Release Notes for Cisco 8000 Series Routers, IOS XR Release 7.8.1

Cisco 8100, 8200, and 8800 Series Routers

What's New in Cisco IOS XR Release 7.8.1

New in Documentation

This release introduces rich and intuitive ways for you to access YANG data models supported in the Cisco IOS XR software.

Product	Description
Cisco IOS XR Error Messages	Search by release number, error strings, or compare release numbers to view a detailed repository of error messages and descriptions.
Cisco IOS XR MIBs	Select the MIB of your choice from a drop-down to explore an extensive repository of MIB information.
YANG Data Models Navigator	We have launched the tool as an easy reference to view the Data Models (Native, Unified, OpenConfig) supported in IOS XR platforms and releases. You can explore the data model definitions, locate a specific model, and view the containers and their respective lists, leaves, leaf lists, Xpaths, and much more.
	As we continue to enhance the tool, we would love to hear your feedback. You are welcome to drop us a note here.
Use Case-based Documentation at Learning Labs	You can now quickly explore and experiment on use-cases without setting up any hardware resources with the new Interactive documentation for Cisco 8000 routers on DevNet Learning Labs. Powered by Jupyter, the automated code blocks within the documentation enable you to configure the desired functionality on the routers and retrieve real-time output swiftly.
	Check out the new interactive documentation here:
	• End to end 3-stage CLOS Networks for SONiC
	• Use cases for QoS and Model-driven Telemetry

Software Features Enhanced and Introduced

To learn about features introduced in other Cisco IOS XR releases, select the release from the Documentation Landing Page.

Feature	Description
Programmability	
Replace Router Configuration at Sub-tree Level Using gNMI	Using the gNMI `SetRequest` message, you can replace the router's existing configuration with a new set of configurations at the subtree level within the same model. Earlier you could replace router configurations at the data tree root level.
	To view the specification of gNMI replace, see Github repository.

Feature	Description
gNMI Bundling Size Enhancement	With gRPC Network Management Interface (gNMI) bundling, the router internally bundles multiple gNMI `Update` messages meant for the same client into a single gNMI `Notification` message and sends it to the client over the interface.
	You can now optimize the interface bandwidth utilization by accommodating more gNMI updates in a single notification message to the client. We have now increased the gNMI bundling size from 32768 to 65536 bytes, and enabled gNMI bundling size configuration through Cisco native data model.
	Prior releases allowed only a maximum bundling size of 32768 bytes, and you could configure only through CLI.
	The feature introduces new XPaths to the `Cisco-IOS-XR-telemetry-model-driven-cfg.yang` Cisco native data model to configure gNMI bundling size.
	To view the specification of gNMI bundling, see Github repository.
gNOI System Service Revision 1.0.0	With the gRPC Network Operations Interface (gNOI) Revision 1.0.0, you can:
	• Cancel a pending reboot request using the `CancelReboot` RPC
	• Terminate a process using the `KillProcess` RPC
	You can access the gNOI system RPC messages from the Github repository.
IP Addresses and Services	
Filter Ingress IPv6 ACL Traffic based on ACL Hop Limit	We ensure that IPv6 packets have a limited lifetime on your networks, thus reducing the impact of any routing loops and preventing networking failures. To that end, we have added the option to set hop limit rules in the ACLs based on the following hop limit match criteria:
	• **eq** - equal to
	• **lt** - less than
	• **gt** - greater than
	• **range** - ranges from 1 to 255
	To set the hop limit, use the **ttl** keyword in the following commands:
	• **deny (IPv6)**
	• **permit (IPv6)**
Enable Ingress Interface Logging on IPv4 and IPv6 ACLs	Using the **log-input** keyword, you can now enable Access Control Lists (ACLs) to generate log messages that help you identify the interface through which a particular traffic stream ingresses the routers. This information aids in optimizing traffic flow across the network. There was no option to enablelogging of ingress interfaces with an ACL in earlier releases. This feature introduces an optional keyword **log-input** for the following commands:
	• **deny (IPv4)**
	• **deny (IPv6)**
	• **permit (IPv4)**
	• **permit (IPv6)**

Feature	Description
L2VPN	
Ethernet VPN Virtual Private Wire Service	The Ethernet VPN Virtual Private Wire Service (EVPN-VPWS) is a BGP control plane solution for point-to-point services. It implements the signaling and encapsulation techniques for establishing an EVPN instance between a pair of PEs. It provides the service of forwarding L2 Ethernet traffic between network devices without inspecting the MAC header in the Ethernet frame. The use of EVPN for VPWS eliminates the need for signaling single-segment and multi-segment pseudowire (PW) for point-to-point Ethernet services.
EVPN Seamless Integration with Legacy VPWS	When expanding an existing L2VPN network, users may want to deploy EVPN-VPWS to provide additional Layer 2 point-to-point Ethernet services, and at the same time some of their customer traffic may still need to be terminated on the existing L2VPN PEs on their network. Users can migrate the PE nodes from L2VPN VPWS to EVPN-VPWS, without disruption in traffic. The seamless migration offers users the option to use either VPWS or EVPN-VPWS services on PE nodes. This allows the coexistence of legacy VPWS and EVPN-VPWS dual-stack in the core for a given L2 Attachment Circuit (AC) over the same MPLS network. This feature introduces the **vpws-seamless-integration** command.
Segment Routing	
Circuit-Style SR-TE Policies	This solution allows Segment Routing to meet the requirements of a connection-oriented transport network, which was historically delivered over circuit-switched SONET/SDH networks. Circuit-style SR-TE policies allow a common network infrastructure to be used for both connection-oriented services and classic IP-based transport. This eliminates the need for multiple parallel networks, which greatly reduces both capital expenditures (CapEx) and operating expenditures (OpEx).
Dual-Stack L3VPN Services (IPv4, IPv6) (SRv6 Micro-SID)	This feature introduces support for Dual-stack (VPNv4/VPNv6) VRFs. VPNv4/VPNv6 Dual-stack supports both IPv4 (uDT4) and IPv6 (uDT6) based SRv6 L3VPN service on the same interface, sub-interface, or VRF. Dual stacking allows operators to access both IPv4 and IPv6 simultaneously and independent of each other. It avoids the need to translate between two protocol stacks. This results in high processing efficiency and zero information loss.
IS-IS Enhancements: max-metric and data plane updates	The new **anomaly** optional keyword is introduced to **affinity flex-algo** command. This keyword helps to advertise the flex-algo affinity when the performance measurement signals a link anomaly, such as an excessive delay on a link. You could use the anomaly option to exclude the link from flex-algo path computations. **affinity flex-algo**
Multicast VPN: Tree-SID MVPN	With this feature, you can use SR and MVPN for optimally transporting IP VPN multicast traffic over the SP network, using SR-PCE as a controller. With SR's minimal source router configuration requirement, its ability to implement policies with specific optimization objectives and constraints and use SR-PCE to dynamically generate optimal multicast trees (including when topology changes occur in the multicast tree), the SR-enabled SP network can transport IP multicast traffic efficiently.

Feature	Description
Path Tracing Midpoint Node	Path Tracing (PT) provides a log or record of the packet path as a sequence of interface IDs along with its time stamp. In Path Tracing, a node can behave as a source, midpoint, or sink node.
	The Path Tracing Midpoint feature is implemented in this release which measures the hop-by-hop delay, traces the path in the network and collects egress interface load information and interface Id, and stores them in the Midpoint Compressed Data (MCD) section of Hop-by-Hop Path Tracing (HbH-PT) header.
	This feature provides visibility to the Path Tracing Midpoint node that handles IPv6 transit in Path Tracing and full characterization of the packet delivery path. It provides real time information and the current status of the network.
	This feature introduces the following command:
	• **performance-measurement interface**
Per-Prefix SRv6 Locator Assignment	This feature allows you to assign a specific SRv6 locator for a given prefix or a set of prefixes (IPv4/IPv6 GRT, IPv4/IPv6 VPN).
	The egress PE advertises the prefix with the specified locator. This allows for per-prefix steering into desired transport behaviors, such as Flex Algo.
SRv6 Services: BGP Global IPv6	With this feature, the egress PE can signal an SRv6 Service SID with the BGP global route. The ingress PE encapsulates the IPv4/IPv6 payload in an outer IPv6 header where the destination address is the SRv6 Service SID provided by the egress PE. BGP messages between PEs carry SRv6 Service SIDs to interconnect PEs.
SRv6 Services: IPv6 L3VPN	With this feature, the egress PE can signal an SRv6 Service SID with the BGP overlay service route. The ingress PE encapsulates the IPv4/IPv6 payload in an outer IPv6 header where the destination address is the SRv6 Service SID provided by the egress PE. BGP messages between PEs carry SRv6 Service SIDs to interconnect PEs and form VPNs.
SRv6 VPN BGP Route Leaking	This feature supports SRv6 VPN Route-leaking between Global Routing Table (GRT) and Virtual Routing and Forwarding (VRF). This enables Enterprise IPv4 internet connectivity.
SRv6/MPLS Dual-Connected PE (SRv6 Micro SID)	This feature allows a PE router to support IPv4 L3VPN services for a given VRF with both MPLS and SRv6. This is MPLS and SRv6 L3VPNv4 co-existence scenario and is sometimes referred to as dual-connected PE.
SRv6/MPLS L3 Service Interworking Gateway (SRv6 Micro-SID)	This feature enables you to extend L3 services between MPLS and SRv6 domains by providing service continuity on the control plane and data plane.
	This feature allows for SRv6 L3VPN domains to interwork with existing MPLS L3VPN domains. The feature also allows migration from MPLS L3VPN to SRv6 L3VPN.
Support for iBGP as PE-CE protocol	This feature introduces support for iBGP as PE-CE protocol.
System Management	

Feature	Description
Smart Licensing on 8111-32EH and 8201-24H8FH	Cisco Smart Licensing is a cloud-based, flexible, automated software licensing model that enables you to activate and manage Cisco software licenses across your organization. Smart Licensing solution allows you to easily track the status of your license and software usage trends. Smart Licensing is now supported on the following chassis: • 8111-32EH • 8201-24H8FH
Smart Licensing Per Port for Segment Routing-Traffic Engineering	Cisco Smart Licensing is a cloud-based, flexible software licensing model that enables you to activate and manage Cisco software licenses across your organization. Under the flexible, automated software licensing model, we have Advantage licenses which are required on top of Essential Licenses for ports that use advanced features like L3VPN. This release allows you to allocate the Advantage licenses to the Segment Routing Traffic Engineering (SR-TE) based on the active ports under MPLS or SRV6. Before this release, when you configured SR-TE, all the ports used to consume Advantage licenses. This allows you to manage advantage licenses for SR-TE.
System Security	
Secure Boot Status	You can now verify whether the router is securely booted up with an authentic Cisco software image. We have introduced a **show** command to verify the secure boot status of the router. If the software image was tampered with, then the secure boot fails, and the router does not boot up. Before this release, there was no provision on the router to verify the secure boot status. The feature introduces these: • CLI: **show platform security integrity log secure-boot status** command. • YANG Data Model: `Cisco-IOS-XR-attestation-agent-oper.yang` Cisco native model (see GitHub)
Selective Authentication Methods for SSH Server	You now have the flexibility to choose the preferred SSH server authentication methods on the router. These methods include password authentication, keyboard-interactive authentication, and public-key authentication. This feature allows you to selectively disable these authentication methods. By allowing the SSH clients to connect to the server only through these permitted authentication methods, this functionality brings in additional security for router access through SSH. Before this release, by default, the SSH server allowed all these authentication methods for establishing SSH connections. The feature introduces these changes: • **CLI**: New **disable auth-methods** command • **YANG Data Model**: New XPaths for `Cisco-IOS-XR-crypto-ssh-cfg.yang` Cisco native model (see GitHub)

Feature	Description
Cisco MASA Service for IOS XR	Cisco's Manufacturer Authorized Signing Authority (MASA) service is used to create ownership vouchers and owner certificates (OVs and OCs) for a Cisco IOS XR router. These OVs and OCs certify that the device belongs to a given customer.
	Use cases where OVs and OCs are required include secure ZTP workflows, and to securely boot up your device on a 5G cell site over a third party ethernet service.
	You can use the MASA service to download, view logs, and audit ownership vouchers for the routers you own.
	This service also enables Cisco's Account teams to assign serial number of a device to customers and view details of the logging, verification, and audit of OVs.
Multicast	
LSM mLDP based MVPN support on edge routers	Label Switch Multicast (LSM) is MPLS technology extensions to support multicast using label encapsulation. Next-generation MVPN is based on Multicast Label Distribution Protocol (mLDP), which can be used to build P2MP and MP2MP LSPs through a MPLS network. These LSPs can be used for transporting both IPv4 and IPv6 multicast packets, either in the global table or VPN context.
	From this release, mLDP is supported on edge routers on profiles 1,2,4,5,6,7,9,12,13,14,17,19,21,23, and 25.
Software Installation	
Error messages with clear actions	The following command descriptions and outputs have been updated for clarity and better user responses: • **show install request** • **show install history last package** • **show install history id 2.1.2 errors**
Setup and Upgrade	
Optimized PSU FPD Upgrade	We have optimized the upgrade process of Field-Programmable Devices (FPDs) associated with the Power Supply Unit (PSUs) on the router. During the installation and PSU insertion process on the router, the FPDs associated with the PSUs are automatically upgraded. Starting this release, the PSU FPDs are grouped in the form of a parent FPD and its related child FPDs, and the upgrade image is downloaded only once. The upgrade is then triggered on the parent FPD PSU and replicated to the child FPD PSUs.
	In earlier releases, you downloaded the FPD image for each FPD associated with that PSU, and the upgrade process was then triggered sequentially. This process was time-consuming.
	The feature is supported on the following PSUs: • PSU2KW-ACPI • PSU2KW-HVPI • PSU3KW-HVPI • PSU4.8KW-DC100

Feature	Description
Cisco IOS XRv 9000 Router Installation and Configuration Guide	
gNMI Bundling of Telemetry Updates	gNMI (gRPC Network Management Interface) bundles multiple messages of a same client into a single message and sends to the client over the interface to optimize the interface bandwidth utilization. You can configure gNMI bundle size up to 65,535 bytes using Cisco IOS XR native model `Cisco-IOS-XR-telemetry-model-driven-cfg.yang` to optimize the interface bandwidth utilization. You can view the telemetry updates of gNMI bundling from the Github repository.

YANG Data Models Introduced and Enhanced

This release introduces or enhances the following data models. For detailed information about the supported and unsupported sensor paths of all the data models, see the Github repository. To get a comprehensive list of the data models supported in a release, navigate to the **Available-Content.md** file for the release in the Github repository. The unsupported sensor paths are documented as deviations. For example, `openconfig-acl.yang` provides details about the supported sensor paths, whereas `cisco-xr-openconfig-acl-deviations.yang` provides the unsupported sensor paths for openconfig-acl.yang on Cisco IOS XR routers.

Feature	Description
Programmability	
Cisco-IOS-XR-attestation-agent-oper.yang	We have introduced this Cisco native data model to verify whether the router is securely booted up with an authentic Cisco software image.
Cisco-IOS-XR-crypto-ssh-cfg.yang	We have introduced the following Xpaths to this Cisco native data model for you to selectively disable the SSH server authentication methods on the router: • `/ssh/server/disable/AuthMethods/Password` • `/ssh/server/disable/AuthMethods/KeyboardInteractive` • `/ssh/server/disable/AuthMethods/PublicKey`

Feature	Description
openconfig-network-instance.yang Revision 0.15.0	The OpenConfig data model is revised from version 0.6.0 to 0.15.0 and supports the following XPaths to configure and retrieve the Layer 3 forwarding constructs, Layer 2 instances, static routes, forwarding instances, Border Gateway Protocol (BGP) parameters and so on: `openconfig-network-instance/network-instances/network-instance[name]/` • `config` • `state` • `tables` • `protocols` You can stream Event-driven and Model-driven telemetry data for the operational state of the network instance.
openconfig-routing-policy.yang Revision 3.2.2	The OpenConfig data model, which is part of the `openconfig-network-instance.yang` data model is revised from version 1.0.1 to 1.2.0. This revision introduces support to configure and retrieve the operational state data for static routes using the following XPaths: `openconfig-network-instance/network-instances/network-instance[name]/` • `config/enabled` • `protocols/[identifier-name]/static-routes/static/config/description` • `protocols/[identifier-name]/static-routes/static/state/description` You can stream Event-driven and Model-driven telemetry data for the operational state of the static routes.
Openconfig-alarms.yang Revision 0.3.2	The OpenConfig data model, part of the `openconfig-system.yang` data model. The model is revised from 0.3.0 to 0.3.2 to enhance the time the system raises the alarm. This value is expressed relative to the UNIX epoch time. Using this XPath, you can stream Event-driven and Model-driven telemetry data.

Feature	Description

opencofig-if-ethernet.yang Revision 2.12.1	The OpenConfig data model is revised from version 2.8.1 to 2.12.1 to support the following sensor paths to manage the Forward Error Correction (FEC) configuration and state of Ethernet interfaces:
	
	Configuration Xpath:
	
	`opencofig-interfaces:interfaces/interface[name="interface-name"]/ opencofig-if-ethernet:ethernet/config/fec-mode`
	
	State XPaths supported on half-duplex interfaces:
	
	`opencofig-interfaces:interfaces/interface[name="interface-name"]/ opencofig-if-ethernet:ethernet/state/`
	
	• `in-carrier-errors`
	
	• `in-interrupted-tx`
	
	• `in-late-collision`
	
	• `in-single-collision`
	
	State XPaths supported on half-duplex and full-duplex interfaces:
	
	`opencofig-interfaces:interfaces/interface[name="interface-name"]/ opencofig-if-ethernet:ethernet/state/`
	
	• `in-mac-errors-rx`
	
	• `in-symbol-error`
	
	• `out-mac-errors-tx`
	
	• `in-maxsize-exceeded`
	
	You can stream Model-driven telemetry data for the operational state of the Ethernet interfaces.

opencofig-interfaces.yang Revision 2.5.0	The OpenConfig data model is revised from version 2.4.3 to 2.5.0. This version introduces support to configure the interface to connect the system to an out-of-band management network and enable the system CPU to handle traffic using the following XPaths: `opencofig-interfaces/interfaces/interface[name]/state/` • `state/management` • `State/cpu` • `subinterfaces/subinterface[index]/state/management` • `subinterfaces/subinterface[index]/state/cpu` You can stream Event-driven and Model-driven telemetry data for the operational state of the interface.

Feature	Description

openconfig-system-terminal.yang Revision 0.3.1	The OpenConfig data model is revised from version 0.3.0 to 0.3.1. This version introduces the following config XPaths to configure the IPv4 or IPv6 telnet server and the number of telnet sessions that are active simultaneously, and state sensor paths to view that the configuration is enabled:
	
	IPv4: `openconfig-system/system/telnet-server/`
	
	`oc-term-ext:ipv4/oc-term-ext:vrf[vrf-name]/`
	
	`oc-term-ext:state/oc-term-ext:enable`
	
	`oc-term-ext:config/oc-term-ext:session-limit`
	
	`oc-term-ext:state/oc-term-ext:session-limit`
	
	IPv6: `openconfig-system/system/telnet-server/`
	
	`oc-term-ext:ipv6/oc-term-ext:vrf[vrf-name]/`
	
	`oc-term-ext:state/oc-term-ext:enable`
	
	`oc-term-ext:config/oc-term-ext:session-limit`
	
	`oc-term-ext:state/oc-term-ext:session-limit`
	
	With this release, an extended model `Cisco-IOS-XR-openconfig-system-terminal-ext.yang` is introduced to manage the telnet server configuration.
	
	You can stream Event-driven and Model-driven telemetry data for the operational state of the system.

openconfig-system.yang Revision 0.7.0	The OpenConfig data model is revised from version 0.6.0 to 0.7.0. This version introduces support to view the statistics of CPU utilization of a component, create a customized banner that is displayed before the username and password login prompt and view the operational state of the system memory using the following XPaths:
	
	`openconfig-system:system/`
	
	• `cpus`
	
	• `memory/state`
	
	• `current-datetime`
	
	  • `boot-time`
	
	  • `config/login-banner`
	
	  • `config/motd-banner`
	
	Event-driven telemetry is not supported for `openconfig-system:/system/cpus`XPath. For the other sensor paths, you can stream Event-driven and Model-driven telemetry data for the operational state of the system.

Feature	Description
openconfig-lacp.yang Revision 1.2.0	The OpenConfig data model is revised from version 1.1.0 to 1.2.0 and introduces the following XPaths to monitor the Link Aggregation Control Protocol (LACP) aggregate interface timeouts and the time since the last timeout: `lacp/interfaces/interface[name]/members/member[interface]/state/:` • `last-change` • `counters/lacp-timeout-transitions` You can stream Event-driven telemetry data for the time since the last change of a timeout and Model-driven telemetry data for the number of times the state has transitioned with a timeout. The state change is monitored since the device restarted or the interface was brought up, whichever is most recent.

Feature	Description
openconfig-sampling-sflow Revision 0.1.0	The OpenConfig data model revision 0.1.0 supports the following XPaths to configure the parameters such as sampling rate, sampling size, the source address of the router, collector port number, IPv4 or IPv6 addresses, and network-instance (VRF) to monitor real-time traffic in data networks using a sampling mechanism in the sFlow agent. `openconfig-sampling-sflow:sampling/sflow` • `config/enabled` • `config/source-address` • `config/sampling-size` • `config/sampling-rate` • `state/enabled` • `state/source-address` • `state/sampling-size` • `state/sampling-rate` • `collectors/collector[address,port]/address` • `collectors/collector[address,port]/port` • `collectors/collector[address,port]/config/address` • `collectors/collector[address,port]/config/port` • `collectors/collector[address,port]/config/network-instance` • `collectors/collector[address,port]/state/address` • `collectors/collector[address,port]/state/port` • `collectors/collector[address,port]/state/network-instance` • `interfaces/interface[name]/name` • `interfaces/interface[name]/config/name` • `interfaces/interface[name]/config/enabled` • `interfaces/interface[name]/config/sampling-rate` • `interfaces/interface[name]/state/name` • `interfaces/interface[name]/state/enabled` • `interfaces/interface[name]/state/sampling-rate` This release introduces **source-address** command.

Feature	Description
opencalfig-aft.yang Revision 0.6.0	The OpenConfig data model is revised from version 0.3.0 to 0.6.0. The revised version introduces the support for NMS to receive essential interface characteristics, such as next-hop and next-hop group using the following XPaths to simplify the forwarding process: `openconfig-network-instance/network-instances/network-instance/afts/` • `next-hop-groups/next-hop-group/` • `next-hops/next-hop` To view the operational data of the system, you can stream Event-driven and Model-driven telemetry data.

Feature	Description
openconfig-qos.yang Revision 0.5.0	

Feature	Description
	The OpenConfig data model version 0.5.0 supports the following XPaths to avoid network congestion using queuing mechanism in the router. `openconfig-qos/qos` • `config` • `state` • interfaces/interface/interface-id • interfaces/interface/config/interface-id • interfaces/input/config • interfaces/input/state • interfaces/input/classifiers/classifier [type]/type • interfaces/input/classifiers/classifier [type]/config/name • interfaces/input/classifiers/classifier [type]/config/type • interfaces/input/classifiers/classifier [type]/state/name • interfaces/input/classifiers/classifier [type]/state/type • interfaces/input/classifiers/classifier [type]/terms/term/id • interfaces/input/classifiers/classifier [type]/terms/term[id]/state/id • Interfaces/input/classifiers/classifier [type]/terms/term[id]/state/matched-packets • Interfaces/input/classifiers/classifier [type]/terms/term[id]/state/matched-octets • interfaces/output/config • interfaces/output/state • interfaces/output/ interface-ref/config/interface • interfaces/output/ interface-ref/config/subinterface • interfaces/output/ interface-ref/classifiers/classifier[type]/type • interfaces/output/ • interface-ref/classifiers/classifier[type]/config/name • interfaces/output/ interface-ref/classifiers/classifier[type]/config/type • interfaces/output/queues/queue[name]/name • interfaces/output/queues/queue[name]/config/name

Feature	Description
	• interfaces/output/queues/queue[name]/state/name
	• interfaces/output/queues/queue[name]/state/ transmit-pkts
	• interfaces/output/queues/queue[name]/state/ transmit-octets
	• interfaces/output/queues/queue[name]/state/dropped-pkts
	• classifiers/classifier[name]/name
	• classifiers/classifier[name]/config/name
	• classifiers/classifier[name]/config/type
	• classifiers/classifier[name]/state/name
	• classifiers/classifier[name]/state/type
	• classifiers/classifier[name]/terms/term/id
	• classifiers/classifier[name]/terms/term/config/id
	• classifiers/classifier[name]/terms/term/state//id
	• classifiers/classifier[name]/terms/term/conditions/l2
	• classifiers/classifier[name]/terms/term/conditions/ipv4
	• classifiers/classifier[name]/terms/term/conditions/ipv6
	• classifiers/classifier[name]/terms/term/conditions/transport
	• classifiers/classifier[name]/terms/term/conditions/mpls
	• classifiers/classifier[name]/terms/term/actions/config/target-group
	• classifiers/classifier[name]/terms/term/actions/remark
	• forwarding-groups/forwarding-group[name]/name
	• forwarding-groups/forwarding-group[name]/config/name
	• forwarding-groups/forwarding-group[name]/config/output-queue
	• queues/queue[name]/name
	• queues/queue[name]/config/name
	You can stream Model-driven telemetry data of state containers of classifiers and queues. In this release, the following guidelines and limitations apply to this QoS data model:

Feature	Description

	• The data model supports:
	
	  • IPv4, IPv6, and MPLS policy types
	
	  • Classifier policy for ingress traffic and scheduler policy for egress traffic
	
	  • Statistics per classifier policy type
	
	  • Priority scheduler. Priority value ranges 1–8. Value 1 corresponds to priority 7 and traffic-class 1, Value 2 corresponds to priority 6 and traffic class 2, and so on.
	
	  • Configuration of identical scheduler policy queue name as that of scheduler Input-Id name
	
	  • Configuration of identical service-policy name for each policy-type on an interface. When a configured policy is removed from an interface, all policy-map types must be deleted from that interface.
	
	• The data model does not support:
	
	  • Egress remark policy
	
	  • Source and destination address match for IPv4 and IPv6
	
	  • Modification of policy-map. If you try to modify the policy-map, the router does not reject the modifications, but it might result in an unpredicted behavior.

Feature	Description
openconfig-policy-forwarding.yang Version 0.4.0	

Feature	Description
	The OpenConfig data model configures the actions to be performed on inbound traffic when a packet matches the conditions defined in the policy-map. The match criteria are based on IPv4 or IPv6 Differentiated Services Code Point (DSCP) and IP-in-IP (IPnIP) protocol for IPv4 address family.

The following

`openconfig-network-instance/network-instances/network-instance[name]/policy-forwarding`

XPaths are supported:

- `/policies/policy[policy-id]`

- `/policies/policy[policy-id]/config/type`

- `/policies/policy[policy-id]/rules/rule[sequence-id]`

- `/policies/policy[policy-id]/rules/rule[sequence-id]/sequence-id`

- `/policies/policy[policy-id]/rules/rule[sequence-id]/l2/config/ethertype`

- `/policies/policy[policy-id]/rules/rule[sequence-id]/ipv4/config/dscp-set`

- `/policies/policy[policy-id]/rules/rule[sequence-id]/ipv4/config/protocol`

- `/policies/policy[policy-id]/rules/rule[sequence-id]/ipv6/config/dscp-set`

- `/interfaces/interface[interface-id]`

- `/interfaces/interface[interface-id]/config/apply-vrf-selection-policy`

- `/policies/policy[policy-id]/rules/rule[sequence-id]/action/config/network-instance`

The following limitations apply when configuring the routing policy using the data model:

- The data model supports only the default VRF for policy configuration.

- A class map and Ether type match in the OC data model is supported on IPv4 or IPv6 address family. Whereas the protocol match in OC data model for the IPv4 address family is supported only on IP-in-IP protocol.

- One policy type of policy-based routing (PBR) is supported per interface. VRF, global policy and PBR interface policies are not supported on the same interface.

- A policy map configured through the data model cannot be modified using the CLI command. Although the modification is accepted, it may lead to an unpredictable outcome.

- Configuration changes made using the OpenConfig model can be retrieved only through the NETCONF get-config operation. Retrieving the configuration using specific show command is not supported.

Feature	Description
	• OpenConfig statistics for policy-forwarding is not supported. • Configuring the PBR ACL with existing DSCP values on the L3 port results in a momentary traffic outage upon interface switch-over. • Configuring PBR ACL is supported only on Cisco Silicon One Q200-based cards.

Hardware Introduced

There is no new hardware introduced in this release.

For a complete list of supported hardware and ordering information, see the Cisco 8000 Series Data Sheet.

Release 7.8.1 Packages

The Cisco IOS XR software is composed of a base image (ISO) that provides the XR infrastructure. The ISO image is made up of a set of packages (also called RPMs). These packages are of three types:

- A mandatory package that is included in the ISO

- An optional package that is included in the ISO

- An optional package that is not included in the ISO

Visit the Cisco Software Download page to download the Cisco IOS XR software images.

To determine the Cisco IOS XR Software packages installed on your router, log in to the router and enter the **show install active** command:

```
RP/0/RP0/CPU0#show install active
 Optional Packages                                          Version
---------------------------------------------------- --------------------------
xr-8000-l2mcast                                              7.8.1v1.0.0-1
xr-8000-mcast                                                7.8.1v1.0.0-1
xr-8000-netflow                                              7.8.1v1.0.0-1
xr-bgp                                                       7.8.1v1.0.0-1
xr-cdp                                                       7.8.1v1.0.0-1
xr-healthcheck                                               7.8.1v1.0.0-1
xr-ipsla                                                     7.8.1v1.0.0-1
xr-is-is                                                     7.8.1v1.0.0-1
xr-k9sec                                                     7.8.1v1.0.0-1
xr-lldp                                                      7.8.1v1.0.0-1
xr-mcast                                                     7.8.1v1.0.0-1
xr-mpls-oam                                                  7.8.1v1.0.0-1
xr-netflow                                                   7.8.1v1.0.0-1
xr-ospf                                                      7.8.1v1.0.0-1
xr-perf-meas                                                 7.8.1v1.0.0-1
xr-perfmgmt                                                  7.8.1v1.0.0-1
xr-telnet                                                    7.8.1v1.0.0-1
xr-track                                                     7.8.1v1.0.0-1
```

To know about all the RPMs installed including XR, OS and other components use the **show install active all** command.

The software modularity approach provides a flexible model that allows you to install a subset of IOS XR packages on devices based on your individual requirements. All critical components are modularized as packages so that you can select the features that you want to run on your router.

> ✎
>
> **Note**   The above show command output displays mandatory packages that are installed on the router. To view the optional and bug fix RPM packages, first install the package and use the **show install active summary** command.

Caveats

There are no caveats in this release.

Determine Software Version

Log in to the router and enter the **show version** command:

```
RP/0/RP0/CPU0# show version
 Build Information:
 Built By     : ingunawa
 Built On     : Wed Nov 30 13:00:28 UTC 2022
 Build Host   : iox-ucs-060
 Workspace    : /auto/srcarchive13/prod/7.8.1/8000/ws
 Version      : 7.8.1
 Label        : 7.8.1

cisco 8000 (Intel(R) Xeon(R) CPU D-1530 @ 2.40GHz)
cisco 8201-SYS (Intel(R) Xeon(R) CPU D-1530 @ 2.40GHz) processor with 32GB of memory
R1-Sherman uptime is 1 hour, 13 minutes
Cisco 8201 1RU System with 24x400GE QSFP56-DD & 12x100GE QSFP28
```

Determine Firmware Support

Log in to the router and enter **show fpd package** command:

Cisco 8100 Series Router

```
RP/0/RP0/CPU0# show fpd package
================================================================================
                   Field Programmable Device Package
                 =================================================
                                     Req    SW      Min Req  Min Req
Card Type          FPD Description   Reload Ver     SW Ver   Board Ver
================== ======================== ====== ======= ======== =========
--------------------------------------------------------------------------------
8111-32EH          Bios              YES    1.02    1.02     0.0
                   BiosGolden        YES    1.02    1.01     0.0
                   IoFpga1           YES    0.22    0.22     0.0
                   IoFpgaGolden1     YES    0.22    0.19     0.0
                   SsdIntelS3520     YES    1.21    1.21     0.0
                   SsdIntelS4510     YES    11.32   11.32    0.0
                   SsdMicron5100     YES    7.01    7.01     0.0
                   SsdMicron5300     YES    0.01    0.01     0.0
                   x86Fpga           YES    1.04    1.04     0.0
```

```
                         x86FpgaGolden           YES     1.04      1.00      0.0
                         x86TamFw                YES     7.12      7.12      0.0
                         x86TamFwGolden          YES     7.12      7.10      0.0
-------------------------------------------------------------------------------
8111-32EH-O              Bios                    YES     0.02      0.02      0.0
                         BiosGolden              YES     0.02      0.02      0.0
                         IoFpga1                 YES     0.22      0.22      0.0
                         IoFpgaGolden1           YES     0.22      0.19      0.0
                         SsdIntelS3520           YES     1.21      1.21      0.0
                         SsdIntelS4510           YES    11.32     11.32      0.0
                         SsdMicron5100           YES     7.01      7.01      0.0
                         SsdMicron5300           YES     0.01      0.01      0.0
                         x86Fpga                 YES     1.04      1.04      0.0
                         x86FpgaGolden           YES     1.04      1.00      0.0
                         x86TamFw                YES     7.12      7.12      0.0
                         x86TamFwGolden          YES     7.12      7.10      0.0
-------------------------------------------------------------------------------
8111-32EH[FB]           IoFpga                  NO      1.00      1.00      0.0
                         IoFpgaGolden            NO      1.00      1.00      0.0
-------------------------------------------------------------------------------
PSU1.4KW-ACPE            DT-PrimMCU              NO      3.01      3.01      0.0
                         DT-SecMCU               NO      2.02      2.02      0.0
-------------------------------------------------------------------------------
PSU1.4KW-ACPI            DT-PrimMCU              NO      3.01      3.01      0.0
                         DT-SecMCU               NO      2.02      2.02      0.0
-------------------------------------------------------------------------------
PSU2KW-ACPE             PO-PrimMCU              NO     17.54     17.54      0.0
-------------------------------------------------------------------------------
PSU2KW-ACPI             PO-PrimMCU              NO     17.56     17.56      0.0
-------------------------------------------------------------------------------
PSU2KW-DCPE             PO-PrimMCU              NO      1.07      1.07      0.0
-------------------------------------------------------------------------------
PSU2KW-DCPI             PO-PrimMCU              NO      1.07      1.07      0.0
-------------------------------------------------------------------------------
PSU2KW-HVPI             PO-PrimMCU              NO     17.136    17.136     0.0
-------------------------------------------------------------------------------
PSU3KW-HVPI             DT-PrimMCU              NO      2.01      2.01      0.0
                         DT-SecMCU               NO      2.02      2.02      0.0
```

Cisco 8200 Series Router

```
RP/0/RP0/CPU0# show fpd package
================================================================================
                    Field Programmable Device Package
                    =============================================
                                          Req    SW      Min Req   Min Req
Card Type            FPD Description       Reload Ver     SW Ver    Board Ver
=================== =========================== ====== ======= ======== ==========
-------------------------------------------------------------------------------
8201                 Bios                    YES     1.23      1.23      0.0
                     BiosGolden              YES     1.23      1.15      0.0
                     IoFpga                  YES     1.11      1.11      0.1
                     IoFpgaGolden            YES     1.11      0.48      0.1
                     SsdIntelS3520           YES     1.21      1.21      0.0
                     SsdIntelS4510           YES    11.32     11.32      0.0
                     SsdMicron5100           YES     7.01      7.01      0.0
                     SsdMicron5300           YES     0.01      0.01      0.0
                     x86Fpga                 YES     1.05      1.05      0.0
                     x86FpgaGolden           YES     1.05      0.48      0.0
                     x86TamFw                YES     5.13      5.13      0.0
                     x86TamFwGolden          YES     5.13      5.05      0.0
-------------------------------------------------------------------------------
8201-ON              Bios                    YES     1.208     1.208     0.0
                     BiosGolden              YES     1.208     1.207     0.0
```

```
                        IoFpga                    YES    1.11     1.11      0.1
                        IoFpgaGolden              YES    1.11     0.48      0.1
                        SsdIntelS3520             YES    1.21     1.21      0.0
                        SsdIntelS4510             YES   11.32    11.32      0.0
                        SsdMicron5100             YES    7.01     7.01      0.0
                        SsdMicron5300             YES    0.01     0.01      0.0
                        x86Fpga                   YES    1.05     1.05      0.0
                        x86FpgaGolden             YES    1.05     0.48      0.0
                        x86TamFw                  YES    5.13     5.13      0.0
                        x86TamFwGolden            YES    5.13     5.05      0.0
-------------------------------------------------------------------------------
8201-SYS                Bios                      YES    1.23     1.23      0.0
                        BiosGolden                YES    1.23     1.15      0.0
                        IoFpga                    YES    1.11     1.11      0.1
                        IoFpgaGolden              YES    1.11     0.48      0.1
                        SsdIntelS3520             YES    1.21     1.21      0.0
                        SsdIntelS4510             YES   11.32    11.32      0.0
                        SsdMicron5100             YES    7.01     7.01      0.0
                        SsdMicron5300             YES    0.01     0.01      0.0
                        x86Fpga                   YES    1.05     1.05      0.0
                        x86FpgaGolden             YES    1.05     0.48      0.0
                        x86TamFw                  YES    5.13     5.13      0.0
                        x86TamFwGolden     YES    5.13      5.05       0.0
-------------------------------------------------------------------------------
8201-SYS-ON             Bios                      YES    1.208    1.208     0.0
                        BiosGolden                YES    1.208    1.207     0.0
                        IoFpga                    YES    1.11     1.11      0.1
                        IoFpgaGolden              YES    1.11     0.48      0.1
                        SsdIntelS3520             YES    1.21     1.21      0.0
                        SsdIntelS4510             YES   11.32    11.32      0.0
                        SsdMicron5100             YES    7.01     7.01      0.0
                        SsdMicron5300             YES    0.01     0.01      0.0
                        x86Fpga                   YES    1.05     1.05      0.0
                        x86FpgaGolden             YES    1.05     0.48      0.0
                        x86TamFw                  YES    5.13     5.13      0.0
                        x86TamFwGolden            YES    5.13     5.05      0.0
-------------------------------------------------------------------------------
PSU1.4KW-ACPE           DT-PrimMCU                NO     3.01     3.01      0.0
                        DT-SecMCU                 NO     2.02     2.02      0.0
-------------------------------------------------------------------------------
PSU1.4KW-ACPI           DT-PrimMCU                NO     3.01     3.01      0.0
                        DT-SecMCU                 NO     2.02     2.02      0.0
-------------------------------------------------------------------------------
PSU2KW-ACPE             PO-PrimMCU                NO    17.54    17.54      0.0
-------------------------------------------------------------------------------
PSU2KW-ACPI             PO-PrimMCU                NO    17.56    17.56      0.0
-------------------------------------------------------------------------------
PSU2KW-DCPE             PO-PrimMCU                NO     1.07     1.07      0.0
-------------------------------------------------------------------------------
PSU2KW-DCPI             PO-PrimMCU                NO     1.07     1.07      0.0
-------------------------------------------------------------------------------
PSU2KW-HVPI             PO-PrimMCU                NO    17.136   17.136     0.0
```

Cisco 8800 Series Router

```
RP/0/RP0/CPU0# show fpd package
===============================================================================
                        Field Programmable Device
            =================================================
                                    Req     SW     Min Req   Min Req
Card Type           FPD Description         Reload  Ver    SW Ver    Board Ver
=================== ========================= ====== ======= ======== =========
-------------------------------------------------------------------------------
88-LC0-34H14FH          Bios                      YES    1.06     1.06      0.0
```

```
                       BiosGolden              YES     1.06      0.13      0.0
                       EthSwitch               YES     1.04      1.04      0.0
                       EthSwitchGolden         YES     1.04      0.07      0.0
                       IoFpga                  YES     1.09      1.09      0.1
                       IoFpgaGolden            YES     1.09      1.01      0.1
                       SsdIntelS3520           YES     1.21      1.21      0.0
                       SsdIntelS4510           YES    11.32     11.32      0.0
                       SsdMicron5100           YES     7.01      7.01      0.0
                       SsdMicron5300           YES     0.01      0.01      0.0
                       x86Fpga                 YES     0.91      0.91      0.1
                       x86FpgaGolden           YES     0.91      0.78      0.1
                       x86TamFw                YES     6.13      6.13      0.1
                       x86TamFwGolden          YES     6.13      6.10      0.1
-------------------------------------------------------------------------------
88-LC0-34H14FH-O       Bios                    YES     0.219     0.219     0.0
                       BiosGolden              YES     0.219     0.219     0.0
                       EthSwitch               YES     1.04      1.04      0.0
                       EthSwitchGolden         YES     1.04      0.07      0.0
                       IoFpga                  YES     1.09      1.09      0.1
                       IoFpgaGolden            YES     1.09      1.01      0.1
                       SsdIntelS3520           YES     1.21      1.21      0.0
                       SsdIntelS4510           YES    11.32     11.32      0.0
                       SsdMicron5100           YES     7.01      7.01      0.0
                       SsdMicron5300           YES     0.01      0.01      0.0
                       x86Fpga                 YES     0.91      0.91      0.1
                       x86FpgaGolden           YES     0.91      0.78      0.1
                       x86TamFw                YES     6.13      6.13      0.1
                       x86TamFwGolden          YES     6.13      6.10      0.1
-------------------------------------------------------------------------------
88-LC0-36FH            Bios                    YES     1.06      1.06      0.0
                       BiosGolden              YES     1.06      0.13      0.0
                       EthSwitch               YES     1.04      1.04      0.0
                       EthSwitchGolden         YES     1.04      0.07      0.0
                       IoFpga                  YES     1.13      1.13      0.1
                       IoFpgaGolden            YES     1.13      1.00      0.1
                       SsdIntelS3520           YES     1.21      1.21      0.0
                       SsdIntelS4510           YES    11.32     11.32      0.0
                       SsdMicron5100           YES     7.01      7.01      0.0
                       SsdMicron5300           YES     0.01      0.01      0.0
                       x86Fpga                 YES     1.35      1.35      0.1
                       x86FpgaGolden           YES     1.35      1.04      0.1
                       x86TamFw                YES     6.13      6.13      0.1
                       x86TamFwGolden          YES     6.13      6.05      0.1
-------------------------------------------------------------------------------
88-LC0-36FH-M          Bios                    YES     1.06      1.06      0.0
                       BiosGolden              YES     1.06      0.13      0.0
                       EthSwitch               YES     1.04      1.04      0.0
                       EthSwitchGolden         YES     1.04      0.07      0.0
                       IoFpga                  YES     1.13      1.13      0.1
                       IoFpgaGolden            YES     1.13      1.00      0.1
                       SsdIntelS3520           YES     1.21      1.21      0.0
                       SsdIntelS4510           YES    11.32     11.32      0.0
                       SsdMicron5100           YES     7.01      7.01      0.0
                       SsdMicron5300           YES     0.01      0.01      0.0
                       x86Fpga                 YES     1.35      1.35      0.1
                       x86FpgaGolden           YES     1.35      1.04      0.1
                       x86TamFw                YES     6.13      6.13      0.1
                       x86TamFwGolden          YES     6.13      6.05      0.1
-------------------------------------------------------------------------------
88-LC0-36FH-MO         Bios                    YES     0.219     0.219     0.0
                       BiosGolden              YES     0.219     0.219     0.0
                       EthSwitch               YES     1.04      1.04      0.0
                       EthSwitchGolden         YES     1.04      0.07      0.0
                       IoFpga                  YES     1.13      1.13      0.1
```

```
                    IoFpgaGolden          YES     1.13      1.00      0.1
                    SsdIntelS3520         YES     1.21      1.21      0.0
                    SsdIntelS4510         YES    11.32     11.32      0.0
                    SsdMicron5100         YES     7.01      7.01      0.0
                    SsdMicron5300         YES     0.01      0.01      0.0
                    x86Fpga               YES     1.35      1.35      0.1
                    x86FpgaGolden         YES     1.35      1.04      0.1
                    x86TamFw              YES     6.13      6.13      0.1
                    x86TamFwGolden        YES     6.13      6.05      0.1
---------------------------------------------------------------------------
88-LC0-36FH-O       Bios                  YES     0.219     0.219     0.0
                    BiosGolden            YES     0.219     0.219     0.0
                    EthSwitch             YES     1.04      1.04      0.0
                    EthSwitchGolden       YES     1.04      0.07      0.0
                    IoFpga                YES     1.13      1.13      0.1
                    IoFpgaGolden          YES     1.13      1.00      0.1
                    SsdIntelS3520         YES     1.21      1.21      0.0
                    SsdIntelS4510         YES    11.32     11.32      0.0
                    SsdMicron5100         YES     7.01      7.01      0.0
                    SsdMicron5300         YES     0.01      0.01      0.0
                    x86Fpga               YES     1.35      1.35      0.1
                    x86FpgaGolden         YES     1.35      1.04      0.1
                    x86TamFw              YES     6.13      6.13      0.1
                    x86TamFwGolden        YES     6.13      6.05      0.1
---------------------------------------------------------------------------
8800-LC-36FH        Bios                  YES     1.23      1.23      0.0
                    BiosGolden            YES     1.23      1.15      0.0
                    EthSwitch             YES     1.04      1.04      0.0
                    EthSwitchGolden       YES     1.04      0.07      0.0
                    IoFpga                YES     1.38      1.38      0.0
                    IoFpgaGolden          YES     1.38      0.08      0.0
                    SsdIntelS3520         YES     1.21      1.21      0.0
                    SsdIntelS4510         YES    11.32     11.32      0.0
                    SsdMicron5100         YES     7.01      7.01      0.0
                    SsdMicron5300         YES     0.01      0.01      0.0
                    x86Fpga               YES     1.52      1.52      0.0
                    x86FpgaGolden         YES     1.52      0.33      0.0
                    x86TamFw              YES     5.13      5.13      0.0
                    x86TamFwGolden        YES     5.13      5.05      0.0
---------------------------------------------------------------------------
8800-LC-36FH-O      Bios                  YES     1.208     1.208     0.0
                    BiosGolden            YES     1.208     1.207     0.0
                    EthSwitch             YES     1.04      1.04      0.0
                    EthSwitchGolden       YES     1.04      0.07      0.0
                    IoFpga                YES     1.38      1.38      0.0
                    IoFpgaGolden          YES     1.38      0.08      0.0
                    SsdIntelS3520         YES     1.21      1.21      0.0
                    SsdIntelS4510         YES    11.32     11.32      0.0
                    SsdMicron5100         YES     7.01      7.01      0.0
                    SsdMicron5300         YES     0.01      0.01      0.0
                    x86Fpga               YES     1.52      1.52      0.0
                    x86FpgaGolden         YES     1.52      0.33      0.0
                    x86TamFw              YES     5.13      5.13      0.0
                    x86TamFwGolden        YES     5.13      5.05      0.0
---------------------------------------------------------------------------
8800-LC-48H         Bios                  YES     1.23      1.23      0.0
                    BiosGolden            YES     1.23      1.15      0.0
                    EthSwitch             YES     1.04      1.04      0.0
                    EthSwitchGolden       YES     1.04      0.07      0.0
                    IoFpga                YES     1.38      1.38      0.0
                    IoFpgaGolden          YES     1.38      0.08      0.0
                    SsdIntelS3520         YES     1.21      1.21      0.0
                    SsdIntelS4510         YES    11.32     11.32      0.0
                    SsdMicron5100         YES     7.01      7.01      0.0
```

```
                    SsdMicron5300          YES    0.01    0.01    0.0
                    x86Fpga                YES    1.52    1.52    0.0
                    x86FpgaGolden          YES    1.52    0.33    0.0
                    x86TamFw               YES    5.13    5.13    0.0
                    x86TamFwGolden         YES    5.13    5.05    0.0
-------------------------------------------------------------------------
8800-LC-48H-O       Bios                   YES    1.208   1.208   0.0
                    BiosGolden             YES    1.208   1.207   0.0
                    EthSwitch              YES    1.04    1.04    0.0
                    EthSwitchGolden        YES    1.04    0.07    0.0
                    IoFpga                 YES    1.38    1.38    0.0
                    IoFpgaGolden           YES    1.38    0.08    0.0
                    SsdIntelS3520          YES    1.21    1.21    0.0
                    SsdIntelS4510          YES   11.32   11.32    0.0
                    SsdMicron5100          YES    7.01    7.01    0.0
                    SsdMicron5300          YES    0.01    0.01    0.0
                    x86Fpga                YES    1.52    1.52    0.0
                    x86FpgaGolden          YES    1.52    0.33    0.0
                    x86TamFw               YES    5.13    5.13    0.0
                    x86TamFwGolden         YES    5.13    5.05    0.0
-------------------------------------------------------------------------
8800-RP             Bios                   YES    1.23    1.23    0.0
                    BiosGolden             YES    1.23    1.15    0.0
                    EthSwitch              YES    1.02    1.02    0.0
                    EthSwitchGolden        YES    1.02    0.07    0.0
                    SsdIntelS3520          YES    1.21    1.21    0.0
                    SsdIntelS4510          YES   11.32   11.32    0.0
                    SsdMicron5100          YES    7.01    7.01    0.0
                    SsdMicron5300          YES    0.01    0.01    0.0
                    TimingFpga             YES    1.02    1.02    0.0
                    TimingFpgaGolden       YES    1.02    0.11    0.0
                    x86Fpga                YES    1.32    1.32    0.0
                    x86FpgaGolden          YES    1.32    0.24    0.0
                    x86TamFw               YES    5.13    5.13    0.0
                    x86TamFwGolden         YES    5.13    5.05    0.0
-------------------------------------------------------------------------
8800-RP-E           Bios                   YES    1.23    1.23    0.0
                    BiosGolden             YES    1.23    1.15    0.0
                    EthSwitch              YES    1.02    1.02    0.0
                    EthSwitchGolden        YES    1.02    0.07    0.0
                    SsdIntelS3520          YES    1.21    1.21    0.0
                    SsdIntelS4510          YES   11.32   11.32    0.0
                    SsdMicron5100          YES    7.01    7.01    0.0
                    SsdMicron5300          YES    0.01    0.01    0.0
                    TimingFpga             YES    1.02    1.02    0.0
                    TimingFpgaGolden       YES    1.02    0.11    0.0
                    x86Fpga                YES    1.32    1.32    0.0
                    x86FpgaGolden          YES    1.32    0.24    0.0
                    x86TamFw               YES    5.13    5.13    0.0
                    x86TamFwGolden         YES    5.13    5.05    0.0
-------------------------------------------------------------------------
8800-RP-O           Bios                   YES    1.208   1.208   0.0
                    BiosGolden             YES    1.208   1.207   0.0
                    EthSwitch              YES    1.02    1.02    0.0
                    EthSwitchGolden        YES    1.02    0.07    0.0
                    SsdIntelS3520          YES    1.21    1.21    0.0
                    SsdIntelS4510          YES   11.32   11.32    0.0
                    SsdMicron5100          YES    7.01    7.01    0.0
                    SsdMicron5300          YES    0.01    0.01    0.0
                    TimingFpga             YES    1.02    1.02    0.0
                    TimingFpgaGolden       YES    1.02    0.11    0.0
                    x86Fpga                YES    1.32    1.32    0.0
                    x86FpgaGolden          YES    1.32    0.24    0.0
                    x86TamFw               YES    5.13    5.13    0.0
```

```
                       x86TamFwGolden          YES     5.13     5.05       0.0
-------------------------------------------------------------------------------
8800-RP2               Bios                     YES     1.01     1.01       0.0
                       BiosGolden               YES     1.01     1.01       0.0
                       EthSwitch                YES     1.02     1.02       0.0
                       EthSwitchGolden          YES     1.02     0.07       0.0
                       SsdIntelS3520            YES     1.21     1.21       0.0
                       SsdIntelS4510            YES    11.32    11.32       0.0
                       SsdMicron5100            YES     7.01     7.01       0.0
                       SsdMicron5300            YES     0.01     0.01       0.0
                       TimingFpga               YES     0.08     0.08       0.0
                       TimingFpgaGolden         YES     0.08     0.08       0.0
                       x86Fpga                  YES     0.71     0.71       0.0
                       x86FpgaGolden            YES     0.71     0.71       0.0
                       x86TamFw                 YES     7.09     7.09       0.0
                       x86TamFwGolden           YES     7.09     7.09       0.0
-------------------------------------------------------------------------------
8800-RP2-E             Bios                     YES     1.01     1.01       0.0
                       BiosGolden               YES     1.01     1.01       0.0
                       EthSwitch                YES     1.02     1.02       0.0
                       EthSwitchGolden          YES     1.02     0.07       0.0
                       SsdIntelS3520            YES     1.21     1.21       0.0
                       SsdIntelS4510            YES    11.32    11.32       0.0
                       SsdMicron5100            YES     7.01     7.01       0.0
                       SsdMicron5300            YES     0.01     0.01       0.0
                       TimingFpga               YES     0.08     0.08       0.0
                       TimingFpgaGolden         YES     0.08     0.08       0.0
                       x86Fpga                  YES     0.71     0.71       0.0
                       x86FpgaGolden            YES     0.71     0.71       0.0
                       x86TamFw                 YES     7.09     7.09       0.0
                       x86TamFwGolden           YES     7.09     7.09       0.0
-------------------------------------------------------------------------------
8800-RP2-O             Bios                     YES     0.02     0.02       0.0
                       BiosGolden               YES     0.02     0.02       0.0
                       EthSwitch                YES     1.02     1.02       0.0
                       EthSwitchGolden          YES     1.02     0.07       0.0
                       SsdIntelS3520            YES     1.21     1.21       0.0
                       SsdIntelS4510            YES    11.32    11.32       0.0
                       SsdMicron5100            YES     7.01     7.01       0.0
                       SsdMicron5300            YES     0.01     0.01       0.0
                       TimingFpga               YES     0.08     0.08       0.0
                       TimingFpgaGolden         YES     0.08     0.08       0.0
                       x86Fpga                  YES     0.73     0.73       0.0
                       x86FpgaGolden            YES     0.73     0.73       0.0
                       x86TamFw                 YES     7.09     7.09       0.0
                       x86TamFwGolden           YES     7.09     7.09       0.0
-------------------------------------------------------------------------------
8804-FAN               FtFpga                   NO      1.00     1.00       0.0
                       FtFpgaGolden             NO      1.00     0.16       0.0
-------------------------------------------------------------------------------
8804-FC0               IoFpga                   YES     1.00     1.00       0.0
                       IoFpgaGolden             YES     1.00     0.16       0.0
-------------------------------------------------------------------------------
8808-FAN               FtFpga                   NO      1.00     1.00       0.0
                       FtFpgaGolden             NO      1.00     0.16       0.0
-------------------------------------------------------------------------------
8808-FC                IoFpga                   YES     1.02     1.02       0.0
                       IoFpgaGolden             YES     1.02     0.05       0.0
-------------------------------------------------------------------------------
8808-FC0               IoFpga                   YES     1.00     1.00       0.0
                       IoFpgaGolden             YES     1.00     0.16       0.0
-------------------------------------------------------------------------------
8808-FC1               IoFpga                   YES     0.12     0.12       0.0
                       IoFpgaGolden             YES     0.12     0.12       0.0
```

```
--------------------------------------------------------------------------
8812-FAN          FtFpga              NO      1.00    1.00    0.0
                  FtFpgaGolden        NO      1.00    0.16    0.0
--------------------------------------------------------------------------
8812-FC           IoFpga              YES     1.02    1.02    0.0
                  IoFpgaGolden        YES     1.02    0.05    0.0
                  Retimer             YES     3.00    3.00    0.0
--------------------------------------------------------------------------
8818-FAN          FtFpga              NO      1.00    1.00    0.0
                  FtFpgaGolden        NO      1.00    0.16    0.0
--------------------------------------------------------------------------
8818-FC           IoFpga              YES     1.02    1.02    0.0
                  IoFpgaGolden        YES     1.02    0.05    0.0
                  Retimer             YES     3.00    3.00    0.0
--------------------------------------------------------------------------
8818-FC0          IoFpga              YES     1.00    1.00    0.0
                  IoFpgaGolden        YES     1.00    0.16    0.0
                  Retimer             YES     3.00    3.00    0.0
--------------------------------------------------------------------------
PSU-4.8KW-DC100   PO-PrimMCU          NO      51.85   51.85   0.0
--------------------------------------------------------------------------
PSU6.3KW-20A-HV   DT-LogicMCU         NO      1.00    1.00    0.0
                  DT-PrimMCU          NO      1.00    1.00    0.0
                  DT-SecMCU           NO      1.00    1.00    0.0
--------------------------------------------------------------------------
PSU6.3KW-HV       AB-LogicMCU         NO      3.08    3.08    0.0
                  AB-PrimMCU          NO      3.08    3.08    0.0
                  AB-SecMCU           NO      3.06    3.06    0.0
                  DT-LogicMCU         NO      4.11    4.11    0.0
                  DT-PrimMCU          NO      4.01    4.01    0.0
                  DT-SecMCU           NO      4.00    4.00    0.0
--------------------------------------------------------------------------
PWR-4.4KW-DC-V3   DT-LogicMCU         NO      3.02    3.02    0.0
                  DT-Prim1MCU         NO      3.01    3.01    0.0
                  DT-Prim2MCU         NO      3.01    3.01    0.0
                  DT-Sec1MCU          NO      3.01    3.01    0.0
                  DT-Sec2MCU          NO      3.01    3.01    0.0
--------------------------------------------------------------------------
```

Important Notes

- The warning message that the smart licensing evaluation period has expired is displayed in the console every hour. There is, however, no functionality impact on the device. The issue is seen on routers that don't have the Flexible Consumption licensing model enabled. To stop the repetitive messaging, register the device with the smart licensing server and enable the Flexible Consumption model. Later load a new registration token.

  To register the device with the smart licensing server, see the Registering and Activating Your Router.

- When you execute the **show tech-support** command, a temporary directory is created and the related data is stored in this directory. This directory is deleted after the command is completed. For example,

  ```
  Router#run ls -ltr
  drwxrwxrwx. 3 root root show-tech-fabric-link-incl-loca-010cpu0_2.tgz
  ```

  In case, you terminate the **show tech-support** command manually, we recommend you to delete the corresponding show tech directory if not needed.

Supported Transceiver Modules

To determine the transceivers that Cisco hardware device supports, refer to the Transceiver Module Group (TMG) Compatibility Matrix tool.

Related Documentation

The most current Cisco 8000 router documentation is located at the following URL:

https://www.cisco.com/c/en/us/td/docs/iosxr/8000-series-routers.html