



Storage, Release 12.1.3

Table of Contents

New and Changed Information	1
Storage Devices	2
Storage Overview	2
Summary	3
SAN Insights	4
Event Analytics	5
Congestion Analysis	5
Zoning	5
Optics	5
FDMI	6
RDP	6
Device	6
Storage Providers	8
Adding SMI-S Provider	9
Copyright	10

New and Changed Information

The following table provides an overview of the significant changes up to this current release. The table does not provide an exhaustive list of all changes or of the new features up to this release.

Release Version	Feature	Description
NDFC release 12.1.3	Reorganized content	Content within this document was originally provided in the <i>Cisco NDFC-Fabric Controller Configuration Guide</i> or the <i>Cisco NDFC-SAN Controller Configuration Guide</i> . Beginning with release 12.1.3, this content is now provided solely in this document and is no longer provided in those documents.

Storage Devices

1. In Nexus Dashboard Fabric Controller, navigate to **SAN > Storage Devices**.

The **Storage Devices** page displays information about storage devices.

2. To view all the storage devices or only the devices with failed links, toggle the setting between **Show All Storages** and **Show Only Storage Devices with Down Paths**.

Additionally, you can filter the enclosures based on a search criterion that you specify in the **Filter by attributes** field.

The following table describes the fields that appear on the **Storage Devices** page.

Field	Description
Enclosure Name	Specifies the storage name. The icon suffixed to the host name indicates the type of discovery. It displays a brown icon with fcD if the enclosure is discovered using FC discovery, or a green icon with SD if discovered using SMI-S discovery. Click on the enclosure name to view the Storage Enclosure details.
Up/Total Paths	Displays the total available paths versus the used paths for all the devices in the enclosure.
Type	Indicates if the storage device is discovered through FC discovery or SMI-S discovery.
Peak Tx(%)	Displays the transmitting speed in percentage.
Peak Rx(%)	Displays the receiving speed in percentage.
CRC	Displays the Cyclic Redundancy Check (CRC) errors.
Corrected FEC	Displays the number of corrected Forward Error Correction (FEC) errors.
Uncorrected FEC	Displays the number of FEC errors that are not corrected.
ITW	Displays the number of Invalid Transmission Words (ITW) detected by the device.
Last Update Time	Specifies the date and time at which the storage device was last updated.
IP Address	Displays the IP address of the storage device.
Protocol	Specifies if the storage device is streaming SCSI protocol traffic or NVMe protocol traffic. This column displays data only for the devices for which data is streamed to NDFC using SAN Insights.

Storage Overview

1. In Cisco Nexus Dashboard Fabric Controller, go to **SAN > Storage Devices**.

2. On **Storage Devices** tab, double-click on any **Enclosure Name** item to open the **Storage Overview** page which provides detailed information about each storage device.

The details of a storage device depend on the type of device discovered, and the provider's adherence to the SMI-S standards.

The tabs and their fields in the **Storage Overview** screen are explained in the following sections.

- [Summary](#)
- [SAN Insights](#)
- [Event Analytics](#)
- [Congestion Analysis](#)
- [Zoning](#)
- [Optics](#)
- [FDMI](#)
- [RDP](#)
- [Device](#)

Summary

The **Summary** tab of the **Storage Overview** page displays information about the selected storage device, its status and path information between various storage enclosures.

Storage Information	
Name	Name of the storage device.
MAC Address	Displays the MAC address of the storage device.
WWNs	Specifies the number of WorldWideNames (WWNs).
IP Address	Displays the IP address of the storage device.
Protocol	Specifies if the transmission protocol is SCSI or NVMe.
OS Version	Specifies the operating system of the storage device.
FCIDs	Specifies the associated FCID.
Storage Status	
Up/Total Paths	Displays the total available paths versus the used path details for all the devices in the enclosure.
Paths	
Device Alias	Specifies the device alias for the storage device.
Status	Specifies the status of the storage device.
Fabric	Displays the name of the fabric associated with the storage device.

Switch Interface	Specifies the interface on the switch that is connected with the storage device.
Rx (Mbps)	Displays the average and the maximum speed in bytes/sec while receiving data.
Tx (Mbps)	Displays the average and the maximum speed while transmitting data.
PWWN	Specifies the assigned port WWN for the storage device.
Updated Time	Specifies the date and time at which the storage device was last updated.
Topology	Provides an end-to-end topology layout and path information between host enclosures and storage enclosures. You can hover on the device icons to see a tool tip that displays details about the device. Click on the green circle icon on the sides of the switch to display the Interface Details and Performance Chart for the interface. It displays details about the interface and a performance chart that depicts the traffic details through the interface.
Custom Graphing	<p>Displays metrics on ECT/DAL/read/write times, active I/Os, aborts, failures etc. You can view the metrics based on two protocols, SCSI and NVMe. By default, the SCSI protocol is selected. The data is displayed for a maximum of 7 days. The refresh interval for Custom Graphing page is 5 minutes. Click on the Play icon to refresh every 5 minutes automatically.</p> <p>The Custom Graphing area has two tabs - Graph and Table. This is a freestyle dashboard where you can select multiple metrics and real-time data for the selected metrics is displayed in a multiline graph format and the data table displays the corresponding raw data. The data is configured to refresh every 5 minutes.</p> <p>You can also add multiple graphs for comparison by clicking on the Add Graph the top right. You can add a maximum of 3 graphs at a time. The Auto Refresh option is disabled by default. You must click the Play icon to enable the auto refresh.</p> <p>Click the Download button to download the table in .csv format. The download option is enabled only if the selected device has SAN insights feature enabled. Hover the mouse on the information (i)icon on the Initiator column. Click the icon that displays Show Flow VMs to open the Flow VMs window. You can view the VM names and IP addresses for the selected device.</p>

SAN Insights

The **SAN Insights** tab of the **Storage Overview** page displays the Initiator-Target (IT) pairs, topology, average and total ECT/DAL/IOPS/throughput/read/write times, VM details and the switch interface for the selected host. You can view total read/write IOPS/throughput value for the selected enclosure.

Field	Description
Initiator Target Pairs	This table lists all the initiator-target pairs for the selected storage device. The flow table displays details of all the metrics on ECT/DAL/ IOPS/ Throughput/read/write times, Source Alias, SID, Destination Alias, DID, and the fabric along with their 1-hour average and baseline information.
Topology	Provides an end-to-end topology layout and path information between the host enclosures. On the View card, from the Select Layout drop-down list, you can choose one of the following layouts: <ul style="list-style-type: none"> • Hierarchical • Hierarchical Left-Right (default view) • Circular • Random
FROM: TO:	Displays details of all the metrics on ECT/DAL/read/write times, active I/Os, IOPs and throughput along with their 1-hour average and baseline information.
-	The middle table in the bottom row displays VM name and IP address for the IT pair selected in the Initiator Target Pairs table.
Switch Interface	Click on the topology to view the associated switch interface and the 1-hour average information.

Event Analytics

The **Event Analytics** tab displays all the alarms that are raised and cleared and also the events that are generated for the host devices. For more information, see [Event Analytics](#).

Congestion Analysis

Congestion Analysis enables you to view slow drain statistics for the storage devices. You can monitor the slow drain issue within any duration. You can view the data in a chart format and export the data for analysis. You can also view the topology that provides a high-level view of Tx wait, drops, credit loss recovery, over utilization, and port monitoring events.

Zoning

Displays the zones under which the storage device is present. Use the Show Topology icon to the left of the zone name to view the zone topology. It displays hosts and storage devices pertaining to the zone and connected to a switch.

Optics

Displays temperature, current, receiving/transmitting power and voltage data for the optics connected to the storage device.

FDMI

Fabric-Device Management Interface (FDMI) retrieves management information about the attached Fiber Channel Host Bus Adapters (HBAs) and host operating systems. The FDMI table displays details about the link status, vendor, serial number, model, firmware version, and driver version of the storage device.

RDP

Read Diagnostics Parameters (RDP) displays diagnostic data from the storage devices which can be used in analyzing and troubleshooting link issues. This page displays data from the ***show rdp fcid [fcid_id] vsan [vsan_id]*** command. To view sensor related information for a particular enclosure, click the link available under the **Sensors** column in the table.



Not all switches support the RDP command. The switch can poll for diagnostic information from the end devices using a polling interval.

Device

This tab is available only for storage devices discovered through SMI-S discovery.

The following tabs on the **Device** tab provides information about the selected device.

Summary	Provides information about the storage provider. Storage array serial number, storage type and number of physical disks in the array are also displayed.
Components	Lists all the components in the storage device. Click on the component Name to view total storage capacity, usage details, and physical disks details.
Pools	Lists all the pools, their status and Raw capacity. Double-click the POOL Name to view the pool details.
LUNs	Lists all the Logical Unit Numbers (LUN) in the storage array. It provides LUN ID, WWN, Status, and Capacity details for each LUN. Click on LUN Name to view further details about each LUN. Double-click a LUN Name to access the LUN Detail page. + Host Interface, Zoning, and Storage Interface values in Host LUN Access table is displayed only if the host accessing this LUN is part of the NDFC discovered fabric.
Host	Lists all the hosts in the selected storage. It provides the Host Name, Node WWN, and WWN details for each host in the Storage array. Click on a Host Name to view details about the host. You can view the relevant details on the LUNs tab and Ports tab within the Host Detail view. Fabric and Host Interface values in Host Ports table is displayed only if Host Port WWN is part of the NDFC discovered fabric.

Processors	Lists all the processors and their status. It also displays the number of adapters for each processor. Double-click a Processor Name to open the Processor Detail page.
Ports	Lists all the ports in the storage device. Click the Port Name to view details about a port.

Storage Providers

The **Storage Providers** page displays the status of SMI-S Storage Providers. A SMI-S Provider can manage more than one array. Each array appears as a separate Storage Enclosure in the **Storage Devices** tab. These enclosure names are suffixed with a green icon with an SD label indicating that the device is discovered using SMI-S discovery.

In Cisco Nexus Dashboard Fabric Controller, go to **SAN > Storage Devices** and go to the **Storage Providers** tab.

The following table describes the fields that appear on the **Storage Providers** tab.

Field	Description
Vendor	Specifies the vendor. Cisco NDFC supports the following vendors: <ul style="list-style-type: none">• EMC• NetApp• IBM• HDS• PureStorage• HP• Other
Provider URL	Specifies SMI-S provider URL.
Name Space	Specifies name space.
Interop Name Space	Specifies interop name space.
Port	Specifies the port.
Status	Specifies the status.
Secure	Specifies if it is a secure connection.
Discovery Status	Specifies the discovery status.
Last Updated Time	Specifies the last updated time.

The following table describes the action items, in the **Actions** menu drop-down list, that appear on **SAN > Storage Devices > Storage Provider** page.

Action	Description
Add Provider	Adds an SMI-S provider. For instructions, refer to Adding SMI-S Provider .
Edit Provider	Allows you to edit a SMI-S provider. To edit, select a provider from the table and choose Edit Provider .
Delete Provider	Allows you to delete a provider from the list. To delete, select a provider from the table and choose Delete Provider .

Rediscover Provider	Allows you to rediscover a provider. Select a provider from the table and choose Rediscover Provider to scan for any changes. This triggers the discovery cycle outside its normal periodic polling.
Purge Provider	Allows you to purge the provider information. To purge, select a provider from the table and choose Purge Provider . This removes elements that are no longer available through discovery.

Adding SMI-S Provider

To add a SMI-S provider from the Cisco Nexus Dashboard Fabric Controller, perform the following steps:

1. Choose **SAN > Storage Devices > Storage Providers**.

The **Storage Providers** tab is displayed.

2. Choose **Actions > Add Provider**.

The **Add SMI-S** window is displayed.

3. In the **Vendor** drop-down list, choose a Vendor name.

All the supported vendors are available in the drop-down list. More SMI-S storage vendors are discovered through a 'best effort' handler using the **Other** vendor option in the drop-down.



A minimum of one valid Nexus Dashboard Fabric Controller license must be provisioned before adding the data sources for SMI-S storage discovery.

4. Specify the **SMI-S Server IP, User Name, and Password**.
5. Specify the **Name Space and Interop Name Space**.
6. By default, the **Port** number is prepopulated.

If you select the **Secure** checkbox, then the default secure port number is populated.

When using the **Secure** mode with EMC, the default setting is mutual authentication. For more information, see the EMC documentation about adding an SSL certificate to their trust store. Also, you can set `SSLClientAuthentication` value to *None* in the *Security_Settings.xml* configuration file and restart the ECOM service.

7. Click **Add**.

The credentials are validated and the storage discovery starts if the credential is valid. If the credentials check fails, you will be prompted to enter valid credentials.

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