Exploring the Industry's Leading Data Center Switching Platform:

The Cisco Nexus 9000 Series Switches

© 2018 Cisco and/or its affiliates. All rights reserved.

Cisco Nexus 9000 Series Switches

Hardware innovation

Three key decisions

Spine Switches

Leaf Switches

Modular spine line cards

Modular leaf line lards

Additional information

Learn more

Cisco Nexus 9000 Series Switches

The Cisco Nexus 9000 Series Switches

Engineered from the ground up for the automation, performance, and simplicity that your team needs to stay ahead of the ever increasing demands of software developers and applications, the Cisco Nexus® 9000 combines the most programmable network operating systems with the world's highest performing ASICs so your team can deliver amazing experiences faster than your competition.

© 2018 Cisco and/or its affiliates. All rights reserved.

Cisco Nexus 9000 Series Switches

Hardware innovation

Three key decisions

Spine Switches

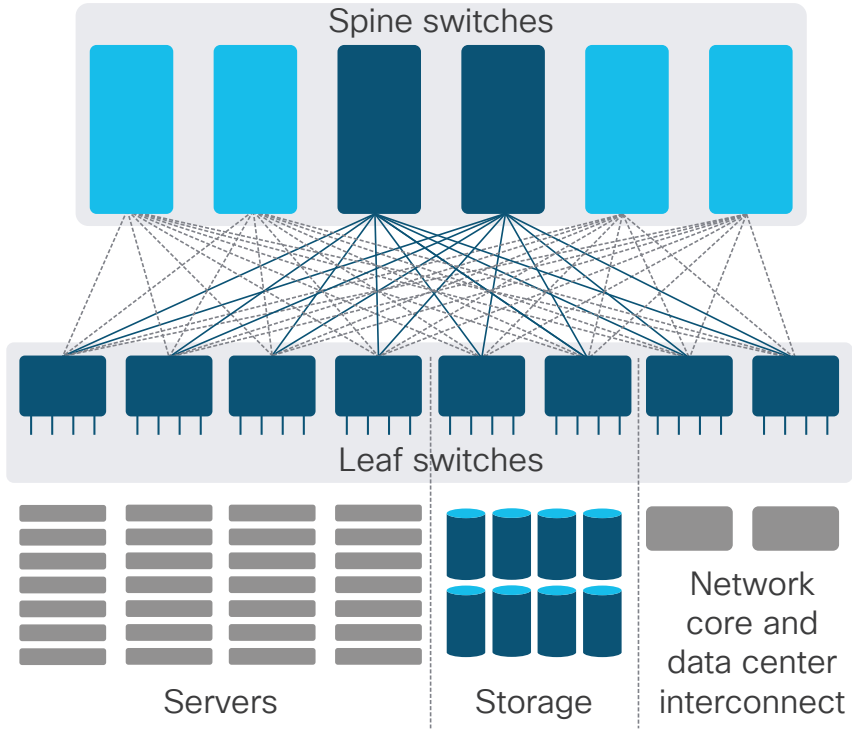
Leaf Switches

Modular spine line cards

Modular leaf line cards

Additional information

Learn more



Optimize your Architecture

Data center networks around the world are shifting to spine-and-leaf[1,2] architecture to simplify scaling bandwidth, deliver consistently lower latency and reduce overall costs.

Unlike traditional 3-tier networks, every leaf (access) switch connects to every spine (aggregation) switch – and every spine switch only connects to the leaf switches. Every connection to the data center network is made through a leaf switch. To increase overall bandwidth, all you need to do is add another spine switch. To add access ports, simply add another leaf switch. Every leaf is only two hops away from every other leaf for consistently low latency. And every link is always active, so your network delivers the maximum bandwidth with the fewest switches.

[1] ACI mode is designed for spine-and-leaf only and requires the Cisco Application Policy Infrastructure Controller (APIC).

[2] While this guide focuses on the spine-and-leaf architecture, the Nexus 9000 and 3000 can be configured for either spine-and-leaf or traditional 2-tier and 3-tier architectures in NX-OS mode.

© 2018 Cisco and/or its affiliates. All rights reserved.

Cisco Nexus 9000 Series Switches

Hardware innovation

Three key decisions

Spine Switches

Leaf Switches

Modular spine line cards

Modular leaf line cards

Additional information

Learn more

Hardware innovation

All networking platforms depend upon their network processors and the other microchips on which they run. That's why we have some of the world's best Application-Specific Integrated Circuit (ASIC) designers. We are committed to driving the industry forward when we see that customer needs aren't being met by merchant silicon. A great example of this are the Cloud Scale ASICs.

© 2018 Cisco and/or its affiliates. All rights reserved.

Cisco Nexus 9000 Series Switches

Hardware innovation

Three key decisions

Which network operating system is right for you?

Which leaf switches do you need?

What is the best spine switch to standardize on?

Spine Switches

Leaf Switches

Modular spine line cards

Modular leaf line lards

Additional information

Learn more

© 2018 Cisco and/or its affiliates. All rights reserved.

Three key decisions

Your organization's data center architecture is unique. When you consider your combination of network administrators, applications, software developers, users, computing, storage, and public cloud usage, no other organization is an exact match for your needs. That's the reason we've built such broad capabilities into the Cisco Nexus 9000 portfolio. As you consider how it could best meet the needs of your organization, there are three key decisions you'll need to make.

Which network operating system is right for you?

Both Cisco ACI[1] and NX-OS[2] have their benefits. You will need to pick one as your spine-and-leaf operating system.

Cisco ACI[1]
The ACI[1] network operating system dramatically simplifies SDN and delivers end-to-end policy automation by taking advantage of Cisco's Cloud Scale ASICs that connect physical and logical networks.

NX-OS[2]
The industry's most programmable network operating system with open APIs. With over 50,000 customers, NX-OS is the world's industry-leading network operating system for data centers.

Which one is right for you?
It really comes down to your people. ACI1 makes automation dramatically easier. Your people won't have to learn tools like Ansible, Puppet, or Chef. They'll have a single-pane of glass for managing physical and virtual networks, and they'll be able to deploy and maintain applications faster and easier.

Read our Guide to learn more about the different approaches to SDN.

[1] ACI mode is designed for spine-and-leaf only and requires the Cisco Application Policy Infrastructure Controller (APIC).

[2] While this guide focuses on the spine-and-leaf architecture, the Nexus 9000 and 3000 can be configured for either spine-and-leaf or traditional 2-tier and 3-tier architectures in NX-OS mode.

Cisco Nexus 9000 Series Switches

Hardware innovation

Three key decisions

Which network operating system is right for you?

Which leaf switches do you need?

What is the best spine switch to standardize on?

Spine Switches

Leaf Switches

Modular spine line cards

Modular leaf line cards

Additional information

Learn more

© 2018 Cisco and/or its affiliates. All rights reserved.

Which leaf switches do you need?

You will likely need many different leaf switches to meet your computing, storage, and core networking needs. If you are new to the Cisco Nexus 9000 Series Switches, we recommend that you focus on switches with Cloud Scale ASICs.

Scale

Cloud Scale ASICs
Built on next-generation process technology (16 nm), our Cloud Scale ASICs deliver significant advantages over merchant silicon:
Fundamentally faster due to 16nm processes
Substantially more features in hardware
Higher performing buffers
Line rate encryption and analytics

Cisco ACI[1] technology
As the industry moves toward Software-Defined Networking (SDN) and infrastructure as code, there is no industry standard for combining physical and virtual networks. We invented Cisco ACI1 to connect physical and virtual networks for deploying policy-based automation end-to-end.

FCoE and Fibre Channel
While all Cisco Nexus 9000 leaf switches support Fibre Channel-over-Ethernet (FCoE), only the N9K-93180YC-FX can be configured for Fibre Channel ports to connect to your SAN.)

What is the best spine switch to standardize on?

Unlike leaf switches, you will want to pick a single spine switch to standardize on. Key considerations include:

Total spine bandwidth
In most cases, you will start with two spine switches and have the option to expand to up to 6 spines.[3]

Leaf uplinks
You'll want to make sure your spine is compatible with all your leaves' uplinks. You'll need a modular spine if want to have both QSFP28 and QSFP+ uplinks.

Operating system
You'll want to make sure your operating system supports all of your spine and leaf switches.

[1] ACI mode is designed for spine-and-leaf only and requires the Cisco Application Policy Infrastructure Controller (APIC).

[3] We strongly recommend you start with at least two spine switches. You will also likely be limited to six spine switches because that is the most common number of uplinks for leaf switches. The range shown here is the total maximum system bandwidth for two to six spine switches.

Cisco Nexus 9000 Series Switches

Hardware innovation

Three key decisions

Spine Switches
- Modular spine switches
- Fixed configuration spine switches

Leaf Switches

Modular spine line cards

Modular leaf line cards

Additional information

Learn more

Spine Switches

Modular spine switches

Total spine bandwidth: 120–360 Tbps[3] maximum
N9K-C9516-FM-E2

- 16-slot chassis
- Cisco ACI™[1] and Cisco® NX-OS[2] modes
- Up to 576 40/100G or 2,304 10G ports

Total spine bandwidth: 60–180 Tbps[3] maximum
N9K-C9508-FM-E

- 8-slot chassis
- Cisco ACI[1] and NX-OS[2] modes
- Up to 288 40/100G or 1,152 10G Ports

Total spine bandwidth: 30–90 Tbps[3] maximum
N9K-C9504-FM-E

- 4-slot chassis
- Cisco ACI[1] and NX-OS[2] modes
- Up to 144 40/100G or 576 10G Ports

Fixed configuration spine switches

Total spine bandwidth: 24–72 Tbps[3] maximum
N9K-9364C

- Cisco ACI[1] and NX-OS[2] modes
- 64 ports 40/100G QSPF28 ports
- 2 fixed 1/10G SFP+ ports
- 16 ports of MACsec line rate encryption

Total spine bandwidth: 14–42 Tbps[3] maximum
N9K-9336C-FX2

- Cisco ACI[1] and NX-OS[2] modes
- 36 x 1/10/25/40/100-Gbps QSFP28 ports
- All ports support MACsec line rate encryption

N9K-9236C

- NX-OS[2] only
- 36 line-rate 10/25/40/100G QSPF285 ports

Total spine bandwidth: 6–18 Tbps[3] maximum
N9K-9336PQ

- Cisco ACI[1] only
- 36 line-rate 40 GBE QSFP+ ports
- 16 ports of MACsec line rate encryption

[1] ACI mode is designed for spine-and-leaf only and requires the Cisco Application Policy Infrastructure Controller (APIC).

[2] While this guide focuses on the spine-and-leaf architecture, the Nexus 9000 and 3000 can be configured for either spine-and-leaf or traditional 2-tier and 3-tier architectures in NX-OS mode.

[3] We strongly recommend you start with at least two spine switches. You will also likely be limited to six spine switches because that is the most common number of uplinks for leaf switches. The range shown here is the total maximum system bandwidth for two to six spine switches.

© 2018 Cisco and/or its affiliates. All rights reserved.

Cisco Nexus 9000 Series Switches

Hardware innovation

Three key decisions

Spine Switches

Leaf Switches

Fixed configuration leaf switches

Modular spine line cards

Modular leaf line cards

Additional information

Learn more

Leaf Switches

Fixed configuration leaf switches

For NX-OS[2] fixed copper access, you'll need to use the Cisco ACI enabled leaf switches.

Cisco ACI[1] and NX-OS[2] modes with line rate encryption[4]

Fiber access with MACsec and 100G uplinks

N9K-9336C-FX2 Scale

- 36 x 1/10/25/40/100-Gbps QSFP28 ports
- Configure each port for access or uplinks

N9K-93240YC-FX2 Scale

- 48 x 1/10/25-Gbps ports
- 12 x 40/100-Gbps QSFP28 uplinks

N9K-93180C-FX Scale

- 48 x 10/25-Gbps or 8/16/32-Gbps Fibre Channel QSFP28 ports
- 6 x 40/100-Gbps QSFP28 uplinks

Copper access with MACsec and 100G uplinks

N9K-93108TC-FX Scale

- 48 x 10GBASE-T ports
- 6 x 40/100-Gbps QSFP28 uplinks

N9K-9348GC-FXP Scale

- 48 x 100M/1G BASE-T ports
- 4 x 1/10/25-Gbps SFP28 uplinks and 2 x 40/100-Gbps QSFP28 uplinks

[1] ACI mode is designed for spine-and-leaf only and requires the Cisco Application Policy Infrastructure Controller (APIC).

[2] While this guide focuses on the spine-and-leaf architecture, the Nexus 9000 and 3000 can be configured for either spine-and-leaf or traditional 2-tier and 3-tier architectures in NX-OS mode.

[4] If you are considering using the Nexus 9500 as a leaf switch, the N9K-X9788TC-FX offers line rate encryption in NX-OS mode.

© 2018 Cisco and/or its affiliates. All rights reserved.

Cisco Nexus 9000 Series Switches

Hardware innovation

Three key decisions

Spine Switches

Leaf Switches

Fixed configuration leaf switches

Modular spine line cards

Modular leaf line cards

Additional information

Learn more

Cisco ACI[1] and NX-OS[2] modes

Fiber access with 100G uplinks

N9K-93180LC-EX

- 24 x 40/50-Gbps QSFP28 ports
- 6 x 40/100-Gbps QSFP28 uplinks

N9K-93180YC-EX

- 48 x 10/25-Gbps QSFP28 ports
- 6 x 40/100-Gbps QSFP28 uplinks

Fiber access with 40G uplinks

N9K-9332PQ

- 32 x 40-Gbps QSFP+ ports
- Configure each port for access or uplinks

N9K-9396PX

- 48 x 1/10-Gbps SFP+ ports
- 12 x 40-Gbps QSFP+ uplinks

N9K-9372PX-E

- 48 x 1/10-Gbps SFP+ ports
- 6 x 40-Gbps QSFP+ uplinks

Copper access with 100G uplinks

N9K-93108TC-EX

- 48 x 1/10GBASE-T ports
- 6 x 40/100-Gbps QSFP28 uplinks

Copper access with 40G uplinks

N9K-93120TX

- 96 x 1/10GBASE-T ports
- 6 x 40-Gbps QSFP+ uplinks

N9K-9396TX

- 48 x 1/10GBASE-T ports
- 12 x 40-Gbps QSFP+ uplinks

N9K-9372TX-E

- 48 x 1/10GBASE-T ports
- 6 x 40-Gbps QSFP+ uplinks

Fiber access with 100G uplinks

N9K-92304QC

- 56 x 40-Gbps QSFP+ports
- 8 x 100-Gbps QSFP28 uplinks

N9K-9236C

- 36 x 1/10/25/40/50/100G QSFP28 ports
- All ports can be configured for access or uplink

N9K-92300YC

- 48 x 10/25-Gbps SFP+ ports
- 18 x 100-Gbps QSFP28 uplinks

N9K-92160YC-X

- 48 x 10/25-Gbps SFP+ ports
- 6 x QSFP28 ports (4 of the QSFP+ ports are 100Gbps capable)

[1] ACI mode is designed for spine-and-leaf only and requires the Cisco Application Policy Infrastructure Controller (APIC).

[2] While this guide focuses on the spine-and-leaf architecture, the Nexus 9000 and 3000 can be configured for either spine-and-leaf or traditional 2-tier and 3-tier architectures in NX-OS mode.

© 2018 Cisco and/or its affiliates. All rights reserved.

Cisco Nexus 9000 Series Switches
Hardware innovation
Three key decisions
Spine Switches
Leaf Switches
Modular spine line cards
Cisco AC and NX-OSI[2] modes
NX-OS[2] mode only
Modular leaf line cards
Additional information
Learn more

Modular spine line cards

Cisco ACI[1] and NX-OSI[2] modes

1/10/25/40/ 50/100G QSFP28 uplinks

Line rate encryption (+170 byte packets) Uplinks
N9K-X9736C-FX
- 36 uplinks
- 3.6 Tbps
- 160 MB buffer capacity

NX-OS[2] mode only

Line rate encryption (+170 byte packets)
N9K-X9732C-FX
- 32 uplinks
- 3.6 Tbps
- 160 MB buffer capacity

Line rate for all packets (no encryption)
N9K-X9736C-EX
- 36 uplinks
- 3.6 Tbps
- 160 MB buffer capacity

NX-OS[2] mode only

Line rate for all packets (no encryption)
N9K-X9732C-EX
- 32 uplinks
- 3.6 Tbps
- 160 MB buffer capacity

Line rate for +250 byte packets
N9K-X9432C-S
- 32 uplinks
- 32 MB buffer capacity

Deep buffers
N9K-X9636C-R
- 36 uplinks
- 24 GB buffer capacity

N9K-X9636C-RX
- 36 uplinks
- 16 GB buffer capacity

40 GPS QSFP + uplinks

Line rate for all packets
N9K-X9636PQ
- 36 uplinks
- 36 MB buffer capacity
- 4-slot and 8-slot chassis only

Line rate for +200 byte packets
N9K-X9432PQ
- 32 uplinks
- 24 MB buffer capacity

Deep buffers
N9K-X9636Q-R
- 36 uplinks
- 24 GB buffer capacity

[1] ACI mode is designed for spine-and-leaf only and requires the Cisco Application Policy Infrastructure Controller (APIC).

[2] While this guide focuses on the spine-and-leaf architecture, the Nexus 9000 and 3000 can be configured for either spine-and-leaf or traditional 2-tier and 3-tier architectures in NX-OS mode.

© 2018 Cisco and/or its affiliates. All rights reserved.

Cisco Nexus 9000 Series Switches

Hardware innovation

Three key decisions

Spine Switches

Leaf Switches

Modular spine line cards

Modular leaf line cards

Modular leaf line cards for the Cisco Nexus 9500

Additional information

Learn more

Modular leaf line cards

Modular leaf line cards for the Cisco Nexus 9500

NX-OS² mode only

There is also the option to use the Nexus 9500 as a leaf switch. This is usually only needed for data centers with tens of thousands of servers.

Fiber access, 100G uplinks
N9K-X97160YC-EX

- 48 x 1/10/25-Gbps SFP+ ports
- 4-port 100-Gpbs QSFP28 uplink

Fiber access, 40G uplinks
N9K-X9536PQ

- 36 x 40-Gbps QSFP+ ports
- 1.5:1 oversubscription
- All ports can be configured for access or uplinks

N9K-X9564PX

- 48 x 1/10-Gbps SFP+ ports
- 4 x 40 Gigabit Ethernet QSFP+ uplinks

N9K-X9464PX

- 48 x 1/10-Gbps SFP+ ports
- 4 x 40 Gigabit Ethernet QSFP+ uplinks

Copper access, 100G uplinks
N9K-X9788TC-FX

- 48-port 1 and 10GBASE-T
- 4-port 40/100-Gbps QSFP28 uplinks
- Line rate encryption

Copper access, 40G uplinks
N9K-X9564TX

- 48-port 1 and 10GBASE-T
  Line rate for all packets
- 4-port 40-Gbps QSFP+ uplinks

N9K-X9464TX2

- 48-port 1 and 10GBASE-T
- Line rate for +200 byte packets
- 4-port 40-Gbps QSFP+ uplinks

© 2018 Cisco and/or its affiliates. All rights reserved.

Cisco Nexus 9000 Series Switches

Hardware innovation

Three key decisions

Spine Switches

Leaf Switches

Modular spine line cards

Modular leaf line cards

Additional information

Learn more

Additional information

1. Cisco ACI mode is designed for spine-and-leaf only and requires the Cisco Application Policy Infrastructure Controller (APIC).
2. While this guide focuses on the spine-and-leaf architecture, the Cisco Nexus 9000 and 3000 can be configured for either spine-and-leaf or traditional 2-tier and 3-tier architectures in NX-OS mode.
3. We strongly recommend you start with at least two spine switches. You will also likely be limited to six spine switches because that is the most common number of uplinks for leaf switches. The range shown here is the total maximum system bandwidth for two to six spine switches.
4. If you are considering using the Cisco Nexus 9500 as a leaf switch, the N9K-X9788TC-FX offers line rate encryption in NX-OS mode.

© 2018 Cisco and/or its affiliates. All rights reserved.

Cisco Nexus 9000 Series Switches

Hardware innovation

Three key decisions

Spine Switches

Leaf Switches

Modular spine line cards

Modular Leaf Line Cards

Additional information

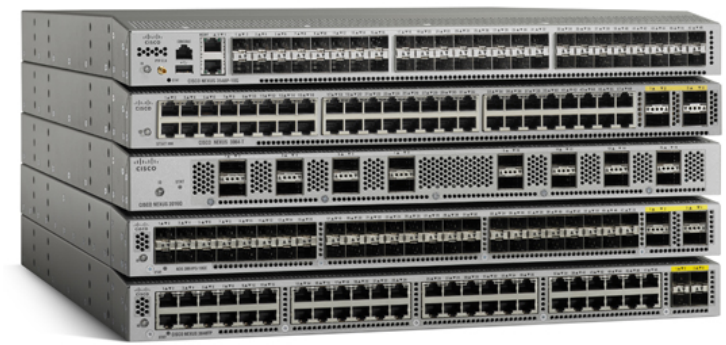
Learn more

Learn more

Do you need really fast switches?

Switches with a latency of less than 250–750 nanoseconds?

If you do, then the Cisco Nexus 3000 Series Switches are your ideal leaf switches, and, like the Cisco Nexus 9000, they run NX-OS[2] Learn more.



[2] While this guide focuses on the spine-and-leaf architecture, the Nexus 9000 and 3000 can be configured for either spine-and-leaf or traditional 2-tier and 3-tier architectures in NX-OS mode.

HOME

© 2018 Cisco and/or its affiliates. All rights reserved. Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: https://www.cisco.com/go/trademarks. Third-party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1110R)

C82-740873-00 07/18