

Dashboard

The intent of the **Dashboard** is to enable network and storage administrators to focus on particular areas of concern around the health and performance of data center switching. This information is provided as 24-hour snapshots.

The various scopes that are available on the Cisco SAN Controller Web UI are:

- Overview, on page 1
- Host, on page 3
- Storage, on page 6
- SAN Insights, on page 8

Overview

By default, a subset of the available dashlets are automatically displayed in the **Overview** of dashboard.

From the left menu bar, choose **Dashboard** > **Overview**. The **Overview** window displays the default dashlets.

The following are the default dashlets that appear in the **Overview** window:

Dashlet	Description
Fabrics	Displays details of Fabrics such as name, state, and health status of the fabric. To view more information about the fabric, click the fabric name (link) to open the **Fabric** slide-in pane. Click the **Launch** icon. Alternatively, double-click the fabric name. The **Fabric Overview** window appears.
Event Analytics	Displays events with **Critical**, **Major**, **Minor**, and **Warning** severity. Click the severity level or the sectors on the pie chart to view more information about the severity of events and alarms in the **Event Analytics** window.
Links	Displays a diagram of Inter-Switch Link (ISL) and NPV Links for transmitting and receiving in the data

Dashlet	Description
	center. Click the sectors on the pie chart to view more information in the **SAN Links** window.
Switches	**Switch Health** - Displays the switch's health status in the form of chart with colors and health condition names with total number of switches in the brackets. The colors and what they indicate are described in the following list: • Green: Indicates that the element is in good health and functioning as intended. • Yellow: Indicates that the element is in warning state and requires attention to prevent any further problems. • Red: Indicates that the element is in critical state and requires immediate attention. • Gray: Indicates lack of information to identify the element or the element has been discovered. **Switch Status** - Displays the status of the switch. **Switch Release Versions** - Displays the switch release versions. **Switch Models** - Displays the models of switches. Click the sectors on the pie chart, the severity, status, versions, or the models to view more information in the **Switches** window.
Modules	Displays the switches on which the modules are discovered, the models name and the count.
Port Usage	Displays the ports inventory summary information.
Performance Collector	Displays the performance collection information. • Click **Stop collector** to stop performance collection information. • Click **Start collector** to restart the performance collection information.
Top ISL	Displays data for top 10 performing ISLs. Each entry shows device name, specifies the average of Rx traffic and Tx traffic in percentage. Click the **chart** icon next to the device name to view more details.

Dashlet	Description
Top SAN End Ports	Displays the performance data for the top ten performing SAN host and storage ports. Each entry shows the current receive and transmit percentage, with a graph depicting the percentage of time each trunk spent exceeding the currently configured thresholds. Click the **chart** icon next to the device name to view more details.
TOP FICON End Ports	Displays data for top 10 performing FICON host and control unit ports. Each entry shows port traffic of switch interface, specifies the device to which the FICON port is connected, specifies the average of Rx traffic and Tx traffic, and exceeded percentage value. Click the **chart** icon next to the device name to view more details.
TOP FCIP ISL	Displays data for top 10 performing FCIP ISLs. Each entry shows device name, specifies the average of Rx traffic and Tx traffic, and exceeded percentage value. Click the **chart** icon to view more details.
TOP Optics	Displays data for top 10 optics. You can sort optics by hotest SPFs, coldest SPFs, lowers Rx Power, and lowest Tx Power. Click the **chart** icon next to the switch interfaces view more details.
TOP CPU/Temperature	Displays the data for top CPU and temperature details of switches. Click the **chart** icon next to the switch to view more details.
TOP Error And Discard	Displays the top error packets that are discarded for the selected interface. Click the **chart** icon to view more details.

Host

UI Path: **Dashboards** > **Host**

Host dashboard provides information that is related to the discovered SAN and LAN hosts. It provides detailed information that is related to the network, such as I/O traffic, disk latency, CPU, memory statistics, topology, and events about each individual host and virtual machines that are configured on top of the virtual host. The **Host** dashboard consists of four panels:

- **Enclosures** panel - Lists the hosts and their network attributes.
  - The **Host Enclosure Name** column lists all the hosts.

    Click **i** icon for relevant host enclosure to view the **SAN Insights Monitor** page. See Monitor Metrics for more information.

    Click the host name to view the summary information of a host.
  - **Member WWNs** displays the World-Wide Name of the member devices. It is a 64-bit identifier and is unique world-wide.
  - **#VMs** displays SAN host VM details. Click **#VMs** to view the **SAN Host VM Screen** and **Enclosures** information.
- **Traffic Chart** — Provides the I/O statistics, CPU and memory information, and disk latency of individual hosts or virtual machines.
- **Events Table** — Provides information about events of all the switch ports that are configured within a specific host enclosure.
- **Topology** - Provides an end-to-end topology layout and path information between host enclosures and storage enclosures. The discovered virtual machines are displayed and when you select the virtual machine, the path to the SAN data source is displayed. You can toggle this view to list all the data paths.

Click a **Host Enclosure Name** to display a slide-out panel that displays the following details about the host device. The details displayed may vary depending on the device type.

Field	Description
IP Address	Displays the IP address of the switch.
MAC Address	Displays the MAC addresses.
WWN	Displays the port WWN.
FCIDs	Specifies the associated FCID.
OS Version	Displays the OS details.
#VMs	Displays the number of VMs.
VHost Name	Displays the name of the virtual host.
VHost IP	Displays the name of the virtual host IP Address.
VCluster	Displays the name of the virtual cluster.
Multipath	Displays the multipath details.
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.

Note Collection level in the vCenter settings determines the amount of data that is gathered and displayed in charts. Level 1 is the default Collection Level for all collection intervals. Change the vCenter statistics settings to Level 2 or higher to collect disk I/O history data.

Viewing Host Enclosures

To view the host enclosures from the SAN Controller Web UI, perform the following steps:

Procedure

Step 1 Choose **Dashboard** > **Hosts**.

The list of hosts in the host enclosures table is displayed.

Step 2 Click on **i** icon of host enclosure.

The **SAN Insights Monitor** window appears.

Step 3 On **SAN Insights Monitor** window, click on required host name.

The Host enclosure slide-in pane appears.

Step 4 Click on **Launch** icon to view Host Enclosure page.

The Host Enclosure window appears.

The Host Enclosure window displays the Initiator-Target (IT) pairs, Topology, average ECT/DAL/read/write times, and Switch Interface for the selected host.

- **Initiator Target Pairs** - This table lists all the initiator-target pairs for the selected host. The flow table shows the details of all metrics on ECT/DAL/read/write times, active I/Os, aborts, failures etc. along with their 1-hour average and the baseline information.
- **Topology** - Provides an end-to-end topology layout and path information between host enclosures. On **View** card click **+** or **-** to zoom-in and zoom-out. Similarly, you can use the mouse scroll wheel to zoom-in and zoom-out. Click **Refresh** icon to refresh the topology view. Choose **Select layout** drop-down list to view topology. This can be either **Hierachical** or **Hierachical Left-Right** view .
- The first table in below row shows the details of all metrics on ECT/DAL/read/write times, active I/Os, IOPS, Throughput, etc. along with their 1-hour average and the baseline information.
- **Switch Interface** - Click on topology to view associated switch name and the interface name in the last row in table.

Viewing CPU & Memory and Disk I/O Charts

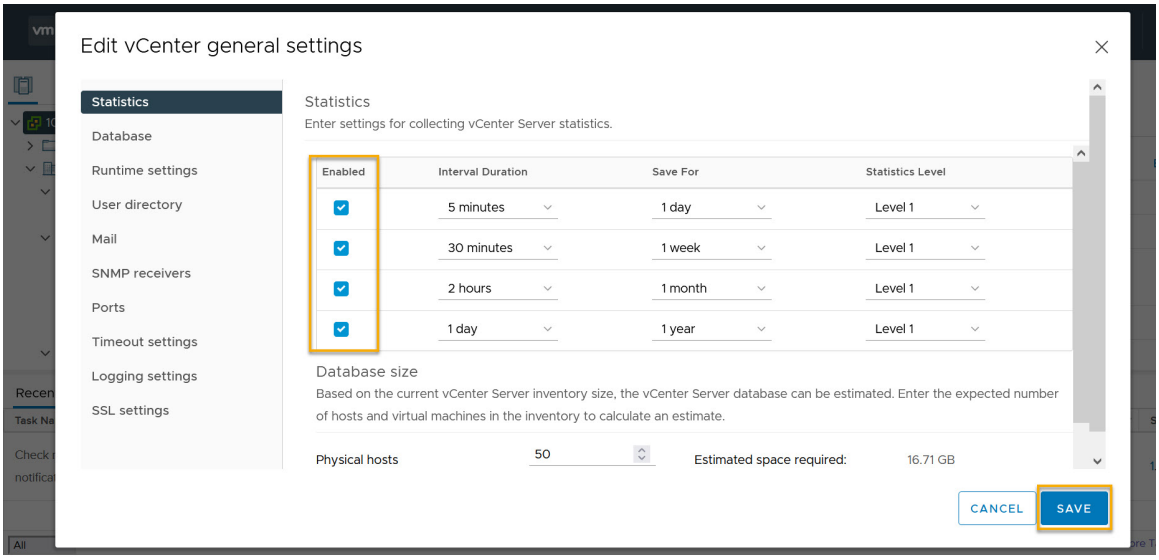
To view the SAN host enclosures from the NDFC SAN Controller Web UI, perform the following steps:

Before you begin

To view VM charts for **CPU & Memory** and **Disk I/O**, you must edit vCenter settings on the vSphere vCenter and enable statistics manually.

To enable statistics manually on the vSphere vCenter, perform the following steps:

1. Login to vSphere vCenter. (Click on the appropriate **Host**.)
2. Click **Configure** > **EDIT**. The **Edit vCenter general settings** screen appears.
3. On **Statistics** tab, check all the check boxes and click **SAVE**.



Procedure

Step 1 Choose **Dashboard** > **Hosts**.

The list of hosts in the Enclosures table is displayed.

Step 2 Click the host name.

The **Host** slide-in pane displays general information.

Step 3 Click on **#VMs** to view the required virtual machine (VM) details.

The **SAN Host VM Screen** is displayed.

Select an Enclosure to view **CPU & Memory** and **Disk I/O** charts on the right pane.

Storage

To access the **Storage** dashboard, choose **Dashboards** > **Storage**.

The **Storage** dashboard consists of the following:

- **Enclosures**: Lists the storage and their network attributes.
  - The **Storage Enclosure Name** column lists all the storage devices.
  - **Member WWNs** displays the World-Wide Name of the member storage devices. It's a 64-bit identifier and is unique world-wide.
- **Traffic Chart** area: Provides the I/O statistics, CPU and memory information, and disk latency of individual storage device or virtual machines.
- **Events Table** area: Provides information about the events of all the ports that are configured within a specific storage device enclosure.
- **Topology**: Provides end-to-end topology layout and path information of storage enclosures. The discovered virtual machines are displayed and when you select the virtual machine, the path to the SAN data source is displayed. You can toggle this view to list all data paths.

Viewing Storage Enclosure

SAN Controller allows you to view SAN Insights metrics based on two protocols, SCSI and NVMe. By default, the SCSI protocol is selected. However, you can change this setting from the **Settings** > **Server Settings** > **Insights**. Ensure that you restart the SAN Insights service to use the new properties.

To view the storage enclosure from the SAN Controller Web UI, perform the following steps:

Procedure

Step 1 Choose **Dashboard** > **Storage**.

The list of storage in the storage enclosures table is displayed.

Step 2 Click **i** icon to view SAN Insights Monitor page. On **SAN Insights Monitor** window, click on required storage name. Refer to Monitor Metrics for more information.

Step 3 Click on **Launch** icon to view Storage Enclosure window.

The **Storage Enclosure** window appears.

The Storage Enclosure window displays the Initiator-Target (IT) pairs, Topology, average ECT/DAL/read/write times, and Switch Interface for the selected host.

- **Initiator Target Pairs** - This table lists all the initiator-target pairs for the selected storage. The flow table shows the details of all metrics on ECT/DAL/read/write times, active I/Os, aborts, failures etc. along with their 1-hour average and the baseline information.
- **Topology** - Provides an end-to-end topology layout and path information between host enclosures. On **View** card click **+** or **-** to zoom-in and zoom-out. Similarly, you can use the mouse scroll wheel to zoom-in and zoom-out. Click **Refresh** icon to Refresh the topology view. Choose **Select layout** drop-down list to view topology. This can be either **Hierachical** or **Hierachical Left-Right** view.
- The flow table shows the details of all metrics on ECT/DAL/read/write times, active I/Os, IOPS, Throughput etc. along with their 1-hour average and the baseline information.

- **Switch Interface** - This table displays data for the last hour period that is selected for the interface. The switch name and the interface name are displayed on top of the switch interface table.

SAN Insights

SAN Insights visually displays fabric-level information in a holistic view from end-to-end.

On the SAN Insights dashboard page, you can select protocol, fabric, and switches from protocol, fabric, and switches drop-down lists. The dashlets display insight data based on the selected scope.

The dashboard displays the data over the last 72 hours. However, the Flow Summary and the Enclosure Summary donuts display the last 15 minutes from the latest updated time.

SAN Controller allows you to view SAN Insights metrics based on fabrics, switches, and two protocols namely SCSI and NVMe.

Ensure that you have enabled SAN Insights feature for SAN Controller. Choose **Settings** > **Feature Management**, choose check box **SAN Insights**.

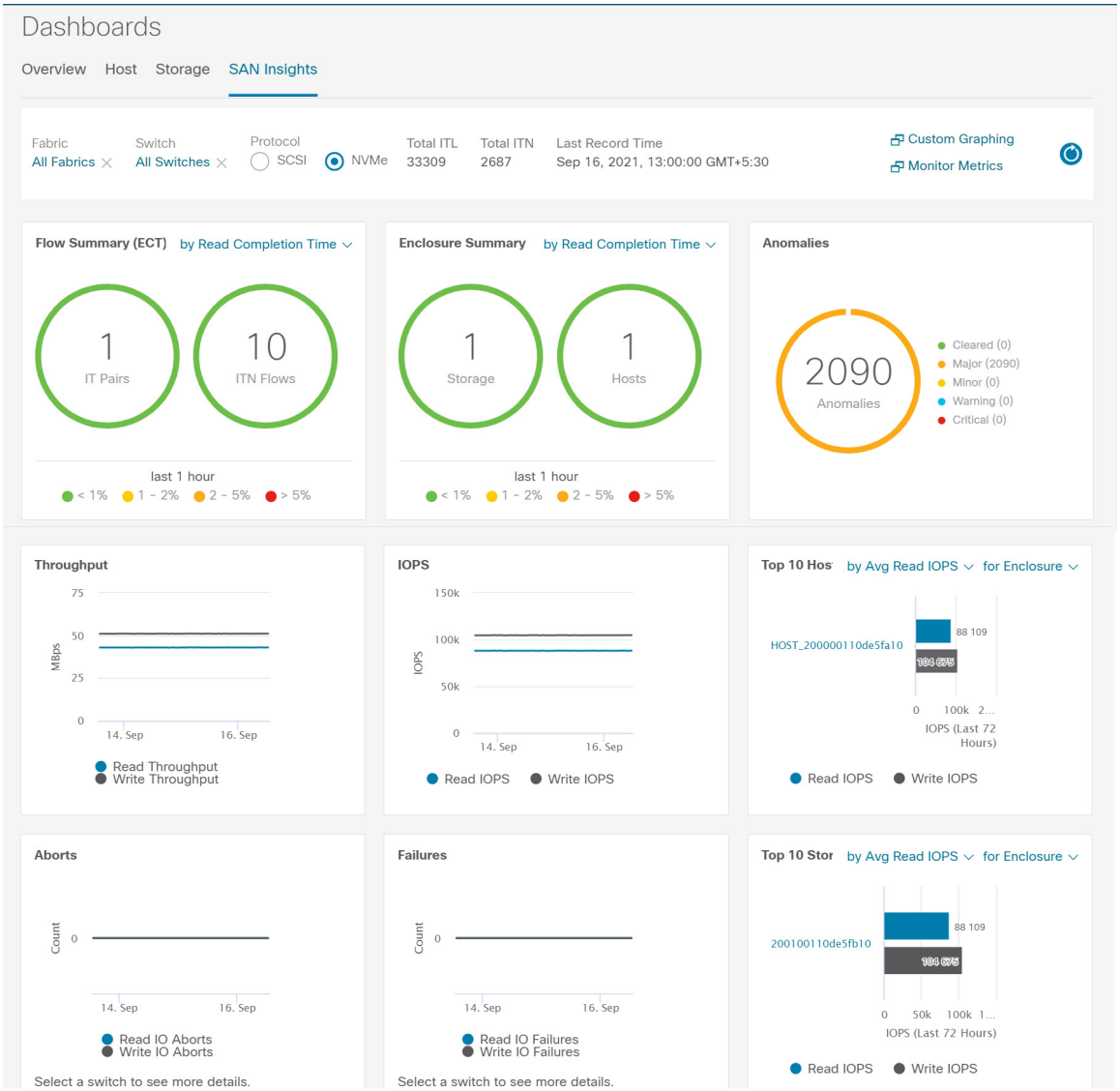
Ensure that you have configured SAN Insights, to view information on Dashboard. See Configuring SAN Insights.

Viewing SAN Insights

To view the SAN Insights Dashboard, choose **Dashboard** > **SAN Insights**. The SAN Insights Dashboard provides visibility for overall read/write IO operations/latency.

Table 1: SAN Insights Dashboard

Field	Description
Fabric	Click **Fabric**, to select required fabric, and click **Save**.
Switch	Click **Switch**, to select required switch.
Protocol	Choose **SCSI** or **NVMe** check box to select required protocol. By default, **SCSI** protocol is selected,
Total ITL	Displays total ITL value for selected options.
Total ITN	Displays total ITN value for selected options.
Last Record Time	Displays last record time for selected options.
Custom Graphing	Click **Custom Graphing**, SAN Insights Metrics Custom Graphing window is displayed. For more information, see Custom Graphing.
Monitor Metrics	Click **Monitor Metrics**, SAN Insights Monitor window is displayed. For more information, see Monitor Metrics.
Refresh	Click **Refresh** icon to Refresh and load screen.



Ensure that you restart the SAN Insights service to use the new properties.

The total distinct ITL and ITN counts from the trained baseline is displayed at top center of dashboard. The donuts show the active ITL/ITN count only, for the last 15 minutes. The total ITL and ITN count, however, shows the count of all the ITLs and ITN for the scope selected.

The SAN Insights dashboard contains the following dashlets.

- Flow Summary (ECT)

  From the drop-down list, select Read Completion Time or Write Completion Time, based on which the donuts show IT Pairs and ITL Flows. These data-points are computed based on the last available 15mins data in the Elasticsearch.

- Enclosure Summary (ECT)

From the drop-down list, select Read Completion Time or Write Completion Time, based on which the donuts display Storage and Hosts. These data-points are computed based on the last available 15mins data in the Elasticsearch.

- Anomalies

  Displays the number of anomalies policy and their severity levels in pie-chart and list. The pie chart displays the severity levels in different color modes and the list next to the chart displays the severity level and the number of anomaly policies in that level.

  You can edit, manage, view, acknowledge, and clear these anomalies. Choose **Operations** > **Event Analytics** > **Alarms**.

- Throughput

  Displays the Read and Write throughput rate. Hover the mouse on the graph to view the value at that instance. The metrics in these line charts are computed based on the data during the last 72 hours.

- IOPS

  Displays the Read and Write IOPs trend. The metrics in these line charts are computed based on the data during the last 72 hours.

- Aborts

  Displays the Read and Write Aborts trend. The metrics in these line charts are computed based on the data during the last 72 hours. This metric is computed based on the **read_io_aborts** and **write_io_aborts** metric reported by the Cisco MDS SAN Analytics infrastructure.

  Select a switch to see more details, to view the custom graphing for READ IO Aborts/Failures for the switch IP address that is selected on the Dashboard page.

- Failures

  Displays the Read and Write Failures trend. The metrics in these line charts are computed based on the data during the last 72 hours. This metric is computed based on the **read_io_failures** and **write_io_failures** metric reported by the Cisco MDS SAN Analytics infrastructure.

  Select a switch to see more details, to view the custom graphing for READ IO Aborts/Failures for the switch IP address that is selected on the Dashboard page.

- Top 10 Hosts

  Represents the top 10 Host Enclosures/WWN/Device Alias in the selected Protocol/Fabric/Switch scope based on the metric that is selected in the drop-down list. The data can be sorted by Read/Write IOPS, Throughput, Exchange Completion Time or Data Access Latency.

- Top 10 Storage

  Represents the top 10 Storage Enclosures/WWN/Device Alias in the selected Protocol/Fabric/Switch scope based on the metric that is selected in the drop-down list. The data can be sorted by Read/Write IOPS, Throughput, Exchange Completion Time or Data Access Latency.

Note

- The **Top 10 Host** and **Top 10 Storage** are computed over the last 72 hours, based on hourly data collected for the selected protocol, fabric(s), and switch(es). If you change the enclosure names for specific WWPNs, the names of the old enclosures names are visible until the data ages out after 72Hours.
- In the **Top 10 Host** and **Top 10 Storage** dashlets, the bars for the write metrics do not display the value always due to restricted space. To view all the values on the graph, you can either hover the mouse over the bar or hide the read or the write bar using the legend at the bottom of the dashlet.

A warning message appears as **HIGH NPU LOAD Detected** on top of the **Dashboard > SAN Insights** window. The warning implies that one or more switches has an unacknowledged Syslog event during the previous week. The event may affect the availability of the analytics data stored or displayed. You must acknowledge these events to remove the warning.

A warning appears as **HIGH ITL LOAD Detected** on top of the **Dashboard > SAN Insights** window.

Ensure that you have configured Syslog on the SAN Controller Device Manager, to capture NPU and ITL Loads. Choose **SAN** > **Switches**. Click on the switch, a slide-panel is displayed, click **Launch** icon to view switch information, click **Device Manager**. On the Device Manager tab, click on **Logs > Syslog > Setup**. Click **Create**. Enter the required parameters. Ensure that you choose the **syslog** radio button in the Facility area. Click **Create** to enable Syslog on the SAN Controller server.

To resolve the high NPU and high ITL loads, click on the **HIGH NPU LOAD Detected** or **HIGH ITL LOAD Detected** link. The **Monitor > Switch > Events** page appears. The list of events is filtered for **Type: HIGH_NPU_LOAD** and **Type: HIGH_ITL_LOAD**. Select all the switches and click **Acknowledge**. This removes the **HIGH NPU LOAD Detected** and **HIGH ITL LOAD Detected** warnings.

Viewing Custom Graphing

To view the SAN Insights metrics, choose **Dashboard** > **SAN Insights**. The SAN Insights Dashboard page appears. Click **View Custom Graphing** to view SAN Insights Metrics Custom Graphing window.

The dashboard displays the data over the last 72 hours. However, the Flow Summary and the Enclosure Summary donuts display the last hour aggregation from the latest updated time. The top 10 hosts/storage, throughput, IOPS, Aborts, Failures, graph display respective data.

Note The refresh interval for Custom Graphing page is 5 minutes. Click on the **Play** icon to refresh every 5 minutes automatically.

Cisco SAN Controller allows you to view SAN Insights metrics based on two protocols, SCSI and NVMe. By default, the SCSI protocol is selected. However, you can change this setting from on the **Web UI** > **Settings** > **Server Settings** > **Insights**.

Ensure that you restart the SAN Insights service to use the new properties.

Viewing Custom Graph and Table

This is a freestyle dashboard where multiple metrics can be selected and the real-time data for the selected metrics is shown in multiline graph which is configured to Refresh every 5 minutes and corresponding raw data will be shown in the data table.

You can also add multiple graphs for comparison by clicking on the **Add Graph** the top right.

Note The Auto Refresh option is disabled by default. You must click the **Play** icon to enable the Auto Refresh feature.

SAN Insights Metrics has two tabs.

- Graph
- Table

Graph



The graph is plotted with corresponding metrics with from and to date selected. It's dynamic in nature as the data can be refreshed every 5 minutes and can be converted into a static graph using the pause button. Click **Add Graph** to create graph. You can add maximum of three graphs at a time on this page.

SAN Controller allows the user to view data for more than two weeks' timeframe (up to a default maximum of 90 days. You can configure this timeframe in the server properties. Click drop down button next to Time Range and select date.

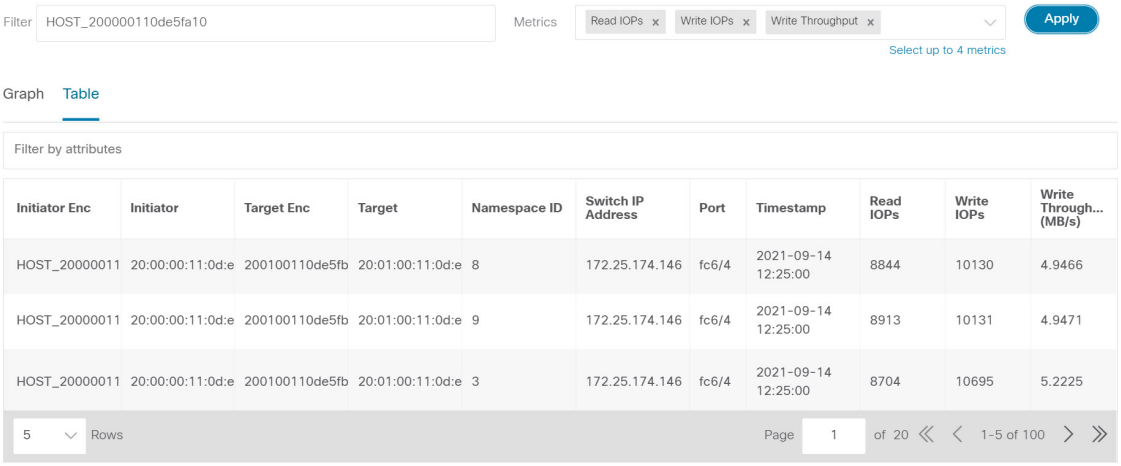
The Custom graphing metrics are enhanced to include the Write IO Failures, Read IO Failures, Write IO Aborts and Read IO Aborts to the drop-down metrics list.

ECT Baseline for each ITL Flow (Reads and Writes) is calculated using weighted average learned continuously over a training period:

- The ECT Baseline computation consists of two parts: the training period and the recalibration time.
- The training period for ECT Baseline is seven days by default (configurable).
- After the training is completed, the ECT Baseline remains the same until the recalibration is triggered after 7 days by default (configurable).

- By default every 14 days training runs for seven days (cyclic).
- The percentage (%) deviation shows the deviation of the current normalized ECT compared to the ECT Baseline.

Table



When you select a failure or abort from **Metrics** drop-down list, the table list is filtered to show only the rows that have at least one of the selected failure or abort metrics as a nonzero entry. The table displays only 100 records. However, to help find their nonzero failures that you can filter the table to show the last 100 records with an Abort or Failure that is nonzero. When you select failure or aborts, the table label changes to depict this behavior.

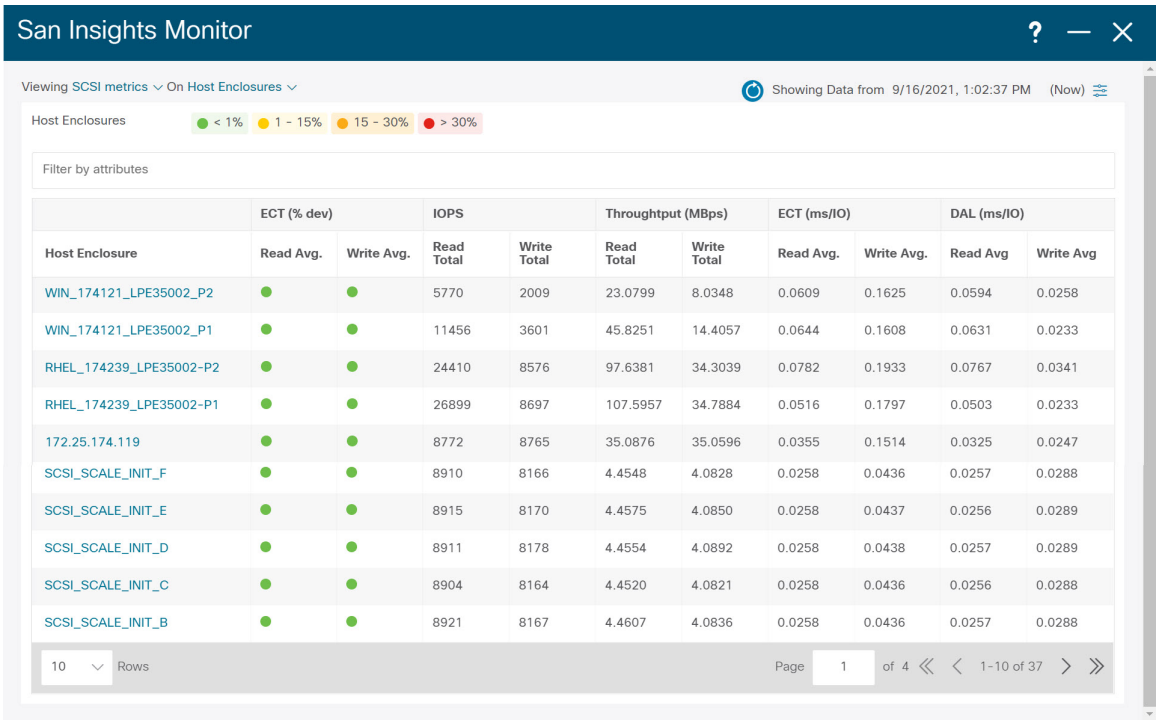
To view, input any of the seven dimensions (Initiator Enc, Initiator, Target Enc, Target, LUN, Switch IP Address, Port, Timestamp, Read IOPs, Write IOPs) in the filter by attributes field (separated by comma), and select an associated metric.

Monitoring Metrics

UI Path: **Dashboard** > **SAN Insights** > **Monitor Metrics**

The SAN Insights Monitor page displays the health-related indicators in the interface so that you can quickly identify issues in your environment. You can use health indicators to understand where problems are in your fabrics.

SAN Controller allows you to view SAN Insights monitor based on two protocols, SCSI and NVMe. By default, the SCSI protocol is selected. However, you can change this setting from the **Settings** > **Server Settings** > **Insights**.



From Release 12.0.1a, you can view SAN Insights Monitor on dashboard. From SAN Controller Web UI, perform the following steps:

Procedure

Step 1 Choose **Dashboard** > **SAN Insights** .

Step 2 Click **Monitor Metrics**.

The **SAN Insights Monitor** window is displayed.

The color of the status is as an hourly average of Read and Write deviation for the respective Initiator Target Pairs.

Step 3 Choose **SCSI** or **NVMe** metrics using **Viewing** drop-down list to view to select the data type.

Step 4 Choose **Host Enclosure**, **Storage Enclosure**, or **IT Pairs** using **On** drop-down list to view required data.

Step 5 Click **Refresh** icon, to view current time.

The system time is displayed at the right corner of the window.

Specify a time interval using the time setting icon. Click **Setting** icon, enter appropriate time in hours and click **Apply** to view data of selected time.

The switch interface counters display when you choose green circle icon on the switch on the topology page.

Step 6 Click on the required name to view details.

A slide-in panel is displayed with the associated I-T pairs.

Step 7 Click **Launch** icon to view the window.

Similarly, you can click thrice on the name to navigate to the detailed view.

The SAN Insights Monitor page displays the initiator-target pairs for the selected enclosure or IT Pairs. The flow table shows the details of all metrics on ECT/DAL/read/write times, ECT (%dev), IOPS, throughput information.

Similarly, you can view SAN Insights Monitor, from host and storage tabs on dashboard.

- Choose **Dashboard > Host**, click **i** icon on required host name. For more information on host enclosure, refer to Viewing Host Enclosures section.
- Choose **Dashboard > Storage**, click **i** icon on required storage name. For more information on storage enclosure, refer to Viewing Storage Enclosures section.

For more information on Initiator-Target (IT) Pairs, refer to Viewing IT Pairs, on page 15 section.

Viewing IT Pairs

Cisco Nexus Dashboard Fabric Controller allows you to view SAN Insights metrics based on two protocols, SCSI and NVMe. By default, the SCSI protocol is selected. However, you can change this setting from the **Settings** > **Server Settings** > **Insights**. Ensure that you restart the SAN Insights service to use the new properties

To view the IT Pair from the Cisco Nexus Dashboard Fabric Controller Web UI, perform the following steps:

Before you begin

UI Path: **Dashboard** > **SAN Insights** > **Monitor Metrics**

Procedure

Step 1 Choose **Dashboard** > **SAN Insights** > **Monitor Metrics**

The SAN Insights Monitor page appears. Refer to Monitor Metrics for more information.

Step 2 Choose **SCSI** or **NVMe** metrics using **Viewing** drop-down list to view to select the data type.

Step 3 Choose **IT Pairs** using **On** drop-down list to view data.

Step 4 Click on required IT pair name.

The IT pair slide-in panel appears.

Step 5 Click on **Launch** icon to view IT pairs window.

The IT pairs window appears.

The IT pair window displays the Initiator-Target (IT) pairs, Topology, average ECT/DAL/read/write times, and Switch Interface for the selected IT pair.

- **Initiator Target Pairs** - This table lists all the IT pairs for the selected IT pair name. The flow table shows the details of all metrics on ECT/DAL/read/write times, active I/Os, aborts, failures etc. along with their 1-hour average and the baseline information.

- **Topology** - Provides an end-to-end topology layout and path information between IT pairs. On **View** card click **+** or **-** to zoom-in and zoom-out. Similarly, you can use the mouse scroll wheel to zoom-in and zoom-out. Click **Refresh** icon to refresh the topology view. Choose **Select layout** drop-down list to view topology. This can be either **Hierachical** or **Hierachical Left-Right** view.
- The flow table shows the details of all metrics on ECT/DAL/read/write times, active I/Os, IOPS, Throughput etc. along with their 1-hour average and the baseline information.
- **Switch Interface** - This table displays data for the last hour period selected for the selected interface. The switch name and the interface name are displayed on top of the switch interface table.