



Verified Scalability for Cisco Nexus 5600 Series NX-OS Release 7.0(3)N1(1)

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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 | 4000 | 4013 (31 are reserved for VSANs, and the remaining are for VLANs.) |
| VLAN/VSAN ID Space | 4013 | 4013 Unreserved Space |
| Logical Interfaces ¹ | 96,000 (MST) ² | 64,000 (96,000 MST) ³ |
| VLAN ACLs (VACLs) | 128 (10 Unique VACLs) | 1024 (512 unique VACLs with up to 1024 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) 16,000 (in non-FEX deployments) |
| Maximum FEXs per Switch | • 24 | 48 |
| Maximum FEXs dual-homed to a vPC Switch Pair | 24 | 24 |
| MAC Table Size (Entries) | 64,000 | 115,000 |
| Number of Switchport Etherchannels | 48 | The following three values apply to the Cisco Nexus 5672: <ul style="list-style-type: none"> • 6 (Single member port-channel for 40G ports) • 72 (Single member port-channel for 10G ports) • 36 (Multi member port-channel) The following three values apply to the Cisco Nexus 56128: <ul style="list-style-type: none"> • 8 (Single member port-channel for 40G ports) • 128 (Single member port-channel for 10G ports) • 64 (Multi member port-channel) |

| Feature | Verified Topology | Verified Maximum |
|--|---|--|
| Number of HIF FEX port channels/vPCs (across the maximum number of FEXs) | 576 | 576 |
| SPAN Sessions | 4 active sessions 32 source VLANs as a RX source | 16 active sessions 32 source VLANs as a RX source |
| SVIs | 2 | 256 |
| FabricPath VLANs | 4000 ⁴ | 4000 |
| FabricPath Switch IDs | 500 | 500 |
| FabricPath Multicast Trees | 1 | 1 |
| 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 | 1936 ⁵ | 1936 |
| Segmentation ID | 3000 (1000 global segments, 2000 local segments) | 3000 (1000 global segments, 2000 local segments) |

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 32,000 STP logical interfaces are verified in the unified fabric topology.

³ 16,000 Port-VLAN scaling number applies to Rapid PVST+ and non-STP modes. For MST mode only, the maximum verified limit for Port-VLAN scaling is 96,000. 64000 limit is verified when a switch is running in MST mode and performing Rapid PVST+ stimulation. 48,000 is for MST and 16,000 is for Rapid PVST+.

⁴ FabricPath VLANs are verified in the unified fabric topology

⁵ 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 | Verified Maximum |
|--|--|--|
| Active VLANs/VSANs per Switch | 1000 6 | 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 |
| Maximum Interfaces per EtherChannel | 16 | 16 |
| IGMP Snooping Groups | 4000 (in FEX deployments) 8000 (in non-FEX deployments) | 4000 (in FEX deployments) 16,000 (in non-FEX deployments) |
| Maximum FEXs per Switch | 24 | 24 |
| Maximum FEXs Dual-homed to a vPC Switch Pair 7 | 24 | 24 |
| MAC Table Size (Entries) | 32,000 8 | 64,000 9 |
| Number of FEX Port Channels/vPCs (across the maximum number of FEXs) | 500 | 768 |
| SPAN Sessions | 4 active sessions 32 source VLANs as an RX source | 16 active sessions 32 source VLANs as an RX source |
| Number of SVIs | 256 | 256 |
| Dynamic IPv4 Routes 10 | 8000 | 24,000 |

| Feature | Verified Topology | Verified Maximum |
|---|---|--|
| Dynamic IPv6 Routes 11 | 4000 12 | 6000 |
| Multicast IPv4 Routes 13 | 4000 | 8000 |
| ARPs (IPv4 Hosts) 14 | 32,000 | 64,000 |
| IPv6 Hosts | 16,000 | 32,000 |
| VRFs | 25 | 1000 |
| RACLs | 64 Ingress RACLs with up to 1152 ACE entries across all the RACLs | 896 Ingress RACLs with up to 1152 ACE entries across all the RACLs |
| HSRP Groups 15 | 256 | 500 |
| VRRP Groups 16 | 256 | 500 |
| BFD sessions over L3-intf for CE mode | 8 sessions (250ms intvl, 750ms dead-intvl) | 30 (250ms intvl, 750ms dead-intvl) |
| BFD sessions over SVI for FabricPath mode | 64 (250ms intvl, 750ms dead-intvl) | 64 (250ms intvl, 750ms dead-intvl) |
| PBR IPv4 | 95 | 95 |
| PBR IPv6 | 95 | 95 |

⁶ 4,013 VLANs are verified in Layer 2 switching, Fibre Channel, and FCoE topologies.

⁷ FEXs are verified in the Layer 2 topology

⁸ 128,000 entries are reserved for unicast MAC entries and 128,000 entries are reserved for IP host routes.

⁹ 128,000 entries are reserved for unicast MAC entries and 128,000 entries are reserved for IP host routes.

¹⁰ The maximum number of entries that can be supported is 24,000. This table is shared between IPv4 and IPv6. An IPv4 route takes up one entry in the table and an IPv6 route takes up four entries.

¹¹ The maximum number of entries that can be supported is 24,000. This table is shared between IPv4 and IPv6. An IPv4 route takes up one entry in the table and an IPv6 route takes up four entries.

¹² With no IPv4, the number increases to 6000.

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 The maximum number of hosts supported is listed under ARPs. This includes IPv4 and IPv6 hosts. IPv4 hosts take up one entry and IPv6 hosts take up 2 entries in hardware. So, for the verified limit, the switch supports one of the following: 64,000 IPv4 hosts and 0 IPv6 hosts, 32,000 IPv6 hosts and 0 IPv4 hosts, or a combination of IPv4 and IPv6 hosts.

- 15 The limit of the table that holds the Router MAC and Virtual MAC entries that determines whether the packet needs to be bridged or routed is 500 entries. The Virtual MAC entries can be shared across Layer 3 interfaces. So, we recommend that you configure the same group ID across all or multiple Layer 3 interfaces/SVIs. If multiple group IDs are configured on an Layer 3 interface, then we recommend that you configure the same set of group IDs across all or multiple Layer 3 interfaces. This way, HSRP/VRRP can be supported on more interfaces. Please refer to the unicast configuration guide for more information.
- 16 The limit of the table that holds the Router MAC and Virtual MAC entries for determining packet routing or switching is 500 entries. The Virtual MAC entries can be shared across Layer 3 interfaces. So, we recommend that you configure the same group ID across all or multiple Layer 3 interfaces/SVIs. If multiple group IDs are configured on an Layer 3 interface, then we recommend that you configure the same set of group IDs across all or multiple Layer 3 interfaces. This way, HSRP/VRRP can be supported on more interfaces. Please refer to the unicast configuration guide for more information.

Verified Scalability for a Layer 3 Aggregation Routing Deployment

This table lists the verified scalability for a Layer 3 aggregation routing deployment.

Table 3: Verified Scalability for a Layer 3 Aggregation Routing Deployment

| Feature | Verified Topology | Verified Maximum |
|---|--|---|
| Active VLANs/VSANs per Switch | 4000 17 | 4000 |
| VLAN/VSAN ID Space | 4013 unreserved space | 4013 unreserved space |
| STP Instances | 64,000 | 64,000 |
| Maximum Interfaces per EtherChannel | 16 | 16 |
| IGMP Snooping Groups | 8000 (in non-FEX deployments) | 16,000 (in non-FEX deployments) |
| MAC Table Size | 64,000 18 | 115,000 19 |
| SPAN Sessions | 4 active sessions 32 source VLANs as an RX source | 16 active sessions 32 source VLANs as an RX source |
| SVIs | 1000 | 4000 |
| Dynamic IPv4 Routes 20 | 8000 | 24,000 |
| Dynamic IPv6 Routes 21 | 4000 22 | 6000 |
| Multicast IPv4 Routes 23 | 8000 | 16,000 |
| RACLs | 64 ingress RACLs with up to 1,152 ACE entries across all of the RACLs. | 512 ingress RACLs with up to 1,152 ACE entries across all of the RACLs. |

| Feature | Verified Topology | Verified Maximum |
|---|--|--|
| VRFs | 25 | 1,000 |
| ARPs (IPv4 Hosts) 24 | 64,000 | 64,000 |
| IPv6 Hosts 25 | 10,000 26 | 32,000 |
| IGP Peers | 64 | 100 |
| HSRP Groups 27 | 1721 (911 IPv4, 810 IPv6) | 1721 (911 IPv4, 810 IPv6) |
| VRRP Groups 28 | 500 | 500 |
| FabricPath Switch IDs | 500 | 500 |
| FabricPath Multicast Trees | 2 | 2 |
| Number of FabricPath Topologies | 2 | 2 |
| Number of FabricPath Core Links | 32 | 32 |
| PBR IPv4 | 110 | 110 |
| PBR IPv6 | 110 | 110 |
| BFD sessions over L3-intf for CE Mode | 100 sessions (250ms intvl, 750ms dead-intvl) | 100 sessions (250ms intvl, 750ms dead-intvl) |
| BFD sessions over SVI for FabricPath mode | 64 sessions (250ms intvl, 750ms dead-intvl) | 64 sessions (250ms intvl, 750ms dead-intvl) |

¹⁷ 4,013 VLANs are verified in Layer 2 switching, Fibre Channel, and FCoE topologies.

¹⁸ 128,000 entries are reserved for Unicast MAC entries, and 128,000 entries are reserved for IP host routes.

¹⁹ 128,000 entries are reserved for Unicast MAC entries, and 128,000 entries are reserved for IP host routes.

²⁰ The maximum number of entries that can be supported is 24,000. This table is shared between IPv4 and IPv6. An IPv4 route takes up one entry in the table and an IPv6 route takes up four entries.

²¹ The maximum number of entries that can be supported is 24,000. This table is shared between IPv4 and IPv6. An IPv4 route takes up one entry in the table and an IPv6 route takes up four entries.

²² Entries shared between IPv4, IPv6 network routes.

²³ 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. This includes (*,G) entries, (S,G) entries, and IGMP-snooping entries combined.

²⁴ The maximum number of hosts supported is listed under ARPs. This includes IPv4 and IPv6 hosts. IPv4 hosts take up one entry and IPv6 hosts take up 2 entries in hardware. So, for the verified limit, the switch supports one of the following: 64,000 IPv4 hosts and 0 IPv6 hosts, 16,000 IPv6 hosts and 0 IPv4 hosts, or a combination of IPv4 and IPv6 hosts.

²⁵ The maximum number of hosts supported is listed under ARPs. This includes IPv4 and IPv6 hosts. IPv4 hosts take up one entry and IPv6 hosts take up 2 entries in hardware. So, for the verified limit, the switch supports one of the following: 64,000 IPv4 hosts and 0 IPv6 hosts, 16,000 IPv6 hosts and 0 IPv4 hosts, or a combination of IPv4 and IPv6 hosts.

- 26 Entries shared between IPv4 multicast, IPv4, IPv6 host routes .
- 27 The limit of the table that holds the Router MAC and Virtual MAC entries that determine whether the packet needs to be bridged or routed is 500 entries. The Virtual MAC entries can be shared across Layer 3 interfaces. So we recommend that you configure the same group ID across all or multiple Layer 3 interfaces/SVIs. If multiple group IDs are configured on a Layer 3 interface, then we recommend that you configure the same set of group IDs across all or multiple Layer 3 interfaces. This way, HSRP/VRRP can be supported on more interfaces. Please refer to the Unicast Routing Configuration Guide for more information.
- 28 The limit of the table that holds the Router MAC and Virtual MAC entries for determining packet routing or switching is 500 entries. The Virtual MAC entries can be shared across Layer 3 interfaces. So we recommend that you configure the same group ID across all or multiple Layer 3 interfaces/SVIs. If multiple group IDs are configured on a Layer 3 interface, then we recommend that you configure the same set of group IDs across all or multiple Layer 3 interfaces. This way, HSRP/VRRP can be supported on more interfaces. Please refer to the Unicast Routing Configuration Guide for more information.

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 4: 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 (32 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 29 | 32,000 | 32,000 |
| IGMP Snooping Groups | 4,000 (in FEX deployments) 8,000 (in non-FEX deployments) | 4,000 (in FEX deployments) 16,000 (in non-FEX deployments) |
| Maximum FEXs per Cisco Nexus 5600 Series Switch | 17 per DUT | 24 |
| Maximum FEXs Dual Homed to a vPC Cisco Nexus 5600 Series Switch Pair | 34 | 34 |
| MAC Table Size | 32,000 unicast entries 30 | 115,000 entries 31 |
| Number of Switchport EtherChannels | 8 | 384 |
| SPAN Sessions | 4 active sessions 32 source VLANs as a RX source | 16 active sessions 32 source VLANs as a RX source |

| Feature | Verified Topology | Verified Maximum |
|--|-------------------|------------------|
| Number of FEX Port Channels/vPCs (across the maximum number of FEXs) | 544 | 768 |
| FabricPath VLANs | 4,000 | 4,000 |
| FabricPath Switch IDs | 500 | 500 |
| FabricPath Multicast Trees | 2 | 2 |
| Number of FabricPath Topologies | 2 | 2 |
| Number of FabricPath Core Links | 2 | 16 |
| FLOGIs or FDISCs per NPV Port Group | 512 | 512 |
| Zone Sets per Switch | 32 | 500 |
| Zone Members per Physical Fabric (includes all VSANs) | 16,000 | 16,000 |
| Zones per Switch (includes all VSANs) | 8000 | 8000 |
| Maximum Diameter of a SAN Fabric | 7 hops | 12 |
| FSPF Interface Instances per Switch | 192 | 3,072 |
| ISL Instances per Switch | 6 | 96 |
| VFC Interfaces | 544 | 544 |
| Maximum FCIDs Allocated | 1024 | 4000 |
| Fibre Channel Flows | 32 | 32 |
| FLOGIs or FDISCs per switch | 1024 | 4000 |

| Feature | Verified Topology | Verified Maximum |
|--|-------------------|------------------|
| The maximum number of vFCs that can be bound to a port-channel | 48 | 48 |

²⁹ 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.

³⁰ 128,000 entries are reserved for unicast MAC entries and 128,000 entries are reserved for IP host routes.

³¹ 128,000 entries are reserved for unicast MAC entries and 128,000 entries are reserved for IP host routes.

Verified Scalability for Multicast Routing

This table lists the verified scalability for multicast routing.

Table 5: 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 mrib 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 6: 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 adjacencies | 16374 |
| | Number of ECMP adjacencies. The regular adjacencies are also part of the maximum ECMP adjacencies | 28470 |

