

Release Notes: Junos[®] OS Evolved Release 19.4R1

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Introduction

Junos OS Evolved is the next-generation Junos OS. It has the same CLI, the same features, and, in some cases, even the same processes as previous versions of Junos OS. But its infrastructure is entirely modernized.

Use these release notes to find new and updated features, software limitations, and open issues for Junos OS Evolved Release 19.4R1.

These release notes are cumulative and are updated for later releases.

For more information on this release of Junos OS Evolved, see [Introducing Junos OS Evolved](#).

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These release notes accompany Junos OS Evolved Release 19.4R1 for PTX10003 devices. They describe new and changed features, limitations, and known and resolved problems in the hardware and software.

What's New

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Learn about new features introduced in Junos OS Evolved Release 19.4R1 for PTX10003 devices.

Authentication, Authorization, and Accounting

- **Link Layer Discovery Protocol (LLDP) (PTX10003)**—LLDP is supported on PTX10003 routers, including on management interfaces. Disabling of LLDP time, length, and value (TLV) messages is also supported.

[See [Device Discovery Using LLDP and LLDP-MED on Switches](#).]

Class of Service

- **- Classification override configured under a forwarding policy extended to PTX10003-80C and PTX10003-160C devices**—Starting in Junos OS Evolved Release 19.4R1 feature support for classification override configured under a forwarding policy is extended to PTX10003-80C and PTX10003-160C devices.

[See [Understanding Class of Service](#) and [Overriding the Input Classification](#).]

Dynamic Host Configuration Protocol

- **Dynamic Host Control Protocol (DHCP) Client (PTX10003)**—DHCPv4 and DHCPv6 for dynamic configuration of IP addresses on client interfaces, including management interfaces, is supported on PTX10003 routers.

[See [DHCP for Routing Devices](#).]

General Routing

- **View ARP table entries and IPv6 neighbor information (PTX10003-80C and PTX10003-160C)**—Starting in Junos OS Evolved Release 19.4R1, on PTX10003 routers, you can view the following:
 - the Address Resolution Protocol (ARP) details such as the next-hop reference count and the next-hop current state, using the commands **show arp reference-count** and **show arp state**.
 - the IPv6 neighbor cache information. The following commands are supported: **show ipv6 neighbors flags**, **show ipv6 neighbors host**, **show ipv6 neighbors interface *interface-name***, **show ipv6 neighbors reference-count**, **show ipv6 neighbors vpn *vpn-name***.

[See [show arp](#) and [show ipv6 neighbors](#).]

Interfaces and Chassis

- **Support for LACP features (PTX10003)**—Starting in Junos OS Evolved Release 19.4R1, the PTX10003 supports LACP in the default periodic packet management (PPM) mode. The router supports the following LACP features:

- LACP load balancing
- OpenConfig
- Telemetry
- **Sync-reset** with minimum-link
- LACP **force-up**
- LACP **hold up**
- **Support for Layer 2 bridging (PTX10003)**—In Junos OS Evolved Release 19.4R1, PTX10003 routers support Layer 2 bridging. You create a bridge domain by adding a set of Layer 2 logical interfaces (on your device) to represent a broadcast domain. All the member ports of the bridge domain participate in Layer 2 learning and forwarding. You can configure one or more bridge domains to perform Layer 2 bridging. You can optionally disable learning on a bridge domain. You can configure the Layer 2 interfaces either by configuring the access and trunk port of the **ethernet-switching** family or by **vlan-tagging**.

[See [Configuring Layer 2 Bridging Interfaces](#).]

- **Support for DCU accounting and SCU accounting (PTX10003 routers)**—Starting in Junos OS Evolved Release 19.4R1, the destination class usage (DCU) accounting and source class usage (SCU) accounting are supported on PTX10003 routers. You can maintain packet counts based on the entry and exit points for traffic passing through your network. Entry and exit points are identified by source and destination prefixes grouped into disjoint sets, which are defined as source classes and destination classes. SCU counts packets sent to customers by performing lookups on the source IP address and the destination IP address. SCU accounting enables you to track traffic originating from specific prefixes on the provider core and destined for specific prefixes on the customer edge. DCU counts packets from customers by performing lookups of the IP destination address. DCU accounting enables you to track traffic originating from the customer edge and destined for specific prefixes on the provider core router.
- **Support for resilient hashing (PTX10003)**—Starting in Junos OS Evolved Release 19.4R1, the PTX10003 supports resilient hashing by link aggregation groups (LAGs) and equal-cost multipath (ECMP) sets. Working together with the default static hashing algorithm, resilient hashing enhances LAGs and ECMP sets by minimizing destination remapping when a new member is added to or deleted from the LAG or ECMP set. When a flow is affected by a LAG member change, the Packet Forwarding Engine rebalances the flow by reprogramming the flow set table. Both consistent hash and resilient hash (on LAG) support only 64-way ECMP routing.

[See [Understanding Consistent Load Balancing Through Resilient Hashing on ECMP Groups](#).]

- **60A power source for PTX10003 DC power supply (PTX10003-80C and PTX10003-160C)**—Starting in Junos OS Evolved Release 19.4R1, the PTX10003 DC power supply supports a 60A power source. If you choose a 60A setting, the power supply limits its output power capacity to 2700W at an input voltage of 48V, and linearly increases the output power if the input voltage increases. The power supply provides a maximum output of 3000W at input voltage greater than 55V, assuming 92 percent efficiency. If the voltage drops below 48V but is above 40V, the software raises a minor alarm 'Input Under Voltage Warning' and reduces the output power capacity to 2200W. The PSM is powered off if the voltage

drops below 40V. The PTX10003 DC power supply already supports 80A power source. In the 80A setup, the power supply provides 3000W output power throughout the input voltage range from 40VDC to 72VDC.

[See [PTX10003 Power System](#)]

Juniper Extension Toolkit

- **ECMP path trace tool with off-box support via API (PTX10003)**—This application traces the ECMP path used by packets ingressing and egressing a CLOS network. You can write the JET client in the language of your choice and use the ecmpt tracer JET APIs to monitor a traffic flow and get flow counters. You provide match criteria through the JET API request. On receipt of the JET request through JSD, the ecmpt tracer-server installs two firewall filters to the inputs on all the interfaces (except the private interfaces) on the switch. The counters associated with these filters are incremented as packets matching the firewall filter criteria arrive and leave, respectively.

[See [Juniper Extension Toolkit Developer Guide](#).]

Junos Telemetry Interface

- **Support for gNMI services with JTI for Routing Engine and Packet Forwarding Engine sensors (PTX10003)**—Junos OS Evolved Release 19.1R1 introduced support to export the statistics using JTI and remote procedure call (gRPC) services. In Junos OS Evolved Release 19.4R1, you can also export statistics for these sensors using gRPC Network Management Interface (gNMI) services.
 - Routing Engine internal interfaces (physical interface state and statistics) (resource path `/interfaces/interface/`)
 - Routing Engine internal logical interfaces (logical interface state and statistics) (resource path `/interfaces/interface[name='interface-name']/subinterfaces/`)
 - Address Resolution Protocol (ARP) (resource path `/arp-information/`)
 - Network Discovery Protocol (NDP) (resource path `/nd6-information/`)
 - Operational state of aggregated Ethernet (AE) interfaces with Link Aggregation Control Protocol (LACP) (resource path `/lACP/`)
 - Operational state of LLDP (neighbors information) (resource path `/lldp/`)
 - Firewall filter counters and policer counters (resource path `/junos/system/linecard/firewall/`)
 - LSP statistics (resource path `/junos/services/label-switched-path/usage/`)
 - Packet Forwarding Engine (resource path `/junos/system/linecard/packet/usage/`)
 - Chassis, environmental, and power (resource path `components/component`)

The following telemetry features are not supported in Junos OS Evolved 19.4R1 for gRPC or gNMI services:

- Zero value suppression
- All modes and submodes for gRPC Network Management Interface (gNMI)
- Packet drop counters
- UDP data export
- ON_CHANGE support
- Sensors for NPU memory, interface Class of Service (CoS) and queue, queue depth statistics for ingress and egress queue traffic, optics, and inline active flow monitoring (J-Flow)

To provision the sensor to export data through gRPC services, use the **telemetrySubscribe** RPC.

To provision the sensor to export data through gNMI services, use the **Subscribe** RPC. The **Subscribe** RPC and subscription parameters are defined in the gnmi.proto file. Streaming telemetry data through gRPC or gNMI also requires the OpenConfig for Junos OS module.

[See [Guidelines for gRPC and gNMI Sensors \(Junos Telemetry Interface\)](#).]

Layer 2 Features

- **Spanning-Tree Protocol (STP), Rapid Spanning-Tree Protocol (RSTP), Multiple Spanning-Tree Protocol (MSTP), and VLAN Spanning-Tree Protocol (VSTP) support (PTX10003 devices)**—Starting in Junos OS Evolved Release 19.4R1, You can use STP, RSTP, MSTP, and VSTP to provide Layer 2 loop prevention.

[See [Spanning-Tree Protocol Overview](#).]

- **Support for basic Layer 2 features (PTX10003)**—Starting in Junos OS Evolved Release 19.4R1, PTX10003 router supports the following basic Layer 2 features:
 - Layer 2 bridging with trunk and access modes
 - MAC learning and aging
 - Handling BUM (broadcast, unknown unicast and multicast) traffic, including split horizon
 - Static MAC addresses
 - MAC limiting
 - Sub-interface bridging
 - Interface statistics

[See [Understanding Layer 2 Bridge Domains](#), [Understanding Layer 2 Learning and Forwarding](#).]

- **Layer 2 features on PTX10003**—Starting in Junos OS Evolved Release 19.4R1, you can configure the following Layer 2 features on the PTX10003 router:

- Circuit cross-connect (CCC) with and without control word
- Transport protocols in CCC
- Layer 2 connection
- Layer 2 circuit
- Layer 2 VPN configuration with **ethernet-ccc** and **vlan-ccc** encapsulation types

The following Layer 2 features are not supported:

- Translational cross-connect (TCC)
- Layer 2 configuration with **flexible-ethernet-services** encapsulation type

[See [Layer 2 VPNs and VPLS Feature Guide for Routing Devices](#), and [Configuring Circuit Cross-Connect \(CCC\) and Translational Cross-Connect \(TCC\)](#).]

MPLS

- **RSVP and LDP point-to-multipoint LSPs on PTX10003**—Starting in Junos OS Evolved Release 19.4R1, you can configure RSVP and LDP point-to-multipoint label-switched paths (LSPs) on the ingress, transit, egress, PHP and bud interfaces of PTX10003 routers.

The following features are supported:

- RSVP-based point-to-multipoint LSPs
- Multicast LDP-based point-to-multipoint LSPs
- Point-to-multipoint LSP statistics

The following features are not supported:

- Point-to-multipoint LSP correlation
- Fast make-before-break (FMBB) protected Packet Forwarding Engine (PFE) support
- Point-to-multipoint LSP traceroute
- Virtual private LAN service (VPLS)
- Ethernet VPN (EVPN)

[See [Point-to-Multipoint LSPs Overview](#).]

Network Management and Monitoring

- **Passive monitoring support (PTX10003)**—Starting in Junos OS Evolved Release 19.4R1, you can enable passive monitoring on your PTX10003 so that any network interface can be configured as a passive-monitoring interface. Passive monitoring provides filtering capabilities for monitoring ingress and egress traffic at the Internet point of presence (PoP) where security networks are attached. With passive monitoring, the router does not route packets from the monitored interface or run any routing protocols related to those interfaces. It only receives traffic flows, collects intercepted traffic, and exports it to monitoring tools such as IDS servers and packet analyzers, or other devices such as routers or end node hosts. To enable this feature, include the **[passive-monitor-mode]** statement at the **[edit interface]** hierarchy level.

[See [Understanding Passive Monitoring](#).]

- **Application-level high availability of fault handling (PTX10003-80C and PTX10003-160C)**—Starting in Junos OS Evolved Release 19.4R1, the PTX10003 routers support application-level high availability (HA) of fault handling by triggering automatic restart of the resiliency application in case of any failure condition of the application. Application-level high availability ensures that resiliency application failures such as crash or termination do not cause the entire platform to restart.

[See [PTX10003 System Overview](#).]

- **Error management at SIB level (PTX10003-80C and PTX10003-160C)**—Starting in Junos OS Evolved Release 19.4R1, the PTX10003 routers support configuration of error scope, category, level with corresponding threshold and corrective actions at the SIB level for fabric errors. These routers also support multilevel action for repeated faults due to any fatal or major error (based on configuration). If a SIB undergoes reboot three times, on the fourth occurrence (within a span of 900 seconds), the SIB is off-lined. This is primarily done to avoid a rolling reboot of the board due to persistent fault condition. Also, all faults being reported by fabric ASIC would use new configuration scope "switch." Additionally, for some of the board level errors, a new error category "internal" is being introduced, which helps raise a unique alarm (apart from standard "Major Error" / "Minor Error").

[See [error](#).]

- **Support for running a Puppet agent as a Docker container (PTX10003-80C, PTX10003-160C, QFX5220-32CD, and QFX5220-128C)**—Starting in Release 19.4R1, devices running Junos OS Evolved support running a Puppet agent as a Docker container. As an alternative to using the Puppet agent that is integrated into the Junos OS Evolved software image, you can use the Puppet agent Docker container provided by Juniper Networks. Using the container enables you to use standard Docker tools to manage the container and mount or unmount the Puppet agent as needed.

[See [Installing Puppet for Junos OS](#).]

- **Support for running a Chef client as a Docker container (PTX10003-80C, PTX10003-160C)**—Starting in Junos OS Evolved Release 19.4R1, devices running Junos OS Evolved support running a Chef client

as a Docker container. As an alternative to using the Chef client that is integrated into the Junos OS Evolved software image, you can use the Chef client Docker container provided by Juniper Networks. Using a container enables you to use standard Docker tools to manage the container and mount or unmount the Chef client as needed.

[See [Deploying Chef for Junos OS](#).]

Port Security

- **Media Access Control Security (MACsec) enhancements (PTX10003)**—MACsec enhancements are supported on PTX10003 routers: pre-shared keychain and hitless key rollover, configurable EAP destination MAC address, and fallback key support. MACsec is an industry-standard security technology that provides secure communication for all traffic on point-to-point Ethernet links. MACsec is standardized in IEEE 802.1AE.

[See [Understanding Media Access Control Security \(MACsec\)](#).]

Routing Policy and Firewall Filters

- **MPLS LSP policer support (PTX10003)**—Starting in Junos OS Evolved Release 19.4R1, you can apply MPLS LSP policing on your PTX10003. Policing allows you to control the amount of traffic forwarded through a particular LSP and ensures that the amount of traffic forwarded through an LSP never exceeds the requested bandwidth allocation. The router supports automatic policing only on regular LSPs. Automatic policing allows you to provide strict service guarantees for network traffic. Such guarantees are especially useful in the context of Differentiated Services for traffic-engineered LSPs, providing better emulation for ATM wires over an MPLS network.

[See [Configuring MPLS Firewall Filters and Policers on Routers](#).]

Routing Protocols

- **BGP Prefix-Independent Convergence (PIC) edge support for inet and MPLS VPNs (PTX10003)**—Prefix Independent Convergence (PIC) edge support is extended to BGP with multiple routes in the global tables such as inet and inet6 unicast, and inet and inet6 labeled unicast. When the BGP PIC feature is enabled on a router, BGP installs to the forwarding table the second best path in addition to the calculated best path to a destination. When an IGP loses reachability to a prefix, the router uses this backup path to reduce traffic loss until the global convergence through BGP is resolved, thereby drastically reducing the outage duration.

You can also install a Layer 3 VPN route in the forwarding table as an alternate path, enabling fast failover when a provider edge (PE) router fails or you lose connectivity to a PE router. This already installed path is used until global convergence through the IGP is resolved.

To enable BGP PIC Edge in an MPLS VPN, include the **protect-core** statement at the **[edit routing-instances routing-instance-name routing-options]** hierarchy level. Both IS-IS LDP and OSPF LDP are supported. When BGP PIC Edge is enabled, the **show route extensive command** now displays the weight assigned to the indirect hop.

[See [Configuring BGP PIC Edge for MPLS Layer 3 VPNs](#).]

[See [Use Case for BGP PIC for Inet](#).]

Services Applications

- **Support for real-time performance monitoring (RPM) on (PTX10003)**—Starting with Junos OS Evolved Release 19.4R1, RPM sends out probes to the network to give a measure of network performance. The scope of support is limited to:
 - User configuration parsing for RPM
 - Probe generation and reception (client) as well as reflection (server) for the following RPM probe types:
 - icmp-ping probes
 - icmp-timestamp probes
 - udp-ping probes
 - udp-timestamp probes

Also supported are probe history management as well as reporting through syslog only.

[See [Understanding Using Probes for Real-Time Performance Monitoring on M, T, PTX and MX Series Routers.](#)]

Spanning Tree Protocols

- **Spanning-Tree Protocol (STP), Rapid Spanning-Tree Protocol (RSTP), Multiple Spanning-Tree Protocol (MSTP), and VLAN Spanning-Tree Protocol (VSTP) support (PTX10003 devices)**—Starting in Junos OS Evolved Release 19.4R1, You can use STP, RSTP, MSTP, and VSTP to provide Layer 2 loop prevention.
- [See [Spanning-Tree Protocol Overview.](#)]

System Management

- **sFlow support (PTX10003)**—Starting in Junos OS Evolved Release 19.4R1, sFlow supports the sampling and detecting of MPLS traffic on the PTX10003 router.
- [See [Overview of sFlow Technology.](#)]

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Learn about what changed in Junos OS Evolved Release 19.4R1 for PTX10003 devices.

Changes in CLI Statements and Commands

- To see the list of CLI statements and commands changed in Junos OS Evolved, see *How Junos OS Evolved Differs from Junos OS* in the [Introducing Junos OS Evolved Guide](#).

User Interface and Configuration

- **Snapshot during a USB scratch install (PTX10003)**—During the USB scratch install, the system asks you to confirm if you want to do a snapshot on the secondary SSD. If you enter “y,” the system takes the snapshot. If you enter “n,” the system skips doing the snapshot. In earlier Junos OS Evolved releases, the USB scratch install performed installation only on the primary SSD and did nothing on the secondary SSD.

[See [Booting Junos OS Evolved by Using a Bootable USB Drive](#).]

- **The request system shutdown (reboot | power-off | halt) command is deprecated on Junos OS Evolved (PTX10003 and QFX5220)**—The command for reboot, power-off, or halt for Junos OS Evolved is **request system (reboot | power-off | halt)** instead of **request system shutdown (reboot | power-off | halt)** as it was previously. Junos OS Evolved uses the same commands for this functionality as Junos OS.

[See [request system reboot](#), [request system power-off](#), and [request system halt](#).]

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Learn about limitations in this release for PTX10003 routers. For the most complete and latest information about known Junos OS defects, use the Juniper Networks online [Juniper Problem Report Search](#) application.

Fault Management

- If one of the two vendor's Ethernet switches becomes inaccessible over PCIe, the marvell-cpss-app might encounter an intermittent core trying to access the inaccessible bus. However, the marvell-cpss-app would be auto-restarted and while coming up will detect the missing switch and not configure it. In the process of the restart while the working switch is getting configured, the host path traffic on that switch would be disrupted for ~90 secs, but it would auto-recover after that duration. [PR1405373](#)

General Routing

- Static link protection is not supported on the PTX10003 router. [PR1382692](#)
- Customer TPID 0x88a8/0x9100 is not supported in Junos OS Evolved releases 19.1R1, 19.2R1, and 19.3R1. [PR1415390](#)
- **show pfe statistics traffic** works fine. But **show pfe statistics traffic fpc <0/1>** works only for fpc 0, not for any other FPC number shown in **show chassis fpc**. [PR1419268](#)
- When securityd is restarted on both nodes, traffic-loss might occur after some time when "replay-protect" is configured. [PR1438061](#)
- The **clear ike** command stanza missing in Junos OS Evolved. [PR1439872](#)
- On MTU configuration, physical interface bounces by design so interface flap is expected. [PR1450014](#)
- The cos queue counter is not supported in Junos OS Evolved release 19.3. [PR1450841](#)
- When a Junos OS Evolved CLI command is typed in CLI prompt, MGD application communicates to daemon responsible for handling the command. MGD expects the connection to succeed and get a reply within a particular time. Commands like **show chassis sibs**, **show chassis fabric topology** are handled by /re0/fabspoked-fchip/ daemon. Following functionality of fabspoked-fchip are handled in a single thread. Training/detraining Process EVO/cli-pfe. When the training/detraining sequence is executed by /re0/fabspoked-fchip/ either during bringup or when sib offline commands are issued, /re0/fabspoked-fchip may not respond to CLI request from MGD. This is indicated by MGD with the following output on CLI error: communication failure with /re0/fabspoked-fchip/ 1. The producer app is either down or unresponsive Run "show system processes node <node> | grep <app>" to check if app is running Run "show system application app <app>" to check the state of the app 2. If there is a change in mastership recently, please wait for the switchover to complete for the app to be online Run "request chassis routing-engine master switch check" to check the status of switchover Once training/detraining is complete, once the command is reissued, MGD will be able to connect with /re0/fabspoked-fchip and get valid output. [PR1455523](#)
- Minimum supported PSM to be available on the chassis to bring up the base system without any line-cards is 3 with 2 feeds connected. [PR1459474](#)
- Instead of querying for a particular interface, all interface resource need to be exported. Subscribe to /interfaces/. [PR1459482](#)

- Multicast feature is not supported in Junos OS Evolved Release 19.4R1. [PR1463697](#)
- Alarms to be raised to indicate reason for FRU shutdown when CoolingApp shuts down the FRU after temperature thresholds have reached. [PR1469271](#)
- Route record + loose/strict route record are not supported in Junos OS Evolved today; packets containing these options is dropped. Moreover, if and when this functionality is supported in Junos OS Evolved, it is done on the Packet Forwarding Engine so as not burden FIBD. [PR1472499](#)

Infrastructure

- XML Tags are missing for the output of the **show system statistics** command. A complete list of the tags missing in the output is listed in the Description tab of the PR. [PR1429644](#)
- In order to use the traceroute command in Junos OS Evolved, one must be root. This is a change from Legacy/Upgraded FreeBSD based Junos behavior brought about by Linux requiring software accessing raw sockets to have root privileges. [PR1456256](#)

Interfaces and Chassis

- For Junos OS Evolved platform only below dot3ad mibs are supported. Missing dot3ad mibs under SNMP registered objects which are present in Junos OS is supported in future releases.
dot3adAggPortStatsLACPDUStatsRx dot3adAggPortStatsMarkerPDUStatsRx
dot3adAggPortStatsMarkerResponsePDUStatsRx dot3adAggPortStatsUnknownRx
dot3adAggPortStatsIllegalRx dot3adAggPortStatsLACPDUStatsTx dot3adAggPortStatsMarkerPDUStatsTx
dot3adAggPortStatsMarkerResponsePDUStatsTx dot3adInterfaceName dot3adOperState dot3adAggname
dot3adInterfaceTimeout. [PR1463256](#)
- Changes in interface encapsulation type/MTU might result in link flap. In case of 400G, the link can stay down for up to 3 minutes. [PR1465714](#)

User Interface and Configuration

- For large YANG file, augmentation might not work. [PR1416972](#)

Open Issues

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Learn about open issues in this release for PTX10003 routers. For the most complete and latest information about known Junos OS defects, use the Juniper Networks online [Juniper Problem Report Search](#) application.

Class of Service (CoS)

- Core files are generated when ports are channelized and de-channelized repeatedly, without delay. [PR1370781](#)
- On CCC Family, COS Classifier Rewrite is not supported. [PR1465087](#)

General Routing

- The convergence time will be of the order of 3508 ms for OSPF/IS-IS (50K routes scale which will be equivalent to 14253 routes/sec). In case of BGP, it will be of the order of ~17K routes/sec. [PR1379961](#)
- The Junos OS Evolved output for the CLI **show LLDP neighbors** is different than in Junos OS. Some of the XML tags for the CLI **show lldp neighbors interface** and **show lldp** are missing. [PR1430795](#)
- Any MTU change causes the portor ifd bounce. This is working as per design. Other Junos OS Evolved platforms, such as PTX10003-80C and PTX10003-160C have the same behaviour. [PR1455794](#)

- With 3K LSPs, about 500 msec of traffic loss is observed for Routing-Engine driven local-repair. [PR1459265](#)
- Customer workflow when they do request system software add an RE1 with diff images than Re0 will be documented in feature description to be: use sw sync to sync the versions. [PR1472582](#)
- **show system errors active/inactive detail** and **show system errors <error id>** CLIs would show "Support" field as "No help info provided". [PR1461691](#)
- [cos] [classifier] Junos OS Evolved PTX10003-80C and PTX10003 (400G): The evo-aftmand error message **Jcmn: CoS: WRED: No curve data points!! token:1130** is observed during the inet-precedence classifier/rewrite verification. [PR1474105](#)
- After Routing Engine switchover, it takes around 2.5 Minutes for new Master Routing Engine applications to reconcile Fabric State. So any Fabric operation or CLI commands functions properly only if issued after 2.5 minutes of Routing Engine switchover. [PR1474316](#)

Infrastructure

- Show system queues output display is different from Junos OS. [PR1423673](#)

Interfaces and Chassis

- **request chassis routing-engine master switch**, should give warning message [PR1228051](#)
- At the time of fpc offline, while offlining is in progress if due to some reason hwdr restarts, picd core file is observed. Possibility of seeing this is very remote. [PR1419535](#)
- PTX10003-160C and PTX10003-80C: COS AE Queue stats for the **show interfaces queue ae0** CLI command is displayed as zero (where as the rate/pps/bps stats are displayed correctly) after the **clear interfaces statistics all** commands and when one AE member link flaps (24x10G ae0). [PR1423134](#)
- The **show system audit** command is not supported in Junos OS Evolved Release 19.4R1. [PR1420984](#)
- When Highly Accelerated Life Test is carried out on PTX10003, FPC Error messages **egp_intr_pkt_trapcode** are seen on the console. There is no direct impact on control plane protocol or to end traffic. [PR1425508](#)
- There are differences in XML tags for **show interfaces/show interfaces terse/show interfaces statistics** compared to Junos. [PR1433459](#)
- After a link flap, a 400G link might take up to 50 seconds before returning stably to "up". [PR1450606](#)
- For PTX10003-160C setup with all optics plugged in and all 4 PSMs operational, if somehow we incur a triple fault in PSM - 2, FPCs should go down abruptly due to insufficient power. However, in the process of that, the peer links in SIB might get major errors due to an ungraceful teardown of links. This mostly

occurs when the setup is a scaled condition with all or most of the optics plugged in. To recover from this condition, offline or online the SIBs. [PR1461179](#)

- When the passive monitoring is enabled for the interface, no packets should be sent out in the TX direction. All the TX packets are supposed to be dropped (data is not sent out on the line). However, the dropped packets are counted in the statistics by the hardware as if normally transmitted. Due to this, you might see the interface statistics showing output packets, even though no packets are sent out in the TX direction. [PR1466857](#)

Multiprotocol Label Switching

- In a scale scenario of million routes and thousands of LSPs, **show mpls lsp statistics** is slow due to high volume of route installation and statistics queries. [PR1416363](#)

Network Management and Monitoring

- An eventd core file might be seen if the system is zeroized. There is no need for any workaround as the system will come up. This core file might be generated as a transitory during system bring up from zeroize. The cause is due to some system resource unavailability. [PR1463464](#)

Routing Protocols

- Route add using BGP APIs can be relatively slow if route monitor register happens when BGP routes are already present in the router. Conditions: BGP route add performance is impacted when BGP route monitor is configured. [PR1389212](#)
- In some scenarios immediately after a software upgrade, the host name in the IS-IS database shows up as "localhost". Flapping the IS-IS session will clear this. This problem is not seen in subsequent reboots after the software upgrade. [PR1419006](#)
- str_value: & key: values are filling incorrectly on PTX10003-80C and PTX10003-160C. Currently: (Issue) str_value:/components/component[name='FPC0:CC0']/properties/property[name='ts-output-packets']/key:state/value, Fix: str_value:/components/component[name='FPC0:CC0']/key:properties/property[name='ts-output-packets']/state/value, [PR1419283](#)
- Output MTU Error statistics is not increasing on **show pfe statistics traffic**. [PR1434860](#)
- To view management interfaces in ARP table, use the command **show arp vpn mgmt_junos**. [PR1435537](#)

User Interface and Configuration

- There is no support for **configure dynamic | edit dynamic** on Junos OS Evolved. [PR1439452](#)

- In Junos OS Evolved, logging in to same Routing Engine gives the following error **We're on same RE as requested**.[PR1472435](#)

Resolved Issues

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Learn which issues were resolved in Junos OS Evolved Release 19.4R1 for PTX10003 routers.

Authentication and Access Control

- TACACS authentication might not fallback to remote user template for platforms based on Junos OS Junos OS Evolved. [PR1463705](#)

Class of Service (CoS)

- The evo-aftmand syslog error messages:

Route: Rt Entry not found in SW DB index, Route: RtEntryBulk:Generic Handler onPendingDelete:Route queue flush failed and Route: RtEntryMsgHandler:routeQueueBulk:Queue flush failed are continuously observed on PTX10003-160c platform, while adding IPv4 and IPv6 DSCP classifiers on an IEEE802.1ad interface.[PR1437717](#)

General Routing

- EVO:vBrackla:JDI-RCT:vRCT: 'Em: root: route entry del failed, route does not exist prefix:0.0.0/24' and 'Em: root: route entry del failed, route does not exist prefix:0.0.32/24' error messages seen after restoring to baseline. [PR1414028](#)
- Tail Drop Bytes is not available. [PR1421363](#)
- Scope for the hostpath wedge errors should be "pfe". [PR1422503](#)
- **show system reboot | display xml** output is variant from classic Junos OS.
- Differences in xml tags for cli **show system core-dumps**. [PR1429627](#)
- Differences in xml tags for cli **show pfe statistics traffic**. [PR1430821](#)
- Differences in xml tags for cli "**show interfaces/show interfaces statistics/show interfaces terse**".[PR1433459](#)
- Output MTU Error statistics is not increasing on **show pfe statistics traffic**. [PR1434860](#)
- PTX10003-80C: restart dot1xd-agent followed by dot1x-protocol on both nodes halts MACsec feature. [PR1436627](#)
- ip monitor route - cannot bind netlink socket. [PR1443859](#)
- Partial of uRPF loose mode function is broken after app restart. [PR1445713](#)
- In case if NSR is enabled in l3vpn scenarios, after restarting routing, vpn table would not be created. [PR1447435](#)
- LACP statistics are not shown in **show pfe statistics traffic** command. [PR1448840](#)
- Arpd is spinning high after change of subnet from 24 to 16 and hence the ping is not going through. [PR1452496](#)
- **show system uptime** points the Time Source to NTPCLOCK for the LOCL time association. [PR1453595](#)

- DDOS:CLI: **show ddos-protection protocols eoam oam-cfm** returns nothing in Junos OS Evolved Release 19.3R1 on PTX Series devices. [PR1456043](#)
- Ports are in Disabled state after continuous triggers were given on setup and incomplete objects in app-controller and binding queue. [PR1460063](#)
- If RSTP is to be enabled on a switch that has a mix of AE and individual network ports, only first 7 AEs (ae0-ae6) can be configured under RSTP. [PR1462059](#)
- Policer drop stats are not updated for software policer at Packet Forwarding Engine level. [PR1463997](#)
- Enhancements to **request system software sync** command. [PR1473572](#)

Infrastructure

- Differences in xml tags for **show route forwarding-table**. [PR1429413](#)
- Scaled I3vpn configuration takes nearly about 30 minutes to come up. [PR1438955](#)
- TCP server might fail to accept connection from IPv6 link-local address). [PR1445177](#)

Interfaces and Chassis

- MIB entPhysicalTable does not show Xcvr/optics data. [PR1414503](#)
- In rare cases, link can take longer time to come up (additional 10-15 seconds) because the first Serdes tune was suboptimal. [PR1442345](#)
- picd becomes unresponsive while powering off 3 PSM in 16T setup. [PR1460185](#)
- SIB major error seen upon removal of 3 DC 80A PSMs. [PR1461179](#)

MPLS

- PCE Initiated RSVP Lsps are not protected. [PR1443672](#)

Network Management and Monitoring

- Forwarding syslog messages when two remote servers each belonging to different VRF is configured using IPv6 through two different users specified Routing Instances fails when configuration changes multiple times. [PR1436314](#)

Routing Policy and Firewall Filters

- ecmp-tracer filters are not removed when all AE child links are deactivated. [PR1433501](#)
- In a scaled environment, when bgp flowspec rr groups are deactivated then dfwd generates a core file. [PR1451504](#)

Routing Protocols

- In some scenarios immediately after a software upgrade, the hostname in IS-IS database might show as 'localhost'. [PR1419006](#)

User Interface and Configuration

- Uploading syslog file to remote IPv6 address archive-sites with management-instance failed. [PR1444733](#)
- If static routes are defined in multiple groups, static route through re0:mgmt-0.0 interface disappears after restart routing in a specific scenario. [PR1448810](#)
- Delete **show system ntp source-adress** command before upgrading Junos OS Evolved Release 19.3R1 from Junos OS Evolved Release 19.1R1. [PR1462728](#)

Junos OS Evolved Release Notes for QFX5220 Devices

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These release notes accompany Junos OS Evolved Release 19.4R1 for QFX5220-32CD and QFX5220-128C switches. They describe new and changed features, limitations, and known and resolved problems in the hardware and software.

What's New

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Learn about new features introduced in Junos OS Evolved Release 19.4R1 for QFX5220-32CD and QFX5220-128C switches.

Class of Service

- **Support for Class of Service (CoS) / Quality of Service (QoS) features through 400G interfaces on QFX-series and PTX-series platforms**—Starting in Junos OS Evolved Release 19.4R1, support is provided for CoS/QoS features through 400G interfaces on QFX Series and PTX Series devices.

[See [Understanding Class of Service](#).]

Forwarding and Sampling

- **Customizing hashing parameters and shared-buffer alpha values for better load balancing (QFX5220)**—The QFX220 switches achieve load balancing through the use of a hashing algorithm, which determines how to forward traffic over LAG bundles or to next-hop devices when ECMP is enabled. The hashing algorithm makes hashing decisions based on values in various packet fields. Starting with Junos OS Evolved Release 19.4R1, you can explicitly configure some hashing parameters to make hashing more efficient. The shared-buffer pool is a global memory space that all ports on the switch share dynamically as they need buffers. The switch uses the shared-buffer pool to absorb traffic bursts after the dedicated-buffer pool is exhausted. The shared-buffer pool threshold is dynamically calculated based on a factor called alpha. Also starting with Junos OS Evolved Release 19.4R1, you can specify the alpha, or dynamic threshold, value to determine the change threshold of shared buffer pools for both ingress and egress buffer partitions.

To specify hashing parameters:

```
user@switch# set forwarding-options enhanced-hash-key hash-parameters (ecmp | lag)
```

To specify a threshold value for a particular queue:

```
user@switch# set class-of-service shared-buffer (ingress|egress) buffer-partition buffer
dynamic-threshold value
```

[See [hash-parameters](#) and [buffer-partition](#).]

General Routing

- **View ARP table entries and IPv6 neighbor information (QFX5220)**—Starting in Junos OS Evolved Release 19.4R1, on QFX5220 switches, you can view the following:
 - Address Resolution Protocol (ARP) details such as the next-hop reference count and the next-hop current state, using the commands **show arp reference-count** and **show arp state**.
 - IPv6 neighbor cache information. The following commands are supported: **show ipv6 neighbors flags**, **show ipv6 neighbors host**, **show ipv6 neighbors interface *interface-name***, **show ipv6 neighbors reference-count**, and **show ipv6 neighbors vpn *vpn-name***.

[See [show arp](#) and [show ipv6 neighbors](#).]

Interfaces and Chassis

- **Support for dynamic load balancing (QFX5220)**—Starting in Junos OS Evolved Release 19.4R1, QFX5220 switches support dynamic load balancing (DLB) for equal-cost multipath (ECMP). DLB is an enhancement to static load balancing. DLB considers member bandwidth utilization along with packet content for member selection.

You can use the following DLB modes to load-balance traffic:

- Flowlet
- Assigned flow
- Per-packet

To configure DLB for ECMP, include the **ecmp-dlb** statement at the **[edit forwarding-options enhanced-hash-key]** hierarchy level.

NOTE: You cannot configure both DLB and resilient hashing at the same time.

[See [Understanding Dynamic Load Balancing](#) and [Configuring Dynamic Load Balancing](#).]

Layer 2 Features

- **Spanning-Tree Protocol (STP), Rapid Spanning-Tree Protocol (RSTP), Multiple Spanning-Tree Protocol (MSTP), and VLAN Spanning-Tree Protocol (VSTP) support (QFX5220 switches)**—Starting in Junos OS Evolved Release 19.4R1, You can use STP, RSTP, MSTP, and VSTP to provide Layer 2 loop prevention.

[See [Spanning-Tree Protocol Overview](#).]

Multicast

- **Support for multicast forwarding (QFX5220-32CD and QFX220-128C switches)**—Starting with Junos OS Evolved Release 19.4R1, the following multicast features are supported:
 - IPv4 and IPv6 multicast
 - Internet Group Management Protocol (IGMP)
 - Multicast Listener Discovery (MLD)
 - Protocol Independent Multicast source-specific multicast (PIM SSM)
 - Protocol Independent Multicast sparse mode (PIM SM)

In this release, IGMP snooping, MLD snooping, MVPN Multicast, PIM MoFRR, PIM First Hop router (FHR), Rendezvous point (RP), and Last Hop Router (LHR) are not supported.

[See [Multicast Routing Protocols](#)].

Network Management and Monitoring

- **Support for running a Puppet agent as a Docker container (PTX10003-80C, PTX10003-160C, QFX5220-32CD, and QFX5220-128C)**—Starting in Release 19.4R1, devices running Junos OS Evolved support running a Puppet agent as a Docker container. As an alternative to using the Puppet agent that is integrated into the Junos OS Evolved software image, you can use the Puppet agent Docker container provided by Juniper Networks. Using the container enables you to use standard Docker tools to manage the container and mount or unmount the Puppet agent as needed.

[See [Installing Puppet for Junos OS](#).]

- **Support for running a Chef client as a Docker container (QFX5220-32CD, QFX5220-128C)**—Starting in Release 19.4R1, devices running Junos OS Evolved support running a Chef client as a Docker container. As an alternative to using the Chef client that is integrated into the Junos OS Evolved software image, you can use the Chef client Docker container provided by Juniper Networks. Using the container enables you to use standard Docker tools to manage the container and mount or unmount the Chef client as needed.

[See [Deploying Chef for Junos OS](#).]

Routing Policy and Firewall Filters

- **Support for 2000 egress firewall filters (QFX5220)**—Starting in Junos OS Evolved Release 19.4R1, you can configure up to 2000 VLAN firewall filters on the QFX5220 switch. This feature is supported only in the egress direction (traffic exiting the VLAN). To configure, include the **egress-scale** option under the **erACL-profile** statement at the **[edit system packet-forwarding-options firewall]** hierarchy level.

[See [erACL-profile](#) and [Configuring Firewall Filters](#).]

System Management

- **Install third-party software on devices running Junos OS Evolved (QFX5220)**—Starting in Junos OS Evolved Release 19.4R1, you can install a third-party software package onto a QFX5220 switch running Junos OS Evolved the same way you install new releases of the Junos OS Evolved software, by using the **request system software add *pathname/filename*** command. The only difference is that the third-party software files are **.tgz** files and the Junos OS Evolved software files are **.iso** files.

[See [How to Install Third-Party Software on Devices Running Junos OS Evolved](#).]

- **Boundary clock and enterprise profile support for Precision Time Protocol (PTP) (QFX5220)**—Starting in Junos OS Evolved Release 19.4R1, the enterprise profile, which is based on PTPv2, provides the ability for enterprise and financial markets to timestamp on different systems and to handle a range of latency and delays.

The enterprise profile supports the following options:

- IPv4 multicast transport
- Boundary clocks
- 512 downstream slave clocks

You can enable the enterprise profile at the **[edit protocols ptp profile-type]** CLI hierarchy level.

[See [Understanding the Precision Time Protocol Enterprise Profile.](#)]

Spanning Tree Protocols

- **Spanning-Tree Protocol (STP), Rapid Spanning-Tree Protocol (RSTP), Multiple Spanning-Tree Protocol (MSTP), and VLAN Spanning-Tree Protocol (VSTP) support (QFX5220 devices)**—Starting in Junos OS Evolved Release 19.4R1, You can use STP, RSTP, MSTP, and VSTP to provide Layer 2 loop prevention.

[See [Spanning-Tree Protocol Overview.](#)]

What's Changed

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Learn about what changed Junos OS Evolved Release 19.4R1 for QFX5220-32CD and QFX5220-128C switches.

Changes in CLI Statements and Commands

- To see the list of CLI statements and commands changed in Junos OS Evolved, see *How Junos OS Evolved Differs from Junos OS* in the [Introducing Junos OS Evolved Guide](#).

User Interface and Configuration

- The **request system shutdown (reboot | power-off | halt)** command is deprecated on Junos OS Evolved (PTX10003 and QFX5220)—The command for reboot, power-off, or halt for Junos OS Evolved is **request system (reboot | power-off | halt)** instead of **request system shutdown (reboot | power-off | halt)** as it was previously. Junos OS Evolved uses the same commands for this functionality as Junos OS.

[See [request system reboot](#), [request system power-off](#), and [request system halt](#).]

Known Behavior

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General Routing

- It takes up to 420 seconds in QFX5220-128C for interfaces to come up after reboot when all ports are channelized. The higher time is due to the time taken to download firmware for all 64 dies. [PR1433083](#)
- Auto-RP announce and mapping is not currently supported for Junos OS Evolved; only discovery is supported. In order to enable this feature, PIM and Packet Forwarding Engine jointly needs to provide a fix. From PIM's POV, we only need to enable the CLI configuration for PTX Series platforms and remove an Junos OS Evolved check in our codepath for announce- which is a very minimal change. But from Packet Forwarding Engine's side we do not need to know what modifications are needed as Packet Forwarding Engine might need to support Local NH as RPF NH for the required platform- which is the main change required here. [PR1459187](#)
- When many member links are added to an AE or MTU is changed for many interfaces at the same time, CPU can remain high for many minutes. The CPU remains high till the all interfaces are flapped. [PR1470353](#)

System Management

- XML Tags are missing for the output of the **show system statistics** command. A complete list of the tags missing in the output is listed in the Description tab of the PR. [PR1429644](#)

User Interface and Configuration

- For large YANG file, augmentation may not work. [PR1416972](#)

Open Issues

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Learn about open issues in this release for QFX5220-32CD and QFX5220-128C switches. For the most complete and latest information about known Junos OS defects, use the Juniper Networks online [Juniper Problem Report Search](#) application.

General Routing

- When removing and inserting a 400G AOC module, there can be up to 90 seconds delay before the link establishes after insertion. [PR1454259](#)

Infrastructure

- During boot installation, ntpd.service fails to start in the scenario when upgrade is done by selecting boot from GRUB menu. [PR1421946](#)

Interfaces and Chassis

- QFX5200 running Junos OS Evolved: Physical interface stats retain old values after clear stats & deactivate/activate on interface where MTU was configured. Workaround is to run clear interfaces statistics once after deactivate/activate interface (for which MTU is configured). [PR1403606](#)
- The show chassis in-service-upgrade and show chassis nonstop-upgrade cli commands are not applicable to this Junos OS Evolved release. [PR1425575](#)
- When exposed to traffic with packet sizes greater than the interface MTU and the do-not-fragment bit set, the traffic is dropped as expected. The "Output MTU Error" counter does not increase when you issue the **show interfaces extensive** command. [PR1434860](#)
- QFX5220-128C: The channelization ports might be marked as down or missing with rapid add or delete configuration multiple times on the interface. To fix the issue, configure all whole block 4 ports to unused and delete the unused ports. This should bring up the interfaces. [PR1442657](#)
- Two physical interfaces flaps are observed for each physical interface if mtu or lacp configuration is changed. The flaps might be observed up to 15 minutes apart if the channelized configuration is present and mtu is applied for all 128 interfaces. [PR1446214](#)
- After a link flap, a 400G link may take up to 50 seconds before returning stably to "up". [PR1450606](#)

Network Management and Monitoring

- With LACP configurations present, some of the channelized interfaces remain down after a reboot. [PR1459554](#)
- After committing the IPCLOS scaled profile configuration with 32 ports or software image upgrade, some DAC interfaces might remain down. Workaround: Reboot the switch with the saved IPCLOS configuration. [PR1460442](#)

Routing Protocols

- To view management interfaces in the ARP table, use the command **show arp vpn mgmt_junos**. [PR1435537](#)

System Management

- **show system uptime** points to correct clock. [PR1453595](#)

User Interface and Configuration

- The Junos CLI communicates with MGD over an internal unix-domain socket and is granted special permission to open this protected mode socket. Due to a misconfiguration of the internal socket, a local, authenticated user may be able to exploit this vulnerability to gain administrative privileges. [PR1406219](#)
- On QFX5220-32CD, VLANs between 3968 to 4095 are reserved for L3 interfaces by default. So, these VLANs cannot be used for L2 interfaces. As of now there is no commit check added for this purpose. User should take care of this while configuring VLAN for L2. [PR1423468](#)
- The Junos OS Evolved output for the CLI "show LLDP neighbors" is different than in Junos OS. Some of the XML tags for the CLI **show lldp neighbors** interface and **show lldp** are missing. [PR1430795](#)
- Restart of App cmdd is failing with below error: error: abnormal communication termination with command-handler daemon error: the command-handler subsystem is not responding to management requests. [PR1434409](#)

Resolved Issues

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Learn which issues were resolved in Junos OS Evolved Release 19.4R1 for QFX5220-32CD and QFX5220-128C switches.

Infrastructure

- Differences in xml tags for **show route forwarding-table** cli. [PR1429413](#)
- DHCP packets might not be received by jdhcpd on all interfaces. [PR1455435](#)

Interfaces and Chassis

- MIB entPhysicalTable does not show Xcvr/optics data. [PR1414503](#)
- Intermittently one or more channelized interfaces might not come up after a reboot. [PR1446755](#)
- Interface not coming up after deactivate/activate AE on DUT. [PR1448436](#)
- QFX5220-128C: Interfaces OIR might take up 50 seconds to come up on Junos OS Evolved 19.2R1 release. [PR1449416](#)
- SNMPD traps are not generated in DC PSM testing. [PR1450037](#)
- 40/100G interface went down after committing the profile configuration. [PR1454412](#)
- Multiple interfaces go down after committing the configuration with the error as Interface: cannot get pfe_portE for ifd: [PR1461868](#)

Layer 2 Features

- **show ethernet-switch statistics** command is not supported in Junos OS Evolved Release 19.3R1. [PR1457307](#)
- If RSTP is to be enabled on a switch that has a mix of AE and individual network ports, only first 7 AEs (ae0-ae6) can be configured under RSTP. [PR1462059](#)

Network Management and Monitoring

- In certain configurations DHCPv6 client fails to bind over L2 LDRA-connected DHCPv6 Relay. [PR1458040](#)

Routing Policies and Firewall Filters

- Lo0 firewall filter might affect L3 forwarding traffic on QFX5220 EVO platforms [PR1475620](#)

Routing Protocols

- LLDP neighborship is not established if interface family configuration is not activated. [PR1433295](#)
- For dual stack configuration, platform does not support different MTU for IPv4 and IPv6. [PR1447183](#)

System Management

- DCQCN:after delete congestion-notification-profile, DCQCN should stop working. [PR1451911](#)
- 128 Traffic not working for vlan-id 1 with IRB configuration. [PR1454468](#)

Finding More Information

Learn about more information on Junos OS Evolved and other Juniper products.

- Feature Explorer—The Juniper Networks Feature Explorer is a Web-based app that helps you to explore and compare Junos OS and Junos OS Evolved feature information to find the right software release and hardware platform for your network. <https://pathfinder.juniper.net/feature-explorer/>
- PR Search Tool—Keep track of the latest and additional information about Junos OS Evolved open defects and issues resolved. prsearch.juniper.net
- Hardware Compatibility Tool—Determine optical interfaces and transceivers supported across all platforms. apps.juniper.net/hct/home

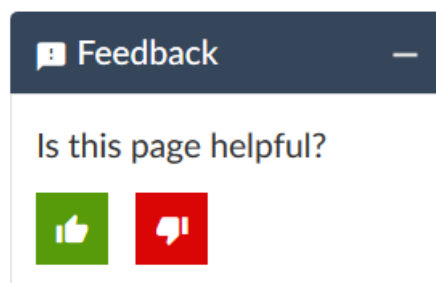
NOTE: To obtain information about the components that are supported on the devices, and the special compatibility guidelines with the release, see the Hardware Guide for the product.

- Juniper Networks Compliance Advisor—Review regulatory compliance information about Common Criteria, FIPS, Homologation, RoHS2, and USGv6 for Juniper Networks products. apps.juniper.net/compliance/

Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can provide feedback by using either of the following methods:

- Online feedback system—Click TechLibrary Feedback, on the lower right of any page on the [Juniper Networks TechLibrary](#) site, and do one of the following:



- Click the thumbs-up icon if the information on the page was helpful to you.

- Click the thumbs-down icon if the information on the page was not helpful to you or if you have suggestions for improvement, and use the pop-up form to provide feedback.
- E-mail—Send your comments to techpubs-comments@juniper.net. Include the document or topic name, URL or page number, and software version (if applicable).

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or Partner Support Service support contract, or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at <https://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf>.
- Product warranties—For product warranty information, visit <http://www.juniper.net/support/warranty/>.
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- Find CSC offerings: <https://www.juniper.net/customers/support/>
- Search for known bugs: <https://prsearch.juniper.net/>
- Find product documentation: <https://www.juniper.net/documentation/>
- Find solutions and answer questions using our Knowledge Base: <https://kb.juniper.net/>
- Download the latest versions of software and review release notes: <https://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <https://kb.juniper.net/InfoCenter/>
- Join and participate in the Juniper Networks Community Forum: <https://www.juniper.net/company/communities/>
- Create a service request online: <https://myjuniper.juniper.net>

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: <https://entitlementsearch.juniper.net/entitlementsearch/>

Creating a Service Request with JTAC

You can create a service request with JTAC on the Web or by telephone.

- Visit <https://myjuniper.juniper.net>.
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, see <https://support.juniper.net/support/requesting-support/>.

Revision History

31 December 2019—Revision 1, Junos OS Evolved Release 19.4R1.

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