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Migration Guide from Cisco Catalyst 2960-X Series to 9200 Series

Introduction

The new Cisco Catalyst® 9000 switching family is the next generation in the legendary Cisco® Catalyst family of enterprise LAN access, aggregation, and core switches. Cisco Catalyst 9200 Series switches extend the power of intent-based networking and Catalyst 9000 hardware and software innovation to a broader set of deployments. Compared to the scale and feature richness the of Catalyst 9300 Series switches, Catalyst 9200 Series switches focus on offering features for the mid-market and simple branch deployments. With its family pedigree, Catalyst 9200 Series offers simplicity without compromise –it is secure, always on and provides IT simplicity.

Purpose of this guide

This document is intended to help network planners and engineers who are familiar with the Cisco Catalyst 2960-X Series Switches deploy the Cisco Catalyst 9200 Series Switches in the enterprise networking environment.

Cisco Catalyst 2960-X Series → NEW → Cisco Catalyst 9200 Series

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Why migrate?

Cisco Catalyst 9200 Series Switches are Cisco's latest addition to the fixed enterprise switching access platform, and are built for security, resiliency, and programmability. These switches play an integral role as entry-level switches in Cisco Software-Defined Access (SD-Access), Cisco's lead enterprise architecture. The 9200 Series provides enterprise-level resiliency and keeps your business up and running seamlessly with FRU power supplies and fans, modular uplinks, cold patching, perpetual Power over Ethernet (PoE), and the industry's highest Mean Time Between Failures (MTBF).

The Cisco Catalyst 9200 Series has a highly flexible uplink architecture with options for fixed and modular uplinks that support 1-Gbps and 10-Gbps speeds. The platform offers 1-Gbps copper Ethernet switches with 40-Gbps uplink bandwidth and high-performance stacking with the Cisco StackWise® 160/80 stacking bandwidth solution. Cisco StackWise architecture provides industry-leading scale (416 ports per stack) and flexibility of deployment for the platform. It offers support for a leading Stateful Switchover (SSO) resiliency architecture in a stackable solution.

The Cisco Catalyst 9200 Series also has a highly resilient and efficient power architecture with support for redundant power supplies, which delivers a high density of PoE+ ports. The switches provide industry-leading PoE resiliency capabilities, such as perpetual and fast PoE, optimizing them for Internet-of-Things (IoT) deployments. They support the most efficient power supplies in the industry with available platinum- and silver-rated power supplies.

The Cisco Catalyst 9200 Series Switches are also built with the latest Cisco Unified Access® Data Plane 2.0 (UADP 2.0) mini Application-Specific Integrated Circuit (ASIC) and an internal ARM based CPU with open Cisco IOS® XE Software, a converged operating system. Together, they deliver model-driven programmability, streaming telemetry, application visibility, stronger security with MACsec and support for higher-bandwidth uplinks, and a more advanced operating system than the Cisco Catalyst 2960-X Series.

System hardware

The Cisco Catalyst 9200 Series is based on Cisco's UADP 2.0 mini ASIC architecture and an internal ARM CPU architecture. This allows the switch to run with the Cisco IOS-XE operating system, which enables the switch to support standard YANG models through NETCONF or RESTCONF and to run scripts natively within the switch.

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Table 1 lists the system hardware differences between the Cisco Catalyst 2960-X Series and 9200 Series.

Table 1.   Comparison of the Cisco Catalyst 2960-X Series and 9200 Series system hardware

	Catalyst 9200 Series	Catalyst 2960X-Series
Programmable ASIC	Yes	No
CPU	Embedded quad core CPU @ 1.4 Ghz	Dual core CPU @ 600 MHz
DRAM (DDR3)	4 GB/2 GB	512 MB
Flash on board	4 GB	Up to 256 MB
mGig Ports	Yes	No
25G uplinks	Yes	No
Stacking (module)	StackWise-160/80	FlexStack-Plus/Extended module
Number of stack members	8	8
Stack bandwidth	160 Gbps/80 Gbps	80 Gbps
Power supply	2 FRUable PS	FRUable on 2960-XR
Platinum Rated Power supply	Yes	No
Max PoE budget	1440W	740W
Modular uplinks	Yes	No
Modular fans	Yes	No
Max depth	13.8 in.	16 in.
Blue Beacon	Yes	No
RFID	Yes	No

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System software

With a consistent hardware architecture and a shared code base with the rest of the Catalyst 9000 family, the Catalyst 9200 Series inherits enhanced functionalities that otherwise would not be supported on Catalyst 2960-X switches. These feature sets provide increased resiliency and security through features such as MACsec, Cisco SD-Access, and support for Cisco TrustSec®.

Table 2 lists the major system software differences between Cisco Catalyst 2960-X Series and 9200 Series switches.

Table 2.   System software differences

Feature		Catalyst 9200 Series	Catalyst 2960X-Series
Modern operating system	OS	IOS-XE	IOS
	Model-driven programmability	✔	✖
	Streaming telemetry	✔	✖
	Patching	✔	✖
	License upgrade	✔	✖
	Cisco Plug and Play (PnP)	✔	✔
Advanced routing	Virtual Route Forwarding (VRF) support	✔	✖
	Intermediate System to Intermediate System (IS-IS)	✔	✖
	Enhanced Interior Gateway Routing Protocol (EIGRP)	✔	✔
	Open Shortest Path First (OSPF)	✔	✔
Fabric	SD-Access Fabric Edge	✔	✖

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Feature		Catalyst 9200 Series	Catalyst 2960X-Series
Security	IEEE 802.1X	✔	✔
	MACsec-128	✔	✘
	Cisco TrustSec	✔	✘
	Security Group Access Control List (SGACL)	✔	✘
	First-Hop Security (FHS)	✔	✔
	Full Flexible NetFlow	✔	✔
Network visibility	Ingress and egress NetFlow	✔	✘

System default behavior

The system default behavior on Cisco Catalyst 9200 Series switches are very much the same as that of the Cisco Catalyst 2960-X Series. For example, interfaces default to the layer 2 switch-port mode and IP routing is disabled. However, there are also some differences:

• Management interface – The management interface on the Cisco Catalyst 9200 Series is Gigabit Ethernet, which is much more capable than the Fast Ethernet on the Catalyst 2960-X Series. The management port on the Catalyst 9200 platform has dedicated Virtual Routing and Forwarding (VRF) for separation of management traffic from normal data traffic, unlike the Catalyst 2960-X series platforms, which lack support for virtual VRF instance. Table 3 lists the management port differences between the two platforms.

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Table 3.   Comparison of management interface default configurations on Catalyst 2960-X and 9200 switches

	Cisco Catalyst 9200 Series	Cisco Catalyst 2960-X Series
Interface	GigabitEthernet 0/0	FastEthernet0
VRF	Mgmt-vrf	none
Default configuration	interface GigabitEthernet0/0 vrf forwarding Mgmt-vrf no ip address speed 1000 negotiation auto end	interface FastEthernet0 no ip address no ip route-cache shutdown end

- Control Plane Policing (CoPP) – CoPP is enabled on the Cisco Catalyst 9200 Series with default policing rates for different classes of traffic. These policing rates are optimized for a typical campus environment. The policing rates can be changed or disabled for different application environments. On the Cisco Catalyst 2960-X Series, CoPP is not enabled by default, but the system provides a macro to create the different classes, and the user can specify the policing rate for different classes.

- Power redundancy – The Cisco Catalyst 9200 Series provides support for dual power supplies on all SKUs, compared to dual power supplies only on 2960-XR SKUs. In the Catalyst 9200 Series, the power supplies operate either on combined or redundant modes based on data or the PoE+ model, whereas all Catalyst 2960-XR switches operate in redundant mode. Table 4 compares the power capabilities of the Catalyst 9200 Series with those of the Catalyst 2960-X Series.

Table 4.   Power capabilities comparison between Catalyst 2960-X and Catalyst 9200 series

	Catalyst 9200	Catalyst 2960-X Series
Number of power supply slots	2 on all SKUs	2 on 2960-XR, 1 on 2960-X
Power supplies	• Silver-rated 125 WAC • Platinum-rated 600 WAC • Platinum-rated 1000 WAC	• 250 WAC • 640 WAC • 1025 WAC
Available full PoE+	Yes, with dual power supplies	No
External redundant power supply	No	Yes, with Cisco RPS 2300
Power mode	Combined mode on PoE SKUs, Redundant mode on data SKUs	Redundant mode

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Operations

Interface reference

Cisco Catalyst 9200 Series Switches have Gigabit Ethernet (GE) and 10-GE ports only. The uplink ports on the Catalyst 2960-X Series had <Type><Slot#>/<Bay#>/<Port#>, whereas the 9200 Series has <Type><Switch#>/<Bay#>/<Port#>.

Table 5 compares the interface numbering between the two platforms.

Table 5. Interface numbering

	Cisco Catalyst 9200 Series	Cisco Catalyst 2960-X Series
GE downlink	GigabitEthernet1/0/1	GigabitEthernet1/0/1
mGig downlink	Tw1/0/1	None
GE uplink	GigabitEthernet1/1/1	GigabitEthernet1/0/49
10-GE uplink	Te1/1/1	Te1/0/1
25-GE uplink	TwentyFiveGigE1/1/1	None

Stacking

The StackWise160/80 architecture on the Catalyst 9200 Series provides a more robust and highly available infrastructure when compared to FlexStack Plus or Extended on the Catalyst 2960-X Series. In StackWise160/80, eight switches can be stacked together to form a single logical switch with support for SSO mechanisms. This enables 1:1 redundancy during failovers. This 1:1 redundancy allows for a role of a standby switch, which would take over the role of the active switch, an improvement over the FlexStack architecture, where the failure of master switch would cause a re-election between the stack members.

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Table 6 compares the stacking architecture between the Catalyst 2960-X and Catalyst 9200 Series Switches.

Table 6.   Stacking comparison between Catalyst 2960-X and 9200 switches

	Catalyst 9200	Catalyst 2960-X Series
Stacking architecture	StackWise	FlexStack
Stacking SSO	Yes	No
Stacking bandwidth	Up to 160 Gbps	Up to 80 Gbps
Switch roles	Active, standby, member	Master, member

Catalyst9200#show switch
Switch/Stack Mac Address : 0xxe.xxxx.axxx - Local Mac Address
Mac persistency wait time: Indefinite

Switch#	Role	Mac Address	Priority	H/W Current Version	State
*1	Active	0xxe.xxxx.axxx	1	P2B	Ready
2	Standby	0x7x.xx0x.5xx0	1	P2B	Ready

Catalyst2960-X#show switch
Switch/Stack Mac Address : 2xx2.xxxx.x1x0

Switch#	Role	Mac Address	Priority	H/W Current Version	State
*1	Master	2xx2.xxxx.x1x0	1	4	Ready
7	Member	xxx7.xxxx.x6x0	1	4	Ready

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Software features

For details on the features supported on the Cisco Catalyst 9200 Series, use the Feature Navigator on cisco.com. For customers migrating from the Cisco Catalyst 2960-X Series to the 9200 Series, following are the only feature differences:

System MTU

On the Cisco Catalyst 9200 Series, the global command "system mtu <1500-9198>" sets the global MTU for all interfaces, whereas on 2960-X Series the command to set MTU was "system mtu jumbo <1500-9198>". With the Cisco Catalyst 9200 Series, the IP MTU is a per-interface-level command that sets a protocol-specific MTU for the interface. Table 7 explains how to set the system MTU.

Table 7.   Setting the system MTU

	Cisco Catalyst 9200 Series	**Cisco Catalyst 2960-X Series**
System MTU	C9200(config)#system mtu ? <1500-9198> MTU size in bytes	C2960-X(config)# system mtu jumbo ? <1500-9198> MTU size in bytes
IP MTU	C9200(config)# int te 1/3 C9200(config-if)#ip mtu ? <832-1500> MTU (bytes)	C2960-X(config)# system mtu routing

Host tracking feature

The Cisco Catalyst 2960-X Series supports IP Device Tracking (IPDT) for keeping track of connected hosts (association of MAC and IP addresses). The Cisco Catalyst 9200 Series, with the latest Cisco IOS XE Software release, supports the new Switch Integrated Security Features (SISF) based on the IPDT feature. It acts as a container policy that enables snooping and device-tracking features available with First-Hop Security (FHS), in both IPv4 and IPv6, using IP-agnostic Command-Line Interface (CLI) commands. See Appendix A for more information on migrating from the IPDT CLI configuration to the new SISFbased device-tracking CLI configuration.

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Full Flexible NetFlow

Both the Catalyst 9200 Series and the Catalyst 2960-X Series support Flexible NetFlow. Besides the scalability differences, there are a few differences in the capabilities and configurations, as listed in Table 8.

Table 8.   Flexible NetFlow differences

	Cisco Catalyst 9200 Series	**Cisco Catalyst 2960-X Series**
Flow support	Ingress and egress	Ingress only
Export formats	Version 9 and Version 10	Version 9
NetFlow support on L2 VLAN	Yes	No
Sampler rate	1 out of 2 to 1 out of 1024	1 out of 32 to 1 out of 1022
Timestamp	Use absolute time [0 is at time 00:00:00 January 1, 1970]	Use system uptime
Bridged traffic	Apply the flow monitor to a VLAN	None

Boot mode

The Catalyst 9200 Series supports the monolithic bundle boot mode as well as the optimized install boot mode, whereas the Catalyst 2960-X Series supports only the traditional bundle mode. All Catalyst 9200 switches ship with the default install boot mode. Table 9 compares the boot mechanism between the two platforms. Table 10 shows how to ignore the startup configuration.

Table 9.   Boot modes on Catalyst 2960-X and Catalyst 9200 Series Switches

	Cisco Catalyst 9200 Series	**Cisco Catalyst 2960-X Series**
Boot modes	Install, bundle	Bundle
Default	Install mode (recommended)	Bundle mode
Boot configuration	C9K# install add file flash:cat9k_xxx.bin activate commit	C2960XR-2010(config)#boot system flash:c2960x-xx.152.bin

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Table 10.   Ignoring the startup configuration

	Cisco Catalyst 9200 Series	Cisco Catalyst 2960-X Series
Cisco IOS Software	9200L-1(config)#system ignore startup config switch ? <1-8> Switch number all Set config for all switches in stack	
ROMMON	SWITCH_IGNORE_STARTUP_CFG=1	Confreg , use the interactive prompt to enable/disable ignore startup configuration

Switch reset

The Cisco Catalyst 2960-X Series uses the traditional "write erase" command in Cisco IOS Software and deleting of the configuration file and vlan.dat file in ROMMON to reset the switch. The Cisco Catalyst 9200 Series provides an exec "factory-reset" command that removes all customer-specific data that has been added to the device since the time of its shipping. Erased data includes configurations, log files, boot variables, core files, and credentials. The device reloads to perform the factory-reset task and stays in ROMMON mode.

Quality of service

The ASICs and operating system that power the Cisco Catalyst 2960-X and Catalyst 9200 Series are different, resulting in some differences in QoS behaviors, as described in Table 11.

Table 11.   QoS differences between the 9200 and 2960-X Switches

	Cisco Catalyst 9200 Series	Cisco Catalyst 2960-X Series
Model	MQC	MLS
QoS default	Enabled	Disabled
Trust interface configuration	Trust all	Trust none
Port ingress	Classification/Policing/Marking	Classification/Policing/Marking/Scheduling
Port egress	Policing/Marking/Queueing	Queueing and scheduling
SVI ingress	Classification/Marking	Not supported

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	Cisco Catalyst 9200 Series	Cisco Catalyst 2960-X Series
SVI egress	Classification/Marking	Not supported
Hierarchical QoS	Supported	Not supported
Queues	2P6Q3T (8 Queues)	2P6Q3T (Up to 8 Queues)
Classification	Ingress and Egress	Ingress only
Marking	Ingress and Egress	Ingress only
Policing	1r2c, 2r3c	1r2c
Sampler rate	1 out of 2 to 1 out of 1024	1 out of 32 to 1 out of 1022
Policing action	Drop, mark down using Table Maps, (DSCP, CoS, Precedence)	Drop, mark down DSCP, CoS, precedence
Egress queuing	YES – Shaping, Bandwidth, tail-drops (AFD, WRED) and priority queuing	WTD (Weighted Tail Drp), Priority queueing, Shaping, Bandwidth

Table 12 lists other QoS specifications in the Cisco Catalyst 2960-X Series and Catalyst 9200 Series.

Table 12.   QoS specifications in the Cisco Catalyst 2960-X Series and Catalyst 9200 Series

	Cisco Catalyst 9200 Series	Cisco Catalyst 2960-X Series
Buffer	6 MB/ASIC	4 MB/ASIC
Buffer sharing	Buffer sharing is within the ASIC	Buffer sharing is within the ASIC
Number of priority queues	0 to 2	0 to 1

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Congestion avoidance

The Cisco Catalyst 2960-X Series supports only Weighted Tail Drop (WTD), which discards packets based on configured thresholds. The Cisco Catalyst 9200 Series uses both WTD and Weighted Random Early Detection (WRED), which randomly discards packets at specified queue thresholds based on IP precedence, Differentiated Services Code Point (DSCP), or Class of Service (CoS), giving the network architect much more control over the drop behavior. Following is an example of a WRED configuration on the 9200 Series.

```
policy-map 2P6Q3T
class PRIORITY-QUEUE
priority level 1|
class VIDEO-PRIORITY-QUEUE
priority level 2 class DATA-QUEUE
bandwidth remaining percent <number> queue-buffers ratio <number> random-detect dscp-based
random-detect dscp 10 percent 60 80
```

Cisco Catalyst 2960-X Series platform-specific commands

Table 13 lists commands that are specific to the Cisco Catalyst 2960-X Series and are not available on the Catalyst 9200 Series.

Table 13.   Cisco Catalyst 2960-X Series platform-specific commands

Cisco Catalyst 2960-X Series	Cisco Catalyst 9200 Series
vlan internal allocation policy ascending	Not applicable
ntp update-calendar	Not applicable
ip device tracking	See Appendix A

Conclusion

The Cisco Catalyst 9200 Series is Cisco's latest addition to our fixed enterprise switching access platform. It is the new generation of the access platform, with many additional capabilities, and is well-suited for enterprises looking to migrate from their existing Cisco Catalyst 2960-X Series deployment.

Appendix A

If your device has no legacy IP device-tracking or IPv6 snooping configurations, you can use only the new SISF-based device-tracking commands for all your future configurations. The legacy IPDT commands and IPv6 snooping commands are not available.

Table 14 displays the new SISF-based device-tracking commands and the corresponding IPDT and IPv6 snooping commands.

Table 14.   IPDT, IPv6 snooping, and device-tracking CLI compatibility

IP device tracking	IPv6 snooping	SISF-based device tracking
IP device tracking probe count	Not supported	Not supported
IP device tracking probe delay	ipv6 neighbor binding reachable-lifetime	device-tracking policy reachable-lifetime
IP device tracking probe interval	ipv6 snooping tracking retry-interval	device-tracking policy retry-interval
IP device tracking probe use-svi	Accepted and interpreted as IP device tracking probe auto-source override	Accepted and interpreted as IP device tracking probe auto-source override.
IP device tracking probe auto-source fallback	Not supported	Not supported
IP device tracking probe auto-source override	Not supported	Not supported
IP device tracking trace buffer	Not supported	Not supported

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IP device tracking	IPv6 snooping	SISF-based device tracking
IP device tracking maximum	ipv6 snooping policy <name> limit	device-tracking snooping policy <name> limit
IP device tracking probe count	Not supported	Not supported
IP device tracking probe interval	Not supported	Not supported
Clear IP device tracking all	Not supported	Not supported

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