# Cisco MDS NX-OS Configuration Limits, Release 7.3

# Cisco MDS NX-OS Release 7.3Configuration Limits

This document discusses the configuration and scalability limits for various SAN switching parameters in Cisco MDS NX-OS Release 7.3(x) and has the following topics:

## Switch Level Fibre Channel Configuration Limits for Cisco MDS 9000 Series Switches

**Note** System messages are generated whenever the configuration limits are exceeded. For more information, see Cisco MDS 9000 Series and Nexus 7000 Series NX-OS System Messages Reference.

The below table lists the switch-level Fibre Channel configuration limits for Cisco MDS 9000 Series switches:

*Table 1: Switch-Level Fibre Channel Configuration Limits*

| Feature | Parameters | MDS 9700 Series | | MDS 9500 Series | MDS 9250i | MDS 9148/9148S | MDS 9396S |
|---|---|---|---|---|---|---|---|
| Logins (FLOGI or FDISC) | FLOGIs or FDISCs per port | 256 | | 256 | 256 | 256 | 256 |
| | FLOGIs or FDISCs per module | 1000 | 400 | N/A | N/A | N/A | |
| | FLOGIs or FDISC per switch[1] | 4000 | 2000 | 400 | 1000 (MDS 9148S) 400 (MDS 9148) | 1000 | |
| N-Port Virtualization (NPV) | NPV switches per NPIV core switch | 105 | | 105 | N/A | N/A | 8 |
| Inter-Switch Links (ISLs) | ISL instances per switch | Up to 200 ISLs, each ISL with 16 VSANs, for a total number of 3200 port-VSAN instances | | Up to 200 ISLs, each ISL with 16 VSANs, for a total number of 3200 port-VSAN instances | Up to 40 ISLs, each with 29 VSANs, for a total number of 1160 port-VSAN instances | Up to 48 ISLs, each with 29 VSANs, for a total number of 1392 port-VSAN instances | Up to 96 ISLs, each with 15 VSANs, for a total number of 1440 port-VSAN instances |

| Feature | Parameters | MDS 9700 Series | MDS 9500 Series | MDS 9250i | MDS 9148/9148S | MDS 9396S |
|---|---|---|---|---|---|---|
| PortChannels | PortChannels and member ports in port channels | 256 PortChannels with a maximum of 16 members in each port channel | 256 PortChannels with a maximum of 16 members in each port channel | 40 PortChannels with a maximum of 16 members in each port channel and 8 Ethernet PortChannels with a maximum of 8 members in each Ethernet PortChannels | 48 PortChannels with a maximum of 16 members in each port channel | 96 PortChannels with a maximum of 16 members in each port channel |
| SSH | SSH | 16 | 16 | 16 | 16 | 16 |

[1] The number of FCIDs supported per switch and per fabric is same as FLOGI limit.

**Considerations**

- A system message appears in the user's session when the maximum supported limit of PortChannels and member ports is exceeded.

- A system message appears on the user's session when the maximum supported number of SSH sessions is exceeded.

# Fabric Level Fibre Channel Configuration Limits for the Cisco MDS 9000 Series Switches

The below table lists the Fibre Channel configuration limits for the Cisco MDS 9000 Fibre Channel fabric network.

*Table 2: Fabric-level Fibre Channel Configuration Limits*

| Feature | Parameters | MDS 9700-only Network (without MDS 9500, 9200, and 9100) | MDS Mixed Fabric Network (MDS 9700, 9500, 9200, 9148, 9148S, and 9396S) |
|---|---|---|---|
| VSANs | Number of VSANs per physical fabric | 80 | 80 |
| Logins and aliases | Number of FCNS entries in fabric | 20000[2] | 10000[3] 13000[4] |
| | Number of device alias entries in fabric | 20000 | 8000 |

| Feature | Parameters | MDS 9700-only Network (without MDS 9500, 9200, and 9100) | MDS Mixed Fabric Network (MDS 9700, 9500, 9200, 9148, 9148S, and 9396S) |
|---|---|---|---|
| Domains and Hops | Number of domains per physical fabric | 80 | 80 |
| | Number of switch hops from server to storage | 7 | 7 |
| Zones/Smart Zones<br><br>**Note** The preferred number of members per zone is 2, and the maximum recommended limit is 50. | Zone sets | 1000 | 1000 |
| | Zones | 16000 [5] | 8000[6]<br>10400 [7] |
| | Zone members | 32000 [8] | 16000[9]<br>20800[10] |
| | Zone DB size | 3.8 MB [11] | 2 MB<br>3.8MB[12] |
| IVR | IVR zone sets | 32 | 32 |
| | IVR zones | 2000 | 2000 |
| | IVR zone member | 4000 | 4000 |
| | IVR service groups | 16 | 16 |
| CFS | CFS Peers | 80 | 80 |
| | CFS Static Peers over IP | 100 | 100 |

[2] An error message appears in the user's session if the number of FCNS entries exceeds 20000.

[3] For platforms other than Cisco MDS 9700, a warning appears in the user's session if the number of FCNS entries exceeds 10000.

[4] This increase in scale is applicable only to Cisco MDS 9500 Series Supervisor-2A Module.

[5] An error message and syslog appears in the user's session if the total number of zones exceeds 16000.

[6] For platforms other than Cisco MDS 9700, a warning appears in the user's session if the number of zones exceeds 8000. However, further configurations are not blocked.

[7] This increase in scale is applicable only to Cisco MDS 9500 Series Supervisor-2A Module.

[8] An error message and syslog appears in the user's session if the total number of the unique zone members exceed 32000.

[9] For platforms other than Cisco MDS 9700, a warning appears in the user's session if the number of unique zone member exceeds 16000.

[10] This increase in scale is applicable only to Cisco MDS 9500 Series Supervisor-2A Module.

[11] An error message appears in the user's console if the zone database size exceeds 3.8 MB.

[12] This increase in scale is applicable only to Cisco MDS 9500 Series Supervisor-2A Module.

**Considerations**

- In a mixed fabric comprising Cisco MDS 9700 and 9500 director class switches and Cisco MDS 9148 and 9148S fabric switches, the fabric can have all the switches in the first 32 VSANs. The remaining VSANs include only those switches that support more than 32 VSANs.

- Beginning with Cisco MDS NX-OS Release 6.2(11), the number of domains per physical fabric is increased to 80.

- A system message appears in the user's session when the supported configuration limit of CFS peers is exceeded.

- Beginning from Cisco MDS NX-OS Release 6.2(7), the zone database size is increased from 2MB to 3.8MB, to provide zone scale enhancements. However, if there are any switches in the fabric running Cisco MDS NX-OS 6.2(5) or earlier releases, the previous 2-MB zone database limit prevails and the new zone scale enhancements are not available. We recommend that the 2MB zone database limit must not be exceeded, unless all the switches in the fabric run on Cisco MDS NX-OS Release 6.2(7) or later.

- 2000 IVR zones are available across all VSANs. However, a single VSAN must not exceed more than 1000 IVR zones.

## Example To calculate Zone DB size

The following example shows how to calculate Zone DB size for a fabric:

```
(config)# show zone status vsan 310 | Inc "Db Size" P 1

Full Zoning Database :
    Db Size: 1040524 Bytes
--
Active Zoning Database :
    Db Size: 962156 Bytesc
Now, Add 962156 with 1040524 = 2002680
      2002680 / (1024 * 1024) = 1.9 MB.
```

**Note** This database size does not include the pending changes in a session.

# Line Rate Limitation for Cisco MDS 9700 Series Switches Using Cisco MDS 9700 40-Gbps 24-Port FCoE Module

For a fabric card to operate at full-line rate on Cisco MDS 9706, 9710, and 9718 Switches, the port and bandwidth should have specific configurations. The below table lists the port-level configuration limits and bandwidth limitations for Cisco MDS 9700 Series switches.

*Table 3: Line Rate Limitation for Cisco MDS 9700 Series Switches Using Cisco MDS 9700 40-Gbps 24-Port FCoE Module*

| No. of Fabric Cards | Front Panel FCoE Bandwidth/slot | Maximum No. of Ports/Speed |
|---|---|---|
| 3 | 660 Gbps | 16 ports/40 Gbps |
| 4 | 880 Gbps | 20 ports/40 Gbps |
| 5 | 1100 Gbps | 24 ports/40 Gbps |

**Note** If the number of ports configured exceed the maximum limit for number of ports then it will result in all ports operating in oversubscribed mode.

# Fibre Channel Topology Combinations and Scaling

Beginning Cisco MDS NX0-OS Release 6.2(7), the following configurable features to support scale enhancements are supported:

- Fibre Channel Name Server (FCNS) bulk notification
- Coalesce switch Registered State Change Notification (SW-RSCN)

For more information about the FCNS and SW-RSCN features, see the Cisco MDS 9000 Family NX-OS Fabric Configuration Guide and the Cisco MDS 9000 Family Command Reference.

**Note** In multidimensional scale configurations, supervisors with 1GB memory may experience sysmgr hap-reset.

The below table provides the configuration limits with and without the FCNS and SW-RSCN optimizations.

*Table 4: Fibre Channel Topology Combination and Scaling*

| Scale Topology | FCNS Bulk Notification | Coalesce Switch RSCN | Configuration Limits | Scale Optimizations |
|---|---|---|---|---|
| Cisco MDS NX-OS Release 6.2(9) and later on Cisco MDS 9700 Series-only Fabric | ON | ON | MDS NX-OS Release 6.2(7) and later | Enabled |
| | | | FLOGI per module: 1000 FLOGI node: 4000 FCNS: 20000 Zone:16000 Zone members: 32000 | |
| | OFF | OFF | MDS NX-OS Release 6.2(5) and earlier | Disabled (Disabled by default in Cisco MDS NX-OS Release 6.2(7)) |
| | | | FLOGI per module: 500 FLOGI node: 2500 FCNS: 10000 Zone: 8000 Zone members: 16000 | |

| Scale Topology | FCNS Bulk Notification | Coalesce Switch RSCN | Configuration Limits | Scale Optimizations |
|---|---|---|---|---|
| Cisco MDS NX-OS Release 6.2(9) and later on MDS Mixed Fabric[13] (Cisco MDS 9700 Series, 9500, 9250i, 9222i, and 9148) | ON/OFF | ON/OFF | FLOGI per module: 400<br><br>FLOGI node: 2000<br><br>FCNS: 10000, 13000 [14]<br><br>Zone: 8000, 10400 [15]<br><br>Zone members: 16000, 20800 [16] | Enabled/Disabled |

[13] The scale enhancements introduced in MDS NX-OS 6.2(7) and later are available on MDS 9700 Series-only networks with Release 6.2(7) and later running on all the switches and the configurable optimizations: FCNS bulk notification and RSCN coalesce enabled. These enhancements are not available on mixed fabrics regardless of whether the FCNS and RSCN are enabled. In Cisco MDS NX-OS Release 6.2(9) and later, FCNS bulk notification is enabled by default. To disable FCNS bulk notification, use the fcns no-bulk-notify command. Coalesce switch RSCN is disabled by default.

[14] This increase in scale is applicable only to Cisco MDS 9500 Series Supervisor-2A Module.

[15] This increase in scale is applicable only to Cisco MDS 9500 Series Supervisor-2A Module.

[16] This increase in scale is applicable only to Cisco MDS 9500 Series Supervisor-2A Module.

# Fibre Channel Scale Limitations

### Limitation 1

Beginning Cisco MDS NX-OS Release 6.2(7), the fcns bulk-notify and rscn coalesce swrscn vsan commands are available on all platforms. We recommend that you use these commands only on the Cisco MDS 9700 Series with the 48-Port 16-Gbps Fibre Channel switching module because the higher configuration limits are currently not supported on any other MDS platforms.

**Note** The FCNS bulk notification and coalesce switch RSCN features are supported only in NX-OS Release 6.2(7) and later releases. The switch coalesce RSCN should be enabled only if all the switches in the fabric are Cisco MDS switches that are running MDS NX-OS Release 6.2(7) or later.

### Limitation 2

The maximum zone database size has been increased from 2 MB to 3.8 MB in Cisco MDS Release 6.2(7) and later for all MDS 9700 Series switches to enable zone scale enhancements. The new limit of 16000 zones is supported on an MDS 9700-only fabric. Fabrics with Cisco MDS 9500, 9200, or 9100 Series switches continue to have the 2-MB zone database limit, supporting only up to 8000 zones.

### Limitation 3

In a three-node serial topology, traffic imbalance may occur if the number of port channels configured between the switches are the same. It is recommended to have a single port channel between two switches with any number of member ports. If more than one port channel is configured, ensure that the count of port channels between the switches varies.

### Limitation 4

The maximum latency (round-trip time) and packet drop supported on FCIP links is 250 ms round trip and 0.05% packet drop.

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>
> **Note**  The limit is the same regardless whether latency and packet drop conditions exist together or only one of them exists.

# Syslog and Warnings for Fibre Channel Network Scale

The below table provides syslogs and warnings for the Fibre Channel network.

*Table 5: FC Fabric Scale-Related Syslog and Warning*

| Syslog and Warnings | Cisco MDS 9700 Series | Cisco MDS 9500, 9200, and 9100 |
|---|---|---|
| Zone limit | 16000 zones – Hard limit: Syslog warning that states no more zones can be configured:<br><br>`"Maximum configurable zone`<br>`limit of 16,000 reached.`<br>`Creation of any more zones`<br>`is not supported."` | 8000 zones – Hard limit: Syslog warning that states no more zones can be configured:<br><br>`"Maximum configurable zone`<br>`limit of 8,000 reached.`<br>`Creation of any more zones`<br>`is not supported."`<br><br>10400 zones – Hard limit for Cisco MDS 9500 Series Supervisor-2A Module: Syslog warning that states no more zones can be configured:<br><br>`"Maximum configurable zone`<br>`limit of 10,400 reached.`<br>`Creation of any more zones`<br>`is not supported."` |
| FCNS limit | 20000 FCNS entries – Hard limit: Syslog warning that states no more name server entries are supported:<br><br>`"Maximum Name-Server entry`<br>`limit of 20,000 reached.`<br>`No more entries are supported."` | 10000 FCNS entries – Soft limit: Syslog warning around validated limit:<br><br>`"Number of Name-Server entries has`<br>`reached the maximum validated limit`<br>`of 10,000. Any more entries could`<br>`potentially destabilize the fabric."`<br><br>13000 FCNS entries – Soft limit for Cisco MDS 9500 Series Supervisor-2A Module: Syslog warning around validated limit:<br><br>`"Number of Name-Server entries has`<br>`reached the maximum validated limit of 13,000.`<br><br>`Any more entries could potentially`<br>`destabilize the fabric."`<br><br>20000 FCNS entries – Hard limit: Syslog warning:<br><br>`"Maximum Name-Server entry`<br>`limit of 20,000 reached.`<br>`No more entries are supported."` |

# Switch-Level Configuration Limits for Fibre Channel over Ethernet (FCoE)

System messages are generated whenever the configuration limits are exceeded. For more information, see Cisco MDS 9000 Series and Nexus 7000 Series NX-OS System Messages Reference.

The below table lists the switch-level configuration limits for Fibre Channel over Ethernet (FCoE) on Cisco MDS.

*Table 6: Switch-Level Configuration Limits for Fibre Channel over Ethernet*

| Feature | MDS 9710 with 48-Port 10-Gigabit Fibre Channel over Ethernet Module |
|---|---|
| FLOGIs per Port | 256 |
| FLOGIs per Module | 1000 |
| FLOGIs per Switch | 4000 |
| VSAN | 80 |
| VSAN-VLAN Mapping | 80 |
| vFC PortChannel and Member Ports | 128 vFC PortChannel and a maximum number of 16 members in one vFC PortChannel |

# Fabric-Level Configuration Limits for Fibre Channel over IP (FCIP)

The below table lists the fabric-level configuration limits:

*Table 7: Fabric-Level Configuration Limits for FCIP on Cisco MDS 9250i Multiservice Fabric Switch*

| Feature | Cisco MDS 9250i Multiservice Fabric Switch |
|---|---|
| Maximum latency (round-trip time) and packet drop supported on FCIP links | 250 ms round trip and 0.05% packet drop |

*Table 8: Fabric-Level Configuration Limits for FCIP on Cisco MDS 9700 Series Multilayer Directors with Cisco MDS 24/10-Port SAN Extension Module*

| Feature | Cisco MDS 9700 Series Multilayer Directors with Cisco MDS 24/10-Port SAN Extension Module |
|---|---|
| Maximum latency (round-trip time) and packet drop supported on FCIP links | 250 ms round trip and 0.05% packet drop |

# Fabric Level Configuration Limits for Fibre Channel over Ethernet (FCoE) on MDS 9700 Series

The below table lists the fabric-level configuration limits for the Fibre Channel over Ethernet on MDS 9700 Series.

*Table 9: Fabric-Level Configuration Limits for Fibre Channel over Ethernet on MDS 9700 Series*

| Feature | MDS 9700 Network with 48-Port 10-Gigabit Fibre Channel over Ethernet Module |
|---|---|
| Zones | 16000 |
| Zone members | 32000 |
| Zone sets | 1000 |
| Zone DB size | 3.8MB [17] |
| Number of FCNS entries in network | 20000 |
| Device alias | 12000 |

[17] An error message appears in the user's console if the zone database size exceeds 3.8 MB.

**Considerations**

- A warning appears in the user's console if the number of zones exceeds 8000. However, further configurations are not blocked.

- An error message appears in the user's console if the total number of the unique zone members exceed 16000.

- Beginning from Cisco MDS NX-OS Release 6.2(7), the Zone database size is increased from 2MB to 3.8MB, to provide zone scale enhancements. However, if there are any switches in the fabric running on Cisco MDS NXOS Release 6.2(5) or lower, the previous 2 MB zone database limit would prevail and the new zone scale enhancements would not be available. We recommend that the 2-MB zone DB limit not be exceeded unless all the switches in the fabric run 6.2(7) or later releases.

- An error message appears in the user's console if the number of FCNS entries exceeds 10000.

## Example To calculate Zone DB size

The following example shows how to calculate Zone DB size for a fabric:

```
(config)# show zone status vsan 310 | Inc "Db Size" P 1

Full Zoning Database :
    Db Size: 1040524 Bytes
--
Active Zoning Database :
    Db Size: 962156 Bytesc
Now, Add 962156 with 1040524 = 2002680
    2002680 / (1024 * 1024) = 1.9 MB.
```

**Note**    This database size does not include the pending changes in a session.

# Cisco IOA Configuration Limits

The below table lists the IOA configurations and the corresponding limits.

*Table 10: Cisco I/O Accelerator Configuration Limits*

| Parameter | |
|---|---|
| Number of switches in a cluster | 4 |
| Number of clusters per switch | 16 |
| Number of switches in a SAN fabric for FC-Redirect | 34 |
| Number of hosts per target | 128 |
| Number of concurrent flows per IOA service engine | 128 |
| Number of flows per IOA service engine (hard limit) | 128 - Release 4.2(1) on MDS 9222i/MDS 9500<br><br>512 - Release 4.2(7) or later on MDS 9222i/MDS 9500<br><br>512 - Release 6.2(5) or later on MDS 9250i |
| Number of flows per IOA service engine (soft limit) | 64 - Release 4.2(1) on MDS 9222i/MDS 9500<br><br>256 - Release 4.2(7) or later on MDS 9222i/MDS 9500<br><br>256 - Release 6.2(5) or later on MDS 9250i<br><br>**Note**    If initiators or targets participating in IOA are present on MDS 9250i switches, then the limit is 203 for tape and 160 for disk. |
| Number of flows in a cluster | 1024 - Release 4.2(7d)<br><br>1248 - Release 5.2(6b) or later |

# Fibre Channel Flow Configuration Limits

The below table lists the Fibre Channel flow configurations limits.

*Table 11: Fibre Channel Flow Limit*

| Cisco MDS Device | Aggregate Flow and Flow Statistics Limit | Flow Statements per Module |
|---|---|---|
| Generation 1 Modules | 1000 | 1024 |
| Generation 2 Modules | 2000 | 2048 |
| Generation 3 Modules | 512 | 512 |
| Generation 4 Modules | 512 | 512 |
| Generation 5 Modules | 512 | 512 |

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