



Verified Scalability

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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	1000	4013 (31 are set reserved for VSANs and the remaining are for VLANs)
VLAN/VSAN ID Space	4013 Unreserved Space	4013 Unreserved Space
Logical Interfaces 1	16,000 2	32,000
VLAN ACLs (VACLs) per switch	128 (10 Unique VACLs)	1024 (62 unique VACLs with up to 2,048 ACE entries across all VACLs)
Member 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	25,000 unicast entries 4000 multicast entries	32,000 entries
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	1000 ³	4000
FabricPath Switch IDs	128	128
FabricPath Multicast Trees	2	2

Feature	Verified Topology	Verified Maximum
Number of FabricPath Topologies	1	1
Number of FabricPath Core Port-Channels	4 core links with 4 ports each	16
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

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



Note

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

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 set reserved for VSANs and the remaining are for VLANs)
VLAN/VSAN ID Space	4013 Unreserved Space	4013 Unreserved Space
STP Instances	16,000	16,000
Member 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)

Feature	Verified Topology	Maximum Limits
Maximum FEXs per Cisco Nexus 5500 Series Switch 4	16	16
Maximum FEXs Dual Homed to a vPC Switch Pair 5	16	16
MAC Table Size	23,400 unicast entries and 4000 multicast entries	32,000 6
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
Number of SVIs	256	256
Dynamic IPv4 Routes 7	7200 8	<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(=))
Dynamic IPv6 Routes 9	3600 10	<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(=))

Feature	Verified Topology	Maximum Limits
Multicast IPv4 Routes 1112	<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(=)) 13	<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)	<ul style="list-style-type: none"> • 6500 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(=)) 	<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(=))
IPv6 Hosts 14	1600 15	<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 1664 ACE entries across all of the RACLs	62 Ingress RACLs with up to 1664 ACE entries across all of the RACLs

Feature	Verified Topology	Maximum Limits
HSRP Groups	254	256
VRRP Groups	254	256

- 4 FEXs are verified in the Layer 2 topology
- 5 FEXs are verified in the Layer 2 topology
- 6 24,000 entries are reserved for unicast MAC entries and 34,00 entries are reserved for IGMP groups.
- 7 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.
- 8 Entries shared between IPv4, IPv6 network routes .
- 9 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.
- 10 Entries shared between IPv4, IPv6 network routes .
- 11 All numbers are for individual feature scalability.
- 12 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.
- 13 Entries shared between IPv4 multicast, IPv4, IPv6 host routes .
- 14 All numbers are for individual feature scalability.
- 15 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 16	32,000 17	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

Feature	Verified Topology	Verified Maximum
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 18	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
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

Feature	Verified Topology	Verified Maximum
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
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

¹⁶ 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.

¹⁷ For the Cisco Nexus 5548 switch, there are no non-edge restrictions.

¹⁸ 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

Feature	Parameter	Verified Maximum
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

Feature	Parameter	Verified Maximum
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

Feature	Verified Topology	Verified Maximum
Server - Number of vNICs per Server	50	96

