# SAN Devices, Release 12.1.3

# Table of Contents

# 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 *Cisco NDFC-Fabric Controller Configuration Guide* or the *Cisco NDFC-SAN Controller Configuration Guide*. 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.<br><br>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** | 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. |
| | 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. |
| | 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. |
| | 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. |

## 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. |

| Field | Description |
|---|---|
| **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:<br><br>· **Hierarchical**<br>· **Hierarchical Left-Right** (default view)<br>· **Circular**<br>· **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.

> **i** 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.<br><br>+ **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.<br><br>**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:<br><br>・ EMC<br><br>・ NetApp<br><br>・ IBM<br><br>・ HDS<br><br>・ PureStorage<br><br>・ HP<br><br>・ 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.

# Hosts

To view a list of SAN hosts and their relevant details from the SAN Controller Web UI, perform the following steps:

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

   The **Hosts** page displays a list of available host devices, their network attributes and the associated Virtual Machines (VMs).

   To view all the hosts or only the hosts with failed links, toggle the setting between **Show All Hosts** and **Show Only Hosts with Down Paths**. Additionally, you can filter the enclosures based on a search criteria that you specify in the **Filter by attributes** field.

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

| Field | Description |
|---|---|
| **Enclosure Name** | Displays the name of the host device. The icon next to the host name displays the type of discovery. It displays if the enclosure is from a vCenter or storage or FC discovery. |
| **Up/Total Paths** | Displays the total available paths versus the used path details for all the devices in the selected enclosure. |
| **Type** | Indicates if a host or storage is discovered through fabric discovery or vCenter discovery. |
| **Total VMs** | Displays the total number of VMs. |
| **Peak Tx(%)** | Displays the maximum transmitting speed in percentage. |
| **Peak Rx(%)** | Displays the maximum receiving speed in percentage. |
| **CRC** | Specifies 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 port. |
| **Last Update Time** | Specifies the date and time at which the host device was last updated. |
| **IP Address** | Displays the IP address of the device. |
| **Protocol** | Specifies if the host is streaming SCSI protocol traffic or NVMe protocol traffic. This column displays data only for the Hosts for which data is streamed to NDFC using SAN Insights. |

2. Click on a host name displayed under the **Enclosure Name** column.

   The Host enclosure slide-out pane appears.

3. Click the **Launch** icon to view detailed information related to that particular host.

   The **Host Overview** page appears. The tabs and their fields in the screen are explained in the following sections.

# Summary

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

| Host Information | |
| --- | --- |
| **Name** | Name of the host device. |
| **MAC Address** | Displays the MAC address of the host device. |
| **WWNs** | Specifies the number of WorldWideNames (WWNs). |
| **IP Address** | Displays the IP address of the host device. |
| **Protocol** | Specifies if the transmission protocol is SCSI or NVMe. |
| **OS Version** | Specifies the operating system of the host device. |
| **FCIDs** | Specifies the associated FCID. |
| **Host Status** | |
| **Up/Total Paths** | Displays the total number of paths available versus the number of paths used by the host devices. |
| **Alarms** | Displays the number of alarms generated, if any. |
| **VM Usage** | Displays the number of VMs in use. |
| **Events** | Displays the number of events that are generated for the host device. |
| **Paths** | |
| **Device Alias** | Specifies the device alias for the host device. |
| **Status** | Specifies the status of the host device. |
| **Fabric** | Displays the name of the SAN fabric. |
| **Switch Interface** | Specifies the interface on the switch that is connected with the end 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 host. |
|---|---|
| Updated Time | Specifies the date and time at which the host 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 | 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.

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.

You can also add multiple graphs for comparison by clicking on the **Add Graph** the top right. You can add up to 3 graphs at a time. The **Auto Refresh** option is disabled by default. You must click the **Play** icon to enable the auto refresh.

Click the **Download** button to download the table in .csv format. The download option is enabled only if the selected host 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 host. |

# SAN Insights

The **SAN Insights** tab of the **Host 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 host enclosure.

| Field | Description |
|---|---|
| Initiator Target Pairs | This table lists all the initiator-target pairs for the selected host. The flow table shows the 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. |

| Field | Description |
|---|---|
| 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:<br><br>· **Hierarchical**<br><br>· **Hierarchical Left-Right** (default view)<br><br>· **Circular**<br><br>· **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 interface icon (green circle) on the topology view to view details for the selected interface on the host device. |

# 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.

# Congestion Analysis

Congestion Analysis enables you to view slow drain statistics for the hosts. 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 host 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 switch.

# DIRL

Displays the data collected from Dynamic Ingress Rate Limiting (DIRL) analysis for all the interfaces in the current fabric. You can view the latest DIRL data for all the configured fabrics. To get the latest DIRL data for a given fabric, select the fabric from the **Fabric** drop-down list and click **Get latest DIRL data**.

# FDMI

Fabric-Device Management Interface (FDMI) retrieves management information about the attached Fibre 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.

# RDP

Read Diagnostics Parameters (RDP) displays diagnostic data from the switch and the connected end devices which can be used in analyzing and troubleshooting link issues. 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.

# VM

Displays details about the virtual machines that are configured on the host device. It also displays VM charts for CPU & Memory and Disk I/O, and VM Flow for the selected virtual machine.

# Devices

Choose **SAN > End Devices > Devices** tab to display the list of host and storage devices.

The following table describes the fields that appear on **SAN > End Devices > Devices**.

Use the **Show last day** menu drop-down list to filter the view by **Day**, **Week**, **Month**, and **Year**.

Use the **Show Host Ports** menu drop-down list to filter the view by **Host Ports** and **Storage Ports**.

| Field | Description |
|---|---|
| Fabric | Specifies the fabric name. Click the fabric name to display the fabric status on the right-side of the page. Click the Launch icon on the top-right side of the pane to see Fabric Overview. For information on Fabric Overview, see . |
| Enclosure Name | Specifies the enclosure name. |
| Device Alias | Specifies the device alias. Click the chart icon in the **Device Alias** column to view a graph of the traffic on that device according to the selected timeline. You can filter the data using the **Day**, **Week**, **Month**, and **Year** options. |
| FCID | Specifies the associated FCID. |
| Switch interface | Specifies the switch interface. |
| Rx/Tx | |
| Avg | Specifies the average receiving or transmitting speed. |
| Avg % | Specifies the average percentage of receiving or transmitting speed. |
| Peak | Specifies the peak utilization of the receiving or transmitting speed. |
| Peak % | Specifies the peak utilization percentage of the receiving or transmitting speed. |
| Errors/Discards | In Avg |
| Specified the average of incoming errors or discards. | Out Avg |
| Specified the average of outgoing errors or discards. | In Peak |
| Specified the peak of incoming errors or discards. | Out Peak |

# Enclosures

Choose **SAN > End Devices > Enclosures** tab to display the host and storage enclosures.

Cisco Nexus Dashboard Fabric Controller extends the fabric visibility up to the server and allows you to discover and search the end devices, SAN Storage Enclosures, and Storage Systems that are attached to the network.

Click an enclosure name in the table to view more information about the enclosure.

# Inventory

Choose **SAN > End Devices > Enclosures> Inventory > Host Enclosures** tab to display the host and storage inventory enclosures.

### Inventory - Host Enclosures

The following table describes the fields that appear on **SAN > End Devices > Enclosures> Inventory > Host Enclosures**.

| Field | Description |
|---|---|
| Enclosure | Specifies the enclosure name. Click the enclosure name for more information. |
| OS | Specifies the OS details. |
| IP Address | Specifies the IP address of the switch. |
| WWNs | Specifies the number of World Wide Names (WWNs). |

The following table describes the action items, in the **Actions** menu drop-down list, that appear on **SAN > End Devices > Enclosures> Inventory > Host Enclosures**.

| Action Item | Description |
|---|---|
| Edit | Select an enclosure from the table and choose **Edit** to update the enclosure information. |
| Change to Storage Enclosure | Select an enclosure from the table and choose **Change to Storage Enclosure** to change the selected enclosure to storage enclosure. |
| Import | Allows you to import enclosures data. |
| Export | Allows you to export host and storage enclosures data in your inventory to your local directory in **.txt** file format. |

**Importing or Exporting Inventory Enclosures Data**

From Release 12.1.2e, you can import and export enclosures data to a .txt file. This feature allows you to edit the exported file, and import the data to NDFC. You can either choose to export **All** or **Only Host Enclosures** or **Only Storage Enclosures** data. You can also choose one Fabric or All

fabrics' data while exporting.

To export Inventory Enclosures data, perform the following steps:

1. On either **Host Enclosures** or **Storage Enclosures** tab, from the Actions drop-down list, select **Export**.

2. Select the enclosures to export data. You can choose **All** or **Only Host Enclosures** or **Only Storage Enclosures**.

3. In the Exported File Name field, provide the name of the exported file.

> **ℹ** The export file is of **.txt** format only.

4. From **Fabric scope** drop-down list, choose **All Fabrics** or specific Fabric from which you must export enclosures data.

5. Click **Export** to download the enclosures data.

   Save the exported file to a local directory.

To import Inventory Enclosures data, perform the following steps:

1. On either **Host Enclosures** or **Storage Enclosures** tab, from the Actions drop-down list, select **Import**.

2. Upload the data file from your local directory. You can either drag and drop the file, or browse to upload the data file.

> **ℹ** You can import data from **.txt** file format only.

   The uploaded file appears in the Import Enclosures area.

3. Click **OK** to import the enclosures data. Click **Cancel** the discard.

## Inventory - Storage Enclosures

The following table describes the fields that appear on **SAN > End Devices > Enclosures> Inventory > Storage Enclosures**.

| Field | Description |
|---|---|
| Enclosure | Specifies the enclosure name. Click the enclosure name for more information. |
| IP Address | Specifies the IP address of the switch. |
| WWNs | Specifies the number of World Wide Names (WWNs). |

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

| Action Item | Description |
|---|---|

| Edit | Select an enclosure from the table and choose **Edit** to update the enclosure information. |
|------|---------------------------------------------------------------------------------------------|
| Change to Host Enclosure | Select an enclosure from the table and choose **Change to Host Enclosure** to change the selected enclosure to host enclosure. |
| Import | Allows you to import enclosures data. |
| Export | Allows you to export host and storage enclosures data in your inventory to your local directory in **.txt** file format. |

**Importing or Exporting Inventory Enclosures data**

From Release 12.1.2e, you can import and export enclosures data to a .txt file. This feature allows you to edit the exported file, and import the data to NDFC. You can either choose to export **All** or **Only Host Enclosures** or **Only Storage Enclosures** data. You can also choose one Fabric or All fabrics' data while exporting.

To export Inventory Enclosures data, perform the following steps:

1. On either **Host Enclosures** or **Storage Enclosures** tab, from the Actions drop-down list, select **Export**.

2. Select the enclosures to export data. You can choose **All** or **Only Host Enclosures** or **Only Storage Enclosures**.

3. In the Exported File Name field, provide the name of the exported file.

> ℹ️ The export file is of **.txt** format only.

4. From **Fabric scope** drop-down list, choose **All Fabrics** or specific Fabric from which you must export enclosures data.

5. Click **Export** to download the enclosures data.

   Save the exported file to a local directory.

To import Inventory Enclosures data, perform the following steps:

1. On either **Host Enclosures** or **Storage Enclosures** tab, from the Actions drop-down list, select **Import**.

2. Upload the data file from your local directory. You can either drag and drop the file, or browse to upload the data file.

> ℹ️ You can import data from **.txt** file format only.

   The uploaded file appears in the Import Enclosures area.

3. Click **OK** to import the enclosures data. Click **Cancel** the discard.

# Performance

Choose **SAN > End Devices > Enclosures> Performance > Host Enclosures** tab to display the host and storage performance enclosures.

## Performance - Host Enclosures

The following table describes the fields that appear on **SAN > End Devices > Enclosures > Performance > Host Enclosures**. Use the **Show last day** menu drop-down list to filter the view by **Day**, **Week**, **Month**, and **Year**.

| Field | Description |
|---|---|
| Enclosure Name | Specifies the enclosure name. Click the enclosure name to view more information. Click the chart icon to view a graph of the traffic on that device according to the selected timeline. You can filter the data using the **Day**, **Week**, **Month**, and **Year** options. |
| Rx/Tx/Errors/Discards | |
| Avg | Specifies the average receiving, transmitting, errors, or discards speed. |
| Peak | Specifies the peak utilization of the receiving, transmitting, errors, or discards speed. |
| Rx + Tx | Specifies the sum of receiving and transmitting speeds. |
| Last Updated | Specifies the last updated time. |

## Performance - Storage Enclosures

The following table describes the fields that appear on **SAN > End Devices > Enclosures> Inventory > Storage Enclosures**.

| Field | Description |
|---|---|
| Enclosure Name | Specifies the enclosure name. |
| Rx/Tx/Errors/Discards | |
| Avg | Specifies the average receiving, transmitting, errors, or discards speed. |
| Peak | Specifies the peak utilization of the receiving, transmitting, errors, or discards speed. |
| Last Updated | Specifies the last updated time. |

Use the **Show last day** menu drop-down list to filter the view by Day, Week, Month, and Year.

## Enclosure Members

The following table describes the fields that appear on **SAN > End Devices > Enclosures >**

**Performance**. Enclosure members can be viewed for Host and Storage performance enclosures. Use the **Show last day** menu drop-down list to filter the view by **Day**, **Week**, **Month**, and **Year**.

| Field | Description |
|---|---|
| Fabric | Specifies the fabric name. Click the name to view information about fabric health on the right-side of the page. |
| Device | Specifies the device name. |
| Speed | Specifies the device speed. |
| Rx/Tx | |
| Avg | Specifies the average receiving or transmitting speed. |
| Avg % | Specifies the average percentage of receiving or transmitting speed. |
| Peak | Specifies the peak utilization of the receiving, or transmitting speed. |
| Peak % | Specifies the peak utilization percentage of the receiving or transmitting speed. |
| Errors/Discards | |
| Avg | Specifies the average errors or discards speed. |
| Peak | Specifies the peak utilization of the errors or discards speed. |
| Last Updated | Specifies the last updated time. |

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