



Verified Scalability for Cisco Nexus 5500 Series NX-OS Release 7.0(0)N1(1)

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Preface

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Preface

This preface describes the audience, organization, and conventions of the Book Title. It also provides information on how to obtain related documentation.

This chapter includes the following topics:

Audience

This publication is for experienced network administrators who configure and maintain Cisco NX-OS on Cisco Nexus 5000 Series Platform switches.

Document Conventions



Note

- As part of our constant endeavor to remodel our documents to meet our customers' requirements, we have modified the manner in which we document configuration tasks. As a result of this, you may find a deviation in the style used to describe these tasks, with the newly included sections of the document following the new format.
- The Guidelines and Limitations section contains general guidelines and limitations that are applicable to all the features, and the feature-specific guidelines and limitations that are applicable only to the corresponding feature.

Command descriptions use the following conventions:

Convention	Description
bold	Bold text indicates the commands and keywords that you enter literally as shown.
<i>Italic</i>	Italic text indicates arguments for which the user supplies the values.
[x]	Square brackets enclose an optional element (keyword or argument).
[x y]	Square brackets enclosing keywords or arguments separated by a vertical bar indicate an optional choice.
{x y}	Braces enclosing keywords or arguments separated by a vertical bar indicate a required choice.
[x {y z}]	Nested set of square brackets or braces indicate optional or required choices within optional or required elements. Braces and a vertical bar within square brackets indicate a required choice within an optional element.
<i>variable</i>	Indicates a variable for which you supply values, in context where italics cannot be used.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.

Examples use the following conventions:

Convention	Description
<code>screen font</code>	Terminal sessions and information the switch displays are in screen font.
<code>boldface screen font</code>	Information you must enter is in boldface screen font.
<i><code>italic screen font</code></i>	Arguments for which you supply values are in italic screen font.
<>	Nonprinting characters, such as passwords, are in angle brackets.
[]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

This document uses the following conventions:



Note

Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.

**Caution**

Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Related Documentation

Documentation for Cisco Nexus 5000 Series Switches is available at:

- Configuration Guides

<http://www.cisco.com/c/en/us/support/switches/nexus-5000-series-switches/products-installation-and-configuration-guides-list.html>

- Command Reference Guides

<http://www.cisco.com/c/en/us/support/switches/nexus-5000-series-switches/products-command-reference-list.html>

- Release Notes

<http://www.cisco.com/c/en/us/support/switches/nexus-5000-series-switches/products-release-notes-list.html>

- Install and Upgrade Guides

<http://www.cisco.com/c/en/us/support/switches/nexus-5000-series-switches/products-installation-guides-list.html>

- Licensing Guide

<http://www.cisco.com/c/en/us/support/switches/nexus-5000-series-switches/products-licensing-information-listing.html>

Documentation for Cisco Nexus 5000 Series Switches and Cisco Nexus 2000 Series Fabric Extenders is available at:

<http://www.cisco.com/c/en/us/support/switches/nexus-2000-series-fabric-extenders/products-installation-and-configuration-guides-list.html>

Documentation Feedback

To provide technical feedback on this document, or to report an error or omission, please send your comments to nexus5k-docfeedback@cisco.com. We appreciate your feedback.

Obtaining Documentation and Submitting a Service Request

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CHAPTER

1

Verified Scalability for Cisco Nexus 5500 Series NX-OS Release 7.0(0)N1(1)

This chapter contains the following sections:

- [Overview of Verified Scalability, page 1](#)
- [Verified Scalability for a Layer 2 Switching Deployment, page 1](#)
- [Verified Scalability for a Layer 2 Switching and Layer 3 Routing Deployment, page 3](#)
- [Verified Scalability for a Layer 2 Switching and Unified Fabric \(FCoE\) Deployment, page 7](#)
- [Verified Scalability for Multicast Routing, page 9](#)
- [Verified Scalability for Unicast Routing, page 10](#)
- [Verified Scalability for a Layer 2 Switching and Virtualization \(Adapter-FEX or VM-FEX\) Deployment, page 11](#)

Overview of Verified Scalability

This document lists the Cisco verified scalability limits.

In the following tables, the Verified Topology column lists the verified scaling capabilities with all listed features enabled at the same time. The numbers listed here exceed those used by most customers in their topologies. The scale numbers listed here are not the maximum verified values if each feature is viewed in isolation.

The Verified Maximum column lists the maximum scale capability tested for the corresponding feature individually. This number is the absolute maximum currently supported by the Cisco NX-OS Release software for the corresponding feature. If the hardware is capable of a higher scale, future software releases may increase this verified maximum limit.

Verified Scalability for a Layer 2 Switching Deployment

This table lists the verified scalability for a Layer 2 switching deployment.

Table 1: Verified Scalability for a Layer 2 Switching Deployment

Feature	Verified Topology	Verified Maximum
Active VLANs/VSANs per switch	4000	4013 (31 are reserved for VSANs and the remaining are for VLANs)
VLAN/VSAN ID Space	4013 Unreserved space	4013 Unreserved space
Logical Interfaces 1	48,000 2	48,000
VLAN ACLs (VACLs)	128 (10 unique VACLs)	1024 (512 unique VACLs with up to 1,024 ACE entries across all VACLs)
Maximum Interfaces per EtherChannel	16	16
IGMP Snooping Groups	4000 (in FEX deployments) 8000 (in non-FEX deployments)	4000 (in FEX deployments) 8000 (in non-FEX deployments)
Maximum FEXs per Cisco Nexus 5500 Series Switch	24	24
Maximum FEXs Dual-homed to a vPC Cisco Nexus 5500 Series Switch Pair	24	24
MAC Table Size (Entries)	25,000 Unicast 4000 Multicast	32,000
Number of Switchport EtherChannels	48 for the Cisco Nexus 5548 or Nexus 5548UP Switch	48 for the Cisco Nexus 5548 or Nexus 5548UP Switch 96 for the Cisco Nexus 5596 Switch
Number of FEX Port Channels/vPCs (across the maximum number of FEXs)	576	1152
SVIs	2	256
FabricPath VLANs	4000 ³	4000
SPAN Sessions	4 active sessions 32 source VLANs as a RX source	4 active sessions 32 source VLANs as a RX source

Feature	Verified Topology	Verified Maximum
FabricPath Switch IDs	500	128
FabricPath Multicast Trees	2	2
Number of FabricPath Topologies	2	2
Number of FabricPath Core Port-Channels	4 core links with 4 ports each	16
FEX Host Interface Storm Control	1152 ⁴	1152
ACL Accounting	32	32

¹ Logical interfaces are a product of the number of VLANs times the number of ports. This parameter reflects the load of handling port programming, and is not dependent on the spanning-tree mode or configuration.

² For the Cisco Nexus 5548 switch, there are no non-edge restrictions.

³ FabricPath VLANs are verified in the unified fabric topology

⁴ This is the target maximum number that HIF-SC can support. Beyond this number, NIF-SC is recommended for deployment.

Verified Scalability for a Layer 2 Switching and Layer 3 Routing Deployment

This table contains the verified scalability for a Layer 2 switching and Layer 3 routing deployment.



Note

The currently tested values do not provide an indication for the maximum scalability of the control plane. These numbers vary based on the load of the system in terms of routing protocols, timers settings, and other values. Proof of concept testing should be used to determine the scalability of a given feature for your environment.

Table 2: Verified Scalability for a Layer 2 Switching and Layer 3 Routing Deployment

Feature	Verified Topology	Maximum Limits
Active VLANs/VSANs per Switch	1000	4013 (31 are reserved for VSANs)
VLAN/VSAN ID Space	4013 Unreserved space	4013 Unreserved space
STP Instances	16,000	16,000

Feature	Verified Topology	Maximum Limits
Maximum Interfaces per EtherChannel	16	16
IGMP Snooping Groups	4000 (in FEX deployments) 8000 (in non-FEX deployments)	4000 (in FEX deployments) 8000 (in non-FEX deployments)
Maximum FEXs per Cisco Nexus 5500 Series Switch 5	16	16
Maximum FEXs Dual-homed to a vPC Switch Pair 6	16	16
MAC Table Size (Entries)	23,400 Unicast entries and 4,000 Multicast entries	32,000 Entries 7
Number of FEX Port-Channels/vPCs (across the maximum number of FEXs)	470	768
SPAN Sessions	2 active sessions 32 source VLANs as a RX source	4 active sessions 32 source VLANs as a RX source
SVIs	256	256
Dynamic IPv4 Routes 8	7200 9	<ul style="list-style-type: none"> • 7200 for the Cisco Nexus 5548 Layer 3 Daughter Card (N55-D160L3(=)) • 14,400 for the Cisco Nexus 5548 Layer 3 Daughter Card, version 2 (N55-D160L3-V2(=))

Feature	Verified Topology	Maximum Limits
Dynamic IPv6 Routes 10	3600 11	<ul style="list-style-type: none"> • 3600 for the Cisco Nexus 5548 Layer 3 Daughter Card (N55-D160L3(=)) • 7200 for the Cisco Nexus 5548 Layer 3 Daughter Card, version 2 (N55-D160L3-V2(=))
Multicast IPv4 Routes 1213	<ul style="list-style-type: none"> • 1000 for the Cisco Nexus 5548 Layer 3 Daughter Card (N55-D160L3(=)) • 2000 for the Cisco Nexus 5548 Layer 3 Daughter Card, version 2 (N55-D160L3-V2(=)) 14	<ul style="list-style-type: none"> • 4000 for the Cisco Nexus 5548 Layer 3 Daughter Card (N55-D160L3(=)) • 8000 for the Cisco Nexus 5548 Layer 3 Daughter Card, version 2 (N55-D160L3-V2(=))
ARPs (IPv4 Hosts) 1516	<ul style="list-style-type: none"> • 6500 for the Cisco Nexus 5548 Layer 3 Daughter Card (N55-D160L3(=)) • 6500 for the Cisco Nexus 5548 Layer 3 Daughter Card, version 2 (N55-D160L3-V2(=)) 17	<ul style="list-style-type: none"> • 8000 for the Cisco Nexus 5548 Layer 3 Daughter Card (N55-D160L3(=)) • 16,000 for the Cisco Nexus 5548 Layer 3 Daughter Card, version 2 (N55-D160L3-V2(=))

Feature	Verified Topology	Maximum Limits
IPv6 Hosts 18	1600 19	<ul style="list-style-type: none"> • 4000 for the Cisco Nexus 5548 Layer 3 Daughter Card (N55-D160L3(=)) • 8000 for the Cisco Nexus 5548 Layer 3 Daughter Card, version 2 (N55-D160L3-V2(=))
VRFs	25	1000
RACLs	62 Ingress RACLs with up to 1,664 ACE entries across all of the RACLs	62 Ingress RACLs with up to 1,664 ACE entries across all of the RACLs
HSRP Groups	254	256
VRRP Groups	254	256
BFD Sessions over L3-intf for CE Mode	8 sessions (250 ms intvl, 750 ms dead-intvl)	32 sessions (250 ms intvl, 750 ms dead-intvl)
BFD Sessions over SVI for L2MP mode	64 sessions (250 ms intvl, 750 ms dead-intvl)	64 sessions (250 ms intvl, 750 ms dead-intvl)
PBR IPv4	15	15
PBR IPv6	15	15

⁵ FEXs are verified in the Layer 2 topology.

⁶ FEXs are verified in the Layer 2 topology.

⁷ 24,000 entries are reserved for Unicast MAC entries and 34,00 entries are reserved for IGMP groups.

⁸ The maximum number of entries that can be supported is 8000. This table is shared between IPv4 and IPv6. An IPv4 route takes up one entry in the table and an IPv6 route takes up two entries.

⁹ Entries shared between IPv4, IPv6 network routes .

¹⁰ The maximum number of entries that can be supported is 8000. This table is shared between IPv4 and IPv6. An IPv4 route takes up one entry in the table and an IPv6 route takes up two entries.

¹¹ Entries shared between IPv4, IPv6 network routes .

¹² All numbers are for individual feature scalability.

¹³ This includes (*,G) entries, (S,G) entries, and the entries required for vPC with bind-vrf configured. When bind-vrf is configured, each (*,G) and (S,G) entry is replicated.

¹⁴ Entries shared between IPv4 multicast, IPv4, IPv6 host routes .

- 15 All numbers are for individual feature scalability.
 16 The maximum number of entries the table can support is the sum of LPM entries plus ARP entries plus SVI route entries.
 17 Entries shared between IPv4 multicast, IPv4, IPv6 host routes .
 18 All numbers are for individual feature scalability.
 19 Entries shared between IPv4 multicast, IPv4, IPv6 host routes .

Verified Scalability for a Layer 2 Switching and Unified Fabric (FCoE) Deployment

This table lists the verified scalability for a Layer 2 switching and unified fabric (FCoE) deployment.

Table 3: Verified Scalability for a Layer 2 Switching and Unified Fabric (FCoE) Deployment

Feature	Verified Topology	Verified Maximum
Active VLANs/VSANs per switch	4,013	4,013 (31 are set reserved for VSANs and the remaining are for VLANs)
VLAN/VSAN ID Space	4,013 Unreserved Space	4,013 Unreserved Space
Logical Interfaces 20	32,000 21	32,000
IGMP Snooping Groups	4,000 (in FEX deployments) 8,000 (in non-FEX deployments)	4,000 (in FEX deployments) 8,000 (in non-FEX deployments)
Maximum FEXs per Cisco Nexus 5500 Series Switch	9	24
Maximum FEXs Dual Homed to a vPC Cisco Nexus 5500 Series Switch Pair	24	24
MAC Table Size	23,000 unicast entries 4,000 multicast entries 22	32,000 entries
Number of Switchport EtherChannels	8	48 for the Cisco Nexus 5548P or Nexus 5548UP switch 96 for the Cisco Nexus 5596UP switch
SPAN Sessions	2 active sessions 32 source VLANs as a TX source	4 active sessions 32 source VLANs as a TX source

Feature	Verified Topology	Verified Maximum
Number of FEX Port Channels/vPCs (across the maximum number of FEXs)	288	768
FabricPath VLANs	4000	4,000
FabricPath Switch IDs	128	128
FabricPath Multicast Trees	2	2
Number of FabricPath Topologies	2	2
Number of FabricPath Core Links	2	16
Native FibreChannel Links per Switch	8	8 for Cisco Nexus 5548 Switch 48 for Cisco Nexus 5548UP Switch 96 for Cisco Nexus 5596UP Switch
FLOGIs or FDISCs per NPV Port Group	180	255
Zone Sets per Switch	32	500
Zone Members per Physical Fabric (includes all VSANs)	1,280	8,000
Zones per Switch (includes all VSANs)	640	8,000
Maximum Diameter of a SAN Fabric	7	12
FSPF Interface Instances per Switch	192	256 for a Cisco Nexus 5548 switch 1,536 for a Cisco Nexus 5548UP switch 3,072 for a Cisco Nexus 5596UP switch
ISL Instances per Switch	6	8 for a Cisco Nexus 5548 switch 48 for a Cisco Nexus 5548UP switch 96 for a Cisco Nexus 5596UP switch
VFC Interfaces	288	288

Feature	Verified Topology	Verified Maximum
Maximum FCIDs Allocated	576	2,048
Fibre Channel Flows	32	32
The maximum number of vFCs that can be bound to a port-channel	48	48

²⁰ Logical interfaces are a product of the number of VLANs times the number of ports. This parameter reflects the load of handling port programming, and is not dependent on the spanning-tree mode or configuration.

²¹ For the Cisco Nexus 5548 switch, there are no non-edge restrictions.

²² 24,000 entries are reserved for unicast MAC entries and 3,400 entries are reserved for IGMP groups.

Verified Scalability for Multicast Routing

This table lists the verified scalability for multicast routing.

Table 4: Verified Scalability for Multicast Routing

Feature	Parameter	Verified Maximum
Protocol Independent Multicast (PIM)	Number of neighbors	500
	Number of neighbors/total routes per system with aggressive hello timers (5 seconds)	16/4,000
Multicast Source Discovery Protocol (MSDP)	Number of MSDP Source-Active (SA) cache entries	6,000



Note

- In vPC setup, TCAM exhaustion failure will lead to some routes not getting programmed in the hardware. Hence, there might exist a condition where mrib will show the route exists but mfib may not have it programmed.
- In bind-vrf configuration, for every mroute, additional mroute is programmed in the hardware and this could lead to TCAM exhaustion. Hence, ensure that the mroute count does not exceed $((\text{max-limit}/2) - 4)$ default routes.

For example: If the hardware profile multicast max-limit is 8000, then mroute count should not exceed $((8000/2)-4)$ default routes.

Verified Scalability for Unicast Routing

Guidelines and Limitations for Unicast Routing

- You can have up to four instances of OSPFv2.
- You can have up to four instances of OSPFv3.

This table lists the verified scalability for unicast routing.

Table 5: Verified Scalability for Unicast Routing

Feature	Parameter	Verified Maximum
OSPFv2	Number of active interfaces	256
	Number of passive interfaces	256
	Number of neighbors/total routes with aggressive timers (1 sec/ 3 sec)	16/6,000
OSPFv3	Number of active interfaces	256
	Number of passive interfaces	256
EIGRP	Number of active interfaces	50
BGP	Number of peers (iBGP and eBGP, active)	256
	Number of AS path entries	512
	Number of prefix-list entries in a single prefix-list	10,000
HSRP	Number of groups with aggressive timers (1 sec/3 sec)	500
L3 ISIS	Number of adjacencies	100
Unicast Adjacencies	Number of regular/ECMP adjacencies	8192

Verified Scalability for a Layer 2 Switching and Virtualization (Adapter-FEX or VM-FEX) Deployment

This table lists the verified scalability for a Layer 2 switching and virtualization (Adapter-FEX or VM-FEX) deployment.

Table 6: Scalability Limits for a Layer 2 Switching and Virtualization (Adapter-FEX or VM-FEX) Deployment

Feature	Verified Topology	Verified Maximum
Number of VFCs over Virtual Ethernet Interfaces	40	40
Number of Port Profiles	1,000	1,000
Number of Virtual Machines (VMs) Concurrently not VMotioned	5 VMs with 10 vNICs each	5 VMs with 10 vNICs each
Number of Virtual Ethernet Interfaces Enabled with vNIC Shaping	2,000	2,000
Number of Virtual Ethernet Interfaces Enabled with Untagged CoS	2,000	2,000
Server - Number of Adapters per Server	1	1
Server - Number of vNICs per Server	50	96

