Dell Connectrix® Cisco Nexus Dashboard Fabric Controller

Version 12.1.1e

Release Notes

Rev 02

June 27, 2022

The Dell Connectrix Cisco Nexus Dashboard Fabric Controller (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 in conjunction with related Nexus Dashboard Fabric Controller documentation located on http://cisco.com.

Topics include:

DELL Technologies

Revision history

The following table presents the revision history of this document.

Revision	Date	Description
12.1.1e	June 27, 2022	New Release
12.0(2f)	February 07, 2022	New Release
11.5(1)	March 8, 2021	New Release
11.4(1)	September 7, 2020	New Release
11.3(1)	February 24, 2020	New Release
11.2(1)	August 19, 2019	New Release
11.1(1)	February 11, 2019	New Release
11.0(1)	September 17, 2018	New Release
10.4(1)	November 13, 2017	New Release
10.2(1)	June 12, 2017	New Release
10.1(2)	April 3, 2017	New Release
10.1(1)	November 14, 2016	New Release
10.0(1)	August 15, 2016	New Release
7.2(3)	May 9, 2016	New Release
7.2(2a)	November 30, 2015	New Release
7.2(1)	August 10, 2015	New Release
7.1(2)	June 15, 2015	New Release
7.1(1)	March 2, 2015	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*.

Beginning with Release 12, Cisco Nexus Dashboard Fabric Controller has a single installation mode. Post installation, it supports selection from multiple personas at run-time. After the Nexus Dashboard Fabric Controller Release 12.1.1e is installed, you can choose from one of the following personas:

Fabric Discovery-Discover, Monitor, and Visualize LAN Deployments.

Fabric Controller-LAN Controller for Classic Ethernet (vPC), Routed, VXLAN, and IP Fabric for Media Deployments.

SAN Controller-SAN Controller for MDS and Nexus switches. Enhanced SAN Analytics with streaming telemetry.

All features/services are modularized, broken into smaller microservices, and the required microservices are orchestrated based on the feature set or feature selections. Therefore, if any feature or microservice is down, only that microservice is restarted and recovered, resulting in minimal disruption.

In contrast to the previous DCNM Active-Standby HA model, Cisco NDFC introduces Active-Active HA deployment model utilizing all three nodes for deploying microservices. This has significant improvement in both latency and effective resource utilization.

For NDFC to run on top of virtual Nexus Dashboard (vND) instance, you must enable promiscuous mode on port groups associated with Nexus Dashboard interfaces where External Service IP addresses are specified. vND comprises of Nexus Dashboard management interface and data interface. By default, for LAN deployments, 2 external service IP addresses are required for the Nexus Dashboard management interface subnet. Therefore, you must enable promiscuous mode for the associated port-group. If inband management or EPL is enabled, you must specify External Service IP addresses in the Nexus Dashboard data interface subnet. The promiscuous mode also needs to be enabled for the Nexus Dashboard data/fabric interface

port-group. For NDFC SAN Controller, promiscuous mode only needs to be enabled on the Nexus Dashboard data interface associated port-group. For more information, refer to *Cisco Nexus Dashboard Fabric Controller Deployment Guide*.

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 at: *https://elabnavigator.dell.com/eln/elnhome* for the latest information on supported configurations.

The answers to many DCNM or NDFC related questions can be found in the Dell Knowledgebase located at Dell Online Support at: http://www.dell.com/support.

New Features and Enhancements

New Features and Enhancements in Cisco NDFC, Release 12.1.1e

Common Enhancements to all Personas

The following features are new in Cisco NDFC Release 12.1.1e for all personas in Cisco Nexus Dashboard Fabric Controller.

Features	Description
Support NDFC with Nexus Dashboard on KVM	NDFC can be installed on virtual Nexus Dashboard cluster running on top of KVM hypervisor. This is supported for Fabric Controller, Fabric Discovery and SAN Controller modes. For more information about deploying a cluster, see Cisco Nexus Dashboard Deployment Guide.

Fabric Controller Enhancements

The following features are new in Cisco NDFC Release 12.1.1e for the Fabric ControllerPre-provisioning of sub-interfaces

Features	Description
Layer-2 ToR visibility and management in Easy fabric	This feature enables onboarding and integrated automation of Layer-2 Top- of-Rack (ToR) switches as fabric devices attached to leaf switches in VXLAN EVPN based Easy Fabric deployments. This allows for a single configuration point for deploying and extending overlay networks for VXLAN EVPN fabrics
NDFC HA with Layer-3 reachability between cluster nodes	Nexus Dashboard cluster nodes support NDFC with Layer 3 connectivity between Nexus Dashboard nodes.
Inband management and Inband POAP for Easy and External fabrics	NDFC Release 12.1.1e supports inband management for devices that are part of VXLAN EVPN based Easy fabrics. In addition, for touch-less Day-0 device bring up, Inband Power-On Auto Provisioning also known as POAP functionality is introduced. Inband POAP is supported for both point-to-point (p2p) and IP un-numbered scenarios with a choice to use the internal pre-packaged DHCP server or an external DHCP server. Inband POAP is also supported for External and Classic LAN fabrics.
Cohosting NDFC-Managed mode with Nexus Dashboard Insights	Nexus Dashboard Fabric Controller and Insights services can be installed in the same physical Nexus Dashboard cluster. This is supported for both Fabric Discovery and Fabric Controller personas.
Routed fabrics with IPv6 underlay	eBGP Routed fabrics with Easy_Fabric_eBGP template supports super spines and IPv6 underlay. This allows eBGP-based routed fabrics to carry both IPv4 and IPv6 traffic over an IPv6 underlay.
Interface Group Support for Border Devices	The interface groups capability for overlay network provisioning is extended to also support Border devices.
Swap Serial Number for pre-provisioned devices	NDFC Release 12.1.1e allows users to provide dummy values for the serial numbers associated with pre-provisioned switches. Subsequently, when the real device serial number is known, the swap serial number workflow allows a serial number swap to the real device serial number while retaining all the user-defined device configurations.
Pre-provisioning of sub-interfaces	NDFC allows sub-interface configuration on pre-provisioned switches. This is especially useful for VRF-Lite configuration on pre-provisioned border devices. You can provide dummy values for the Serial number after configuration and the appropriate serial number can be updated.
IPv6 support in VXLAN OAM	NDFC VXLAN OAM IPv4 capabilities are enhanced to also support IPv6 underlay and IPv6 overlay deployments.

Features	Description
Image Management Groups	NDFC allows you to select groups of switches to perform bulk upgrades. This provides the capability to set or unset an upgrade group designation per switch.
Support for IOS-XR based Cisco 8000 platforms	NDFC supports managing or monitoring IOS-XR-based Cisco 8000 Series Switches in External Fabrics.
L4-7 Service Enhancements	NDFC services use-cases are extended to support One-arm firewall. In addition, NDFC also supports use cases where multiple virtual service nodes are connected to the same interface of a service switch. All L4-7 services workflow are now supported with both IPv4 and IPv6.
PTP monitoring for non-IPFM fabrics	Release 12.1.1e supports PTP monitoring for non-IPFM fabrics like Classic LAN and VXLAN fabrics with up to 35 switches.
PTP Topology View	PTP visibility is available in tabular format. NDFC Release 12.1.1e introduces PTP data visibility in topology view.

Fabric Controller with IP Fabric for Media (IPFM) Enhancements

The following features are new in Cisco NDFC Release 12.1.1e for the Fabric Controller with IP Fabric for Media (IPFM).

Features	Description
Multicast to Unicast NAT for IPFM flows	NDFC Release 12.1.1e supports configuration of Multicast to Unicast NAT for IPFM flows and provides end-to-end flow visualization.
Unicast to Multicast NAT for IPFM flows	NDFC Release 12.1.1e supports configuration of Unicast to Multicast NAT for IPFM flows and provides end-to-end flow visualization.

SAN Controller Enhancements

The following features are new in Cisco Nexus Dashboard Fabric Controller Release 12.1.1e for the SAN Controller.

Features	Description
NDFC delivered on RHEL for SAN deployments	Nexus Dashboard can be deployed on Red Hat Enterprise Linux and allows you to install NDFC SAN Controller persona. For more information, see Cisco Nexus Dashboard Deployment Guide.
DIRL Congestion Management Visualization	Beginning from Release 12.1.1e, NDFC provides visualization of DIRL information to highlight congestion points within a SAN fabric.
One View for multiple SAN Controllers	This feature provides a single pane of glass for multiple NDFC SAN Controller instances. It provides information about the status of switches, ports, and fabrics across multiple controllers.
Interface to execute CLI Commands	With this release, NDFC provides an interface to execute CLI commands on multiple Cisco MDS 9000 Series Switches simultaneously.
Smart Licensing using Policy support for Cisco MDS 9000 Series Switches	NDFC allows you to discover Cisco MDS 9000 Series Switches that are configured with Smart Licensing using Policy.
Endpoint Visibility	You can now view transceiver information in Fibre Chanel interfaces.
Enhancement to SAN Insights	• Enhanced SAN Insights scale now supports up to 500K ITLs/ITNs. • Support for SAN Insights for 64G modules

New Hardware Features

The following new hardware is supported with Cisco Nexus Dashboard Fabric Controller Release 12.1.1e.

- "DS-X9748-3072K9 - 48 port 8/16/32/64 Gbps Advanced FC Module line card

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:

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

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

https://www.cisco.com/c/en/us/td/docs/dcn/ndfc/1201/licensing/smart-licensing-using-policy-for-cisco-ndfc-1201.html

Fixed problems

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

http://www.cisco.com/en/US/products/ps9369/tsd_products_support_series_home.html

Environment and system requirements

The following sections describes the various system requirements for the proper functioning of your Cisco Nexus Dashboard Fabric Controller, Release 12.1.1e:

Cisco Nexus Dashboard Version Compatibility

Cisco Nexus Dashboard Fabric Controller (NDFC) requires Nexus Dashboard version 2.2(1g) or higher. If you try to upload NDFC 12.1.1e on a Nexus Dashboard version earlier than 2.2(1g), you will not be allowed to upload the application. To download the correct version of Nexus Dashboard, visit Software Download - Nexus Dashboard.

Nexus Dashboard Server Resource (CPU/Memory) Requirements

Table 1 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 2 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: • 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 these 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 101.0.4951.64

Microsoft Edge version 101.0.1210.47 (64 bit)

Mozilla Firefox version 100.0.1 (64 bit)

Other Supported Software

The following table lists the other software that is supported by Cisco Nexus Dashboard Fabric Controller Release 12.1.1e.

Table 3 Other software supported by Cisco Nexus Fabric Controller Release 12.1.1e

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

Table 4 lists the products and components that Cisco NDFC Release 12.1.1e supports.

Table 4 Hardware features supported by Cisco NFDC Release 12.1.1e (page 1 of 3)

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
Hardware features supported by Cisco NDFC Release 12.0.(2f)	DS-C9220I-K9

Table 4 Hardware features supported by Cisco NFDC Release 12.1.1e (page 2 of 3)

Product/Component	Part Number
Cisco 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 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 4 Hardware features supported by Cisco NFDC Release 12.1.1e (page 3 of 3)

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

Compatibility with Cisco MDS 9000 Family switches

Table 5 shows the Cisco NDFC Compatibility Matrix for Release 12.1.1e.

Table 5 Cisco NDFC Compatibility Matrix (page 1 of 2)

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)
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)
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)
Cisco MDS 9220i	9.2(1), 8.5(1), 9.2(2), 8.4(2d)

Table 5 Cisco NDFC Compatibility Matrix (page 2 of 2)

Switches	Supported Switch Releases
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)
Cisco MDS 9500	9.2(1), 8.4(2c), 8.5(1), 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), 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)
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), 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)

Known problems and limitations

For a list of problems with this release, please refer to the Cisco release notes located at:

https://www.cisco.com/c/en/us/support/cloud-systems-management/prime-data-center-network-manager/series.html

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, https://www.dell.com/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 www.cisco.com.

Location of Cisco NDFC documentation

The Cisco NDFC documentation is available at the following URL:

https://www.cisco.com/c/en/us/support/cloud-systems-management/prime-data-center-network-manager/series.html

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

Release Notes

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 12.1.1x

Cisco NDFC Fundamentals Guide

Cisco NDFC Configuration, Release 12.1.1x

Cisco NDFC REST API Guide

Cisco NDFC REST API Guide, Release 12.1.1x

Cisco NDFC Troubleshooting Guide

https://www.cisco.com/c/en/us/support/cloud-systems-management/prime-data-center-network-manager/series.html

Software media, organization, and files

For information on related software environment and system requirements refer to the *Dell Support Matrix* located on E-Lab Interoperability Navigator at https://elabnavigator.dell.com/eln/elnhome under the **PDFs and Guides** tab.

To download the latest Nexus Dashboard Fabric Controller software, navigate to Dell Online Support, https://www.dell.com/support. 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 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: 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)

From Release 12.1.1e, on 5-Node Nexus Dashboard, you can deploy NDFC with the following personas:

Fabric Discovery

Fabric Controller

NDFC on a 3-node/4-node/5-node physical Nexus Dashboard (pND) Cluster (Active-Active HA mode)

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 12.1.1e, on a 1-node or 3-node Nexus Dashboard on the RHEL server, you can deploy NDFC with the following personas:

SAN Controller with or without SAN Insights

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 3 Nexus Dashboard master nodes. In the 5-node deployment, the additional 2 nodes serve as worker nodes. The 3-node or 5-node cluster deployment is an active-active solution, that is, all nodes are utilized to run micro-services of Nexus Dashboard Fabric Controller. When a node fails, microservices running on the node, are moved to the other nodes. Nexus Dashboard Fabric Controller will perform normally under one node failure scenarios. However, it is expected that there will be a brief disruption to services 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 will be disrupted.

For virtual Nexus Dashboard OVA deployments on ESXi environments, it is imperative that promiscuous mode is enabled on the port groups 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 on Installation, refer to

https://www.cisco.com/c/en/us/td/docs/dcn/ndfc/1202/installation/cisco-ndfc-install-and-upgrade-guide-1202.html

Deployment Profile Simplification

Deployment Profile Simplification

Nexus Dashboard deployment profile simplification is intended to help streamline the onboarding of services against a given deployment scale and relieve the task of remembering the cross-connect of deployments.

Beginning with Cisco Nexus Dashboard Release 2.2.1h, resource profile selection has been reduced to several more intuitive parameters directly related to your deployment use case. These parameters, such as number of switches or flows describe the fabric size and use case intent, and allow the cluster to intelligently determine the resources needed for the service. The parameters are categorized as **Network Scale**.

NDFC selects an appropriate profile from among the predefined set of profiles to match the scale.

Note: You must restart the services on the Nexus Dashboard after modifying the network scale parameters.

To view or modify the Network Scale parameters on Cisco Nexus Dashboard, perform the following steps:

1. Choose **Nexus Dashboard > Cluster Configuration > Network Scale.**
2. Click the edit icon to modify the network scale parameters.
3. In the **Number of Sites field**, provide the target number of sites for your deployment that this Nexus Dashboard cluster manages.
4. In the **Number of Switches** field, provide the target number of switch nodes for your deployment.
5. In the **Flows per second field**, provide the target number of flows for LAN/IPFM/SAN-Insights deployments or scale that is supported by NDFC and Nexus Dashboard Insights cohosted setup.

The deployment profiles in NDFC Release 12.1.1e use a different naming convention for these deployment profiles which is more in line with the scale numbers that each profile supports.

On the fresh install of Nexus Dashboard, the "Network Scale" is empty. We recommend that you define the number of sites, switches, and flows per second in the Network Scale. In such a scenario, the service selects a default profile based on the number of cluster nodes.

If the available cluster compute capacity is less than the desired Network Scale, Cisco NDFC installation displays an error. You must resolve the network scale values on Nexus Dashboard and proceed to install NDFC. Note that the recommendations specified in the error message provide useful suggestions about remedial action.

Nexus Dashboard assigns profile names for supported scale values with NDFC Release 12.1.1e. For validated scale numbers, refer to Cisco NDFC Verified Scalability, Release 12.1.1e.

When you upgrade to NDFC 12.1.1e, the individual containers are restarted and the newly spawned 12.1.1e containers start with new resource requests and limit values.

Layer-3 Reachability between Cluster Nodes

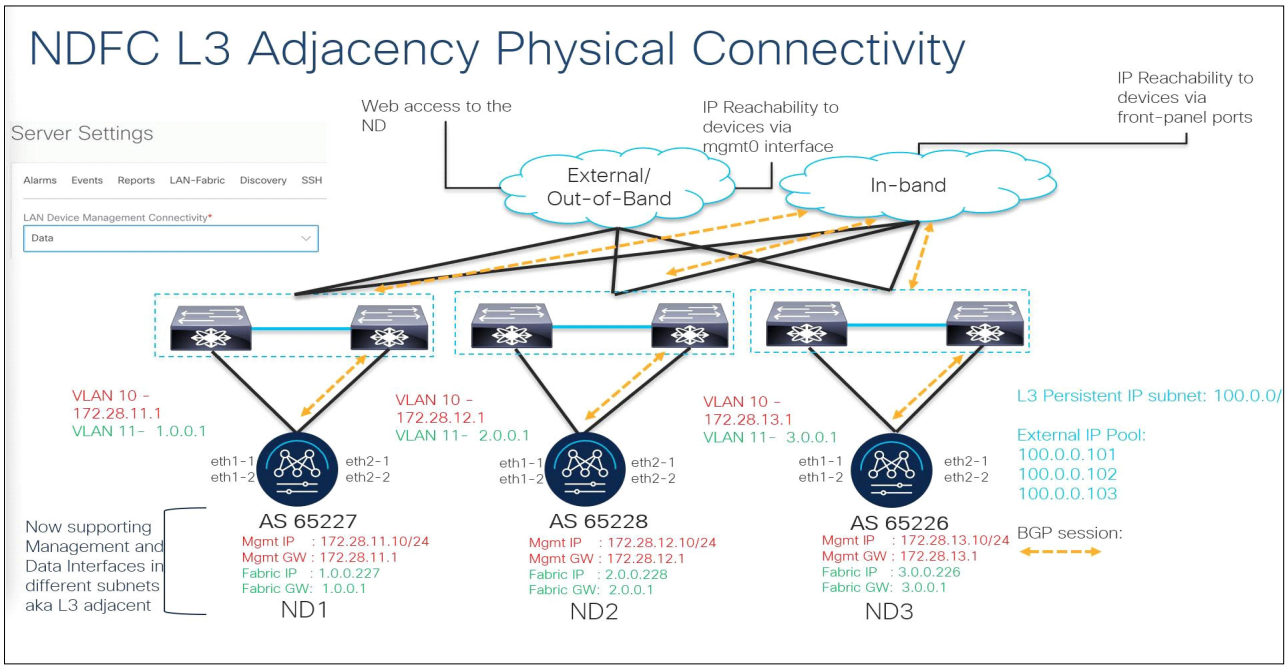
From Release 12.1.1e, NDFC can be deployed as a service on Nexus Dashboard with Layer 3 adjacent nodes. A sample NDFC Layer3 adjacent Physical Connectivity topology is shown in the following image.

When using Layer 3 adjacency between the Nexus Dashboard nodes on which the NDFC service is running, the persistent IP addresses are advertised using the Nexus Dashboard Data or Fabric interface. The Layer 3 Persistent IP subnet pool must be unique and will be advertised to the fabric using BGP on Nexus Dashboard. Cisco NDFC container pods, such as EPL/SNMP Trap/SCP that requires Persistent IPs, are advertised as /32 BGP entries with the next hop of Nexus Dashboard Data Interface. Also, the BGP session between the Nexus Dashboard node and the uplink switches must be configured using directly connected links.

To deploy Layer 3 cluster connectivity, Nexus Dashboard nodes use BGP local and remote autonomous system configuration, along with Data Network gateway of the node to establish eBGP sessions with neighboring routers over the Data interface. As Nexus Dashboard nodes

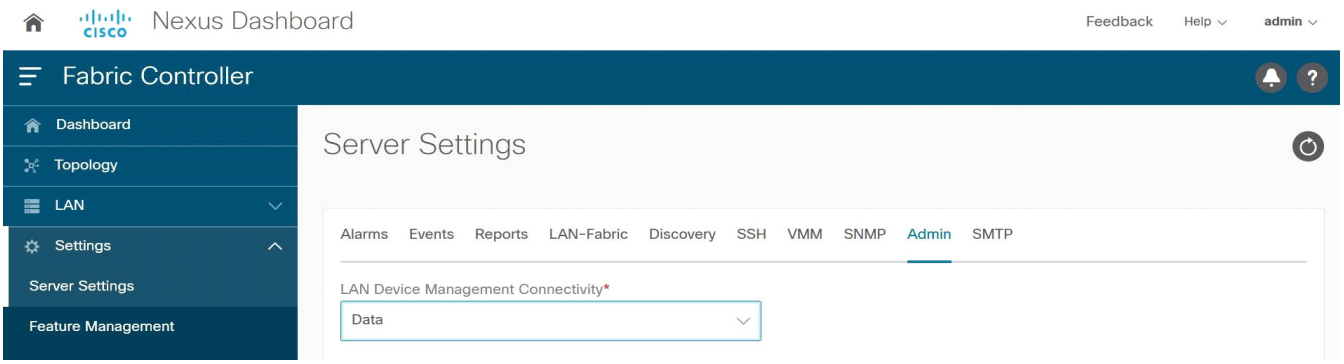
use gateway IPs to establish sessions, the neighboring BGP peers must be Layer 2 adjacent. Peers without Layer 2 adjacent connectivity are not supported. You must configure the BGP network correctly to ensure that the Nexus Dashboard routes are transmitted correctly.

Nexus Dashboard uses BGP session to publish /32 routes for reaching NDFC features using external IPs obtained from the Persistent IP subnet. If a node or network fails, the external IPs are not reachable until recovery is complete (if the network can recover itself).



Upgrade or modification from an existing Layer-2 adjacent Nexus Dashboard cluster to a Layer-3 adjacent cluster is not supported. When using Layer 3 adjacency, NDFC service is supported only when the switch connectivity is through the Nexus Dashboard Data interface. Choose **NDFC UI > Settings > Admin tab**.

From the **LAN Device Management Connectivity** drop-down list, select **Data.**



The following table provides information about different scenarios about Layer 3 adjacent cluster nodes connectivity.

Network details	Support provided
Modify or upgrade from Layer 2 adjacency to Layer 3 adjacency	Not supported; redeploy cluster if necessary
Modify or upgrade from Layer 3 adjacency to Layer 2 adjacency	Not supported; redeploy cluster if necessary
NDFC to Switch connectivity over the Management interface	Not supported

Network details	Support provided
NDFC to Switch connectivity over Data interface	Supported
Nexus Dashboard BGP traffic over Nexus Dashboard Management interface	Not supported
Nexus Dashboard BGP traffic over Nexus Dashboard Data interface	Supported
Nexus Dashboard BGP peer L2-Adjacent	Supported
Nexus Dashboard BGP peer L3-Adjacent	Not supported

Upgrade Paths to Release 12.1.1e

The following table summarizes the type of upgrade that you must follow to upgrade to Release 12.1.1e. Go to **Software Download** to download the Upgrade Tool scripts.

Persona Compatibility for Upgrade

Table 6 (page 1 of 2) Upgrade paths to release 12.1.1e (page 1 of 2)

Current Release Number	Deployment Type	Upgrade type when upgrade to Release 12.1.1e
12.0.1a	All	1. Upgrade Nexus Dashboard version to 2.2.1h 2.Upgrade NDFC application to 121.1e.
12.0.2f	All	Upgrade Nexus Dashboard version to 2.2.1h Upgrade NDFC application to 12.1.1e.
11.5.4	All	Not supported

Table 6 (page 2 of 2) Upgrade paths to release 12.1.1e (page 2 of 2)

Current Release Number	Deployment Type	Upgrade type when upgrade to Release 12.1.1e
11.5(3)	LAN Fabric Deployment **Note:** Media Controller and all SAN deployments are not supported in Release 11.5(3).	1.Backup using **DCNM_To_NDFC_Upgrade_Tool_OVA_ISO.zip** 2.Restore on Nexus Dashboard Fabric Controller **Web UI > Operations > Backup & Restore**
11.5(2)	SAN Deployment on Windows and Linux	1.Backup using **DCNM_To_NDFC_Upgrade_Tool_LIN_WIN.zip** 2.Restore on Nexus Dashboard Fabric Controller **Web UI > Operations > Backup & Restore**
	SAN Deployment on OVA/ISO/SE	1.Backup using **DCNM_To_NDFC_Upgrade_Tool_OVA_ISO.zip** 2.Restore on Nexus Dashboard Fabric Controller **Web UI > Operations > Backup & Restore**
	LAN Fabric Deployment onOVA/ISO/SE	1.Backup using **DCNM_To_NDFC_Upgrade_Tool_OVA_ISO.zip** 2.Restore on Nexus Dashboard Fabric Controller **Web UI > Operations > Backup & Restore**
11.5(1)	SAN Deployment on Windows and Linux	1.Backup using **DCNM_To_NDFC_Upgrade_Tool_LIN_WIN.zip** 2.Restore on Nexus Dashboard Fabric Controller **Web UI > Operations > Backup & Restore**
	SAN Deployment on OVA/ISO/SE	1.Backup using **DCNM_To_NDFC_Upgrade_Tool_OVA_ISO.zip** 2.Restore on Nexus Dashboard Fabric Controller **Web UI > Operations > Backup & Restore**
	LAN Fabric Deployment on OVA/ISO/SE	1.Backup using **DCNM_To_NDFC_Upgrade_Tool_OVA_ISO.zip** 2.Restore on Nexus Dashboard Fabric Controller **Web UI > Operations > Backup & Restore**
	Media Controller Deployment on OVA/ISO	1.Backup using **DCNM_To_NDFC_Upgrade_Tool_OVA_ISO.zip** 2.Restore on Nexus Dashboard Fabric Controller **Web UI > Operations > Backup & Restore**

By using the appropriate Upgrade Tool, you can restore data that is backed up from DCNM Release 11.5(1) or 11.5(2) or 11.5(3) on a newly deployed Cisco Nexus Dashboard Fabric Controller for the personas as mentioned in the following table:

Backup from DCNM 11.5(x)[1, 2]	**Persona Enabled in NDFC 12.1.1e after Upgrade**
DCNM 11.5(x) LAN Fabric Deployment on OVA/ISO/SE	Fabric Controller + Fabric Builder
DCNM 11.5(x) PMN Deployment on OVA/ISO/SE	Fabric Controller + IP Fabric for Media (IPFM)
DCNM 11.5(x) SAN Deployment on OVA/ISO/SE	SAN Controller
DCNM 11.5(x) SAN Deployment on Linux	SAN Controller
DCNM 11.5(x) SAN Deployment on Windows	SAN Controller

1. All references to 11.5(x) are for 11.5(1) or 11.5(2). Upgrade to NDFC 12 from DCNM 11.5(3) is supported for LAN Fabric Deployments only.
2. DCNM Release 11.5(3) does not support Media Controller and SAN deployments

Feature Compatibility Post Upgrade

The following table lists caveats associated with features that are restored from DCNM 11.5(x) backup after upgrade to NDFC, Release 12.1.1e.

Feature in DCNM 11.5(x)	**Upgrade Support**
Nexus Dashboard Insights configured Refer to Nexus Dashboard Insights User Guide for more information.	Supported
Container Orchestrator (K8s) Visualizer	Supported
VMM Visibility with vCenter	Supported
Nexus Dashboard Orchestrator configured	Not Supported
Preview features configured	Not Supported
LAN switches in SAN installations	Not Supported
Switches discovered over IPv6	Not Supported
DCNM Tracker	Not Supported
SAN CLI templates	Not carried over from 11.5(x) to 12.1.1e
Switch images/Image Management data	Not carried over from 11.5(x) to 12.1.1e
Slow drain data	Not carried over from 11.5(x) to 12.1.1e

Feature in DCNM 11.5(x)	Upgrade Support
Infoblox configuration	Not carried over from 11.5(x) to 12.1.1e
Endpoint Locator configuration	You must reconfigure Endpoint Locator (EPL) post upgrade to Release 12.0.2f. However, historical data is retained up to a maximum size of 500 MB.
Alarm Policy configuration	Not carried over from 11.5(x) to 12.1.1e
Performance Management data	CPU/Memory/Interface statistics up to 90 days is restored post upgrade.

Troubleshooting and getting help

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

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) at:

https://dell.com/support

Technical support

Dell offers a variety of support options.

Support by Product — Dell offers consolidated, product-specific information on the Web at:

https://dell.com/support/products

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 an Dell Support Engineer.

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