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Dell Connectrix® Cisco Nexus Dashboard Fabric Controller Release Notes

Current Release Version: 12.2.2
Release Date: 2024-09-23
Previous Release Version: 12.2.1

Topics:

The Dell Connectrix Cisco Nexus Dashboard Fabric Controllers (NDFC) Release Notes contains information that is exclusive to NDFC Storage (SAN) functionality as a management tool for NX-OS MDS 9000 Family switches. Use this document with related Nexus Dashboard Fabric Controller documentation.

Revision history

The following table presents the revision history of this document.

Table 1. Revision history

Revision	Release	Date	Description
Rev 06	12.2.2	September 23, 2024	New Release
Rev 05	12.2.1	April 29, 2024	New Release
Rev 04	12.1.3b	October 23, 2023	New Release
Rev 03	12.1.2e	May 1, 2023	New Release
Rev 02	12.1.1e	June 27, 2022	New Release
Rev 01	12.0(2f)	February 07, 2022	New Release

Product description

Cisco Data Center Network Manager (DCNM) is renamed as Cisco Nexus Dashboard Fabric Controller (NDFC) from Release 12.0.1a.

Cisco Nexus Dashboard Fabric Controller is the comprehensive management solution for all NX-OS deployments spanning LAN Fabric, SAN, and IP Fabric for Media (IPFM) networks in data centers powered by Cisco. Cisco Nexus Dashboard Fabric Controller also supports other devices, such as IOS-XE switches, IOS-XR routers, and non-Cisco devices. Being a multi-fabric controller, Cisco Nexus Dashboard Fabric Controller manages multiple deployment models like VXLAN EVPN, Classic 3-Tier, Routed based fabrics for LAN while providing ready-to-use control, management, monitoring, and automation capabilities for all these environments. In addition, Cisco NDFC when enabled as a SAN Controller, automates Cisco MDS Switches and Cisco Nexus Family infrastructure in NX-OS mode.

Nexus Dashboard Fabric Controller primarily focuses on Control and Management for three primary market segments:

- LAN networking including VXLAN, Multi-site, Classic Ethernet, and External Fabrics supporting Cisco Nexus switches running standalone NX-OS, with additional support for IOS-XR, IOS-XE and adjacent Host, Compute, Virtual Machine, and Container Management systems.
- SAN networking for Cisco MDS and Cisco Nexus switches running standalone NX-OS, including support for integration with storage arrays and additionally Host, Compute, Virtual Machine, and Container Management systems.
- Media Control for Multicast Video production networks running Cisco Nexus switches operated as standalone NX-OS, with additional integrations for 3rd party media control systems.

Previously, DCNM was an application server running on a VM deployed via OVA or ISO, a physical appliance deployed via ISO, or software installed on a qualified Windows or Linux machine.

Cisco Nexus Dashboard Fabric Controller, Release 12 is available as an application running exclusively on top of the Cisco Nexus Dashboard Virtual or Physical Appliance.

Virtual Nexus Dashboard deployment with OVA is also referred to as virtual Nexus Dashboard (vND) deployment, while deployment of Nexus Dashboard on physical appliance (Service Engine) is known as physical Nexus Dashboard (pND) deployment. To deploy Nexus Dashboard based on your requirement, refer to Cisco Nexus Dashboard Deployment Guide.

The following table shows the compatible versions for Nexus Dashboard and services.

Table 2. Nexus Dashboard and Services Compatible Versions

Services	Compatible Versions
Nexus Dashboard	3.2.1e
Nexus Dashboard Fabric Controller	12.2.2

NOTE: Cisco will no longer support the deployment of Nexus Dashboard (ND) on Red Hat Enterprise Linux (RHEL) in any future releases. Cisco Nexus Dashboard release 3.0.1 and Cisco Nexus Fabric Controller (NDFC) 12.1.3b will be the last releases that this form factor will support. Work with partners or Cisco representative to leverage other supported form factors for future releases.

Cohosting of NDFC-Managed mode with Nexus Dashboard Insights (NDI)

For information about supported scale for NDFC and NDI co-hosted on the same Nexus Dashboard Cluster, see the Verified Scalability Guide for Cisco Nexus Dashboard Fabric Controller.

For information about the supported scale for NDFC on Nexus Dashboard Cluster and Insights and Orchestrator services on a different Nexus Dashboard Cluster, see Verified Scalability Limits for Nexus Dashboard Insights.

For more information, see Cisco Nexus Dashboard Fabric Controller (Formerly DCNM).

As always in a Dell environment, refer to the Dell Support Matrix available through E-Lab™ Interoperability Navigator for the latest information on supported configurations.

The answers to many DCNM or NDFC related questions can be found in the Dell Knowledge base located at Dell Online Support.

New features and changes

New Features and Enhancements in Cisco NDFC, Release 12.2.2

This section provides information about the new features, enhancements, and hardware support introduced in this release.

Common enhancements to all personas

The following features are new in Cisco NDFC Release 12.2.2 for all personas in Cisco Nexus Dashboard Fabric Controller.

Table 3. Common enhancements to all personas

Product Impact	Features	Description
Base Functionality	Unified backup and restore	Beginning with NDFC release 12.2.2, with a few exceptions, backup and restore is no longer available at these individual service levels: ● Nexus Dashboard Insights (NDI) ● Nexus Dashboard Orchestrator (NDO) ● Nexus Dashboard Fabric Controller (NDFC) Instead, a unified backup and restore is now available at the Nexus Dashboard (ND) level, where a backup and restore performed at the ND level backs up not only the configuration information for ND, but also for any services (such as NDI, NDO, or NDFC) running in that ND. For more information, see Unified Backup and Restore for Nexus Dashboard and Services.

LAN controller enhancements

Table 4. LAN controller enhancements

Product Impact	Features	Description
Security	Security for VXLAN EVPN fabrics using security groups	Beginning with NDFC release 12.2.2, security for VXLAN EVPN fabrics using security groups is available. For more information, see Configuring Security for VXLAN EVPN Fabrics.
Base Functionality	Added support for new Cisco Nexus 9300 and 9400 switches	Support added for the following Cisco Nexus 9300 and 9400 switches: ● N9K-C9364C-H1 ● N9K-X9400-22L For more information, see the “New Hardware Features” on page 9.
Ease of Use	Extended support for adding Cisco Nexus 9800 series switches to NDFC fabrics with the border gateway role	Prior to NDFC 12.2.2, NDFC included support for adding Cisco Nexus 9800 series switches using the spine and super spine roles. Beginning with NDFC 12.2.2, NDFC extended support for adding Cisco Nexus 9800 series switches as a border gateway (BGW). NDFC supports all border and border gateway roles for Cisco Nexus 9800 series switches. This feature is supported when creating or editing the following fabric types: ● BGP Fabric ● Campus VXLAN EVPN fabric

Table 4. LAN controller enhancements (continued)

Product Impact	Features	Description
		• Data Center VXLAN EVPN fabric • VXLAN EVPN Multi-Site fabric For more information, see the "Adding Cisco Nexus 9800 Series Switches to a Fabric" section in Add Switches for LAN Operational Mode.
Ease of Use	Support for connecting fabrics using inter-fabric links with MACsec using a QKD server or a preshared key	With this feature, you can connect two fabrics using inter-fabric links with Media Access Control Security (MACsec), either using a quantum key distribution (QKD) server or by providing a preshared key. Beginning with NDFC 12.2.2, NDFC added support for MACsec for inter-fabric links for the following fabric types: • Data Center VXLAN EVPN • Enhanced Classic LAN • External Connectivity Network Prior to NDFC 12.2.2, NDFC supported MACsec for intra- fabric links for the Data Center VXLAN EVPN fabric and the BGP fabric. With this release, NDFC moved MACsec parameters from the **Advanced** tab to a new **Security** tab and added a Layer 2 template, **ext_l2_dci_link**, for configuring a Layer 2 DCI link. For more information, see the "Security" section in Data Center VXLAN EVPN and the "Create a Layer 2 DCI Link" section in VRF Lite. For more information about configuring MACsec with or without QKD, see Connecting Two Fabrics with MACsec Using QKD.
Ease of Use	Support for Cisco Plug and Play Connect (PnP) with out-of-band (OOB) management for Cisco Catalyst 9000 series switches in an External Connectivity Network or Custom Network fabric	With this feature, you can enable automatic Cisco Plug n Play (PnP) IP assignment for Cisco Catalyst 9000 series switches in an External Connectivity Network or a Custom Network fabric using the **Create Fabric** or **Edit Fabric** > **Bootstrap** tab. For more information, see the "External Fabrics" and "Creating an External Fabric" sections in External Connectivity Networks.
Ease of Use	Support for assigning a vPC/port-channel ID range and for specifying custom vPC/port-channel IDs for leaf-ToR pairing and aggregation-access pairing	With this feature, you can assign one virtual port channel (vPC)/port-channel ID range and also specify a custom vPC/port-channel IDs. Beginning with NDFC 12.2.2, NDFC added an **Action > Edit Pairing** option on the **TOR Pairing** page for editing leaf and ToR and for aggregation and the **Access**

Table 4. LAN controller enhancements (continued)

Product Impact	Features	Description
		Pairing page for accessing vPC/port-channel IDs. For more information, see the "Configuring a Specific vPC/Port-Channel ID Range for Leaf-ToR Pairing" section in Configuring ToR Switches. For more information, see the "Specifying a vPC/Port- Channel ID Range and Providing Custom vPC/Port- Channel IDs for Aggregation-Access Pairing" section in Enhanced Classic LAN.
Ease of Use	Support added for creating VXLAN EVPN fabrics with a PIMv6 Underlay and TRMv6	In previous releases of NDFC, NDFC supported an IPv6 underlay with ingress replication (IR). Beginning with the NDFC 12.2.2 release, NDFC added support for multicast replication. Previously, NDFC supported a standalone VXLAN IPv4 fabric. Beginning with NDFC 12.2.2, NDFC supports creating a Multi-Site Domain (MSD) fabric with VXLANv6. Prior to NDFC 12.2.2, NDFC supported Tenant Routed Multicast (TRM) IPv4. With NDFC 12.2.2, NDFC added support for TRMv6 with a new tab **TRM** on the **Create VRF** page for enabling forwarding of multicast traffic for IPv4 or IPv6. Existing IPv4 TRM fields are moved from the **Advanced** tab to the **TRM** tab. This feature is available for the following fabric types: • Data Center VXLAN EVPN fabric • BGP (eBGB EVPN) fabric • VXLAN EVPN Multi-Site fabric For more information, see the following sections in Data Center VXLAN EVPN: • Creating a VXLAN EVPN Fabric Using the Data Center VXLAN EVPN Template • Creating VRF • Configuring VXLAN EVPN Fabrics with a PIMv6 Underlay and TRMv6
Ease of Use	ePBR Support	Beginning with NDFC release 12.2.2, support is available for enhanced policy-based redirect (ePBR), which is used for Layer 4 to Layer 7 service load balancing, and for single-fabric steering and redirection. For more information, see Layer 4 to Layer 7 Services Configuration.
Ease of Use	Updated workflow and terminology	Beginning with NDFC release 12.2.2, the workflow for configuring Layer 4 to Layer 7 services has been enhanced. In addition, the following terms that were used in previous releases have been changed:

Table 4. LAN controller enhancements (continued)

Product Impact	Features	Description
		• Service appliance has been renamed to service cluster. • Route peering has been renamed to service function. • Service policy has been renamed to service insertion. For more information, see Layer 4 to Layer 7 Services Configuration.
Ease of Use	Update groups for switches in a fabric	Beginning with NDFC release 12.2.2, the Fabric Software functionality described in this document is supported when cohosting Nexus Dashboard Insights and NDFC, where: • Nexus Dashboard Insights is configured in NX-OS without controller mode. • NDFC is configured with NX-OS Discovery mode.
Ease of Use	One Manage feature is now available	Beginning with NDFC release 12.2.2, the One Manage feature is available to provide the following functionality: • Create and manage multi-cluster fabrics (new to NDFC release 12.2.2). • Monitor multi-cluster fabrics (previously introduced in NDFC release 12.1.3 as One View Dashboard for LAN deployments). For more information, see Managing and Monitoring Multi-Cluster Fabrics Using One Manage.

SAN controller enhancements

Table 5. SAN controller enhancements

Product Impact	Features	Description
Ease of Use	Enhanced zone, Fibre Channel Name Server (FCNS), and fabric login (FLOGI) limitations by adding default policies for triggering alarms when the scale percentage exceeds a defined threshold	With this feature, you can view alarms with a default warning severity when zone, FCNS, and FLOGI scale percentages exceed 80%. You can edit the zone, FCNS, and FLOGI scale percentage values by exporting or importing the policies, updating the values, and waiting for the nightly scan to run. Navigate to **Analyze > Event Analytics > Alarm** and then click on the **Alarm Policies** tab to view the alarm policies. For more information, see the "Forwarding Alarms to Registered SNMP Listeners" section in Event Analytics. With this feature, you can perform the following: • Predict the failure of a small form-factor pluggable (SFP) for
Ease of Use	Support for enhanced metrics for predicting the health of an SFP and	Multilayer Distributed Switching (MDS) switches.

Table 5. SAN controller enhancements (continued)

Product Impact	Features	Description
	automatic alerts when optics values exceed the default thresholds defined on the switch	• View usage data by day, week, month, or year for Rx power, Tx power, temperature, current, and voltage for the SFPs • View usage trends and receive alerts when optics values exceed default thresholds. NDFC added a default alarm policy, **pm_optics_predict**, so alerts are automatically sent out when optics values exceed the defaultthresholds as defined on the switch. For more information, see the "Alarms," "Alarms Raised," and "Alarms Clearer" sections in Event Analytics and the "Viewing Performance Information for Optics" section in Add Interfaces for SAN Operational Mode.
Ease of Use	New Interfaces card added to the **Fabric Controller > Overview** page for displaying the interface count for all the discovered fabrics	With this feature, you can view the interface count for all the discovered fabrics by viewing the Interfaces card on the **Fabric Controller > Overview** page. For more information, see the "Dashboard Overview" section in Overview and Initial Setup of Cisco NDFC SAN.
Ease of Use	Support for displaying VSAN zone lock status on the **Fabric Overview > Summary** page	With this feature, you can identify if a VSAN zone is locked due to a zone pending on a switch on the VSAN. You can view the VSAN lock status on the **Fabric Overview > Summary** page. For more information, see the "Fabric Summary" section and the "Zoning" section in Configure Zoning. For more information, see the "Troubleshooting VSAN Zone Locks" section in About Fabric Overview for SAN Operational Mode Setups.
Ease of Use	Enhance configuration drift functionality to generate an alert every 24 hours if up or trunking interfaces differ from the current up or trunking interface count	With this feature, NDFC generates an alert every 24 hours if up or trunking interfaces differ from the current interface count. Navigate to **Fabric Overview > Configuration Monitor** and choose a switch. Click **View** under the **Baseline Configuration** column. With this feature, the **Base Configuration** page displays the up or the trunking interfaces. NDFC compares the result to determine the configuration differences. This feature is limited to MDS platforms that support the **show interface status** command. For more information, see the "Configuration Monitor" section in About Fabric Overview for SAN Operational Mode Setups.
Ease of Use	A **Perf. Graph** button added to the **Topology** view for displaying	Beginning with NDFC 12.2.2, you can view performance data for the Inter-Switch Links (ISLs) and the connected

Table 5. SAN controller enhancements (continued)

Product Impact	Features	Description
	performance data with colors based on Rx and Tx utilization percentages	storage or host devices by clicking on the **Perf. Graph** button within the **Topology** view. When you click on the **Perf. Graph** button within the **Topology** view, you can see colors in the legend in the **Topology** view based on the latest Receive (RX) and Transmit (Tx) utilization percentages. For more information, see the following sections in SAN Devices: • **Storage Overview > Summary and SAN Insights** • **Hosts > Summary and SAN Insights**
Ease of Use	Support added for visualizing performance data with moving dotted lines between the connected storage or host devices	With this feature, after clicking the **Perf. Graph** button within the **Topology** view, you can visualize performance data displayed with moving dotted lines between the connected storage or host devices. NDFC displays the performance data in the legend of the **Topology** view with a color based on the latest Receive (Rx) and Transmit (Tx) utilization percentages. If no data is available, the links display in gray. For more information, see the following sections in SAN Devices: • **Storage Overview > Summary and SAN Insights** • **Hosts > Summary and SAN Insights**
Ease of Use	VM utilization information	Receive (Rx) and Transmit (Tx) utilization percentages of the bandwidth of the links for the host are available, which helps to deliver a visual indication of which VM is utilized more than others. This is useful information when trying to find which VM is potentially causing issues on a server. For more information, see the "Hosts > VMs" section in SAN Devices.

Fabric Controller with IP Fabric for Media (IPFM) enhancements

Table 6. Fabric Controller with IP Fabric for Media (IPFM) enhancements

Product Impact	Features	Description
Ease of Use	2022-7 redundant media fabrics (red/blue) visualization	With this feature, you can group 2022-7 redundant fabrics into a fabric group. This feature allows you to associate endpoints and multicast groups from both fabrics for a side-by-side topology view for individual flows. For more information, see the "Creating an IPFM Fabric Group" section in IPFM and Classic IPFM.

Table 6. Fabric Controller with IP Fabric for Media (IPFM) enhancements (continued)

Product Impact	Features	Description
Ease of Use	Support for Cisco Catalyst 9000 series switches in an IPFM Classic fabric	This feature lets you add Cisco Catalyst 9000 series switches to an IPFM Classic fabric. For more information, see the "Creating a Classic IPFM Fabric" section in IPFM and Classic IPFM and the "Add Switches for LAN Operational Mode" section in Add Switches for LAN Operational Mode.
Ease of Use	Support for IPFM fabrics in One Manage	With this release, NDFC supports IPFM fabrics for One Manage. For more information, see the "Viewing the Details" section in Managing and Monitoring Multi-Cluster Fabrics Using One Manage.

New Hardware Feature

The following is the list of new hardware supported with this release:

- Cisco Nexus Switches for LAN deployments
  - N9K-C9364C-H1 – Cisco Nexus 9300 series TOR chassis with 64 100g ports
  - N9K-X9400-22L – Cisco Nexus 9400 series TOR chassis with 64 100g ports
- Cisco Unified Computing System (Cisco UCS) for SAN deployments

Cisco UCS 64108 108-Port Fabric Interconnect – 10/25/40/100 Gigabit Ethernet, FCoE and Fiber Channel switch offering up to 7.42 Tbps throughput and up to 108 ports.

NOTE: To view UCS FI 64108 vFC traffic on NDFC, the UCS FI NX-OS version has to be 9.3(5)I43(5a) or 9.3(5)I43(5a.1) or later.

Changes in Behavior

- Beginning with NDFC release 12.2.2, when enabling the AI/ML feature, priority-flow-control watchdog-interval on is enabled on all your configured devices, intra-fabric links, and all your host interfaces where Priority Flow Control (PFC) is also enabled. This release also adds the Priority flow control watch-dog interval field. Here you can set the Priority flow control watch-dog interval field to a non-system default value. (The default is 100 milliseconds.) Valid values are <101-1000>. For more information, see the section "About AI/ML QoS Classification and Queuing Policies" in Data Center VXLAN EVPN.
- When you enable Tenant Routing Multicast (TRM) in a fabric and a VRF without VLAN mode is allowed in the fabric settings, vPC switches have the following autogenerated configuration:

router bgp <bgp ask>

mvpn vri id <vrf-id>

After upgrading to NDFC 12.2.2 and higher, when performing a Recalculate Config on the VXLAN fabric with TRM enabled, you can see an extra mvpn vri id configuration on the vPC switches.

- During a VxLAN fabric brownfield import, set the vrf 'tag' field to a default of "12345" and no VRF loopbacks are detected.
- Devices with the ToR role are not supported in a fabric with the artificial intelligence and machine learning (AI/ML) feature enabled. ToR devices do not use the AI/ML settings but are allowed to be added as a member of a fabric.
- OpenStack Visualizer is removed and is not available for you to start from the Admin > System Settings > Feature Management page of NDFC.
- The multi-select option for selecting multiple nodes in a topology is now disabled for all fabrics and the Multi-Site Domain (MSD) view, including when you are in a VRF or in a network of an MSD.
- A new template, ERSPAN, is added for Cisco Nexus 9000 series switches that support configuration of Encapsulated Remote Switched Port Analyzer (ERSPAN) source and destination ports.

- In an eBGP fabric, if AS mode is Same-Tier-AS, you no longer need to create a leaf_bgp_asn policy. You can set the ASN in the fabric setting instead.
- Precision Time Protocol (PTP) configuration change for links between leaf/spine and ToR/leafs. Intra-fabric links have additional configurations for the following switches, release versions, and neighbors:
  - ptp - existing
  - pttp delay-request minimum interval aes67 -3 - new
  - ptp sync interval aes67 -3 - new
  - Cisco Nexus N9K-C9408 - Cisco NX-OS release 10.4.(3)
  - Cisco Nexus N9K-C93400LD-H1 - Cisco NX-OS release 10.4.(3)
  - Cisco Nexus N9K-C9332D-H2R - Cisco NX-OS release 10.4.(2)
  - Cisco Nexus N9K-C9364C-H1 - Cisco NX-OS release 10.5.(1)
- In releases earlier than NDFC release 12.2.2, fabric backup was supported for fabrics in monitored mode. Beginning with NDFC release 12.2.2, fabric backup is not supported for fabrics in monitored mode.

Licensing Model

Two types of Cisco DCNM-SAN licenses are available:

- Cisco DCNM-SAN Essentials Edition (comparable to Cisco Fabric Manager) is included at no charge with every Cisco MDS 9000 hardware purchase. No license is required to use these features because they are unlocked with the image.
- Cisco DCNM-SAN Advanced Edition (comparable to Cisco Fabric Manager Server) provides additional capabilities and is required to use the Virtual Machine Topology and Performance feature and the Performance Forecasting Charts feature. The Advanced Edition licenses have the following part numbers:

Table 7. Licensing Model

Product Name	Part Number
DCNM for SAN Advanced Edition for MDS 9700	DCNM-SAN-M97EK9
DCNM for SAN Advanced Edition for MDS 9500	DCNM-SAN-M95EK9
DCNM for SAN Advanced Edition for MDS 9200	DCNM-SAN-M92EK9
DCNM for SAN Advanced Edition for MDS 9100	DCNM-SAN-M91EK9

For a description of the license differences between Fabric Manager and Data Center Network Manager, refer to the following tech note.

Fixed problems

Cisco-specific caveats for resolved problems can be found in the Cisco release-noted documentation at the following Cisco website.

Environment and system requirements

The following sections describes the various system requirements for the proper functioning of your Cisco Nexus Dashboard Fabric Controller, Release 12.2.2:

- Cisco Nexus Dashboard Version Compatibility" on page 11
- "Nexus Dashboard Server Resource (CPU/Memory) Requirements" on page 11
- "Nexus Dashboard Networks" on page 11
- "Virtual Nexus Dashboard (vND) Prerequisites" on page 12
- "Supported Latency" on page 12
- "Cisco Nexus Dashboard Version Compatibility" on page 11

Cisco Nexus Dashboard Version Compatibility

NDFC 12.2.2 is bundled with the ND 3.2.1e image. There is no longer any separate option for upload of applications into the Nexus Dashboard. Nexus Dashboard is now a single unified product.

Nexus Dashboard Server Resource (CPU/Memory) Requirements

The following table provides information about Server Resource (CPU/Memory) Requirements to run NDFC on top of Nexus Dashboard. Refer to Nexus Dashboard Capacity Planning to determine the number of switches supported for each deployment.

Cisco Nexus Dashboard can be deployed using number of different form factors. NDFC can be deployed on the following form factors:

- pND - Physical Nexus Dashboard
- vND - Virtual Nexus Dashboard
- rND - RHEL Nexus Dashboard

Table 8. Server Resource (CPU/Memory) Requirements to run NDFC on top of ND

Deployment Type	Node Type	CPUs	Memory	Storage (Throughput: 40-50MB/s)
Fabric Discovery	Virtual Node (vND) - app OVA	16vCPUs	64GB	550GB SSD
	Physical Node (pND) (PID: SE-NODE-G2)	2x 10-core 2.2G Intel Xeon Silver CPU	256 GB of RAM	4x 2.4TB HDDs 400GB SSD 1.2TB NVME drive
Fabric Controller	Virtual Node (vND) - app OVA	16vCPUs	64GB	550GB SSD
	Physical Node (pND) (PID: SE-NODE-G2)	2x 10-core 2.2G Intel Xeon Silver CPU	256 GB of RAM	4x 2.4TB HDDs 400GB SSD 1.2TB NVME drive
SAN Controller	Virtual Node (vND) - app OVA (without SAN Insights)	16vCPUs	64GB	550GB SSD
	Data Node (vND) - Data OVA (with SAN Insights)	32vCPUs	128GB	3TB SSD
	Physical Node (pND) (PID: SE-NODE-G2)	2x 10-core 2.2G Intel Xeon Silver CPU	256 GB of RAM	4x 2.4TB HDDs 400GB SSD 1.2TB NVME drive

Nexus Dashboard Networks

When first-configuring Nexus Dashboard, on every node, you must provide two IP addresses for the two Nexus Dashboard interfaces-one connected to the Data Network and the other to the Management Network. The data network is typically used for the nodes' clustering and north-south connectivity to the physical network. The management network typically connects to the Cisco Nexus Dashboard Web UI, CLI, or API.

For enabling the Nexus Dashboard Fabric Controller, the Management and Data Interfaces on a Nexus Dashboard node must be in different subnets. The interfaces between different nodes that belong to the same Nexus Dashboard cluster, must be within the same Layer-2 Network and Layer-3 subnet.

Connectivity between the Nexus Dashboard nodes is required on both networks with the round-trip time (RTT) not exceeding 50ms. Other application running on the same Nexus Dashboard cluster may have lower RTT requirements and you must always use the lowest RTT requirement when deploying multiple applications in the same Nexus Dashboard cluster. We recommend consulting the Cisco Nexus Dashboard Deployment Guide for more information.

Table 9. Network Requirements for NDFC on Nexus Dashboard

Management Interface	Data Interface	Persistent IPs
Layer 2 adjacent	Layer 2 adjacent	One of the following for LAN:

Table 9. Network Requirements for NDFC on Nexus Dashboard (continued)

Management Interface	Data Interface	Persistent IPs
		• 2 IPs in management network if using the default LAN Device Management Connectivity setting • 2 IPs in data network if setting LAN Device Management Connectivity to Data Plus one IP per fabric for EPL in data network Plus one IP for Telemetry receiver in data or management network if IP Fabric for Media is enabled. For SAN: • 2 IPs in data network Plus one IP per node in data network for SAN Insights receiver if enabled.
Layer 3 adjacent	Layer 3 adjacent	For LAN: • LAN Device Management Connectivity on NDFC must be set to Data • 2 IPs for SNMP/Syslog and SCP/POAP services • Plus one IP per fabric for EPL These IPs must be part of a subnet that is different from Nexus Dashboard management and Nexus Dashboard data subnets associated with any of Nexus Dashboard nodes. These IPs must belong to the Layer-3 External Persistent Service Pool. Note: SAN Controller and IP Fabric for Media modes are not supported in this deployment.

Virtual Nexus Dashboard (vND) Prerequisites

For virtual Nexus Dashboard deployments, each vND node has 2 interfaces or vNICs. The Data vNIC maps to bond0 (also known as bond0br) interface and Management vNIC maps to bond1 (also known as bond1br) interface. The requirement is to enable/accept promiscuous mode on the port groups associated with the Nexus Dashboard Management and/or Data vNICs where IP stickiness is required. The Persistent IP addresses are given to the pods (e.g., SNMP Trap/Syslog receiver, Endpoint Locator instance per Fabric, SAN Insights receiver, etc.). Every POD in Kubernetes can have multiple virtual interfaces. Specifically for IP stickiness, an extra virtual interface is associated with the POD that is allocated an appropriate free IP from the external service IP pool. The vNIC has its own unique MAC address that is different from the MAC addresses associated with the vND virtual vNICs. Moreover, all North-to-South communication to and from thesethese PODs go out of the same bond interface. By default, the VMware ESXi systems check if the traffic flows out of a particular VM vNIC matches the Source-MAC associated with that vNIC. In the case of NDFC pods with an external service IP, the traffic flows are sourced with the Persistent IP addresses of the given PODs that map to the individual POD MAC associated with the virtual POD interface. Therefore, we need to enable the required settings on the VMware side to allow this traffic to flow seamless in and out of the vND node.

When vND nodes are deployed with the new Layer-3 HA feature, you need not enable Promiscuous mode on the vND vNIC interfaces. Promiscuous mode is required only for vND deployments when the vNDs are layer-2 adjacent from each other.

For more information, refer to Cisco Nexus Dashboard Deployment Guide.

Supported Latency

As Cisco Nexus Dashboard Fabric Controller is deployed atop Cisco Nexus Dashboard, the latency factor is dependent on Cisco Nexus Dashboard. Refer to Cisco Nexus Dashboard Deployment Guide for information about latency.

Supported Web Browsers

Cisco Nexus Dashboard Fabric Controller is supported on the following web browsers:

- Google Chrome version 109.0.5414.87 (64 bit)
- Microsoft Edge version 109.0.1518.61 (64 bit)
- Mozilla Firefox version 108.0.1 (64 bit)

Other Supported Softwares

The following table lists the other software that is supported by Cisco Nexus Dashboard Fabric Controller Release 12.2.2.

Table 10. Other software supported by Cisco Nexus Fabric Controller Release 12.2.2

Component	Features
Security	• ACS versions 4.0, 5.1, 5.5, and 5.8 • ISE version 2.6 • ISE version 3.0 • Telnet Disabled: SSH Version 1, SSH Version 2, Global Enforce SNMP Privacy Encryption. • Web Client: HTTPS with TLS 1, 1.1 and 1.2 • TLS 1.3

In addition, Cisco NDFC supports the following types of events: Dell Call Home events, fabric change events, and events that are forwarded by traps and email.

Hardware supported

The following table lists the products and components that Cisco NDFC Release 12.2.2 supports.

Table 11. Hardware features supported by Cisco NFDC Release 12.2.2

Product/Component	Part Number
Cisco MDS 9718 Supervisor-1E Modules	DS-X97-SF1-K9
Cisco MDS 9710 Crossbar Fabric-3 Switching Module	DS-X9710-FAB3
Cisco MDS 9700 Series Supervisor-4 Module	DS-X97-SF4-K9
MDS 9706 Crossbar Switching Fabric-3 Module	DS-X9706-FAB3
Cisco MDS 9396T 32 Gbps 96-Port Fibre Channel Switch	DS-C9396T-K9
Cisco MDS 9148T 32 Gbps 48-Port Fibre Channel Switch	DS-C9148T-K9
Cisco MDS 9700 48-Port 32-Gbps Fibre Channel Switching Module	DS-X9648-1536K9
Cisco MDS 9700 64-Gbps 48-port Fibre Channel Switching Module	DS-X9748-3072K9
Cisco MDS 9250i Multilayer Fabric Switch	DS-9250I-K9
Cisco MDS 9124 24-Port Multilayer Fabric Switch	DS-C9124-K9
Cisco MDS 9134 34-Port Multilayer Fabric Switch	DS-C9134-K9
Cisco MDS 9148 48-Port Multilayer Fabric Switch	DS-C9148-K9
Cisco MDS 9148 48-Port Multilayer Fabric Switch	DS-C9148S-K9
Cisco MDS 9216i Multilayer Fabric Switch	DS-C9216i-K9
Cisco MDS 9222i Multilayer Fabric Switch	DS-C9222i-K9

Table 11. Hardware features supported by Cisco NFDC Release 12.2.2 (continued)

Product/Component	Part Number
Hardware features supported by Cisco NDFC Release 12.0.(2f)	DS-C9220I-K9
MDS 9506 Multilayer Director	DS-C9506
Cisco MDS 9509 Multilayer Director	DS-C9509
Cisco MDS 9513 Multilayer Director	DS-C9513
Cisco MDS 9706 Multilayer Director	DS-C9706
Cisco MDS 9710 Multilayer Director	DS-C9710
Cisco MDS 9718 Multilayer Director	DS-C9718
Cisco MDS 9000 32-Port 2-Gbps Fibre Channel Switching Module	DS-X9032
Cisco MDS 9000 32-Port Storage Services Module	DS-X9032-SSM
Cisco MDS 9000 12-port 4-Gbps Fibre Channel Switching Module	DS-X9112
Cisco MDS 9000 12-port 4-Gbps Fibre Channel Switching Module	DS-X9112
Cisco MDS 9000 24-port 4-Gbps Fibre Channel Switching Module	DS-X9124
Cisco MDS 9000 48-port 4-Gbps Fibre Channel Switching Module	DS-X9148
Cisco MDS 9000 24-Port 8-Gbps Fibre Channel Switching Module	DS-X9224-96K9
Cisco MDS 9000 32-port 8-Gbps Advanced Fibre Channel Switching Module	DS-X9232-256K9
Cisco MDS 9000 48-port 8-Gbps Advanced Fibre Channel Switching Module	DS-X9248-256K9
Cisco MDS 9000 4/44-Port Host-Optimized 8-Gbps Fibre Channel Switching Module	DS-X9248-48K9
Cisco MDS 9000 48-Port 8-Gbps Fibre Channel Switching Module	DS-X9248-96K9
Cisco MDS 9000 Family 14-Port Fibre Channel and 2-port Gigabit Ethernet Module	DS-X9302-14K9
Cisco MDS 9000 18/4-Port Multiservice Module (MSM-18/4)	DS-X9304-18K9
Cisco MDS 9000 4-port 1-Gbps IP Storage Module	DS-X9304-SMIP
Cisco MDS 9000 8-port 1-Gbps IP Storage Module	DS-X9308-SMIP
Cisco MDS 9000 Family 16-Port Storage Services Node (SSN-16)	DS-X9316-SSNK9
Cisco MDS 9000 Family 24/10 SAN Extension Module	DS-X9334-K9
Cisco MDS 9000 48-port 16-Gbps Fibre Channel Switching Module with SFP LC connectors	DS-X9448-768K9
Cisco MDS 9500 Series Supervisor-1 Module	DS-X9530-SF1-K9
Cisco MDS 9500 Series Supervisor-2 Module	DS-X9530-SF2-K9
Cisco MDS 9500 Series Supervisor-2A Module	DS-X9530-SF2A-K9

Table 11. Hardware features supported by Cisco NFDC Release 12.2.2 (continued)

Product/Component	Part Number
Cisco MDS 9000 Family 4-Port 10-Gbps Fibre Channel Switching Module	DS-X9704
Cisco MDS 9000 8-port 10-Gbps Fibre Channel over Ethernet (FCoE) Module	DS-X9708-K9
Cisco MDS 48-Port 10-Gigabit Fibre Channel over Ethernet (FCoE) Module with SFP LC connectors	DS-X9848-480K9
Cisco MDS 9132T 32-Gbps 32-Port Fibre Channel Switch	DS-C9132T-K9
Cisco MDS 9148V 64-Gbps 48-Port Fibre Channel Switch	DS-C9148V-K9
Cisco MDS 9124V 64-Gbps 24-Port Fibre Channel Switch	DS-C9124V-K9

Compatibility with Cisco MDS 9000 Family Switches

The following table shows the Cisco NDFC Compatibility Matrix for Release 12.2.2.

Table 12. Cisco NDFC Compatibility Matrix

Switches	Supported Switch Releases
Cisco MDS 9100	9.2(1), 8.4(2c), 8.5(1), 6.2(33), 8.4(2b), 8.1(1b), 6.2(31), 6.2(29), 8.4(2a), 8.4(2), 8.4.(1a), 6.2(29), 8.4(1), 6.2(27), 8.3(2), 8.3(1), 8.2(2), 8.2(1), 8.1(1a), 7.3(1)DY(1), 7.3(1)D1(1), 7.3(0)DY(1), 7.3(0)D1(1), 6.2(25), 6.2(23), 6.2.(21), 6.2(19), 6.2(17), 6.2(15), 6.2(13b), 6.2(13a), 6.2(13), 6.2(11c), 6.2(11b), 6.2(11), 6.2(9c), 6.2(9b), 6.2(9a), 6.2(9), 6.2(7), 6.2(5a), 6.2(5), 6.2(3), 6.2(1), 5.2(8i), 5.2(8h), 5.2(8g) , 5.2(8f), 5.2(8e), 5.2(8d), 5.2(8c), 9.2(2), 8.4(2d) 8.4(2f), 9.3(1), 9.3(2)
Cisco MDS 9200	8.5(1), 8.3(2), 8.3(1), 7.3(1)DY(1), 7.3(1)D1(1), 7.3(0)DY(1), 7.3(0)D1(1), 6.2(25), 6.2(23), 6.2.(21), 6.2(19), 6.2(17), 6.2(15), 6.2(13b), 6.2(13a), 6.2(13), 6.2(11c), 6.2(11b), 6.2(11), 6.2(9c), 6.2(9b), 6.2(9a), 6.2(9), 6.2(7), 6.2(5a), 6.2(5), 6.2(3), 6.2(1), 5.2(8h), 5.2(8c), 5.2(8d), 5.2(8e), 5.2(8f), 5.2(8g), 9.2(2), 8.4(2d), 8.4(2f), 9.3(1), 9.3(2)
Cisco MDS 9250i	9.2(1), 8.4(2c), 8.5(1), 8.4(2b), 8.4(2a), 8.4(2), 8.1(1b), 8.4.(1a), 6.2(31), 6.2(29), 8.4(1), 6.2(27), 8.3(2), 8.3(1), 8.2(2), 8.2(1), 8.1(1a), 7.3(1)DY(1), 7.3(1)D1(1), 7.3(0)DY(1), 7.3(0)D1(1), 6.2(25), 6.2(23), 6.2.(21), 6.2(19), 6.2(17), 6.2(15), 6.2(13b), 6.2(13a), 6.2(13), 6.2(11c), 6.2(11b), 6.2(11), 6.2(9c), 6.2(9b), 6.2(9a), 6.2(9), 6.2(7), 6.2(5a), 6.2(5), 9.2(2), 8.4(2d), 8.4(2f), 9.3(1), 9.3(2)
Cisco MDS 9220i	9.2(1), 8.5(1), 9.2(2), 8.4(2d) 8.4(2f), 9.3(1), 9.3(2)
Cisco MDS 9300	9.2(1), 8.4(2c), 8.5(1), 6.2(33), 8.4(2b), 8.1(1b), 6.2(31), 6.2(29), 8.4(2a), 8.4(2), 8.4(1a), 6.2(29), 8.4(1), 6.2(27), 8.3(2), 8.3(1), 8.2(2), 8.2(1), 8.1(1a), 8.1(1), 7.3(1)DY(1), 7.3(1)D1(1), 7.3(0)DY(1), 7.3(0)D1(1), 6.2(25), 6.2(23), 6.2.(21), 6.2(19), 6.2(17), 6.2(15), 6.2(13b), 6.2(13a), 6.2(13), 9.2(2), 8.4(2d), 8.4(2f), 9.3(1), 9.3(2)
Cisco MDS 9500	6.2(33), 7.3(1)DY(1), 7.3(1)D1(1), 7.3(0)DY(1), 7.3(0)D1(1), 6.2(31), 6.2(29), 6.2(25), 6.2(23), 6.2.(21), 6.2(19), 6.2(17), 6.2(15), 6.2(13b), 6.2(13a), 6.2(13), 6.2(11c), 6.2(11b), 6.2(11),
Cisco MDS 9700	9.2(1), 8.4(2c), 8.5(1), 6.2(33), 8.4(2b), 8.1(1b), 6.2(31), 6.2(29), 8.4(2a), 8.4(2), 8.4(1a), 6.2(29), 8.4(1), 6.2(27), 8.3(2), 8.3(1), 8.2(2), 8.2(1), 8.1(1a), 8.1(1), 7.3(1)DY(1),

Table 12. Cisco NDFC Compatibility Matrix (continued)

Switches	Supported Switch Releases
	7.3(1)D1(1), 7.3(0)DY(1), 7.3(0)D1(1), 6.2(25), 6.2(23), 6.2.(21), 6.2(19), 6.2(17), 6.2(15), 6.2(13b), 6.2(13a), 6.2(13), 6.2(11c), 6.2(11b), 6.2(11), 6.2(9c), 6.2(9b), 6.2(9a), 6.2(9), 6.2(7), 6.2(5a), 6.2(5), 6.2(3), 6.2(1), 9.2(2), 8.4(2d), 8.4(2f), 9.3(1), 9.3(2)

Known problems and limitations

For a list of problems with this release, please refer to the Nexus Dashboard and Services Release Notes, Release 3.2.2.

Technical notes

This section contains technical notes.

Dell Email Home for Cisco MDS switches

Configuration and troubleshooting instructions, prerequisites, and other caveats can be found in the Dell Connectrix Procedure Generator. The Connectrix Procedure Generator can be downloaded from Dell Online Support. Search for **Connectrix Procedure Generator**.

Customers requiring installation of this solution should contact their Dell EMC Customer Engineer to assist with the installation and provide the documentation.

Documentation

Send documentation comments to networkingpub.feedback@dell.com.

Location of Cisco NDFC documentation

The Cisco NDFC documentation is available on the Cisco Nexus Dashboard Fabric Controller page.

The documentation set for Cisco NDFC includes the following Cisco NDFC release 12.x documents:

- Release Notes:
  - Cisco NDFC Release Note, release 12.2.2
  - Cisco NDFC Release Note, release 12.1.3b
  - Cisco NDFC Release Notes, release 12.1.2x
  - Cisco NDFC Release Notes, release 12.1.1x
  - Cisco NDFC Release Notes, Release 12.0.2.x
- Installation and Licensing
  - Cisco NDFC OVA Installation Guide, Release 12.2.2
- Cisco NDFC Fundamentals Guide
  - Cisco NDFC Configuration, Release 12.2.2
- Cisco NDFC REST API Guide
  - Cisco NDFC REST API Guide, Release 12.2.2
- Cisco NDFC Troubleshooting Guide

Software media, organization, and files

For information about related software environment and system requirements, see the Dell Support Matrix that is located in the E-Lab Interoperability Navigator, under the **PDFs and Guides** tab.

To download the latest Nexus Dashboard Fabric Controller software, go to Dell Online Support and search for **Nexus Dashboard Fabric Controller**.

Deployment Options

The following deployment options are available for Cisco Nexus Dashboard Fabric Controller

NDFC on Single node (non HA Cluster)

On Single node Nexus Dashboard, you can deploy NDFC with the following personas:

- Fabric Discovery for lab/non-production environments (<= 25 switches)
- Fabric Controller for lab/non-production environments (<= 25 switches)
- Fabric Controller in IP Fabric for Media controller mode for production environments
- SAN Controller for production environments (<= 80 switches)

NOTE: Fabric Controller/Fabric Discovery deployment is for Lab purposes only. Do not deploy this in your production environment.

NDFC on a 3-node virtual (vND) or physical (pND) Nexus Dashboard Cluster (Active-Active HA mode

On 3-Node Nexus Dashboard, you can deploy NDFC with the following personas:

- Fabric Discovery
- Fabric Controller
- SAN Controller with or without SAN Insights

NOTE: Note: For NDFC deployments, the Nexus Dashboard node should have a different subnet on the management interface and the data/fabric interface. In addition, in a 3-node Nexus Dashboard cluster, all Nexus Dashboard nodes should be layer-2 adjacent. In other words, the 3 Nexus Dashboard nodes must all belong to the same management and data networks respectively. In summary, Nexus Dashboard Fabric Controller is not supported on Nexus Dashboard nodes that are deployed with management and data networks using overlapping subnets.

NDFC on a 5-node vND Cluster (Active-Active HA mode)

In release 12.1.1e and later, on 5-Node Nexus Dashboard, you can deploy NDFC with the following personas:

- Fabric Discovery
- Fabric Controller

NDFC on a 5-node-vND Cluster (Active-Active-HA mode)

In release 12.1.1e and later, on 5-Node Nexus Dashboard, you can deploy NDFC with the following personas:

- Fabric Discovery
- Fabric Controller

On a 4-node or 5-node Nexus Dashboard, you can deploy Nexus Dashboard Insights (NDI) along with NDFC with the following personas:

- NDI and NDFC in Fabric Discovery persona (NDFC-Monitored mode) - 4 pND nodes
- NDI and NDFC in Fabric Controller persona (NDFC-Managed mode) - 5 pND nodes

NDFC on a Nexus Dashboard running on top of Red Hat Enterprise Linux (RHEL)

From Release 12.1.2e, on a 1-node or 3-node Nexus Dashboard on the RHEL server, you can deploy NDFC with the following persona:

- SAN Controller with or without SAN Insights

NDFC on a virtual Nexus Dashboard (vND) with KVM Hypervisor

NDFC on a virtual Nexus Dashboard (vND) with KVM hypervisor supports Fabric Controller, Fabric Discovery, and SAN Controller personas.

In the 3-node and 5-node deployment, there are three Nexus Dashboard control nodes. In the 5-node deployment, the additional two nodes serve as worker nodes. The 3-node or 5-node cluster deployment is an active/active solution, that is, all nodes are used to run microservices of Nexus Dashboard Fabric Controller. When a node fails, microservices running on the node are moved to the other nodes. Nexus Dashboard Fabric Controller performs normally under one-node failure scenarios. However, a brief disruption to services is expected that must be migrated on node failure. After the migration of services is complete, the supported scale will continue to function albeit at degraded performance.

To restore optimal NDFC performance, a system running with one failed node is not the desired situation and must be rectified at the earliest. A 3-node or 5-node cluster cannot tolerate failure of two nodes, and all NDFC services are disrupted.

For virtual Nexus Dashboard OVA deployments on ESXi environments, the promiscuous mode must be enabled on the port groups that are associated with Nexus Dashboard management and Nexus Dashboard data/fabric interfaces. Otherwise, some of the functionality such as SNMP trap, Image management, Endpoint Locator, SAN Insights, and so on, will not work.

For more information about Installation, see the Cisco Nexus Dashboard Fabric Controller (NDFC) Deployment Guide.

Troubleshooting and getting help

Dell support, product, and licensing information can be obtained on the Dell Online Support site as described next.

NOTE: To open a service request through the Dell Online Support site, you must have a valid support agreement. Contact your Dell sales representative for details about obtaining a valid support agreement or to answer any questions about your account.

Product information

For documentation, release notes, software updates, or for information about Dell products, licensing, and service, go to the Dell Online Support site (registration required).

Technical support

Dell offers a variety of support options.

Dell offers a variety of support options.

The Support by Product web pages offer quick links to Documentation, White Papers, Advisories (such as frequently used Knowledgebase articles), and Downloads, as well as more dynamic content, such as presentations, discussion, relevant Customer Support Forum entries, and a link to Dell Live Chat.

Dell Live Chat - Open a Chat or instant message session with a Dell Support Engineer.

Notes, cautions, and warnings

NOTE: A NOTE indicates important information that helps you make better use of your product.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.