Switch Port Management

The Switch Port Management (SPM) features in NetMRI allow at-a-glance management of all switched access interfaces in the network. IT departments routinely under-estimate (and over-estimate) port utilization and capacity requirements. In a large, switched spanning-tree network, some switches can go under-utilized while other switches in the network absorb unacceptably high loads. Switch port utilization trends are difficult to identify—is switch port utilization static, increasing or decreasing? Where are usage trends increasing? Decreasing? If certain switches support hosts that frequently leave their network segment (on business trips, for example) only to return within a week or two, how does the network manager control those temporarily vacated ports so that they remain available for their returning hosts?

Users often confront issues such as rogue/unknown devices on their switched networks, devices that frequently shift between switch segments, and a general lack of ability to track who connects when and where. Lacking adequate capacity planning, users sometimes resort to investing in expensive switch capacity “just to be safe.”

NetMRI's Switch Port Management (SPM) page (Network Explorer -> Switch Port Management) solves all of these issues. SPM enables both big-picture and highly focused views of an entire switched Ethernet network, from the overall network layer to individual devices and interfaces. Extending throughout the entire switched network, all endpoints are detected, tabulated and monitored by NetMRI. NetMRI can perform near-real-time polling of any part of the switched Ethernet network from the distribution level to any LAN switch. Network polling settings can be customized for any device group and administrators can execute a poll of a device group or the entire switched network at any time.

In a large-scale switched network, it can also be difficult to perform basic troubleshooting—locating the affected devices and analyzing their switch-port configuration. Through specialized reports, Switch Port Management gives administrators an integrated tool by which they can quickly learn the switch port settings of the interface to which any given device connects, including line speed, duplex, link status, VLAN ID and other information.

Quick Start: Deploying Switch Port Management

**Note:** When you execute port control tasks such as Set Admin Status for an SPM port, NetMRI displays a separate window showing the execution state of the command. In some cases, completion may take some time. NetMRI automatically polls the device at regular intervals to check status and notifies the user when the command completes.

The following procedure describes the overview of an entire rollout process for Switch Port Management. For brevity, this topic does not describe certain elements in detail. Where necessary, links are given to topics providing more information.

**Note:** The switches and switch-routers have already been discovered by NetMRI. Switch Port Management polls switches for a detailed collection of information on switch port connectivity, status of ports and end devices. For information, see Running the Setup Wizard, Configuring Network Discovery Settings and Running Network Discovery on Routed and Switched Networks.

NetMRI gives explicitly licensed devices priority in determining which devices to manage. Unlicensed devices continue to be managed by the appliance, but the appliance periodically collects only basic discovery data. See Other Network View Operations for more information.

1. After performing initial setup and defining your Discovery settings, you must define your global switchport polling settings. Go to Settings icon -> Setup -> Collection and Groups -> Global and click the Switchport Manager side tab to define your switch polling settings. Several primary polling options are offered:
   - Periodic Polling: Define regular polling time periods. Choose a polling interval of 1 or more Minutes or Hours. This is the default polling behavior for NetMRI. The default polling interval is 60 minutes;
   - Scheduled Polling: Schedule recurrent polling based on hourly, daily, weekly or monthly time periods. Click Add New Schedule and select a Recurrence Pattern of Once, Hourly, Daily, Weekly or Monthly; in all cases you must choose an Execution Time;
   - On-demand polling: click Poll Now to immediately begin polling all switch and switch-router devices in the managed network. (Also see Understanding SPM Polling for more information);
   - Completely disable switch port polling.

2. After defining global polling settings, you can define more specific polling settings at the Device Group level. Go to the topic Device Actions in Switch Port Management for more information.

   After some time, polled switch performance and configuration data appears in the NetMRI UI.

3. Go to Network Explorer -> Switch Port Management.

   The left-side menu provides three categories: Devices, Interfaces and End Hosts.

4. Click any menu item on the left for more information about the switched devices in the network. Go to the topic Using the Switch Port Management Console for more information.

5. For port control, you can set any switched interface to administratively Up or administratively Down by right-clicking the switch interface link and selecting Set Admin Status. You can also assign or change a VLAN assignment for a switch port by right-clicking the switch interface link and selecting Edit VLAN Membership.

Using the Switch Port Management Console

Two hierarchical lists appear in the Switch Port Management page: the Select Device Groups list on the right, and the Devices, Interfaces and End Hosts categories on the left. To begin using the Switch Port Management console, select any device group in the right-side list. Each device group represents a data set from a selected group of network devices. Consider that some device groups (Routing, for example) have systems with ports that will not be managed or catalogued by Switch Port Management.

After selecting a device group on the right, choose a category on the left: Devices, Interfaces or End Hosts. Then choose a menu option from the exploded list. For example, Devices has five menu items.

**Note:** The All Devices category is also a device group, and you can get a complete view of the switched network by selecting it.
The **Capacity Summary – Ports** appears at the top of the Switch Port Management page, indicating several basic pieces of information:

- **Total Ports**: The number of switched Ethernet ports, in the selected Device Group, that are being managed by Switch Port Management (if All Devices is chosen, this counter represents all managed switching ports).
- **Free Ports**: The count of ports most recently polled that show a link state of Down, having lost connectivity.
- **Free Ports %**: The percentage of all managed switch ports in the chosen Device Group showing Down link state.
- **Available Ports**: The count of ports that remained in a link state of Down for more than the prescribed time period; when a port is considered Available, it is deemed available for other network resources.

*Note:* The number of Available ports will always be less than or equal to the number of Free ports. Trunk, routed and unlicensed ports also are not included in the SPM port counts.

- **Available Ports %**: The percentage of all managed switch ports appearing as Available.
- **PoE Ports**: The count of Cisco switched Ethernet ports running the Power over Ethernet switching protocol for IP telephony applications.

Choosing Devices Present shows the total of all switches’ contributions to each of the six capacity categories. Choosing any other device group rewrites the Capacity Summary – Ports pane to reflect the subset of values for the selected device group:

Beneath the Capacity Summary – Ports pane, the Devices Present table appears displaying the data sets for all devices in the chosen data group. Each table row reflects a data set record obtained from LAN switching devices from a process called polling. The Devices Present table designation is for all devices in the chosen data set—not for all devices in the network.

### Performing Actions in Switch Port Management

All tables in the Switch Port Management console provide an Actions column on the far left. This column is populated with a gear icon, called the Action icon, for each table record. Clicking the Action icon for any table record in SPM displays a dropdown menu with differing options based upon the network entity type listed in the respective tables.

The Devices, Interfaces and End Hosts data categories provide different Action menus based on the table selection. The following sections describe switch port Actions menu options for each category.

### Setting Measurement Time Windows

![Switching 2012-10-09 / Daily](image)
Switch Port Management (SPM) Date/Period menus enable flexible measurement and reporting for any device, interface or end host. You can effectively go back in time to view data sets for any device, interface or end host phenomena.

For any page in SPM, clicking the icon on the top left of the table displays the Select Date/Period menu. The Select Date/Period menu fixes the current SPM page to a specific date or range of dates, going backwards from the current date, using a drop-down calendar.

Calendar dates shown in Green represent an immediately available data set to display in a Switch Port Management table. The most current data in any SPM table (such as the most recent 7 days for the Daily selection) is always available by default and appears highlighted in green. Older data requires the user to wait while NetMRI generates the requested data as a background task. After generation, the requested date appears in green, indicating the data is instantly available by reloading the page. Any date in the past or in the future appearing in grey that cannot be selected, represents information that is unavailable to the current NetMRI system.

Consider the Device category, with the default time measurement set to Daily. As an example, you decide to look at the list of network switches that have changed in their status or their configuration over the previous 30 days from the current date. Choose Devices → Changed Devices, click the Select Date/Period icon, and choose the time period (Daily, Weekly, Monthly, 7-Day or 30-Day). The time window shown in the currently selected page changes to the new value, and the current page changes in a number of ways:

- The Capacity Summary → Ports pane adjusts to reflect the different data sample, and the Total Ports, Free Ports and other counters may change to reflect new values.
- The chosen time window applies to any further selected pages in Switch Port Management until you change the settings again for the same page or for a different page.
- The chosen time window also applies to any other tables and information charts under Network Explorer, Network Analysis or the Dashboard until you change the value chosen under the Select Date/Period.

You can shift time windows across the calendar. Select a date three weeks previous to the current. Then, choose Period → 7-Day. The current table redraws to show the currently selected data set. Then, use the Select Date/Period menu to select day three months in the past. The 7-day time window shifts to the new position, with the selected date as the last day in the time window.

### Understanding SPM Polling

**Note:** Switch Port Management (and its polling functions) operates only with devices detected as Switches or Switch-Routers in NetMRI. Also see **Performing On-Demand Switch Port Polling**.

Network device polling is the key mechanism for building Switch Port Management (SPM)'s switching information, and the polling features provide considerable flexibility. You use polling at the Device Group level to check for changes to any active device in that group. You can define polling time periods for individual device groups so that administrators have near-real-time capabilities for monitoring large-scale switched networks, or specific parts thereof, and quickly detect and address problems.

In all cases, a polling schedule indicates the start of a polling cycle. Any given network device may not be polled at the specific time when the scheduled polling cycle begins; this is particularly likely when many devices are being polled during the cycle. The duration of a polling cycle may take some time.

**Note:** The Settings icon → Setup → Collection and Groups → Global tab provides the appliance-wide settings for polling all Switch and Switch-Router devices in the network.

NetMRI provides several polling and discovery optimizations under Advanced Settings. See **Changing Advanced SPM Settings** for details.

### Device Group Polling

You can apply switch port management polling settings to device groups. These settings, located under the Settings icon → Setup → Collection and Groups → Groups tab, take precedence over the settings defined in the Global tab.

In NetMRI, network polling automatically takes place every 90 minutes. This setting can be lowered to a minimum value of 30 minutes.

### Periodic Polling

**Note:** Periodic polling executes at a minimum time period of 30 minutes between polling cycles.

By default, Switch Port Management polls all known Ethernet switching devices every 60 minutes. This feature is called **periodic polling**. Polling performance relies on many factors, including the size of the network, link speeds, the number of ports in the switched networks, and other factors. If the appliance cannot complete polling within the specified time period, NetMRI does the following:

- Logs a warning that it has not completed polling within the specified period;
- Completes the polling in progress and logs how long it took to finish.

Periodic polling settings can be adjusted globally and within each device group. Periodic polling provides for the following rates: 30/45/60/90 minutes, then every hour up to and including 24 hours.

NetMRI always logs the elapsed polling time period for any network device regardless of the installed license for the current instance.

### Scheduled Polling

Use scheduled polling in place of periodic polling. You define specific days and times for the polling schedule. Device groups also can support multiple polling schedules.
Note: Different data collection methods cannot collect polled information from a device at the same time.

You may exclude device groups from Switch Port Management; the switches within the chosen group will not appear in the Devices page and their switch ports will not count against the SPM interface license count, or in the Capacity Summary – Ports pane. Switch Port Management will not poll excluded device groups.

Device polling combines with NetMRI's configuration management features (the ability, for example, to quickly pull up and edit a given LAN or distribution switch's configuration files) to provide a workflow to quickly respond to issues in the switched network.

Multiple polling schedules can be applied per device group. For example, a user can schedule polling to run every Sunday at 3AM and 6PM.

Understanding Performance Information Gathering

Infoblox recommends regular collection of interface performance statistics for Switch Port Management-managed systems, differing from the irregular or lengthy time periods used by the automatic collection of switch-forwarding data in the full NetMRI configuration. For information on switched interface management, see Managing Interfaces Through Switch Port Management.

Performance polling can be executed immediately, on demand, with limitations. If someone manually attempts to poll a device group when another poll of the entire network is already running, NetMRI notifies the user that another polling session is already in progress and will not execute the manual request until the current session completes.

Infoblox advises regular performance polling because interface-level performance statistics are provided to the appliance as counter values. NetMRI tracks differences in performance counter values from poll to poll and uses the deltas to calculate the true interface performance statistics over that time period. A regular time period provides greater granularity to the performance data and minimizes the changes of counter roll-overs.

For switch port management, interface performance statistics collection applies only to ports in Switch and Switch-Router devices.

Performing On-Demand Switch Port Polling

Switch Port Management (SPM) allows on-demand polling for device groups and for the entire managed network. A key use case is to check for changes to switches or switch ports in the network. In most cases, polling globally across the entire network should be discouraged in favor of polling across a single device group. When a polling session takes place, NetMRI commits a record of each polled network entity to the Device History, to the Interface History in the Interface Viewer; and to the Device History of any end devices involved in the group poll.

On-demand polling of switching devices can be executed for the entire switched network or by smaller Device Groups:

- On the global level, begin polling all switches in the network by choosing Settings -> Setup -> Collection and Groups -> Switch Port Manage ment side tab and clicking Poll Now. Note that no other polling operations are allowed by NetMRI when this process is being carried out.

- At the device group level, initiate polling for a subset of devices in the managed network by going to the Settings icon -> Setup -> Collection and Groups -> Groups tab, selecting a group and clicking Edit in the table row; choosing the Switch Port Management tab, then clicking Poll Now.

The Device History and Interface History record all polling events for the chosen entities. NetMRI users can view interface performance statistics in the Switch Port Management page view after the appliance collects all switch forwarding data.

Filtering Switch Port Information

Device, Interface and End Host tables can contain huge numbers of records, and be overwhelming to search through. Switch Port Management provides filtering to efficiently cope with the array of data. Using the Filters capability, you can select any data field type displayed in any table, specify a threshold value, and search out the required data. Using this method, you can use any relevant, common-sense networking criteria to single out subsets of records.

1. Display the Switch Port Management table you wish to filter. For example, choose Devices Present.
2. Click Filters just above the top of the table.
3. In the Select a New Field drop-down list, choose the table field by which to filter. For example, in a long device list, you might choose Avail Ports.
4. Choose an Operator. For example, you might want to check for all switches that have 20% or less of their ports available; in this case the <= operator is appropriate.
5. In the Value field of the Filters dialog, enter the numeric value. This is the numeric threshold by which the data is filtered. The result is a filter by which all records with a count of less than 20% will not appear in the filtered table.
6. Click Apply to test the filter. The table will refresh in the background. If you wind up with results you don't expect, check your use of the correct operator or change the numeric threshold.
7. Click the trashcan (Delete) icon for the filter row to delete a filter. Of course, you can apply more than one filter at a time to the table.

Filter criteria change according to the chosen table information. Devices, Interfaces and End Hosts all present a different set of table fields by which you can filter their respective bodies of information.

Device Actions in Switch Port Management
In Switch Port Management (SPM), devices denote network switches and switch-routers only. End hosts are counted as a separate category. The Devices pages provide the views of all the distribution and LAN switches and switch-routers in the managed network.

The **Action** column on the far left of any Device-related table (such as **Devices Present**), provides the following functions for switching device management from the NetMRI console:

- **View Device History**: Choosing this option displays the Device Viewer in a separate browser window. The device window automatically displays the Device History, with the most recent History record at the top. In the Device History view, the **First Seen** time stamp is the first time the device's MAC address was discovered.
- **The Last Seen** timestamp represents the most recent time that NetMRI communicated with the device (often the most recent polling event). The device **Name** is the configured name of the switching device. The device's IP address is also shown, along with the **DNS Name** if any. A standard **Description** (taken directly from the device) is given along with the **Poll Duration**. If the **Poll Duration** shows a value of "1" the polling process completed in the normal time period.

**Note**: SPM tracks MAC addresses and their associated IP and switch port history. SPM separately maintains an active record of all MACs ever seen by the NetMRI system, along with their associated connectivity information. Unique identities for all detected End Hosts are established by their respective MAC addresses.

---

**Open Telnet Session**: Uses the Telnet/SSH proxy built-in to NetMRI to start a Telnet session with the selected device. **Open SSH Session**: Uses the Telnet/SSH proxy built-in to NetMRI to start an SSH session with the selected device.

**Topology Viewer**: Through a second-level dropdown menu, gives quick access to Layer 2 and Layer 3 views of the network topology surrounding the chosen device. If the selected device is classified as a Switch, only the **L2 nHop** and **L2/L3 Path Viewer** topology views are available.

- **L2 nHop**: Shows the devices that can be reached from a starting device through a given number of Level 2 (actually a hybrid of L1 and L2) connections.
- **L3 nHop**: Shows devices that can be reached from a starting device through a given number of routed Level 3 connections.
- **L3 Path Viewer**: Shows the most likely path traffic would take, ignoring Layer 2 connectivity and concentrating on L3 reachability and the "best" path for communication between Layer 3 devices.
- **L2/L3 Path Viewer**: Shows the most likely path traffic would take between two devices, including both Layer 2 and Layer 3 connectivity.

Also see **Using the Topology Viewer** for more information on how to use this NetMRI feature.

---

**Viewing All Devices in the Switched Network**

The **Devices Present** link (Network Explorer→ Switch Port Management→ Devices → Devices Present) is the top-level view in Switch Port Management. It provides the complete list of switches and switch routers that are being managed by NetMRI. The **Capacity Summary– Ports** pane appears at the top of the table, showing the network totals for Free Ports and Available Ports.

The **Devices Present** table breaks down this information into each switch's share of network capacity:

- **Action** icon: Provides the Action menu with **View Device History**, **Open Telnet Session**, **Open SSH Session**, and **Topology Viewer** options.
- **Device Name**: The configured name of the device.
- **IP Address**: The host IP address of the network device (live link to the Device Viewer).
- **Total Ports**: The number of switched Ethernet ports, in the selected Device Group, that are being managed by Switch Port Management (if All Devices is chosen, this counter represents all LAN switching ports).
- **Used Trunks**: The number of trunk ports used in the switched Ethernet ports.
- **Used Access**: The number of access ports used in the switched Ethernet ports.
- **Free Ports**: The count of free ports which are available for use and also contains most recently used ports (hyperlink to **Ports Present** page).
- **Available Ports**: The count of ports that remained unused for more than the prescribed time period. The port is available, it can be deemed available for other network resources (hyperlink to **Ports Present** page).
- **Available Ports %**: The percentage of all managed switch ports appearing as Available (hyperlink to **Ports Present** page).
- **PoE Ports**: Count of Cisco switched Ethernet ports running the Power over Ethernet switching protocol for IP telephony applications.

Data columns related to interfaces on each device (**Free Ports**, **Available Ports**, **Available Ports %**) provide hyperlinks to the **Ports Present** table. You can immediately see the operating status and admin status of every port that appears as Free in a given switch.

---

**Viewing Device Vendor Model Information**

The **Device/Vendor Model** page displays a different subset of Switch Port Management data, focusing on equipment vendor, product model, device serial number and other information:

- **Action** icon: provides the Action menu with **View Device History**, **Open Telnet Session**, **Open SSH Session** and **Topology Viewer** options.
- **Device Name**: The configured name of the device.
- **IP Address**: The host IP address of the network device (live link to the Device Viewer).
- **Vendor**: The equipment manufacturer.
- **Model**: The vendor model number of each device in the network.
- **Serial Number**: The manufacturer serial number for each device.
- **Description**: The device description, typically burned into the software ROM of each device.
- **Last Seen**: The timestamp of the last successful poll of the device, or the last time the device was seen on the network by other means such as through a device's ARP table. (You can also choose to display the **First Seen** data column, which is the timestamp of the moment when the device was first detected by the appliance.)
- **Last Changed**: The timestamp when the last changes were performed on the device. Clicking on the IP address hyperlink for any device in the table displays the Device Viewer.
Viewing the List of Newly Discovered Devices

The **New Devices** table lists the subset of switching network devices that have been discovered by NetMRI during the displayed measurement period. By default, the table is sorted in ascending order by the **Device Name**. These devices are not yet considered to be actively managed by NetMRI. The default data set includes the following:

- **Action** icon: provides the Action menu with View Device History, Open Telnet Session, Open SSH Session and Topology Viewer options.
- **Device Name**: The configured name of the device. By default, this column sorts the **New Devices** page in ascending order.
- **IP Address**: The host IP address of the network device (live link to the Device Viewer).
- **Total Ports**: The number of switched Ethernet ports for each device most recently discovered by NetMRI and catalogued in Switch Port Management.
- **View** icon: provides the Action menu with View Device History, Open Telnet Session, Open SSH Session and Topology Viewer options.

The **New Devices** table, which lists any network devices that have been discovered by NetMRI during the displayed measurement period. These devices are not yet considered to be actively managed by NetMRI and may be assigned to Switch Port Management at the conclusion of the next polling process.

Viewing the List of Changed Devices

The **Changed Devices** page lists any network devices that have changed in some fashion within the most recent polling period. All newly discovered devices appear in this table; devices may move from one VLAN to another VLAN and also appear here. If a device is administratively Up but is taken down for any reason, it also appears here. The devices listed here represent a smaller subset of the total of network devices, and the **Capacity Summary** pane changes values to match.

Default data set shown in the table include the following:

- **Action** icon: provides the Action menu with View Device History, Open Telnet Session, Open SSH Session and Topology Viewer options.
- **Device Name**: The configured name of the network device.
- **IP Address**: The host IP address of the network device (live link to the Device Viewer).
- **DNS Name**: The DNS-resolved host name, if any, of the network device.
- **Last Seen**: The timestamp of the last time the device was detected or seen on the network by any means, such as through a device’s ARP table.
- **Last Changed**: The timestamp of the last change performed on the device. This column is the default sorting for the **Changed Devices** table, listing in descending order from the most recent to least recent.

Clicking on the IP address hyperlink for any device in the table displays the Device Viewer.

Viewing the List of Unreachable Devices

The **Devices Not Present** page lists any active switch and switch-router devices, excluding end hosts, with which Switch Port Management has lost communication over the last measurement time period. The device is off the network for some reason, such as having been turned off or rebooted or having settings changed so that it is out of Discovery range.

The default **Devices Not Present** page consists of the following data set:

- **Action** icon: provides the Action menu with View Device History, Open Telnet Session, Open SSH Session and Topology Viewer options.
- **Device Name**: The configured name of the device. By default, this column sorts the **Devices Not Present** page in ascending order.
- **IP Address**: The host IP address of the network device. This is a live link to the Device Viewer, which automatically displays the Issues page.
- **DNS Name**: The DNS-resolved host name, if any, of the network device.
- **Last Seen**: The timestamp of the last successful poll of the device, or the last time the device was seen on the network by any means such as through a device’s ARP table.
- **Last Changed**: The timestamp of the last change performed on the device.

A second page under End Hosts, **End Hosts Not Present**, lists any end host devices that have lost communication with the network.

Managing Interfaces Through Switch Port Management

The **Action** column on the far left of any Interface-related table (Ports Present, Link Changes and Hub Locator) provides a View Interface History function for LAN interface management from the Interface Viewer.

All ports that appear in tables described in this section are a subset of all ports discovered and managed by NetMRI. Interface tables outside of the Switch Port Management feature set will include such items as trunk ports and routed ports from routers and switch routers as catalogued and described by NetMRI.

**View Interface History** displays the Interface Viewer in a separate browser window, which automatically displays the History page, with the most recent records at the top.

---

**Note**: SPM port counts in interface tables include only access ports. Trunk ports and routed ports are not counted against access interface counts or against the NetMRI license. Routed ports on switch-router devices will not appear in any Switch Port Management interface counts.
For an interface, the First Seen and Last Seen timestamps indicate the first occasion when the network switch was polled by Switch Port Management, and the last occasion when the device was polled or otherwise detected on the network.

The Device Name is shown, along with the Interface identifier and a brief Description, its MAC address, operating and administrative status, the Line Speed, and Duplex settings if known and supported.

Several SPM port control settings also appear:

- Set Admin Status – Set the port to administratively Up or administratively Down;
- Edit Description – A text label describing the port;
- Edit VLAN Membership – Change the VLAN assignment for a switch interface.
- Choosing a menu option displays a dialog for the port configuration change.
- For Admin Status, ports can be set to Up or Down from the drop-down menu.
- Enter a new text description for the port in the Interface Description field.
- For Edit VLAN Membership, choose the VLAN ID from the VLANID drop-down list (new values are not entered in this location) and the VLAN name from the VLAN Name drop-down list. By enabling the No VLAN checkbox, a port can be set to disable any VLAN assignment.

In all cases, click Save to commit settings.

Also see Using the Interface Viewer for more information on how to use this NetMRI feature set.

Viewing Interface Status

The Ports Present table provides the list of switched access interfaces for the entire network, the aggregate interface list for any chosen device group and the list of interfaces for any chosen LAN switch or distribution switch.

Note: Sort the Ports Present table by the # End Hosts column to more easily show the switch ports with the highest number of connected hosts.

The Ports Present table data defaults include the following:

- Action icon: provides the Action menu with View Interface History, Set Admin Status, Edit Description, and Edit VLAN Membership options.
- Device Name: The Ethernet switching device to which the interface is associated (live link to the Device Viewer).
- Interface: The switched port identifier (live link to the Interface Viewer, displays the History of the port).
- VRF Name: The name of the VRF instance.
- Interface Description: Functional description of the LAN switched port type.
- Interface Type: The standard interface type supported by the port. For switched Ethernet, this value will typically be ethernet-csmacd.
- Interface MAC: The 48-bit hardware address for each port in the Link Changes list (live link to the Interface Viewer, displays the history of the port).
- Trunk Status: The switched interface's trunk status.
- If Oper Status: The switched interface's operating status.
- If Admin Status: The switched interface's Admin status (whether the port is administratively enabled by the operator).
- Speed: The line speed of each listed interface.
- #End Hosts: The number of detected End Hosts bound to each listed interface, if any (live link to the End Hosts Present page).

Pay special attention to the # End Hosts column. As with any data column, you can sort by this value, upwards or downwards. Choosing Sort Descending brings all switch interfaces with connected hosts to the top of the table, with the interfaces having the highest number of connected hosts at the top. For any switched interface, clicking the numeric hyperlink in the # End Hosts column will close the Ports Present table and display the End Hosts Present table listing only the end hosts associated with the specific interface. You can readily identify each connected host by their respective host names, host IP address, VLAN name and other information.

Viewing the List of Links that Change State

The Link Changes page provides a list of interfaces that have most recently changed state. Data column defaults include the following (you may need to scroll across to see all data samples):

- Action icon: provides the Action menu with View Device History, Set Admin Status, Edit Description and Topology Viewer options.
- Device Name: The Ethernet switching device to which the interface is associated (live link to the Device Viewer). The Link Changes table is sorted by this column in ascending order.
- Interface: The switched port identifier (live link to the Interface Viewer, displays the History of the port).
- Interface Type: The standard interface type supported by the port. For switched Ethernet, this value will typically be ethernet-csmacd.
- Interface MAC: The 48-bit hardware address for each port in the Link Changes list (live link to the Interface Viewer, displays the History of the port).
- If Oper Status: the switched interface's operating status.
- If Admin Status: the switched interface's Admin status (whether the port is administratively enabled by the operator).
- Line Speed: the line speed of each listed interface.
- First Seen: The timestamp indicating when Switch Port Management first polled the device.
- Last Seen: The timestamp indicating the last occasion when Switch Port Management detected the device in another device's ARP table, or otherwise saw the device on the network.

Viewing the Hub Locator

The Hub Locator table lists all switched interfaces in the network that operate as Smart Hubs, with more than one end host connected to the switch port. Consider the table in Switch Port Management, with its sortable # End Hosts column. When you perform the sort, all interfaces that show a count of more than one connected host in the # End Hosts column will appear at the top. These interfaces with their higher End Host counts will also be separated into the Hub Locator table.
In many cases, the collection of end hosts for each located hub are clients bound to a VLAN.

**Note:** In many cases, the collection of end hosts for each located hub are clients bound to a VLAN.

- **Action** icon: provides the Action menu with View Device History, Set Admin Status, Edit Description and Topology Viewer options.
- **Device Name**: The Ethernet switching device to which the interface is associated (live link to the Device Viewer, displaying the Issues page).
- **Interface**: The switched port identifier (live link to the Interface Viewer, displays the History of the port).
- **Interface Type**: The standard interface type supported by the port. For switched Ethernet, this value will typically be ethernet-csmacd.
- **Interface MAC**: The 48-bit hardware address for each port in the Link Changes list (live link to the Interface Viewer, displays the History of the port).
- **If Oper Status**: the switched interface's operating status.
- **If Admin Status**: the switch port's Admin status (if the port is administratively enabled by the operator).
- **# End Hosts**: The number of detected End Hosts bound to the hub interface (live link to the End Hosts Present page). The Hub Locator table is sorted in descending order by this column.
- **First Seen**: The timestamp indicating when Switch Port Management first polled the device.
- **Last Seen**: The timestamp indicating the last occasion when Switch Port Management detected the device on the network.

### Tracing VLANs Through a Switched Network

The **Refine View** tool is helpful for tracing the path of a L3 switched VLAN.

Every device in a Device Group that participates in the same switched VLAN can be marked using this feature. To perform any VLAN path trace, click on **Network Explorer** → **Topology** → **Network** accordion menu → **Aggregate** and click the **Refine View** button.

The Edit View dialog appears, displaying the **Device Group** tab.

Hover the mouse over the Action icon for the VLAN ID that you want to use as the basis for your VLAN path trace. Choose **Select Blue** or **Select Yellow** from the Actions pop-up menu. The color for the VLAN ID appears under the **Selections** column. Click **OK**, and the Topology map redraws to add color markers to all devices in the map corresponding to the chosen VLAN ID.

You can hover the mouse over the devices carrying the VLAN, and over the links between devices to get more information about each link.

### Tracking and Managing End Hosts

In the Switch Port Management page, the **End Devices** category displays all end host devices associated with LAN switches in the selected device group, and filters them into several functional categories.

**Note:** To optimally configure Switch Port Management for end host detection, ensure that all end host subnetworks that you want managed are included in NetMRI’s Discovery IP ranges. The discovered end hosts also must be excluded from management by NetMRI. This can be done by specifying the IP ranges for the end host network segments in Step 2 of the Setup Wizard or by opening Settings icon → **Setup** → **Discovery Settings** following initial NetMRI setup. Also see the **Configuring Discovery Ranges** topic for more information.

### Performing End Host Actions

The **Action** column on the far left of any Interface-related table (Interfaces Present, Link Changes and Hub Locator) provides the following functions for end host device management from the NetMRI console.

- The **End Host History** displays the Device History page of the Device Viewer. For an end host, meaningful values include the **Host IP Address**, the switch or switch-router **Device Name**, the interface the host is bound to (**Interface**), and the **VLAN Name** to which the host is also bound.
- The **Interface History** displays the Interface Viewer in a separate browser window, which automatically displays the History page, with the most recent records at the top.
- The **Device History** provides the recent connectivity history for the current end host. In this context, the Device Viewer treats end hosts, such as VMs or servers or host PCs, generically.
- You can set the Admin Status (**Set Admin Status**) for the selected switch interface.
- You can edit the description that appears in the interface table for the selected interface (**Edit Description**), and change its VLAN assignment (**Edit VLAN Membership**).

Also see **Using the Interface Viewer** for more information on how to use the Interface Viewer feature set.

### Viewing All Current End Hosts

The **End Hosts Present** table provides a complete list of all end host devices detected and successfully probed by the NetMRI appliance. You can begin by choosing **Actions** from the icon on the left of each table record. Other data displayed include the following:

- **Action** icon: provides the Action menu with **End Host History**, **Interface History** and **Device History** options, changing the Admin Status for an end host interface, and editing the description and VLAN assignment.
- **Host IP address**: Provides live link to the Device Viewer.
- **Host Name**: DNS host name (if any), provides live link to the Device Viewer.
- **Host MAC**: 48-bit hardware address of the host system.
- **Last Seen**: The timestamp of the last successful detection of the end host connected to the given switch interface. (You can also choose to display the **First Seen** data column, which is the timestamp of the moment when the end host was first detected as a host connected to its current LAN switch interface.
- **Device Name**: The LAN switching device to which the host is currently associated (live link to the Device Viewer).
- **Interface**: The LAN switched interface to which the end host connects (live link to the Interface Viewer).
In earlier releases, NetMRI did not detect and report neighbor relationships between switch trunk ports and non-trunked downstream switch ports. This could present issues for discovery and inventory of ESXi and Hyper-V VM host servers and any other end host neighbors of trunk ports. In Release 6.9 onwards, when NetMRI detects no switch downstream from those trunk ports, the system correctly reports all end host neighbors of switched trunk ports in Network Explorer End Host and Connected End Host tables, Device Viewer/Interface Viewer neighbor tables and in the Topology feature.

Virtual Machines acting as De Facto end hosts in the network, including VMs that directly communicate through a switch port, and VMs communicating through a 'virtual switch,' which in turn communicates through a switch port, will not appear in End Host-related tables and pages. NetMRI will discover such VMs but they are not visible in End Host tables. Virtual switches are also not supported by NetMRI. Virtual machine-based hosts appear in the **Netw ork Explorer → Inventory** page under Connected End Hosts, but their entries will not show switching infrastructure.

### Viewing the List of Newly Discovered Hosts

The **New End Hosts** page filters the list of **Devices Present** to show the devices and hosts that were found by NetMRI. By default, it shows the same set of data columns shown by the **End Hosts Present** table. Many more data fields can be displayed in the table (click the down arrow on the right end of any table column header, choose **Columns**, and enable check boxes for any new columns to display). For the VLAN ID, select the **VLAN** data field from the dropdown menu in any column.

- **Host IP address**: Provides live link to the Device Viewer.
- **Host Name**: DNS host name (if any), provides live link to the Device Viewer.
- **Host MAC**: 48-bit hardware address of the end host's Ethernet port.
- **Last Seen**: The timestamp of the last successful detection of the end host connected to the given switch interface. (You can also choose to display the **First Seen** data column, which is the timestamp of the moment when the end host was first detected by NetMRI as a host connected to its current LAN switch interface.)
- **Device Name**: The LAN switching device to which the host is currently associated (live link to the Device Viewer).
- **Interface**: The LAN switched interface to which the end host connects (live link to the Interface Viewer).
- **VLAN Name**: The active VLAN to which the end host is currently bound (live link to the VLAN Viewer).

### Viewing the List of Hosts that Change State

The **End Hosts Not Present** page lists the end devices or hosts that are discovered to be disconnected or otherwise become unreachable on the network when the last polling took place. By default, it shows the same set of data columns shown by the **End Hosts Present** table. Many more data fields can be displayed in the table (click the down arrow on the right end of any table column header, choose **Columns**, and enable check boxes for any new columns to display). For the VLAN ID, select the **VLAN** data field from the drop-down menu in any column.

- **Action** icon: provides the Action menu with **End Host History**, **Interface History** and **Device History** options, changing the Admin Status for an end host interface, and editing the description and VLAN assignment.
- **Host IP address**: IP address of the end host, provides live link to the Device Viewer.
- **Host Name**: DNS host name (if any), provides live link to the Device Viewer.
- **Host MAC**: 48-bit hardware address of the end host's Ethernet port.
- **Last Seen**: The timestamp of the most recent detection of the end host connected to the given switch interface. (You can also choose to display the **First Seen** data column, which is the timestamp of the moment when the end host was first detected by NetMRI as a host connected to its current LAN switch interface.)
- **Device Name**: The LAN switching device to which the host is currently associated (live link to the Device Viewer).
- **Interface**: The LAN switched interface to which the end host connects (live link to the Interface Viewer).
- **VLAN Name**: The active VLAN to which the end host is currently bound (live link to the VLAN Viewer).

### Viewing and Interpreting VLAN Changes

The VLAN Changes page lists all devices that switched from one VLAN to a different VLAN during the user-configured time period.

- **Action** icon: provides the Action menu with **End Host History**, **Interface History** and **Device History** options, changing the Admin Status for an end host interface, and editing the description and VLAN assignment.
- **Host IP address**: IP address of the end host, provides live link to the Device Viewer.
- **Host Name**: DNS host name (if any), provides live link to the Device Viewer.
- **Host MAC**: 48-bit hardware address of the end host's Ethernet port.
- **Last Seen**: The timestamp of the most recent detection of the end host connected to the given VLAN. (You can also choose to display the **First Seen** data column, which is the timestamp of the moment when the end host was first detected by NetMRI as a host connected to its current LAN switch interface.)
- **Device Name**: The LAN switching device to which the host is currently associated (live link to the Device Viewer).
- **Interface**: The LAN switched interface to which the end host connects (live link to the Interface Viewer).
• If Oper Status: The LAN switched interface’s operating status (live link to the Interface Viewer).
• VLAN Name: The active VLAN to which the end host is currently bound (live link to the VLAN Viewer).

Using the VLAN Viewer

The VLAN Viewer is a pop-up browser window that provides table rows listing several basic characteristics of a selected virtual LAN interface, including all switches that terminate the VLAN.

Most of the key information about a VLAN appears in the top section of the Viewer, including the Root Bridge, the root bridge priority and ID, and its configured Max Age, Hello Time and Bridge FWD Delay values.

Important table data columns include the Priority field, the Bridge Address, and a Timers field showing the status of spanning tree timers for VLAN switching.

Note: See Viewing Active VLANs and VLAN Configuration for more details about VLAN settings displayed in the Device Viewer and the VLAN Viewer.

Changing Advanced SPM Settings

Switch Port Management provides for a set period of days after an SPM port is free and unused before it is specifically defined as Available. When a port is first disconnected from all other devices, it is in a Down link state, and appears in the Free category. After a certain time period elapses (the duration of which is based on the business policies of the IT department), the port is counted against the Available category and removed from the Free category, because its link state has been down for longer than the specified time period.

Note: For Switch Port Management, the default transition time between an SPM port’s Free status and its change to Available is 14 days.

The ARP Cache Refresh Period defines the time period between ARP refreshes by NetMRI across all switch ports. Before any other switchport polling operations take place (including device group or global polling operations initiated by the NetMRI user), another ARP refresh is carried out by the appliance regardless of the time interval. To modify advanced SPM settings, do the following:

1. Go to Settings icon -> General Settings –> Advanced Settings.
2. Under the Switch Port Management category –> Free to Available Ports option, click Edit to change the amount of time, in days, a port must remain Free before it becomes administratively Available for new connectivity.
3. Under the Switch Port Management category –> ARP Cache Refresh Period option, click Edit to change the time in seconds between ARP refreshes on switch ports managed by the appliance. The default is 300 seconds, because switch forwarding tables are frequently purged from LAN switching devices. The default on Cisco switches is five minutes/300 seconds. NetMRI primarily uses ARP Cache refreshes to improve the accuracy of end-device discovery. Without this feature, some endpoints may not be discovered and cataloged.
4. The ARP Cache Refresh Ignore Discovery Ranges Advanced Setting helps to optimize the discovery of end hosts by disabling pinging of any devices outside of specified discovery ranges. By default, this feature is set to False, which means that devices outside the configured discovery ranges may be pinged by NetMRI. Set this value to True to restrict pinging to end hosts within defined IP ranges.
5. Switch Port Management can use the ARP Cache Refresh Device History to allow pinging of devices listed in older tables compiled from previous polling days, prior to the most recently compiled End Host data tables. The default value is 14 days and the minimum value is one day.
6. Click OK when finished.

For the Free to Available Ports value, the new setting is reflected as the hyperlink in the Available Ports and Available Ports % counters in the Capacity Summary – Ports pane under Switch Port Management.

Notes on ARP, Switch Data Collection, and End Hosts

NetMRI uses ARP cache refresh to control LAN switches from which switch-forwarding data is collected. When ARP cache refresh is enabled for a LAN switch, before further collection of switch-forwarding data, NetMRI pings all known IP addresses known to exist as members of the device's switch-forwarding table, by relaying previously gathered switch-forwarding data MAC addresses to determine their IP addresses. Because this requires a prior SPM poll, the first poll of any switch by SPM after the device is added to the license will not perform an ARP cache refresh.

For subsequent polling events, NetMRI performs ARP cache refresh by sending a UDP packet on Port 80 to each IP address in the switch's forwarding table, without waiting for return messages. This has the effect of re-populating the switches’ forwarding table. NetMRI sends nothing to the switches themselves, the refresh is performed against all the end hosts and other devices connected to each LAN or distribution switch.

The appliance also tracks the time period required to collect switch-forwarding data and compare the result to the last ARP refresh. Once a timeout period is exceeded, NetMRI will re-perform the refresh on the switch, and repeat as necessary as data is collected from the device.

The appliance automatically performs an ARP cache refresh immediately before a new switch port polling session.