



## **Cisco N9300 Series Smart Switches NX-OS Verified Scalability Guide, Release 10.6(1s)**

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# Introduction

This document describes the Cisco NX-OS configuration limits for Cisco N9300 Series smart 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 following tables in this section list the verified scalability limits of the Cisco N9324C-SE1U, Cisco N9348Y2C6D-SE1U switches for Cisco NX-OS Release 10.6(1s).

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



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**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.
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**Note** You can deploy up to 500 commands under config-profile.

### Interfaces Verified Scalability Limits

| Feature  | Supported Platforms                               | Verified Limits                      |
|--|---|--------------------------------------|
| IP DHCP relay addresses (helper addresses) per interface | Cisco N9324C-SE1U, Cisco N9348Y2C6D-SE1U switches | 32 (IPv4) + 32 (IPv6)                |
| Port channel links                                       | Cisco N9324C-SE1U switch                          | 96                                   |
|  | Cisco N9348Y2C6D-SE1U switch                      | 80                                   |
| SVIs   | Cisco N9324C-SE1U, Cisco N9348Y2C6D-SE1U switches | 1000 (with HSRP)<br>1000 HSRP groups |
| vPCs   | Cisco N9324C-SE1U switch                          | 96                                   |
|  | Cisco N9348Y2C6D-SE1U switch                      | 80                                   |
| Sub-interfaces   | Cisco N9324C-SE1U, Cisco N9348Y2C6D-SE1U switches | 1000                                 |



- Note**
- The scale for vPC convergence is tested with an LACP supported device connected to the vPC pair link.
  - For **interface port-channel** configuration, LACP vPC convergence must be enabled. For information on vPC, see [Configuring vPCs](#).
  - For **vPC domain** configuration, the tested time for the delay restore is 150 seconds, the delay restore for interface VLAN is 150 seconds, and the delay restore for orphan ports is 140 seconds. For information on vPC, see [Configuring vPCs](#).

### Label Switching Verified Scalability Limits

| Feature                               | Verified Limits                               |
|---------------------------------------|---|
| Layer 3 VPN routes                    | 400,000 (IPv4 routes)<br>90,000 (IPv6 routes) |
| <b>Hierarchical ECMP</b> <sup>1</sup> |   |
| Node SID                              | 4000  |
| Adjacency SID                         | 8   |
| VRF                                   | 1000  |
| VPN label                             | 1000  |

| Feature              | Verified Limits |
|----------------------|-----------------|
| Level 1 ECMP groups  | 12              |
| Level 2 ECMP groups  | 10              |
| Level 2 ECMP members | 8               |
| VPN decap statistics | 1000 VRF        |

<sup>1</sup> Hierarchical ECMP provides enhanced ECMP scale and convergence, with two level route resolution.

### Layer 2 Switching Verified Scalability Limits

| Feature                                     | Verified Limits                             |
|---|---|
| MAC addresses                               | 120,000 (including control plane MACs)      |
| MST instances                               | 64  |
| RPVST logical ports (logical ports * VLANs) | 22,000                                      |
| VLANs in MST mode                           | 3967 (the remaining 127 VLANs are reserved) |
| VLANs in RPVST mode                         | 3967  |

### Multicast Routing Verified Scalability Limits

| Feature   | Verified Limits  |
|---|------------------|
| IPv4 multicast routes   | 32,768 (Layer 3) |
| <b>Note</b><br>The limits are for a combination of IPv4 and IPv6 multicast routes. Layer 2 multicast entries are a part of the total 120K limits. For example, 110K IPv4 + 2K IPv6 multicast routes + 8K Layer 2 multicast entries. |                  |
| IGMP snooping groups  | 16,000           |



**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.

### IP Fabric for Media Solution Policer Verified Scalability Limits

| Feature                          | Supported Platforms                               |
|----------------------------------|---|
| NBM Flow Policers (Slice/System) | Cisco N9324C-SE1U, Cisco N9348Y2C6D-SE1U switches |

### Programmability Verified Scalability Limits

| Feature  | Verified Limits                                   |
|--|---|
| <b>DME</b>   |   |
| <b>Note</b> <ul style="list-style-type: none"><li>• If all the DME features are configured together, it may cause performance issues.</li><li>• Model to CLI Conversion of payload is not supported.</li></ul> |   |
| Telemetry  | 4 telemetry receivers can be streamed in parallel |

### QoS Verified Scalability Limits

| Feature                   | Verified Limits |
|---------------------------|-----------------|
| Class maps per policy map | 128             |

### Security Verified Scalability Limits

| Feature                       | Verified Limits  |
|-------------------------------|--|
| Access Control Lists (ACL)    | <ul style="list-style-type: none"><li>• Ingress RACLv4 - 7168 Access Control Entries (ACE) per slice</li><li>• Ingress RACLv6 - 3584 ACE per slice</li><li>• Egress RACLv4 - 7168 ACE per slice</li><li>• Egress RACLv6 - 3584 ACE per slice</li><li>• Ingress PACLv4 - 7168 ACE per slice</li><li>• Ingress PACLv6 - 3584 ACE per slice</li><li>• Ingress SVI RACLv4 - 7168 ACE per slice</li><li>• Ingress SVI RACLv6 - 3584 ACE per slice</li><li>• Egress SVI RACLv4 - 7168 ACE per slice</li><li>• Egress SVI RACLv6 - 3584 ACE per slice</li></ul> |
| ACL Labels                    | <ul style="list-style-type: none"><li>• Ingress IPv4 - 126 unique labels</li><li>• Ingress IPv6 - 126 unique labels</li><li>• Egress IPv4 - 14 unique labels</li><li>• Egress IPv6 - 14 unique labels</li></ul>  |
| Ingress SUP IPv4 TCAM entries | 360  |
| Ingress SUP IPv6 TCAM entries | 180  |

**Note**

- For Cisco N9324C-SE1U, Cisco N9348Y2C6D-SE1U switches, ACL scalability is defined per slice. Each ASIC typically contains two slices. To understand how interfaces are organized across these slices, use the **show interface hardware-mappings** command.
- 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.

**System Management Verified Scalability Limits**

| Feature                                     | Verified Limits                  |
|---|----------------------------------|
| <b>sFlow</b>                                |                                  |
| sFlow ports                                 | 64                               |
| <b>SPAN and ERSPAN</b>                      |                                  |
| Active SPAN or ERSPAN sessions <sup>2</sup> | 10                               |
| Destination interfaces per SPAN session     | 1 Physical only (no PO support). |

<sup>2</sup> 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.

**Unicast Routing Verified Scalability Limits**

| Feature                             | Verified Limits |
|-------------------------------------|-----------------|
| <b>IPv4 ARP and IPv6 ND</b>         |                 |
| IPv4 ARP (Default routing template) | 98,304          |
| IPv6 ND (Default routing template)  | 98,304          |
| <b>IPv4 and IPv6 Routes</b>         |                 |
| <b>Default Routing Template</b>     |                 |
| IPv4 host routes <sup>3</sup>       | 1,146,880       |
| IPv6 host routes <sup>4</sup>       | 212,992         |
| IPv4 LPM routes                     | 1,048,576       |
| IPv6 LPM routes                     | 524,288         |
| <b>Unicast Protocols</b>            |                 |

| Feature  | Verified Limits  |
|--|--|
| <b>Bidirectional Forwarding Detection (BFD)</b>                              |  |
| BFD sessions (echo mode)   | 128 when the BFD intervals are set to default, which is 50 ms<br>1000 (IPv4 and IPv6) sessions when the BFD intervals are relaxed to 300 ms<br><b>Note</b><br>For Nexus 9800 switches, the maximum session limit per L3 port channel and its subinterfaces is 128. |
| <b>Border Gateway Protocol</b>   |  |
| BGP neighbors (IPv4 and IPv6 combined)                                       | 1024   |
| <b>HSRP</b>  |  |
| HSRP groups  | 1000 (virtual MAC address support) <sup>5</sup>  |
| <b>IS-IS</b>   |  |
| IS-ISv4 adjacencies (either L1, L2, or sum of L1 and L2 with default timers) | 255  |
| IS-ISv4 BFD sessions (with default timers)                                   | 255  |
| IS-ISv4 routes   | 10,000   |
| <b>OSPFv2 and OSPFv3</b>   |  |
| OSPFv2/OSPFv3 LSA/LSDB size  | 100,000  |
| OSPFv2/OSPFv3 areas  | 100  |
| OSPFv2/OSPFv3 neighbors  | 256  |
| <b>Policy Based Routing</b>  |  |
| Configured sequences per policy  | 128  |
| Next-hop addresses per policy  | 32   |
| IPv4 ACEs (unidimensional)   | 3582 (per network forwarding engine)   |
| IPv6 ACEs (unidimensional)   | 1792 (per network forwarding engine)   |
| Interfaces with PBR policy <sup>6</sup>                                      | 512  |
| <b>VRRP</b>  |  |
| VRRPv3 groups per interface  | 250  |
| VRRPv3 groups with default timers (1 s)                                      | 250  |
| VRRPv3 groups with relaxed timers (3 s)                                      | 250  |

| Feature   | Verified Limits |
|---|-----------------|
| <b>ECMP Scale</b>                                 |                 |
| ECMP Paths (IPv4 and IPv6 Unicast Address-family) | 64              |
| ECMP Groups                                       | 8192            |

<sup>3</sup> The hash table is subject to collisions. Depending on the host route pattern, collisions might occur.

<sup>4</sup> The hash table is subject to collisions. Depending on the host route pattern, collisions might occur.

<sup>5</sup> 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.

<sup>6</sup> When using PBR with the "set vrf" option, if the user attempts to shut down the recircular port, it will trigger a modify PPF session from RPM. If the maximum labels (510) have already been consumed and atomic update is enabled, a "label allocation failure" will occur. To avoid this, the user needs to disable atomic update.



#### Note

- With IPv6 scale, traffic loss could be there for a few seconds during switchover.
- The maximum number of PBR next-hops based on 4 FM-E supported is 192 per slice of the forwarding engine
  - 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 be increased in multidimensional scenarios.

#### VXLAN Verified Scalability Limits

| Feature                   | Verified Limits  |
|---------------------------|--|
| VTEP Peers <sup>7</sup>   | 350 vPC pairs or 1000 standalone VTEPs with IR<br>512 standalone VTEPs with multicast underlay |
| Underlay multicast groups | 512  |
| <b>Overlay EVPN ECMP</b>  |  |

| Feature   | Verified Limits  |
|---|--|
| ECMP Paths<br><b>Note</b><br>An ECMP entry is created for each tunnel. (There may be multiple tunnels for each VXLAN peer). | 64   |
| <b>Underlay EVPN ECMP</b>   |  |
| ECMP Paths  | 64   |
| <b>Multi-Site</b> <sup>8</sup>  |  |
| Number of sites   | 128  |
| Number of sites for TRM   | 16 sites   |
| <b>Tenant Route Multicast Layer 3 Mode with VXLAN BGP eVPN</b>  |  |
| VXLAN Layer 3 VNI/VRFs  | 250  |
| Total Multicast routes (PIM ASM & PIM SSM)  | 32,000   |
| <b>VXLAN Flood and Learn</b>  |  |
| Ingress replication peers <sup>9</sup>  | 512  |
| <b>VXLAN BGP eVPN</b>   |  |
| Layer 2 VNIs  | 1000   |
| Layer 3 VNIs / VRFs <sup>10</sup>   | 1000   |
| Underlay multicast groups   | 512  |
| MAC addresses   | 96,000<br><b>Note</b><br>To scale MAC addresses, use <b>system routing template-dual-stack-host-scale</b> command and reload the switch.<br>90,000 |
| Overlay IPv4 LPM routes   | 1,000,000  |
| Overlay IPv6 LPM routes   | 512,000  |
| <b>VXLAN BGP eVPN Ingress Replication</b>   |  |
| Layer 2 VNIs  | 1000   |
| Layer 3 VNIs / VRFs <sup>11</sup>   | 1000   |
| VTEPs   | 350 vPC pairs or 1000 standalone VTEPs with IR   |

| Feature          | Verified Limits |
|------------------|-----------------|
| MAC addresses    | 96,000          |
| IPv4 host routes | 512,000         |
| IPv6 host routes | 112,000         |

<sup>7</sup> In case of IR, each VNI can have a max of 64 peers.

<sup>8</sup> 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.

<sup>9</sup> In case of IR, each VNI can have a maximum number of 64 peers; 512 peers supported on 100 VNIs only.

<sup>10</sup> ECMP objects are not shared across multiple VRFs.

<sup>11</sup> ECMP objects are not shared across multiple VRFs.

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