• util-Disp 1 Pkts-average-instructions-per-packet</li> <li>• util-Disp 1 Pkts-average-wait-cycles-per-packet</li> <li>• util-Disp 1 Pkts-average-cycles-per-packet</li> <li>• util-Disp 2 Pkts-packet-rate</li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<ul style="list-style-type: none"> <li>• util-Disp 2 Pkts-average-instructions-per-packet</li> <li>• util-Disp 2 Pkts-average-wait-cycles-per-packet</li> <li>• util-Disp 2 Pkts-average-cycles-per-packet</li> <li>• util-Disp 3 Pkts-packet-rate</li> <li>• util-Disp 3 Pkts-average-instructions-per-packet</li> <li>• util-Disp 3 Pkts-average-wait-cycles-per-packet</li> <li>• util-Disp 3 Pkts-average-cycles-per-packet</li> <li>• mem-util-EDMEM-average-util</li> <li>• mem-util-EDMEM-highest-util</li> <li>• mem-util-EDMEM-lowest-util</li> <li>• mem-util-EDMEM-average-cache-hit-rate</li> <li>• mem-util-EDMEM-highest-cache-hit-rate</li> <li>• mem-util-EDMEM-lowest-cache-hit-rate</li> <li>• mem-util-IDMEM-average-util</li> <li>• mem-util-IDMEM-highest-util</li> <li>• mem-util-IDMEM-lowest-util</li> <li>• mem-util-IDMEM-average-cache-hit-rate</li> <li>• mem-util-IDMEM-highest-cache-hit-rate</li> <li>• mem-util-IDMEM-lowest-cache-hit-rate</li> <li>• mem-util-Bulk DMEM-average-util</li> <li>• mem-util-Bulk DMEM-highest-util</li> <li>• mem-util-Bulk DMEM-lowest-util</li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<ul style="list-style-type: none"> <li>• mem-util-Bulk DMem-average-cache-hit-rate</li> <li>• mem-util-Bulk DMem-highest-cache-hit-rate</li> <li>• mem-util-Bulk DMem-lowest-cache-hit-rate</li> </ul>
/junos/system/linecard/npu/utilization/	<p>Packet Forwarding Engine sensor for NPU processor utilization.</p> <p>Periodic streaming is supported on PTX10002 routers starting with Junos OS Release 19.1R1.</p> <p>Starting with Junos OS Release 19.2R1, MX960, MX2008, MX2010 and MX2020 routers and PTX1000 and PTX10000 routers are supported on gRPC and gNMI services.</p> <p>Starting in Junos OS Evolved Release 21.4R1, streaming statistics by means of gRPC and gNMI is supported on PTX10001-36MR, PTX10004, and PTX10008 routers.</p>
/junos/system/linecard/optical	<p>Sensor for optical alarms. Configure this sensor for <i>et-type-fpc/pic/port</i> (100-Gigabit Ethernet) interfaces.</p> <p>Supported on ACX6360 Universal Metro, MX Series, and PTX Series routers with a CFP2-DCO optics module starting with Junos OS Release 18.3R1. This module provides a high-density, long-haul OTN transport solution with MACSec capability.</p> <p>Supported on MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches starting with Junos OS Release 19.2R1 on gRPC and gNMI services.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/system/linecard/otn	<p>Sensor for G.709 optical transport network (OTN) alarms. Configure this sensor on <i>ot-type-fpc/pic/port</i> interfaces.</p> <p>Supported on ACX6360 Universal Metro, MX Series, and PTX Series routers with a CFP2-DCO optics module starting with Junos OS Release 18.3R1. This module provides a high-density, long-haul OTN transport solution with MACSec capability.</p> <p>Supported on MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches starting with Junos OS Release 19.2R1 on gRPC and gNMI services.</p>
/junos/system/linecard/packet/usage/	<p>Sensor for Packet Forwarding Engine error and drop statistics. Use these statistics to optimize traffic engineering and improve your network design.</p> <p>When you include the resource path <i>/junos/system/linecard/packet/usage/</i> in a subscription, statistics are streamed in the format:</p> <pre>/components/component[name='FPC0:NPU3']/properties/property[name='hwds-dlu-not-routable']/state/value</pre> <p>Supported on PTX1000 and PTX5000 routers and QFX10002-60C switches using Juniper proprietary gRPC starting with Junos OS Release 22.1R1.</p> <p>Supported on PTX10003 routers starting with Junos OS Evolved Release 22.3R1.</p>
/junos/system/linecard/page-drops/page-drop/	<p>Sensor for CoS support. Use this sensor to stream CoS page-drop counters and interface details from a device to a collector. Page drop statistics include page drop counter, interface name and queue details.</p> <p>Supported on PTX5000 routers starting with Junos OS Release 22.2R1.</p> <p>Supported on PTX10003 routers starting with Junos OS Evolved Release 22.3R1.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/system/linecard/qmon-sw/	<p>Sensor for congestion and latency monitoring statistics.</p> <p>Supported on QFX5100, QFX5110, and QFX5200 switches starting with Junos OS Release 18.2R1.</p> <p>Supported on QFX5120-48Y and EX4650 switches starting with Junos OS Release 18.3R1.</p> <p>Supported on EX4600 switches starting with Junos OS Release 18.4R1.</p> <p>Supported on MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches starting with Junos OS Release 19.2R1 on gRPC and gNMI services.</p> <p>Supported on QFX5200 switches starting with Junos OS Release 19.2R1 for streaming telemetry information using gNMI services.</p> <p>Periodic streaming using gRPC services with EX4300-MP switches is supported starting with Junos OS Release 19.4R1.</p> <p>Periodic streaming using gRPC services is supported on EX3400 switches starting with Junos OS Release 20.2R1.</p> <p>INITIAL_SYNC statistics using gNMI services is supported on MX960, MX2008, MX2010, MX2020, PTX1000, PTX5000 routers, PTX10000 line of routers, and QFX5100 and QFX5200 switches starting with Junos OS Release 20.2R1.</p> <p>Periodic streaming is supported on QFX5120-48YM switches starting with Junos OS Release 20.4R1.</p> <p>Periodic streaming is supported on PTX5000, PTX1000, PTX10002, PTX10008, and PTX10016 routers and QFX10002, QFX10008, and QFX10016 switches starting with Junos OS Release 21.2R1.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
<p><code>/junos/system/linecard/services/inline-jflow</code></p>	<p>Sensor for inline active flow monitoring services statistics.</p> <p>Supported on MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches starting with Junos OS Release 19.2R1 on gRPC and gNMI services.</p> <p>When configuring inline active flow monitoring in Junos, you can apply version 9 or IPFIX flow templates to define a flow record template suitable for IPv4 or IPv6 MPLS and bridging traffic. For more information, see <i>Configuring Flow Aggregation on MX, M, vMX and T Series Routers and NFX250 to Use Version 9 Flow Templates</i>.</p> <p>Supported on MX Series operating with MPC10E-15C-MRATE line-rate cards starting with Junos OS Release 19.2R1.</p> <p>Supported on MX240, MX480, and MX960 routers starting with Junos OS Release 19.3R1 for exporting telemetry information using gNMI services. This feature includes support to export telemetry data for integration with AFTTelemetry and LibTelemetry libraries with the OpenConfig model openconfig-aft.</p> <p>Periodic streaming using gNMI services on MX2K-MPC11E line cards on MX2010 and MX2020 routers is supported starting with Junos OS Release 20.1R1.</p> <p>Periodic streaming using gRPC services on PTX10008 routers is supported starting with Junos OS Evolved Release 20.1R1.</p>
<p><code>/network-instances/network-instance[instance-name='name']/protocols/protocol/evpn/irb-interfaces/</code></p>	<p>Local integrated routing and bridging (IRB) interface information sensor.</p> <p>Use the <a href="https://apps.juniper.net/ydm-explorer/">https://apps.juniper.net/ydm-explorer/</a> tool to see leafs for this resource path.</p> <p>Starting with Junos OS Release 20.2R1, streaming statistics is supported using gRPC services with QFX5100, QFX5110, QFX5120, QFX5200, QFX10002-60C, QFX10002, QFX10008, and QFX10016 switches.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
<b>/network-instances/network-instance[instance-name='name']/protocols/protocol/evpn/vxlan-tunnel-end-point/</b>	<p>Overlay VX-LAN tunnel information sensor. This sensor also delivers VTEP information ON_CHANGE leafs:</p> <ul style="list-style-type: none"> <li>• source_ip_address</li> <li>• remote_ip_address</li> <li>• status</li> <li>• mode</li> <li>• nexthop-index</li> <li>• event-type</li> <li>• source-interface</li> </ul> <p>Starting with Junos OS Release 20.2R1, streaming statistics is supported using gRPC services with QFX5100, QFX5110, QFX5120, QFX5200, QFX10002-60C, QFX10002, QFX10008, and QFX10016 switches.</p>
<b>/network-instances/network-instance[instance-name='name']/mac_db/entries/entry/</b>	<p>EVPN MAC table information sensor.</p> <p>Use the <a href="#">Telemetry Explorer</a> tool to see leafs for this resource path.</p> <p>Starting with Junos OS Release 20.2R1, streaming statistics is supported using gRPC services with QFX5100, QFX5110, QFX5120, QFX5200, QFX10002-60C, QFX10002, QFX10008, and QFX10016 switches.</p>
<b>/network-instances/network-instance[instance-name='name']/macip_db/entries/entry/</b>	<p>MAC-IP or ARP-ND table sensor.</p> <p>Use the <a href="#">Telemetry Explorer</a> tool to see leafs for this resource path.</p> <p>Starting with Junos OS Release 20.2R1, streaming statistics is supported using gRPC services with QFX5100, QFX5110, QFX5120, QFX5200, QFX10002-60C, QFX10002, QFX10008, and QFX10016 switches.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/junos/system/linecard/optics/	<p>Sensor for various optical interface performance metrics, such as transmit and receive power levels.</p> <p>The following leaves streamed with the /junos/system/linecard/optics/ resource path return a value of -Inf dB milliwatt (dBm) when the power is 0 milliwatt (mW)), To view these statistics from the Junos CLI, use the operational mode command <b>show interface diagnostics optics</b>.</p> <ul style="list-style-type: none"> <li>• /interfaces/interface/optics/ laser_output_power_high_alarm_threshold_dbm</li> <li>• /interfaces/interface/optics/ laser_output_power_low_alarm_threshold_dbm</li> <li>• /interfaces/interface/optics/ laser_output_power_high_warning_threshold_dbm</li> <li>• /interfaces/interface/optics/ laser_output_power_low_warning_threshold_dbm</li> <li>• /interfaces/interface/optics/ laser_rx_power_high_alarm_threshold_dbm</li> <li>• /interfaces/interface/optics/ laser_rx_power_low_alarm_threshold_dbm</li> <li>• /interfaces/interface/optics/ laser_rx_power_high_warning_threshold_dbm</li> <li>• /interfaces/interface/optics/ laser_rx_power_low_warning_threshold_dbm</li> <li>• /interfaces/interface/optics/lanediags/lane/ lane_laser_output_power_dbm</li> <li>• /interfaces/interface/optics/lanediags/lane/ lane_laser_receiver_power_dbm</li> </ul> <p>The following resource paths are also supported on MX10004 starting with Junos OS Release 22.3R1:</p>



Table 5: gRPC Sensors (Continued)

resource path	Description
	<ul style="list-style-type: none"> <li>• /junos/system/linecard/optics/optics-diag[if-name =]</li> <li>• /junos/system/linecard/optics/optics-diag/if-name</li> <li>• /junos/system/linecard/optics/optics-diag/snmp-if-index</li> </ul> <p>MX10004 routers support these endpoints:</p> <ul style="list-style-type: none"> <li>• module_temp</li> <li>• module_temp_high_alarm_threshold</li> <li>• module_temp_low_alarm_threshold</li> <li>• module_temp_high_warning_threshold</li> <li>• module_temp_low_warning_threshold</li> <li>• laser_output_power_high_alarm_threshold_dbm</li> <li>• laser_output_power_low_alarm_threshold_dbm</li> <li>• laser_output_power_high_warning_threshold_dbm</li> <li>• laser_output_power_low_warning_threshold_dbm</li> <li>• laser_rx_power_high_alarm_threshold_dbm</li> <li>• laser_rx_power_low_alarm_threshold_dbm</li> <li>• laser_rx_power_high_warning_threshold_dbm</li> <li>• laser_rx_power_low_warning_threshold_dbm</li> <li>• laser_bias_current_high_alarm_threshold</li> <li>• laser_bias_current_low_alarm_threshold</li> <li>• laser_bias_current_high_warning_threshold</li> <li>• laser_bias_current_low_warning_threshold</li> <li>• module_temp_high_alarm</li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<ul style="list-style-type: none"> <li>• module_temp_low_alarm</li> <li>• module_temp_high_warning</li> <li>• module_temp_low_warning</li> </ul> <p>Supported on QFX10000 switches starting with Junos OS Release 17.2R1.</p> <p>Supported on PTX1000 routers and EX9200 switches starting with Junos OS Release 17.3R1.</p> <p>Supported on EX4650 switches starting with Junos OS Release 18.3R1.</p> <p>Supported on MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches starting with Junos OS Release 19.2R1 on gRPC and gNMI services.</p> <p>Supported on MX10 routers, PTX1000 and PTX10000 routers, and QFX5100 and QFX5200 switches starting with Junos OS Release 19.2R1 on gRPC and gNMI services.</p> <p>Supported on MX10008 routers starting with Junos OS Release 22.1R1 using Juniper proprietary gRPC.</p> <p>Supported on MX10004 routers starting with Junos OS Release 22.3R1 using Juniper proprietary gRPC.</p> <p>Supported on ACX7100-32C, ACX7100-48L, and ACX7024 routers starting with Junos OS Evolved Release 22.3R1.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
<pre>/mpls/lsp-constrained-path/tunnels/ tunnel[name='foo-name',source='foo-source']/p2p- tunnel-attributes/p2p-primary-paths[name='foo- path']/state/name</pre>	<p>Sensor to export the path name for ingress point-to-point LSPs, point-to-multipoint LSPs, bypass LSPs, and dynamically created LSPs.</p> <p>This sensor is supported on indicated platforms up to and including Junos OS Release 17.3R1. See the following resource paths for LSP support in Junos OS Release 17.4R1 and higher:</p> <ul style="list-style-type: none"> <li>• /network-instances/network-instance[name='instance-name']/mpls/lsp-constrained-path/tunnels/tunnel/p2p-tunnel-attributes/p2p-primary-paths/</li> <li>• /network-instances/network-instance[name='instance-name']/mpls/signaling-protocols/rsvp-te/sessions/session/state/notify-status</li> </ul> <p>Supported on PTX Series routers, MX Series routers , and QFX10002, QFX10008, and QFX10016 switches starting with Junos OS Release 17.2R1.</p>
<pre>/mpls/lsp-constrained-path/tunnels/ tunnel[name='foo-name',source='foo-source']/p2p- tunnel-attributes/p2p-primary-paths[name='foo- path']/lsp-instances[index='local-index']/state/</pre>	<p>Sensor to export LSP properties for ingress point-to-point LSPs, point-to-multipoint LSPs, bypass LSPs, and dynamically created LSPs</p> <p>Supported on PTX Series routers, MX Series routers, and QFX10002, QFX10008, and QFX10016 switches starting with Junos OS Release 17.2R1.</p> <p>The following end paths are also supported for the resource path:</p> <ul style="list-style-type: none"> <li>• bandwidth</li> <li>• metric</li> <li>• max-average-bandwidth</li> <li>• explicit-route-objects</li> <li>• record-route-objects</li> </ul>
<pre>/mpls/signaling-protocols/ldp/lsp-transit-policies/ lsp-transit-policy/state/counters</pre>	<p>Sensor to export statistics for LDP LSP transit traffic.</p> <p>Supported on MX Series routers starting with Junos OS Release 20.2R1.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/mpls/signaling-protocols/ldp/lsp-ingress-policies/ lsp-ingress-policy/state/counters	<p>Sensor to export statistics for LDP LSP ingress traffic.</p> <p>Supported on MX Series routers starting with Junos OS Release 20.2R1.</p>
/mpls/signaling-protocols/ldp/p2mp-lsps/p2mp-lsp/ state/counters	<p>Sensor to export statistics for multipoint LDP LSP traffic.</p> <p>Supported on MX Series routers starting with Junos OS Release 20.2R1.</p>
/mpls/signalling-protocols/ldp/p2mp-interfaces/ p2mp-interface/state/counters/	<p>Sensor to export statistics for multipoint LDP egress traffic per interface.</p> <p>Supported on MX Series routers starting with Junos OS Release 20.2R1.</p>
/mpls/signalling-protocols/ldp/p2mp-egress- interfaces/p2mp-interface/state/counters/	<p>Sensor to export statistics for multipoint LDP egress traffic per interface.</p> <p>Supported only on MPC10E-10C-MRATE, MPC10E-15C-MRATE, and MX2K-MPC11E line cards line cards on MX Series routers starting with Junos OS Release 20.3R1.</p>
/mpls/signalling-protocols/ldp/p2mp-interfaces/ p2mp-interface/	<p>Sensor to export statistics for multipoint LDP ingress traffic per interface.</p> <p>Supported on MX Series routers starting with Junos OS Release 20.2R1.</p>

Table 5: gRPC Sensors *(Continued)*

resource path	Description
<code>/mpls/lsp/signaling-protocols/rsvp-te/sessions/session[local-index='foo-index']/state/notify-status</code>	<p>Sensor to export statistics for ingress point-to-point LSPs, point-to-multipoint LSPs, bypass LSPs, and dynamically created LSPs.</p> <p>ON_CHANGE support for LSP events is only activated when the reporting interval is set to 0 in the subscription request.</p> <p>Supported on PTX Series routers, MX Series routers, and QFX10002, QFX10008, and QFX10016 switches starting with Junos OS Release 17.2R1.</p> <p>The following events are exported under this resource path:</p> <ul style="list-style-type: none"><li>• PATHERR_RECEIVED<ul style="list-style-type: none"><li>• TTL_EXPIRED</li><li>• NON_RSVP_CAPABLE_ROUTER</li><li>• RESVTEAR_RECEIVED</li><li>• PATH_MTU_CHANGE</li></ul></li></ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/network-instances/network-instance/mpls/signaling-protocols/rsvp-te/	<p>Sensor to export events for ingress point-to-point LSPs, point-to-multipoint LSPs, bypass LSPs, and dynamically created LSPs.</p> <p>Starting in Junos OS Evolved Release 19.2R1, PTX10003 routers support streaming statistics.</p> <p>The following end paths are also supported:</p> <ul style="list-style-type: none"> <li>• interface-attributes/interface/bandwidth-reservations/state/active-reservations-count</li> <li>• interface-attributes/interface/bandwidth-reservations/state/available-bandwidth</li> <li>• interface-attributes/interface/bandwidth-reservations/state/highwater-mark</li> <li>• interface-attributes/interface/bandwidth-reservations/state/reserved-bandwidth</li> <li>• interface-attributes/interface/counters/in-ack-messages</li> <li>• interface-attributes/interface/counters/in-hello-messages</li> <li>• interface-attributes/interface/counters/in-path-messages</li> <li>• interface-attributes/interface/counters/in-path-tear-messages</li> <li>• interface-attributes/interface/counters/in-reservation-error-messages</li> <li>• interface-attributes/interface/counters/in-reservation-messages</li> <li>• interface-attributes/interface/counters/in-reservation-tear-messages</li> <li>• interface-attributes/interface/counters/in-srefresh-messages</li> <li>• interface-attributes/interface/counters/out-path-tear-messages</li> <li>• interface-attributes/interface/counters/out-ack-messages</li> <li>• interface-attributes/interface/counters/out-hello-messages</li> </ul>

Table 5: gRPC Sensors *(Continued)*

resource path	Description
	<ul style="list-style-type: none"><li>• interface-attributes/interface/counters/out-path-messages</li><li>• interface-attributes/interface/counters/out-reservation-error-messages</li><li>• interface-attributes/interface/counters/out-reservation-messages</li><li>• interface-attributes/interface/counters/out-reservation-tear-messages</li><li>• interface-attributes/interface/counters/out-srefresh-messages</li><li>• neighbors/neighbor/state/neighbor-status</li><li>• sessions/session/record-route-objects/record-route-object</li><li>• sessions/session/state/destination-address</li><li>• sessions/session/state/label-in</li><li>• sessions/session/state/label-out</li><li>• sessions/session/state/lsp-id</li></ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/mpls/signaling-protocols/segment-routing/	<p>Sensor for traffic statistics for both ingress IP traffic and transit MPLS traffic..</p> <p>Supported on MX Series and PTX Series routers starting with Junos OS Release 18.3R1.</p> <p>The following end points are also supported and specify BGP Segment Routing traffic Engineering (SR-TE) transit statistics:</p> <ul style="list-style-type: none"> <li>• /sr-te-bsid-policies/sr-te-bsid-policy[binding-sid='80001', to-address='foo-to' color='foo-color']/state/counters[name='oc-xxx']/packets</li> <li>• /sr-te-bsid-policies/sr-te-bsid-policy[binding-sid='80001', to-address='foo-to' color='foo-color']/state/counters[name='oc-xxx']/bytes</li> </ul> <p>The following end points are also supported and specify BGP Segment Routing traffic Engineering (SR-TE) ingress statistics:</p> <ul style="list-style-type: none"> <li>• /sr-te-ip-policies/sr-te-ip-policy[to-address='foo-to' color='foo-color']/state/counters[name='oc-xxx']/packets</li> <li>• /sr-te-ip-policies/sr-te-ip-policy[to-address='foo-to' color='foo-color']/state/counters[name='oc-xxx']/bytes</li> </ul> <p>In addition to configuring the sensor, you must enable statistics collection using the statistics statement at the <code>[[edit protocols source-packet-routing telemetry statistics]</code> hierarchy level.</p>



Table 5: gRPC Sensors (*Continued*)

resource path	Description
<code>/junos/system/linecard/packet/usage/</code>	<p>Sensor for Packet Forwarding Engine Statistics. This sensor exports statistics for counters and provides visibility into Packet Forwarding Engine error and drop statistics.</p> <p>This sensor is supported starting on MX Series and PTX Series routers starting with Junos OS Release 17.4R1.</p> <p>Starting in Junos OS Evolved Release 19.1R1, PTX10003 routers are supported.</p> <p>Starting in Junos OS Release 19.2R1, MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5200 switches are supported on gRPC and gNMI services.</p> <p>Starting with Junos OS Evolved Release 19.4R1, periodic streaming using gNMI services with PTX10003 routers is supported.</p>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
<p>/junos/system/linecard/packet/usage/</p>	<p>Sensor for Packet Forwarding Engine Statistics. This sensor exports statistics and provides visibility into Packet Forwarding Engine error and drop statistics. Statistics include counters (CC, CPU, and NPU) for traffic data. Note that NPU statistics are different than those streamed from the sensors <code>/junos/system/linecard/npu/memory/</code> and <code>/junos/system/linecard/npu/utilization/</code>. Sensor output is comparable to the output using the operational mode command <b>show pfe statistics traffic</b>.</p> <p>Shown below, statistics are exported for the default FPC (<b>FPC0</b>). Multiples FPCs are supported. The component values and property values are names (like interface names).</p> <p>Starting in Junos OS Evolved Release 19.4R1, streaming statistics using gRPC and gNMI services on PTX10008 routers is supported.</p> <p>Starting in Junos OS Release 20.2R1, INITIAL_SYNC statistics using gNMI services on MX960, MX2008, MX2010, MX2020, PTX1000, PTX5000 routers, PTX10000 line of routers, and QFX5100 and QFX5200 switches are supported.</p> <p>Starting in Junos OS Evolved Release 21.4R1, streaming statistics by means of gRPC and gNMI is supported on PTX10001-36MR, PTX10004, and PTX10008 routers.</p> <p>The following paths are also supported:</p> <ul style="list-style-type: none"> <li>• <code>:/components/component[name='FPC0:CC0']/properties/property[name='ts-input-packets']/</code></li> <li>• <code>/components/component[name='FPC0:CC0']/properties/property[name='ts-output-packets']/</code></li> <li>• <code>//components/component[name='FPC0:CC0']/properties/property[name='ts-input-packets-pps']/</code></li> <li>• <code>/components/component[name='FPC0:CC0']/properties/property[name='ts-output-packets-pps']/</code></li> <li>• <code>/components/component[name='FPC0:CC0']/properties/property[name='ts-fabric-input-packets']/</code></li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<ul style="list-style-type: none"> <li>• /components/component[name='FPC0:CC0']/properties/property[name='ts-fabric-input-packets-pps']/</li> <li>• /components/component[name='FPC0:CC0']/properties/property[name='ts-fabric-output-packets']/</li> <li>• /components/component[name='FPC0:CC0']/properties/property[name='ts-fabric-output-packets-pps']/</li> <li>• /components/component[name='FPC0:CPU0']/properties/property[name='lts-input-packets']/</li> <li>• /components/component[name='FPC0:CPU0']/properties/property[name='lts-output-packets']/</li> <li>• /components/component[name='FPC0:CPU0']/properties/property[name='lts-sw-input-control-drops']/</li> <li>• /components/component[name='FPC0:CPU0']/properties/property[name='lts-sw-input-high-drops']/</li> <li>• /components/component[name='FPC0:CPU0']/properties/property[name='lts-sw-input-medium-drops']/</li> <li>• /components/component[name='FPC0:CPU0']/properties/property[name='lts-sw-input-low-drops']/</li> <li>• /components/component[name='FPC0:CPU0']/properties/property[name='lts-sw-output-low-drops']/</li> <li>• /components/component[name='FPC0:CPU0']/properties/property[name='lts-hw-input-drops']/</li> <li>• /components/component[name='FPC0:NPU0']/properties/property[name='hwdsNormal']/</li> <li>• /components/component[name='FPC0:NPU0']/properties/property[name='hwds-data-error']/</li> <li>• /components/component[name='FPC0:NPU0']/properties/property[name='hwds-tcp-error']/</li> </ul>

Table 5: gRPC Sensors *(Continued)*

resource path	Description
	<ul style="list-style-type: none"><li>• /components/component[name='FPC0:NPU0']/properties/property[name='hwds-illegal-nh']/</li><li>• /components/component[name='FPC0:NPU0']/properties/property[name='hwds-invalid-iif']/  //components/component[name='FPC0:NPU0']/properties/property[name='hwds-fabric']/</li></ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
<code>/junos/system/linecard/packet-capture</code>	<p>Sensor for secure packet capture.</p> <p>Starting in Junos OS Release 21.2R1 on EX4400 switches, we support secure packet capture. You can use this feature to capture packets from a device and send them over a secure channel to an external collector (in the cloud) for monitoring and analysis. The maximum size of the packet you can capture is 128 bytes, including the packet header and the data within. Network professionals use real-time packet capture data to troubleshoot complex issues such as network and performance degradation and poor end-user experience.</p> <p>To use secure packet capture, include the <code>/junos/system/linecard/packet-capture</code> resource path using a Junos RPC call.</p> <p>For ingress packet capture, include the <code>packet-capture</code> option in the existing firewall filter configuration at the</p> <pre>[edit firewall family family-name filter filter-name term match-term then     packet-capture]</pre> <p>hierarchy level. Do this before you send packet capture sensor data to the collector and remove the <code>packet-capture</code> configuration after data is sent to the collector. After the capture is done, ingress packets with the filter match conditions are trapped to the CPU. The trapped packets then go to the collector over a secure channel in JTI-specified format in key-value pairs by means of Remote Procedure Call (gRPC) transport.</p> <p>For egress packet capture on physical interfaces (<code>ge-*</code>, <code>xe-*</code>, <code>mge-*</code>, and <code>et-*</code>), include "packet-capture-telemetry," "egress," and "interface &lt;interface-name&gt;" at the <code>[edit forwarding-options]</code> hierarchy level. For example:</p> <pre>set forwarding-options packet-capture-telemetry egress interface ge-0/0/0  set forwarding-options packet-capture-telemetry egress interface ge-0/0/10</pre> <p>You can add multiple interfaces on the device for egress packet capture. When configured, host-bound egress packets are captured</p>

Table 5: gRPC Sensors *(Continued)*

resource path	Description
	from the interface and sent to the collector. As with the ingress configuration, remove the configuration when packet capture is not required.

Table 5: gRPC Sensors (*Continued*)

resource path	Description
/interfaces/	<p>Sensor for device monitoring.</p> <p>To stream statistics, use the resource path <b>/interfaces/</b> in a subscription to export statistics to a collector in the following format: <code>/interfaces/interface[name='et-*/*/*']/</code>.</p> <p>Exported statistics include the following:</p> <ul style="list-style-type: none"> <li>• <code>/interfaces/interface[name='et-*/*/*']/init_time</code></li> <li>• <code>/interfaces/interface[name='et-*/*/*']/oper-status</code></li> <li>• <code>/interfaces/interface[name='et-*/*/*']/parent_ae_name</code></li> <li>• <code>/interfaces/interface[name='et-*/*/*']/in-pkts</code></li> <li>• <code>/interfaces/interface[name='et-*/*/*']/in-octets</code></li> <li>• <code>/interfaces/interface[name='et-*/*/*']/in-unicast-pkts</code></li> <li>• <code>/interfaces/interface[name='et-*/*/*']/in-multicast-pkts</code></li> <li>• <code>/interfaces/interface[name='et-*/*/*']/in-broadcast-pkts</code></li> <li>• <code>/interfaces/interface[name='et-*/*/*']/in-pause-pkts</code></li> <li>• <code>/interfaces/interface[name='et-*/*/*']/out-pkts</code></li> <li>• <code>/interfaces/interface[name='et-*/*/*']/out-octets</code></li> <li>• <code>/interfaces/interface[name='et-*/*/*']/out-unicast-pkts</code></li> <li>• <code>/interfaces/interface[name='et-*/*/*']/out-multicast-pkts</code></li> <li>• <code>/interfaces/interface[name='et-*/*/*']/out-broadcast-pkts</code></li> <li>• <code>/interfaces/interface[name='et-*/*/*']/out-pause-pkts</code></li> <li>• <code>/interfaces/interface[name='et-*/*/*']/in-errors</code></li> <li>• <code>/interfaces/interface[name='et-*/*/*']/in-discards</code></li> <li>• <code>/interfaces/interface[name='et-*/*/*']/out-errors</code></li> </ul>

Table 5: gRPC Sensors (*Continued*)

resource path	Description
	<ul style="list-style-type: none"> <li>• /interfaces/interface[name='et-*/*/*']/out-discards</li> </ul> <p>Supported starting in Junos OS 22.3R1 on PTX10003 routers.</p>
<p>/qos/interfaces/interface/output/queues/queue/state/</p>	<p>Sensor for CoS telemetry support.</p> <p>To stream statistics, use the resource path <b>/qos/interfaces/interface/output/queues/queue/state/</b> in a subscription to retrieve statistics from a router to a collector in the following format: /qos/interfaces/interface[interface-id='xe-1/1/5:0'] .</p> <p>The following end points are supported:</p> <ul style="list-style-type: none"> <li>• /queues/queue[name='0']/state/transmit-pkts</li> <li>• /queues/queue[name='0']/state/transmit-octets</li> <li>• /queues/queue[name='0']/state/dropped-pkts</li> </ul> <p>Starting in Junos OS Evolved Release 21.4R1, streaming statistics by means of gRPC and gNMI is supported on PTX10001-36MR, PTX10003, PTX10004, PTX10008, and PTX10016 routers.</p>
<p>/system/alarms/alarm</p>	<p>INITIAL_SYNC support for OpenConfig data model openconfig-platform.yang and openconfig-alarms.yang. This feature lets the collector have a complete view of the current state of every sensor it is subscribed to. INITIAL_SYNC requires that at least one copy of all the sensors be sent to the collector.</p> <p>Starting in Junos OS Evolved Release 21.4R1, streaming statistics by means of gRPC and gNMI is supported on PTX10001-36MR, PTX10003, PTX10004, PTX10008, and PTX10016 routers.</p>



**Table 6: Broadband Edge gRPC Sensors**

resource path	Description
<p>/junos/system/subscriber-management/chassis/virtual-chassis-ports/virtual-chassis-port</p> <p>/junos/system/subscriber-management/chassis/virtual-chassis-ports/virtual-chassis-port[vcp-interface-name=<i>vcp-interface-port-string</i>] (to specify the interface name)</p>	<p>Virtual chassis port counter sensor.</p> <p>The sensor includes these statistics:</p> <ul style="list-style-type: none"> <li>• Input packets</li> <li>• Output packets</li> <li>• Input bytes</li> <li>• Output bytes</li> </ul> <p>Starting with Junos OS Release 20.2R1, streaming statistics from a virtual chassis is supported using gRPC services with MX480, MX960, MX10003, MX2010, and MX2020 routers.</p>
<p>/junos/system/subscriber_management/dynamic-interfaces/interface-sets/meta-data/interface[sid-id=<i>sid-value</i>]/</p>	<p>Sensor for subscriber interface information.</p> <p>ON-CHANGE streaming is supported.</p> <p>The following end paths are supported:</p> <ul style="list-style-type: none"> <li>• interface-index-The system assigned interface index for the interface.</li> <li>• session-type-The type of client session (e.g VLAN, DHCP, PPPoE).</li> <li>• user-name-The login name for this interface and session.</li> <li>• profile-name-The name of the client profile used to create the interface.</li> <li>• underlying-interface-name-The name of the associated underlying interface.</li> <li>• cvlan-tag-The innermost VLAN tag value associated with the interface.</li> <li>• svlan-tag-The outermost VLAN tag value associated with the interface.</li> </ul>

**Table 6: Broadband Edge gRPC Sensors (Continued)**

resource path	Description
<pre>/junos/system/subscriber_management/dynamic- interfaces/interface-sets/meta-data/ interface[sid-id='sid-value']/</pre>	<p>Sensor for actual accounting statistics for dynamic subscriber interfaces.</p> <p>The following end paths are supported:</p> <ul style="list-style-type: none"> <li>• ip-in-packets-The number of actual transit IPv4 &amp; IPv6 packets received by the interface.</li> <li>• ip-out-packets-The number of actual transit IPv4 &amp; IPv6 packets sent to the interface.</li> <li>• ip-in-bytes-The number of actual transit IPv4 &amp; IPv6 bytes received by the interface.</li> <li>• ip-out-bytes-The number of actual transit IPv4 &amp; IPv6 bytes received by the interface.</li> <li>• ipv6-in-packets-The number of actual transit IPv6 packets received by the interface.</li> <li>• ipv6-out-packets-The number of actual transit IPv6 packets sent to the interface.</li> <li>• ipv6-in-bytes-The number of actual transit IPv6 bytes received by the interface.</li> <li>• ipv6-out-bytes-The number of actual transit IPv6 bytes sent to the interface.</li> </ul>
<pre>/junos/system/linecard/ddos/</pre>	<p>This PFE sensor exports the statistics of DDOS from MPC1, MPC2, MPC3, MPC5, MPC6, MPC7, MPC8, and MPC9 line cards.</p>

**Change History Table**

Feature support is determined by the platform and release you are using. Use [Feature Explorer](#) to determine if a feature is supported on your platform.

Release	Description
22.4R1	Starting in Junos OS Evolved Release 22.4R1 you can stream statistics for IPv4 and IPv6 traffic statistics using the resource path <code>/junos/system/linecard/interface/traffic/</code> .

22.3R1	Junos OS and Junos OS Evolved Release 22.3R1 introduces improved performance time for the initial sync of telemetry statistics. This enhancement applies to subscription requests for the top-level sensor path <code>/network-instances/network-instance/afts</code> .
20.3R1	Starting with Junos OS Release 20.3R1, gRPC service for exporting LDP and mLDP statistics is supported on MPC10E-10C-MRATE, MPC10E-15C-MRATE, and MX2K-MPC11E line cards.
20.2R1	Starting with Junos OS Evolved Release 20.2R1, gRPC service for streaming NDP statistics is supported on PTX10001 routers.
20.2R1	Starting with Junos OS Release 20.2R1, gRPC service for streaming Packet forwarding Engine and Routing Engine statistics is supported on EX2300, EX2300-MP, and EX3400 switches.
20.2R1	Starting with Junos OS Release 20.2R1, gRPC service for streaming BGP routing information base (RIB) and BGP peer statistics is supported on any platform family that supports containerized routing protocol process (cRPD). cRPD is Juniper's routing protocol process (rpd) decoupled from Junos OS and packaged as a Docker container to run in Linux-based environments.
20.2R1	Starting with Junos OS Release 20.2R1, ON_CHANGE BGP peer statistics export using gRPC services and gNMI services is supported on MX960, MX2008, MX2010, MX2020, PTX1000, PTX5000, PTX10000 routers and QFX5100 and QFX5200 switches.
20.2R1	Starting with Junos OS Release 20.2R1, streaming BGP global, peer and perr groups statistics using gRPC services is supported on EX2300, EX3400, EX4300, EX4600, and EX9200 switches.
20.2R1	Starting with Junos OS Release 20.2R1, streaming revenue interface statistics through Packet Forwarding Engine sensors and pseudo interface statistics through Routing Engine sensors using gRPC services and gNMI services is supported on SRX5400, SRX5600, and SRX5800 Services Gateways..
20.2R1	Starting with Junos OS Release 20.2R1, streaming revenue interface statistics through Packet Forwarding Engine sensors and pseudo interface statistics through Routing Engine sensors using gRPC services and gNMI services is supported on SRX5400, SRX5600, and SRX5800 Services Gateways.
20.2R1	Starting with Junos OS Release 20.2R1 sensors to stream standby Routing Engine statistics are supported on MX480, MX960, MX10003, MX2010, and MX2020 routers.
20.2R1	Starting with Junos OS Release 20.2R1 sensors to stream EVPN statistics using gRPC services are supported with QFX5100, QFX5110, QFX5120, QFX5200, QFX10002-60C, QFX10002, QFX10008, and QFX10016 switches.

20.2R1	Starting with Junos OS Release 20.2R1, gRPC service for exporting LDP and mLDP statistics is supported on MX Series routers.
20.1R1	Starting with Junos Release 20.1R1, gNMI service for streaming telemetry sensors for Packet Forwarding Engine statistics is supported on MX2K-MPC11E line cards on MX2010 and MX2020 routers.
19.4R1	Starting with Junos OS Release 19.4R1, gRPC service for streaming Packet Forwarding Engine and Routing Engine statistics is supported on EX4300-MP switches.
19.3R1	Starting with Junos OS Release 19.3R1, gNMI services for streaming Packet Forwarding Engine statistics is supported on MX240, MX480 and MX960 routers.
19.3R1	Starting with Junos OS Release 19.3R1, gRPC service for exporting statistics is supported on MX Series routers hosting MPC10E-10C-MRATE and MPC10E-15C-MRATE line cards. The resource paths <code>/junos/system/linecard/cpu/memory/</code> , <code>/junos/system/linecard/npn/memory/</code> , and <code>/junos/system/linecard/npn/utilization/</code> can be updated to call out individual sensors (leaves) and their respective paths for better clarity.
19.3R1	Starting with Junos OS Evolved Release 19.3R1, gRPC service for exporting statistics is supported on QFX5220-128C and QFX5220-32CD switches.
19.2R1	Starting with Junos OS Release 19.2R1, SRX4100, SRX4200, SRX4600, SRX5400, SRX5600, SRX5800, and vSRX Virtual Firewall Series Services Gateways are supported.
19.2R1	Starting with Junos OS Release 19.2R1, gNMI services for streaming Packet Forwarding Engine statistics is supported on MX960, MX2008, MX2010 and MX2020 routers, PTX1000 and PTX10000 routers, and QFX5100 and QFX5200 switches.
19.2R1	Starting with Junos OS Release 19.2R1, gNMI services for streaming statistics is supported on QFX5110, QFX5120, QFX5200 and QFX5210 switches.
19.2R1	Starting with Junos OS Release 19.3R1, gNMI services for streaming and ON_CHANGE export of Routing Engine statistics is supported on MX960, MX2010, MX2020, PTX5000, PTX1000, and PTX10000 routers.
19.1R1 EVO	Starting in Junos OS Evolved Release 19.1R1, OpenConfig (OC) and Junos Telemetry Interface (JTI) are supported. Both gRPC APIs and the customer-facing CLI remain the same as for the Junos OS. As was standard for Junos OS, Network Agent (NA) and OC packages are part of the Junos OS Evolved image.

19.1R1	Starting with Junos OS Evolved 19.1R1, Packet Forwarding Engine sensors on PTX10003 routers are also supported.
18.4R1	Starting with Junos OS Release 18.4R1, MX480, MX960, MX2010, MX2020, MX2008 and MX-ELM routers are also supported.
18.3R1	Starting with Junos OS Release 18.3R1, ON_CHANGE streaming of LLDP telemetry sensor information is supported through gRPC for MX Series and PTX Series routers.
18.3R1	Starting with Junos OS Release 18.3R1, QFX5120-48Y and EX4650 switches are also supported.
18.3R1	Starting with Junos OS Release 18.4R1, EX4600 switches are also supported.
18.2R1	Starting with Junos OS Release 18.2R1, PTX10002 routers are also supported.
18.1R1	Starting with Junos OS Release 18.1R1, QFX5210-64C switches and QFX5100 switches are also supported.
18.1R1	Starting with Junos OS Release 18.1R1, ON_CHANGE streaming of ARP, ND, and IP sensor information associated with interfaces is supported through gRPC for MX Series routers and PTX Series routers.
17.4R1	Starting with Junos OS Release 17.4R1, PTX10016 routers and virtual MX Series (vMX) routers are also supported.
17.3R1	Starting with Junos OS Release 17.3R1, QFX5110 switches, EX4600, EX4600-VC, and EX9200 switches and the Routing and Control Board (RCB) on PTX3000 routers are also supported.
17.3R1	Starting with Junos OS Release 17.3R1, broadband edge (BBE) gRPC sensors are supported.
17.3R1	In Junos OS Release 17.3R1, broadband edge (BBE) gRPC sensor /junos/system/subscriber-management/client-protocols/dhcp/v4/routing-instances/routing-instance[ri-name=' <i>routing-instance-name</i> ' ] /server/statistics/ the only value supported for <i>routing-instance-name</i> is default.
17.3R1	In Junos OS Release 17.3R1, broadband edge (BBE) gRPC sensor /junos/system/subscriber-management/client-ancpinstance[ri-name=' <i>routing-instance-name</i> ' ] /server/statistics/ the only value supported for <i>routing-instance-name</i> is default.
17.3R1	In Junos OS Release 17.3R1, broadband edge (BBE) gRPC sensor /junos/system/subscriber-management/client-protocols/dhcp/v4/routing-instances/routing-instance[ri-name=' <i>routing-instance-name</i> ' ]/relay/statistics/ the only value supported for the value <i>routing-instance-name</i> is default.

17.3R1	In Junos OS Release 17.3R1, broadband edge (BBE) gRPC sensor /junos/system/subscriber-management/client-protocols/dhcp/v6/ routing-instances/routing-instance[ri-name= ' <i>routing-instance-name</i> ' ]/server/statistics the only value supported for <i>routing-instance-name</i> is default.
17.3R1	In Junos OS Release 17.3R1, broadband edge (BBE) gRPC sensor /junos/system/subscriber-management/client-protocols/dhcp/v6/ routing-instances/routing-instance[ri-name= ' <i>routing-instance-name</i> ' ]/relay/statistics the only value supported for <i>routing-instance-name</i> is default.
17.2R1	Starting with JunosOS Release 17.2R1, QFX10002, QFX10008, and QFX10016 switches, QFX5200 switches, and PTX1000 and PTX10008 routers are also supported.
16.1R3	Starting with Junos OS Release 16.1R3, the Junos Telemetry Interface supports gRPC remote procedure calls (gRPC) to provision sensors and to subscribe to and receive telemetry data on MX Series routers and PTX3000 and PTX5000 routers.

## RELATED DOCUMENTATION

| *Understanding OpenConfig and gRPC on Junos Telemetry Interface*

# 3

CHAPTER

## OpenConfig to Junos Mapping

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# Mapping OpenConfig 802.1X Commands to Junos Configuration

## IN THIS SECTION

- [802.1X Interface Configuration](#) | 148



**NOTE:** See "[OpenConfig Data Model Version](#)" on [page 3](#) for supported versions of the OpenConfig data model.

## 802.1X Interface Configuration

See [Table 7 on page 149](#) for configuration mappings of the following OpenConfig paths under `/oc-if:interfaces/oc-if:interface/oc-eth:ethernet/oc-1x:dot1x/oc-1x:config/`:

- `authenticate-port`
- `host-mode`
- `reauthenticate-interval`
- `retransmit-interval`
- `supplicant-timeout`
- `max-requests`
- `server-fail-vlan`
- `auth-fail-vlan`

**Table 7: 802.1X Configuration**

<i>Command</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
Authenticate port	<pre> openconfig-interfaces:interfaces {   interface ge-0/0/3 {     openconfig-if-ethernet:ethernet {       openconfig-1x:dot1x {         config {           authenticate-port;         }       }     }   } } </pre>	<pre> protocols {   dot1x {     authenticator {       interface &lt;&gt; {         disable;       }     }   } } </pre>

OpenConfig path: **/oc-if:interfaces/oc-if:interface/oc-eth:ethernet/oc-1x:dot1x/oc-1x:config/authenticate-port**

Host (supplicant) mode	<pre> openconfig-interfaces:interfaces {   interface ge-0/0/3 {     openconfig-if-ethernet:ethernet {       openconfig-1x:dot1x {         config {           host-mode &lt;&gt;;         }       }     }   } } </pre>	<pre> protocols {   dot1x {     authenticator {       interface &lt;&gt; {         supplicant &lt;&gt;;       }     }   } } </pre>
------------------------	---	--

OC options for host-mode are SINGLE\_HOST, MULTI\_HOST, and MULTI\_DOMAIN.

Junos options for supplicant mode are single, single-secure, and multiple.

OpenConfig path: **/oc-if:interfaces/oc-if:interface/oc-eth:ethernet/oc-1x:dot1x/oc-1x:config/host-mode**

Table 7: 802.1X Configuration (Continued)

Command	OpenConfig Configuration	Junos Configuration
Reauthenticate interval	<pre> openconfig-interfaces:interfaces {   interface ge-0/0/3 {     openconfig-if-ethernet:ethernet {       openconfig-1x:dot1x {         config {           reauthenticate-interval &lt;&gt;;         }       }     }   } } </pre>	<pre> protocols {   dot1x {     authenticator {       interface &lt;&gt; {         reauthentication &lt;&gt;;       }     }   } } </pre>

You can configure the reauthentication interval for 1 to 65535 seconds.

OpenConfig path: **/oc-if:interfaces/oc-if:interface/oc-eth:ethernet/oc-1x:dot1x/oc-1x:config/reauthenticate-interval**

Retransmit interval	<pre> openconfig-interfaces:interfaces {   interface ge-0/0/3 {     openconfig-if-ethernet:ethernet {       openconfig-1x:dot1x {         config {           retransmit-interval &lt;&gt;;         }       }     }   } } </pre>	<pre> protocols {   dot1x {     authenticator {       interface &lt;&gt; {         transmit-period &lt;&gt;;       }     }   } } </pre>
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You can configure the retransmit interval for 1 to 65535 seconds.

OpenConfig path: **/oc-if:interfaces/oc-if:interface/oc-eth:ethernet/oc-1x:dot1x/oc-1x:config/retransmit-interval**

Table 7: 802.1X Configuration (Continued)

Command	OpenConfig Configuration	Junos Configuration
Supplicant timeout	<pre> openconfig-interfaces:interfaces {   interface ge-0/0/3 {     openconfig-if-ethernet:ethernet {       openconfig-1x:dot1x {         config {           supplicant-timeout &lt;&gt;;         }       }     }   } } </pre>	<pre> protocols {   dot1x {     authenticator {       interface &lt;&gt; {         supplicant-timeout &lt;&gt;;       }     }   } } </pre>

You can configure the supplicant timeout for 1 to 60 seconds.

OpenConfig path: **/oc-if:interfaces/oc-if:interface/oc-eth:ethernet/oc-1x:dot1x/oc-1x:config/supplicant-timeout**

Maximum requests	<pre> openconfig-interfaces:interfaces {   interface ge-0/0/3 {     openconfig-if-ethernet:ethernet {       openconfig-1x:dot1x {         config {           max-requests &lt;&gt;;         }       }     }   } } </pre>	<pre> protocols {   dot1x {     authenticator {       interface &lt;&gt; {         maximum-requests &lt;&gt;;       }     }   } } </pre>
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You can configure 1 to 10 maximum requests.

OpenConfig path: **/oc-if:interfaces/oc-if:interface/oc-eth:ethernet/oc-1x:dot1x/oc-1x:config/max-requests**

Table 7: 802.1X Configuration (Continued)

Command	OpenConfig Configuration	Junos Configuration
Server fail VLAN	<pre> openconfig-interfaces:interfaces {   interface ge-0/0/3 {     openconfig-if-ethernet:ethernet {       openconfig-1x:dot1x {         config {           server-fail-vlan &lt;&gt;;         }       }     }   } } </pre>	<pre> protocols {   dot1x {     authenticator {       interface &lt;&gt; {         server-fail {           vlan-name &lt;&gt;;         }       }     }   } } </pre>

OpenConfig path: /oc-if:interfaces/oc-if:interface/oc-eth:ethernet/oc-1x:dot1x/oc-1x:config/server-fail-vlan

Authentication fail (server reject) VLAN	<pre> openconfig-interfaces:interfaces {   interface ge-0/0/3 {     openconfig-if-ethernet:ethernet {       openconfig-1x:dot1x {         config {           auth-fail-vlan &lt;&gt;;         }       }     }   } } </pre>	<pre> protocols {   dot1x {     authenticator {       interface &lt;&gt; {         server-reject-vlan {           vlan-name &lt;&gt;;         }       }     }   } } </pre>
--	--	--

OpenConfig path: /oc-if:interfaces/oc-if:interface/oc-eth:ethernet/oc-1x:dot1x/oc-1x:config/auth-fail-vlan

# Mapping OpenConfig AAA Commands to Junos Operation



**NOTE:** See ["OpenConfig Data Model Version" on page 3](#) topic to understand the data models supported version and its Junos OS release for Juniper Networks ACX Series, EX Series, MX Series, PTX Series, and QFX Series.

The following tables show the mapping of OpenConfig AAA configurations with the relevant configuration in Junos OS.

- [Table 8 on page 153](#): Global AAA Configuration
- [Table 9 on page 154](#): RADIUS Server Configuration
- [Table 10 on page 156](#): Accounting Event Configuration
- [Table 11 on page 156](#): Accounting-method Configuration
- [Table 12 on page 157](#): Authorization Roles Configuration
- [Table 13 on page 158](#): Authorization Permissions Configuration: Authorization Permissions Configuration
- [Table 14 on page 159](#): Authorization Permissions Configuration
- [Table 15 on page 160](#): Authorization Policies and request-regex Configuration
- [Table 16 on page 162](#)[Table 16 on page 162](#): TACACS Server Configuration
- [Table 17 on page 163](#): AAA Admin and User Configuration

**Table 8: Global AAA Configuration**

Command Name	OpenConfig Command Path	Junos Configuration
	Command path prefix: <code>/system/aaa</code>	

Table 8: Global AAA Configuration (*Continued*)

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Config-Name	/server-groups/server-group/ config/name	Not supported  <b>NOTE:</b> There is no equivalent configuration in the Junos OS for this path. The configured server group name is used in the RADIUS/TACACS attributes configuration.
Server-Config-Address	/server-groups/server-group/ servers/server/config/address	Not supported  <b>NOTE:</b> There is no equivalent configuration in the Junos OS for this path. The configured server address is used in the RADIUS/TACACS attributes configuration.
Server-Config-Name	/server-groups/server-group/ servers/server/config/name	Not supported  <b>NOTE:</b> There is no equivalent configuration in the Junos OS for this path. You can configure a server name to identify the server.
Config-Timeout	/server-groups/server-group/ servers/server/config/timeout	Not supported  <b>NOTE:</b> There is no equivalent configuration in the Junos OS for this path. However, the timeout configured is derived from the timeout parameter at the Junos OS edit radius-server or edit tacplus-server hierarchy level.

Table 9: RADIUS Server Configuration

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
	Command path prefix:  <b>/system/aaa</b>	

Table 9: RADIUS Server Configuration (Continued)

Command Name	OpenConfig Command Path	Junos Configuration
Auth-Port	/server-groups/server-group/servers/server/radius/config/auth-port	set system radius-server <i>address</i> port <i>port</i>  <b>NOTE:</b> The <i>address</i> value is derived from the value configured after server. The <i>port</i> value is the same value as <i>auth-port</i> .
Retransmit-Attempts	/server-groups/server-group/servers/server/radius/config/retransmit-attempts	set system radius-server <i>address</i> retry <i>retry</i>  <b>NOTE:</b> The <i>address</i> value is derived from the value configured after server. The <i>retry</i> value is the same value as that specified for retransmit-attempts.
Secret-Key	/server-groups/server-group/servers/server/radius/config/secret-key	set system radius-server <i>address</i> secret <i>secret</i>  <b>NOTE:</b> The <i>address</i> value is derived from the value configured after server. The <i>secret</i> value is the same value as that specified for secret-key.
Source-Address	/server-groups/server-group/servers/server/radius/config/source-address	set system radius-server <i>address</i> source-address <i>source-address</i>  <b>NOTE:</b> The <i>address</i> value is derived from the value configured after server. The <i>source-address</i> value is the same value as that specified for source-address.



**Table 10: Accounting Event Configuration**

Command Name	OpenConfig Configuration	Junos Configuration
Event	<pre> openconfig-system:system {   aaa {     accounting {       events {         event &lt;event-type&gt;{           config {             event-type &lt;value&gt;           }         }       }     }   } } </pre>	<pre> system {   accounting {     events [ ... ];   } } </pre>

The OpenConfig configuration has two values for for event-type:

- AAA\_ACCOUNTING\_EVENT which maps to Junos OS event type interactive-commands
- AAA\_ACCOUNTING\_EVENT\_LOGIN which maps to Junos OS even type login

**Table 11: Accounting-method Configuration**

Command Name	OpenConfig Configuration	Junos Configuration
Accounting-method	<pre> openconfig-system:system {   aaa {     accounting {       config {         accounting-method       }     }   } } </pre>	<pre> system {   accounting {     destination {       radius / tacplus {         server {           &lt;name&gt; secret &lt;&gt;;           &lt;name&gt; secret &lt;&gt;;         }       }     }   } } </pre>

Table 11: Accounting-method Configuration *(Continued)*

Command Name	OpenConfig Configuration	Junos Configuration
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The OpenConfig values for accounting-method are TACACS\_ALL, RADIUS\_ALL, abd LOCAL. The OpenConfig accounting-method configuration in combination with the server-groups configuration generates the Junos hierarchy /system/accounting/destination.

Table 12: Authorization Roles Configuration

Command Name	OpenConfig Configuration	Junos Configuration
Roles	<pre>openconfig-system:system {   aaa {     authorization {       roles {         role &lt;rolename&gt; {           .....           .....         }       }     }   } }</pre>	<pre>system {   login {     class &lt;name&gt; {       ....       ....     }   } }</pre>

The OpenConfig user-defined role maps to the Junos login classes parameter.

Table 13: Authorization Permissions Configuration

Command Name	OpenConfig Configuration	Junos Configuration
Permissions	<pre>openconfig-system:system {   aaa {     authorization {       roles {         role &lt;rolename&gt; {           permissions [ ... ];         }       }     }   } }</pre>	<pre>system {   login {     class &lt;name&gt; {       permissions [ ... ];     }   } }</pre>

The OpenConfig user-defined permissions is a leaf-list and maps to the Junos leaf-list permissions parameter.

Possible OpenConfig values for permissions and their corresponding Junos values are:

OpenConfig	Junos
ADMIN	admin
ADMIN CONTROL	admin-control
ALL	all
MAINTENANCE	maintenance
VIEW	view
VIEW_CONFIG	view-configuration

Table 14: Authorization Permissions Configuration

Command Name	OpenConfig Configuration	Junos Configuration
Permissions	<pre>openconfig-system:system {   aaa {     authorization {       roles {         role foo {           config {             policies {               policy PERMIT REQUEST_RPC {                 request-regex /gnmi.gNMI/               }             }           }         }       }     }   } }</pre>	<pre>system {   login {     class foo {       allow-grpc-rpc-       regexps /gnmi.gNMI/Set;     }   } }</pre>

**Table 15: Authorization Policies and request-regex Configuration**

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
Policies	<pre> openconfig-system:system {   aaa {     authorization {       roles {         role foo {           config {             policies {               policy &lt;action&gt; &lt;request- type&gt; {                 request-regex [ ... ];               }             }           }         }       }     }   } } </pre>	<pre> system {   login {     class foo {       deny-commands-regexps [ ... ];       OR       allow-commands- regexps [ ... ];       OR       deny-configuration- regexps [ ... ];       OR       allow-configuration- regexps [ ... ];       OR       deny-grpc-rpc-regexps [ ... ];       OR       allow-grpc-rpc- regexps [ ... ];     }   } } </pre>

Table 15: Authorization Policies and request-regex Configuration (Continued)

Command Name	OpenConfig Configuration	Junos Configuration
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The OpenConfig policies configuration is translated into different allow and deny (\*regexps) parameters. Possible OpenConfig values for action, request-type, and request-regex translate to the following Junos configuration parameters:

action	request-type	OpenConfig request-regex translates to:
PERMIT	REQUEST_CONFIG	allow-configuration-regexps
DENY	REQUEST_CONFIG	deny-configuration-regexps
PERMIT	REQUEST_RPC	allow-grpc-rpc-regexps
DENY	REQUEST_RPC	deny-grpc-rpc-regexps
PERMIT	REQUEST_COMMAND	allow-commands-regexps
DENY	REQUEST_COMMAND	deny-commands-regexps

Example	<pre>openconfig-system:system {   aaa {     authorization {       roles {         role foo {           config {             rolename foo;             policies {               policy DENY             }           }         }       }     }   } }</pre>	<pre>system {   login {     class foo {       deny-commands-regexps       [ "clear interfaces" "show       interfaces" ];     }   } }</pre>
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Table 15: Authorization Policies and request-regex Configuration (*Continued*)

Command Name	OpenConfig Configuration	Junos Configuration
Example	<pre> openconfig-system:system {   aaa {     authorization {       roles {         role foo {           config {             policies {               policy PERMIT             }           }         }       }     }   } } </pre>	<pre> system {   login {     class foo {       allow-grpc-rpc-       regexps /gnmi.gNMI/Set;     }   } } </pre>

Table 16: TACACS Server Configuration

Command Name	OpenConfig Command Path	Junos Configuration
	Command path prefix: <b>/system/aaa</b>	
Config-Port	/server-groups/server-group/servers/server/tacacs/config/port	set system tacplus-server <i>address</i> port <i>port</i>  <b>NOTE:</b> The <i>address</i> value is derived from the value configured after server . The <i>port</i> value is the same value as that specified for port.

Table 16: TACACS Server Configuration (*Continued*)

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Secret-Key	/server-groups/server-group/servers/server/ tacacs/config/secret-key	set system tacplus-server <i>address</i> secret <i>secret</i>  <b>NOTE:</b> The <i>address</i> value is derived from the value configured after server. The <i>secret</i> value is the same value as that specified for secret-key.
Source-Address	/server-groups/server-group/servers/server/ tacacs/config/source-address	set system tacplus-server <i>address</i> source-address <i>source-address</i>  <b>NOTE:</b> The <i>address</i> value is derived from the value configured after server. The <i>source-address</i> value is the same value as that specified for source-address.

Table 17: AAA Admin and User Configuration

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
	Command path prefix:  <b>/system/aaa</b>	
Admin-Password	/authentication/admin-user/config/admin- password	set system root-authentication <i>plain-text-password</i>  <b>NOTE:</b> The <i>plain-text-password-</i> <i>authentication</i> value is derived from the value configured for admin-password.



Table 17: AAA Admin and User Configuration (*Continued*)

Command Name	OpenConfig Command Path	Junos Configuration
Admin-Password-Hashed	/authentication/admin-user/config/admin-password-hashed	set system root-authentication encrypted-password <i>encrypted-password</i>  <b>NOTE:</b> The <i>encrypted-password</i> value is derived from the value configured for admin-password-hashed.
Authentication-Method	/authentication/config/authentication-method	set system authentication-order  <b>NOTE:</b> The <i>authentication-order</i> value is derived from the value configured for authentication-method.
Password	/authentication/users/user/config/password	set system login user <i>user-name</i> authentication plain-text-password <i>plain-text-password</i>  <b>NOTE:</b> The <i>user-name</i> value is derived from the value configured for user. The <i>plain-text-password</i> value is derived from the value configured for password.
Password-Hashed	/authentication/users/user/config/password-hashed	set system login user <i>user-name</i> authentication encrypted-password <i>encrypted-password</i>  <b>NOTE:</b> The <i>user-name</i> value is derived from the value configured for user. The <i>encrypted-password</i> value is derived from the value configured for password-hashed.

Table 17: AAA Admin and User Configuration (*Continued*)

Command Name	OpenConfig Command Path	Junos Configuration
Role	/authentication/users/user/config/role	set system login user <i>user-name</i> class <i>class</i>  <b>NOTE:</b> The <i>user-name</i> value is derived from the value configured for user. The <i>class</i> value is derived from the value configured for role.
Username	/authentication/users/user/config/username	Not supported  <b>NOTE:</b> There is no equivalent configuration in the Junos OS.

## Mapping OpenConfig BGP Commands to Junos Configuration

### IN THIS SECTION

- [AFI-SAFI Prefix-Limit Configuration | 166](#)
- [AFI-SAFI Prefix-Limit Received Configuration | 168](#)



**NOTE:** See "[OpenConfig Data Model Version](#)" on [page 3](#) topic to understand the data models supported version and its Junos OS release for Juniper Networks MX Series, PTX Series, and QFX Series.

The tables below show the mapping of OpenConfig BGP commands with the relevant configuration in Junos.

## AFI-SAFI Prefix-Limit Configuration

Table 18: SRTE Policy Prefix-Limit Configuration

Command Name	OpenConfig Command Path	Junos Configuration
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Command path prefixes:

- IPv4—/network-instances/network-instance/protocols/protocol/bgp/peer-groups/peer-group/afi-safi/afi-safi-name/<afi-safi-name>/srte-policy-ipv4
- IPv6—/network-instances/network-instance/protocols/protocol/bgp/peer-groups/peer-group/afi-safi/afi-safi-name/<afi-safi-name>/srte-policy-ipv6

Max-Prefixes	/prefix-limit-received/config/max-prefixes	<pre>protocols {   bgp {     group &lt;&gt; {       family (inet   inet6) {         segment-routing-te {           prefix-limit {             maximum &lt;&gt;;           }         }       }     }   } }</pre>
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Table 18: SRTE Policy Prefix-Limit Configuration (*Continued*)

Command Name	OpenConfig Command Path	Junos Configuration
Prevent- Teardown	/prefix-limit-received/config/prevent-teardown	<pre> protocols {   bgp {     group &lt;&gt; {       family (inet   inet6) {         segment-routing-te {           prefix-limit {             teardown;           }         }       }     }   } } </pre>
Warning- Threshold-PCT	/prefix-limit-received/config/warning-threshold-pct	<pre> protocols {   bgp {     group &lt;&gt; {       family (inet   inet6) {         segment-routing-te {           prefix-limit {             teardown &lt;&gt;;           }         }       }     }   } } </pre>

## AFI-SAFI Prefix-Limit Received Configuration

Table 19: Unicast Prefix-Limit-Received Configuration

Command Name	OpenConfig Command Path	Junos Configuration
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Command path prefixes:

- IPv4—/network-instances/network-instance/protocols/protocol/bgp/peer-groups/peer-group/afi-safi/afi-safi-name/<afi-safi-name>/ipv4-unicast
- IPv6—/network-instances/network-instance/protocols/protocol/bgp/peer-groups/peer-group/afi-safi/afi-safi-name/<afi-safi-name>/ipv6-unicast

Max-Prefixes	/prefix-limit-received/config/max-prefixes	<pre>protocols {   bgp {     group &lt;&gt; {       family (inet   inet6) {         unicast {           prefix-limit {             maximum &lt;&gt;;           }         }       }     }   } }</pre>
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Table 19: Unicast Prefix-Limit-Received Configuration (*Continued*)

Command Name	OpenConfig Command Path	Junos Configuration
Prevent-Teardown	/prefix-limit-received/config/prevent-teardown	<pre> protocols {   bgp {     group &lt;&gt; {       family (inet   inet6) {         unicast {           prefix-limit {             teardown;           }         }       }     }   } }</pre>
Warning-Threshold-PCT	/prefix-limit-received/config/warning-threshold-pct	<pre> protocols {   bgp {     group &lt;&gt; {       family (inet   inet6) {         unicast {           prefix-limit {             teardown &lt;&gt;;           }         }       }     }   } }</pre>

Table 20: Policy Configuration

Command Name	OpenConfig Command Path	Junos Configuration
<p>Command path prefixes:</p> <ul style="list-style-type: none"> <li>• openconfig-network-instance/network-instances/</li> </ul>		

Table 20: Policy Configuration (Continued)

Command Name	OpenConfig Command Path	Junos Configuration
Peer Group Export Policy	<pre>network-instance DEFAULT {   config {     type DEFAULT_INSTANCE;   }   protocols {     protocol BGP bgp {       bgp {         neighbors {           neighbor 1.1.1.1 {             config {               peer-group ext;             }             afi-safis {               afi-safi             }           }         }       }     }   } }</pre>	<pre>protocols {   bgp {     group ext {       type internal;       local-as 200;       neighbor 1.1.1.1 {         family inet {           unicast {             export           }         }       }     }   } }</pre>

Table 20: Policy Configuration (Continued)

Command Name	OpenConfig Command Path	Junos Configuration
Peer Group Import Policy	<pre>network-instance DEFAULT {   config {     type DEFAULT_INSTANCE;   }   protocols {     protocol BGP bgp {       bgp {         peer-groups {           peer-group ext {             config {               local-as 200;               peer-type INTERNAL;             }             afi-safis {               afi-safi                 IPV4_UNICAST {                   apply-policy {                     config {                       import- policy send-direct;                     }                   }                 }               }             }           }         }       }     }   } }</pre>	<pre>protocols {   bgp {     group ext {       type internal;       family inet {         unicast {           import send- direct;         }       }       local-as 200;     }   } }</pre>



Table 20: Policy Configuration (Continued)

Command Name	OpenConfig Command Path	Junos Configuration
Neighbor Export Policy	<pre>network-instance DEFAULT {   config {     type DEFAULT_INSTANCE;   }   protocols {     protocol BGP bgp {       bgp {         neighbors {           neighbor 1.1.1.1 {             config {               peer-group ext;             }             afi-safis {               afi-safi                 IPV4_UNICAST {                   apply-policy {                     config {                       export-                         policy send-direct;                     }                   }                 }               }             }           }         }       }     }   } }</pre>	<pre>protocols {   bgp {     group ext {       type internal;       local-as 200;       neighbor 1.1.1.1 {         family inet {           unicast {             export               send-direct;           }         }       }     }   } }</pre>

Table 20: Policy Configuration *(Continued)*

Command Name	OpenConfig Command Path	Junos Configuration
Neighbor Import Policy	<pre>network-instance DEFAULT {   config {     type DEFAULT_INSTANCE;   }   protocols {     protocol BGP bgp {       bgp {         neighbors {           neighbor 1.1.1.1 {             config {               peer-group ext;             }             afi-safis {               afi-safi                 IPV4_UNICAST {                   apply-policy {                     config {                       import- policy send-direct;                     }                   }                 }               }             }           }         }       }     }   } }</pre>	<pre>protocols {   bgp {     group ext {       type internal;       local-as 200;       neighbor 1.1.1.1 {         family inet {           unicast {             import send-direct;           }         }       }     }   } }</pre>

Table 20: Policy Configuration (Continued)

Command Name	OpenConfig Command Path	Junos Configuration
Global Export Policy	Not Supported	<pre>protocols {   bgp {     family inet {       unicast {         export send- direct;       }     }   } }</pre>
Global Import Policy	Not Supported	<pre>protocols {   bgp {     family inet {       unicast {         import send- direct;       }     }   } }</pre>

**NOTE:** OpenConfig configuration of export and import policies under the afi-sai hierarchy level is only supported for IPv4 and IPv6 unicast.

**Table 21: Labeled-Unicast Prefix-Limit-Received Configuration**

Command Name	OpenConfig Command Path	Junos Configuration
<p>Command path prefixes:</p> <ul style="list-style-type: none"> <li>IPv4—/network-instances/network-instance/protocols/protocol/bgp/peer-groups/peer-group/afi-safi/afi-safi-name/ &lt;afi-safi-name&gt;/ipv4-labeled-unicast</li> <li>IPv6—/network-instances/network-instance/protocols/protocol/bgp/peer-groups/peer-group/afi-safi/afi-safi-name/ &lt;afi-safi-name&gt;/ipv6-labeled-unicast</li> <li>L3 VPN-IPv4—/network-instances/network-instance/protocols/protocol/bgp/peer-groups/peer-group/afi-safi/afi-safi-name/ &lt;afi-safi-name&gt;/l3vpn-ipv4-unicast</li> <li>L3 VPN-IPv6—/network-instances/network-instance/protocols/protocol/bgp/peer-groups/peer-group/afi-safi/afi-safi-name/ &lt;afi-safi-name&gt;/l3vpn-ipv6-unicast</li> </ul>		
Max-Prefixes	/prefix-limit-received/config/max-prefixes	<pre> protocols {   bgp {     group &lt;&gt; {       family (inet   inet6           inet-vpn   inet6-vpn) {         labeled-unicast {           prefix-limit {             maximum &lt;&gt;;           }         }       }     }   } } </pre>

Table 21: Labeled-Unicast Prefix-Limit-Received Configuration (Continued)

Command Name	OpenConfig Command Path	Junos Configuration
Prevent- Teardown	/prefix-limit-received/config/prevent-teardown	<pre> protocols {   bgp {     group &lt;&gt; {       family (inet   inet6           inet-vpn   inet6-vpn) {         labeled-unicast {           prefix-limit {             teardown;           }         }       }     }   } } </pre>
Warning- Threshold-PCT	/prefix-limit-received/config/warning-threshold-pct	<pre> protocols {   bgp {     group &lt;&gt; {       family (inet   inet6           inet-vpn   inet6-vpn) {         labeled-unicast {           prefix-limit {             teardown &lt;&gt;;           }         }       }     }   } } </pre>

Table 22: L3 VPN Multicast Prefix-Limit-Received Configuration

Command Name	OpenConfig Command Path	Junos Configuration
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Command path prefixes:

- IPv4—/network-instances/network-instance/protocols/protocol/bgp/peer-groups/peer-group/afi-safi/afi-safi-name/ <afi-safi-name>/l3vpn-ipv4-multicast
- IPv6—/network-instances/network-instance/protocols/protocol/bgp/peer-groups/peer-group/afi-safi/afi-safi-name/ <afi-safi-name>/l3vpn-ipv6-multicast

Max-Prefixes	/prefix-limit-received/config/max-prefixes	<pre>protocols {   bgp {     group &lt;&gt; {       family (inet-vpn           inet6-vpn) {         multicast {           prefix-limit {             maximum &lt;&gt;;           }         }       }     }   } }</pre>
--------------	--	--

Table 22: L3 VPN Multicast Prefix-Limit-Received Configuration (*Continued*)

Command Name	OpenConfig Command Path	Junos Configuration
Prevent-Teardown	/prefix-limit-received/config/prevent-teardown	<pre> protocols {   bgp {     group &lt;&gt; {       family (inet-vpn           inet6-vpn) {         labeled-unicast {           prefix-limit {             teardown;           }         }       }     }   } } </pre>
Warning-Threshold-PCT	/prefix-limit-received/config/warning-threshold-pct	<pre> protocols {   bgp {     group &lt;&gt; {       family (inet-vpn           inet6-vpn) {         labeled-unicast {           prefix-limit {             teardown &lt;&gt;;           }         }       }     }   } } </pre>

Table 23: L2 VPN VPLS Prefix-Limit-Received Configuration

Command Name	OpenConfig Command Path	Junos Configuration
Command path prefix: <ul style="list-style-type: none"><li>/network-instances/network-instance/protocols/protocol/bgp/peer-groups/peer-group/afi-safi/afi-safi-name/&lt;afi-safi-name&gt;/l2vpn-vpls</li></ul>		
Max-Prefixes	/prefix-limit-received/config/max-prefixes	<pre>protocols {   bgp {     group &lt;&gt; {       family l2vpn {         signaling {           prefix-limit {             maximum &lt;&gt;;           }         }       }     }   } }</pre>
Prevent-Teardown	/prefix-limit-received/config/prevent-teardown	<pre>protocols {   bgp {     group &lt;&gt; {       family l2vpn {         signaling {           prefix-limit {             teardown;           }         }       }     }   } }</pre>



Table 23: L2 VPN VPLS Prefix-Limit-Received Configuration (Continued)

Command Name	OpenConfig Command Path	Junos Configuration
Warning-Threshold-PCT	/prefix-limit-received/config/warning-threshold-pct	<pre>protocols {   bgp {     group &lt;&gt; {       family l2vpn {         signaling {           prefix-limit {             teardown &lt;&gt;;           }         }       }     }   } }</pre>

Table 24: L2 VPN EVPN Prefix-Limit-Received Configuration

Command Name	OpenConfig Command Path	Junos Configuration
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Command path prefix:

- /network-instances/network-instance/protocols/protocol/bgp/peer-groups/peer-group/afi-safi/afi-safi-name/<afi-safi-name>/l2vpn-evpn

Table 24: L2 VPN EVPN Prefix-Limit-Received Configuration (*Continued*)

Command Name	OpenConfig Command Path	Junos Configuration
Max-Prefixes	/prefix-limit-received/config/max-prefixes	<pre> protocols {   bgp {     group &lt;&gt; {       family evpn {         signaling {           prefix-limit {             maximum &lt;&gt;;           }         }       }     }   } } </pre>
Prevent-Teardown	/prefix-limit-received/config/prevent-teardown	<pre> protocols {   bgp {     group &lt;&gt; {       family evpn {         signaling {           prefix-limit {             teardown;           }         }       }     }   } } </pre>

Table 24: L2 VPN EVPN Prefix-Limit-Received Configuration *(Continued)*

Command Name	OpenConfig Command Path	Junos Configuration
Warning-Threshold-PCT	/prefix-limit-received/config/warning-threshold-pct	<pre>protocols {   bgp {     group &lt;&gt; {       family evpn {         signaling {           prefix-limit {             teardown &lt;&gt;;           }         }       }     }   } }</pre>

Table 25: SRTE Policy Prefix-Limit-Received Configuration

Command Name	OpenConfig Command Path	Junos Configuration
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Command path prefixes:

- IPv4—/network-instances/network-instance/protocols/protocol/bgp/peer-groups/peer-group/afi-safi/afi-safi-name/<afi-safi-name>/srte-policy-ipv4
- IPv6—/network-instances/network-instance/protocols/protocol/bgp/peer-groups/peer-group/afi-safi/afi-safi-name/<afi-safi-name>/srte-policy-ipv6

Table 25: SRTE Policy Prefix-Limit-Received Configuration (*Continued*)

Command Name	OpenConfig Command Path	Junos Configuration
Max-Prefixes	/prefix-limit-received/config/max-prefixes	<pre> protocols {   bgp {     group &lt;&gt; {       family (inet   inet6) {         segment-routing-te {           prefix-limit {             maximum &lt;&gt;;           }         }       }     }   } } </pre>
Prevent-Teardown	/prefix-limit-received/config/prevent-teardown	<pre> protocols {   bgp {     group &lt;&gt; {       family (inet   inet6) {         segment-routing-te {           prefix-limit {             teardown;           }         }       }     }   } } </pre>


Table 25: SRTE Policy Prefix-Limit-Received Configuration *(Continued)*

Command Name	OpenConfig Command Path	Junos Configuration
Warning-Threshold-PCT	/prefix-limit-received/config/warning-threshold-pct	<pre> protocols {   bgp {     group &lt;&gt; {       family (inet   inet6) {         segment-routing-te {           prefix-limit {             teardown &lt;&gt;;           }         }       }     }   } } </pre>

RELATED DOCUMENTATION

<a href="#">Mapping OpenConfig Routing Policy Commands to Junos Configuration   365</a>
<a href="#">Mapping OpenConfig Interface Commands to Junos Configuration   225</a>
<a href="#">Mapping OpenConfig LLDP Commands to Junos Configuration   268</a>
<a href="#">Mapping OpenConfig Local Routing Commands to Junos Configuration   270</a>
<a href="#">Mapping OpenConfig MPLS Commands to Junos Configuration   284</a>

# Mapping OpenConfig BFD Commands to Junos Operation



**NOTE:** See "[OpenConfig Data Model Version](#)" on [page 3](#) topic to understand the data models supported version and its Junos OS release for Juniper Networks ACX Series, EX Series, MX Series, PTX Series, and QFX Series.

The following tables show the mapping of OpenConfig Bidirectional Forwarding Detection (BFD) configurations with the relevant configuration in Junos OS.

- [Table 26 on page 185](#): Interface Configuration
- [Table 27 on page 187](#): Interface Micro-bfd Session Configuration
- [Table 28 on page 189](#): Interface-ref Configuration

**Table 26: Interface Configuration**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Interface ID	<pre> openconfig-bfd interfaces {   interface &lt;&gt; {     config{       id &lt;&gt;;     }   } }</pre>	Not supported

Not configurable in Junos or Junos Evolved. However, the id leaf value is obtained by Junos when BFD is enabled on the client's interface.

OpenConfig path: **/bfd/interfaces/interface/config/id**

Interface Name	<pre> openconfig-bfd interfaces {   interface &lt;&gt; {     config{       enabled;     }   } }</pre>	Not supported
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Not configurable in Junos or Junos Evolved. However, the name leaf is implicit when BFD is enabled on an interface.

OpenConfig path: **/bfd/interfaces/interface/config/enabled**

Table 26: Interface Configuration (*Continued*)

Command Name	OpenConfig Command Path	Junos Configuration
Local address	<pre> openconfig-bfd interfaces {   interface &lt;&gt; {     config{       local-address &lt;&gt;;     }   } } </pre>	Not supported
<p>Not configurable in Junos or Junos Evolved. However, the name leaf is implicit when BFD is enabled on an interface.</p> <p>OpenConfig path: <b>/bfd/interfaces/interface/config/local-address</b></p>		
Desired minimum transmit interval	<pre> openconfig-bfd interfaces {   interface &lt;&gt; {     config{       desired-minimum-tx-         interval &lt;&gt;;     }   } } </pre>	<pre> interface {   bfd-liveness-detection {     transmit-interval {       minimum-interval;     }   } } </pre>
<p>OpenConfig path: <b>/bfd/interfaces/interface/config/desired-minimum-tx-interval</b></p>		
Required minimum receive interval	<pre> openconfig-bfd interfaces {   interface &lt;&gt; {     config{       required-minimum-receive         &lt;&gt;;     }   } } </pre>	<pre> interface {   bfd-liveness-detection {     minimum-receive-interval;   } } </pre>
<p>OpenConfig path: <b>/bfd/interfaces/interface/config/required-minimum-receive</b></p>		

**Table 26: Interface Configuration (Continued)**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Detection multiplier	<pre> openconfig-bfd interfaces {   interface &lt;&gt; {     config{       detection-multiplier &lt;&gt;;     }   } } </pre>	<pre> interface {   bfd-liveness-detection {     multiplier ;   } } </pre>

OpenConfig path: `/bfd/interfaces/interface/config/detection-multiplier`

Enable per member link	<pre> openconfig-bfd interfaces {   interface &lt;&gt; {     config{       enable-per-member-link     }   } } </pre>	Not supported
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OpenConfig path: `/bfd/interfaces/interface/config/enable-per-member-link/`

**Table 27: Interface Micro-bfd Session Configuration**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Member interface	<pre> Openconfig-bfd interfaces {   Interface &lt;&gt; {     micro-bfd-sessions {       micro-bfd-session {         member-interface &lt;&gt;;       }     }   } } </pre>	Not supported



Table 27: Interface Micro-bfd Session Configuration (Continued)

Command Name	OpenConfig Command Path	Junos Configuration
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Not configurable in Junos or Junos Evolved. However, the micro-bfd leaf value is enabled on all member interfaces by default.

OpenConfig path: `/bfd/interfaces/interface/micro-bfd-sessions/micro-bfd-session/member-interface`

Local address	<pre> Openconfig-bfd interfaces {   Interface &lt;&gt; {     micro-bfd-sessions {       micro-bfd-session {         config {           local-address &lt;&gt;;         }       }     }   } } </pre>	<pre> interfaces {   aggregated-ether-options {     bfd-liveness-detection {       local-address     }   } } </pre>
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OpenConfig path: `/bfd/interfaces/interface//micro-bfd-sessions/micro-bfd-session/config/local-address`

Remote address	<pre> Openconfig-bfd interfaces {   Interface &lt;&gt; {     micro-bfd-sessions {       micro-bfd-session {         config {           remote-address &lt;&gt;;         }       }     }   } } </pre>	<pre> interfaces {   aggregated-ether-options {     bfd-liveness-detection {       neighbor &lt;&gt;;     }   } } </pre>
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OpenConfig path: `/bfd/interfaces/interface/micro-bfd-sessions/micro-bfd-session/config/remote-address`

Table 28: Interface-ref Configuration

Command Name	OpenConfig Command Path	Junos Configuration
Interface-ref	<pre> Openconfig-bfd interfaces {   Interface &lt;&gt; {     interface-ref {       config {         interface &lt;&gt;;       }     }   } } </pre>	Not supported
<p>Not configurable in Junos or Junos Evolved.</p> <p>OpenConfig path: <b>/bfd/interfaces/interface/interface-ref/config/interface</b></p>		
Subinterface	<pre> Openconfig-bfd interfaces {   Interface &lt;&gt; {     interface-ref {       config {         subinterface &lt;&gt;;       }     }   } } </pre>	Not supported
<p>Not configurable in Junos or Junos Evolved. However, the subinterface leaf value is part of the interface name and parsed to form a Junos CLI "unit."</p> <p>OpenConfig path: <b>/bfd/interfaces/interface/interface-ref/config/subinterface</b></p>		

# Mapping OpenConfig Firewall Filter Commands to Junos Configuration



**NOTE:** See "[OpenConfig Data Model Version](#)" on [page 3](#) topic to understand the data models supported version and its Junos OS or Junos Evolved OS release for Juniper Networks ACX Series, MX Series and PTX Series.

The following tables show the mapping of OpenConfig firewall filter commands with the relevant configuration in Junos OS:

- [Table 29 on page 191](#): Differentiated Services code point (DSCP) Filter Configuration
- [Table 30 on page 194](#): Google Discovery Protocol (GDP) and Traceroute Configuration
- [Table 31 on page 198](#): MPLS Filter Configuration.
- [Table 32 on page 199](#): IPv4 Filter Configuration
- [Table 33 on page 206](#): IPv6 Filter Configuration
- [Table 34 on page 212](#): Bind Configuration
- [Table 35 on page 214](#): IPv6 Network Instance Filtering Configuration
- [Table 36 on page 219](#): Network Instance Action Filtering Configuration
- [Table 37 on page 221](#): Network Instance Bind Configuration

Table 29: Differentiated Services code point (DSCP) Filter Configuration

Command Name	OpenConfig Configuration	Junos Configuration
Filter	<pre> network-instances {   network-instance n1 {     policy-forwarding {       policies {         policy dscp-steer {           config {             policy-id dscp-steer;           }           rules {             rule 1 {               config {                 sequence-id 1;               }               ipv4 {                 config {                   dscp &lt;&gt;;                 }               }               ipv6 {                 config {                   dscp &lt;&gt;;                 }               }               action {                 config {                   network- instance &lt;&gt;;                 }               }             }           }         }       }     }   } } </pre>	<pre> firewall {   family inet {     filter dscp-steer-ipv4-n1 {       term 1 {         from {           interface et-1/0/0.0;           dscp &lt;&gt;;         }         then {           routing-instance &lt;&gt;;         }       }       term 2 {         then accept;       }     }   }   family inet6 {     filter dscp-steer-ipv6-n1 {       term 1 {         from {           interface et-1/0/0.0;           traffic-class &lt;&gt;;         }         then {           routing-instance &lt;&gt;;         }       }       term 2 {         then accept;       }     }   } } </pre>

Table 29: Differentiated Services code point (DSCP) Filter Configuration (*Continued*)

Command Name	OpenConfig Configuration	Junos Configuration
Binding	<pre> network-instances {   network-instance n1 {     policy-forwarding {       interfaces {         interface et-1/0/0.0 {           config {             apply-forwarding-policy dscp_steer;           }           interface-ref {             config {               interface et-1/0/0;               subinterface 0;             }           }         }       }     }   } } </pre>	<pre> routing-instances {   n1 {     forwarding-options {       family inet {         filter {           input dscp-steer- ipv4-n1;         }       }       family inet6 {         filter {           input dscp-steer- ipv6-n1;         }       }     }   } } </pre> <p>In case of binding to 'default' routing instance then following will be the junos config</p> <pre> forwarding-options {   family inet {     filter {       input dscp-steer-ipv4- n1;     }   }   family inet6 {     filter {       input dscp-steer-ipv6- n1;     }   } } </pre>

Table 29: Differentiated Services code point (DSCP) Filter Configuration *(Continued)*

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
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This OpenConfig DSCP configuration is intended to filter traffic routed to a specific port according to the following set of input criteria specified in the device configuration:

- An input Layer 3 interface
- DSCP enabled
- Using IP protocol as the transport

If there is no match, packets are filtered back to a default VRF context where they are routed according to the exposed header.

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Table 30: Google Discovery Protocol (GDP) and Traceroute Filter Configuration

Command Name	OpenConfig Configuration	Junos Configuration
Filter	<pre> acl-sets {   acl-set gdp-trace-route-filter   ACL_MIXED {     config {       name gdp-trace-route- filter;       type ACL_MIXED;     }     acl-entries {       acl-entry 1 {         config {           sequence-id 1;         }         l2 {           config {             ethertype 0x6007;           }         }         actions {           config {             jnx-redirect &lt;&gt;;           }         }       }       acl-entry 2 {         config {           sequence-id 2;         }         ipv4 {           config {             hop-limit 0;           }         }         actions {           config {             jnx-redirect &lt;&gt;;           }         }       }     }   } } </pre>	<pre> firewall {   family any {     filter gdp-trace-route-filter {       term 1 {         from {           ether-type 0x6007;         }         then redirect &lt;&gt;;       }       term 2 {         from {           ip-version {             ipv4 {               ttl 0;             }           }         }         then redirect &lt;&gt;;       }       term 3 {         from {           ip-version {             ipv4 {               ttl 1;             }           }         }         then redirect &lt;&gt;;       }       term 4 {         from {           ip-version {             ipv6 {               hop-limit 0;             }           }         }         then redirect &lt;&gt;;       }       term 5 { </pre>

Table 30: Google Discovery Protocol (GDP) and Traceroute Filter Configuration *(Continued)*

Command Name	OpenConfig Configuration	Junos Configuration
	<pre> acl-entry 3 {   config     sequence-id 3; } ipv4 {   config {     hop-limit 1;   } } actions {   config {     jnx-redirect &lt;&gt;;   } } acl-entry 4 {   config     sequence-id 4; } ipv6 {   config {     hop-limit 0;   } } actions {   config {     jnx-redirect &lt;&gt;;   } } acl-entry 5 {   config     sequence-id 5; </pre>	<pre> from {   ip-version {     ipv6 {       hop-limit 1;     }   } } then redirect &lt;&gt;; } term 6 {   then accept; } } } services {   inline-monitoring {     instance {       &lt;&gt; {         controller p4;       }     }   } } </pre>



Table 30: Google Discovery Protocol (GDP) and Traceroute Filter Configuration *(Continued)*

Command Name	OpenConfig Configuration	Junos Configuration
	<pre>        }         ipv6 {             config {                 hop-limit 1;             }         }         actions {             config {                 jnx-redirect &lt;&gt;;             }         }     }     acl-entry 6 {         config {             sequence-id 6;         }         actions {             config {                 forwarding- action ACCEPT;             }         }     } }</pre>	

The Junos redirect statement corresponds to the redirect action in the filter term. Inline monitoring is configured implicitly. The instance-name under the redirect statement cannot be modified. You need to delete the redirect statement and commit the configuration again.

Table 30: Google Discovery Protocol (GDP) and Traceroute Filter Configuration *(Continued)*

Command Name	OpenConfig Configuration	Junos Configuration
Binding	<pre>interfaces {   interface et-0/0/1 {     config {       id et-0/0/1;     }     interface-ref {       config {         interface et-0/0/1;         subinterface 4000;       }     }     ingress-acl-sets {       ingress-acl-set gdp- trace-route-filter ACL_MIXED {         config {           set-name gdp- trace-route-filter;           type ACL_MIXED;         }       }     }   } }</pre>	<pre>/* gdp-trace-route-filter binding */ interfaces {   et-0/0/1 {     unit 4000 {       filter {         input gdp-trace-route-filter;       }     }   } }</pre>

**Table 31: MPLS Filter Configuration**

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
Traffic class	<pre> acl-sets {   acl-set &lt;&gt; ACL_MPLS {     acl-entries {       acl-entry 1 {         mpls {           config {             traffic-class &lt;&gt;;           }         }       }     }   } } </pre>	<pre> family mpls {   filter &lt;&gt; {     term &lt;&gt; {       from {         exp0 &lt;&gt;;       }     }   } } </pre>
OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/mpls/config/traffic-class		
Start label value	<pre> acl-sets {   acl-set &lt;&gt; ACL_MPLS {     acl-entries {       acl-entry 1 {         mpls {           config {             start-label-value &lt;&gt;;           }         }       }     }   } } </pre>	<pre> family mpls {   filter &lt;&gt; {     term &lt;&gt; {       from {         label 0 &lt;&gt;;       }     }   } } </pre>
OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/mpls/config/start-label-value		

Table 31: MPLS Filter Configuration (*Continued*)

Command Name	OpenConfig Configuration	Junos Configuration
End label value	<pre> acl-sets {   acl-set &lt;&gt; ACL_MPLS {     acl-entries {       acl-entry 1 {         mpls {           config {             end-label-value &lt;&gt;;           }         }       }     }   } } </pre>	<pre> family mpls {   filter &lt;&gt; {     term &lt;&gt; {       from {         label 0 &lt;&gt;;       }     }   } } </pre>

OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/mpls/config/end-label-value

Table 32: IPv4 Filter Configuration

Command Name	OpenConfig Configuration	Junos Configuration
destination address	<pre> acl-sets {   acl-set &lt;&gt; ACL_IPV4 {     acl-entries {       acl-entry &lt;&gt; {         ipv4 {           config {             destination-address             &lt;&gt;;           }         }       }     }   } } </pre>	<pre> firewall {   family inet {     filter &lt;&gt; {       term &lt;&gt; {         from {           destination- address {             &lt;&gt;;           }         }       }     }   } } </pre>

OpenConfig path: acl/acl-sets/acl-set/acl-entries/acl-entry/ipv4/config/destination-address

**Table 32: IPv4 Filter Configuration (Continued)**

Command Name	OpenConfig Configuration	Junos Configuration
DSCP	<pre> acl-sets {   acl-set &lt;&gt; ACL_IPV4 {     acl-entries {       acl-entry &lt;&gt; {         ipv4 {           config {             dscp &lt;&gt;;           }         }       }     }   } } </pre>	<pre> Firewall {   family inet {     filter &lt;&gt; {       term &lt;&gt; {         from {           dscp &lt;&gt;;         }       }     }   } } </pre>
OpenConfig path: <b>acl/acl-sets/acl-set/acl-entries/acl-entry/ipv4/config/dscp</b>		
hop limit	<pre> acl-sets {   acl-set &lt;&gt; ACL_IPV4 {     acl-entries {       acl-entry &lt;&gt; {         ipv4 {           config {             hop-limit &lt;&gt;;           }         }       }     }   } } </pre>	<pre> firewall {   family inet {     filter &lt;&gt; {       term &lt;&gt; {         from {           ttl &lt;&gt;;         }       }     }   } } </pre>
OpenConfig path: <b>acl/acl-sets/acl-set/acl-entries/acl-entry/ipv4/config/hop-limit</b>		

**Table 32: IPv4 Filter Configuration (Continued)**

Command Name	OpenConfig Configuration	Junos Configuration
protocol	<pre> acl-sets {   acl-set &lt;&gt; ACL_IPV4 {     acl-entries {       acl-entry &lt;&gt; {         ipv4 {           config {             protocol &lt;&gt;;           }         }       }     }   } } </pre>	<pre> firewall {   family inet {     filter &lt;&gt; {       term &lt;&gt; {         from {           protocol &lt;&gt;;         }       }     }   } } </pre>

OpenConfig path: **acl/acl-sets/acl-set/acl-entries/acl-entry/ipv4/config/protocol**

source address	<pre> acl-sets {   acl-set &lt;&gt; ACL_IPV4 {     acl-entries {       acl-entry &lt;&gt; {         ipv4 {           config {             source-address &lt;&gt;;           }         }       }     }   } } </pre>	<pre> firewall {   family inet {     filter &lt;&gt; {       term &lt;&gt; {         from {           source-address {             &lt;&gt;;           }         }       }     }   } } </pre>
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OpenConfig path: **acl/acl-sets/acl-set/acl-entries/acl-entry/ipv4/config/source-address**

Table 32: IPv4 Filter Configuration (Continued)

Command Name	OpenConfig Configuration	Junos Configuration
destination port	<pre>acl-sets {   acl-set &lt;&gt; ACL_IPV4 {     acl-entries {       acl-entry &lt;&gt; {         transport {           config {             destination-port &lt;&gt;;           }         }       }     }   } }</pre>	<pre>firewall {   family inet {     filter &lt;&gt; {       term &lt;&gt; {         from {           destination-port             &lt;&gt;;         }       }     }   } }</pre>
OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/transport/config/destination-port		
source port	<pre>acl-sets {   acl-set &lt;&gt; ACL_IPV4 {     acl-entries {       acl-entry &lt;&gt; {         transport {           config {             source-port &lt;&gt;;           }         }       }     }   } }</pre>	<pre>firewall {   family inet {     filter &lt;&gt; {       term &lt;&gt; {         from {           source-port &lt;&gt;;         }       }     }   } }</pre>
OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/transport/config/source-port		

Table 32: IPv4 Filter Configuration *(Continued)*

Command Name	OpenConfig Configuration	Junos Configuration
TCP flags	<pre>acl-sets {   acl-set &lt;&gt; ACL_IPV4 {     acl-entries {       acl-entry &lt;&gt; {         transport {           config {             tcp-flags &lt;&gt;;           }         }       }     }   } }</pre>	<pre>firewall {   family inet {     filter &lt;&gt; {       term &lt;&gt; {         from {           tcp-flags &lt;&gt;;         }       }     }   } }</pre>

OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/transport/config/tcp-flags

interface	<pre>acl-sets {   acl-set &lt;&gt; ACL_IPV4 {     acl-entries {       acl-entry &lt;&gt; {         input-interface {           interface-ref {             config {               interface &lt;&gt;;               subinterface &lt;&gt;;             }           }         }       }     }   } }</pre>	<pre>firewall {   family inet {     filter &lt;&gt; {       term &lt;&gt; {         from {           interface &lt;&gt;;         }       }     }   } }</pre>
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OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/input-interface/interface-ref/config/interface-subinterface



Table 32: IPv4 Filter Configuration (Continued)

Command Name	OpenConfig Configuration	Junos Configuration
forwarding-action ACCEPT	<pre>acl-sets {   acl-set &lt;&gt; ACL_IPV4 {     acl-entries {       acl-entry &lt;&gt; {         actions {           config {             forwarding-action             ACCEPT;           }         }       }     }   } }</pre>	<pre>firewall {   family inet {     filter &lt;&gt; {       term &lt;&gt; {         then accept;       }     }   } }</pre>
OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/actions/config/forwarding-action		
forwarding-action DROP	<pre>acl-sets {   acl-set &lt;&gt; ACL_IPV4 {     acl-entries {       acl-entry &lt;&gt; {         actions {           config {             forwarding-action             DROP;           }         }       }     }   } }</pre>	<pre>firewall {   family inet {     filter &lt;&gt; {       term &lt;&gt; {         then {           discard;         }       }     }   } }</pre>
OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/actions/config/forwarding-action		

Table 32: IPv4 Filter Configuration (*Continued*)

Command Name	OpenConfig Configuration	Junos Configuration
forwarding-action REJECT	<pre> acl-sets {   acl-set &lt;&gt; ACL_IPV4 {     acl-entries {       acl-entry &lt;&gt; {         actions {           config {             forwarding-action             REJECT;           }         }       }     }   } } </pre>	<pre> firewall {   family inet {     filter &lt;&gt; {       term &lt;&gt; {         then {           reject;         }       }     }   } } </pre>

OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/actions/config/forwarding-action

log-action LOG_SYSLOG	<pre> acl-sets {   acl-set &lt;&gt; ACL_IPV4 {     acl-entries {       acl-entry &lt;&gt; {         actions {           config {             log-action             LOG_SYSLOG;           }         }       }     }   } } </pre>	<pre> firewall {   family inet {     filter &lt;&gt; {       term &lt;&gt; {         then syslog;       }     }   } } </pre>
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OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/actions/config/log-action

Table 33: IPv6 Filter Configuration

Command Name	OpenConfig Configuration	Junos Configuration
destination address	<pre>acl-sets {   acl-set &lt;&gt; ACL_IPV6 {     acl-entries {       acl-entry &lt;&gt; {         ipv6 {           config {             destination-address           }         }       }     }   } }</pre>	<pre>firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         from {           destination-             address {               &lt;&gt;;             }           }         }       }     }   } }</pre>
OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/ipv6/config/destination-address		
hop limit	<pre>acl-sets {   acl-set &lt;&gt; ACL_IPV6 {     acl-entries {       acl-entry &lt;&gt; {         ipv6 {           config {             hop-limit &lt;&gt;;           }         }       }     }   } }</pre>	<pre>firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         from {           hop-limit &lt;&gt;;         }       }     }   } }</pre>
OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/ipv6/config/hop-limit		

Table 33: IPv6 Filter Configuration (*Continued*)

Command Name	OpenConfig Configuration	Junos Configuration
protocol	<pre> acl-sets {   acl-set &lt;&gt; ACL_IPV6 {     acl-entries {       acl-entry &lt;&gt; {         ipv6 {           config {             protocol &lt;&gt;;           }         }       }     }   } } </pre>	<pre> firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         from {           next-header &lt;&gt;;         }       }     }   } } </pre>
OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/ipv6/config/protocol		
source address	<pre> acl-sets {   acl-set &lt;&gt; ACL_IPV6 {     acl-entries {       acl-entry &lt;&gt; {         ipv6 {           config {             source-address &lt;&gt;;           }         }       }     }   } } </pre>	<pre> firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         from {           source-address {             &lt;&gt;;           }         }       }     }   } } </pre>
OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/ipv6/config/source-address		

Table 33: IPv6 Filter Configuration (Continued)

Command Name	OpenConfig Configuration	Junos Configuration
DSCP	<pre>acl-sets {   acl-set &lt;&gt; ACL_IPV6 {     acl-entries {       acl-entry &lt;&gt; {         ipv6 {           config {             dscp &lt;&gt;;           }         }       }     }   } }</pre>	<pre>firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         from {           traffic-class &lt;&gt;;         }       }     }   } }</pre>
OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/ipv6/config/dscp		
destination port	<pre>acl-sets {   acl-set &lt;&gt; ACL_IPV6 {     acl-entries {       acl-entry &lt;&gt; {         transport {           config {             destination-port &lt;&gt;;           }         }       }     }   } }</pre>	<pre>firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         from {           destination-port           &lt;&gt;;         }       }     }   } }</pre>
OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/transport/config/destination-port		

**Table 33: IPv6 Filter Configuration (Continued)**

Command Name	OpenConfig Configuration	Junos Configuration
source port	<pre> acl-sets {   acl-set &lt;&gt; ACL_IPV6 {     acl-entries {       acl-entry &lt;&gt; {         transport {           config {             source-port &lt;&gt;;           }         }       }     }   } } </pre>	<pre> firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         from {           source-port &lt;&gt;;         }       }     }   } } </pre>
OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/transport/config/source-port		
TCP flags	<pre> acl-sets {   acl-set &lt;&gt; ACL_IPV6 {     acl-entries {       acl-entry &lt;&gt; {         transport {           config {             tcp-flags &lt;&gt;;           }         }       }     }   } } </pre>	<pre> firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         from {           tcp-flags &lt;&gt;;         }       }     }   } } </pre>
OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/transport/config/tcp-flags		

Table 33: IPv6 Filter Configuration (*Continued*)

Command Name	OpenConfig Configuration	Junos Configuration
interface	<pre> acl-sets {   acl-set &lt;&gt; ACL_IPV6 {     acl-entries {       acl-entry &lt;&gt; {         input-interface {           interface-ref {             config {               interface &lt;&gt;;               subinterface &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         from {           interface &lt;&gt;;         }       }     }   } } </pre>

OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/input-interface/interface-ref/config/interface

forwarding-action ACCEPT	<pre> acl-sets {   acl-set &lt;&gt; ACL_IPV6 {     acl-entries {       acl-entry &lt;&gt; {         actions {           config {             forwarding-action             ACCEPT;           }         }       }     }   } } </pre>	<pre> firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         then accept;       }     }   } } </pre>
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OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/actions/config/forwarding-action

Table 33: IPv6 Filter Configuration (Continued)

Command Name	OpenConfig Configuration	Junos Configuration
forwarding-action DROP	<pre>acl-sets {   acl-set &lt;&gt; ACL_IPV6 {     acl-entries {       acl-entry &lt;&gt; {         actions {           config {             forwarding-action             DROP;           }         }       }     }   } }</pre>	<pre>firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         then discard;       }     }   } }</pre>
OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/actions/config/forwarding-action		
forwarding-action REJECT	<pre>acl-sets {   acl-set &lt;&gt; ACL_IPV6 {     acl-entries {       acl-entry &lt;&gt; {         actions {           config {             forwarding-action             REJECT;           }         }       }     }   } }</pre>	<pre>firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         then {           reject;         }       }     }   } }</pre>
OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/actions/config/forwarding-action		



Table 33: IPv6 Filter Configuration (*Continued*)

Command Name	OpenConfig Configuration	Junos Configuration
log-action LOG_SYSLOG	<pre> acl-sets {   acl-set &lt;&gt; ACL_IPV6 {     acl-entries {       acl-entry &lt;&gt; {         actions {           config {             log-action             LOG_SYSLOG;           }         }       }     }   } } </pre>	<pre> firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         then syslog;       }     }   } } </pre>

OpenConfig path: /acl/acl-sets/acl-set/acl-entries/acl-entry/actions/config/log-action

Table 34: Bind Configuration

Command Name	OpenConfig Configuration	Junos Configuration
ingress bind configuration	<pre> openconfig-acl:acl {   interfaces {     interface &lt;&gt; {       interface-ref {         config {           interface &lt;&gt;;           subinterface &lt;&gt;;         }       }     }     ingress-acl-sets {       ingress-acl-set &lt;&gt; ACL_IPV6;     }   } } </pre>	<pre> interfaces {   xe-&lt;&gt; {     unit 0 {       family inet6 {         filter {           input &lt;&gt;;         }       }     }   } } </pre>

Table 34: Bind Configuration (Continued)

Command Name	OpenConfig Configuration	Junos Configuration
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OpenConfig path: /acl/interfaces/interface/config/interface/interface-ref/config/interface/ingress-acl-sets/  
ingress-acl-set

egress bind configuration	<pre>openconfig-acl:acl {   interfaces {     interface &lt;&gt; {       interface-ref {         config {           interface &lt;&gt;;           subinterface &lt;&gt;;         }       }     }     egress-acl-sets {       egress-acl-set &lt;&gt; ACL_IPV6;     }   } }</pre>	<pre>interfaces {   &lt;&gt; {     unit 0 {       family inet6 {         filter {           output &lt;&gt;;         }       }     }   } }</pre>
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OpenConfig path: /acl/interfaces/interface/config/interface/interface-ref/config/interface/egress-acl-sets/  
egress-acl-set

Table 35: IPv6 Network Instance Filtering Configuration

Command Name	OpenConfig Configuration	Junos Configuration
destination address	<pre>network-instances {   network-instance &lt;&gt; {     policy-forwarding {       policies {         policy &lt;&gt; {           rules {             rule &lt;&gt; {               ipv6 {                 config {                   destination- address &lt;&gt;;                 }               }             }           }         }       }     }   } }</pre>	<pre>firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         from {           destination- address {             &lt;&gt;;           }         }       }     }   } }</pre>

OpenConfig path: /network-instances/network-instance/policy-forwarding/policies/policy/rules/rule/ipv6/config/destination-address

Table 35: IPv6 Network Instance Filtering Configuration *(Continued)*

Command Name	OpenConfig Configuration	Junos Configuration
hop limit	<pre>network-instances {   network-instance &lt;&gt; {     policy-forwarding {       policies {         policy &lt;&gt; {           rules {             rule &lt;&gt; {               ipv6 {                 config {                   hop-limit &lt;&gt;;                 }               }             }           }         }       }     }   } }</pre>	<pre>firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         from {           ttl &lt;&gt;;         }       }     }   } }</pre>
OpenConfig path: /network-instances/network-instance/policy-forwarding/policies/policy/rules/rule/ipv6/config/hop-limit		

Table 35: IPv6 Network Instance Filtering Configuration (Continued)

Command Name	OpenConfig Configuration	Junos Configuration
protocol	<pre>network-instances {   network-instance &lt;&gt; {     policy-forwarding {       policies {         policy &lt;&gt; {           rules {             rule &lt;&gt; {               ipv6 {                 config {                   protocol &lt;&gt;;                 }               }             }           }         }       }     }   } }</pre>	<pre>firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         from {           protocol &lt;&gt;;         }       }     }   } }</pre>
OpenConfig path: /network-instances/network-instance/policy-forwarding/policies/policy/rules/rule/ipv6/config/protocol		

Table 35: IPv6 Network Instance Filtering Configuration (Continued)

Command Name	OpenConfig Configuration	Junos Configuration
source address	<pre>network-instances {   network-instance &lt;&gt; {     policy-forwarding {       policies {         policy dscp &lt;&gt; {           rules {             rule &lt;&gt; {               ipv6 {                 config {                   source-address                 }               }             }           }         }       }     }   } } &lt;&gt;;</pre>	<pre>firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         from {           source-address         }       }     }   } } &lt;&gt;;</pre>

OpenConfig path: /network-instances/network-instance/policy-forwarding/policies/policy/rules/rule/ipv6/config/source-address

Table 35: IPv6 Network Instance Filtering Configuration *(Continued)*

Command Name	OpenConfig Configuration	Junos Configuration
action: discard	<pre>network-instances {   network-instance &lt;&gt; {     policy-forwarding {       policies {         policy &lt;&gt; {           rules {             rule &lt;&gt; {               action {                 config {                   discard &lt;&gt;;                 }               }             }           }         }       }     }   } }</pre>	<pre>firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         then {           discard;         }       }     }   } }</pre>

Table 36: Network Instance Action Filtering Configuration

Command Name	OpenConfig Configuration	Junos Configuration
action: discard	<pre>network-instances {   network-instance &lt;&gt; {     policy-forwarding {       policies {         policy &lt;&gt; {           rules {             rule &lt;&gt; {               action {                 config {                   discard &lt;&gt;;                 }               }             }           }         }       }     }   } }</pre>	<pre>firewall {   family inet {     filter &lt;&gt; {       term &lt;&gt; {         then {           discard;         }       }     }   } }  firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         then {           discard;         }       }     }   } }</pre>

OpenConfig path: /network-instances/network-instance/policy-forwarding/policies/policy/rules/rule/action/config/discard



Table 36: Network Instance Action Filtering Configuration (*Continued*)

Command Name	OpenConfig Configuration	Junos Configuration
action: config network-instance	<pre> network-instances {   network-instance &lt;&gt; {     policy-forwarding {       policies {         policy dscp-steer {           rules {             rule &lt;&gt; {               action {                 config {                   network- instance &lt;&gt;;                 }               }             }           }         }       }     }   } } </pre>	<pre> firewall {   family inet {     filter &lt;&gt; {       term &lt;&gt; {         then {           routing- instance &lt;&gt;;         }       }     }   } }  firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         then {           routing- instance &lt;&gt;;         }       }     }   } } </pre>

OpenConfig path: **/network-instances/network-instance/policy-forwarding/policies/policy dscp-steer/rules/rule/action/config/network-instance**

**NOTE:** When the network-instance leaf is set, packets matching the match criteria for the forwarding rule should be looked up in the network instance that is referenced rather than the network-instance with which the interface is associated. This configuration permits policy routing for multiple subtopologies from a single ingress access interface.

**Table 37: Network Instance Bind Configuration**

Command Name	OpenConfig Configuration	Junos Configuration
INET: apply forwarding policy (default routing instance)	<pre> network-instances {   network-instance &lt;&gt; {     policy-forwarding {       interfaces {         interface &lt;&gt; {           config {             apply-forwarding-policy &lt;&gt;;           }         }       }     }   } } </pre>	<pre> firewall {   family inet {     filter &lt;&gt; {       term &lt;&gt; {         then {           next-interface;         }       }     }   } }  forwarding-options {   family inet {     filter {       input &lt;&gt;;     }   } } </pre>

OpenConfig path: /network-instances/network-instance/policy-forwarding/interfaces/interface/config/apply-forwarding-policy/interface-ref/config/interface/subinterface

**NOTE:** Use the apply-forwarding-policy leaf to apply the policy to an interface. Packets ingressing on the referenced interface should be compared to the match criteria within the specified policy. If the criteria are met, the forwarding actions specified are applied. These policies do not take precedence over any quality of service classification or ACL actions on the corresponding interface.

Table 37: Network Instance Bind Configuration (*Continued*)

Command Name	OpenConfig Configuration	Junos Configuration
INET: apply forwarding policy ( <b>not</b> a default routing instance)	<pre> INET interface bind ingress (not a default routing instance)  network-instances {   network-instance &lt;&gt; {     policy-forwarding {       interfaces {         interface &lt;&gt; {           config {             apply-forwarding- policy &lt;&gt;;           }           interface-ref {             config {               interface &lt;&gt;;               subinterface &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> INET interface bind ingress (not a default routing instance)  firewall {   family inet {     filter &lt;&gt; {       term &lt;&gt; {         then {           next-interface;         }       }     }   } }  routing-instances {   &lt;&gt; {     forwarding-options {       family inet {         filter {           input &lt;&gt;;         }       }     }   } } </pre>

OpenConfig path: /network-instances/network-instance/policy-forwarding/interfaces/interface/config/apply-forwarding-policy/interface-ref/config/interface/subinterface

**Table 37: Network Instance Bind Configuration (Continued)**

Command Name	OpenConfig Configuration	Junos Configuration
INET6: apply forwarding policy (default routing instance)	<pre> network-instances {   network-instance &lt;&gt; {     policy-forwarding {       interfaces {         interface &lt;&gt; {           config {             apply-forwarding- policy &lt;&gt;;           }           interface-ref {             config {               interface &lt;&gt;;               subinterface &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         then {           next-interface;         }       }     }   } }  forwarding-options {   family inet6 {     filter {       input &lt;&gt;;     }   } } </pre>

OpenConfig path: /network-instances/network-instance/policy-forwarding/interfaces/interface/config/apply-forwarding-policy/interface-ref/config/interface/subinterface

**Table 37: Network Instance Bind Configuration (Continued)**

Command Name	OpenConfig Configuration	Junos Configuration
INET6: apply forwarding policy (not a default routing instance)	<pre> network-instances {   network-instance &lt;&gt; {     policy-forwarding {       interfaces {         interface &lt;&gt; {           config {             apply-forwarding- policy &lt;&gt;;           }           interface-ref {             config {               interface &lt;&gt;;               subinterface &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> firewall {   family inet6 {     filter &lt;&gt; {       term &lt;&gt; {         then {           next-interface;         }       }     }   } }  routing-instances {   &lt;&gt; {     forwarding-options {       family inet6 {         filter {           input &lt;&gt;;         }       }     }   } } </pre>

**NOTE:** Please note that these filters will be implemented as an input forwarding table filter.

**NOTE:** Egress filtering is not supported.

# Mapping OpenConfig Interface Commands to Junos Configuration



**NOTE:** See "OpenConfig Data Model Version" on page 3 topic to understand the data models supported version and its Junos OS release for Juniper Networks MX Series, PTX Series, and QFX Series.

The following tables show the mapping of OpenConfig interface commands to the relevant configuration in Junos:

- [Table 38 on page 225](#): Ethernet Configuration
- [Table 39 on page 226](#): GRE Tunnel Interface Configuration
- [Table 40 on page 228](#): IPv4 and IPV6 Address Configuration
- [Table 41 on page 230](#): Interface AE Configuration
- [Table 42 on page 231](#): IFD Configuration
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- [Table 47 on page 234](#): P4Runtime (P4RT) Configuration
- [Table 48 on page 235](#): Proxy ARP Configuration
- [Table 49 on page 236](#): VRRP Configuration

**Table 38: Ethernet Configuration**

Command Name	OpenConfig Command Path	Junos Configuration
Auto-negotiate	/ethernet/config/auto-negotiate	set interfaces <i>interface</i> gigether-options <i>auto-negotiation/no-auto-negotiation</i>

**Table 38: Ethernet Configuration (Continued)**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
MAC Address	/ethernet/config/mac-address	set interfaces <i>interface</i> mac
Duplex Mode	/ethernet/config/duplex-mode	set interfaces <i>interface</i> link-mode
Port Speed	/ethernet/config/port-speed	set interface <i>interface</i> speed
Flow Control	/ethernet/config/enable-flow-control	set interface <i>interface</i> gigether-options flow-control

**Table 39: GRE Tunnel Interface Configuration**

<i>Command Name</i>	<i>OpenConfig configuration</i>	<i>Junos Configuration</i>
Source	<pre> openconfig-interfaces {   interfaces {     interface[name] {       subinterfaces {         subinterface[index] {           jnx-aug-openconfig-if- tunnel:tunnel {           config {             src &lt;&gt;;           }         }       }     }   } } </pre>	<pre> interfaces {   gr-&lt;&gt; {     unit &lt;&gt; {       tunnel {         source &lt;&gt;;       }     }   } } </pre>

The augmented OpenConfig tunnel src node value maps to the Junos source parameter.

Table 39: GRE Tunnel Interface Configuration (*Continued*)

Command Name	OpenConfig configuration	Junos Configuration
Destination	<pre> openconfig-interfaces {   interfaces {     interface[name] {       subinterfaces {         subinterface[index] {           jnx-aug-openconfig-if- tunnel:tunnel {             config {               dst &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> interfaces {   gr-&lt;&gt; {     unit &lt;&gt; {       tunnel {         destination &lt;&gt;;       }     }   } } </pre>

The augmented OpenConfig tunnel dst node value maps to the Junos destination parameter.

TTL	<pre> openconfig-interfaces {   interfaces {     interface[name] {       subinterfaces {         subinterface[index] {           jnx-aug-openconfig-if- tunnel:tunnel {             config {               ttl &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> interfaces {   gr-&lt;&gt; {     unit &lt;&gt; {       tunnel {         ttl &lt;&gt;;       }     }   } } </pre>
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The augmented OpenConfig tunnel ttl node value maps to the Junos ttl parameter.



**Table 39: GRE Tunnel Interface Configuration (Continued)**

Command Name	OpenConfig configuration	Junos Configuration
Key	<pre> openconfig-interfaces {   interfaces {     interface[name] {       subinterfaces {         subinterface[index] {           jnx-aug-openconfig-if- tunnel:tunnel {               config {                 gre-key &lt;&gt;;               }             }           }         }       }     }   } } </pre>	<pre> interfaces {   gr-&lt;&gt; {     unit &lt;&gt; {       tunnel {         key &lt;&gt;;       }     }   } } </pre>

The augmented OpenConfig tunnel gre-key node value maps to the Junos key parameter.

**Table 40: IPv4 and IPv6 Address Configuration**

Command Name	OpenConfig Command Path	Junos Configuration
Configuration Address	<pre> ipv4/addresses/address/ip ipv4/addresses/address/prefix-length </pre>	<pre> set interfaces <i>interface-name</i> unit <i>unit- number</i> family inet address <i>address</i>  set interfaces <i>interface-name</i> unit <i>unit- number</i> family inet6 address <i>address</i> </pre>
Neighbor Address	<pre> ipv4/neighbors/neighbor/ip ipv6/neighbors/neighbor/ip </pre>	<pre> set interfaces <i>interface-name</i> unit <i>unit- number</i> family inet address <i>address</i> arp <i>address</i>  set interfaces <i>interface-name</i> unit <i>unit- number</i> family inet6 address <i>address</i> ndp <i>address</i> </pre>

Table 40: IPv4 and IPv6 Address Configuration (*Continued*)

Command Name	OpenConfig Command Path	Junos Configuration
Link Layer Address	ip4/neighbors/neighbor/ip/link-layer-address  ip6/neighbors/neighbor/ip/link-layer-address	set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet address <i>address</i> arp <i>address</i> mac <i>address</i>  set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet6 address <i>address</i> ndp <i>address</i> mac <i>address</i>
Neighbor solicitation messages to send for duplicate address detection  dup-addr-detect-transmits 0	<pre> openconfig-interfaces:interfaces {   interface &lt;interface_name&gt; {     subinterfaces {       subinterface &lt;unit&gt; {         openconfig-if-           ip:ipv6 {             config {               dup-addr-                 detect-transmits 0;             }           }         }       }     }   } } </pre>	<pre> interfaces {   &lt;interface_name&gt; {     unit &lt;unit&gt; {       family inet6 {         dad-disable;       }     }   } } </pre>

Table 40: IPv4 and IPv6 Address Configuration (*Continued*)

Command Name	OpenConfig Command Path	Junos Configuration
Neighbor solicitation messages to send for duplicate address detection  dup-addr-detect- transmits <non_zero_value>	<pre> openconfig-interfaces:interfaces {   interface &lt;interface_name&gt;{     subinterfaces {       subinterface &lt;unit&gt; {         openconfig-if- ip:ipv6 {           config {             dup-addr- detect-transmits &lt;non_zero_value&gt;;           }         }       }     }   } } </pre>	<pre> system {   internet-options {     ipv6-duplicate-addr-detection- transmits &lt;non_zero_value&gt;;   } } interfaces {   &lt;interface_name&gt; {     unit &lt;unit&gt; {       family inet6 {         no-dad-disable;       }     }   } } </pre> <p><b>NOTE:</b> Junos OS has no equivalent configuration under the interfaces hierarchy to map the number of neighbor solicitation messages to send for duplicate address detection. Consequently, this is mapped to the parameter <code>ipv6-duplicate-addr-detection-transmits</code> at the system hierarchy. When there are multiple instances of OpenConfig <code>dup-addr-detect-transmits</code> at the interfaces stanza, the Junos OS parameter takes the maximum value configured among them.</p>

Table 41: Interface AE Configuration

Command Name	OpenConfig Command Path	Junos Configuration
LAG Type	<pre> /aggregation/config/lag-type/lacp /aggregation/config/lag-type/static </pre>	<pre> set interfaces ae-name aggregated-ether-options lacp </pre>

Table 41: Interface AE Configuration (*Continued*)

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Minimum Links	/aggregation/config/min-links	set interfaces <i>ae-name</i> aggregated-ether-options minimum-links

Table 42: IFD Configuration

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Interface Type	/interfaces/ <i>interface</i> /config/type	Not supported.  Type is derived from the interface name.
Interface MTU	/interfaces/ <i>interface</i> /config/mtu	set interface <i>interface</i> mtu
Interface Name	/interfaces/ <i>interface</i> /config/name	set interface <i>interface</i>
Interface Description	/interfaces/ <i>interface</i> /config/description	set interface <i>interface</i> description
Interface Enabled/ Disabled	/interfaces/ <i>interface</i> /config/enabled	set interface <i>interface</i> disabled  set interface <i>interface</i> enabled
Hold Time Up	/interfaces/ <i>interface</i> /config/hold-time/ config/up	set interface <i>interface</i> hold-time up
Hold Time Down	/interfaces/ <i>interface</i> /config/hold-time/ config/down	set interface <i>interface</i> hold-time down

Table 42: IFD Configuration (*Continued*)

Command Name	OpenConfig Command Path	Junos Configuration
VLAN tag protocol identifier (TPID)	<pre> openconfig-interfaces:interfaces {   interfaces &lt;interface_name&gt; {     config {       openconfig-vlan:tpid &lt;tpid&gt;;     }   } } </pre>	<pre> interfaces {   &lt;interface_name&gt; {     together-options {       ethernet-switch-profile {         tag-protocol-id &lt;tpid&gt;;       }     }   } } </pre>

Table 43: IFL Configuration

Command Name	OpenConfig Command Path	Junos Configuration
Unit Name	/interfaces/ <i>interface</i> /subinterfaces/ subinterface/config/index	set interfaces <i>interface</i> unit <i>unit</i>
Unnumbered Address	/interfaces/ <i>interface</i> /config/ subinterfaces/subinterface/config/ unnumbered	set interfaces <i>interface</i> unit <i>unit</i> family <i>family</i> unnumbered-address source <i>ifl</i>
Unit Description	/interfaces/ <i>interface</i> /subinterfaces/ subinterface/config/description	set interfaces <i>interface</i> unit <i>unit</i> description
Unit Enabled/Disabled	/interfaces/ <i>interface</i> /subinterfaces/ subinterface/config/enabled	set interfaces <i>interface</i> unit <i>unit</i> enabled set interfaces <i>interface</i> unit <i>unit</i> disabled
Interface Alias	/interfaces/ <i>interface</i> /subinterfaces/ subinterface/config/name	set interfaces <i>interface</i> alias

**Table 44: LACP Configuration**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
LACP Interval	/lacp/interfaces/interface/ config/interval	set interfaces <i>ae-name</i> aggregated-ether-options lacp periodic fast  set interfaces <i>ae-name</i> aggregated-ether-options lacp periodic slow
LACP Mode	/lacp/interfaces/interface/ config/lacp-mode	set interfaces <i>ae-name</i> aggregated-ether-options lacp active  set interfaces <i>ae-name</i> aggregated-ether-options lacp passive
System ID	/lacp/interfaces/interface/ config/system-id-mac	set interfaces <i>ae-name</i> aggregated-ether-options lacp system-id <i>address</i>
System Priority	/lacp/interfaces/interface/ config/system-priority	set interfaces <i>ae-name</i> aggregated-ether-options lacp system-priority <i>system-priority</i>
Ethernet Options	/lacp/interfaces/interface/ members/member	set interface <i>interface</i> gigether-options 802.3ad  set interface <i>interface</i> fastether-options 802.3ad  set interface <i>interface</i> ether-options 802.3ad

**Table 45: Member Interface Configuration**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Aggregate ID	/interface/aggregate-id	set interface <i>interface</i> gigether-options 802.3ad <i>aggregate-id</i>  set interface <i>interface</i> fastether-options 802.3ad <i>aggregate-id</i>  set interface <i>interface</i> ether-options 802.3ad <i>aggregate-id</i>

**Table 46: Optical Transport Configuration**

<i>Command Name</i>	<i>OpenConfig configuration</i>	<i>Junos Configuration</i>
Frequency	<pre> openconfig-platform:components {   component &lt;&gt; {     openconfig-terminal-device:optical-channel   {     config {       frequency &lt;&gt;;     }   } } </pre>	<pre> interfaces &lt;&gt; {   optics-options {     wavelength &lt;&gt;;   } } </pre>

The formula to calculate the wavelength from frequency, or vice-versa, is  $C = (\text{wavelength} \times \text{frequency})$  where  $C$  = the speed of light in vacuum (299792458 m/s).

**Table 47: P4Runtime (P4RT) Configuration**

<i>Command Name</i>	<i>OpenConfig configuration</i>	<i>Junos Configuration</i>
id	<pre> openconfig-interfaces:interfaces {   interface &lt;&gt; {     config {       openconfig-p4rt:id &lt;&gt;;     }   } } </pre>	<pre> interfaces {   &lt;&gt; {     p4rt {       Id &lt;&gt;;     }   } } </pre>

Table 47: P4Runtime (P4RT) Configuration *(Continued)*

Command Name	OpenConfig configuration	Junos Configuration
id	<pre> openconfig-interfaces:interfaces {   interface &lt;&gt; {     config {       type &lt;&gt; {         openconfig-if-sdn- ext:forwarding-viable &lt;&gt;;       }     }   } } </pre>	<pre> interfaces {   &lt;&gt; {     no-forwarding-viable;   } } </pre>

Table 48: Proxy ARP Configuration

Command Name	OpenConfig configuration	Junos Configuration
proxy-arp	<pre> openconfig-interfaces:interfaces {   interface &lt;&gt; {     subinterfaces {       subinterface &lt;&gt; {         openconfig-if-ip:ipv4 {           proxy-arp {             config {               mode &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> interfaces {   &lt;&gt; {     unit &lt;&gt; {       proxy-arp &lt;&gt;;     }   } } </pre>



**Table 48: Proxy ARP Configuration (Continued)**

<i>Command Name</i>	<i>OpenConfig configuration</i>	<i>Junos Configuration</i>
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OpenConfig has three proxy-arp and Junos has two modes:

- OC maps to Junos (native)
- REMOTE\_ONLY maps to restricted
- ALL maps to Unrestricted
- DISABLE deletes the configured proxy-arp configuration

**Table 49: VRRP Configuration**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Virtual Router ID	ifa/vrrp/vrrp-group/config/virtual-router-id	set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet address <i>address</i> vrrp-group <i>virtual-router-id</i>  set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet6 address <i>address</i> vrrp-inet6-group <i>virtual-router-id</i>
Virtual Address	ifa/vrrp/vrrp-group/config/virtual-address	set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet address <i>address</i> vrrp-group <i>virtual-router-id</i> virtual-address <i>address</i>  set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet6 address <i>address</i> vrrp-inet6-group <i>virtual-router-id</i> virtual-inet6-address
VRRP Priority	ifa/vrrp/vrrp-group/config/priority	set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet address <i>address</i> vrrp-group <i>virtual-router-id</i> priority  set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet6 address <i>address</i> vrrp-inet6-group <i>virtual-router-id</i> priority

Table 49: VRRP Configuration (Continued)

Command Name	OpenConfig Command Path	Junos Configuration
VRRP Preempt	ifa/vrrp/vrrp-group/config/preempt	<pre>set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet address <i>address</i> vrrp-group <i>virtual-router-id</i> preempt</pre> <pre>set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet6 address <i>address</i> vrrp-inet6-group <i>virtual-router-id</i> preempt</pre>
VRRP Preempt Hold Time	ifa/vrrp/vrrp-group/config/preempt-delay	<pre>set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet address <i>address</i> vrrp-group <i>virtual-router-id</i> preempt hold- time <i>time</i></pre> <pre>set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet6 address <i>address</i> vrrp-inet6-group <i>virtual-router-id</i> preempt hold-time <i>time</i></pre>
Accept Data	ifa/vrrp/vrrp-group/config/accept_mode	<pre>set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet address <i>address</i> vrrp-group <i>virtual-router-id</i> accept-data</pre> <pre>set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet6 address <i>address</i> vrrp-inet6-group <i>virtual-router-id</i> accept- data</pre>
Advertise Interval	ifa/vrrp/vrrp-group/config/advertisement_interval	<pre>set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet address <i>address</i> vrrp-group <i>virtual-router-id</i> advertise- interval</pre> <pre>set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet6 address <i>address</i> vrrp-inet6-group <i>virtual-router-id</i> inet6- advertise-interval</pre>

Table 49: VRRP Configuration (Continued)

Command Name	OpenConfig Command Path	Junos Configuration
Track Interface	ifa/vrrp/vrrp-group/interface-tracking/config/track-interface	set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet address <i>address</i> vrrp-group <i>virtual-router-id</i> track interface <i>interface-name</i>  set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet6 address <i>address</i> vrrp-inet6-group <i>virtual-router-id</i> track interface <i>interface-name</i>
Priority Cost	ifa/vrrp/vrrp-group/interface-tracking/config/priority-decrement	set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet address <i>address</i> vrrp-group <i>virtual-router-id</i> track interface <i>interface-name</i> priority-cost <i>cost</i>  set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet6 address <i>address</i> vrrp-inet6-group <i>virtual-router-id</i> track interface <i>interface-name</i> priority-cost <i>cost</i>
Virtual Link Local Address	ifa/vrrp/vrrp-group/config/virtual-link-local	set interfaces <i>interface-name</i> unit <i>unit-number</i> family inet6 address <i>address</i> vrrp-inet6-group <i>virtual-router-id</i> virtual-link-local-address

## RELATED DOCUMENTATION

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# Mapping OpenConfig ISIS Commands to Junos Configuration

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**NOTE:** See "[OpenConfig Data Model Version](#)" on [page 3](#) for supported versions of the OpenConfig data model.

## Global Configuration

See [Table 50 on page 240](#) for configuration mappings of the following OpenConfig paths under `/network-instances/network-instance/protocols/protocol/isis/`:

- `/global/timers/config/lsp-lifetime-interval`
- `/global/timers/config/lsp-refresh-interval`
- `/global/timers/spf/config/spf-first-interval`
- `/global/timers/spf/config/spf-hold-interval`
- `/global/lsp-bit/overload-bit/config/set-bit`
- `/global/config/net`
- `/global/config/level-capability`
- `/global/afi-safi/af/config/enabled`
- `/global/transport/config/lsp-mtu-size`

Table 50: Global ISIS Configuration

Command	OpenConfig Configuration	Junos Configuration
LSP lifetime interval	<pre>openconfig-network-instance:network-instances {   protocols {     protocol ISIS &lt;&gt; {       global {         timers {           config {             lsp-lifetime-interval &lt;&gt;;           }         }       }     }   } }</pre>	<pre>protocols {   isis {     lsp-lifetime &lt;&gt;;   } }</pre>

OpenConfig path: /network-instances/network-instance/protocols/protocol/isis/global/timers/config/lsp-lifetime-interval

LSP refresh interval	<pre>openconfig-network-instance:network-instances {   protocols {     protocol ISIS &lt;&gt; {       global {         timers {           config {             lsp-refresh-interval &lt;&gt;;           }         }       }     }   } }</pre>	<pre>protocols {   isis {     lsp-refresh-interval &lt;&gt;;   } }</pre>
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OpenConfig path: /network-instances/network-instance/protocols/protocol/isis/global/timers/config/lsp-refresh-interval

Table 50: Global ISIS Configuration (Continued)

Command	OpenConfig Configuration	Junos Configuration
SPF first interval	<pre>openconfig-network-instance:network-instances {   protocols {     protocol ISIS &lt;&gt; {       global {         timers {           spf {             config {               spf-first-interval &lt;&gt;;             }           }         }       }     }   } }</pre>	<pre>protocols {   isis {     spf-options {       delay &lt;&gt;;     }   } }</pre>

OpenConfig path:  
/network-instances/network-instance/protocols/protocol/isis/global/timers/spf/config/spf-first-interval

SPF hold interval	<pre>openconfig-network-instance:network-instances {   protocols {     protocol ISIS &lt;&gt; {       global {         timers {           spf {             config {               spf-hold-interval &lt;&gt;;             }           }         }       }     }   } }</pre>	<pre>protocols {   isis {     spf-options {       holddown &lt;&gt;;     }   } }</pre>
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OpenConfig path: /network-instances/network-instance/protocols/protocol/isis/global/timers/spf/config/spf-hold-interval

Table 50: Global ISIS Configuration (Continued)

Command	OpenConfig Configuration	Junos Configuration
Overload bit	<pre>openconfig-network-instance:network-instances {   protocols {     protocol ISIS &lt;&gt; {       global {         lsp-bit {           overload-bit {             config {               set-bit &lt;true   false&gt;;             }           }         }       }     }   } }</pre>	<pre>protocols {   isis {     overload;   } }</pre>

OpenConfig path: /network-instances/network-instance/protocols/protocol/isis/global/lsp-bit/overload-bit/config/set-bit

Net	<pre>openconfig-network-instance:network-instances {   protocols {     protocol ISIS &lt;&gt; {       global {         config {           overload-bit {             config {               net &lt;&gt;;             }           }         }       }     }   } }</pre>	<pre>protocols {   isis {     net &lt;&gt;;   } }</pre>
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OpenConfig path: /network-instances/network-instance/protocols/protocol/isis/global/config/net

Table 50: Global ISIS Configuration (Continued)

Command	OpenConfig Configuration	Junos Configuration
Level capability	<pre>openconfig-network-instance:network-instances {   protocols {     protocol ISIS &lt;&gt; {       global {         config {           overload-bit {             config {               level-capability &lt;&gt;;             }           }         }       }     }   } }</pre>	<pre>protocols {   isis {     level &lt;&gt; disable;   } }</pre>

OpenConfig path: /network-instances/network-instance/protocols/protocol/isis/global/config/level-capability

Address family indicator (AFI) and subsequent address family identifier (SAFI)	<pre>openconfig-network-instance:network-instances {   protocols {     protocol ISIS &lt;&gt; {       global {         afi-safi {           af &lt;&gt; {             config {               enabled FALSE;             }           }         }       }     }   } }</pre>	<pre>protocols {   isis {     (no-ipv4-routing       no-ipv6-routing);   } }</pre>
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Table 50: Global ISIS Configuration (Continued)

Command	OpenConfig Configuration	Junos Configuration
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OpenConfig path: `/network-instances/network-instance/protocols/protocol/isis/global/afi-safi/af/config/enabled`

In OpenConfig, configure the values true or false to enable or disable the address families. In Junos, the IPv4 and IPv6 address families are enabled by default. To disable, use the `no-ipv4-routing` or `no-ipv6-routing` statements.

**NOTE:** Junos supports only the IPv4 and IPv6 address families for AFI, and unicast for SAFI.

LSP MTU size	<pre>openconfig-network-instance:network-instances {   protocols {     protocol ISIS &lt;&gt; {       isis {         global {           transport {             config {               lsp-mtu-size &lt;&gt;;             }           }         }       }     }   } }</pre>	<pre>protocols {   isis {     max-lsp-size &lt;&gt;;   } }</pre>
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OpenConfig path: `/network-instances/network-instance/protocols/protocol/isis/global/transport/config/lsp-mtu-size`

**NOTE:** The range of values for `max-lsp-size` is 512 to 9192 bytes. Values outside this range will cause a commit error in OpenConfig.

## Level Configuration

See [Table 51 on page 245](#) for configuration mappings of the following OpenConfig paths under `/network-instances/network-instance/protocols/protocol/isis/`:

- `/levels/level/config/enabled`

- /levels/level/authentication/config/auth-type
- /levels/level/authentication/config/auth-password
- /levels/level/authentication/config/enabled
- /levels/level/authentication/config/disable-lsp

Table 51: Level ISIS Configuration

Command and Path	OpenConfig Configuration	Junos Configuration
Enable or disable	<pre>openconfig-network-instance:network-instances {   protocols {     protocol ISIS &lt;&gt; {       levels {         level {           config {             enabled FALSE;           }         }       }     }   } }</pre>	<pre>protocols {   isis {     level &lt;&gt; {       disable;     }   } }</pre>

OpenConfig path: /network-instances/network-instance/protocols/protocol/isis/levels/level/config/enabled

In OpenConfig, configure the value true to enable.

Table 51: Level ISIS Configuration (Continued)

Command and Path	OpenConfig Configuration	Junos Configuration
Authentication type	<pre>openconfig-network-instance:network-instances {   protocols {     protocol ISIS &lt;&gt; {       levels {         level &lt;&gt; {           authentication {             config {               auth-type (simple-key   keychain);             }           }         }       }     }   } }</pre>	NA
OpenConfig path: /network-instances/network-instance/protocols/protocol/isis/levels/level/authentication/config/auth-type		
Authentication password	<pre>openconfig-network-instance:network-instances {   protocols {     protocol ISIS &lt;&gt; {       levels {         level &lt;&gt; {           authentication {             config {               auth-password &lt;&gt;;             }           }         }       }     }   } }</pre>	<pre>protocols {   isis {     level &lt;&gt; {       authentication-key &lt;&gt;;     }   } }</pre>

Table 51: Level ISIS Configuration (Continued)

Command and Path	OpenConfig Configuration	Junos Configuration
	OpenConfig path: /network-instances/network-instance/protocols/protocol/isis/levels/level/authentication/config/auth-password	
Hello authentication (disable)	<pre>openconfig-network-instance:network-instances {   protocols {     protocol ISIS &lt;&gt; {       levels {         level &lt;&gt; {           authentication {             config {               enabled FALSE;             }           }         }       }     }   } }</pre>	<pre>protocols {   isis {     level &lt;&gt; {       inactive:         authentication-key &lt;&gt;;       inactive:         authentication-type &lt;&gt;;     }   } }</pre>

OpenConfig path: /network-instances/network-instance/protocols/protocol/isis/levels/level/authentication/config/enabled

**Table 51: Level ISIS Configuration (Continued)**

Command and Path	OpenConfig Configuration	Junos Configuration
Disable authentication for LSP packets	<pre> openconfig-network-instance:network-instances {   protocols {     protocol ISIS &lt;&gt; {       isis {         levels {           level &lt;&gt; {             authentication {               config {                 disable-lsp TRUE;               }             }           }         }       }     }   } } </pre>	<pre> protocols {   isis {     level &lt;&gt; {       no-lsp-authentication;     }   } } </pre>

OpenConfig path: /network-instances/network-instance/protocols/protocol/isis/levels/level/authentication/config/disable-lsp

## Interface Configuration

See [Table 52 on page 249](#) for configuration mappings of the following OpenConfig paths under /network-instances/network-instance/protocols/protocol/isis/:

- /interfaces/interface/config/enabled
- /interfaces/interface/config/hello-padding
- /interfaces/interface/config/circuit-type
- /interfaces/interface/timers/config/csnp-interval
- /interfaces/interface/levels/level/timers/config/hello-interval

- /interfaces/interface/levels/level/timers/config/hello-multiplier
- interfaces/interface/levels/level/hello-authentication/config/enabled
- /interfaces/interface/levels/level/hello-authentication/config/auth-type
- /interfaces/interface/levels/level/hello-authentication/config/auth-mode
- /interfaces/interface/levels/level/hello-authentication/config/auth-password
- /interfaces/interface/afi-safi/af/config/enabled

Table 52: Interface ISIS Configuration

Command and Path	OpenConfig Configuration	Junos Configuration
Enable or disable	<pre>openconfig-network-instance:network-instances {   protocols {     protocol ISIS &lt;&gt; {       interfaces {         interface {           config {             enabled FALSE;           }         }       }     }   } }</pre>	<pre>protocols {   isis {     interface &lt;&gt; {       disable;     }   } }</pre>

OpenConfig path: /network-instances/network-instance/protocols/protocol/isis/interfaces/interface/config/enabled

Table 52: Interface ISIS Configuration (Continued)

Command and Path	OpenConfig Configuration	Junos Configuration
Hello padding	<pre> openconfig-network-instance:network-instances {   protocols {     protocol ISIS &lt;&gt; {       interfaces {         interface {           config {             hello-padding &lt;&gt;;           }         }       }     }   } } </pre>	<pre> protocols {   isis {     interface &lt;&gt; {       hello-padding &lt;&gt;;     }   } } </pre>

OpenConfig path: **/network-instances/network-instance/protocols/protocol/isis/interfaces/interface/config/hello-padding**

CSNP interval	<pre> openconfig-network-instance:network-instances {   protocols {     protocol ISIS &lt;&gt; {       interfaces {         interface &lt;&gt; {           timers {             config {               csnp-interval &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> protocols {   isis {     interface &lt;&gt; {       csnp-interval &lt;&gt;;     }   } } </pre>
---------------	---	--

OpenConfig path: **/network-instances/network-instance/protocols/protocol/isis/interfaces/interface/timers/config/csnp-interval**

Table 52: Interface ISIS Configuration *(Continued)*

Command and Path	OpenConfig Configuration	Junos Configuration
Hello interval	<pre>openconfig-network-instance:network-instances {   protocols {     protocols ISIS &lt;&gt; {       interfaces {         interface &lt;&gt; {           levels {             level &lt;&gt; {               timers {                 config {                   hello-interval &lt;&gt;;                 }               }             }           }         }       }     }   } }</pre>	<pre>protocols {   isis {     interface &lt;&gt; {       level &lt;&gt; {         hello-interval &lt;&gt;;       }     }   } }</pre>

OpenConfig path: **/network-instances/network-instance/protocols/protocol/isis/interfaces/interface/levels/level/timers/config/hello-interval**



Table 52: Interface ISIS Configuration (Continued)

Command and Path	OpenConfig Configuration	Junos Configuration
Hello multiplier	<pre>openconfig-network-instance:network-instances {   protocols {     protocols ISIS &lt;&gt; {       interfaces {         interface &lt;&gt; {           levels {             level &lt;&gt;;             timers {               config {                 hello-multiplier &lt;&gt;;               }             }           }         }       }     }   } }</pre>	<pre>protocols {   isis {     interface &lt;&gt; {       level &lt;&gt; {         hold-time &lt;&gt;;       }     }   } }</pre>

OpenConfig path: /network-instances/network-instance/protocols/protocol/isis/interfaces/interface/levels/level/timers/config/hello-multiplier

Table 52: Interface ISIS Configuration *(Continued)*

Command and Path	OpenConfig Configuration	Junos Configuration
Circuit type	<pre>openconfig-network-instance:network-instances {   protocols {     protocol ISIS &lt;&gt; {       interfaces {         interface &lt;&gt; {           timers {             config {               circuit-type &lt;&gt;;             }           }         }       }     }   } }</pre>	<pre>protocols {   isis {     interface &lt;&gt; {       point-to-point;     }   } }</pre>

OpenConfig path: **/network-instances/network-instance/protocols/protocol/isis/interfaces/interface/config/circuit-type**

Table 52: Interface ISIS Configuration (Continued)

Command and Path	OpenConfig Configuration	Junos Configuration
Hello authentication (enable or disable)	<pre>openconfig-network-instance:network-instances {   protocols {     protocols ISIS &lt;&gt; {       interfaces {         interface &lt;&gt; {           levels {             level &lt;&gt; {               hello-authentication {                 config {                   enabled FALSE;                 }               }             }           }         }       }     }   } }</pre>	<pre>protocols {   isis {     interface &lt;&gt; {       level &lt;&gt; {         inactive: hello- authentication-key &lt;&gt;;         inactive: hello- authentication-type &lt;&gt;;       }     }   } }</pre>

OpenConfig path: /network-instances/network-instance/protocols/protocol/isis/interfaces/interface/levels/level/hello-authentication/config/enable

**NOTE:** When the following conditions apply in the OpenConfig configuration, the Junos configuration will move to the inactive state:

- Authentication mode is configured.
- Authentication password is configured.
- Value for enabled is set to false.

Table 52: Interface ISIS Configuration (Continued)

Command and Path	OpenConfig Configuration	Junos Configuration
Authentication type	<pre>openconfig-network-instance:network-instances {   protocols {     protocols ISIS &lt;&gt; {       interfaces {         interface &lt;&gt; {           levels {             level &lt;&gt;;             hello-authentication {               config {                 auth-type &lt;&gt;;               }             }           }         }       }     }   } }</pre>	NA

OpenConfig path: /network-instances/network-instance/protocols/protocol/isis/interfaces/interface/levels/level/hello-authentication/config/auth-type

Table 52: Interface ISIS Configuration (Continued)

Command and Path	OpenConfig Configuration	Junos Configuration
Authentication mode	<pre>openconfig-network-instance:network-instances {   protocols {     protocols ISIS &lt;&gt; {       interfaces {         interface &lt;&gt; {           levels {             level &lt;&gt;;             hello-authentication {               config {                 auth-mode &lt;&gt;;               }             }           }         }       }     }   } }</pre>	<pre>protocols {   isis {     interface &lt;&gt; {       level &lt;&gt; {         hello-         authentication-type         &lt;&gt;;       }     }   } }</pre>

OpenConfig path: /network-instances/network-instance/protocols/protocol/isis/interfaces/interface/levels/level/hello-authentication/config/auth-mode

Table 52: Interface ISIS Configuration (Continued)

Command and Path	OpenConfig Configuration	Junos Configuration
Authentication password	<pre>openconfig-network-instance:network-instances {   protocols {     protocols ISIS &lt;&gt; {       interfaces {         interface &lt;&gt; {           levels {             level &lt;&gt;;             hello-authentication {               config {                 auth-password &lt;&gt;;               }             }           }         }       }     }   } }</pre>	<pre>protocols {   isis {     interface &lt;&gt; {       level &lt;&gt; {         hello-           authentication-key         &lt;&gt;;       }     }   } }</pre>


OpenConfig path: /network-instances/network-instance/protocols/protocol/isis/interfaces/interface/levels/level/hello-authentication/config/auth-password

Table 52: Interface ISIS Configuration (Continued)

Command and Path	OpenConfig Configuration	Junos Configuration
AFI-SAFI configuration	<pre>openconfig-network-instance:network-instances {   protocols {     protocols ISIS &lt;&gt; {       interfaces {         interface &lt;&gt; {           afi-safi {             af &lt;&gt;;             config {               enabled (true   false);             }           }         }       }     }   } }</pre>	<pre>protocols {   isis {     interface &lt;&gt; {       no-unicast-topology;     }   } }</pre>

OpenConfig path: /network-instances/network-instance/protocols/protocol/isis/interfaces/interface/afi-safi/af/config/enabled

# Mapping OpenConfig LACP Commands to Junos Configuration



**NOTE:** See "OpenConfig Data Model Version" on page 3 topic to understand the data models supported version and its Junos OS release for Juniper Networks ACX Series, MX Series, PTX Series, and QFX Series.

Table 53 on page 259 shows the mapping of OpenConfig LACP configurations with the relevant configuration in Junos.

**Table 53: LACP Configuration**

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
System priority	/lacp/config/system-priority	set chassis aggregated-devices ethernet lacp system-priority <i>system-priority</i>
Interval	/lacp/interfaces/interface/config/interval	set interfaces <i>ae_name</i> aggregated-ether-options lacp periodic [fast slow]
LACP mode	/lacp/interfaces/interface/config/lacp-mode/	set interfaces <i>ae_name</i> aggregated-ether-options lacp [active passive]
Name	/lacp/interfaces/interface/config/name/	set interfaces <i>ae_name</i>
System ID MAC	/lacp/interfaces/interface/config/system-id-mac/	set interfaces <i>ae_name</i> aggregated-ether-options lacp system-id <i>system-id-mac</i>
System Priority	/lacp/interfaces/interface/config/system-priority/	set interfaces <i>ae_name</i> aggregated-ether-options lacp system-priority <i>system-priority</i>

**RELATED DOCUMENTATION**
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# Mapping OpenConfig LDP Commands to Junos Configuration

## IN THIS SECTION

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- [Interface Configuration | 261](#)
- [Graceful Restart Configuration | 262](#)
- [Authentication Configuration | 264](#)
- [Targeted LDP Configuration | 265](#)
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**NOTE:** See "[OpenConfig Data Model Version](#)" on [page 3](#) topic to understand the data models supported version and its Junos OS release for Juniper Networks MX Series and PTX Series.

The tables below show the mappings of LDP commands with the relevant configurations in Junos.

- [Table 54 on page 261](#): Global LDP
- [Table 55 on page 262](#): Interfaces
- [Table 56 on page 263](#): Graceful Restart
- [Table 57 on page 265](#): Authentication
- [Table 58 on page 266](#): Targeted LDP
- [Table 59 on page 267](#): LDP Neighbor

## Global LDP Configuration

See [Table 54 on page 261](#) for configuration mappings of the following sensor:

- `/network-instances/network-instance/mps/signaling-protocols/ldp/global/config/lsr-id`

Table 54: Global LDP Configuration

Command Name	OpenConfig configuration	Junos Configuration
LSR ID	<pre>ldp {   global {     config {       lsr-id &lt;&gt;;     }   } }</pre>	<pre>ldp {   transport-address &lt;&gt;; }</pre>

For the LSR ID in OpenConfig, the transport address can be set as either the interface ID, router ID, or any other ID. This is only for single transport.

## Interface Configuration

See [Table 55 on page 262](#) for configuration mappings of the following sensors:

- /network-instances/network-instance/mpls/signaling-protocols/ldp/interface-attributes/interfaces/interface/config/interface-id
- /network-instances/network-instance/mpls/signaling-protocols/ldp/interface-attributes/interfaces/interface/config/hello-holdtime
- /network-instances/network-instance/mpls/signaling-protocols/ldp/interface-attributes/interfaces/interface/config/hello-interval

**Table 55: Interface Configuration**

<i>Command Name</i>	<i>OpenConfig configuration</i>	<i>Junos Configuration</i>
interface ID	<pre> ldp {   interface-attributes {     interface &lt;&gt; {       config {         interface-id ge-0/0/2.0;       }     }   } } </pre>	<pre> ldp {   interface &lt;&gt;; } </pre>
hello holdtime	<pre> ldp {   interface-attributes {     interface &lt;&gt;/all {       config {         hello-holdtime &lt;&gt;;       }     }   } } </pre>	<pre> ldp {   interface &lt;&gt;/all {     hello-holdtime &lt;&gt;;   } } </pre>
hello interval	<pre> ldp {   interface-attributes {     interface &lt;&gt;/all {       config {         hello-interval &lt;&gt;;       }     }   } } </pre>	<pre> ldp {   interface &lt;&gt;/all {     hello-interval &lt;&gt;;   } } </pre>

## Graceful Restart Configuration

See [Table 56 on page 263](#) for configuration mappings of the following sensors:

- /network-instances/network-instance/mpls/signaling-protocols/ldp/global/graceful-restart/config/enabled
- /network-instances/network-instance/mpls/signaling-protocols/ldp/global/graceful-restart/config/reconnect-time
- /network-instances/network-instance/mpls/signaling-protocols/ldp/global/graceful-restart/config/recovery-time
- /network-instances/network-instance/mpls/signaling-protocols/ldp/global/graceful-restart/config/helper-enable

Table 56: Graceful Restart Configuration

Command Name	OpenConfig configuration	Junos Configuration
enabled	<pre>ldp {   graceful-restart {     config {       enabled &lt;true/false&gt;;     }   } }</pre>	<pre>ldp {   graceful-restart {     disable;   } }</pre>
By default, graceful restart is disabled in the OC configuration. To enable graceful restart, set enable to true.		
reconnect-time	<pre>ldp {   graceful-restart {     config {       reconnect-time &lt;&gt;;     }   } }</pre>	<pre>ldp {   graceful-restart {     reconnect-time &lt;&gt;;   } }</pre>

**Table 56: Graceful Restart Configuration (Continued)**

Command Name	OpenConfig configuration	Junos Configuration
recovery-time	<pre> ldp {   graceful-restart {     config {       recovery-time &lt;&gt;;     }   } } </pre>	<pre> ldp {   graceful-restart {     recovery-time &lt;&gt;;   } } </pre>
helper-disable	<pre> ldp {   graceful-restart {     config {       helper-disable &lt;&gt;;     }   } } </pre>	<pre> ldp {   graceful-restart {     helper-disable &lt;&gt;;   } } </pre>

## Authentication Configuration

See [Table 57 on page 265](#) for configuration mappings of the following sensors:

- /network-instances/network-instance/mpls/signaling-protocols/ldp/global/authentication/config/authentication-key
- /network-instances/network-instance/mpls/signaling-protocols/ldp/global/authentication/config/enable

Table 57: Authentication Configuration

Command Name	OpenConfig configuration	Junos Configuration
authentication-key	<pre>ldp {   authentication {     config {       authentication-key &lt;&gt;;     }   } }</pre>	<pre>ldp {   session-group 0.0.0.0/0 {     authentication-key &lt;&gt;;   } }</pre>

Authentication key configuration is not available at the global level. Use session group 0.0.0.0/0 for global configuration.

enable	<pre>ldp {   authentication {     config {       enable &lt;true/false&gt;;     }   } }</pre>	<pre>ldp {   session-group 0.0.0.0/0 {     inactive; authentication- key &lt;&gt;;   } }</pre>
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In OC configuration, the authentication key will be activated when enable is set to true. In JUNOS configuration, authentication key will be inactive by default.

## Targeted LDP Configuration

See [Table 58 on page 266](#) for configuration mappings of the following sensors:

- /network-instances/network-instance/mpls/signaling-protocols/ldp/targeted/config/hello-interval
- /network-instances/network-instance/mpls/signaling-protocols/ldp/targeted/config/hello-holdtime
- /network-instances/network-instance/mpls/signaling-protocols/ldp/targeted/config/hello-accept

Table 58: Targeted LDP Configuration

Command Name	OpenConfig configuration	Junos Configuration
hello-interval	<pre> ldp {   targeted {     config {       hello-interval &lt;&gt;;     }   } } </pre>	<pre> ldp {   targeted-hello {     hello-interval &lt;&gt;;   } } </pre>
hello-holdtime	<pre> ldp {   targeted {     config {       hello-holdtime &lt;&gt;;     }   } } </pre>	<pre> ldp {   targeted-hello {     hold-time &lt;&gt;;   } } </pre>
hello-accept	<pre> ldp {   targeted {     config {       hello-accept;     }   } } </pre>	<pre> ldp {   strict-targeted-hellos; } </pre>

## LDP Neighbor Configuration

See [Table 59 on page 267](#) for configuration mappings of the following sensors:

- /network-instances/network-instance/mpls/signaling-protocols/ldp/neighbors/neighbor/

- /network-instances/network-instance/mpls/signaling-protocols/ldp/neighbors/neighbor/authentication/config/enable
- /network-instances/network-instance/mpls/signaling-protocols/ldp/neighbors/neighbor/authentication/config/authentication-key

Table 59: LDP Neighbor Configuration

Command Name	OpenConfig configuration	Junos Configuration
neighbor	<pre>ldp {   neighbors {     neighbor &lt;id&gt;&lt;label-space-id&gt;;   } }</pre>	<pre>ldp {   session &lt;neighbor-id&gt;; }</pre>
enable	<pre>ldp {   neighbors {     neighbor &lt;&gt; {       authentication {         config {           enable &lt;true/false&gt;;         }       }     }   } }</pre>	<pre>ldp {   session &lt;&gt; {     inactive: authentication-key &lt;&gt;;   } }</pre>


For neighbour ID, the neighbor IP address and label space ID are the keys. Label space ID should be zero. Non-zero values will be treated as zeros.



Table 59: LDP Neighbor Configuration *(Continued)*

Command Name	OpenConfig configuration	Junos Configuration
authentication-key	<pre>ldp {   neighbors {     neighbor &lt;&gt; {       authentication {         config {           authentication-key &lt;&gt;;         }       }     }   } }</pre>	<pre>ldp {   session-group &lt;&gt; {     authentication-key &lt;&gt;;   } }</pre>

# Mapping OpenConfig LLDP Commands to Junos Configuration



**NOTE:** See ["OpenConfig Data Model Version" on page 3](#) topic to understand the data models supported version and its Junos OS release for Juniper Networks MX Series and PTX Series.

[Table 60 on page 269](#) and [Table 61 on page 269](#) show the mapping of OpenConfig LLDP commands with the relevant configuration in Junos.

Table 60: Global LLDP Configuration

Command Name	OpenConfig Command Path	Junos Configuration
Enable	/lldp/config/enabled  <b>NOTE:</b> Supported in Junos Evolved OS Release 21.4R1 for PTX10008 and PTX10016 routers based on OpenConfig data model openconfig-lldp.yang version 0.2.1.	set protocols lldp <i>enable/disable</i>
Hello time	/lldp/config/hello-timer	set protocols lldp tlv-filter
TLV advertisement	/lldp/config/suppress-tlv-advertisement  <b>NOTE:</b> Supported in Junos Evolved OS Release 21.4R1 for PTX10008 and PTX10016 routers based on OpenConfig data model openconfig-lldp.yang version 0.2.1.	set protocols lldp advertisement-interval <i>advertisement-interval</i>
System Information	/lldp/config/chassis-id /lldp/config/chassis-id-type	Not supported


Table 61: Interface Configuration

Command Name	OpenConfig Command Path	Junos Configuration
Interface	/lldp/interfaces/interface/  <b>NOTE:</b> Supported in Junos Evolved OS Release 21.4R1 for PTX10008 and PTX10016 routers based on OpenConfig data model openconfig-lldp.yang version 0.2.1.	set protocols lldp interface <i>interface-name</i>
Interface Config	/lldp/interfaces/interface/config/name /lldp/interfaces/interface/config/enabled  <b>NOTE:</b> Supported in Junos Evolved OS Release 21.4R1 for PTX10008 and PTX10016 routers based on OpenConfig data model openconfig-lldp.yang version 0.2.1.	set protocols lldp interface <i>interface-name</i> enable

RELATED DOCUMENTATION

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# Mapping OpenConfig Local Routing Commands to Junos Configuration



**NOTE:** See "OpenConfig Data Model Version" on page 3 topic to understand the data models supported version and its Junos OS release for Juniper Networks ACX Series, EX Series, MX Series, PTX Series, and QFX Series.

Table 62 on page 270 and Table 63 on page 271 show the mapping of OpenConfig local routing commands to the relevant configuration in Junos.

Table 62: Static Route Configuration

Command Name	OpenConfig Command Path	Junos Configuration
	Command path prefix:  /local-routes/static-routes	
<p><b>NOTE:</b> Supported in Junos OS Release 21.2R1 for PTX Series and MX Series. Supported in Junos Evolved OS Release 21.3R1 for PTX10003 and PTX10008 routers. Supported in Junos Evolved OS Release 21.4R1 for PTX10016 routers.</p> <p>Local Static Routes</p>	/static/next-hops/next-hop/ config/metric	set routing-options static route prefix qualified-next-hop nexthop metric value

Table 62: Static Route Configuration (*Continued*)

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Local Static Prefix	/static/config/prefix	set routing-options static route <i>prefix</i>
Local Static Next Hop	/static/config/prefix /static/config/next-hop/ <i>ip-address</i> /static/config/next-hop/ <i>local-defined-next-hop</i> /static/config/next-hop/ <i>string</i>	set routing-options static route <i>prefix</i> next-hop ( <i>address</i>   <i>interface</i> )  set routing-options static route <i>prefix</i> discard
Local Static Tag	/static/config/prefix /static/config/set-tag	set routing-options static route <i>prefix</i> tag <i>tag</i>


Table 63: Local Aggregate Configuration

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
	Command path prefix: <b>/local-routes/local-aggregates</b>	
Local Aggregate Prefix	/aggregate/config/prefix	set routing-options aggregate route <i>prefix</i>
Local Aggregate Discard	/aggregate/config/prefix /aggregate/config/discard	set routing-options aggregate route <i>prefix</i> discard
Local Aggregate Tag	/aggregate/config/prefix /aggregate/config/set-tag	set routing-options aggregate route <i>prefix</i> tag <i>tag</i>

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# Mapping OpenConfig MACsec Model Commands to Junos Configuration



**NOTE:** See "OpenConfig Data Model Version" on page 3 topic to understand the data models supported version and its Junos OS release for Juniper Networks PTX Series.

The following tables show the mapping of OpenConfig Media Access Control Security (MACsec) commands with the relevant configurations in Junos OS:

- [Table 64 on page 273](#): MACsec Key Agreement (MKA) Policies Configuration
- [Table 65 on page 277](#): MKA Key Chain Configuration
- [Table 66 on page 280](#): MKA Key Chain Key ID Configuration Deviation
- [Table 67 on page 282](#): MACsec Interfaces Configuration

Table 64: MACsec Key Agreement (MKA) Policies Configuration

Command Name	OpenConfig Configuration	Junos Configuration
name	<pre> openconfig-macsec: macsec {   mka {     policies {       policy {         name(leafref)       }     }   } } </pre>	<pre> security macsec {   connectivity-association {     &lt;ca_name&gt;   } } </pre>
name	<pre> openconfig-macsec: macsec {   mka {     policies {       policy {         config {           name(string)         }       }     }   } } </pre>	<pre> security macsec {   connectivity-association {     &lt;name&gt;   } } </pre>
key-server-priority	<pre> openconfig-macsec: macsec {   mka {     policies {       policy {         config {           key-server-priority(uint8)         }       }     }   } } </pre>	<pre> security macsec {   connectivity-association {     &lt;name&gt; {       mka {         key-server-         priority &lt; 0..255 &gt;       }     }   } } </pre>

Table 64: MACsec Key Agreement (MKA) Policies Configuration *(Continued)*

Command Name	OpenConfig Configuration	Junos Configuration
macsec-cipher-suite	<pre> openconfig-macsec: macsec {   mka {     policies {       policy {         config {           macsec-cipher- suite(macsec-types:macsec-cipher-suite)         }       }     }   } } </pre>	<pre> security macsec {   connectivity-association {     &lt;name&gt; {       cipher-suite {         &lt;suit-options&gt;       }     }   } } </pre>
confidentiality-offset	<pre> openconfig-macsec: macsec {   mka {     policies {       policy {         config {           confidentiality- offset(macsec-types: confidentiality-offset)         }       }     }   } } </pre>	<pre> security macsec {   connectivity-association {     &lt;name&gt; {       offset {         &lt;0 or 30 or 50&gt;       }     }   } } </pre>

Table 64: MACsec Key Agreement (MKA) Policies Configuration (Continued)

Command Name	OpenConfig Configuration	Junos Configuration
delay-protection	<pre> openconfig-macsec: macsec {   mka {     policies {       policy {         config {           delay-protection(boolean)         }       }     }   } } </pre>	<pre> security macsec {   connectivity-association {     &lt;name&gt; {       mka {         bounded-delay       }     }   } } </pre>
include-icv-indication	<pre> openconfig-macsec: macsec {   mka {     policies {       policy {         config {           include-icv-indication(boolean)         }       }     }   } } </pre>	Configuration unsupported in Junos OS.
sak-rekey-interval	<pre> openconfig-macsec: macsec {   mka {     policies {       policy {         config {           sak-rekey-interval(uint32)         }       }     }   } } </pre>	<pre> security macsec {   connectivity-association {     &lt;name&gt; {       mka {         sak-rekey-interval         &lt; 60..86400 seconds&gt;       }     }   } } </pre>



Table 64: MACsec Key Agreement (MKA) Policies Configuration *(Continued)*

Command Name	OpenConfig Configuration	Junos Configuration
sak-rekey-on-live-peer-loss	<pre> openconfig-macsec: macsec {   mka {     policies {       policy {         config {           sak-rekey-on-live-peer-           loss(boolean)         }       }     }   } } </pre>	Configuration unsupported in Junos OS.
use-updated-eth-header	<pre> openconfig-macsec: macsec {   mka {     policies {       policy {         config {           use-updated-eth-           header(boolean)         }       }     }   } } </pre>	Configuration unsupported in Junos OS.

Table 65: MKA Key Chain Configuration

Command Name	OpenConfig Configuration	Junos Configuration
key-chain name	<pre> openconfig-macsec: macsec {   mka {     key-chains {       key-chain {         name(leafref)       }     }   } } </pre>	<pre> security authentication-key-chains {   key-chain {     &lt;key-chain-name&gt;   } } </pre>
key-chain config name	<pre> openconfig-macsec: macsec {   mka {     key-chains {       key-chain {         config {           name(string)         }       }     }   } } </pre>	<pre> security authentication-key-chains {   key-chain {     &lt;key-chain-name&gt;   } } </pre>
mka-key id	<pre> openconfig-macsec: macsec {   mka {     key-chains {       key-chain {         mka-keys {           mka-key {             id(leafref)           }         }       }     }   } } </pre>	<pre> security authentication-key-chains {   key-chain {     &lt;key-chain-name&gt; {       key &lt;0..63&gt;     }   } } </pre>

**Table 65: MKA Key Chain Configuration (Continued)**

Command Name	OpenConfig Configuration	Junos Configuration
mka-key config id	<pre> openconfig-macsec: macsec {   mka {     key-chains {       key-chain {         mka-keys {           mka-key {             config {               id(oc-yang:hex- string)             }           }         }       }     }   } } </pre>	<pre> security authentication-key-chains {   key-chain {     &lt;key-chain-name&gt; {       key &lt;0..63&gt; {         key-name &lt;&gt;       }     }   } } </pre>
key-clear-text	<pre> openconfig-macsec: macsec {   mka {     key-chains {       key-chain {         mka-keys {           mka-key {             config {               key-clear- text(string)             }           }         }       }     }   } } </pre>	<pre> key-chain {   &lt;key-chain-name&gt; {     key &lt;0..63&gt; {       secret       &lt;secret_key&gt;     }   } } </pre>

**Table 65: MKA Key Chain Configuration (Continued)**

Command Name	OpenConfig Configuration	Junos Configuration
cryptographic-algorithm	<pre> openconfig-macsec: macsec {   mka {     key-chains {       key-chain {         mka-keys {           mka-key {             config {               cryptographic- algorithm(enumeration)             }           }         }       }     }   } } </pre>	Configuration unsupported in Junos OS.
valid-date-time	<pre> openconfig-macsec: macsec {   mka {     key-chains {       key-chain {         mka-keys {           mka-key {             config {               valid-date- time(union)             }           }         }       }     }   } } </pre>	<pre> security authentication-key-chains {   key-chain {     &lt;key-chain-name&gt; {       key &lt;0..63&gt; {         start-time {           &lt; YYYY-MM- DD.HH:MM&gt;         }       }     }   } } </pre>

Table 65: MKA Key Chain Configuration *(Continued)*

Command Name	OpenConfig Configuration	Junos Configuration
	<pre>openconfig-macsec: macsec {   mka {     key-chains {       key-chain {         mka-keys {           mka-key {             config {               expiration-date- time(union)             }           }         }       }     }   } }</pre>	Configuration unsupported in Junos OS.

Table 66: MKA Key Chain Key ID Configuration Deviation

Command Name	OpenConfig Configuration	Junos Configuration
MKA Key	<pre>openconfig-macsec: macsec {   mka {     key-chains {       key-chain {         mka-keys {           mka-key {             id(leafref)           }         }       }     }   } }</pre>	<pre>security authentication-key-chains {   key-chain {     &lt;key-chain-name&gt; {       key &lt;0..63&gt;     }   } }</pre>

Table 66: MKA Key Chain Key ID Configuration Deviation (*Continued*)

Command Name	OpenConfig Configuration	Junos Configuration
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In OpenConfig configurations, the `mka-key` elements ID, key, and start time are referenced by the `mka-key id`. In Junos OS configurations, this is referenced by the key value, in the range from 0 to 63.

In order to support the OpenConfig configuration, Junos OS deviates the `mka-key` pattern in the OpenConfig model in the following way:

- The first two digits should be an integer from 00 to 63 followed by a hexstring; for example: [00..63] [hexstring].
- The first two digits from the OpenConfig `mka-key id` translate to the Junos OS configuration integer.

The following OpenConfig configuration is an example:

```
set openconfig-macsec:macsec mka key-chains key-chain MACSEC_OC_KEY mka-keys mka-key 00cafe0000
config key-clear-text 1234567890
```

```
set openconfig-macsec:macsec mka key-chains key-chain MACSEC_OC_KEY mka-keys mka-key 00cafe0000
config valid-date-time 2021-11-30T00:00:00.OZ
```

The resulting OpenConfig configuration commit on a Juniper device looks like this:

```
security {
  authentication-key-chains {
    key-chain MACSEC_OC_KEY {
      key 0 {
        secret "$9$EVBcev8X7Vs2LXikmfzFevMW-VJGDjk."; ## SECRET-DATA
        key-name cafe0000;
        start-time "2021-11-29.16:00:00 -0800";
      }
    }
  }
}
```

Table 67: MACsec Interfaces Configuration

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
interface name	<pre> openconfig-macsec: macsec {   interfaces {     interface {       name(leafref)     }   } } </pre>	<pre> security macsec {   interfaces {     &lt;name&gt;   } } </pre>
interface config name	<pre> openconfig-macsec: macsec {   interfaces {     interface {       config {         name(oc-if:base-interface- ref)       }     }   } } </pre>	<pre> security macsec {   interfaces {     &lt;name&gt;   } } </pre>
config enable	<pre> openconfig-macsec: macsec {   interfaces {     interface {       config {         enable(boolean)       }     }   } } </pre>	There is no separate enable keyword in Junos OS.

Table 67: MACsec Interfaces Configuration (Continued)

Command Name	OpenConfig Configuration	Junos Configuration
replay-protection	<pre> openconfig-macsec: macsec {   interfaces {     interface {       config {         replay-protection(uint16)       }     }   } } </pre>	<pre> openconfig-macsec: macsec {   interfaces {     interface {       config {         replay-protection(uint16)       }     }   } } security macsec {   connectivity-association {     &lt;name&gt; {       replay-protect {         replay-window-size &lt; 0..65535 packets&gt;       }     }   } } </pre>
mka-policy	<pre> openconfig-macsec: macsec {   interfaces {     interface {       mka {         config {           mka-policy(leafref)         }       }     }   } } </pre>	<pre> security macsec {   interfaces {     &lt;name&gt; {       connectivity-association {         &lt;connectivity- association&gt;       }     }   } } </pre>



Table 67: MACsec Interfaces Configuration (Continued)

Command Name	OpenConfig Configuration	Junos Configuration
config key-chain	<pre> openconfig-macsec: macsec {   interfaces {     interface {       mka {         config {           key-chain(leafref)         }       }     }   } } </pre>	<pre> security macsec {   connectivity-association {     &lt;name&gt; {       pre-shared-key-chain {         &lt;pre-shared-key-chain&gt;       }     }   } } </pre>

## Mapping OpenConfig MPLS Commands to Junos Configuration



**NOTE:** See "OpenConfig Data Model Version" on page 3 topic to understand the data models supported version and its Junos OS release for Juniper Networks MX Series, PTX Series, and QFX Series.

Table 68 on page 284 to Table 73 on page 295 show the mapping of OpenConfig MPLS commands with the relevant configuration in Junos.

Table 68: Global MPLS Configuration

Command Name	OpenConfig Command Path	Junos Configuration
Explicit Null	<pre> /mpls/global/config/null-label/explicit /mpls/global/config/null-label/implicit </pre>	<pre> set protocols mpls explicit-null </pre>

Table 68: Global MPLS Configuration (*Continued*)

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Interface	/mpls/global/interface-attributes/interface/config/ interface-id	set protocols mpls interface <i>interface</i>
	/mpls/global/interface-attributes/interface/config/mpls- enabled	set protocols mpls interface <i>interface</i> disable
	/mpls/global/interface-attributes/interface/interface-ref/ config/interface	
	/mpls/global/interface-attributes/interface/interface-ref/ config/subinterface	

Table 69: TE Global Attributes

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
SRLGs	/mpls/te-global-attributes/srlg/srlg/config/name	Flooded:  set routing-options srlg <i>name</i>  Static:  set routing-options fate- sharing group <i>name</i>
SRLG Value	/mpls/te-global-attributes/srlg/srlg/config/value	set routing-options fate- sharing group <i>name</i> srlg-value <i>value</i>
SRLG Cost	/mpls/te-global-attributes/srlg/srlg/config/cost	Flooded:  set routing-options srlg <i>name</i> srlg-cost <i>cost</i>  Static:  set routing-options fate- sharing group <i>name</i> cost <i>cost</i>

Table 69: TE Global Attributes (*Continued*)

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Address	/mpls/te-global-attributes/srlg/srlg/static-srlg-members/ members-list/config/from-address  /mpls/te-global-attributes/srlg/srlg/static-srlg-members/ members-list/config/to-address	set routing-options fate-sharing group <i>name</i> from <i>address</i> to <i>address</i>
Admin Groups	/mpls/te-global-attributes/mpls-admin-groups/admin-group/ config/admin-group-name  /mpls/te-global-attributes/mpls-admin-groups/admin-group/ config/bit-position	Bit position (group-value) 0-31:  set protocols mpls admin-groups <i>group-name group-value</i>  Bit position (group-value) 32-4294967295:  set routing-options admin-groups-extended <i>group-name group-value group-value</i>
Delay	/mpls/te-global-attributes/te-lsp-timers/config/install-delay  /mpls/te-global-attributes/te-lsp-timers/config/cleanup-delay  /mpls/te-global-attributes/te-lsp-timers/config/reoptimize-timer	set protocols mpls optimize-switchover-delay <i>delay</i>  set protocols mpls optimize-hold-dead-delay <i>delay</i>  set protocols mpls optimize-timer <i>timer</i>

Table 70: TE Interface Attributes

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
TE Interface	/mpls/te-interface-attributes/interface/config/interface-id  /mpls/te-interface-attributes/interface/interface-ref/config/interface  /mpls/te-interface-attributes/interface/interface-ref/config/subinterface	set protocols ospf area <i>id</i> interface <i>interface</i>

Table 70: TE Interface Attributes (Continued)

Command Name	OpenConfig Command Path	Junos Configuration
TE Metric	/mpls/te-interface-attributes/interface/config/te-metric	set protocols ospf area <i>id</i> interface <i>interface</i> te-metric <i>te-metric</i>  set protocols isis interface <i>interface</i> level <i>level</i> te-metric <i>te-metric</i>
SRLG Membership	/mpls/te-interface-attributes/interface/config/srlg-membership	set protocols mpls interface <i>name</i> srlg <i>name</i>
Admin Groups	/mpls/te-interface-attributes/interface/config/admin-group	If protocols mpls admin-groups <i>name</i> is configured:  set protocols mpls interface <i>name</i> admin-group <i>name</i>  If routing-options admin-groups-extended <i>name</i> is configured:  set protocols mpls interface <i>name</i> admin-group-extended <i>name</i>
IGP Flooding Bandwidth	/mpls/te-interface-attributes/interface/igp-flooding-bandwidth/config/threshold-type  /mpls/te-interface-attributes/interface/igp-flooding-bandwidth/config/delta-percentage	set protocols rsvp interface <i>name</i> update-threshold <i>threshold</i>
	/mpls/te-interface-attributes/interface/igp-flooding-bandwidth/config/threshold-specification  /mpls/te-interface-attributes/interface/igp-flooding-bandwidth/config/up-thresholds  /mpls/te-interface-attributes/interface/igp-flooding-bandwidth/config/down-thresholds  /mpls/te-interface-attributes/interface/igp-flooding-bandwidth/config/up-down-thresholds	Not supported

**Table 71: RSVP Signaling Protocols**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Graceful Restart	/mpls/signaling-protocols/rsvp-te/global/ graceful-restart/config/enable  /mpls/signaling-protocols/rsvp-te/global/ graceful-restart/config/restart-time  /mpls/signaling-protocols/rsvp-te/global/ graceful-restart/config/recovery-time	set protocols rsvp graceful- restart enable  set protocols rsvp graceful- restart maximum-helper- recovery-time <i>time</i>  set protocols rsvp graceful- restart maximum-helper- restart-time <i>time</i>
Cleanup Timer	/mpls/signaling-protocols/rsvp-te/global/ soft- preemption/config/enable  /mpls/signaling-protocols/rsvp-te/global/ soft- preemption/config/soft-preemption-timeout	set protocols rsvp preemption soft-preemption cleanup-timer <i>timer</i>
Hello Interval (All Interfaces)	/mpls/signaling-protocols/rsvp-te/global/ hellos/ config/hello-interval  /mpls/signaling-protocols/rsvp-te/global/ hellos/ config/refresh-reduction	set protocols rsvp interface all hello-interval <i>interval</i>  set protocols rsvp interface all no-reliable

Table 71: RSVP Signaling Protocols (*Continued*)

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Hello Interval (Single Interface)	/mpls/signaling-protocols/rsvp-te/interface-attributes/ interface/config/interface-id	set protocols rsvp interface <i>name</i> hello-interval <i>interval</i>
	/mpls/signaling-protocols/rsvp-te/interface-attributes/ interface/interface-ref/config/interface	set protocols rsvp interface <i>name</i> no-reliable
	/mpls/signaling-protocols/rsvp-te/interface-attributes/ interface/config/interface-name	
	/mpls/signaling-protocols/rsvp-te/interface-attributes/ interface/hellos/config/hello-interval	
	/mpls/signaling-protocols/rsvp-te/interface-attributes/ interface/hellos/config/refresh-reduction	
Authentication Key	/mpls/signaling-protocols/rsvp-te/interface-attributes/ interface/config/interface-id	set protocols rsvp interface <i>name</i> authentication-key <i>key</i>
	/mpls/signaling-protocols/rsvp-te/interface-attributes/ interface/interface-ref/config/interface	
	/mpls/signaling-protocols/rsvp-te/interface-attributes/ interface/interface-ref/config/subinterface	
	/mpls/signaling-protocols/rsvp-te/interface-attributes/ interface/authentication/config/enable	
	/mpls/signaling-protocols/rsvp-te/interface-attributes/ interface/authentication/config/authentication-key	

Table 71: RSVP Signaling Protocols *(Continued)*

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Subscription	<div>/mpls/signaling-protocols/rsvp-te/interface-attributes/ interface/config/interface-id</div> <div>/mpls/signaling-protocols/rsvp-te/interface-attributes/ interface/interface-ref/config/interface</div> <div>/mpls/signaling-protocols/rsvp-te/interface-attributes/ interface/interface-ref/config/subinterface</div> <div>/mpls/signaling-protocols/rsvp-te/interface-attributes/ interface/subscription/config/subscription</div>	<div>set protocols rsvp interface</div> <div><i>name</i> subscription</div> <div><i>subscription</i></div>

Table 71: RSVP Signaling Protocols (*Continued*)

Command Name	OpenConfig Command Path	Junos Configuration
Link Protection	/mpls/signaling-protocols/rsvp-te/interface-attributes/ interface/config/interface-id  /mpls/signaling-protocols/rsvp-te/interface-attributes/ interface/interface-ref/config/interface  /mpls/signaling-protocols/rsvp-te/interface-attributes/ interface/interface-ref/config/subinterface  /mpls/signaling-protocols/rsvp-te/interface-attributes/interface/ protection/config/link-protection-style-requested/unprotected  /mpls/signaling-protocols/rsvp-te/interface-attributes/interface/protection/ config/link-protection-style-requested/link-protection-requested  /mpls/signaling-protocols/rsvp-te/interface-attributes/interface/protection/ config/link-protection-style-requested/link-node-protection-requested  /mpls/signaling-protocols/rsvp-te/interface-attributes/interface/protection/ config/bypass-optimize-interval	set protocols rsvp interface <i>name</i> link-protection  To disable node-protection:  set protocols rsvp interface <i>name</i> link-protection no-node-protection  set protocols rsvp interface <i>name</i> link-protection optimize-timer <i>timer</i>



Table 72: Label Switched Paths

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Path	/mpls/lsp/ constrained-path/ named-explicit-paths/ config/ name  /mpls/lsp/ constrained-path/ named-explicit-paths/ explicit-route-objects/ config/ address  /mpls/lsp/ constrained-path/ named-explicit-paths/ explicit-route-objects/ config/ hop-type  /mpls/lsp/ constrained-path/ named-explicit-paths/ explicit-route-objects/ config/ index	set protocols mpls path <i>name</i> <i>address hop-type</i>
Name	/mpls/lsp/ constrained-path/ tunnel/ config/ name  /mpls/lsp/ constrained-path/ tunnel/ config/ type/ P2P  /mpls/lsp/ constrained-path/ tunnel/ config/ signaling-protocol/ path-setup-rsvp	set protocols mpls label-switched-path <i>name</i>
Description	/mpls/lsp/ constrained-path/ tunnel/ config/ description	set protocols mpls label-switched-path <i>name</i> description <i>description</i>
Admin-Status	/mpls/lsp/ constrained-path/ tunnel/ config/ admin-status	set protocols mpls label-switched-path <i>name</i> disable
Preference	/mpls/lsp/ constrained-path/ tunnel/ config/ preference	set protocols mpls label-switched-path <i>name</i> preference <i>preference</i>
Metric	/mpls/lsp/ constrained-path/ tunnels/ tunnel/ config/ metric-type  /mpls/lsp/ constrained-path/ tunnels/ tunnel/ config/ shortcut-eligible  /mpls/lsp/ constrained-path/ tunnel/ config/ metric	set protocols mpls label-switched-path <i>name</i> metric <i>metric</i>

Table 72: Label Switched Paths *(Continued)*

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Link Protection	/mpls/lsp/protected-path/tunnel/config/ protection-style-requested/unprotected	set protocols mpls label-switched-path <i>name</i> link-protection
	/mpls/lsp/protected-path/tunnel/config/ protection-style-requested/link-protection-requested	set protocols mpls label-switched-path <i>name</i> node-link-protection
	/mpls/lsp/protected-path/tunnel/config/ protection-style-requested/link-node-protection-requested	
Optimize Timer	/mpls/lsp/protected-path/tunnel/config/reoptimize-timer	set protocols mpls label-switched-path <i>name</i> optimize-timer <i>timer</i>
Source	/mpls/lsp/protected-path/tunnel/config/source	set protocols mpls label-switched-path <i>name</i> from <i>from</i>
Soft Preemption	/mpls/lsp/protected-path/tunnel/config/soft-preemption	set protocols mpls label-switched-path <i>name</i> soft-preemption
Priority	/mpls/lsp/protected-path/tunnel/config/setup-priority	set protocols mpls label-switched-path <i>name</i> priority <i>setup</i>
	/mpls/lsp/protected-path/tunnel/config/hold-priority	<i>reservation</i>
Bandwidth	/mpls/lsp/protected-path/tunnel/bandwidth/config/specification-type/specified	set protocols mpls label-switched-path <i>name</i> bandwidth <i>bandwidth</i>
	/mpls/lsp/protected-path/tunnel/bandwidth/config/set-bandwidth	

Table 72: Label Switched Paths (*Continued*)

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Min/Max Bandwidth	/mpls/lsp/constrained-path/tunnel/bandwidth/config/specification-type/auto  /mpls/lsp/constrained-path/tunnel/bandwidth/auto-bandwidth/ config/enabled  /mpls/lsp/constrained-path/tunnel/bandwidth/auto-bandwidth/ config/min-bw  /mpls/lsp/constrained-path/tunnel/bandwidth/auto-bandwidth/ config/max-bw  /mpls/lsp/constrained-path/tunnel/bandwidth/auto-bandwidth/ config/adjust-interval  /mpls/lsp/constrained-path/tunnel/bandwidth/auto-bandwidth/ config/adjust-threshold	set protocols mpls label-switched-path <i>name</i> minimum-bandwidth <i>minimum</i>  set protocols mpls label-switched-path <i>name</i> maximum-bandwidth <i>maximum</i>  set protocols mpls label-switched-path <i>name</i> adjust-interval <i>interval</i>  set protocols mpls label-switched-path <i>name</i> adjust-threshold <i>threshold</i>
Overflow Bandwidth	/mpls/lsp/constrained-path/tunnel/bandwidth/ config/specification-type/auto  /mpls/lsp/constrained-path/tunnel/auto-bandwidth/ overflow/ config/enabled  /mpls/lsp/constrained-path/tunnel/bandwidth/auto-bandwidth/ overflow/config/overflow-threshold  /mpls/lsp/constrained-path/tunnel/bandwidth/auto-bandwidth/ overflow/config/trigger-event-count	set protocols mpls label-switched-path <i>name</i> auto-bandwidth adjust-threshold-overflow-limit

**Table 72: Label Switched Paths (Continued)**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Underflow Bandwidth	/mpls/lsp/constrained-path/tunnel/bandwidth/config/specification-type/auto  /mpls/lsp/constrained-path/tunnel/auto-bandwidth/underflow/ config/enabled  /mpls/lsp/constrained-path/tunnel/bandwidth/auto-bandwidth/ underflow/config/underflow-threshold  /mpls/lsp/constrained-path/tunnel/bandwidth/auto-bandwidth/ underflowflow/config/trigger-event-count	set protocols mpls label-switched-path <i>name</i> auto-bandwidth adjust-threshold-underflow-limit

**Table 73: RSVP P2P Tunnel**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Destination	/mpls/lsp/constrained-path/tunnel/ p2p-tunnel-attributes/config/destination	set protocols mpls label-switched-path <i>name</i> to <i>to</i>
Primary Path	/mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-primary-paths/config/ name	set protocols mpls label-switched-path <i>name</i>

Table 73: RSVP P2P Tunnel (Continued)

Command Name	OpenConfig Command Path	Junos Configuration
Primary Path - Locally-Computed	/mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-primary-paths/config/path-computation-method/ locally-computed  /mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-primary-paths/config/use-cspf  /mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-primary-paths/config/cspf-tiebreaker/random  /mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-primary-paths/config/cspf-tiebreaker/least-fill  /mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-primary-paths/config/cspf-tiebreaker/most-fill	set protocols mpls label-switched-path <i>name</i> no-cspf  set protocols mpls label-switched-path <i>name</i> random  set protocols mpls label-switched-path <i>name</i> least-fill  set protocols mpls label-switched-path <i>name</i> most-fill
Primary Path - Externally Queried	/mpls/lsp/constrained-path/tunnel/ p2p-tunnel-attributes/p2p-primary-paths/config/path-computation-method/externally-queried	set protocols mpls label-switched-path <i>name</i> lsp-external-controller pccd  set protocols pcep pce <i>name</i> destination-ipv4-address <i>address</i>  set protocols pcep pce <i>name</i> destination-port 4189
Primary Path - Explicitly Defined	/mpls/lsp/constrained-path/tunnel/ p2p-tunnel-attributes/p2p-primary-paths/config/path-computation-method/explicitly-defined  /mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-primary-paths/config/explicit-path-name	set protocols mpls label-switched-path <i>name</i> primary <i>path</i>

Table 73: RSVP P2P Tunnel (Continued)

Command Name	OpenConfig Command Path	Junos Configuration
Primary Path - Preference	/mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-primary-paths/config/preference	set protocols mpls label-switched-path <i>name</i> primary path preference <i>preference</i>
Primary Path - Priorities	/mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-primary-paths/config/setup-priority  /mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-primary-paths/config/hold-priority	set protocols mpls label-switched-path <i>name</i> primary path priority <i>setup reservation</i>
Primary Path - Retry Timer	/mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-primary-paths/config/retry-timer	set protocols mpls label-switched-path <i>name</i> retry-timer
Primary Path - Candidate Secondary Paths	/mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-primary-paths/candidate-secondary-paths	Not supported
Primary Path - Admin-Groups	/mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-primary-paths/admin-groups/config/exclude-group  /mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-primary-paths/admin-groups/config/include-all-group  /mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-primary-paths/admin-groups/config/include-any-group	set protocols mpls label-switched-path <i>name</i> primary path admin-group exclude group  set protocols mpls label-switched-path <i>name</i> primary path admin-group exclude group  set protocols mpls label-switched-path <i>name</i> primary path admin-group include-any group

Table 73: RSVP P2P Tunnel (Continued)

Command Name	OpenConfig Command Path	Junos Configuration
Secondary Path	/mpls/lsp/constrained-path/tunnel/config/ name  /mpls/lsp/constrained-path/tunnel/config/ type/P2P  /mpls/lsp/constrained-path/tunnel/p2p- tunnel-attributes/ p2p-secondary-paths/ config/name	set protocols mpls label-switched-path <i>name</i>
Secondary Path - Locally-Computed	/mpls/lsp/constrained-path/tunnel/p2p- tunnel-attributes/ p2p-secondary-paths/ config/ path-computation-method/locally- computed  /mpls/lsp/constrained-path/tunnel/p2p- tunnel-attributes/ p2p-secondary-paths/ config/use-cspf  /mpls/lsp/constrained-path/tunnel/p2p- tunnel-attributes/ p2p-secondary-paths/ config/cspf-tiebreaker/random  /mpls/lsp/constrained-path/tunnel/p2p- tunnel-attributes/ p2p-secondary-paths/ config/cspf-tiebreaker/least-fill  /mpls/lsp/constrained-path/tunnel/p2p- tunnel-attributes/ p2p-secondary-paths/ config/cspf-tiebreaker/most-fill	set protocols mpls label-switched-path <i>name</i> secondary <i>path name</i> no-cspf
Secondary Path - Externally Queried	/mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-secondary-paths/config/ path-computation-method/externally-queried	Not supported

Table 73: RSVP P2P Tunnel (Continued)

Command Name	OpenConfig Command Path	Junos Configuration
Secondary Path - Explicitly Defined	/mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-secondary-paths/config/ path-computation-method/explicitly-defined  /mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-secondary-paths/config/explicit-path-name	set protocols mpls label-switched-path <i>name</i> secondary <i>path</i>
Secondary Path - Preference	/mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-secondary-paths/config/preference	set protocols mpls label-switched-path <i>name</i> secondary <i>path</i> preference <i>preference</i>
Secondary Path - Priorities	/mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-secondary-paths/config/setup-priority  /mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-secondary-paths/config/hold-priority	set protocols mpls label-switched-path <i>name</i> secondary <i>path</i> priority <i>setup reservation</i>
Secondary Path - Retry Timer	/mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-secondary-paths/config/retry-timer	set protocols mpls label-switched-path <i>name</i> secondary <i>path</i> retry-timer



Table 73: RSVP P2P Tunnel *(Continued)*

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Secondary Path - Admin-Groups	/mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-secondary-paths/admin-groups/config/exclude-group  /mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-secondary-paths/admin-groups/config/include-all-group  /mpls/lsp/constrained-path/tunnel/p2p-tunnel-attributes/ p2p-secondary-paths/admin-groups/config/include-any-group	set protocols mpls label-switched-path <i>name</i> secondary <i>path</i> admin-group exclude <i>group</i>  set protocols mpls label-switched-path <i>name</i> secondary <i>path</i> admin-group include-all <i>group</i>  set protocols mpls label-switched-path <i>name</i> secondary <i>path</i> admin-group include-any <i>group</i>

## RELATED DOCUMENTATION

[Mapping OpenConfig BGP Commands to Junos Configuration | 165](#)

[Mapping OpenConfig Interface Commands to Junos Configuration | 225](#)

[Mapping OpenConfig LLDP Commands to Junos Configuration | 268](#)

[Mapping OpenConfig Local Routing Commands to Junos Configuration | 270](#)

[Mapping OpenConfig Routing Policy Commands to Junos Configuration | 365](#)

# Mapping OpenConfig Multicast Commands to Junos Configuration

## IN THIS SECTION

- [IGMP Configuration | 301](#)



**NOTE:** See ["OpenConfig Data Model Version" on page 3](#) for supported versions of the OpenConfig data model.

## IGMP Configuration

See [Table 74 on page 301](#) for configuration mappings of the following OpenConfig paths under /  
network-instances/network-instance/protocols/protocol/igmp:

- /interfaces/interface/config/interface-id
- /interfaces/interface/config/enabled
- /interfaces/interface/config/version

Table 74: IGMP Configuration

Command	OpenConfig Configuration	Junos Configuration
Interface ID	<pre>openconfig-network-instance:network-instances {   protocols IGMP &lt;&gt; {     igmp {       interfaces {         interface &lt;&gt; {           config {             interface-id &lt;&gt;;           }         }       }     }   } }</pre>	<pre>protocols {   igmp {     interface &lt;&gt;;   } }</pre>

OpenConfig path: /network-instances/network-instance/protocols/protocol/igmp/interfaces/interface/config/  
interface-id

Table 74: IGMP Configuration (Continued)

Command	OpenConfig Configuration	Junos Configuration
Enable or disable	<pre>openconfig-network-instance:network-instances {   protocols IGMP &lt;&gt; {     igmp {       interfaces {         interface &lt;&gt; {           config {             enabled &lt;true   false&gt;;           }         }       }     }   } }</pre>	<pre>protocols {   igmp {     interface &lt;&gt; {       disable;     }   } }</pre>

In Junos OS, there is no explicit configuration to enable IGMP. Enable the protocol by configuring the interface at the [edit protocols igmp] hierarchy level.

OpenConfig path: **/network-instances/network-instance/protocols/protocol/igmp/interfaces/interface/config/enabled**

IGMP version	<pre>openconfig-network-instance:network-instances {   protocols IGMP &lt;&gt; {     igmp {       interfaces {         interface &lt;&gt; {           config {             version &lt;1   2   3&gt;;           }         }       }     }   } }</pre>	<pre>protocols {   igmp {     interface &lt;&gt; {       version &lt;1   2   3&gt;;     }   } }</pre>
--------------	---	---

OpenConfig path: **/network-instances/network-instance/protocols/protocol/igmp/interfaces/interface/config/version**

# Mapping OpenConfig Network Instance Commands to Junos Operation



**NOTE:** See "[OpenConfig Data Model Version](#)" on [page 3](#) topic to understand the data models supported version and its Junos OS release for Juniper Networks ACX Series, EX Series, MX Series, PTX Series, and QFX Series.

Network instance models a generic virtual forwarding table on a device. This supports a Layer 3 forwarding construct such as a virtual routing and forwarding (VRF) instance, or a Layer 2 instance such as a virtual switch instance. A mixed Layer 2 and Layer 3 instances are also supported.

Starting with Junos OS Release 17.4R1, network instance based BGP configuration is supported. After the network instance is configured, you will be prompted with options for BGP configuration such as global bgp, neighbor bgp, and so on.



**NOTE:** There is no change in the existing BGP configuration, you can configure BGP in a specific network instance.

No Link Title lists the network instance resource paths.

For configuration and mappings to Junos commands, see:

- [Table 75 on page 304](#): Basic Configuration
- [Table 76 on page 305](#): Interfaces Configuration
- [Table 77 on page 306](#): Subinterfaces Configuration
- [Table 78 on page 308](#): Static Routes Configuration
- [Table 79 on page 315](#): Local Aggregates Configuration
- [Table 80 on page 318](#): Inter-Instance Policies Configuration
- [Table 81 on page 321](#): Route Limits

Table 75: Basic Configuration

Command Name	OpenConfig Configuration	Junos Configuration
description	<pre> network-instances {   network-instance &lt;&gt; {     config {       description;     }   } } </pre>	<pre> routing-instances &lt;&gt; {   description; } </pre>
enabled	<pre> network-instances {   network-instance &lt;&gt; {     config {       enabled;     }   } } </pre>	<pre> routing-instances &lt;&gt;; </pre> <p><b>NOTE:</b> Use the deactivate command to indicate that the network instance should not be active.</p>
name	<pre> network-instances {   network-instance &lt;&gt; {     config {       name;     }   } } </pre>	<pre> routing-instances &lt;&gt;; </pre>
route-distinguisher	<pre> network-instances {   network-instance &lt;&gt; {     config {       route-distinguisher &lt;&gt;;     }   } } </pre>	<pre> routing-instances &lt;&gt; {   route-distinguisher &lt;&gt;; } </pre>

**Table 75: Basic Configuration (Continued)**

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
router-id	<pre> network-instances {   network-instance &lt;&gt; {     config {       router-id &lt;&gt;;     }   } } </pre>	<pre> routing-instances &lt;&gt; {   router-options {     router-id &lt;&gt;;   } } </pre>
type	<pre> network-instances {   network-instance &lt;&gt; {     config {       type &lt;&gt;;     }   } } </pre>	<pre> routing-instances &lt;&gt; {   instance-type &lt;&gt;; } </pre>

**Table 76: Interfaces Configuration**

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
interface	<pre> network-instances {   network-instance &lt;&gt; {     interfaces {       config {         interface &lt;&gt;;       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   interface &lt;&gt;; } </pre>

Table 76: Interfaces Configuration (*Continued*)

Command Name	OpenConfig Configuration	Junos Configuration
subinterface	<pre> network-instances {   network-instance &lt;&gt; {     interfaces {       config {         subinterface &lt;&gt;;       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   interface &lt;&gt;; } </pre>

Table 77: Sub-interfaces Configuration

Command Name	OpenConfig Configuration	Junos Configuration
interval	<pre> openconfig-interfaces:interfaces {   interface &lt;&gt; {     subinterfaces {       subinterface &lt;&gt; {         oc-ip:ipv6 {           oc-ip:router-advertisement {             oc-ip:config {               oc-ip:interval &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> protocols {   router-advertisement {     interface &lt;&gt; {       max-advertisement-interval &lt;&gt;;     }   } } </pre>

Table 77: Sub-interfaces Configuration (*Continued*)

Command Name	OpenConfig Configuration	Junos Configuration
lifetime	<pre> openconfig-interfaces:interfaces {   interface &lt;&gt; {     subinterfaces {       subinterface &lt;&gt; {         oc-ip:ipv6 {           oc-ip:router-advertisement {             oc-ip:config {               oc-ip:lifetime &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> protocols {   router-advertisement {     interface &lt;&gt; {       default-lifetime &lt;&gt;;     }   } } </pre>
suppress	<pre> openconfig-interfaces:interfaces {   interface &lt;&gt; {     subinterfaces {       subinterface &lt;&gt; {         oc-ip:ipv6 {           oc-ip:router-advertisement {             oc-ip:config {               oc-ip:suppress &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> protocols {   router-advertisement {     interface &lt;&gt; {       passive-mode &lt;&gt;;     }   } } </pre>



Table 78: Static Route Configuration

Command Name	OpenConfig Configuration	Junos Configuration
description	<pre> openconfig-network-instance:network-instances {   network-instance &lt;&gt; {     protocols {       protocol &lt;&gt; {         static-routes{           static &lt;&gt; {             config {               description &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   routing-options {     static {       route &lt;&gt; {         description &lt;&gt;       }     }   } } </pre>
prefix	<pre> network-instances {   network-instance &lt;&gt; {     protocols {       protocol {         static-routes {           static {             config {               prefix &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   routing-options {     static {       route &lt;&gt;;     }   } } </pre>

Table 78: Static Route Configuration (*Continued*)

Command Name	OpenConfig Configuration	Junos Configuration
set tag (static routes)	<pre> network-instances {   network-instance &lt;&gt; {     protocols {       protocol {         static-routes {           static {             config {               set-tag &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   routing-options {     static {       route &lt;&gt; {         tag &lt;&gt;;       }     }   } } </pre>
index	<pre> network-instances {   network-instance &lt;&gt; {     protocols {       protocol {         static-routes {           static {             next-hops {               next-hop &lt;&gt; {                 config {                   index &lt;&gt;;                 }               }             }           }         }       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   routing-options {     static {       route &lt;&gt; {         next-hop &lt;&gt;;       }     }   } } </pre>

Table 78: Static Route Configuration (Continued)

Command Name	OpenConfig Configuration	Junos Configuration
metric	<pre>network-instances {   network-instance &lt;&gt; {     protocols {       protocol {         static-routes {           static {             next-hops {               next-hop &lt;&gt; {                 config {                   metric &lt;&gt;;                 }               }             }           }         }       }     }   } }</pre>	<pre>routing-instances &lt;&gt; {   routing-options {     static {       route &lt;&gt; {         qualified-next-hop &lt;&gt; {           metric &lt;&gt;;         }       }     }   } }</pre>

Table 78: Static Route Configuration (Continued)

Command Name	OpenConfig Configuration	Junos Configuration
next-hop	<pre>network-instances {   network-instance &lt;&gt; {     protocols {       protocol {         static-routes {           static {             next-hops {               next-hop &lt;&gt; {                 config {                   next-hop &lt;&gt;;                 }               }             }           }         }       }     }   } }</pre>	<pre>routing-instances &lt;&gt; {   routing-options {     static {       route &lt;&gt; {         next-hop &lt;&gt;;       }     }   } }</pre>

Table 78: Static Route Configuration *(Continued)*

Command Name	OpenConfig Configuration	Junos Configuration
interface	<pre>network-instances {   network-instance &lt;&gt; {     protocols {       protocol {         static-routes {           static {             next-hops {               next-hop &lt;&gt; {                 interface-ref {                   config {                     interface &lt;&gt;;                   }                 }               }             }           }         }       }     }   } }</pre>	<pre>routing-instances &lt;&gt; {   routing-options {     static {       route &lt;&gt; {         next-hop &lt;&gt;;       }     }   } }</pre>

Table 78: Static Route Configuration (Continued)

Command Name	OpenConfig Configuration	Junos Configuration
sub-interface	<pre>network-instances {   network-instance &lt;&gt; {     protocols {       protocol {         static-routes {           static {             next-hops {               next-hop &lt;&gt; {                 interface-ref {                   config {                     subinterface &lt;&gt;;                   }                 }               }             }           }         }       }     }   } }</pre>	<pre>routing-instances &lt;&gt; {   routing-options {     static {       route &lt;&gt; {         next-hop &lt;&gt;;       }     }   } }</pre>

Table 78: Static Route Configuration (*Continued*)

Command Name	OpenConfig Configuration	Junos Configuration
recurse	<pre> network-instances {   network-instance &lt;&gt; {     protocols {       protocol {         static-routes {           static {             next-hops {               next-hop &lt;&gt; {                 config {                   recurse;                 }               }             }           }         }       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   routing-options {     static {       route &lt;&gt; {         resolve;       }     }   } } </pre>
default metric	<pre> network-instances {   network-instance &lt;&gt; {     protocols {       protocol {         config {           default-metric;         }       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   routing-options {     static {       defaults {         metric &lt;&gt;;       }     }   } } </pre>

Table 79: Local Aggregates Configuration

Command Name	OpenConfig Configuration	Junos Configuration
description	<pre> openconfig-network-instance:network-instances {   network-instance &lt;&gt; {     protocols {       protocol &lt;&gt; {         local-aggregates{           aggregate &lt;&gt; {             config {               description &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   routing-options {     aggregate {       route &lt;&gt; {         description &lt;&gt;       }     }   } } </pre>
discard	<pre> network-instances {   network-instance &lt;&gt; {     protocols {       protocol {         local-aggregates {           aggregate {             config {               discard &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   routing-options {     aggregate {       route &lt;&gt; {         discard;       }     }   } } </pre>



Table 79: Local Aggregates Configuration (*Continued*)

Command Name	OpenConfig Configuration	Junos Configuration
prefix	<pre> network-instances {   network-instance &lt;&gt; {     protocols {       protocol {         local-aggregates {           aggregate {             config {               prefix &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   routing-options {     aggregate {       route &lt;&gt;;     }   } } </pre>
set tag	<pre> network-instances {   network-instance {     protocols {       protocol {         local-aggregates {           aggregate {             config {               set-tag &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   routing-options {     aggregate {       route &lt;&gt; {         tag &lt;&gt;;       }     }   } } </pre>

Table 79: Local Aggregates Configuration (*Continued*)

Command Name	OpenConfig Configuration	Junos Configuration
metric	<pre> network-instances {   network-instance {     protocols {       protocol {         local-aggregates {           aggregate &lt;&gt; {             config {               metric &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   routing-options {     aggregate {       route &lt;&gt; {         metric &lt;&gt;;       }     }   } } </pre>
preference	<pre> network-instances {   network-instance {     protocols {       protocol {         local-aggregates {           aggregate &lt;&gt; {             config {               preference &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   routing-options {     aggregate {       route &lt;&gt; {         preference &lt;&gt;;       }     }   } } </pre>

Table 79: Local Aggregates Configuration (*Continued*)

Command Name	OpenConfig Configuration	Junos Configuration
default metric	<pre> network-instances {   network-instance &lt;&gt; {     protocols {       protocol {         config {           default-metric;         }       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   routing-options {     aggregate {       defaults {         metric &lt;&gt;;       }     }   } } </pre>

Table 80: Inter-instance Policies

Command Name	OpenConfig Configuration	Junos Configuration
export policy	<pre> network-instances {   network-instance &lt;&gt; {     inter-instance-policies {       apply-policy &lt;&gt; {         config {           export-policy;         }       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   vrf-export &lt;&gt;; } </pre>

Table 80: Inter-instance Policies *(Continued)*

Command Name	OpenConfig Configuration	Junos Configuration
import policy	<pre>network-instances {   network-instance &lt;&gt; {     inter-instance-policies {       apply-policy &lt;&gt; {         config {           import-policy;         }       }     }   } }</pre>	<pre>routing-instances &lt;&gt; {   vrf-import &lt;&gt;; }</pre>
default export policy	<pre>network-instances {   network-instance &lt;&gt; {     inter-instance-policies {       apply-policy &lt;&gt; {         config {           default-export-policy;         }       }     }   } }</pre>	<pre>routing-instances &lt;&gt; {   export-default-action &lt;accept   reject&gt;; }</pre>

You must configure an export policy before you can configure a default export policy.

Table 80: Inter-instance Policies *(Continued)*

Command Name	OpenConfig Configuration	Junos Configuration
default import policy	<pre>network-instances {   network-instance &lt;&gt; {     inter-instance-policies {       apply-policy &lt;&gt; {         config {           default-import-policy;         }       }     }   } }</pre>	<pre>routing-instances &lt;&gt; {   import-default-action &lt;accept   reject&gt;; }</pre>
You must configure an import policy before you can configure a default import policy.		
export route target	<pre>network-instances {   network-instance &lt;&gt; {     inter-instance-policies {       import-export-policy {         config {           export-route-target;         }       }     }   } }</pre>	<pre>routing-instances &lt;&gt; {   vrf-target {     export;   } }</pre>

**Table 80: Inter-instance Policies *(Continued)***

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
import route target	<pre> network-instances {   network-instance &lt;&gt; {     inter-instance-policies {       import-export-policy {         config {           import-route-target;         }       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   vrf-target {     import;   } } </pre>

**Table 81: Route Limits Configuration**

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
maximum	<pre> network-instances {   network-instance &lt;&gt; {     route-limits {       route-limit &lt;&gt; {         config {           maximum &lt;&gt;;         }       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   routing-options rib &lt;&gt; {     maximum-paths &lt;&gt;;   } } </pre>

**Table 81: Route Limits Configuration *(Continued)***

Command Name	OpenConfig Configuration	Junos Configuration
warning only	<pre> network-instances {   network-instance &lt;&gt; {     route-limits {       route-limit &lt;&gt; {         config {           warning-only &lt;&gt;;         }       }     }   } } </pre>	<pre> routing-instances &lt;&gt; {   routing-options rib &lt;&gt; {     maximum-paths log-only;   } } </pre>

**Change History Table**

Feature support is determined by the platform and release you are using. Use [Feature Explorer](#) to determine if a feature is supported on your platform.

Release	Description
17.4R1	Starting with Junos OS Release 17.4R1, network instance based BGP configuration is supported.

**RELATED DOCUMENTATION**

<a href="#">Mapping OpenConfig BGP Commands to Junos Configuration   165</a>
<a href="#">Mapping OpenConfig Interface Commands to Junos Configuration   225</a>

# Mapping OpenConfig OSPF Commands to Junos Configuration

## IN THIS SECTION

- Global Configuration | 323
- Timer Configuration (Global) | 325
- Timer Configuration (Interfaces) | 328
- MPLS Configuration (Global) | 331
- MPLS Configuration (Interfaces) | 332
- Graceful Restart Configuration | 335
- Area Configuration | 337
- Interface Configuration | 337
- Neighbor Configuration | 342



**NOTE:** See "[OpenConfig Data Model Version](#)" on [page 3](#) for supported versions of the OpenConfig data model.

## Global Configuration

See [Table 82 on page 324](#) for configuration mappings of the following OpenConfig paths under `/network-instances/network-instance/protocols/protocol/ospfv2/`:

- `/global/config/router-id`
- `/global/config/igp-shortcuts`
- `/global/config/log-adjacency-changes`



Table 82: Global OSPF Configuration

Command	OpenConfig Configuration	Junos Configuration
Router ID	<pre>openconfig-network-instance:network-instances {   protocols ospf {     ospfv2 {       global {         config {           router-id &lt;&gt;;         }       }     }   } }</pre>	<pre>routing-options {   router-id &lt;&gt;; }</pre>

A 32-bit number represented as a dotted quad assigned to each router running the OSPFv2 protocol. This number should be unique within the autonomous system.

OpenConfig path: **/network-instances/network-instance/protocols/protocol/ospf/ospfv2/global/config/router-id**

IGP shortcuts	<pre>openconfig-network-instance:network-instances {   protocols ospf {     ospfv2 {       global {         config {           igp-shortcuts &lt;&gt;;         }       }     }   } }</pre>	<pre>protocols {   ospf {     traffic-engineering {       shortcuts;     }   } }</pre>
---------------	--	--

When this leaf is set to true, OSPFv2 will route traffic to a remote system via any LSP to the system that is marked as shortcut eligible.

OpenConfig path: **/network-instances/network-instance/protocols/protocol/ospf/ospfv2/global/config/igp-shortcuts**

Table 82: Global OSPF Configuration (Continued)

Command	OpenConfig Configuration	Junos Configuration
Log adjacency changes	<pre>openconfig-network-instance:network-instances {   protocols ospf {     ospfv2 {       global {         config {           log-adjacency-changes &lt;&gt;;         }       }     }   } }</pre>	<pre>protocols {   ospf {     traceoptions {       file &lt;&gt; size &lt;&gt;;       flag state;     }   } }</pre>

When this leaf is set to true, a log message will be generated when the state of an OSPFv2 neighbor changes.

OpenConfig path: /network-instances/network-instance/protocols/protocol/ospf/ospfv2/global/config/log-adjacency-changes

## Timer Configuration (Global)

See [Table 83 on page 326](#) for configuration mappings of the following OpenConfig paths under /network-instances/network-instance/protocols/protocol/ospfv2/:

- /global/timers/spf/config/initial-delay
- /global/timers/max-metric/config/set
- /global/timers/max-metric/config/timeout
- /global/timers/max-metric/config/include

Table 83: Global Timer Configuration

Command	OpenConfig Configuration	Junos Configuration
SPF initial delay	<pre>openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       global {         timer{           spf {             config {               initial-delay &lt;&gt;;             }           }         }       }     }   } }</pre>	<pre>routing-options {   ospf {     spf-options {       delay &lt;&gt;;     }   } }</pre>

The value of this leaf specifies the time between a change in topology being detected and the first run of the SPF algorithm.

OpenConfig path: `/network-instances/network-instance/protocols/protocol/ospf/ospfv2/global/timers/spf/config/initial-delay`

Maximum metric	<pre>openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       global {         timer {           max-metric {             config {               set &lt;&gt;;             }           }         }       }     }   } }</pre>	<pre>protocols {   ospf {     overload;   } }</pre>
----------------	--	---

Table 83: Global Timer Configuration *(Continued)*

Command	OpenConfig Configuration	Junos Configuration
---------	--------------------------	---------------------

When this leaf is set to true, all non-stub interfaces of the local system are advertised with the maximum metric, such that the router does not act as a transit system.

OpenConfig path: `/network-instances/network-instance/protocols/protocol/ospf/ospfv2/global/timers/max-metric/config/set`

Maximum metric timeout	<pre>openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       global {         timer {           max-metric {             config {               timeout &lt;v&gt;;             }           }         }       }     }   } }</pre>	<pre>protocols {   ospf {     overload {       timeout &lt;v&gt;;     }   } }</pre>
------------------------	---	---

The delay after which the advertisement of entities with the maximum metric should be cleared, and the system reverts to the default, or configured, metrics.

OpenConfig path: `/network-instances/network-instance/protocols/protocol/ospf/ospfv2/global/timers/max-metric/config/timeout`

**Table 83: Global Timer Configuration (Continued)**

Command	OpenConfig Configuration	Junos Configuration
Maximum metric include	<pre> openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       global {         timer {           max-metric {             config {               include &lt;&gt;;             }           }         }       }     }   } } </pre>	<pre> protocols {   ospf {     overload {       stub-network;       as-external;     }   } } </pre>

By default, the maximum metric is advertised for all non-stub interfaces of a device. You specify additional entities to advertise using the include leaf list.

OpenConfig path: `/network-instances/network-instance/protocols/protocol/ospf/ospfv2/global/timers/max-metric/config/include`

## Timer Configuration (Interfaces)

See [Table 83 on page 326](#) for configuration mappings of the following OpenConfig paths under `/network-instances/network-instance/protocols/protocol/ospfv2/`:

- `/areas/area/interfaces/interface/timers/config/hello-interval`
- `/areas/area/interfaces/interface/timers/config/dead-interval`
- `/areas/area/interfaces/interface/timers/config/retransmission-interval`

Table 84: Timer Configuration (Interfaces)

Command	OpenConfig Configuration	Junos Configuration
Hello interval	<pre>openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       areas {         area &lt;&gt; {           interfaces {             interface &lt;&gt; {               timers {                 config {                   hello-interval &lt;&gt;;                 }               }             }           }         }       }     }   } }</pre>	<pre>protocols {   ospf {     area &lt;&gt; {       interface &lt;&gt; {         hello-interval &lt;&gt;;       }     }   } }</pre>

OpenConfig path: /network-instances/network-instance/protocols/protocol/ospf/ospfv2/areas/area/  
interfaces/interface/timers/config/hello-interval

Table 84: Timer Configuration (Interfaces) *(Continued)*

Command	OpenConfig Configuration	Junos Configuration
Dead interval	<pre>openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       areas {         area &lt;&gt; {           interfaces {             interface &lt;&gt; {               timers {                 config {                   dead-interval &lt;&gt;;                 }               }             }           }         }       }     }   } }</pre>	<pre>protocols {   ospf {     area &lt;&gt; {       interface &lt;&gt; {         dead-interval &lt;&gt;;       }     }   } }</pre>

OpenConfig path:  
/network-instances/network-instance/protocols/protocol/ospf/ospfv2/areas/area/interfaces/interface/timers/config/dead-interval

Table 84: Timer Configuration (Interfaces) (Continued)

Command	OpenConfig Configuration	Junos Configuration
Retransmission interval	<pre>openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       areas {         area &lt;&gt; {           interfaces {             interface &lt;&gt; {               timers {                 config {                   retransmission-                     interval &lt;&gt;;                 }               }             }           }         }       }     }   } }</pre>	<pre>protocols {   ospf {     area &lt;&gt; {       interface &lt;&gt; {         retransmit-           interval &lt;&gt;;       }     }   } }</pre>

OpenConfig path: /network-instances/network-instance/protocols/protocol/ospf/ospfv2/areas/area/interfaces/interface/timers/config/retransmission-interval

MPLS Configuration (Global)

See [Table 85 on page 332](#) for configuration mappings of the OpenConfig path /network-instances/network-instance/protocols/protocol/ospfv2/global/mpls/config/traffic-engineering-extensions.



**Table 85: MPLS Configuration (Global)**

Command and Path	OpenConfig Configuration	Junos Configuration
Traffic engineering extensions	<pre> openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       global {         mpls {           config {             traffic-engineering-extensions           }         }       }     }   } } &lt;&gt; </pre>	<pre> protocols {   ospf {     traffic-engineering;   } } </pre>

When this leaf is set to true, traffic engineering extensions for OSPF advertise traffic engineering parameters using type 10 opaque LSAs.

OpenConfig path: `/network-instances/network-instance/protocols/protocol/ospf/ospfv2/global/mpls/config/traffic-engineering-extensions`

## MPLS Configuration (Interfaces)

See [Table 83 on page 326](#) for configuration mappings of the following OpenConfig paths under `/network-instances/network-instance/protocols/protocol/ospfv2/`:

- `/areas/area/interfaces/interface/mpls/config/traffic-engineering-metric`
- `/areas/area/interfaces/interface/mpls/igp-ldp-sync/config/enabled`
- `/areas/area/interfaces/interface/mpls/igp-ldp-sync/config/post-session-up-delay`

Table 86: MPLS Configuration (Interfaces)

Command	OpenConfig Configuration	Junos Configuration
Traffic engineering metric	<pre>openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       areas {         area &lt;&gt; {           interfaces {             interface &lt;&gt; {               mpls {                 config {                   traffic-engineering-                     metric &lt;&gt;;                 }               }             }           }         }       }     }   } }</pre>	<pre>protocols {   ospf {     area &lt;&gt; {       interface &lt;&gt; {         te-metric &lt;&gt;;       }     }   } }</pre>

A link metric that should only be considered for traffic engineering purposes.

OpenConfig path: /network-instances/network-instance/protocols/protocol/ospfv2/areas/area/interfaces/interface/mps/config/traffic-engineering-metric

Table 86: MPLS Configuration (Interfaces) *(Continued)*

Command	OpenConfig Configuration	Junos Configuration
IGP-LDP sync	<pre>openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       areas {         area &lt;&gt; {           interfaces {             interface &lt;&gt; {               mpls {                 igp-ldp-sync {                   config {                     enabled &lt;&gt;;                   }                 }               }             }           }         }       }     }   } }</pre>	<pre>protocols {   ospf {     area &lt;&gt; {       interface &lt;&gt; {         ldp-           synchronization &lt;&gt;;       }     }   } }</pre>

When this leaf is set to true, do not utilize this link for forwarding over IGP until LDP adjacencies to the neighbors over the link are established.

OpenConfig path: `/network-instances/network-instance/protocols/protocol/ospfv2/areas/area/interfaces/interface/mps/igp-ldp-sync/config/enabled`

Table 86: MPLS Configuration (Interfaces) (Continued)

Command	OpenConfig Configuration	Junos Configuration
Post-session up delay	<pre> openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       areas {         area &lt;&gt; {           interfaces {             interface &lt;&gt; {               mpls {                 igp-ldp-sync {                   config {                     post-session-up-delay &lt;&gt;;                   }                 }               }             }           }         }       }     }   } } </pre>	<pre> protocols {   ospf {     area &lt;&gt; {       interface &lt;&gt; {         ldp-         synchronization {           hold-time &lt;&gt;;         }       }     }   } } </pre>

This leaf specifies a delay, in milliseconds, between the establishment of the LDP session to the IGP neighbor, and it being considered synchronized by the IGP. You must configure this leaf using multiples of 1000 so that it maps to the Junos equivalent hold-time, which is measured in seconds.

OpenConfig path: `/network-instances/network-instance/protocols/protocol/ospfv2/areas/area/interfaces/interface/mpls/igp-ldp-sync/config/post-session-up-delay`

## Graceful Restart Configuration

See [Table 87 on page 336](#) for configuration mappings of the following OpenConfig paths under `/network-instances/network-instance/protocols/protocol/ospfv2/`:

- `/global/graceful-restart/config/enabled`
- `/global/graceful-restart/config/helper-only`

**Table 87: Graceful Restart Configuration**

Command	OpenConfig Configuration	Junos Configuration
Enable	<pre> openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       global {         graceful-restart {           config {             enabled &lt;&gt;;           }         }       }     }   } } </pre>	<pre> system {   commit synchronize; }  chassis {   redundancy {     graceful-switchover;   } }  routing-options {   graceful-restart; } </pre>

OpenConfig path: `/network-instances/network-instance/protocols/protocol/ospf/ospfv2/global/graceful-restart/config/enabled`

Helper mode	<pre> openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       global {         graceful-restart {           config {             helper-only &lt;&gt;;           }         }       }     }   } } </pre>	<p><b>NOTE:</b> Helper mode is enabled by default.</p> <p>If you enable helper mode using OpenConfig:</p> <ul style="list-style-type: none"> <li>• You will not be able to configure graceful restart in Junos.</li> <li>• Any existing configuration for graceful restart in Junos will be deleted.</li> </ul>
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OpenConfig path: `/network-instances/network-instance/protocols/protocol/ospf/ospfv2/global/graceful-restart/config/helper-only`

# Area Configuration

See [Table 88 on page 337](#) for configuration mappings of the OpenConfig path `/network-instances/network-instance/protocols/protocol/ospfv2/areas/area/config/identifier`.

**Table 88: Area Configuration**

Command and Path	OpenConfig Configuration	Junos Configuration
Area ID	<pre> openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       areas {         area &lt;&gt; {           config {             identifier &lt;&gt;;           }         }       }     }   } } </pre>	<pre> protocols {   ospf {     area &lt;&gt;;   } } </pre>

OpenConfig path: `/network-instances/network-instance/protocols/protocol/ospfv2/areas/area/config/identifier`

# Interface Configuration

See [Table 89 on page 338](#) for configuration mappings of the following OpenConfig paths under `/network-instances/network-instance/protocols/protocol/ospfv2/`:

- `/areas/area/interfaces/interface/config/id`
- `/areas/area/interfaces/interface/config/passive`
- `/areas/area/interfaces/interface/config/priority`
- `/areas/area/interfaces/interface/config/metric`
- `/areas/area/interfaces/interface/config/network-type`

Table 89: Interface Configuration

Command	OpenConfig Configuration	Junos Configuration
Interface ID	<pre>openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       areas {         area &lt;&gt; {           interfaces {             interface &lt;&gt; {               config {                 id &lt;&gt;;               }             }           }         }       }     }   } }</pre>	<pre>protocols {   ospf {     area &lt;&gt; {       interface &lt;&gt;;     }   } }</pre>

Use this leaf to define a unique reference for the interface.

OpenConfig path: **/network-instances/network-instance/protocols/protocol/ospf/ospfv2/areas/area/interfaces/interface/config/id**

Table 89: Interface Configuration *(Continued)*

Command	OpenConfig Configuration	Junos Configuration
Passive interface	<pre>openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       areas {         area &lt;&gt; {           interfaces {             interface &lt;&gt; {               config {                 passive &lt;&gt;;               }             }           }         }       }     }   } }</pre>	<pre>protocols {   ospf {     area &lt;&gt; {       interface &lt;&gt; {         passive;       }     }   } }</pre>

When this leaf is set to true, the interface is advertised within the OSPF area but OSPF adjacencies are not established over the interface.

OpenConfig path: `/network-instances/network-instance/protocols/protocol/ospf/ospfv2/areas/area/interfaces/interface/config/passive`



Table 89: Interface Configuration *(Continued)*

Command	OpenConfig Configuration	Junos Configuration
Interface priority	<pre>openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       areas {         area &lt;&gt; {           interfaces {             interface &lt;&gt; {               config {                 priority &lt;&gt;;               }             }           }         }       }     }   } }</pre>	<pre>protocols {   ospf {     area &lt;&gt; {       interface &lt;&gt; {         priority &lt;&gt;;       }     }   } }</pre>

The local system's priority to become the designated router.

OpenConfig path: **/network-instances/network-instance/protocols/protocol/ospf/ospfv2/areas/area/interfaces/interface/config/priority**

**Table 89: Interface Configuration (Continued)**

Command	OpenConfig Configuration	Junos Configuration
Interface metric	<pre> openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       areas {         area &lt;&gt; {           interfaces {             interface &lt;&gt; {               config {                 metric &lt;&gt;;               }             }           }         }       }     }   } } </pre>	<pre> protocols {   ospf {     area &lt;&gt; {       interface &lt;&gt; {         metric &lt;&gt;;       }     }   } } </pre>

OpenConfig path: **/network-instances/network-instance/protocols/protocol/ospf/ospfv2/areas/area/interfaces/interface/config/metric**

Interface network type	<pre> openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       areas {         area &lt;&gt; {           interfaces {             interface &lt;&gt; {               config {                 network-type &lt;&gt;;               }             }           }         }       }     }   } } </pre>	<pre> protocols {   ospf {     area &lt;&gt; {       interface &lt;&gt; {         interface-type &lt;&gt;;       }     }   } } </pre>
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Table 89: Interface Configuration *(Continued)*

Command	OpenConfig Configuration	Junos Configuration
	OpenConfig path: /network-instances/network-instance/protocols/protocol/ospf/ospfv2/areas/area/interfaces/interface/config/network-type	

## Neighbor Configuration

See [Table 90 on page 342](#) for configuration mappings of the OpenConfig path /network-instances/network-instance/protocols/protocol/ospfv2/areas/area/interfaces/interface/neighbors/neighbor/config/router-id.

Table 90: Neighbor Configuration

Command and Path	OpenConfig Configuration	Junos Configuration
Neighbor router ID	<pre>openconfig-network-instance:network-instances {   protocol ospf {     ospfv2 {       areas {         area &lt;&gt; {           interfaces {             interface &lt;&gt; {               neighbors {                 neighbor &lt;router-id&gt; {                   config {                     router-id                     &lt;router-id&gt;;                   }                 }               }             }           }         }       }     }   } }</pre>	<pre>protocols {   ospf {     area &lt;&gt; {       interface &lt;&gt; {         neighbor &lt;&gt;;       }     }   } }</pre>

Table 90: Neighbor Configuration (Continued)

Command and Path	OpenConfig Configuration	Junos Configuration
The router ID of the remote system.		
OpenConfig path: /network-instances/network-instance/protocols/protocol/ospfv2/areas/area/interfaces/interface/neighbors/neighbor/config/router-id		

# Mapping OpenConfig QoS Commands to Junos Configuration

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**NOTE:** See "OpenConfig Data Model Version" on page 3 for supported data model versions and corresponding Junos OS or Junos Evolved OS releases.

## Forwarding Class Configuration

See [Table 91 on page 344](#) for configuration mappings of the following OpenConfig paths:

- /qos/forwarding-groups/forwarding-group/name
- /qos/forwarding-groups/forwarding-group/config/name
- /qos/forwarding-groups/forwarding-group/config/fabric-priority
- /qos/forwarding-groups/forwarding-group/config/output-queue

Table 91: Forwarding Class Configuration

OpenConfig Configuration	Junos Configuration
<pre>openconfig-qos:qos {   forwarding-groups {     forwarding-group {       name af1;       config {         name &lt;&gt;;         fabric-priority 0;         output-queue &lt;&gt;;       }     }     forwarding-group {       name nc;       config {         name &lt;&gt;;         fabric-priority 1;         output-queue &lt;&gt;;       }     }   } }</pre>	<pre>class-of-service {   forwarding-classes {     class &lt;name&gt; queue-num &lt;num&gt; priority low;     class &lt;name&gt; queue-num &lt;num&gt; priority high;   } }</pre>
<p>An OpenConfig fabric-priority value of 0 indicates low priority. Any non-zero value indicates high priority. The fabric-priority value is not supported on the PTX platform.</p>	

## BA Classifier Configuration

See for configuration mappings of the following OpenConfig paths:

- /qos/classifiers/classifier/name

- /qos/classifiers/classifier/terms/term/id
- /qos/classifiers/classifier/config/name
- /qos/classifiers/classifier/config/type
- /qos/classifiers/classifier/terms/term/id
- /qos/classifiers/classifier/terms/term/config
- /qos/classifiers/classifier/terms/term/config/id
- /qos/classifiers/classifier/terms/term/conditions/ipv4/config/dscp-set
- /qos/classifiers/classifier/terms/term/conditions/ipv6/config/dscp-set
- /qos/classifiers/classifier/terms/term/actions/config/target-group



**NOTE:** To more easily follow the OpenConfig examples below, variables are used in the OpenConfig configuration tree above.

**Table 92: BA Classifier Configuration**

<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
<pre> Open-Config-QoS:QoS:classifiers:classifier {   name DSCP;   terms {     term {       id 0;       conditions {         ipv6 {           config {             dscp-set [ 2 3 ];           }         }       }       actions {         config {           target-group best-effort;         }       }     }   } } </pre>	<pre> [edit class-of-service]  classifiers {   dscp DSCP {     term-id {       term-id 0;       forwarding-class best-effort {         loss-priority low code-points [ 000100 000010 ];       }     }   } } </pre>
<p>Junos OS expects a loss-priority value. However, the OpenConfig configuration does not provide this. By default, the loss-priority value is considered as low.</p> <p>The OpenConfig code-point value is provided using bit format as octets and decimal values as decimals. To avoid confusion, you can provide code-point values in decimal format and the script converts them into a 6-bit pattern and sends it to the management daemon. For example:</p> <p><b>set openconfig-qos:qos classifiers classifier DSCP terms term 0 conditions ipv4 config dscp-set [2 3]</b></p>	

## MPLS Classifier Configuration

See [Table 93 on page 348](#) for configuration mappings of the following OpenConfig paths:

- `/qos/classifiers/classifier/terms/term/conditions/mpls`
- `/qos/classifiers/classifier/terms/term/conditions/mpls/config`

- /qos/classifiers/classifier/terms/term/conditions/mps/config/traffic-class
- /qos/classifiers/classifier/terms/term/actions/config/target-group



Table 93: MPLS Classifier Configuration

<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
<pre> openconfig-qos:qos {   classifiers {     classifier &lt;&gt; {       config {         name &lt;&gt;;         type &lt;&gt;;       }       terms {         term {           id &lt;&gt;;           conditions {             mpls {               config {                 traffic-class &lt;&gt;;               }             }           }           actions {             config {               target-group &lt;&gt;;             }           }         }       }     }     term {       id &lt;&gt;;       conditions {         mpls {           config {             traffic-class &lt;&gt;;           }         }       }       actions {         config {           target-group &lt;&gt;;         }       }     }   } } </pre>	<pre> class-of-service {   classifiers {     exp &lt;&gt; {       forwarding-class &lt;&gt; {         loss-priority low code-points       }     }     forwarding-class &lt;&gt; {       loss-priority low code-points     }   } } </pre>

Table 93: MPLS Classifier Configuration *(Continued)*

OpenConfig Configuration	Junos Configuration
<pre>    }   } }</pre>	
<p>Junos OS expects a loss-priority value. The OpenConfig configuration does not provide this. By default, the loss-priority value is low.</p> <p>The OpenConfig code-point value is provided using bit format as octets and decimal values as decimals. To avoid confusion, provide code-point values in decimal format.</p>	

## Rewrite Rules Configuration

See [Table 94 on page 350](#) for configuration mappings of the following OpenConfig paths:

- /qos/classifiers/classifier/terms/term/actions/remark
- /qos/classifiers/classifier/terms/term/actions/remark/config
- /qos/classifiers/classifier/terms/term/actions/remark/config/set-dscp
- /qos/classifiers/classifier/terms/term/actions/remark/config/set-dot1p
- /qos/classifiers/classifier/terms/term/actions/remark/config/set-mpls-tc

Table 94: Rewrite Rules Configuration

OpenConfig Configuration	Junos Configuration
<pre>openconfig-qos:qos {   classifiers {     classifier &lt;&gt; {       config {         name &lt;&gt;;         type IPV4;       }       terms {         term 0 {           actions {             config {               target-group &lt;&gt;;             }             remark {               config {                 set-dscp 5;               }             }           }         }         term 1 {           actions {             config {               target-group &lt;&gt;;             }             remark {               config {                 set-dscp 6;               }             }           }         }       }     }   } }</pre>	<pre>class-of-service {   rewrite-rules {     dscp &lt;&gt; {       forwarding-class &lt;&gt; {         loss-priority low code-point 000101 term-id 0;       }       forwarding-class &lt;&gt; {         loss-priority low code-point 000110 term-id 1;       }     }   } }</pre>

Table 94: Rewrite Rules Configuration (Continued)

OpenConfig Configuration	Junos Configuration
<pre>openconfig-qos:qos {   classifiers {     classifier &lt;&gt; {       config {         name &lt;&gt;;         type IPV6;       }       terms {         term 0 {           actions {             config {               target-group &lt;&gt;;             }             remark {               config {                 set-dscp 7;               }             }           }         }         term 1 {           actions {             config {               target-group &lt;&gt;;             }             remark {               config {                 set-dscp 8;               }             }           }         }       }     }   } }</pre>	<pre>class-of-service {   rewrite-rules {     dscp-ipv6 &lt;&gt; {       forwarding-class &lt;&gt; {         loss-priority low code-point 000111 term-id 0;       }       forwarding-class &lt;&gt; {         loss-priority low code-point 001000 term-id 1;       }     }   } }</pre>

Table 94: Rewrite Rules Configuration (Continued)

OpenConfig Configuration	Junos Configuration
<pre>openconfig-qos:qos {   classifiers {     classifier &lt;&gt; {       config {         name &lt;&gt;;         type MPLS;       }       terms {         term 0 {           actions {             config {               target-group &lt;&gt;;             }             remark {               config {                 set-mpls-tc 5;               }             }           }         }         term 1 {           actions {             config {               target-group &lt;&gt;;             }             remark {               config {                 set-mpls-tc 6;               }             }           }         }       }     }   } }</pre>	<pre>class-of-service {   rewrite-rules {     exp &lt;&gt; {       forwarding-class &lt;&gt; {         loss-priority low code-point 101 term-id 0;       }       forwarding-class &lt;&gt; {         loss-priority low code-point 110 term-id 1;       }     }   } }</pre>

The forwarding groups used for the rewrite rules configuration are shown below:

**Table 94: Rewrite Rules Configuration (Continued)**

<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
<pre> openconfig-qos:qos {   forwarding-groups {     forwarding-group &lt;&gt; {       config {         name &lt;&gt;;         output-queue 0;       }     }     forwarding-group &lt;&gt; {       config {         name &lt;&gt;;         output-queue 1;       }     }   } } </pre>	<pre> class-of-service {   forwarding-classes {     class &lt;&gt; queue-num 0;     class &lt;&gt; queue-num 1;   } } </pre>

## Classifier Binding Configuration

See [Table 95 on page 354](#) for configuration mappings of the following OpenConfig paths:

- /qos/interfaces/interface/interface-id
- /qos/interfaces/interface/interface-ref/config/interface
- /qos/interfaces/interface/interface-ref/config/subinterface
- /qos/interfaces/interface/input/classifiers/classifier/type
- /qos/interfaces/interface/input/classifiers/classifier/config/name
- /qos/interfaces/interface/input/classifiers/classifier/config/type



**NOTE:** To more easily follow the OpenConfig examples below, variables are used in the OpenConfig configuration tree.

Table 95: Classifier Binding Configuration

OpenConfig Configuration	Junos Configuration
<pre>openconfig-qos:qos {   interfaces {     interface {       interface-id et-0/0/1.0;       input {         classifiers {           classifier {             type &lt;&gt;;             config {               name &lt;&gt;;               type &lt;&gt;;             }           }         }       }     }   }   interface {     interface-id ae0;     interface-ref {       config {         subinterface &lt;&gt;;       }     }     input {       classifiers {         classifier {           type &lt;&gt;;           config {             name &lt;&gt;;             type &lt;&gt;;           }         }       }     }   } }</pre>	<pre>class-of-service {   et-0/0/1 {     unit 0 {       classifiers {         dscp &lt;&gt;;       }     }   }   ae0 {     unit &lt;&gt; {       classifiers {         exp &lt;&gt;;       }     }   } }</pre>

**Table 95: Classifier Binding Configuration (Continued)**

OpenConfig Configuration	Junos Configuration
<p>Classifier binding can be formed from the interfaces table by mapping classifier and interface.</p> <p>This configuration also supports wild cards (*). For example:</p> <pre> set openconfig-qos:qos interfaces interface et-*/*/.0 interface-ref config interface et-*/*/ set openconfig-qos:qos interfaces interface et-*/*/.0 interface-ref config subinterface 0 set openconfig-qos:qos interfaces interface et-*/*/.0 input classifiers classifier IPV4 config name DSCP </pre>	
<pre> openconfig-qos:qos {   interfaces interface &lt;&gt; {     interface-ref {       config interface &lt;&gt;;     }     output scheduler-policy {       config name &lt;&gt;;     }   } } </pre>	<pre> class-of-service {   interfaces &lt;&gt; {     output-traffic-control-profile &lt;&gt;;   } } </pre>

## Scheduler Configuration

See [Table 96 on page 357](#) for configuration mappings of the following OpenConfig paths:

- /qos/scheduler-policies/scheduler-policy/name
- /qos/scheduler-policies/scheduler-policy/schedulers/scheduler/sequence
- /qos/scheduler-policies/scheduler-policy/schedulers/scheduler/config/priority
- /qos/scheduler-policies/scheduler-policy/schedulers/scheduler/output/config/output-fwd-group
- 
- /qos/scheduler-policies/scheduler-policy/schedulers/scheduler/config/sequence
- /qos/scheduler-policies/scheduler-policy/schedulers/scheduler/two-rate-three-color/config/bc



- /qos/scheduler-policies/scheduler-policy/schedulers/scheduler/two-rate-three-color/config/cir
- /qos/scheduler-policies/scheduler-policy/schedulers/scheduler/two-rate-three-color/config/cir-pct
- /qos/scheduler-policies/scheduler-policy/schedulers/scheduler/two-rate-three-color/config/pir
- /qos/scheduler-policies/scheduler-policy/schedulers/scheduler/two-rate-three-color/config/pir-pct
- /qos/scheduler-policies/scheduler-policy/schedulers/scheduler/inputs/input/id
- /qos/scheduler-policies/scheduler-policy/schedulers/scheduler/inputs/input/config/id
- /qos/scheduler-policies/scheduler-policy/schedulers/scheduler/inputs/input/config/input-type
- /qos/scheduler-policies/scheduler-policy/schedulers/scheduler/inputs/input/config/queue
- /qos/scheduler-policies/scheduler-policy/schedulers/scheduler/inputs/input/config/weight
- /qos/scheduler-policies/scheduler-policy/schedulers/scheduler/config/priority



**NOTE:** To more easily follow the OpenConfig examples below, variables are used in the OpenConfig configuration trees below.

**Table 96: Scheduler Configuration**

<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
<pre> openconfig-qos:qos {   scheduler-policies {     scheduler-policy {       name smap;       schedulers {         scheduler {           sequence:4           two-rate-three-color {             config {               cir-pct:10             }           }         }       }     }     scheduler {       sequence:1       two-rate-three-color {         config {           cir-pct:1         }       }     }     scheduler {       sequence:5       two-rate-three-color {         config {           cir-pct:1         }       }     }     scheduler {       sequence:2       priority: STRICT       two-rate-three-color {         config {           cir-pct:1         }       }     }     scheduler {       sequence:0       two-rate-three-color { </pre>	<pre> class-of-service {   scheduler-maps {     smap {       forwarding-class af1 scheduler sched_af1;       forwarding-class af2 scheduler sched_af2;       forwarding-class af3 scheduler sched_af3;       forwarding-class af4 scheduler sched_af4;       forwarding-class be1 scheduler sched_be1;       forwarding-class nc1 scheduler sched_nc1;     }   }   schedulers {     sched_af1 {       transmit-rate percent 10;       buffer-size shared;       priority low;     }     sched_af2 {       transmit-rate percent 1;       buffer-size shared;       priority low;     }     sched_af3 {       transmit-rate percent 1;       buffer-size shared;       priority low;     }     sched_af4 {       transmit-rate percent 1;       buffer-size shared;       priority strict-high;     }     sched_be1 {       transmit-rate percent 1;       buffer-size shared;       priority low;     }     sched_nc1 {       transmit-rate percent 1;       buffer-size shared;       priority low; </pre>



**Table 96: Scheduler Configuration (Continued)**

<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
<p>The OpenConfig parameters that are not supported under the scheduler command include buffer-size, excess-rates, and excess priorities. Only STRICT-HIGH priority is supported. If you configure a priority, it is treated as STRICT-HIGH. Otherwise, the priority is LOW by default.</p> <p>The OpenConfig fields that are unsupported fields under scheduler command are cir-pct-remaining, pir-pct-remaining, be (excess burst size), and bc (committed burst size). These fields are unsupported on the PTX platform but are supported on the MX platform.</p> <p>There is no parameter to configure a scheduler name in OpenConfig. Instead, the name is deduced by combining the Junos scheduler-map name and forwarding group. For example, the below parameters creates the scheduler name sched_smap_assured-forwarding.</p> <pre>&lt;schedulers&gt; {   &lt;name&gt; "sched" _ "_" _\$smap_name _ "_" _ \$out_fwd_group; }</pre> <p><b>NOTE:</b> The scheduler name can be 64 characters in length. Since scheduler map and forwarding class names are concatenated in OpenConfig configurations, care must be taken when providing them.</p> <p>The OpenConfig sequence number should be same as the queuenum value, which the forwarding group represents. For example, if assured-forwarding is attached to queue 2, then sequence number should be 2. While exporting state, the queuenum to which the target-group is attached is exported as the sequence number.</p> <p><b>set openconfig-qos:qos scheduler-policies scheduler-policy smap schedulers scheduler 2 output config output-fwd-group assured-forwarding</b></p>	

Table 96: Scheduler Configuration (Continued)

OpenConfig Configuration	Junos Configuration
<pre> openconfig-qos:qos {   scheduler-policies scheduler-policy sp1 {     schedulers scheduler 0 {       inputs {         input AF4 {           config id AF4;           input-type QUEUE;           queue 2;           weight 60;         }       }     }   } } </pre>	<pre> class-of-service {   scheduler-maps sp1{     forwarding-class AF4 scheduler sched_scheduler_AF4;   }   traffic-control-profiles {     tcp_sp1       schedule-map sp1;   } } // If STRICT priority is configured: class-of-service {   schedulers {     scheduler_AF4{       transmit-rate percent 100;       excess-rate percent 60;       priority high;     }   } } // If *not* STRICT priority, use Weighted Round Robin (WRR)mode: class-of-service {   schedulers {     scheduler_AF4{       transmit-rate percent 0;       excess-rate percent 60;       priority low;     }   } } </pre>

**Table 96: Scheduler Configuration (Continued)**

OpenConfig Configuration	Junos Configuration
<p><b>NOTE:</b> Values are added to the above configurations for a better understanding of the mapping.</p> <p>The queue leaf value is translated as the equivalent forwarding class value in the scheduler map.</p> <p>When you configure a strict scheduler priority:</p> <ul style="list-style-type: none"> <li>• Configure transmit-rate value as 100 percent for each forwarding class.</li> <li>• Forwarding class priority is based on the OpenConfig forwarding class weights in ascending order.</li> <li>• Forwarding class priority is assigned in the order of "strict-high:high:medium-high:medium-low:low:low:low:low:low:low."</li> </ul> <p>In cases where strict scheduler priority is not configured (WRR mode):</p> <ul style="list-style-type: none"> <li>• Configure transmit-rate value as 0 percent for each forwarding class.</li> <li>• Configure excess-rate value with the same value as the weights for each OpenConfig forwarding class. A weight value over 100 is not permitted.</li> </ul> <p>You can only use the QUEUE value for input-type with OpenConfig path <b>/qos/scheduler-policies/scheduler-policy/schedulers/scheduler/input/config/input-type</b> because QUEUE is the only enumeration value that can be mapped to the Junos OS. Likewise, subscribing to the resource path <b>/qos/scheduler-policies/scheduler-policy/schedulers/scheduler/state/input-type</b> will always stream the enumeration QUEUE leaf to a collector.</p> <p>From the Junos OS, create a traffic control profile (TCP) for the scheduler map configuration and use the TCP to bind the configuration to the interface. The Junos OS configuration above uses TCP tcp_sp1 and scheduler map sp1.</p>	

## Scheduler Map Configuration

See [Table 97 on page 362](#) for configuration mappings of the following OpenConfig paths:

- **/qos/interfaces/interface/interface-id**
- **/qos/interfaces/interface/output/scheduler-policy/config/name**



**NOTE:** To more easily follow the OpenConfig examples below, variables are used in the OpenConfig configuration trees below.

**Table 97: Scheduler Map Configuration**

OpenConfig Configuration	Junos Configuration
<pre>openconfig-qos:qos {   interfaces {     interface {       interface-id et-0/0/1;       output {         scheduler-policy {           config {             name &lt;&gt;;           }         }       }     }   } }</pre>	<pre>class-of-service {   interfaces et-0/0/1{     output-traffic-control-profile tcp_sp1;   } }</pre>
<p>Scheduler-maps can be bound to physical (IFD) interfaces only.</p> <p>Wild cards are also supported. For example:</p> <pre>set openconfig-qos:qos interfaces interface et-*/*/* interface-ref config interface et-*/*/* set openconfig-qos:qos interfaces interface et-*/*/* output scheduler-policy config name smap</pre>	

## Drop Profile Configuration

See [Table 98 on page 363](#) for configuration mappings of the following OpenConfig paths:

- /qos/queue-management-profiles/queue-management-profile/config/name
- /qos/queue-management-profiles/queue-management-profile/wred/uniform/config/min-threshold

- /qos/queue-management-profiles/queue-management-profile/wred/uniform/config/max-threshold
- /qos/queue-management-profiles/queue-management-profile/wred/uniform/config/max-drop-probability-percent
- /qos/queue-management-profiles/queue-management-profile/wred/uniform/config/enable-ecn
- /qos/queue-management-profiles/queue-management-profile/wred/
- /qos/interfaces/interface/output/queues/queue/config/name
- /qos/interfaces/interface/output/queues/queue/config/queue-management-profile

Table 98: Drop Profile Configuration

OpenConfig Configuration	Junos Configuration
<pre> openconfig-qos:qos {   queue-management-profiles {     queue-management-profile &lt;&gt; {       wred {         uniform {           config {             min-threshold; (not for MX Series)             max-threshold; (not for MX Series)             enable-ecn &lt;true   false&gt;; (not for MX Series)             max-drop-probability-percent &lt;&gt;;           }         }       }     }   } } </pre>	<pre> class-of-service {   drop-profiles {     &lt;profile-name&gt; {       fill-level &lt;&gt; drop-probability &lt;&gt;;     }   }   schedulers {     &lt;scheduler-name&gt; {       explicit-congestion-notification;     }   } } </pre>
<p>In OpenConfig, you configure the minimum and maximum threshold levels in bytes. In Junos, you configure each threshold as a percentage of the queue fill level. You can repeat the fill-level statement, combined with the drop-probability statement, to configure the minimum and maximum thresholds.</p>	




Table 98: Drop Profile Configuration (Continued)

OpenConfig Configuration	Junos Configuration
<pre> openconfig-qos:qos {   queue-management-profile {     config {       name &lt;&gt;;     }     wred {       uniform {         config {           min-threshold-percent &lt;&gt;;           max-threshold-percent &lt;&gt;;           max-drop-probability-percent &lt;&gt;;         }       }     }   } } </pre>	<pre> class-of-service {   drop-profiles {     &lt;profile-name&gt; {       interpolate {         fill-level [ &lt;&gt; &lt;&gt; ];         drop-probability &lt;&gt;;       }     }   } } </pre>
<pre> openconfig-qos:qos {   interfaces interface &lt;&gt; {     interface-ref {       config interface &lt;&gt;;     }     output queues &lt;&gt; {       config {         name &lt;&gt;;         queue-management-profile &lt;&gt;;       }     }   } } </pre>	<pre> interfaces {   &lt;interface-name&gt;{     scheduler-map &lt;&gt;;   } } scheduler-maps {   &lt;scheduler-map-name&gt; {     forwarding-class best-effort scheduler     &lt;&gt;;   } } schedulers {   &lt;scheduler-name&gt; {     drop-profile-map loss-priority any     protocol any drop-profile &lt;&gt;;   } } </pre>

**Table 98: Drop Profile Configuration (Continued)**

<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
<pre> openconfig-qos:qos {   scheduler-policies scheduler-policy &lt;&gt; {     schedulers scheduler &lt;&gt; {     }   } } </pre>	<pre> class-of-service {   schedulers {     &lt;scheduler&gt; {       priority strict-high;     }   } } </pre>
<p>When binding the queue-management profile to the queue under the interface configuration, the Junos OS class of service model attaches the drop profile to the scheduler map which is already present under the same interface output. In order to attach a drop profile to the interface, the interface must have a scheduler-policy attached to it in the output under <code>/qos/interfaces/interface/output/scheduler-policy/</code></p>	

# Mapping OpenConfig Routing Policy Commands to Junos Configuration



**NOTE:** See ["OpenConfig Data Model Version" on page 3](#) topic to understand the data models supported version and its Junos OS release for Juniper Networks EX2300, EX3400, EX4300, EX4600, and EX9200 switches, MX Series, PTX Series, and QFX Series.

[Table 99 on page 365](#) to [Table 101 on page 366](#) show the mapping of OpenConfig routing policy commands to the relevant configuration in Junos.

**Table 99: Defined Set Configuration**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Prefix Set	/routing-policy/defined-sets/ prefix-set	set policy-options prefix-list <i>name</i>

Table 99: Defined Set Configuration (*Continued*)

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Neighbor Set	/routing-policy/defined-sets/ neighbor-set	set policy-options neighbor-list <i>name</i>
Tag Set	/routing-policy/defined-sets/tag- set	set policy-options tag-list <i>name</i> tag-set <i>value</i>

Table 100: BGP Defined Set Configuration

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Community Set	/routing-policy/defined-sets/bgp-defined-sets/ community-set	set policy-options community <i>name</i> members <i>value</i>
AS Path Set	/routing-policy/defined-sets/bgp-defined-sets/as- path-set	Not supported
Ext Community Set	/routing-policy/defined-sets/bgp-defined-sets/ext- community-set	set policy-options community <i>name</i> members <i>value</i>

Table 101: Policy Definition Configuration

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
	Command path prefix:  <b>/routing-policy/policy- definition/statements/ statement</b>	
Call Policy	/conditions/call-policy	set policy-options policy-statement <i>name</i> from policy <i>value</i>

Table 101: Policy Definition Configuration (*Continued*)

Command Name	OpenConfig Command Path	Junos Configuration
Prefix Set	/conditions/match-prefix-set/ prefix-set	set policy-options policy-statement <i>name</i> from prefix-list <i>name</i>  set policy-options policy-statement <i>name</i> from route-filter <i>address</i> prefix-length-range <i>range</i>
Match Set Options	<pre> conditions {   match-prefix-set {     config {       match-set-options &lt;&gt;     }   } } </pre>	<pre> policy-options {   policy-statement &lt;&gt; {     term &lt;&gt; {       from {         route-filter-list &lt;&gt; invert;       }     }   } } </pre>

Possible OpenConfig values for match-set-options are any and invert. If you configure any, there is no Junos OS translation because this is the Junos OS default behavior. If you configure invert, the Junos OS mapping configuration is shown above, ending with route-filter-list <> invert-match.

Neighbor Set	/conditions/match-neighbor-set/ neighbor-set	set policy-options policy-statement <i>name</i> from neighbor <i>address</i>
Match Neighbor Set	/conditions/match-neighbor-set/ match-set-options	Not supported
Tag Set	/conditions/match-tag-set/tag- set	set policy-options policy-statement <i>name</i> from tag <i>tag</i>
Match Tag Set	/conditions/match-tag-set/ match-set-options	Not supported

Table 101: Policy Definition Configuration (Continued)

Command Name	OpenConfig Command Path	Junos Configuration
Install Protocol EQ	/conditions/install-protocol-eq	set policy-options policy-statement <i>name</i> from protocol <i>protocol</i>
IGP Conditions	/conditions/igp-conditions	Not supported
BGP Match Community Set	/conditions/bgp-conditions/ match-community-set/community-set	set policy-options policy-statement <i>name</i> from community <i>name</i>
BGP Match Ext Community Set	/conditions/bgp-conditions/ match-ext-community-set	set policy-options policy-statement <i>name</i> from community <i>name</i>
BGP Match Ext Community Set Options	/conditions/bgp-conditions/ match-ext-community-set/match-set-options	Not supported
BGP Match AS Path Set	/conditions/bgp-conditions/ match-as-path-set	Not supported
BGP MED EQ	/conditions/bgp-conditions/med-eq	set policy-options policy-statement <i>name</i> from metric <i>metric</i>
BGP Origin EQ	/conditions/bgp-conditions/origin-eq	set policy-options policy-statement <i>name</i> from origin (egp   igp   incomplete)
BGP Next Hop	/conditions/bgp-conditions/ next-hop-in	set policy-options policy-statement <i>name</i> from next-hop <i>address</i>
BGP Local Preference EQ	/conditions/bgp-conditions/ local-pref-eq	set policy-options policy-statement <i>name</i> from local-preference <i>preference</i>

Table 101: Policy Definition Configuration (*Continued*)

Command Name	OpenConfig Command Path	Junos Configuration
BGP Community Count	/conditions/bgp-conditions/ community-count	set policy-options policy-statement <i>name</i> from community-count <i>count</i> (equal   orhigher   orlower)
BGP AS Path Length	/conditions/bgp-conditions/as- path-length	Not supported
Accept-Route	/actions/config/accept-route	set policy-options policy-statement example-accept then accept
Reject-Route	/actions/config/reject-route	set policy-options policy-statement example-reject then reject
Set Tag	<pre> actions {   set-tag {     inline {       config {         tag &lt;&gt;;       }     }   } } </pre>	<pre> policy-options {   policy-statement &lt;&gt; {     term &lt;&gt; {       then {         tag &lt;&gt; ;       }     }   } } </pre>
IGP Actions	/actions/igp-actions/set-tag	set policy-options policy-statement <i>name</i> then tag <i>tag</i>
BGP Actions Set AS Path Prepend	/actions/bgp-actions/set-as- path-prepend	Not supported
BGP Actions Set Community	/actions/bgp-actions/set- community	set policy-options policy-statement <i>name</i> then community (set   replace   add) <i>name</i>

**Table 101: Policy Definition Configuration (Continued)**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
BGP Actions Set Ext Community	/actions/bgp-actions/set-ext-community	set policy-options policy-statement <i>name</i> then community (set   replace   add) <i>name</i>
BGP Actions Set Route Origin	/actions/bgp-actions/set-route-origin	set policy-options policy-statement <i>name</i> then origin (egp   igp   incomplete)
BGP Actions Set Local Preferences	/actions/bgp-actions/set-local-pref	set policy-options policy-statement <i>name</i> then local-preference <i>preference</i>
BGP Actions Set Next Hop	/actions/bgp-actions/set-next-hop	set policy-options policy-statement <i>name</i> then next-hop <i>address</i>
BGP Actions Set Med	/actions/bgp-actions/set-med	set policy-options policy-statement <i>name</i> then metric <i>metric</i>
BGP Actions As-Path-Prepend	/actions/bgp-actions/config/set-as-path-prepend/asn	set policy-options policy-statement <i>name</i> then as-path-prepend <i>as-path</i>

**RELATED DOCUMENTATION**
[Mapping OpenConfig BGP Commands to Junos Configuration | 165](#)
[Mapping OpenConfig Interface Commands to Junos Configuration | 225](#)
[Mapping OpenConfig LLDP Commands to Junos Configuration | 268](#)
[Mapping OpenConfig Local Routing Commands to Junos Configuration | 270](#)
[Mapping OpenConfig MPLS Commands to Junos Configuration | 284](#)

# Mapping OpenConfig System Logging Model Commands to Junos Configuration



**NOTE:** See ["OpenConfig Data Model Version" on page 3](#) topic to understand the data models supported version and its Junos OS release for Juniper Networks MX Series and PTX Series.

The following tables show the mapping of OpenConfig logging commands with the relevant configuration in Junos OS:

- [Table 102 on page 371](#): Remote Logging Configuration
- [Table 103 on page 373](#): Console Logging Configuration

**Table 102: Remote Logging Configuration**

Command Name	OpenConfig Configuration	Junos Configuration
Host	<pre>openconfig-system:system {   logging {     remote-servers {       remote-server &lt;host&gt; {         ...       }     }   } }</pre>	<pre>system {   syslog {     host &lt;&gt; {       .....     }   } }</pre>

The OpenConfig remote-logging server host leaf maps to the Junos host parameter.



Table 102: Remote Logging Configuration *(Continued)*

Command Name	OpenConfig Configuration	Junos Configuration
Source-address	<pre>openconfig-system:system {   logging {     remote-servers {       remote-server &lt;&gt; {         config {           source-address &lt;&gt;;         }       }     }   } }</pre>	<pre>system {   syslog {     host &lt;&gt; {       source-address &lt;&gt;;     }   } }</pre>

The OpenConfig source-address leaf maps to the Junos source-address parameter.

Remote-port	<pre>openconfig-system:system {   logging {     remote-servers {       remote-server &lt;&gt; {         config {           remote-port &lt;&gt;;         }       }     }   } }</pre>	<pre>system {   syslog {     host &lt;&gt; {       port &lt;&gt;;     }   } }</pre>
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The OpenConfig remote-port leaf maps to the Junos port parameter.

**Table 102: Remote Logging Configuration (Continued)**

Command Name	OpenConfig Configuration	Junos Configuration
Selector	<pre> openconfig-system:system {   logging {     remote-servers {       remote-server &lt;&gt; {         selectors {           selector &lt;facility&gt; &lt;severity&gt;;         }       }     }   } } </pre>	<pre> system {   syslog {     host &lt;&gt; {       &lt;facility&gt; &lt;severity&gt;;     }   } } </pre>

The OpenConfig facility and severity leaves map to the Junos facility and severity parameters.

**Table 103: Console Logging Configuration**

Command Name	OpenConfig Configuration	Junos Configuration
Console	<pre> openconfig-system:system {   logging {     console {       .....     }   } } </pre>	<pre> system {   syslog {     console {       .....     }   } } </pre>
Selector	<pre> openconfig-system:system {   logging {     console {       selectors {         selector &lt;facility&gt; &lt;severity&gt; ;       }     }   } } </pre>	<pre> system {   syslog {     console {       &lt;facility&gt; &lt;severity&gt;;     }   } } </pre>

Table 103: Console Logging Configuration *(Continued)*

Command Name	OpenConfig Configuration	Junos Configuration
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The OpenConfig facility and severity leaves map to the Junos facility and severity parameters.

# Mapping OpenConfig System Management Model Commands to Junos Configuration



**NOTE:** See ["OpenConfig Data Model Version" on page 3](#) topic to understand the data models supported version and its Junos OS release for Juniper Networks MX Series and PTX Series.

The following tables show the mapping of OpenConfig system management configuration with the relevant configuration in the Junos OS.

- [Table 104 on page 375](#): DNS Configuration
- [Table 105 on page 375](#): Domain Name Configuration
- [Table 106 on page 375](#): Host Name Configuration
- [Table 107 on page 376](#): Login Banner Configuration
- [Table 108 on page 376](#): MOTD Banner Configuration
- [Table 109 on page 377](#): Time Zone Configuration
- [Table 110 on page 377](#): Local Station MAC Address

**Table 104: DNS Configuration**

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
Search	<pre> openconfig-system:system {   dns {     config {       search [ &lt;&gt; ... ];     }   } } </pre>	<pre> system {   domain-search [&lt;&gt; ...]; } </pre>

The OpenConfig DNS search leaf maps to the Junos domain-search statement.

**Table 105: Domain Name Configuration**

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
Domain-name	<pre> openconfig-system:system {   config {     domain-name &lt;&gt;;   } } </pre>	<pre> system {   domain-name &lt;&gt;; } </pre>

The OpenConfig domain-name leaf maps to the Junos domain-name statement.

**Table 106: Host Name Configuration**

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
Host-name	<pre> openconfig-system:system {   config {     hostname &lt;&gt;;   } } </pre>	<pre> system {   host-name &lt;&gt;; } </pre>

Table 106: Host Name Configuration *(Continued)*

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
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The OpenConfig hostname leaf maps to the Junos hostname statement.

Table 107: Login Banner Configuration

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
Login-banner	<pre>openconfig-system:system {   config {     login-banner &lt;&gt;;   } }</pre>	<pre>system {   login {     message &lt;&gt;;   } }</pre>

The OpenConfig DNS login-banner leaf maps to the Junos message statement.

Table 108: MOTD Banner Configuration

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
Motd-banner	<pre>openconfig-system:system {   config {     motd-banner &lt;&gt;;   } }</pre>	<pre>system {   login {     announcement &lt;&gt;;   } }</pre>

The OpenConfig motd-banner leaf maps to the Junos announcement statement.

Table 109: Time Zone Configuration

Command Name	OpenConfig Configuration	Junos Configuration
Time-zone	<pre>openconfig-system:system {   clock {     config {       timezone-name &lt;&gt;;     }   } }</pre>	<pre>system {   time-zone &lt;&gt;; }</pre>


The OpenConfig timezone-name leaf maps to the Junos time-zone statement.

Table 110: Local Station MAC Address Configuration

Command Name	OpenConfig Configuration	Junos Configuration
Routing MAC	<pre>openconfig-system:system {   mac-address {     config {       routing-mac &lt;&gt;;     }   } }</pre>	<pre>chassis {   local-station-mac &lt;&gt;; }</pre>

Use to configure a MAC address for the entire chassis.

# Mapping OpenConfig System Model Commands to Junos Configuration



**NOTE:** See ["OpenConfig Data Model Version"](#) on [page 3](#) topic to understand the data models supported version and its Junos OS or Junos Evolved OS release for Juniper Networks ACX Series, MX Series and PTX Series.

The following tables show the mapping of OpenConfig system commands with the relevant configuration in Junos OS:

- [Table 111 on page 378](#): SSH Server Configuration
- [Table 112 on page 380](#): NTP Configuration

Table 111: SSH Server Configuration

Command Name	OpenConfig Configuration	Junos Configuration
Timeout	<pre>openconfig-system:system {   ssh-server {     config {       timeout &lt;&gt;;     }   } }</pre>	<pre>system {   services {     ssh {       client-alive-count-max 1;       client-alive-interval &lt;&gt;;     }   } }</pre>

The OpenConfig timeout leaf value is set to the client-alive-interval parameter. The client-alive-count-max parameter value is set to 1. It must be set to 1 to overwrite the default value of 3.

**Table 111: SSH Server Configuration *(Continued)***

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
Session limit	<pre> openconfig-system:system {   ssh-server {     config {       session-limit &lt;&gt;;     }   } } </pre>	<pre> system {   services {     ssh {       connection-limit &lt;&gt;;     }   } } </pre>

The OpenConfig session-limit leaf value is set to the Junos parameter connection-connection-limit value.

Rate limit	<pre> openconfig-system:system {   ssh-server {     config {       rate-limit &lt;&gt;;     }   } } </pre>	<pre> system {   services {     ssh {       rate-limit &lt;&gt;;     }   } } </pre>
------------	--	---

The OpenConfig rate-limit leaf value is set to the Junos parameter rate-limit value.

Protocol version	<pre> openconfig-system:system {   ssh-server {     config {       protocol-version &lt;&gt;;     }   } } </pre>	<pre> system {   services {     ssh {       protocol-version &lt;&gt;;     }   } } </pre>
------------------	--	---

The OpenConfig protocol-version leaf value is set to the Junos parameter protocol-version value.



**Table 111: SSH Server Configuration (Continued)**

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
Enable	<pre> openconfig-system:system {   ssh-server {     config {       enable &lt;&gt;;     }   } } </pre>	<pre> system {   services {     ssh {       .....     }   } } </pre>

The OpenConfig enable leaf value toggles the set system services ssh configuration. When enable is not configured, the SSH configuration is enabled by default. The model defines TRUE as the default value for the enable leaf.

**Table 112: NTP Configuration**

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
Prefer	<pre> openconfig-system:system {   ntp {     servers {       server &lt;&gt; {         config {           prefer &lt;&gt;;         }       }     }   } } </pre>	<pre> system {   ntp {     server &lt;&gt; prefer;   } } </pre>

When the OpenConfig prefer leaf value is set to true, the Junos prefer parameter will be set. The Junos prefer parameter is a toggle and needs to be set when the OpenConfig value prefer is set to true.

Table 112: NTP Configuration *(Continued)*

Command Name	OpenConfig Configuration	Junos Configuration
Version	<pre>openconfig-system:system {   ntp {     servers {       server &lt;&gt; {         config {           version &lt;&gt;;         }       }     }   } }</pre>	<pre>system {   ntp {     server &lt;&gt; version &lt;&gt;;   } }</pre>

The OpenConfig NTP version leaf value is set to the Junos parameter version value.

Port	<pre>openconfig-system:system {   ntp {     servers {       server &lt;&gt; {         config {           port &lt;&gt;;         }       }     }   } }</pre>	Not supported.
------	---	----------------


Junos OS doesn't have a parameter for an NTP server port, and instead, always runs at port 1234. Consequently, the OpenConfig leaf port is not supported.

Table 112: NTP Configuration (Continued)

Command Name	OpenConfig Configuration	Junos Configuration
Enabled	<pre>openconfig-system:system {   ntp {     config {       enabled &lt;&gt;;     }   } }</pre>	<pre>system {   ntp {     .....   } }</pre>

The OpenConfig enable leaf value toggles the set system ntp configuration. Since its default value is FALSE, the NTP configuration is enabled only when the enable parameter is set to TRUE.

# Mapping OpenConfig System Terminal Model Commands to Junos Configuration



**NOTE:** See ["OpenConfig Data Model Version" on page 3](#) topic to understand the data models supported version and its Junos OS or Junos Evolved OS release for Juniper Networks ACX Series, MX Series and PTX Series.

The following tables show the mapping of system terminal commands with the relevant configurations in Junos:

- [Table 113 on page 383](#): gRPC Server Configuration
- [Table 114 on page 386](#): Telnet Server Configuration

Table 113: gRPC Server Configuration

Command Name	OpenConfig Configuration	Junos Configuration
Port	<pre>openconfig-system:system {   grpc-servers {     grpc-server &lt;&gt; {       config {         port &lt;&gt;;       }     }   } }</pre>	<pre>system {   services {     extension-service {       request-response {         grpc {           ssl {             port &lt;&gt;;           }         }       }     }   } }</pre>

The OpenConfig port leaf value maps to the Junos port statement.

Listen address	<pre>openconfig-system:system {   grpc-servers {     grpc-server &lt;&gt; {       config {         listen-addresses         &lt;&gt;;       }     }   } }</pre>	<pre>system {   services {     extension-service {       request-response {         grpc {           ssl {             address &lt;&gt;;           }         }       }     }   } }</pre>
----------------	---	--

The OpenConfig listen-addresses is a leaf-list and maps to the Junos address statement. Consequently, the listen-addresses leaf value is restricted to a single value.

**Table 113: gRPC Server Configuration (Continued)**

Command Name	OpenConfig Configuration	Junos Configuration
Certificate-id	<pre> openconfig-system:system {   grpc-servers {     grpc-server &lt;&gt; {       config {         certificate-id       }     }   } } </pre>	<pre> system {   services {     extension-service {       request-response {         grpc {           ssl {             local-certificate &lt;&gt;;           }         }       }     }   } } </pre>

The OpenConfig certificate-id leaf maps to the Junos statement local-certificate. The single OpenConfig certificate value is merged with Junos certificates.

Enable	<pre> openconfig-system:system {   grpc-servers {     grpc-server &lt;&gt; {       config {         enable &lt;&gt;;       }     }   } } </pre>	<pre> system {   services {     extension-service {       request-response {         grpc {           ssl {             .....           }         }       }     }   } } </pre>
--------	---	--

The OpenConfig enable leaf value toggles the set system services ssh configuration. When enable is not set, the SSH configuration is enabled by default as the data model defines TRUE as the default value for leaf enable.

**Table 113: gRPC Server Configuration (Continued)**

Command Name	OpenConfig Configuration	Junos Configuration
Metadata-authentication	<pre> openconfig-system:system {   grpc-servers {     grpc-server &lt;&gt; {       config {         metadata- authentication &lt;&gt;;       }     }   } } </pre>	Not supported.

Metadata authentication is enabled by default in Junos. There is no Junos statement to enable or disable this feature.

Transport-security	<pre> openconfig-system:system {   grpc-servers {     grpc-server &lt;&gt; {       config {         transport- security &lt;&gt;;       }     }   } } </pre>	<pre> system {   services {     extension-service {       request-response {         grpc {           ssl {             .....           }         }       }     }   } } </pre>
--------------------	--	--

The OpenConfig transport-security leaf is a toggle to enable or disable gRPC Secure Sockets Layer (SSL)/Transport Layer Security (TLS). The default value for transport-security is TRUE. SSL is enabled by default. However, if the value for transport-security is FALSE, the configuration commit will fail.

**Table 114: Telnet Server Configuration**

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
Rate-limit	<pre> openconfig-system:system {   telnet-server {     config {       rate-limit &lt;&gt;;     }   } } </pre>	<pre> system {   services {     telnet {       rate-limit &lt;&gt;;     }   } } </pre>

The OpenConfig rate-limit leaf is set to the Junos telnet server rate-limit value.

Session-limit	<pre> openconfig-system:system {   telnet-server {     config {       session-limit &lt;&gt;;     }   } } </pre>	<pre> system {   services {     telnet {       connection-limit &lt;&gt;;     }   } } </pre>
---------------	--	--

The OpenConfig session-limit leaf is set to the Junos telnet server connection-limit value.

Timeout	<pre> openconfig-system:system {   telnet-server {     config {       timeout &lt;&gt;;     }   } } </pre>	Not supported.
---------	--	----------------

The OpenConfig timeout leaf is not supported on Junos.

Table 114: Telnet Server Configuration (Continued)

Command Name	OpenConfig Configuration	Junos Configuration
Enable	<pre> openconfig-system:system {   telnet-server {     config {       enable &lt;&gt;;     }   } } </pre>	<pre> system {   services {     telnet {       .....     }   } } </pre>

The OpenConfig enable leaf is a toggle to enable or disable the telnet server configuration. It's disabled or set to FALSE by default.

# Mapping OpenConfig Telemetry System Model Commands to Junos Configuration

## IN THIS SECTION

- [OpenConfig Sensor Example | 393](#)
- [OpenConfig Destination Configuration | 395](#)
- [OpenConfig Telemetry System Example | 395](#)



**NOTE:** See "OpenConfig Data Model Version" on page 3 topic to understand the data models supported version and its Junos OS or Junos Evolved OS release for Juniper Networks ACX Series, MX Series and PTX Series.

The following tables show the mapping of telemetry system commands with the relevant configurations in Junos:

- [Table 115 on page 388](#): Sensor Path and Filter Configuration



- [Table 116 on page 389](#): Sample Interval Configuration
- [Table 117 on page 390](#): Destination Group Configuration
- [Table 118 on page 391](#): Export Profile Configuration
- [Table 119 on page 392](#): Protocol Configuration
- [Table 120 on page 393](#): Encoding Configuration

**Table 115: Sensor Path and Filter Configuration**

<i>Command Name</i>	<i>OpenConfig Configuration</i>	<i>Junos Configuration</i>
sensor-path	<pre> openconfig-telemetry-system:telemetry- system {   sensor-groups {     sensor-group &lt;sensor-group-id&gt; {       config {         sensor-group-id &lt;sensor-group- id&gt;;       }     }     sensor-paths {       sensor-path &lt;path&gt; {         config {           path &lt;path&gt;;         }       }     }   } } </pre>	<pre> services {   analytics {     sensor &lt;&lt;subscription- name&gt;__ + &lt;sensor-group-id&gt;__ + &lt;sensor-path &gt;&gt; {       resource &lt;path&gt;;     }   } } </pre>

The OpenConfig sensor-path leaf value maps to the Junos *paths* parameter at the edit services analytics sensor resource hierarchy level. When enable is not specified, the SSH configuration is still enabled. This occurs because the **openconfig-telemetry.yang** data model defines the default value for the enable leaf as TRUE.

Note that the Junos sensor name is derived using the data values subscription-name, sensor-group-id, and sensor-path.

See ["OpenConfig Sensor Example" on page 393](#) for an example of this configuration.

Table 116: Sample Interval Configuration

Command Name	OpenConfig Configuration	Junos Configuration
Sample-interval	<pre>openconfig-telemetry-system:telemetry-system {   subscriptions {     persistent-subscriptions {       persistent-subscription 10000 {         sensor-profiles {           sensor-profile &lt;&gt; {             config {               sample-interval &lt;&gt;;             }           }         }       }     }   } }</pre>	<pre>services {   analytics {     sensor &lt;&lt;subscription- name&gt;_ + &lt;sensor-group-id&gt;_ + &lt;sensor-path&gt;&gt; {       reporting-rate &lt;&gt;;     }   } }</pre>

The OpenConfig sample-interval leaf value maps to the Junos reporting-rate parameter value at the edit services analytics sensor hierarchy level. The reporting-rate equals the sampling-interval/1000 as reporting-rate (in seconds) and sampling-interval (in milliseconds).

Table 117: Destination Group Configuration

Command Name	OpenConfig Configuration	Junos Configuration
Sample-interval	<pre>openconfig-telemetry-system:telemetry- system {   destination-groups {     destination-group DST1 {       destinations {         destination &lt;destination- address&gt; {           config {             destination-address &lt;address&gt;;             destination-port &lt;port&gt;;           }         }       }     }   } }</pre>	<pre>services {   analytics {     streaming-server &lt;&lt;destination-group-id&gt;_ + &lt;destination-address&gt;_ + &lt;destination-port&gt; {     remote-address 10.1.1.1;     remote-port 2000;   } }</pre>

The OpenConfig destination-address and port leaf values map to Junos parameters remote-address and remote-port. Each OpenConfig destination entry maps to a separate Junos streaming-server entry.

The OpenConfig streaming-server value is generated using the Junos parameter values for destination-group-id, destination-address and destination-port.

See ["OpenConfig Destination Configuration" on page 395](#) for an example of this configuration.

Table 118: Export Profile Configuration

Command Name	OpenConfig Configuration	Junos Configuration
Export-profile	<pre>openconfig-telemetry-system:telemetry-system {   subscriptions {     persistent-subscriptions {       persistent-subscription 10000 {         config {           name 10000;           local-source-address 10.2.3.1;           originated-qos-marking 60;         }         sensor-profiles {           sensor-profile SEN1 {             config {               sensor-group SEN1;               sample-interval 10000;             }           }         }       }     }   } }</pre>	<pre>services {   analytics {     export-profile 10000 {       local-address 10.2.3.1;       dscp 60;     }     sensor 10000__SEN1__&lt;sensor- path&gt; {       export-name 10000;     }   } }</pre>

The OpenConfig local-source-address leaf value maps to the Junos local-address parameter value.

The OpenConfig originated-qos-marking leaf value maps to the Junos dscp parameter value.

Note that the Junos export-profile name is generated from the *subscription-name*.

Table 119: Protocol Configuration

Command Name	OpenConfig Configuration	Junos Configuration
Protocol	<pre>openconfig-telemetry-system:telemetry- system { subscriptions {   persistent-subscriptions {     persistent-subscription 10000 {       sensor-profiles {         sensor-profile &lt;&gt; {           config {             protocol &lt;&gt;;           }         }       }     }   } }</pre>	<pre>services {   analytics {     export-profile 10000 {       transport &lt;&gt;;     }     sensor 10000__SEN1__&lt;sensor- path&gt; {       export-name 10000;     }   } }</pre>

The OpenConfig protocol leaf value maps to the Junos transport parameter value at the edit services analytics hierarchy level. The OpenConfig protocol value STREAM\_GRPC maps to the Junos transport value grpc.

**Table 120: Encoding Configuration**

Command Name	OpenConfig Configuration	Junos Configuration
Encoding	<pre> openconfig-telemetry-system:telemetry-system {   system {     subscriptions {       persistent-subscriptions {         persistent-subscription 10000 {           sensor-profiles {             sensor-profile &lt;&gt; {               config {                 encoding &lt;&gt;;               }             }           }         }       }     }   } } </pre>	<pre> services {   analytics {     export-profile 10000 {       format &lt;&gt;;     }     sensor 10000__SEN1__&lt;sensor- path&gt; {       export-name 10000;     }   } } </pre>

The OpenConfig encoding leaf value maps to the Junos format parameter value at the edit services analytics export-profile hierarchy level. The OpenConfig encoding values ENC\_JSON\_IETF and ENC\_PROTO3 map respectively to the Junos values json-gnmi and gpb-gnmi.

## OpenConfig Sensor Example

For information about the OpenConfig to Junos mapping used in this example, refer to [Table 115 on page 388](#): Sensor Path and Filter Configuration.

```

openconfig-telemetry-system:telemetry-system {
  sensor-groups {
    sensor-group SEN1 {
      config {
        sensor-group-id SEN1;
      }
      sensor-paths {
        sensor-path /junos/system/linecard/interface/ {

```



## OpenConfig Destination Configuration

For information about the OpenConfig to Junos mapping used in this example, refer to [Table 117 on page 390](#): Destination Group Configuration.

```

OC destination config:
----
destination-groups {
  destination-group DST1 {
    destinations {
      destination 10.1.1.1 2000 {
        config {
          destination-address 10.1.1.1;
          destination-port 2000;
        }
      }
    }
  }
}

Translates to:
services {
  analytics {
    streaming-server DST1_10.1.1.1_2000 {
      remote-address 10.1.1.1;
      remote-port 2000;
    }
  }
}

```

## OpenConfig Telemetry System Example

The following example illustrates a complete OpenConfig telemetry system configuration.

```

openconfig-telemetry-system:telemetry-system {
  sensor-groups {
    sensor-group SEN1 {
      config {
        sensor-group-id SEN1;

```



```

    }
    sensor-paths {
        sensor-path /junos/system/linecard/interface/ {
            config {
                path /junos/system/linecard/interface/;
            }
        }
    }
}

destination-groups {
    destination-group DST1 {
        config {
            group-id DST1;
        }
        destinations {
            destination 10.1.1.1 2000 {
                config {
                    destination-address 10.1.1.1;
                    destination-port 2000;
                }
            }
            destination 10.2.2.1 4000 {
                config {
                    destination-address 10.2.2.1;
                    destination-port 4000;
                }
            }
            destination 10.2.1.1 2000 {
                config {
                    destination-address 10.2.1.1;
                    destination-port 2000;
                }
            }
        }
    }
}

subscriptions {
    persistent-subscriptions {
        persistent-subscription 10000 {
            config {
                name 10000;
                local-source-address 10.2.3.1;
            }
        }
    }
}

```

```

        originated-qos-marking 60;
        protocol STREAM_GRPC;
        encoding ENC_PROTO3;
    }
    sensor-profiles {
        sensor-profile SEN1 {
            config {
                sensor-group SEN1;
                sample-interval 10000;
            }
        }
    }
    destination-groups {
        destination-group DST1;
    }
}
}
}
}

```

The OpenConfig configuration example above maps to the following Junos telemetry system configuration.

```

services {
    analytics {
        streaming-server DST1_10.1.1.1_2000 {
            remote-address 10.1.1.1;
            remote-port 2000;
        }
        streaming-server DST1_10.2.2.1_4000 {
            remote-address 10.2.2.1;
            remote-port 4000;
        }
        streaming-server DST_10.2.1.1_2000 {
            remote-address 10.2.1.1;
            remote-port 2000;
        }
    }
    export-profile 10000 {
        local-address 10.2.3.1;
        dscp 60;
        transport grpc;
    }
}

```

```

        format gpb-gnmi;
    }
    sensor 10000__SEN1__junos_system_linecard_interface {
        server-name [DST1_10.1.1.1_2000
                    DST1_10.2.2.1_4000 DST1_10.2.1.1_2000 ];
        export-name 10000;
        resource /junos/system/linecard/interface/;
        subscription-id 10000;
        reporting-rate 10;
    }
}
}

```

## Mapping OpenConfig VLAN Commands to Junos Configuration



**NOTE:** See "[OpenConfig Data Model Version](#)" on [page 3](#) topic to understand the data models supported version and its Junos OS release for Juniper Networks EX Series and QFX Series.

The following tables show the mapping of OpenConfig VLAN commands with the relevant configuration in Junos:

- [Table 121 on page 399](#): Top-level Group VLAN Configuration
- [Table 122 on page 400](#): VLAN Membership Configuration
- [Table 123 on page 402](#): MAC Table Configuration
- [Table 124 on page 406](#): Ethernet Interfaces Configuration
- [Table 125 on page 407](#): Aggregation Interfaces Configuration
- [Table 126 on page 409](#): Routed VLAN Interfaces Configuration
- [Table 127 on page 409](#): VLAN Tagged IFL Configuration

**Table 121: Top-level Group VLAN Configuration**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
VLAN Name and ID	<pre> openconfig-network-instance:network-instances {   network-instance &lt;routing-instance-name&gt;;   config {     type L2VSI;   } } openconfig-vlan:vlan {   config {     name &lt;name&gt;;   }   vlan-id &lt;id&gt;; } </pre> <p>Or:</p> <pre> openconfig-network-instance:network-instances {   network-instance &lt;routing-instance-name&gt;;   config {     type DEFAULT-INSTANCE;   } } openconfig-vlan:vlan {   config {     name &lt;name&gt;;   }   vlan-id &lt;id&gt;; } </pre>	<pre> vlan {   vlan-name;   vlan-id &lt;id&gt;; } </pre> <p>Or:</p> <pre> routing-instances {   &lt;instance-name&gt;;   instance-type virtual-switch;   vlan {     vlan-name;     vlan-id &lt;id&gt;;   } } </pre> <p>Or:</p> <pre> bridge-domains {   &lt;name&gt;;   vlan-id &lt;id&gt;; } </pre> <p>Or:</p> <pre> routing-instances {   &lt;instance-name&gt;;   instance-type virtual-switch;   bridge-domains {     &lt;name&gt;;     vlan-id &lt;id&gt;;   } } </pre>

Table 121: Top-level Group VLAN Configuration (*Continued*)

Command Name	OpenConfig Command Path	Junos Configuration
VLAN Admin State	<pre> openconfig-network-instance:network-instances {   network-instance &lt;routing-instance-name&gt;;   openconfig-vlan:vlan {     vlan {       config {         status &lt;activate   deactivate&gt;;       }     }   } } </pre>	<pre> deactivate/activate {   vlans &lt;name&gt;; }  Or:  deactivate/activate {   routing-instances {     &lt;instance-name&gt;;     vlans &lt;name&gt;;   } }  Or:  deactivate/activate {   routing-instances {     &lt;instance-name&gt;;     bridge-domains &lt;name&gt;;   } }  Or:  deactivate/activate {   bridge-domains &lt;name&gt;; } </pre>

Table 122: VLAN Membership Configuration

Command Name	OpenConfig Command Path	Junos Configuration
	<p>Command path prefix:</p> <pre> /oc-if:interfaces/oc- if:interface/oc-eth:ethernet/ switched-vlan </pre>	

**Table 122: VLAN Membership Configuration (Continued)**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Interface Mode	/config/interface-mode	set interfaces ge-0/0/0 unit 0 family ethernet-switching interface-mode trunk (l2ng)
Native VLAN	/config/native-vlan	set interfaces ge-0/0/0 native-vlan-id <i>vid</i> (for a trunk port) set interface ge-0/0/0 unit 0 family ethernet-switching interface-mode trunk
Trunk VLANs	/config/trunk-vlans	set interfaces ge-0/0/0 unit 0 family ethernet-switching vlan members 600 set interfaces ge-0/0/0 unit 0 family ethernet-switching vlan members [10-200] Interface-mode = TRUNK
Access VLAN	/config/access-vlan	set interfaces ge-0/0/0 unit 0 family ethernet-switching vlan members 600 Interface-mode = ACCESS

**Table 123: MAC Table Configuration**

Command Name	OpenConfig Command Path	Junos Configuration
MAC aging time	<pre> openconfig-network-instance:network-instances {   network-instance &lt;instance-name&gt;;   config {     type L2VSI;   }   openconfig-fdb:fdb {     config {       mac-aging-time &lt;time&gt;;     }   } } </pre> <p>Or:</p> <pre> openconfig-network-instance:network-instances {   network-instance &lt;instance-name&gt;;   config {     type DEFAULT_INSTANCE;   }   openconfig-fdb:fdb {     config {       mac-aging-time &lt;time&gt;;     }   } } </pre>	<pre> routing-instances {   &lt;instance-name&gt;;   switch-options {     mac-table-aging-time {       &lt;time&gt;;     }   } } </pre> <p>Or:</p> <pre> switch-options {   mac-table-aging-time &lt;time&gt;; } </pre> <p><b>NOTE:</b> The switch-options configuration is allowed only if a virtual switch is configured as the instance-type. The mac-table-aging-time configuration is allowed only with enhanced-mode.</p>

Table 123: MAC Table Configuration (*Continued*)

Command Name	OpenConfig Command Path	Junos Configuration
MAC learning	<pre> openconfig-network-instance:network-instances {   network-instance &lt;instance-name&gt;;   config {     type L2VSI;   }   openconfig-fdb:fdb {     config {       mac-learning &lt;true   false&gt;;     }   } } </pre> <p>Or:</p> <pre> openconfig-network-instance:network-instances {   network-instance &lt;instance-name&gt;;   config {     type DEFAULT_INSTANCE;   }   openconfig-fdb:fdb {     config {       mac-learning &lt;true   false&gt;;     }   } } </pre>	<pre> routing-instances {   &lt;instance-name&gt;;   switch-options {     no-mac-learning;   } } </pre> <p>Or:</p> <pre> switch-options {   no-mac-learning; } </pre>



Table 123: MAC Table Configuration (*Continued*)

Command Name	OpenConfig Command Path	Junos Configuration
Maximum entries	<pre> openconfig-network-instance:network-instances {   network-instance &lt;instance-name&gt;;   config {     type L2VSI;   }   openconfig-fdb:fdb {     config {       maximum-entries &lt;limit&gt;;     }   } } </pre> <p>Or:</p> <pre> openconfig-network-instance:network-instances {   network-instance &lt;instance-name&gt;;   config {     type DEFAULT_INSTANCE;   }   openconfig-fdb:fdb {     config {       maximum-entries &lt;limit&gt;;     }   } } </pre>	<pre> routing-instances {   &lt;instance-name&gt;;   switch-options {     mac-table-size &lt;limit&gt;;   } } </pre> <p>Or:</p> <pre> switch-options {   mac-table-size &lt;limit&gt;; } </pre>

Table 123: MAC Table Configuration (*Continued*)

Command Name	OpenConfig Command Path	Junos Configuration
MAC pinning	<pre> openconfig-network-instance:network-instances {   network-instance &lt;instance-name&gt;;   config {     type L2VSI;   }   openconfig-interface:interfaces {     interface &lt;name&gt; {       config {         mac-pinning &lt;true   false&gt;;       }     }   } } </pre> <p>Or:</p> <pre> openconfig-network-instance:network-instances {   network-instance &lt;instance-name&gt;;   config {     type DEFAULT_INSTANCE;   }   openconfig-interface:interfaces {     interface &lt;name&gt; {       config {         mac-pinning &lt;true   false&gt;;       }     }   } } </pre>	<pre> routing-instances {   &lt;instance-name&gt; ;   switch-options {     interface &lt;name&gt; {       mac-pinning;     }   } } </pre> <p>Or:</p> <pre> switch-options {   interface &lt;name&gt; {     mac-pinning   } } </pre>

**Table 124: Ethernet Interfaces Configuration**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Interface Mode	<pre> openconfig-interfaces:interfaces {   interface &lt;name&gt;;   openconfig-if-ethernet:ethernet {     openconfig-vlan:switched-vlan {       config {         interface-mode &lt;access   trunk&gt;;       }     }   } } </pre>	<pre> interfaces {   &lt;name&gt;;   unit 0;   family ethernet-switching;   interface-mode &lt;access   trunk&gt;; } </pre>
Native VLAN	<pre> openconfig-interfaces: interfaces {   interface &lt;name&gt;;   openconfig-if-ethernet:ethernet {     openconfig-vlan:switched-vlan {       config {         native-vlan &lt;id&gt;;       }     }   } } </pre>	<pre> interfaces {   &lt;name&gt;;   native-vlan-id &lt;id&gt;; } </pre>
Access VLAN	<pre> openconfig-interfaces:interfaces{   interface &lt;name&gt;;   openconfig-if-ethernet:ethernet {     openconfig-vlan:switched-vlan {       config {         access-vlan &lt;id&gt;;       }     }   } } </pre>	<pre> interfaces {   &lt;name&gt;;   unit 0;   family ethernet-switching;   vlan {     members &lt;id&gt;;   } } </pre>

**Table 124: Ethernet Interfaces Configuration (Continued)**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Trunk VLAN	<pre> openconfig-interfaces:interfaces {   interface &lt;name&gt;;   openconfig-if-ethernet:ethernet {     openconfig-vlan:switched-vlan {       config {         trunk-vlan &lt;id&gt;;       }     }   } } </pre>	<pre> interfaces {   &lt;name&gt;;   unit &lt;unit-no&gt;;   family bridge;   vlan-id {     &lt;id&gt;;   } } </pre>

**Table 125: Aggregation Interfaces Configuration**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
Interface Mode	<pre> openconfig-interfaces:interfaces {   interface &lt;name&gt;;   openconfig-if-aggregate:aggregation {     openconfig-vlan:switched-vlan {       config {         interface-mode &lt;trunk   access&gt;;       }     }   } } </pre>	<pre> interfaces {   &lt;name&gt;;   unit &lt;unit-no&gt;;   family &lt;ethernet-switching   bridge&gt;;   interface-mode &lt;access   trunk&gt;; } </pre>

Table 125: Aggregation Interfaces Configuration *(Continued)*

Command Name	OpenConfig Command Path	Junos Configuration
Native VLAN	<pre> openconfig-interfaces:interfaces {   interface &lt;name&gt;;   openconfig-if-aggregate:aggregation {     openconfig-vlan:switched-vlan {       config {         native-vlan &lt;id&gt;;       }     }   } } </pre>	<pre> interfaces {   &lt;name&gt;;   native-vlan-id &lt;id&gt;; } </pre>
Access VLAN	<pre> openconfig-interfaces:interfaces {   interface &lt;name&gt;;   openconfig-if-aggregate:aggregation {     openconfig-vlan:switched-vlan {       config {         access-vlan &lt;id&gt;;       }     }   } } </pre>	<pre> interfaces {   &lt;name&gt;;   unit 0;   family ethernet-switching;   vlan {     members &lt;id&gt;;   } } </pre>
Trunk VLAN	<pre> openconfig-interfaces:interfaces {   interface &lt;name&gt;;   openconfig-if-aggregate:aggregation {     openconfig-vlan:switched-vlan {       config {         trunk-vlan &lt;id&gt; ;       }     }   } } </pre>	<pre> interfaces {   &lt;name&gt;;   unit &lt;unit-no&gt;;   family &lt;bridge&gt;;   vlan-id {     &lt;id&gt;;   } } </pre>

**Table 126: Routed VLAN Interfaces Configuration**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
	Command path prefix:  <b>/oc-if:interfaces/oc-if:interface/routed-vlan</b>	
VLAN	/config/vlan	Set vlans <i>vlan-name</i> l3-interface irb. <i>vid</i>  <b>NOTE:</b> To create IRB IFL, configure IPv4/IPv6 under routed VLAN hierarchy.

**Table 127: VLAN Tagged IFL Configuration**

<i>Command Name</i>	<i>OpenConfig Command Path</i>	<i>Junos Configuration</i>
	Command path prefix:  <b>/ocif:interfaces/ocif:interface/ocif:subinterfaces/ocif:subinterface/vlan</b>	
VLAN ID	/config/vlan-id	set interfaces <i>interface</i> unit <i>subinterface index</i> vlan-id <i>vid</i>  set interfaces <i>interface</i> vlan-tagging

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# 4

CHAPTER

## Configuration Statements and Operational Commands

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# Junos CLI Reference Overview

We've consolidated all Junos CLI commands and configuration statements in one place. Learn about the syntax and options that make up the statements and commands and understand the contexts in which you'll use these CLI elements in your network configurations and operations.

- [Junos CLI Reference](#)

Click the links to access Junos OS and Junos OS Evolved configuration statement and command summary topics.

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