

Cisco Nexus 9000 Series NX-OS Verified Scalability Guide, Release 9.3(2)

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Introduction

This document describes the Cisco NX-OS configuration limits for Cisco Nexus 9000 Series switches.

The values provided in this guide should not be interpreted as theoretical system limits for Cisco NX-OS hardware or Cisco NX-OS software. These limits refer to values that have been validated by Cisco. They can increase over time as more testing and validation is done.

Verified Scalability Limits - Unidimensional

The tables in this section list the verified scalability limits for the Cisco Nexus 9000 Series switches for Cisco NX-OS Release 9.3(2).

These limits are validated with a unidimensional configuration. The values provided in these tables focus on the scalability of one particular feature at a time.

Each number is the absolute maximum currently supported by this Cisco NX-OS release for the corresponding feature. If the hardware is capable of a higher scale, future software releases might increase this verified maximum limit. Results might differ from the values listed in this guide when you try to achieve maximum scalability with multiple features enabled.

Note

1. If only one number is provided, the verified limit applies to all supported platforms and line cards.
2. Verified limits are provided only for supported platforms.
3. If a feature is not supported for a particular platform, the verified limit is not provided.

Table 1: Cisco Nexus 2000 Series Fabric Extenders (FEX) Straight Through Mode Verified Scalability Limits (Unidimensional)

Feature	Supported Platforms	Verified Limits
Fabric Extenders[1] and Fabric Extender server interfaces	Nexus 9300, 9300-EX, and -FX switches	16 and 768
	Nexus 9500 switches	32 and 1536
VLANs across all Fabric Extenders	Nexus 9300 and 9500 switches	2,000
	Nexus 9300-EX and -FX switches	562
VLANs per Fabric Extender server interface[2]	Nexus 9300, 9300-EX, 9300-FX, and 9500 switches	75
Port channels	Nexus 9300 switches	256
	Nexus 9300-EX and 9300-FX/FX2 switches + FEX	511
	Nexus 9500 switches	426
Unique Fabric Extenders per Cisco Nexus 9500 Series supported line card	Nexus 9500 switches	12

[1] When FEX configured using "AA" mode, then the maximum number of 6 FEX on NFE base ToR and 16 FEX for LSE base ToR are supported.
[2] For FEX HIF port channels, Cisco recommends that you enable STP port type edge using the **spanning tree port type edge [trunk]** command.

Table 2: FCoE Verified Scalability Limits (Unidimensional)

Feature [3]	**Supported Platforms**	**Verified Limits**
FLOGI per port	Nexus 93180YC-FX	256
FLOGI per switch	Nexus 93180YC-FX	1,000
Port channels	Nexus 93180YC-FX switches	8[4]
Maximum number of member ports in a port channel	Nexus 93180YC-FX switches	16
VFCs	Nexus 93180YC-FX switches	544
VSANs	Nexus 93180YC-FX switches	32

[3] Feature Verified Limit is 5.
[4] The number of SAN port channels and virtual FC port channels, together, can be only 8 on the Cisco Nexus 9000 Series switch.

Note For a list of platforms on which FCoE is supported, see the Cisco Nexus 9000 Series NX-OS FCoE Configuration Guide.

Table 3: FC Verified Scalability Limits (Unidimensional)

Feature [5]	**Supported Platforms**	**Verified Limits**
FLOGI per port	Nexus 93180YC-FX switches	256
FLOGI per switch	Nexus 93180YC-FX switches	1,000
Port channels	Nexus 93180YC-FX switches	8 [6]
Maximum number of member ports in a port channel	Nexus 93180YC-FX switches	16
FC ports	Nexus 93180YC-FX switches	48
VSANs	Nexus 93180YC-FX switches	32

[5] Feature Verified Limit is 6.
[6] The number of SAN port channels and virtual FC port channels, together, can be only 8 on the Cisco Nexus 9000 Series switch.

Table 4: Intelligent Traffic Director Verified Scalability Limits (Unidimensional)

Feature	**Supported Platforms**	**Verified Limits**
Nodes per device group	Nexus 9200, 9300, and 9500 switches	32

Feature	Supported Platforms	Verified Limits
Nodes across all device groups	Nexus 9200, 9300, and 9500 switches	256
Device groups per switch	Nexus 9200, 9300, and 9500 switches	48
ITD services per switch	Nexus 9200, 9300, and 9500 switches	64
Ingress interfaces per ITD service	Nexus 9200, 9300, and 9500 switches	8
Virtual IP addresses per ITD service	Nexus 9200, 9300, and 9500 switches	255
Device groups per ITD service	Nexus 9200, 9300, and 9500 switches	48



Note For a list of platforms on which ITD is supported, see the Cisco Nexus 9000 Series NX-OS Intelligent Traffic Director Configuration Guide.

Table 5: Interfaces Verified Scalability Limits (Unidimensional)

Feature	Supported Platforms	Verified Limits
DHCP clients per switch	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, 9500 switches and the X9700-EX line cards	10 (IPv4) + 10 (IPv6)
Flex link	Nexus 9300-EX, 9300-FX/FX2, and 9364C switches	One pair consists of one each of active and backup interface. The active and backup interface can be either a physical port or port channel.
IP DHCP relay addresses (helper addresses) per L3 interface	32 (IPv4) + 32 (IPv6) - (Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, 9500 switches and the X9700-EX line cards	32 (IPv4) + 32 (IPv6)
Generic routing encapsulation (GRE) tunnels	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, 9500 switches and the X9700-EX line cards	8
LACP rate fast support during system switchover	Nexus 9500 switches with X9700-EX and X9700-FX line cards	606 ports in total on the Nexus 9516 switches with 16 line cards
MAC address - table limit per port	Nexus 9500 switches with N9K-X9636C-RX line cards	2,000
MAC address - table system, VLAN limit	Nexus 9500 switches with N9K-X9636C-RX line cards	2,000
Port channel links	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, 9500 switches and the X9700-EX, X9636C-R/RX, X9636Q-R line cards)	32

Feature	Supported Platforms	Verified Limits
SVIs	Nexus 9200 switches	490
	Nexus 9300-EX and 9300-FX/FX2 switches	1000 (with HSRP) 1000 HSRP groups
	Nexus 9300 switches	450 (with HSRP)
	Nexus 9500 switches and the X9700-EX line cards	490 (with HSRP), 1500 (without HSRP)
	X9636C-R/RX and X9636Q-R line cards	3,967
Selective QinQ with Multiprovider tag	Nexus 93180YC-EX, 93180YC-FX, and 9336C-FX2 switches	4,000 mappings, 10 provider VLANs;System wide: 48,000 mappings, 512 Provider VLANs
SVI Unnumbered	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX line cards	Primary (50); Secondary (450), 1 primary SVI can have a maximum of 50 secondary SVIs
vPCs	Nexus 9200, Nexus 9300, and Nexus 9300-FX/FX2 switches	80
	Nexus 9300-EX switches	48
	Nexus 9500 switches and the X9700-EX line cards	300
	X9636C-R/RX and X9636Q-R line cards	255
Static network address translation (NAT)	Nexus 9200, 9300, 9300-EX, 9300-FX, and 9300-FX2 switches	1,023
Dynamic network address translation (NAT)	Nexus 9200, 9300, 9300-EX, 9300-FX, and 9300-FX2 switches	1023
Static twice network address translation (NAT)	Nexus 9200, 9300, 9300-EX, 9300-FX, and 9300-FX2 switches	768
Dynamic twice network address translation (NAT)	Nexus 9200, 9300, 9300-EX, 9300-FX, and 9300-FX2 switches	1,023

Table 6: Label Switching Verified Scalability Limits (Unidimensional)

Feature	Supported Platforms	Verified Limits
Forwarding Equivalence Classes (FECs) (Node /Prefix /Adj / Binding SID)	Nexus 9200 switches	MPLS Heavy Template: 512; Default: 128
	Nexus 9300 and 9500 switches	128
	Nexus 9300-EX, and 9300-FX switches and the X9700-EX/FX line cards	MPLS Heavy Template: 4096; Default: 1024
	X9636C-R/RX and X9636Q-R line cards	1,000
Equal-cost multipaths (ECMPs)	Nexus 9200, 9300, and 9500 switches	16
	Nexus 9300-EX and 9300-FX switches, and the X9700-EX/FX line cards	32
	X9636C-R/RX and X9636Q-R line cards	8-way
Equal-cost multipaths Groups (ECMPs)	Nexus 9300-EX and 9300-FX switches, and the X9700-EX/FX line cards	MPLS Heavy Template: 4096; Default: 1024
	N9K-X9636C-RX line cards	24K ECMP Groups 2 paths per ECMP
FECs * ECMPs	Nexus 9200, 9300, and 9500 switches	1,000
	X9636C-R/RX and X9636Q-R line cards	8,000
Flex counters for segment-routing in ingress direction	Nexus 9300 and 9500 switches	4,000 (includes ingress and egress)
	Nexus 9200 switches	4,000 (includes ingress and egress) (MPLS Heavy Template)
	Nexus 9300-EX/FX switches and the X9700-EX/FX line cards)	Total ingress label stats: 4000; VRF ingress label stats: 1,000; (MPLS Heavy Template)
Flex counters for segment-routing in Egress direction	Nexus 9300 and 9500 switches	4,000 (includes ingress and egress)
	Nexus 2000 switches	4000 (includes ingress and egress) (MPLS Heavy Template)
	Nexus 9300-EX/FX switches and the X9700-EX/FX line cards	Total ingress label stats: 48K (MPLS Heavy Template)
Egress Peer Engineering	Nexus 9200, 9300, 9300-EX, and 9300-FX switches and the X9700-EX/FX line cards	64
IAS option B labels	X9636C-R/RX and X9636Q-R line cards	450,000

Feature	Supported Platforms	Verified Limits
Label-switched paths (LSPs) for label stack imposition[7]	Nexus 9300 and 9500 switches	128 (with 4-way ECMP and 3 label stack push)
	Nexus 9200 switches	256 (with 32-way ECMP and 5 label stack push)
	Nexus 9300-EX/FX switches and the X9700-EX/FX line cards	256 (with 32-way ECMP and 5 label stack push)
Layer 3 VPN routes	X9636C-R/RX and X9636Q-R line cards	450,000
Layer 3 EVPN Labels	Nexus 9300 and 9500 switches	128
	Nexus 9200 switches	128 (With MPLS Heavy Template)
	Nexus 9300-EX/FX switches and the X9700-EX/FX line cards	1,000 (With MPLS Heavy Template))
LDP session	N9K-X9636C-RX line card	64+ sessions
Node Sid/Prefix SID	Nexus 9200, 9300, and 9500 switches	128
	Nexus 9300-EX/FX switches and the X9700-EX/FX line cards	4,000
Adjacency SID	Nexus 9200, 9300, and 9500 switches	128
	Nexus 9300-EX/FX switches and the X9700-EX/FX line cards	600
Binding SID	Nexus 9200, 9300, and 9500 switches	50
	Nexus 9300-EX/FX switches and the X9700-EX/FX line cards	1,000
Private VLANs (PVLANs)		
Primary VLANs [8]	Nexus 9300, 9300-FX2, and 9500 switches and the X9700-EX/FX line cards	16
	Nexus 9300-EX and 9300-FX switches	400
Secondary VLANs [9]	Nexus 9300, 9300-FX2, and 9500 switches and the X9700-EX/FX line cards	20
	Nexus 9300-EX and 9300-FX switches	400
Ports in Community host mode	Nexus 9300, Nexus 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	40
Ports in isolated host mode	Nexus 9500 switches	20
	Nexus 9300, Nexus 9300-EX, and 9300-FX/FX2 switches and the X9700-EX/FX line cards	40)

Feature	Supported Platforms	Verified Limits
Ports in isolated trunk host mode	Nexus 9500 switches	22
	Nexus 9300, Nexus 9300-EX, 9300-FX/FX2 switches and the X9700-EX/FX line cards	40
Ports in promiscuous mode	Nexus 9300-EX and 9300-FX switches	10
	Nexus 9500 switches	48
	Nexus 9300 and 9300-FX2 switches and the X9700-EX/FX line cards	5
Ports in promiscuous trunk mode	Nexus 9300-EX and 9300-FX switches	10
	Nexus 9500 switches	80
	Nexus 9300 and 9300-FX2 switches and the X9700-EX/FX line cards	5
PVLANs allowed on a PVLAN port [10]	Nexus 9300-EX and 9300-FX switches	400
	Nexus 9300, 9300-FX2, and 9500 switches and the X9700-EX/FX line cards	16

7 For Cisco Nexus 9300 and 9500 Series switches, LSPs *ECMP* label stack push cannot exceed 1500.
8 The 400 PVLAN mapping scale per PVLAN port is only applicable when port is configured as promiscuous trunk port
9 The 400 PVLAN mapping scale per PVLAN port is only applicable when port is configured as promiscuous trunk port
10 The 400 PVLAN mapping scale per PVLAN port is only applicable when port is configured as promiscuous trunk port

Note For network scalability, Cisco recommends using a hierarchical routing design with multi-hop BGP for advertising the attached prefixes from a top-of-rack (ToR) or border leaf switch.

Table 7: Layer 2 Switching Verified Scalability Limits (Unidimensional)

Feature	Supported Platforms	Verified Limits
MAC addresses	Nexus 9200 and 9300-EX, 9300-FX/FX2 switches and the X9700-EX/FX line cards	92,000
	Nexus 9300 and 9500 switches	90,000
	X9636C-R/RX and X9636Q-R line cards	192,000
	N9K-C9264PQ, N9K-C9272Q, N9K-C9236C, N9K-C92300YC, N9K-C92304QC, N9K-C92300YC, and 9300-EX switches	200,000 [11]
MST instances	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2 switches and the X9700-EX/FX, X9636C-R/RX, and X9636Q-R line cards	64

Feature	Supported Platforms	Verified Limits
MST PV count with single instances 0	Nexus 9200, 9300-FX, and 9300-FX switches	190,000
MST virtual ports with more than 1 MST instance	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2 switches	48,000
	Nexus 9500 switches and the X9700-EX/FX line cards	85,000
	X9636C-R/RX and X9636Q-R line cards)	236,000
RPVST virtual ports	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2 switches	48,000
	Nexus 9500 switches and the X9700-EX/FX line cards	22,000
	X9636C-R/RX and X9636Q-R line cards	13,750
VLANs	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX, X9636C-R/RX, and X9636Q-R line cards	3,967 (the remaining 127 VLANs are reserved)
	Nexus 92348GC-X switches	4.096
VLANs in RPVST mode	Nexus 9200 and 9300-EX/FX/FX2/FX3/GX switches	3,967
	Nexus 9300 and 9500 switches	500
	3,967 - (X9700-EX/FX line cards)	3,967[12]
	X9636C-R/RX and X9636Q-R line cards	250
Total number of VLANs × ports with switchport isolated (3967 VLANs x 48 ports)	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches, and the X9700-EX/FX line cards	190,000
Private VLANs (PVLANs)		
Primary VLANs	Nexus 9300, 9300-EX/FX/FX2, 9500 switches and the Nexus 9700-EX line cards	16
Secondary VLANs	Nexus 9300, 9300-EX/FX/FX2, 9500 switches and the Nexus 9700-EX line cards	20
Ports in Community host mode	Nexus 9300, 9300-EX/FX/FX2, 9500 switches and the Nexus 9700-EX line cards	40
Ports in isolated host mode	Nexus 9500 switches	20
	Nexus 9300, 9300-EX/FX/FX2 switches and the Nexus 9700-EX line cards	40
Ports in isolated trunk host mode	Nexus 9500 switches	22
	Nexus 9300, 9300-EX/FX/FX2 switches and the Nexus 9700-EX line cards	40

Feature	Supported Platforms	Verified Limits
Ports in promiscuous mode	Nexus 9500 switches	48
	Nexus 9300, 9300-EX/FX/FX2 switches and the Nexus 9700-EX line cards	5
Ports in promiscuous trunk mode	Nexus 9500 switches	80
	Nexus 9300, 9300-EX/FX/FX2 switches and the Nexus 9700-EX line cards	5
PVLANs allowed on a PVLAN port	Nexus 9300, 9300-EX/FX/FX2, 9500 switches and the Nexus 9700-EX line cards	16

[11] Layer 2 unidimensional scale only. SVI, Layer 3 interface, and VXLAN VLANs are not supported. 200K MAC is enabled only when " system routing template-l2-heavy" is configured and the system is reloaded.

[12] On EOR, support is for 12000 PV count with 3967 vlans and RPVST with default timers. If 22000 PV count is needed with 3968 vlans and RPVST, recommended hello timer value is 4 or higher. It is also recommended to tune forward delay and max age accordingly



Note

- For more information on STP scale considerations, see Spanning Tree Protocol scale considerations, on page 37.
- The number of supported VLANs per vPC should be within the MST or RPVST virtual port count specified in this table, depending on the topology.
- The number of supported STP VLAN port instances for Fabric Extender host interface ports should be less than 13,000.

Table 8: Multicast Routing Verified Scalability Limits (Unidimensional)

Feature	Supported Platforms	Verified Limits
IPv4 multicast routes **Note** The limits are for a combination of IPv4 and IPv6 multicast routes. Layer 2 multicast routes are a part of the total 120K limits. For example 110,000 IPv4 + 2,000 IPv6 multicast routes.	Nexus 9200 switches	8,000 (Layer 2 + Layer 3) **Note** Cisco Nexus 9200 switches do not support the system routing template -Ipm - heavy mode for IPv4 multicast routes. Make sure to reset the LPM maximum limit to 0.
	Nexus 9300 switches	8,192 (Layer 2 + Layer 3)
	Nexus 9300-EX switches	8,000 (Layer 2 + Layer 3); 32,000 (layer 2 + Layer 3 with system routing template -multicast -heavy mode)
	Nexus 9300-FX/FX2 switches	8,000 (Layer 2 + Layer 3); 32,000 (layer 2 + Layer 3 with system routing template -multicast -heavy mode)
	Nexus 9500 switches	32,000 (Layer 2 + Layer 3)
	X9700-EX line cards	8,000 (Layer 2 + Layer 3); 32,000 (layer 2 + Layer 3 with system routing template -multicast -heavy mode); 8000 (with system routing template -lpm - heavy mode)
	Nexus 9300 switches and the X9700-FX line cards	8,000 (Layer 2 + Layer 3); 32,000 (layer 2 + Layer 3 with system routing template -multicast -heavy mode); 128,000 (with system routing template -multicast - ext - heavy mode) [13]
	X9636C-R/RX and X9636Q-R line cards	32, 000 (Layer 3)
IPv6 multicast routes	Nexus 9300-FX2 and 9364C switches	2048 (Layer 3 with system routing template -multicast -heavy mode)
Outgoing interfaces (OIFs)	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	40 (SVI + physical Layer 3) or 256 (physical Layer 3)
	X9636C-R/RX and X9636Q-R line cards	16 OIFs for 32K mroutes or 287 OIFs for 1000 mroutes
IGMP snooping groups	Nexus 9200, 9300, 9300-EX, and 9500 switches and the X9700-EX line cards	8,000
	Nexus 9600-R and 9600-RX line cards	8000
	Nexus 9300-FX/FX2 switches and the X9700-FX line cards	16,000
PIM neighbors	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2 switches	250
	Nexus 9500 switches and the X9700-EX/FX,X9636C-R/RX and X9636Q-R line cards	500

[13] All line cards must have the FX type.

Note

- The IPv4 multicast routes and the IPv4/IPv6 host routes share the same hardware table. Limits are provided for both the default line card mode and the max host line card mode.
- High availability (graceful restart and stateful switchover) is not supported when unicast or multicast aggressive timers are configured at any scale.

Table 9: IP Fabric for Media Solution Verified Scalability Limits (Unidimensional)

Feature	**Verified Limits**
Nodes	29 (2spine and 27 leafs)
Routes	32,000
Host Policy	
Sender	8,000
Receiver	8,000
PIM	512
FlowPolicy	2,000
ASM group-range	20
NBM Static Flows	
Per switch maximum (receiver leaf where the static OIF will be programmed) mroutes	1,500
Per fabric maximum mroutes	8,000
VRFs	16
RTP Flow Monitoring with ACL	
ACL	128 IPv4 ACL entries or 64 IPv6 ACL entries (total 128 TCAM spaces) **Note** With combined IPv4 and IPv6 ACL entries, the scale limit cannot exceed 128 TCAM space.

Note For a list of platforms on which IP Fabric for Media is supported, see Cisco Nexus 9000 Series NX-OS IP Fabric for Media Solution Guide.

Table 10: Programmability Verified Scalability Limits (Unidimensional)

Feature	Supported Platforms	Verified Limits
OpenFlow ports	Nexus 9300 switches	96
OpenFlow Layer 2 flows	Nexus 9300 switches	32,000
OpenFlow Layer 3 flows	Nexus 9300 switches	3,000
OpenFlow IPv6 Layer 3 flows	Nexus 9300 switches	1,500

Table 11: Security Verified Scalability Limits (Unidimensional)

Feature	Supported Platforms	Verified Limits
Egress ACLs	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2 switches and Nexus 9500 platform switches with the -R and -RX line cards	20,000
System ACLs	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2 switches and Nexus 9500 platform switches with the -R and -RX line cards	4000 TCAM entries in internal TCAM 64000 TCAM entries in external TCAM
ACLs	Nexus 92348GC-X switches	Ingress - 3072 IPv4, 1792 IPv6
DHCP snooping bindings	(Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX line cards	2,048
IPv4 ingress access control entries (ACEs)	X9636C-R/RX and X9636Q-R line cards	• RACL on LC N9K-X9636C-RX: 100,000 • PACL on LC N9K-X9636C-RX: 12,000 • RACL-2048, PACL-1024 (without TCAM Carving) IPv4 52640 ACEs per system • PACL IPv4: 1024 TCAM entries in internal TCAM • PACL MAC: 2048 TCAM entries in internal TCAM • RACL IPv4: 2048 TCAM entries in internal TCAM

Feature	Supported Platforms	Verified Limits
IPv6 ingress access control entries (ACEs)	For X9636C-R/RX and X9636Q-R line cards	• RACL-1024, PACL-1024 (without TCAM Carving) IPv6 25200 ACEs per system • PACL IPv6: 1024 TCAM entries in internal TCAM • RACL IPv6: 1024 TCAM entries in internal TCAM
IPv4 ingress TCAM entries	Nexus 9200, 9300-EX, and 9300-FX switches and the X9700-EX line cards	3,582 (per slice of the forwarding engine)
	Nexus 9300-FX2 switches	3,582
	(Nexus 9300 and 9500 switches	3,072 (per network forwarding engine)
IPv4 egress TCAM entries	Nexus 9200, 9300-EX, 9300-FX/FX2 switches and the X9700-EX line cards	1,792 (per slice of the forwarding engine)
	Nexus 9300 and 9500 switches	768 (per network forwarding engine)
IPv6 ingress TCAM entries	Nexus 9200, 9300-EX, and 9300-FX/FX2 switches and the X9700-EX line cards	1,792 (per slice of the forwarding engine)
	Nexus 9300 and 9500 switches	1,536 (per network forwarding engine)
IPv6 egress TCAM entries	Nexus 9200, 9300-EX, and 9300-FX/FX2 switches and the X9700-EX line cards	896 (per slice of the forwarding engine)
	Nexus 9300 and 9500 switches	256 (per network forwarding engine)

Note

- The TCAM entries scalability limits also apply to policy-based TCAM entries (PBACLs).
- Only 62 unique ACLs can be configured. Each ACL takes one label. If the same ACL is configured on multiple interfaces, the same label is shared. If each ACL has unique entries, the ACL labels are not shared, and the label limit is 62.

Table 12: System Management Verified Scalability Limits (Unidimensional)

Feature	Supported Platforms	Verified Limits
MPLS Stripping		
Labels	Nexus 9300 and 9500 switches	12,000
Ingress interfaces	Nexus 9200 and 9300 switches	48
	Nexus 9500 switches	400

Feature	Supported Platforms	Verified Limits
Egress interfaces	Nexus 9200 and 9300 switches	16
	Nexus 9500 switches	64
PTP		
PTP ports	Nexus 9200, 9300, 9300-EX, 9300-FX, 9300-FX2, and 9500 switches	64
	N9K-C92160YC-X	44
	X9700-EX line cards	1305
	9508-R line cards	64 per line card 300 per chassis **Note** PTP Offload is supported on 9508-R line cards.
PTP offload [14]	N9K-X9564PX line cards	32 PTP sessions per line card.
	N9K-X9636PQ line cards	24 PTP session per line card.
sFlow		
sFlow ports	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2 switches	64
	Nexus 9500 switches and the X9700-EX line cards	256
SPAN and ERSPAN		
Configurable SPAN or ERSPAN sessions	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2 switches and the X9636C-R/RX and X9636Q-R line cards	32
Active SPAN or ERSPAN sessions[15]	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX line cards	4
	Nexus 9500 switches and the X9700-EX/X9700-FX line cards	4 to 32, based on the number of line cards and the session configuration
	X9636C-R/RX and X9636Q-R line cards	32
Active localized SPAN or ERSPAN sessions per line card[16]	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/X9700-FX line cards	4
	X9636C-R/RX and X9636Q-R line card)	32 sessions across ports on single line card

Feature	Supported Platforms	Verified Limits
Active localized SPAN or ERSPAN session (Rx and Tx, Rx, or Tx)	X9636C-R/RX and X9636Q-R line cards	32 sessions, 128 sources and 1 destination
Source interfaces per SPAN or ERSPAN session (Rx and Tx, Rx, or Tx)	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX line cards	48
Destination interfaces per SPAN session	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX, X9636C-R/RX, and X9636Q-R line cards	1 (physical/PO interface)
Source VLANs per SPAN or ERSPAN session	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX, X9636C-R/RX, and X9636Q-R line cards	32
Tap Aggregation		
Redirect interfaces in the redirect port list	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches	12
Redirect port lists (or fan outs) per system	Nexus 9200, 9300-EX, and 9300-FX/FX2 switches	12
	Nexus 9300 and 9500 switches	100
NetFlow		
Flow monitors	Nexus 9300-EX switches and Nexus 9500 switches with 9700-EX and FM-E fabric line cards	2 exporters and 2 flow monitors per type (2 IPv4 flow monitors and 2 IPv6 flow monitors)
	Nexus 9300-FX/FX2 switches	2 exporters and 32 flow monitors per type (32 Layer 2 flow monitors, 32 IPv4 flow monitors, and 32 IPv6 flow monitors)
Layer 3 interfaces (Layer 3 ports, port channels, and SVIs) to which IPv4 flow monitors can be applied	Nexus 9300-EX switches	Number of Layer 3 interfaces (Layer 3 ports, port channels, and SVIs) to which IPv4 flow monitors can be applied. You can use the show interface hardware-mappings command to check if the interface belongs to ASIC slice 0 or slice 1.
Layer 3 interfaces (Layer 3 ports, port channels, and SVIs) to which IPv6 flow monitors can be applied	Nexus 9300-EX switches	252 (with members on just one ASIC slice) or 126 (with members on both ASIC slices). You can use the show interface hardware-mappings command to check if the interface belongs to ASIC slice 0 or slice 1.

[14] An EPLD upgrade is necessary before you use PTP offload.
[15] A single forwarding engine instance supports four SPAN or ERSPAN sessions. For Cisco Nexus 9300 Series switches, if the first three sessions have bidirectional sources, the fourth session has hardware resources only for Rx sources. This limitation might also apply to Cisco Nexus 9500 Series switches, depending on the SPAN or ERSPAN source's forwarding engine instance mappings.
[16] The number of SPAN or ERSPAN sessions per line card reduces to two if the same interface is configured as the bidirectional source in more than one session.



Note PTP is supported for all Cisco Nexus 9000 Series hardware except for the 100G 9408PC line card and the 100G M4PC generic expansion module (GEM).

Table 13: Unicast Routing Verified Scalability Limits (Unidimensional)

Feature	Supported Platforms	Verified Limits
Unicast Routing		
BFD sessions (echo mode)	Nexus 9200, 9300, 9364C, 9300-EX, and 9300-FX/FX2 switches	128 **Note** Cisco Nexus 9300 (EX, FX, FX2, and 9364C) platform switches support up to 512 BFD sessions, when the BFD intervals are relaxed to 300 ms.
	Nexus 9500 switches	512
	X9700-EX /FX line cards	512[17]
	X9636C-R/RX and X9636Q-R line cards	288
BGP neighbors	Nexus 9200 switches	512 (IPv4), 512 (IPv6), or 256 (IPv4 + IPv6)
	Nexus 92348GC-X switches	141
	Nexus 9300, 9364C, 9300-EX, and 9300-FX/FX2 switches	1024 (9346C, 9300-EX, 9300-FX/FX2)
	Nexus 9500 switches and the X9700-EX/FX line cards	2,000
	X9636C-R/RX and X9636Q-R line cards	960
EIGRP routes	Nexus 9200, 9300, 9364C, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX /FX line cards	20, 000

Feature	Supported Platforms	Verified Limits
EIGRP neighbors	Nexus 9200, 9300, 9364C, 9300-EX, and 9300-FX/FX2 switches	256
	Nexus 9500 switches and the X9700-EX/FX line cards	512
HSRP groups	Nexus 9200, 9300, 9364C, 9300-EX, and 9500 switches and the X9700-EX /FX, X9636C-R/RX, and X9636Q-R line cards	490
	Nexus 9300-EX and FX2 switches	1000 [18]
IPv4 ARP	Nexus 9200 and 9364C switches	32,000
	Nexus 9300 and 9500 switches and the X9636C-R/RX and X9636Q-R line cards	48,000
	Nexus 9300-EX and 9300-FX switches	Nexus 9300-EX and 9300-FX switches
	Nexus 9300-FX2 switches	64,000 / 32,000 (with out/with urpf enabled) (in default routing mode, Hash Table: Shared between IPv6 ND, IPv4 ARP)
	X9700-EX /FX line cards	X9700-EX /FX line cards
IPv4 host routes [19]	Nexus 9200 switches	96,000 (hash table and there will be more collisions after 80%)
	Nexus 9300 and 9500 switches	Default System Routing Mode: 208,000 (hash table and there will be more collisions after 80%)
	Nexus 9364C switches	96,000
	Nexus 9300-EX switches	458,000 (default); 786,000/720,000 (with system routing template -lpm - heavy mode)
	Nexus 9300-FX switches	471,000 / 419,000 (with out/with urpf enabled) (default); 786,000/734,000 (with system routing template -lpm -heavy mode)
	Nexus 9300-FX2 switches	471,000 (default); 786,000/734,000 (with out/with urpf enabled) (with system routing template -lpm -heavy mode)
	X9700-EX line card	589,000 (default); 786,000 (with system routing template -lpm -heavy mode)
	X9636C-R	750,000
	X9636C-RX	1,000,000

Feature	Supported Platforms	Verified Limits
IPv6 host routes [20]	Nexus 9200 switches	48,000 (hash table and there will be more collisions after 80%)
	Nexus 9300 and 9500 switches	Default System Routing Mode: 104,000 (hash table and there will be more collisions after 80%); ALPM Routing Mode: 16000 with host Routes Programmed in the LPM Table.
	Nexus 9364C switches	48,000
	Nexus 9300-EX switches	24000 / 16,000 (with out/with urpf enabled)
	Nexus 9300-FX switches	265,000 / 235,000 (with out/with urpf enabled) (default) 442,000 / 412,000 (with out/with urpf enabled) (with system routing template -lpm - heavy mode)
	Nexus 9300-FX2 switches	265,000 (default) 442,000 / 412,000 (with out/with urpf enabled) (with system routing template -lpm - heavy mode)
	X9700-EX/FX line cards	32,000 (FM-E), 235000 (FM-E2)
	X9636C-RX	256,000
IPv6 ND	Nexus 9200, 9364C, 9300-EX, and 9300-FX2 switches	32,000 (default), 16,000 (lpm heavy)
	Nexus 9300 and 9500 switches	48,000
	Nexus 9300-FX	32,000 (in default routing mode, Hash Table: Shared between IPv6 ND, IPv4 ARP)
	X9700-EX/FX, X9636C-R/RX, and X9636Q-R line cards	32,000

Feature	Supported Platforms	Verified Limits
IPv4 unicast routes (LPM)*	Nexus 9200 switches	• Default values: 6000 (IPv4), 1900 (IPv6), and 2000 (multicast) • With hardware profile multicast max-limit lpm-entries 0 configured: 8000 (IPv4), 1900 (IPv6), and 0 (multicast) • With hardware profile ipv6 lpm-entries maximum 0 configured: 14,000 (IPv4), 0 (IPv6), and 2000 (multicast) • With hardware profile ipv6 lpm-entries maximum 4096 and hardware profile multicast max - limit lpm - entries 0 configured: 0 (IPv4), 4096 (IPv6), and 0 (multicast) • When you allocate the entire table for IPv4 or IPv6 LPM unicast routes, the other address family cannot be used
	Nexus 9300 switches	12,000 (default system routing mode); 128,000 (ALPM routing mode)
	Nexus 9364C switches	• Default values: 8000 (IPv4), 1900 (IPv6), and 2000 (multicast) • With hardware profile multicast max-limit lpm-entries 0 configured: 10000 (IPv4), 1900 (IPv6), and 0 (multicast) • With hardware profile ipv6 lpm-entries maximum 0 configured: 14,000 (IPv4), 0 (IPv6), and 2000 (multicast) • With hardware profile ipv6 lpm-entries maximum 4096 and hardware profile multicast max - limit lpm - entries 0 configured: 4000 (IPv4), 4096 (IPv6), and 0 (multicast) • When you allocate the entire table for IPv4 or IPv6 LPM unicast routes, the other address family cannot be used.
	Nexus 9300-EX switches	458,000 (default)
	Nexus 9300-FX switches	

Feature	Supported Platforms	Verified Limits
		471,000 / 419,000 (with out / with urpf enabled) (default)
	Nexus 9300-FX2 switches	471,000 (default)
	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2 switches and the X9636Q-R line cards	128,000 (default system routing mode); 16,000 (max-host routing mode)
	Nexus 9500 switches	128,000 with no IPv6 routes (64-bit ALPM routing mode)
	X9700-EX /FX line cards	589,000 (default)
	N9K-X9636Q-R, N9K-9636C-R, and N9K-93180YC-R line cards	192,000 (Default system routing template)
	X9636C-RX	1,000,000 (Default system routing template)

Feature	Supported Platforms	Verified Limits
IPv6 unicast routes (LPM)*	Nexus 9200 switches	• Default values: 6000 (IPv4), 1900 (IPv6), and 2000 (multicast) • With hardware profile multicast max-limit lpm-entries 0 configured: 8000 (IPv4), 1900 (IPv6), and 0 (multicast) • With hardware profile ipv6 lpm-entries maximum 0 configured: 14,000 (IPv4), 0 (IPv6), and 2000 (multicast) • With hardware profile ipv6 lpm-entries maximum 4096 and hardware profile multicast max - limit lpm - entries 0 configured: 0 (IPv4), 4096 (IPv6), and 0 (multicast) • When you allocate the entire table for IPv4 or IPv6 LPM unicast routes, the other address family cannot be used.
	Nexus 9300 switches	7000 (6000 routes < /64, 1000 routes > /64) (default system routing mode); 20,000 (ALPM routing mode)
	Nexus 9364C switches	• Default values: 8000 (IPv4), 1900 (IPv6), and 2000 (multicast) • With hardware profile multicast max-limit lpm-entries 0 configured: 10000 (IPv4), 1900 (IPv6), and 0 (multicast) • With hardware profile ipv6 lpm-entries maximum 0 configured: 14,000 (IPv4), 0 (IPv6), and 2000 (multicast) • With hardware profile ipv6 lpm-entries maximum 4096 and hardware profile multicast max - limit lpm - entries 0 configured: 4000 (IPv4), 4096 (IPv6), and 0 (multicast) • When you allocate the entire table for IPv4 or IPv6 LPM unicast routes, the other address family cannot be used
	Nexus 9300-EX switches	206,000 (/64 prefix length); 1900 (non /64 prefix length)

Feature	Supported Platforms	Verified Limits
	Nexus 9300-FX switches	265,000 / 235,000 (with out/with urpf enabled) (default)
	Nexus 9300-FX2 switches	265,000 (default)
	Nexus 9500 switches	20,000 (default system routing mode) 4000 (max-host routing mode) 80,000 with no IPv4 routes (64-bit ALPM routing mode)
	X9700-EX /FX line cards	176,000 (/64 prefix length); 3900 (non /64 prefix length) (FM-E) and 235,000 (any prefix length) (FM-E2)
	X9636C-R, X9636Q-R, and X96136YC-R line cards	62,000 (Default system routing template)
	X9636C-RX	256,000 (Default system routing template)
IPv4 and IPv6 unicast routes (LPM) in 64-bit ALPM routing mode	Nexus 9500 switches	128,000 (IPv4) and 80,000 (IPv6)
IPv4 host routes (LPM heavy mode)	Nexus 9236C, 9272Q, and 92304QC switches	262,000
	Nexus 92160YC-X switches	650,000
	Nexus 9364C switches	262,000
	Nexus 9300-EX switches	786,000 / 720,000 (with out/with urpf enabled)
	Nexus 9300-FX switches	786000 / 734000 (with out/with urpf enabled)
	Nexus 9300-FX2 switches	786,000 / 734,000 (with out/with urpf enabled)
	X9700-EX /FX line cards	786,000

Feature	Supported Platforms	Verified Limits
IPv6 host routes (LPM heavy mode)	Nexus 9200 switches	16,000
	Nexus 9364 switches	131,000
	Nexus 9300-EX switches	24000 / 16,000 (with out/with urpf enabled) (protocol learned host)
	Nexus 9300-FX/FX2 switches	442,000 / 412,000 (with out/with urpf enabled) (protocol learned host)
	X9700-EX/FX line cards	32,000 (shared between IPv6 ND and protocol learned host) (FM-E) and 235,000 (FM-E2)
IPv4 LPM routes (LPM heavy mode)	Nexus 9236C, 9272Q, and 92304QC switches	262,000
	Nexus 92160YC-X switches	650,000
	Nexus 9364C switches	262,000
	Nexus 9300-EX switches	786,000 / 720,000 (with out/with urpf enabled)
	Nexus 9300-FX switches	786,000 / 734,000 (with out/with urpf enabled)
	Nexus 9300-FX2 switches	786,000 / 734,000 (with out/with urpf enabled)
	X9700-EX/FX line cards	786,000
IPv6 LPM routes (LPM heavy mode)	Nexus 9236C, 9272Q, and 92304QC switches	131,000 (/64 prefix length); 1900 (non /64 LPM scale)
	Nexus 92160YC-X switches	294,000 (/64 prefix length); 1900 (non /64 LPM scale)
	Nexus 9364C switches	131,000
	Nexus 9300-EX switches	353,000 / 324,000 (with out/with urpf enabled) (/64 prefix length); 1900 (non /64 prefix length)
	Nexus 9300-FX/FX2 switches	442,000 / 412,000 (with out/with urpf enabled)
	X9700-EX /FX line cards	235,000 (/64 prefix length); 3900 (non /64 prefix length) (FM-E) and 235,000 (any prefix length) (FM-E2)

Feature	Supported Platforms	Verified Limits
IPv4 host routes (dual-host mode)	Nexus 9200 and 9364C switches	163,000
	Nexus 9300-EX and 9300-FX/FX2 switches	262,000
IPv6 host routes (dual-host mode)	Nexus 9200 and 9364C switches	81,000
	Nexus 9300-EX and 9300-FX/FX2 switches	131,000
IPv4 LPM routes (dual-host mode)	Nexus 9200 and 9300-EX switches	6000
	Nexus 9364C switches	8,000
	Nexus 9300-FX/FX2 switches	7,000
IPv6 LPM routes (dual-host mode)	Nexus 9200, 9300, 9364C, 9300-EX, and 9300-FX/FX2 switches	1,900
IPv4 ARP (dual-host mode)	Nexus 9200, 9300, 9364C, 9300-EX, and 9300-FX/FX2 switches	64,000
IPv6 ND (dual-host mode)	Nexus 9200, 9300, 9364C, 9300-EX, and 9300-FX/FX2 switches	64,000
IPv4 host routes (internet-peering mode)	Nexus 9300-EX and 9300-FX/FX2 switches	1 Million (protocol learned host)
IPv6 host routes (internet-peering mode)	Nexus 9300-EX switches and the X9700-EX /FX line cards	16,000 (Hash Table: Shared between IPv6 ND, IPv4 ARP, and protocol learned IPv6 host)
	Nexus 9300-FX/FX2 switches	500,000
Routes (internet-peering mode)	Nexus 9500 switches with the N9K-X9636Q-R and N9K-9636C-R line cards	1 Million[21]
IPv4 routes (internet-peering mode)	Nexus 9500 switches with the N9K-X9636Q-R and N9K-9636C-R line cards	852000[22]
IPv6 routes (internet-peering mode)	Nexus 9500 switches with the N9K-X9636Q-R and N9K-9636C-R line cards	175000[23]
Routes (internet-peering mode)	Nexus 9500 switches with the N9K-96136YC-R line cards	852000
IPv4 routes (internet-peering mode)	Nexus 9500 switches with the N9K-96136YC-R line cards	781000

Feature	Supported Platforms	Verified Limits
IPv6 routes (internet-peering mode)	Nexus 9500 switches with the N9K-96136YC-R line cards	71000
IPv4 ARP (internet peering mode)	Nexus 9300-EX switches and the X9700-EX/FX line cards	32,000 (Hash Table: Shared between IPv6 ND, IPv4 ARP, and protocol learned IPv6 host)
	Nexus 9300-FX/FX2 switches	32,000 (Hash Table: Shared between IPv6 ND, IPv4 ARP)
IPv6 ND (internet-peering mode)	Nexus 9300-EX switches and the X9700-EX/FX line cards	16,000 (Hash Table: Shared between IPv6 ND, IPv4 ARP, and protocol learned IPv6 host)
	Nexus 9300-FX/FX2 switches	16,000 (Hash Table: Shared between IPv6 ND, IPv4 ARP)
IS-ISv4 adjacencies (either L1, L2, or sum of L1 and L2 with default timers)	Nexus 9200, 9300, 9364C, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX /FX line cards	255
IS-ISv4 BFD sessions (with default timers)	Nexus 9300, 9364C, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	255
IS-ISv4 routes	Nexus 9200, 9300, 9364C, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX /FX line cards	10,000
IS-ISv4 network type	Nexus 9200, 9300, 9364C, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	Point to point, broadcast
Groups with default timers (3s/10s) and multiple group optimization. [There are 2 primary, one for IPv4 and the other for IPv6, and 7926 secondary]	X9636C-R/RX and X9636Q-R line cards	7,928
Groups with aggressive timers (1s/3s) and multiple groups optimization. [There are 2 primary, one for IPv4 and the other for IPv6, and 7926 secondary][24]	X9636C-R/RX and X9636Q-R line cards	7,928
Groups per interface or I/) module	X9636C-R/RX and X9636Q-R line cards	Maximum 16 (Because 16 is the unique virtual MAC address limit)
OSPF/OSPFv3 LSA/LSDB size	X9636C-R/RX and X9636Q-R line cards	250, 000
OSPF/OSPFv3 areas	X9636C-R/RX and X9636Q-R line cards	15

Feature	Supported Platforms	Verified Limits
OSPFv2 neighbors	Nexus 9500 switches and the X9700-EX /FX, X9636C-R/RX, and X9636Q-R line cards	1,000
	Nexus 9200, 9300, 9364C, 9300-EX, 9300-FX/FX2, and 9500 switches	256
OSPFv3 neighbors	Nexus 9500 switches and the X9700-EX/FX, X9636C-R/RX, and X9636Q-R line cards	1000
	Nexus 9200, 9300, 9364C, 9300-EX, 9300-FX/FX2, and 9500 switches	256
OSPF/OSPFv3 LSA/LSDB size	Nexus 9200, 9300, 9364C, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	100,000
OSPF/OSPFv3 areas	Nexus 9200, 9300, 9364C, 9300-EX, 9300-FX, 9300-FX2, and 9500 switches and the X9700-EX/FX line cards	100
Static routes	Nexus 9200, 9300, 9364C, 9300-EX, 9300-FX, 9300-FX2, and 9500 switches and the X9700-EX/FX line cards	4,000
VRFs	Nexus 9200, 9300, 9364C, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	1,000
	X9636C-R/RX and X9636Q-R line cards	3,967
VRRP groups per interface or I/O module	Nexus 9200, 9300, 9364C, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	250
Policy-based routing (PBR)		
Configured sequences per policy	Nexus 9200, 9300-EX, 9300-FX/FX2 switches and the X9700-EX/FX line cards	128
	Nexus 9300 and 9500 switches	256
Next-hop addresses per policy	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	32
IPv4 ACEs (unidimensional)	Nexus 9200, 9300-EX, and 9300-FX/FX2 switches and the X9700-EX /FX line cards	3582 (per network forwarding engine)
	Nexus 9300 and 9500 switches	3072 (per network forwarding engine)

Feature	Supported Platforms	Verified Limits
IPv6 ACEs (unidimensional)	Nexus 9200, 9300-EX, and 9300-FX/FX2 switches	1792 (per network forwarding engine)
	Nexus 9300 and 9500 switches	1536 (per network forwarding engine)
IPv4 and IPv6s ACEs	Nexus 9200, 9300-EX, and 9300-FX/FX2 switches	1024 IPv4 + 128 IPv6
	Nexus 9300 and 9500 switches	2048 IPv4 + 256 IPv6
	X9700-EX/FX line cards	1024 IPv4
Interfaces with PBR policy	Nexus 9200, 9300-EX, and 9300-FX/FX2 switches and the X9700-EX/FX line cards	512
	Nexus 9300 and 9500 switches	256
VRRPv3		
VRRPv3 groups per interface	Nexus 9200, 9300-EX, and 9300-FX/FX2 switches and the X9700-EX /FX line cards	255
VRRPv3 groups with default timers (1 s)	Nexus 9200, 9300-EX, and 9300-FX/FX2 switches and the X9700-EX/FX line cards	490
VRRPv3 groups with relaxed timers (3 s)	Nexus 9200, 9300-EX, and 9300-FX/FX2 and the X9700-EX /FX line cards	490
Pathways with one VRRPv3 group with default timer (1 s)	Nexus 9200, 9300-EX, and 9300-FX/FX2 switches and the X9700-EX/FX line cards	489
VRRPv3 groups and pathways combined	Nexus 9200, 9300-EX, and 9300-FX/FX2 switches and the X9700-EX/FX line cards	490
ECMP		
ECMP Paths	Nexus 9200, 9300-EX, and 9300-FX/FX2/FXP, and 9504 / 9508 switches with -R/ RX line cards	64

[17] The limit of supported BFD sessions for each EoR line card is 75.

[18] If you have more than 490 groups, then only one group per SVI. SVIs cannot have a user defined MAC or any VRRP group with it.

[19] The hash table is subject to collisions. Depending on the host route pattern, collisions might occur.

[20] The hash table is subject to collisions. Depending on the host route pattern, collisions might occur.

[21] Contains internet peering profile with additional IPv4 and IPv6 routes.

[22] Internet profile with additional IPv4 routes (total of 914K routes consisting of IPv4 and 62K of IPv6)

[23] Internet profile with additional IPv6 routes (total of 871K routes consisting of IPv6 and 696K of IPv4)

[24] If the user has Multi-protocol configuration, user should configure appropriate CoPP policies so as to avoid any control plane traffic drops.

For the Cisco Nexus 9200 Platform switches, the default value for LPM unicast routes is 6000 (IPv4) or 1900 (IPv6). You can use the **hardware profile multicast max-limit lpm-entries 0** command to increase the number of IPv4 LPM unicast routes to 8000.

The **hardware profile ipv6 lpm-entries maximum 0** command reserves the entire LPM table for IPv4. With this configuration, the IPv4 LPM scale is 14,000 (with 2000 reserved for multicast by default). This value can be increased to 16,000 with the **hardware profile multicast max-limit lpm-entries 0** command. The **hardware profile ipv6 lpm-entries maximum 4096** command reserves the entire LPM table for IPv6. With this configuration, the IPv6 LPM scale is 3900. When you allocate the entire table for IPv4 or IPv6 LPM unicast routes, the other address family cannot be used.

The maximum number of PBR next-hops based on 4 FM-E supported is 192 per slice of the forwarding engine



Note

- The IPv4/IPv6 host routes and the IPv4 multicast routes share the same hardware table. Limits are provided for both the default line card mode and the max host line card mode.
- The IPv4 and IPv6 unicast routes share the same hardware table. Limits are provided for both the default line card mode and the max host line card mode.
- High availability (graceful restart and stateful switchover) is not supported when unicast or multicast aggressive timers are configured at any scale.

Guidelines and Limitations for OSPF Verified Scalability Limits

- To achieve the highest scale, we recommend that you use a single OSPF instance instead of multiple instances.
- Each OSPFv2 and OSPFv3 scale value might vary when combined with other parameters.
- The graceful restart timeout value might need to be increased in multi-dimensional scenarios.

Table 14: PVLAN VXLAN Verified Scalability Limits (Unidimensional)

Feature	Supported Platforms	Verified Limits
Primary VLANs	Nexus 9300-EX and 9300-FX/FX2 switches	16
Secondary VLANs	Nexus 9300-EX and 9300-FX/FX2 switches	20
Ports in community host mode	Nexus 9300-EX and 9300-FX/FX2 switches	40
Port in Isolated host mode	Nexus 9300-EX and 9300-FX/FX2 switches	40
Ports in isolated trunk mode	Nexus 9300-EX and 9300-FX/FX2 switches	40
Ports in promiscuous mode	Nexus 9300-EX and 9300-FX/FX2 switches	5
PVLANs allowed on a PVLAN port	Nexus 9300-EX and 9300-FX/FX2 switches	16

Table 15: VXLAN Verified Scalability Limits (Unidimensional)

Feature	Supported Platforms	Verified Limits
IGMP snooping over VXLAN		
VXLAN VLANs	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2 and the X9700-EX/FX line cards	1000
VTEP Peers[25]	Nexus 9200 and 9300 switches	256
	Nexus 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX, X9636C-R/RX, and X9636Q-R line cards	512
Underlay multicast groups	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2 switches and the X9700-EX/FX line cards	128
Multi-Site [26]		
Number of Sites	Nexus 9200 and 9300 switches	10
	Nexus 9300-EX, 9300-FX/FX2, 9332C, 9364C, and 9500 switches and the X9700-EX/FX line cards	25
Number of BGWs per site with TRM enabled[27]	Nexus 9200, 9300, 9332C, 9364C, and 9500 switches and the X9700-EX/FX line cards	2 (Anycast), 2(vPC)
	Nexus 9300-EX and 9300-FX/FX2 switches	6 (Anycast), 2(vPC)
Number of sites for TRM	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, 9332C, 9364C, and 9500 switches and the X9700-EX/FX line cards switches	15 sites
Number of BGWs for TRM	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, 9332C, 9364C, and 9500 switches and the X9700-EX/FX line cards switches	06 BGW
VTEPs per Site	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	256
Tenant Route Multicast L3 Mode with VXLAN BGP eVPN		

Feature	Supported Platforms	Verified Limits
VXLAN Layer 2 VNI	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2 and the X9700-EX/FX line cards	1000
VXLAN Layer 3 VNI/VRFs	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2 and the X9700-EX/FX line cards	250
VTEP Peers	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2 and the X9700-EX/FX line cards	256
Underlay Multicast Group (PIM ASM Underlay)	Nexus 9200, 9300,9300-EX, and 9300-FX/FX2 and the X9700-EX/FX line cards	2[28]
Overlay Multicast Group (PIM ASM & PIM SSM)	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2 and the X9700-EX/FX line cards	7200[29]
VXLAN Flood and Learn		
Virtual network identifiers (VNIs) or VXLAN-mapped VLANs	Nexus 9200, 9300, 9300-EX,and 9300-FX/FX2 switches	2000
	Nexus 9500 switches and the X9700-EX/FX line cards	1000
Underlay multicast groups	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	128
Overlay MAC addresses	Nexus 9200, 9300, and 9500 switches	64,000
	Nexus 9300-EX and 9300-FX switches and the X9700-EX/FX line cards	90,000
	Nexus 9300-FX2 switches	60,000
Remote VXLAN tunnel endpoints (VTEPs Multicast)	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	256
Ingress replication peers [30]	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	256
Ingress replication Layer 2 VNIs	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	1000

Feature	Supported Platforms	Verified Limits
MAC addresses for ingress replication	Nexus 9200, 9300, and 9500 switches	64,000
	Nexus 9300-EX and 9300-FX/FX2 switches and the X9700-EX/FX line cards	90,000
Port VLAN translations under an interface	Nexus 9300 and 9500 switches and the X9700-EX/FX line cards	100
	Nexus 9300-EX and 9300-FX switches	4,000
	Nexus 9300-FX2 switches	500
Port VLAN translations in a switch	Nexus 9300 switches and the X9700-EX/FX line cards	2000
	Nexus 9300-EX and 9300-FX switches	24000
	Nexus 9300-FX2 switches	6,000
	Nexus 9500 switches	200
Static MAC addresses pointing to a remote VTEP	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	1000
VXLAN VLAN logical port VP count	Nexus 9300 and 9500 switches	7,000
VXLAN VLANs per FEX port (host interface)	Nexus 9300 and 9500 switches	75
	Nexus 93180YC-EX	75[31]
Layer 2 routed VNIs for vPC-centralized gateway	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	450
IGMP groups	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	8,192
VXLAN BGP eVPN		
Layer 2 VNIs	Nexus 9200 and 9300 switches and the X9636C-R/RX and X9636Q-R line cards	2000
	Nexus 9300-EX and 9300-FX/FX2 switches	2000, 4000 (with no Layer 3 VNIs)
	Nexus 9500 switches and the X9700-EX/FX line cards	1000
Xconnect VLANs	Nexus 9300, 9332C, 9364C, 9300-EX, and 9300-FX/FX2 switches	40

Feature	Supported Platforms	Verified Limits
SVI with Distributed Anycast Gateway; Layer 2 VNI extended	Nexus 9300-EX switches	2,000[32]
	Nexus 9300-EX switches	2000[33]
	Nexus 9300 and 9300-FX/FX2 switches	2,000
	Nexus 9500 switches and the X9700-EX/FX line cards	1000
Layer 3 VNIs / VRFs[34]	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2 switches and the X9636C-R/RX and X9636Q-R line cards	900
	Nexus 9500 switches and the X9700-EX/FX line cards	750
Underlay multicast groups	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	128
VTEPs	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2, and 9500 switches and the X9700-EX FX, X9636C-R/RX, and X9636Q-R line cards	512
MAC addresses	Nexus 9200, 9300, and 9500 switches	64,000
	Nexus 9300-EX and 9300-FX/FX2 switches and the X9700-EX /FX line cards	90,000
	Nexus 92348GC-X switches	97,000
IPv4 host routes	Nexus 9200, 9300, and 9500 switches	60,000
	Nexus 92348GC-X switches	16,000
	Nexus 9300-EX switches	458,000
	Nexus 9300-FX/FX2 switches	471,000
	X9700-EX/FX line cards	656,000
	X9636C-R/RX and X9636Q-R line cards	128,000
IPv6 host routes	Nexus 9200, 9300, and 9500 switches)	7,000
	Nexus 9300-EX switches	24,000
	Nexus 9300-FX/FX2 switches	265,000
	X9700-EX/FX line card	34,000
	X9636C-R/RX and X9636Q-R line cards	32,000

Feature	Supported Platforms	Verified Limits
Overlay IPv4 LPM routes	Nexus 9200 switches	8,000
	Nexus 9300 and 9500 switches	12,000
	Nexus 9300-EX switches	458,000
	Nexus 9300-FX/FX2 switches	471,000
	X9700-EX/FX line cards	656,000
Overlay IPv6 LPM routes	Nexus 9200 switches	2,000
	Nexus 9300 and 9500 switches	7000
	Nexus 9300-EX switches	206,000[35]
	Nexus 9300-FC/FX2 switches	265,000[36]
	X9700-EX/FX line cards	174,000[37]
VXLAN VLAN logical port VP count	Nexus 9300 switches	10,000
	Nexus 9500 switches	7,000
VXLAN VLANs per FEX port (host interface)	Nexus 9500 switches	75
IGMP groups	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	8,192
VXLAN BGP eVPN Ingress Replication		
Layer 2 VNIs	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2 switches	2,000
	Nexus 9500 switches and the X9700-EX/FX line cards	1,000
Xconnect VLANs	Nexus 9300, 9300-EX, and 9300-FX/FX2 switches	40
Selective Qinvni with multiprovider tag	Nexus 93180YC-EX, 93180YC-FX, and 9336C-FX2 switches	- 4,000 mappings, 10 provider VLANs;System wide: 48,000 mappings, 512 Provider VLANs
SVI with Distributed Anycast Gateway; Layer 2 VNI extended	Nexus 9200 and 9300-EX switches	2,000[38]
	Nexus 9300 and 9300-FX/FX2 switches	2,000
	Nexus 9500 switches and the X9700-EX/FX line cards	1,000

Feature	Supported Platforms	Verified Limits
Layer 3 VNIs / VRFs[39]	Nexus 9200, 9300, 9300-EX, and 9300-FX/FX2 switches	900
	Nexus 9500 switches and the X9700-EX/FX line cards	750
VTEPs	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	256
MAC addresses	Nexus 9200, 9300, and 9500 switches	64,000
	Nexus 9300-EX and 9300-FX/FX2 switches and the X9700-EX/FX line cards	90,000
IPv4 host routes	Nexus 9200, 9300, and 9500 switches	32,000
	Nexus 9300-EX switches	458,000
	Nexus 9300-FX/FX2 switches)	471,000
	X9700-EX/FX line cards	656,000
IPv6 host routes	Nexus 9200, 9300, and 9500 switches	7,000
	Nexus 9200, 9300, and 9500 switches	24,000
	Nexus 9300-FX/FX2 switches	265,000
	X9700-EX/FX line cards	34,000
Overlay IPv4 LPM routes	Nexus 9200 switches	8,000
	Nexus 9300 and 9500 switches	12,000
	Nexus 9300-EX switches	458,000
	Nexus 9300-FX/FX2 switches	471,500
	(X9700-EX/FX line cards	656,000
Overlay IPv6 LPM routes	Nexus 9200 switches	2,000
	Nexus 9300 and 9500 switches	7,000
	Nexus 9300-EX switches	206,000[40]
	Nexus 9300-FX/FX2 switches	265,000[41]
	X9700-EX/FX line cards	174,000[42]
VXLAN VLAN logical port VP count	Nexus 9300 and 9500 switches	7,500

Feature	Supported Platforms	Verified Limits
VXLAN VLANs per FEX port (host interface)	Nexus 9300 and 9500 switches	75
IGMP groups	Nexus 9200, 9300, 9300-EX, 9300-FX/FX2, and 9500 switches and the X9700-EX/FX line cards	8,192

[25] In case of IR, each VNI can have a max of 64 peers.
[26] All the other BGW numbers (number of supported L2VNIs, L3VNIs, MAC addresses, IP addresses, and so on) match the values supported on a generic VXLAN EVPN VTEP node.
[27] Multisite enabled with TRM supported number of L2VNIs - 1000 and L3VNIs – 100. Maximum supported multicast underlay and overlay route is 8000.
[28] VXLAN underlay and overlay multicast routes shares the same hardware table. Maximum Multicast routes is 8000 in the default mode. If you want more overlay route scale, reduce the underlay multicast control group.
[29] VXLAN underlay and overlay multicast routes shares the same hardware table. Maximum Multicast routes is 8000 in the default mode. If you want more overlay route scale, reduce the underlay multicast control group.
[30] In case of IR, each VNI can have a max number of 64 peers
[31] This is the limit for the Cisco Nexus 93180YC-EX and other fiber based switches. All copper based 9300-EX switches are not applicable.
[32] Only 1900 SVI are supported if dual stack is used/IPv6 is used.
[33] Only 1900 SVI are supported if dual stack is used/IPv6 is used.
[34] ECMP objects are not shared across multiple VRFs.
[35] All /64 routes + 4000 for non /64 routes.
[36] All /64 routes + 4000 for non /64 routes.
[37] All /64 routes + 4000 for non /64 routes.
[38] Only 1900 SVI are supported if dual stack is used/IPv6 is used.
[39] ECMP objects are not shared across multiple VRFs.
[40] All /64 routes + 4000 for non /64 routes.
[41] All /64 routes + 4000 for non /64 routes.
[42] All /64 routes + 4000 for non /64 routes.

Table 16: Tetration Verified Scalability Limits (Unidimensional)

Feature	Supported Platforms	Verified Limit
TCAM size	Nexus 92160YC-X, 9300-EX, and 9300-FX switches	1,024 entries
	Nexus 92160YC-X switches	IPv4 – 4 entries per rule (TCP, UDP, ICMP, and IP)
	Nexus 9300-EX, and 9300-FX switches	IPv4 – 2 entries per rule (ICMP and IP)
	Nexus 92160YC-X switches	IPv6 – 8 entries per rule (4 entries per ICMP and IPv6 for a total of 8 entries)
	Nexus 9300-EX and 9300-FX switches	IPv6 – 8 entries per rule (4 entries per ICMP and IPv6 for a total of 8 entries)
	Nexus 92160YC-X, 9300-EX, and 9300-FX switches	24 entries out of 1000 is consumed for default

Feature	Supported Platforms	Verified Limit
TCAM scale	Nexus 92160YC-X switches	250 (IPv4) or 62 (IPv6)
	Nexus 9300-EX and 9300-FX switches	500 (IPv4) or 125 (IPv6)

The entire Cisco Tetration Analytics documentation set is available at the following URL:
https://www.cisco.com/c/en/us/support/data-center-analytics/tetration-analytics/tsd-products-support-series-home.html

Spanning Tree Protocol scale considerations

Spanning Tree Protocol (STP) scalability is assessed using two main metrics, each representing a different dimension of scale:

1. **STP Virtual Port Scale**

   Definition: Represents the total number of STP entities managed, considering both internal STP data structures and port-level MAC programming/VLAN allow lists.

   Calculation: Virtual Port Scale = (Number of physical STP-managed ports) × (Number of VLANs carried by those ports)

   Example (RPVST):

   - 100 VLANs
   - 4 individual L2 interfaces
   - 2 L2 port-channels (each with 8 member interfaces)
   - Calculation:

     (4 individual interfaces + 2 port-channels × 8 members each) × 100 VLANs

     = (4 + 16) × 100 = 2000 Virtual Ports

   Note All port-channel members are included in this calculation.

   MST Scenario:

   For Multiple Spanning Tree (MST), multiply the number of physical interfaces by the number of VLANs in the carried MST instances. If all 100 VLANs are in the same instance, the result is the same (2000 Virtual Ports).

2. **STP Logical Port Scale**

   Definition: Measures the maximum STP BPDU load per hello interval, especially relevant for RPVST, which generates a BPDU per VLAN. This metric helps evaluate control plane scalability. Hence, MST is recommended for large-scale environments, as it reduces Logical Port Scale concerns.

   Calculation: Logical Port Scale = (Number of individual L2 interfaces + Number of port-channels) × (Number of VLANs carried)

   Example:

   - 100 VLANs
   - 4 individual L2 interfaces
   - 2 L2 port-channels
   - Calculation:

(4 interfaces + 2 port-channels) × 100 VLANs

= 6 × 100 = 600 Logical Ports

Note Port-channel members are not included in this calculation.

Note

- All computation will vary if interfaces have unique VLAN pruning lists or have different MST instances with unique VLAN counts. Always review STP scalability against actual hardware/software limits.
- For large deployments, prefer MST to minimize BPDU processing overhead.

Verified Scalability Limits - Multidimensional

The tables in this section list the verified scalability limits for the Cisco Nexus 9508 switch with an X9636C-R, X9636C-RX, or X9636Q-R line card or a C9508-FM-R fabric module and Cisco Nexus 9504 with -R line cards for Cisco NX-OS Release 9.3(2). These limits are validated with a multidimensional configuration. The values provided in these tables focus on the scalability of all listed features at the same time.

Each number is the absolute maximum currently supported by this Cisco NX-OS release for the corresponding feature. If the hardware is capable of a higher scale, future software releases might increase this verified maximum limit. Results might differ from the values listed here when trying to achieve maximum scalability with multiple features enabled.

Attention These numbers are not the maximum verified values if each feature is viewed in isolation. For these numbers, see the "Verified Scalability Limits" section.

Table 17: eBGP/IS-IS Profile Verified Scalability Limits (Multidimensional)

Feature	Verified Limits
Number of 100G ports	288
ECMP	16-way (Upstream)
BGP neighbors	960
BGP IPv4 /32 unicast routes	30,000
BGP IPv4 VLSM unicast routes	18,000
BGP IPv6 /128 unicast routes	16,000
BGP IPv6 VLSM unicast routes	1,000
IS-IS v2 neighbors	255

Feature	Verified Limits
IS-IS v3 neighbors	255
IS-IS L2 adjacency	16
IS-IS IPv4 /32 unicast routes	20,000
IS-IS IPv4 VLSM unicast routes	1,000
IS-IS IPv6 /128 unicast routes	20,000
IS-IS IPv6 VLSM unicast routes	1,000
BFD sessions	272
PIM neighbors	256
ACL ACEs	15,000 500
Sub-interfaces	712
SPAN sessions	1 local SPAN session
Multicast SSM	20,000

Table 18: iBGP/OSPF Profile Verified Scalability Limits (Multidimensional)

Feature	Verified Limits
Number of 100G ports	180
Number of 40G ports	108
ECMP	8-way (Upstream)
BGP neighbors	8
BGP IPv4 VLSM unicast routes	40,000
BGP IPv6 VLSM unicast routes	10,000
OSPFv2 neighbors	108
OSPFv3 neighbors	30
OSPF IPv4 /32 unicast routes	100,000
OSPF IPv4 VLSM unicast routes	155,000
OSPFv3 IPv6 /128 unicast routes	1,000
OSPFv3 IPv6 VLSM unicast routes	9,000

Feature	Verified Limits
BFD sessions	108
VRF	250
PIM neighbors	108
IPv4 (*,G) multicast routes	2,000
IPv4 (S,G) multicast routes	10,000
ACL ACEs	500 (IPv4) 500 (IPv6)
SPAN sessions	1 local SPAN session

Table 19: iBGP/EIGRP Profile Verified Scalability Limits (Multidimensional)

Feature	Verified Limits
Number of 100G ports	180
Number of 40G ports	108
ECMP	16-way (Upstream)
BGP neighbors	8
BGP IPv4 VLSM unicast routes	40,000
BGP IPv6 VLSM unicast routes	10,000
EIGRP v4 neighbors	276
EIGRP v6 neighbors	276
EIGRP IPv4 /32 unicast routes	30,000
EIGRP IPv4 VLSM unicast routes	1,000
EIGRP IPv6 /128 unicast routes	30,000
EIGRP IPv6 VLSM unicast routes	1,000
BFD sessions	276
VRF	250
PIM neighbors	276
IPv4 (*,G) multicast routes	6,000
IPv4 (S,G) multicast routes	16,000

Feature	Verified Limits
ACL ACEs	500 (IPv4) 500 (IPv6)
SPAN sessions	1 local SPAN session

Table 20: MPLS Verified Scalability Limits (Multidimensional)

Feature	Verified Limits
MPLS L3VPN	3967
VPE	3967
PE nodes	3
PE routes	20,000
X9636C-RX line card: ACL - IPv4	95,000
X9636C-RX line card: ACL - IPv6	20,000
HSRP, HSRP VIP	3967 each for v4 and v6
vPC uRPF	3967
Strict uRPF	Yes
VRF	3967
SVI	3967
Layer 3 VPN routes IP ECMP	2,000
MPLS LSR ECMP	2,000
VPNv4 routes	400,000
VPNv6 routes	90,000
EBGP neighbors	750

Table 21: Layer 2/Layer 3 Boundary Verified Scalability Limits (Multidimensional)

Feature	Verified Limits
MAC addresses	19,000
Sub-interfaces	500
vPC Port channels	46
ECMP	16-way (Upstream)

Feature	Verified Limits
OSPFv2 neighbors	47
OSPFv3 neighbors	47
OSPF IPv4 /32 unicast routes	45,000
OSPF IPv4 VLSM unicast routes	1,000
OSPF IPv6 /128 unicast routes	20,000
OSPF IPv6 VLSM unicast routes	1,000
BFD sessions	49
VRF	250
VLAN	3,750
SVI	3,750
VRRP v4 groups	1,996 VRRS / 4 VRRPv3
VRRP v6 groups	1,996 VRRS / 4 VRRPv3
HSRP IPv4	1,743 Secondary groups / 7 Primary groups
HSRP IPv6	1,743 Secondary groups / 7 Primary groups
PIM neighbors	396
IPv4 (*,G) multicast routes	3,080
IPv4 (S,G) multicast routes	26,600
IGMP snooping database entries	6,400
sFlow enabled interfaces	83
UDLD enabled interfaces	93
SPAN sessions	1 local SPAN session

Table 22: Segment Routing Verified Scalability Limits (Multidimensional)

Feature	Verified Limits
VLAN	100
SVI	100
MAC entries	10,000
ARP entries	70

Feature	Verified Limits
HSRP v4 VIPs	100
HSRP v6 VIPs	100
LACP	11
LACP members	4
eBGP IPv6 neighbors	9
eBGP IPv4 LU neighbors	9
IPv4 (LU) routes	6888
IPv4 (LU) paths	17580
IPv6 routes	6,663
IPv4 (LU) routes	17,338
SR ECMP	18 (dual-homed)
MPLS HW entries	11,957

Table 23: VXLAN Profile Verified Scalability Limits (Multidimensional)

Feature	Verified Limits
Ports	16
ECMP	8-way (Upstream)
BGP neighbors	200
BGP EVPN Layer 2 VPN host routes	64,000
BGP IPv4 VLSM unicast routes or ospf	10,000
BGP IPv6 VLSM unicast routes or ospf	6,000
BFD sessions	20
PIM neighbors	20
IPv4 (*, G) multicast routes (co-existing)	4,000
IPv4 (S,G) multicast routes (co-existing)	2,000
Layer 3 VNI	900
Layer 2 VNI	2000
Local VTEP	1

Feature	Verified Limits
Remote VTEPs	256
VLAN	3600
SVI	900
MAC	90,000

Deployment Case Studies

This section provides sample topologies for some common deployments. For each topology, the scalability numbers are the limits with all of the listed features enabled at the same time.



Attention These numbers are not the maximum verified values if each feature is viewed in isolation. For these numbers, see the "Verified Scalability Limits" section.

Layer 2/Layer 3 Aggregation Topology (Max-Host Routing Mode)

This Layer 2/Layer 3 aggregation topology consists of Cisco Nexus 9508 switches as virtual port channel (vPC) aggregation pairs. These aggregation nodes are fully loaded with N9K-X9564TX, N9K-X9564PX, and N9K-X9636PQ line cards. The N9K-X9636PQ line cards are used in normal mode and breakout mode. Cisco Nexus 9396PX and 93128TX switches are used as top-of-rack units with Cisco Nexus 3000 Series switches to achieve the desired vPC scale.

The Cisco Nexus 9508 switch is also used as a core Layer 3 node that connects to a pair of vPC aggregation nodes. The focus of the topology is to test IPv4 ARP, IPv6 neighbor discovery (ND), and Layer 2 scalability and other routing, switching, and Layer 4 through Layer 7 features for management and operations. All Layer 3 interfaces are configured for dual stack, and the traffic is dual stack for all VLANs.

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

Table 24: Layer 2/Layer 3 Aggregation Topology (Max-Host Routing Mode)

Feature	9508 Verified Limit (Max-Host Routing Mode)
Fully loaded chassis	1 N9K-X9636PQ, 1 N9K-X9564TX, 2 N9K-X9564PX, 1 N9K-X9432PQ, 1 N9K-X9536PQ
Physical interfaces enabled	276
Multicast S,G routes	653
Multicast *,G routes	500
IPv4 unicast routes (LPM)	5000
IPv6 unicast routes (LPM)	850

Feature	9508 Verified Limit (Max-Host Routing Mode)
IPv4 ARP	65,000
IPv6 ND	40,000
MAC addresses	90,000
VLANs	490
vPCs*	200
OSPFv2 neighbors	20
OSPFv3 neighbors	4
BGP (IPv4) neighbors	65
BGP (IPv6) neighbors	65
SVIs	490
STP logical ports	2800 (RPVST)
HSRP VLANs (IPv4/IPv6)	490
Virtual ports	700
Port channel links	8

* The number of VLANs per vPC supported should be within the MST or RPVST virtual port count specified in this table, depending on the topology.

Layer 2/Layer 3 Aggregation Topology (Default Routing Mode)

This Layer 2/Layer 3 aggregation topology consists of Cisco Nexus 9516 switches as virtual port channel (vPC) aggregation pairs. These aggregation nodes are fully loaded with N9K-X9564TX, N9K-X9564PX, and N9K-X9536PQ line cards. The chassis is fully loaded with five line cards configured for breakout mode. The Cisco Nexus 9396PX and 93128TX switches are used as top-of-rack units with Cisco Nexus 3000 Series switches to achieve the desired vPC scale. The Cisco Nexus 9516 nodes are running in default routing mode. The Cisco Nexus 3164Q switch is also used as a core Layer 3 node that connects to a pair of vPC aggregation nodes.

The focus of the topology is to test IPv4 ARP, IPv6 neighbor discovery (ND), Layer 2 scalability, IPv4 and IPv6 LPM routing, Layer 2 and Layer 3 multicast routing for IPv4, and Layer 4 through Layer 7 features for management and operations. All Layer 3 interfaces are configured for dual stack, and the traffic is dual stack for all VLANs.

In the following table, the Verified Limit column lists the verified scaling capabilities with all listed features enabled at the same time. These numbers are not the maximum verified values if each feature is viewed in isolation.

Table 25: Layer 2/Layer 3 Aggregation Topology (Default Routing Mode)

Feature	9516 Switch Verified Limit (Default Routing Mode)	9300 Platform Verified Limit (Default Routing Mode)
Chassis configuration	5 N9K-X9432PQ line cards 4 N9K-X9464PX line cards 3 N9K-X9536PQ line cards 3 N9K-X9464TX line cards 1 N9K-X9564TX line card	9372
Physical ports	1335	50
vPCs	303	24
SVIs	450	450
VRFs	100	100
IPv4 ARP	40,000	40,000
IPv6 ND	10,000	10,000
STP logical ports	10,000	6000
BGP neighbors (IPv4 + IPv6)	502 + 502	502 + 502
IPv4 LPM routes	50,000	6000
IPv6 LPM routes	10,000	1000
BFD (IPv4 + IPv6)	300	102
IGP OSPFv2 neighbors	502	502
IGP OSPFv3 neighbors	502	502
HSRP (IPv4 + IPv6)	450 + 450	450 + 450
IGMP groups	2000	2000
Multicast *,G routes	2000	2000
Multicast S,G routes	8000	6000
Tracking objects	450	450
VLANs	500	500
PIM neighbors	502	502
MAC addresses	60,000	60,000

Feature	9516 Switch Verified Limit (Default Routing Mode)	9300 Platform Verified Limit (Default Routing Mode)
Network address translation (NAT)	Not applicable	756
sFlow	256	32

FEX System Topology

The FEX 9500 multi-dimensional scale topology consists of Cisco Nexus 9508 switches as virtual port channel (vPC) pairs. Each switch has multiple X9564PX line cards. Each switch has 32 FEX uplinks connected to them. The FEX 9300 multi-dimensional scale topology consists of two Cisco Nexus 9396PX switches used in vPC mode along with 16 FEX uplinks connected to each switch. Multiple FEXs of type Nexus 2248TP-E, 2232PP, 2248PQ, and 2348UPQ are used.

The switches are used at the Layer 2 and Layer 3 boundary and are also configured as VXLAN VTEPs. The FEX host ports are operating as Layer 2 ports. The switches are configured as gateways with the use of SVI interfaces.

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

Table 26: FEX System Topology

Feature	9500 Platform Verified Limit	9300 Platform Verified Limit
Fabric Extenders	32	16
Up interfaces	1100	560
Port channels	426	256
vPC members	390	360
VLANs	744	416
PVLAN VLANs	56	56
Secondary VLANs per primary VLAN	25	25
MAC addresses	45,000	25,000
HSRP	365	365
ARP	12,000	10,000
Neighbor discovery (ND)	5000	5000
Multicast (*,G)	4000	4000
Multicast (S,G)	4000	4000

Multicast System Topology

Two Cisco Nexus 9508 switches are configured as vPC peers in one domain, and two Cisco Nexus 9372PX switches are configured as vPC peers in the other domain. The chassis are fully loaded with N9K-X9432PQ, N9K-X9464PX, N9K-X9536PQ, N9K-X9564PX, N9K-X9564TX, and N9K-X9636PQ line cards. eBGP routing is used to connect these two PIM domains. OSPF is used as IGP in one domain, and EIGRP is configured in the other domain. This setup is configured with multiple rendezvous points (RPs) to serve different multicast group ranges. BSR is used to advertise RP information in both of these PIM domains. PIM anycast is used in one domain, and MSDP anycast is used in the other domain for redundancy and load balancing. Static RP configuration is also used for a range of multicast groups.

The Cisco Nexus 9516 and Cisco Nexus 7000 Series switches are used as Layer 3 core routers in one domain. The Cisco Nexus 3164Q switches are used as Layer 3 core routers in the other domain. This topology also includes the Cisco Nexus 9396PX, Cisco Nexus 9372PX, and Cisco Nexus 3016/3064T switches in the access layer.

In addition to including Layer 2/Layer 3 IPv4 multicast routing, this topology also covers IPv4 and IPv6 host and LPM routing and Layer 2 unicast forwarding. All interfaces are configured for dual stack.

In the following table, the Verified Limit column lists the verified scaling capabilities with all listed features enabled at the same time. These numbers are not the maximum verified values if each feature is viewed in isolation.

Table 27: Multicast System Topology

Feature	**9500 Platform Verified Limit**	**9300 Platform Verified Limit**
Chassis configuration	N9K-X9636PQ, N9K-X9536PQ, N9K-X9564PX, N9K-X9564TX, N9K-X9432PQ, N9K-X9464PX, N9K-X9432PQ, C3164PQ	C9372PX, C9396PX, C3164PQ
Multicast S,G routes	17,500	5000
Multicast *,G routes	2500 (IGMP) 12500 (snooping)	500 (IGMP) 2500 (snooping)
Sources	2000, 200, 100, 40, 10, 3, 2, 1	2000, 200, 100, 40, 10, 3, 2, 1
Replications	40	20
ECMPs	16	8
SVIs	200	200
HSRP/VRRP	200 HSRP	100 VRRP
MAC addresses	40,000	10,000
ARP	20,000	4000
Unicast LPM IPv4 routes	20,000	4000
Unicast LPM IPv6 routes	10,000	1000
IPv4 ARP	18,000	4000
IPv6 ND	4000	2000

Feature	9500 Platform Verified Limit	9300 Platform Verified Limit
MSDP peers (fully mesh)	4	4
Anycast RPs (MSDP and PIM anycast) [43]	2 MSDP	2 PIM anycast
IPv4 multicast routes with PIM bidirectional groups	8000	8000

[43] This multicast system topology consists of two multicast PIM domains. The Multicast Source Discovery Protocol (MSDP) is used to exchange multicast source information between these two domains.

VXLAN BGP/eVPN iBGP Centric Topology

This VXLAN BGP/eVPN iBGP centric topology consists of Cisco Nexus 9300 and 9500 Platform switches acting as VXLAN vPC tunnel endpoints (VTEPs) and VXLAN non-vPC VTEPs. VXLAN VTEPs establish iBGP sessions to a Cisco Nexus 9508 switch (route reflector) acting as a spine node. VXLAN-distributed anycast gateway SVIs are configured for dual stack, and the traffic is dual stack.

The focus of this topology is to test VXLAN overlay network scale and underlay Layer 2 switching and other routing, multicast, and Layer 4 through Layer 7 features for management and operations. Underlay PIM neighbors and IS-IS adjacency were tested with the default timer and Bidirectional Forwarding Detection (BFD) enabled on all links.

In the following table, the Verified Limit column lists the verified scaling capabilities with all listed features enabled at the same time. These numbers are not the maximum verified values if each feature is viewed in isolation.

Table 28: VXLAN BGP/eVPN iBGP Centric Topology

Feature	Supported Platform	Verified Limit
System Routing Template	Nexus 9200, 9300, 9300-EX, 9300-FX, and 9500 switches and the X9700-EX/FX line cards	default
	Nexus 9364C switches	Not applicable
VXLAN VTEPs	Nexus 9200, 9300, 9300-EX, 9300-FX, 9364C and 9500 switches and the X9700-EX/FX line cards	128
VXLAN Layer 2 VNIs	Nexus 9200, 9300, 9300-EX, 9300-FX, 9364C and 9500 switches and the X9700-EX/FX line cards	2000
VXLAN Layer 3 VNIs/VRFs	Nexus 9200, 9300, 9300-EX, 9300-FX, 9364C and 9500 switches and the X9700-EX/FX line cards	500
VXLAN multicast groups	Nexus 9200, 9300, 9300-EX, 9300-FX, 9364C and 9500 switches and the X9700-EX/FX line cards	128

Feature	Supported Platform	Verified Limit
VXLAN overlay MAC addresses	Nexus 9200, 9300, 9300-EX, 9300-FX, 9364C and 9500 switches and the X9700-EX/FX line cards	64,000
VXLAN overlay IPv4 host routes	Nexus 9200, 9300, 9300-EX, 9300-FX, 9364C and 9500 switches and the X9700-EX/FX line cards	60,000
VXLAN overlay IPv6 host routes	Nexus 9200, 9300, 9300-EX, 9300-FX, and 9500 switches and the X9700-EX/FX line cards	16,000
	Nexus 9364C switches	Not applicable
VXLAN overlay IGMP Snooping groups	Nexus 9200, 9300, 9300-EX, 9300-FX, 9364C and 9500 switches and the X9700-EX/FX line cards	1000
VXLAN IPv4 LPM routes	Nexus 9200, 9300-EX, 9300-FX, and 9364C switches and the X9700-EX/FX line cards	5120
VXLAN IPv6 LPM routes	Nexus 9200, 9300-EX, and 9300-FX switches and the X9700-EX/FX line cards	1500
	Nexus 9364C switches	Not applicable
VXLAN VLAN logical port VP count	Nexus 9364C switches	Not applicable
VLANs on VTEP node	Nexus 9200, 9300, 9300-EX, 9300-FX, 9364C, and 9500 switches and the X9700-EX/FX line cards	1700 (total VLANs) 1500 (VXLAN VLANs) 200 (non-VXLAN VLANs)
MST instances	Nexus 9200, 9300, 9300-EX, 9300-FX, and 9500 switches and the X9700-EX/FX line cards	20
	Nexus 9364C switches	Not applicable
STP logical ports For more information on STP scale considerations, see Spanning Tree Protocol scale considerations, on page 37 section.	Nexus 9200, 9300, 9300-EX, 9300-FX, and 9500 switches and the X9700-EX/FX line cards	3500
	Nexus 9364C switches	Not applicable
vPC port channels	Nexus 9200, 9300, 9300-EX, and 9300-FX switches and the X9700-EX/FX line cards	40
	Nexus 9364C switches	Not applicable

Feature	Supported Platform	Verified Limit
Underlay IS-IS neighbors	Nexus 9200, 9300, 9300-EX, and 9300-FX switches and the X9700-EX/FX line cards	32
	Nexus 9364C switches	Not applicable
Underlay PIM neighbors	Nexus 9200, 9300, 9300-EX, 9300-FX, and 9500 switches and the X9700-EX/FX line cards	12
	Nexus 9364C switches	Not applicable
Underlay HSRP groups for regular VLANs	Nexus 9364C switches	Not applicable
Underlay vPC SVIs	Nexus 9200, 9300, 9300-EX, 9300-FX, and 9500 switches and the X9700-EX/FX line cards	200
	Nexus 9364C switches	Not applicable

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