



Cisco UCS Performance Manager User Guide

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Contents

About this guide.....	4
Chapter 1: Introduction.....	5
Dashboard.....	7
Events.....	12
Infrastructure.....	14
Reports.....	28
Chapter 2: Understanding performance and capacity utilization.....	29
Working with service profiles.....	29
Viewing VMware farm storage and compute utilization.....	30
Viewing Hyper-V performance.....	31
Viewing OS performance.....	32
Detecting high utilization resources.....	33
Finding the server with highest utilization.....	34
Determining chassis capacity utilization.....	34
Determining blade server capacity utilization.....	36
Finding congestion between a fabric extender and a rack server.....	37
Exploring domain port channel capacity utilization.....	39
Determining virtual adapter capacity utilization.....	41
Exploring fabric interconnect congestion.....	41
Exploring fabric utilization and capacity.....	43
Chapter 3: Monitoring network and storage performance and utilization.....	46
Monitoring and correcting network congestion.....	46
Reviewing storage utilization and capacity.....	49
Chapter 4: Working with capacity projections and finding available capacity.....	56
Viewing projected bandwidth exhaustion dates.....	56
Finding remaining capacity for components.....	57
Finding remaining capacity for an aggregation pool.....	58
Creating a predictive threshold.....	59
Adding a trend line to a graph.....	61

About this guide

Cisco UCS Performance Manager User Guide provides detailed instructions for performing basic tasks using

- Cisco UCS Performance Manager Express
- Cisco UCS Performance Manager

Related publications

Title	Description
<i>Cisco UCS Performance Manager Planning Guide</i>	Provides general and specific information for preparing to deploy Cisco UCS Performance Manager.
<i>Cisco UCS Performance Manager Installation Guide</i>	Provides detailed information and procedures for installing Cisco UCS Performance Manager.
<i>Cisco UCS Performance Manager Upgrade Guide</i>	Provides detailed procedures for upgrading your existing Cisco UCS Performance Manager 2.x instance to a newer version.
<i>Cisco UCS Performance Manager Migration Guide</i>	Provides detailed information about, and where applicable, procedures for migrating data from Cisco UCS Performance Manager version 1.x into a version 2.x instance.
<i>Cisco UCS Performance Manager Getting Started Guide</i>	Provides instructions for configuring Cisco UCS Performance Manager to monitor your environment after installation.
<i>Cisco UCS Performance Manager User Guide</i>	Provides specific instructions for using Cisco UCS Performance Manager in the UCS environment.
<i>Cisco UCS Performance Manager Administration Guide</i>	Provides an overview of Cisco UCS Performance Manager architecture and features, as well as procedures and examples to help you use the system.
<i>Cisco UCS Performance Manager Release Notes</i>	Describes known issues, fixed issues, and late-breaking information not already provided in the published documentation set.

Documentation feedback

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Introduction

Cisco UCS Performance Manager helps you visualize and monitor your Cisco UCS infrastructure. The product alerts you to current problems and future potential problems for physical and logical components, network interconnections, and network performance, including

- Unified fabric connections between individual components, including upstream dependencies
- Bandwidth utilization and remaining capacity between various levels of infrastructure hierarchy
- Physical ports topology
- Aggregation pools (port channels)
- Service profiles
- Organizations
- IO modules
- Fabric extenders
- Chassis
- Blade and rack servers

The extensive amount of data that Cisco UCS Performance Manager collects and organizes helps you identify and diagnose different conditions across your infrastructure and enhances your ability to explore potential solutions. These conditions include

- Over-subscription of resources
- Under-performing components
- Out-of-balance port channel components
- Connection issues
- Overload conditions
- Sources of congestion
- Component misconfiguration
- Failing or inappropriately provisioned components

The web-based browser interface provides a wide array of viewpoints, graphs, and reports enable you to quickly assess the overall health of your entire infrastructure. When necessary, you can drill down to specific components that require attention. For example, the **Dashboard**, **Topology**, and **Dynamic View** are some of the views that provide a high-level summary and status of your infrastructure.

Most pages and views contain color-coded indicators and number counts based on system events. These indicators provide "at-a-glance" information of overall status. The color of the event notification levels indicate relative severity as follows:

- Red - Critical
- Orange - Error
- Yellow - Warning
- Blue - Info

The following examples show status indicators in the left pane **Devices** navigation tree and the right pane **Device** table.

Figure 1: Devices navigation tree with status indicators

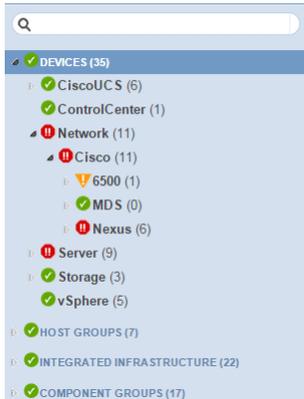


Figure 2: Device table with status indicators

The screenshot shows a table titled "Devices" with a toolbar at the top containing 12 critical (red), 53 error (orange), and 147 warning (yellow) indicators. The table has columns for Device, IP Address, Device Class, Production State, and Events. A context menu is open over the "Device" column, showing options for sorting and columns.

Device	IP Address	Device Class	Production State	Events
ucs2		/CiscoUCS/UCS-Ma...	Production	1 (Critical)
ucs1-rs1-3		/Storage/EMC/VNX	Production	
ucs1	10.87.208.163	/CiscoUCS/UCS-Ma...	Production	1 (Critical)
netapp-2552.zenoss.loc	10.87.209.91	/Storage/NetApp/C...	Production	1 (Error)
aus-ucs7	10.87.207.94	/CiscoUCS/UCS-Ma...	Production	1 (Critical)
aus-ucs6	10.87.207.93	/CiscoUCS/UCS-Ma...	Production	1 (Critical)
aus-ucs5	10.87.207.92	/CiscoUCS/UCS-Ma...	Production	1 (Critical)
aus-ucs3	10.87.207.90	/CiscoUCS/UCS-Ma...	Production	1 (Critical)
aus-ucs2	10.87.207.89	/CiscoUCS/UCS-Ma...	Production	107 (Warning)
aus-ucs1	10.87.207.88	/CiscoUCS/UCS-Ma...	Production	1 (Critical)
10.88.121.20	10.88.121.20	/Storage/NetApp/C...	Production	1 (Critical)
10.87.209.245	10.87.209.245	/CiscoUCS/UCS-Ce...	Production	4 (Critical)

For every component of your infrastructure, whether physical or logical, tabular and graphical information is available to help you analyze performance and utilization. The information varies by component, but typically includes utilization and capacity information, and might also include projected exhaustion dates and usage trend lines.

In data tables such as the **Device** table, you can sort a column from highest to lowest or vice versa. You can add, remove, and rearrange columns. Using filter fields you can narrow the displayed results; For example, you could search for device names that begin with "ucs".

Out-of-the-box reports provide current and historical utilization and performance information in tabular and graphical format. You can refine the content of a report and customize the reported data by using the report configuration options.

This chapter provides a brief introduction to some of the Cisco UCS Performance Manager views, graphs, and reports. For more information, refer to the *Cisco UCS Performance Manager Administration Guide*.

Dashboard

When you log into Cisco UCS Performance Manager, the Dashboard is your initial view. The Dashboard contains individual portlets that provide a quick view into specific areas of your infrastructure. Initially, it contains several default portlets, however it is highly customizable. You can add or remove portlets at any time using the dashboard and portlet controls. You can switch between **Dashboards** by using the drop-down menu. **Dashboards** are specific to individual users, so each user can define one or more customized **Dashboards**.

Figure 3: Dashboard



The following portlets show information specific to Cisco UCS integrated infrastructure:

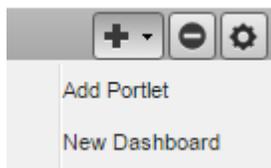
- Domain Overview
- Fabric Extender Capacity
- Integrated Infrastructure
- Service Profile
- UCS Inventory
- Welcome to UCS PM

You can see the full list of available portlets when you add a new portlet to the Dashboard.

Adding a portlet to the Dashboard

- 1 In the upper, right corner of the **Dashboard**, click + > **Add Portlet**.
The **Add Portlet** dialog box appears.

Figure 4: Add Portlet



- 2 In the **Add Portlet** dialog box, click the drop-down menu and select the portlet.
The **Add Portlet** dialog box displays the default settings and a preview of the portlet.
- 3 Modify the portlet configuration options.
- 4 Click **Add**.
The portlet is added to the **Dashboard**.
- 5 To move the portlet to a different area of the **Dashboard**, drag and drop it to a new location.

For more information about customizing and creating **Dashboards**, refer the *Cisco UCS Performance Manager Administration Guide*.

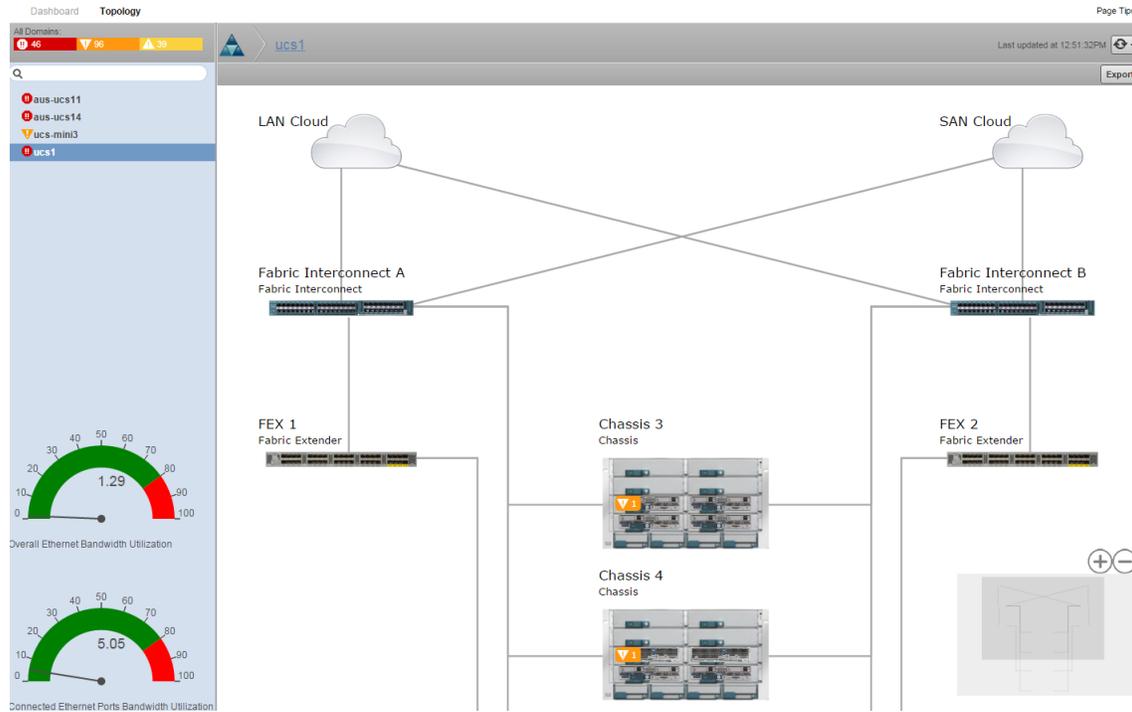
Topology view

The Topology view provides a high-level, architectural view of UCS domains and their physical network connections.

You can launch the Topology view in the following ways:

- Navigate to the Dashboard and in the upper left corner, click **Topology**.
- Navigate to **Infrastructure > Devices**, in the right pane, select a device, and in the left-side navigation panel, click **Topology**.

Figure 5: Topology view



The lower left corner shows overall bandwidth and port utilization in the gauges. The view also shows event information as follows:

- for all domains (upper left corner)
- for individual domains that are listed in the **Device** panel
- by component

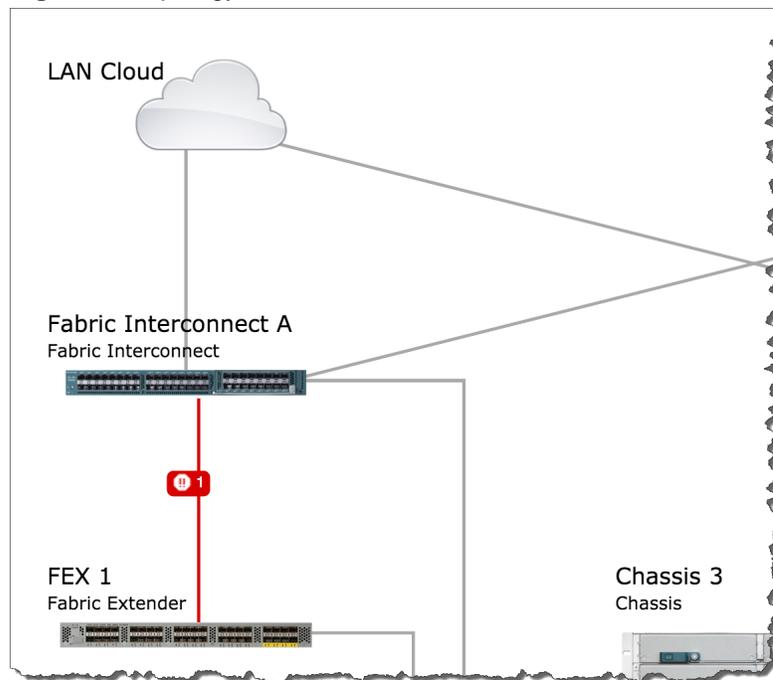
For example, you can view the networked components from fabric interconnects southbound to a chassis, fabric extenders, and rack servers. Northbound of the fabric interconnects you can see the LAN and SAN clouds.

To work with the **Topology** view:

- To see additional information for an item, click the network connection, component, or event notification icon.
- To move around the diagram, use the **mini-map** in the lower, right corner.
- To zoom in or out, click the +/- controls.
- To go the event console, in the upper left corner, click the **All Domains** event bar.

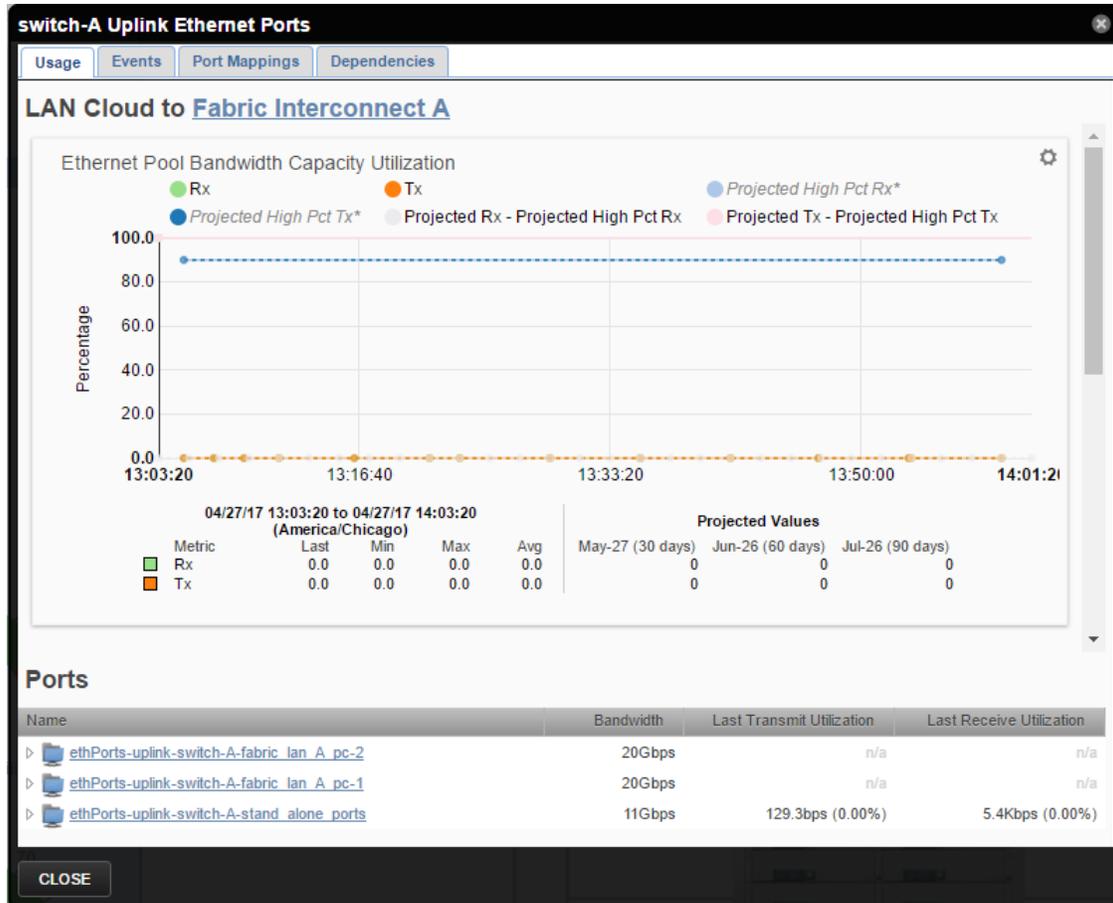
Topology-level status

In the **Topology** view, status indicators include color-coded network connection lines between components. For example, a red connection line between two components indicates that a critical event has occurred on that connection. A colored event icon beside a component indicates that an event has occurred on that component.

Figure 6: Topology view: critical event connection

To view additional information about the component or the connection between the components, click an object or connection. For example, click a connection line between a LAN uplink and the fabric interconnect component to display information about usage, events, port mappings, and the dependencies of the fabric interconnect. The projected values show the projected bandwidth usage over the next 30, 60, and 90 days.

Figure 7: Ethernet Ports dialog box



Exploring uplink connectivity in Topology view

Using the **Topology** view, you can explore the uplinks from a fabric interconnect and quickly get detailed information about the physical connections down to the slot and port numbers. Use the information when you are troubleshooting poorly performing network connections.

To view network uplinks ports from a fabric interconnect to a LAN cloud:

- 1 Click **Dashboard > Topology**.
The topology for the first UCS domain appears.
- 2 Click a network connection line between a fabric interconnect device and the LAN cloud. (If you have an Express license, click a different network connection line.)
A window for the connection appears with tabs for **Usage**, **Events**, **Port Mappings**, and **Dependencies**.
- 3 Click **Port Mappings**.
All physical port connections for this network link are displayed.

Figure 8:Fabric Interconnect Uplink Port Mappings



In this example, the **Port A** column shows the fabric interconnect network uplink ports and **Port B** shows the LAN switches and ports to which the uplink connects.

These port mappings are discovered by correlating Cisco Discovery Protocol (CDP) information from the LAN switches with the UCS identity discovered from UCS Manager.

Events

Use the **Event Console** to view all system-wide events, such as device faults, status events, and performance threshold events.

Access the **Event Console** in any of the following ways:

- In the top-level navigation bar, click **Events**.
- From a specific device or component page, in the left pane, click **Events**.
- Click a visual event notification, such as an "event rainbow":



Figure 9: Event Console

Status	Severity	Resource	Component	Event Class	Summary	First Seen	Last Seen	Count
		0850d895...	zenjobs	/App/Job/E...	Job "Discover and model device qa-centos-7-ssh.zenoss.lab as /Serv...	04/26/17 08:42:49	04/26/17 08:42:49	1
		10.87.209...	test1	/CiscoUCS...	Service profile test1 configuration failed due to insufficient-resource...	04/27/17 13:28:46	04/27/17 13:28:46	25368
		10.87.209...	UCSPE-10...	/CiscoUCS...	Grace period for UCS Domain UCSPE-10-87-207-151 registered with U...	02/07/17 07:23:29	02/07/17 07:23:29	3
		10.87.209...	UCSPE-10...	/CiscoUCS...	Grace period for UCS Domain UCSPE-10-87-208-11 registered with U...	02/07/17 07:23:29	02/07/17 07:23:29	3
		10.87.209...	sys/license...	/CiscoUCS...	Grace period for feature UCS_CENTRAL_DOMAIN_REGN_PKG on U...	02/07/17 07:23:29	02/07/17 07:23:29	3
		10.87.209...	test1	/CiscoUCS...	[FSM:FAILED]: Configuring Service Profile test1(FSM:sam:dme:LsSe...	11/29/16 11:28:14	11/29/16 11:28:14	1
		10.87.209...	UCSPE-10...	/CiscoUCS...	Managed endpoint (pcm, 10.87.208.11, ::) lost connectivity	03/21/16 13:42:40	03/21/16 13:42:40	1
		af28f4982...		/Unknown ...	Error removing ZenPack ZenPacks.zenoss.ZPLTest1	04/26/17 15:27:20	04/26/17 15:27:20	1
		aus-ucs2...	Rack Serve...	/Change/S...	operational state is inaccessible	04/26/17 07:11:43	04/27/17 14:07:04	14
		aus-ucs2...	Rack Serve...	/Change/S...	operational state is inaccessible	04/26/17 07:11:43	04/27/17 14:07:04	14
		aus-ucs2...	Blade Serv...	/Change/S...	operational state is compute-mismatch	04/26/17 07:11:43	04/27/17 14:07:04	14
		aus-ucs2...	Blade Serv...	/Change/S...	operational state is compute-mismatch	04/26/17 07:11:43	04/27/17 14:07:04	14
		aus-ucs2...	Blade Serv...	/Change/S...	operational state is compute-mismatch	04/26/17 07:11:43	04/27/17 14:07:04	14

Note After adding your UCS infrastructure to Cisco UCS Performance Manager, a high number of threshold-related events might be displayed in the **Event Console**. These events can be caused by a UCS configuration that does not align well with the default threshold values for Cisco UCS Performance Manager.

You can adjust these thresholds to make your UCS environment easier to view and understand. For more information about threshold, refer to the *Cisco UCS Performance Manager Administration Guide*.

Working with the Event Console

The **Event Console** provides controls that enable you to perform common tasks related to events.

Follow these tips to work with the events table:

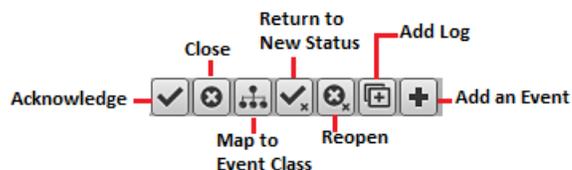
- To view event details, double-click an event row (not the hyperlinks for Resource, Component, or Event Class).
- To select multiple events, use Control-click, Shift-click, or **Select > All**.
- To change the sort order, click a column heading or enter a value in a filter text box beneath a column heading:
 - Enter any full string or a subset of a string, optionally with the wildcard (*) contained in the values in that column.
 - Use "||" (OR), or "!!" (NOT) expressions to further target your filters. For example, type `!!status` in the **Event Class** filter to return all non-status class events.
- Click the date selection tool in the **First Seen** and **Last Seen** columns.
- Enter a value to match the **Count** column, as follows:
 - N — Displays events with a count equal to N.
 - :N — Displays events with a count less than or equal to N.
 - M:N — Displays events with a count between M and N (inclusive).
 - M: — Displays events with a count greater than or equal to M.
- To clear filters, select **Configure > Clear filters**.
- To rearrange the column order, drag a column heading to a new location.
- To manually refresh the events or choose a new refresh cycle, click **Refresh**.
- To save the displayed information in CSV or XML format, click **Export**.
- To customize the events table, use the **Configure** menu options.
- To perform administrative operations on the selected resource rows, use the **Actions** and **Commands** menu options.

For information about using the **Event Archive**, **Event Classes**, and **Triggers** pages, refer to the *Cisco UCS Performance Manager Administration Guide*.

Using the Event Console toolbar

To assist you in managing events in the **Event Console**, the toolbar provides the following functions:

Figure 10: Event Console toolbar



To perform the following actions, click an event and then click the corresponding toolbar button:

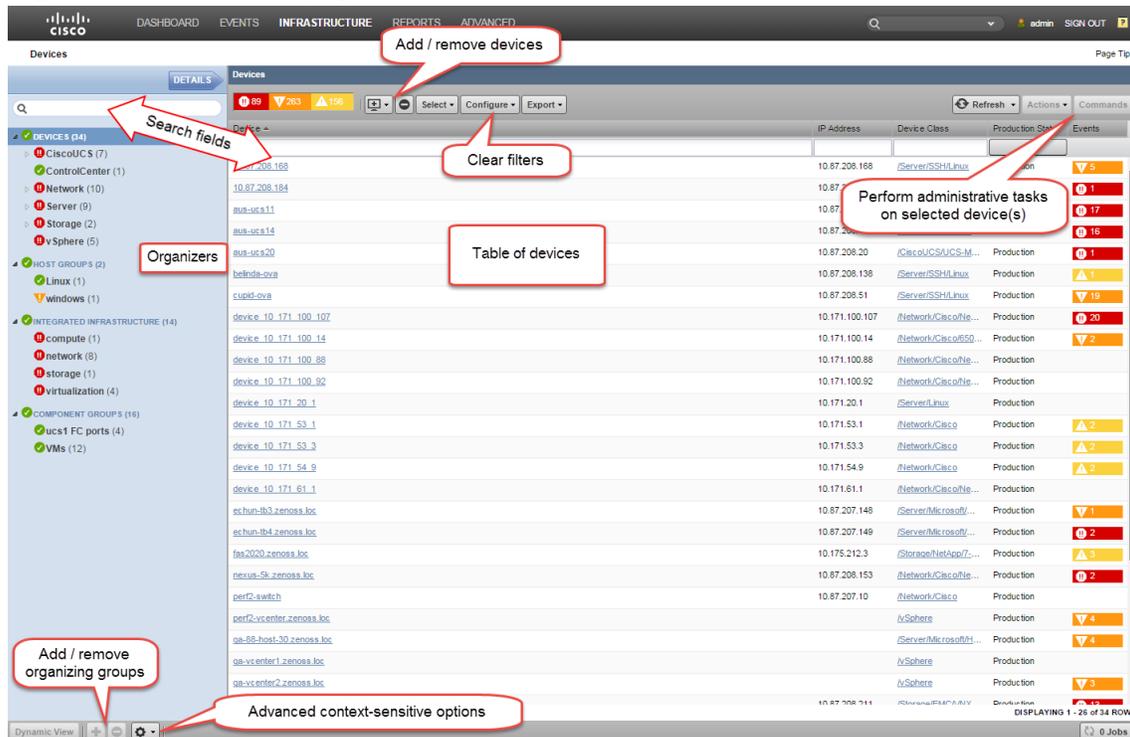
- Acknowledge an event.
- Close an event (move it to history).

- Map (associate) an event to a specific event class.
- Change an event's status to New (revoke its Acknowledged status).
- Add a log note to an event.
- Add (create) a simulated event so that you can test a specific condition.

Infrastructure

The **Infrastructure** page provides controls and menus that help you find, view, and manage devices. The following figure highlights these tools. To navigate to the **Infrastructure** page, in the top navigation bar, click **Infrastructure**.

Figure 11: Infrastructure page



Review the following terminology that is related to the **Infrastructure** page:

- *Device* — Primary monitoring object in the system. Generally, a device is the combination of hardware and an operating system.
- *Device class* — Special type of organizer that is used to manage how the system models and monitors devices through the use of monitoring templates.
- *Component* — Object contained by a device. Components include interfaces, OS processes, file systems, CPUs, and hard drives.
- *Integrated infrastructure* — A bundle of compute, storage, networking, and virtualization components. Most integrated infrastructures are bought as one from a vendor:
 - NetApp FlexPod
 - VCE Vblock
 - EMC VSPEX

These infrastructures have UCS as the common compute element, Nexus as networking components, and VMware as virtualization.

- *Managed resource, resource* — Servers, networks, virtual machines, and other devices in the IT environment.

To work with multiple devices, select one or more rows in the table (without clicking a device name or device class hyperlink). If you click a hyperlink, the corresponding page is displayed. To return to the previous page, click your browser's back button or **Infrastructure**.

To work with a single device, click the device's hyperlink name. The device's overview page provides additional information about the device and access to views, graphs, and the device's individual components.

Exploring the IT infrastructure

The left pane of the **Infrastructure** page, the **Devices** panel, provides access to the following device classes and organizing groups:

- **Devices**
- **Host Groups**
- **Integrated Infrastructure**
- **Component Groups**

In the **Devices** panel, you can drill down in a device class or group to quickly locate a specific device, a group of common devices or components, or a bundled infrastructure group. To perform the same actions, enter a text string in the search field at the top of the **Devices** panel or any of the search fields that are located beneath a column heading.

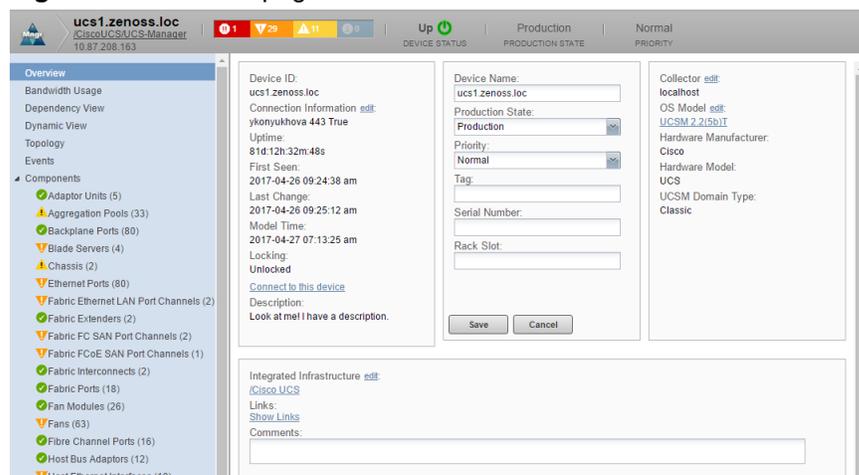
Host Groups, Integrated Infrastructure, and Component Groups help you manage your infrastructure in logical groupings that make sense for your organization.

For more information, see to [Working with host groups](#), [Working with integrated infrastructure](#), and [Creating component groups](#) on page 27

Working with devices and components

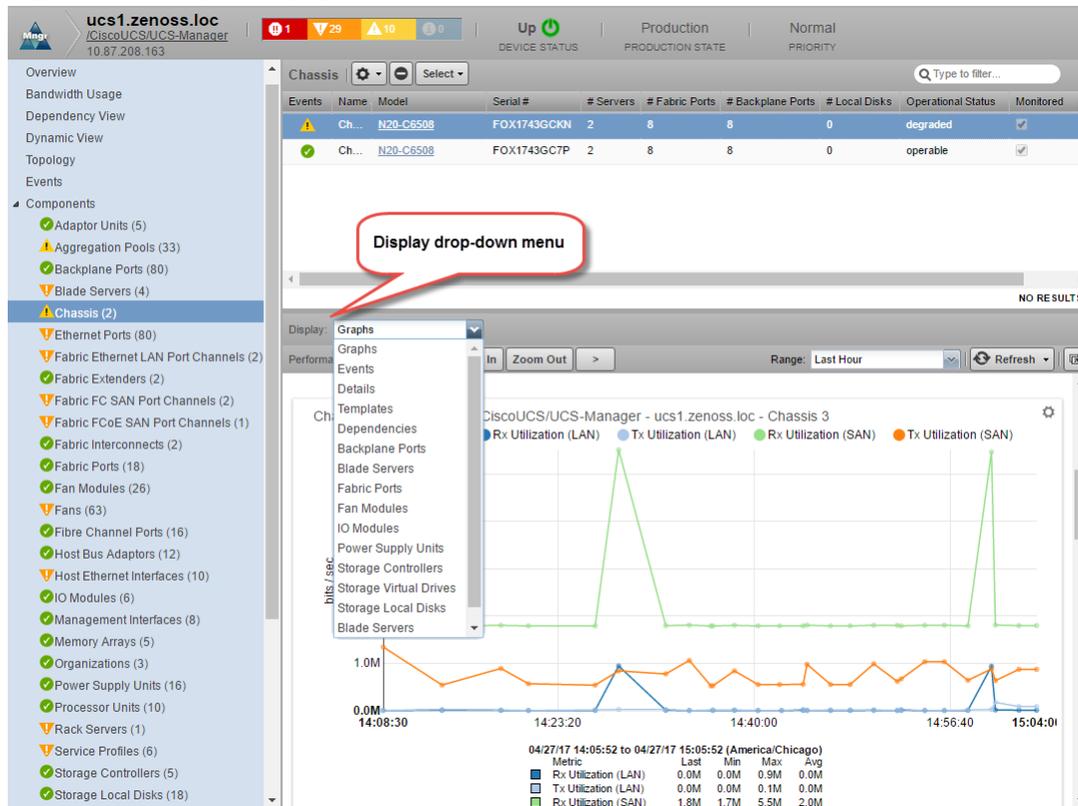
From working with a device, you can drill down to work with a component. Use the **Overview** page and the **Component** page.

Figure 12: Overview page



A device's **Overview** page provides access to different views of the device, **Events**, an expanded list of components, graphs, component graphs, custom properties, device administration, and monitoring templates. The overview pane on the right provides device details; some fields are editable.

Figure 13: Component page



The **Component** page provides multiple panes and graphs. At the top is a list of the components of the type that you choose. The lower portion of the page displays graphs for the component that you choose in the upper portion of the page. If graphs are not available for the component, **No Graph Data** appears.

Perform the following steps to

- Get detailed information about a specific device.
- Access different views for a device, such as the **Bandwidth Usage**, **Dependency View**, and other related views.
- Access the components of a device.
- Get detailed information about a component.

- 1 Navigate to the **Infrastructure** page.
- 2 On the right, under **Device**, click a device's hyperlink name.
The devices' overview page appears.
- 3 In the left pane, select a view, for example **Dynamic View**.
The right pane is refreshed with the **Dynamic View** for this device. The left pane continues to display navigation options for changing the current view, selecting a component, or choosing another option.
- 4 In the left pane, choose a component, such as logical volumes.
The component page appears. Depending on the chosen component, the page displays a list of components and graphs.
- 5 To change the information on the lower half of the page, from the **Display** drop-down menu, choose an option, such as **Details**.

Drilling into device infrastructure

To understand how to drill down into device infrastructure, review the following example. In this example, you drill down and follow usage from a fabric interconnect back to the server.

- 1 Navigate to the **Infrastructure** page.
- 2 In the left pane, choose **Devices > CiscoUCS > UCS Manager**.
- 3 In the right pane, click a device hyperlink.
The device's overview page appears.
- 4 In the left pane, choose **Fabric Interconnects**.
For the first fabric interconnect in the table, general information and performance graphs are displayed.
- 5 To see usage and performance information, scroll through the **Performance Graphs**.
- 6 From the **Display** drop-down menu, choose **Component Bandwidth Capacity**.
The average and maximum Rx and Tx for connected components, such as rack servers, fabric extenders, and chassis, are displayed.

Maximum utilization is calculated over the last hour. For example, a graph that covers the past six hours reports maximum utilization for the last hour of that period. Aggregation does not occur.

Figure 14: Component Bandwidth Capacity table

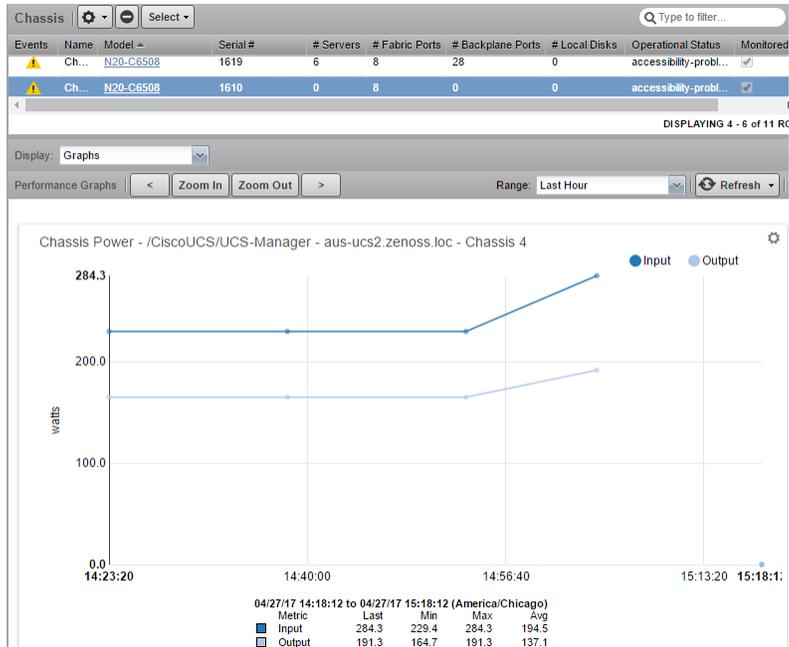
Events	Name	Distinguished Name	Type	Avg Util Rx	Avg Util Tx	Max Util Rx	Max Util Tx
✓	Rack Server 2	sys/rack-unit-2	Rack Server	6Kbps	537bps	7Kbps	8Kbps
✓	FEX 1	sys/fex-1	Fabric Extender	124Kbps (0.00%)	954Kbps (0.01%)	261Kbps (0.00%)	1Mbps (0.01%)
✓	Chassis 3	sys/chassis-3	Chassis	9Gbps (11.61%)	12Gbps (15.60%)	10Gbps (12.66%)	14Gbps (16.98%)
✓	Chassis 4	sys/chassis-4	Chassis	7Gbps (9.13%)	4Gbps (5.21%)	8Gbps (10.19%)	5Gbps (5.86%)

- 7 To see historical usage, change the **Range** to **Last Hour**, **Day**, or **Week**.

Figure 15: Range drop-down menu

Range:		Type to filter...	
Last Hour			
Last Day			
Last Week			
6Kbps	7Kbps	8Kbps	
9Gbps (11.61%)	12Gbps (15.60%)	10Gbps (12.66%)	14Gbps (16.98%)
7Gbps (9.13%)	4Gbps (5.21%)	8Gbps (10.19%)	5Gbps (5.86%)
124Kbps (0.00%)	954Kbps (0.01%)	261Kbps (0.00%)	1Mbps (0.01%)

- 8 With the component bandwidth capacity table still displayed, to see utilization and capacity graphs, click the name of a chassis.
Chassis information and the usage and performance graphs appear.

Figure 16: Chassis table and graphs

- 9 To see the busiest servers, click **Display > Blade Server Capacity**. The blade servers for the selected chassis appear.
- 10 To view the blade server performance and utilization graphs, click the name of a blade. The blade servers table and graphs are displayed.
- 11 To view service profile information, choose **Display > Service Profile Capacity**. The *service profile* defines a single server and its storage and networking characteristics. Displayed are the average and maximum utilization for Rx and Tx; the manufacturer and model; number of CPUs, threads, and ports; operational status; and whether the server is monitored or locked.

Working with graphs

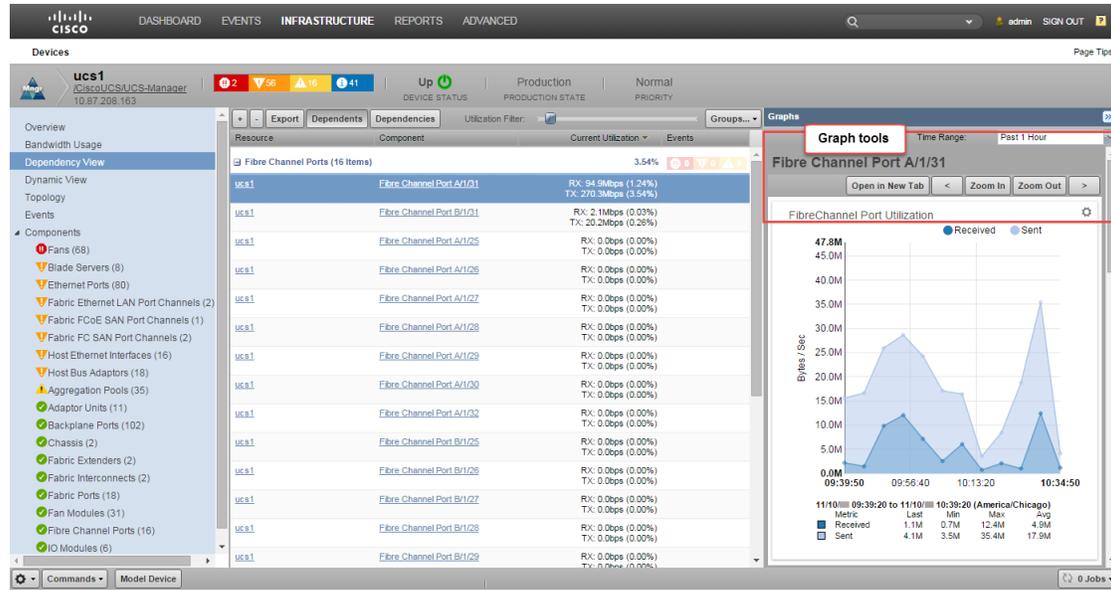
Cisco UCS Performance Manager provides graphs for devices and components. The content of a graph depends on the selected device or component, and typically contains the data points for the managed resource. When viewing a component graph, you can show individual data points or all data points simultaneously. For certain graphs, you can view projected exhaustion dates and trend lines.

To view device and component graphs:

- 1 Navigate to the **Infrastructure** page.
- 2 Choose a device, and in the left pane, click **Graphs**.
- 3 To view component graphs, in the left pane, click **Component Graphs**.

Alternatively, from a device overview page, in the left pane, click **Dependency View**, and then choose a table row.

Figure 17: Component graph available in the Dependency View

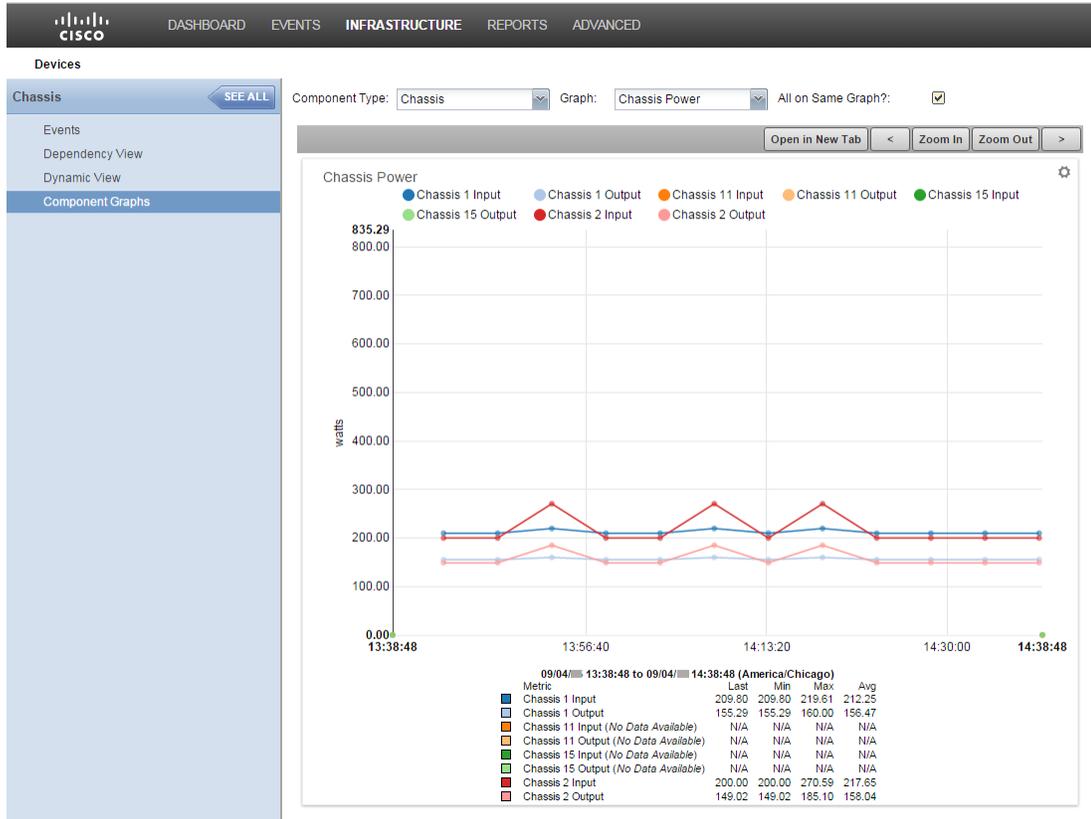


Use the graph tools, labeled in the preceding figure, as follows:

- To move the graph view forward or back in time, click \lt/\gt .
- To narrow or expand the time range that a graph displays, click **Zoom In / Zoom Out**.
- To select a predefined time range, click **Range**.
- To enter a specific start and end date, choose **Custom**.
- To highlight a particular data set, hover over a legend description. You can also click on a legend description to toggle its display. A solid dot indicates data will be displayed. A hollow dot indicates data will be hidden.
- To view all data points on the graph at the same time for component graphs, click **All on Same Graph**.

In the following example, all chassis in a component group appear on the same graph. To see individual graphs for each component, clear **All on Same Graph**.

Figure 18: Component graph



- If the graph contains **Projections** in the lower right corner, hover over the information icon to see projected exhaustion dates.
- Choose options from the Action menu (gear) to
 - View the graph definition.
 - Export the graph to a CSV file.
 - Get an HTML link to the graph.
 - Expand the graph in a new standalone window.

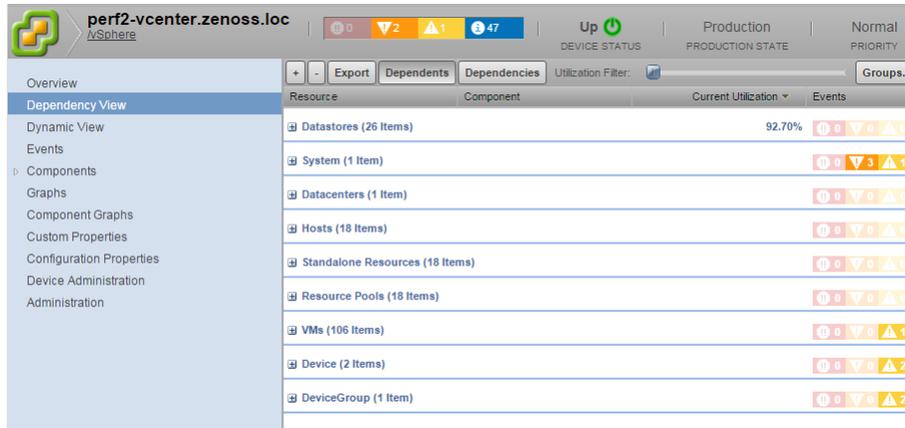
For more information about using graphs, see [Working with capacity projections and finding available capacity](#) on page 56 and [Adding a trend line to a graph](#) on page 61.

Viewing resource dependencies

The **Dependency View** shows the resources that are dependent on a device and the resources on which the device depends.

The following figure shows a sample **Dependency View**.

Figure 19: Dependency View



Accessing the Dependency View

From the **Infrastructure** page **Devices** panel, you can access the view in several ways and use the same functionality.

- Choose a device to display the device overview page, and then take one of the following actions:
 - Click **Dependency View**.
 - Expand **Components**, select a component, and then, from the **Display** drop-down list, select **Dependencies**.
- Under **Host Groups**, **Integrated Infrastructure**, or **Component Groups**, click an object. At the top of the pane, click **Details**, and then click **Dependency View**.

Working with the Dependency View

- To expand or collapse the contents of a group, click + or -.
- To save a copy of the information, click **Export**.
- To toggle the view between resources that depend on the component to resources on which the device depends, click **Dependents** or **Dependencies**.

If a resource has no dependents, a message appears.

- To show components that are greater than or equal to a certain utilization percentage, use the **Utilization Filter**. The default setting is 0%, which shows all dependents. Moving the slider to the right increases the utilization percentage. As you move the slider, a tooltip displays the current percentage and the list of dependents changes.

Components that have open events are automatically displayed regardless of the **Utilization Filter** setting.

- To change the list of displayed groups, click **Groups**. Unchecked groups are not displayed. To add a group back to the table, check the group name.

Viewing infrastructure hierarchy and resource relationships

The **Dynamic View** displays an architectural overview of your infrastructure and relationships to other resources. Event information for each object is shown in the infrastructure hierarchy.

The **Dynamic View** is available for

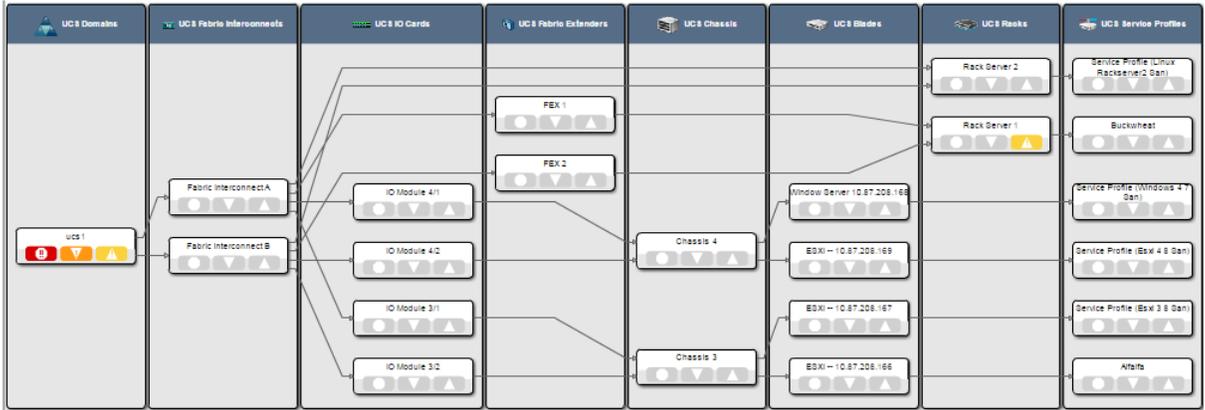
- Server devices (registered OS)
- Integrated infrastructure
- Host groups, which include a dynamic view for vSphere

To access the **Dynamic View**:

- 1 Navigate to the **Infrastructure** page.
- 2 Select a device, integrated infrastructure, or host group.
- 3 In the left pane, click **Dynamic View**.

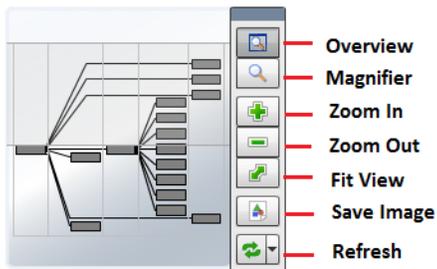
The following figure shows the **Dynamic View**.

Figure 20: Dynamic View



- 4 To change the perspective, save the image, or refresh the image, use the controls in the upper right corner.

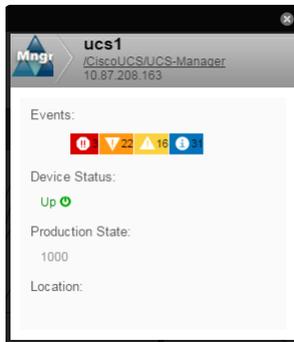
Figure 21: Dynamic View controls



- 5 To access the **Inspector**, click an object.

The **Inspector** displays object events, device status, production station, and location.

Figure 22: Inspector



Viewing bandwidth usage and projections

The **Bandwidth Usage View** shows usage information and projected exhaustion date ranges for the following metrics:

- Average Rx, Average Tx
- Maximum Rx, Maximum Tx
- Average LAN Tx, Maximum LAN Tx
- Average Storage Tx, Maximum Storage Tx
- Projected Tx Date, Projected Rx Date (The number of days before the maximum capacity will be reached.)

To access and work with the **Bandwidth Usage View**:

- 1 Navigate to the **Infrastructure** page.
- 2 Select a device to display the device's overview page.
- 3 In the left pane, click **Bandwidth Usage**.

Figure 23: Bandwidth Usage View with graphs expanded

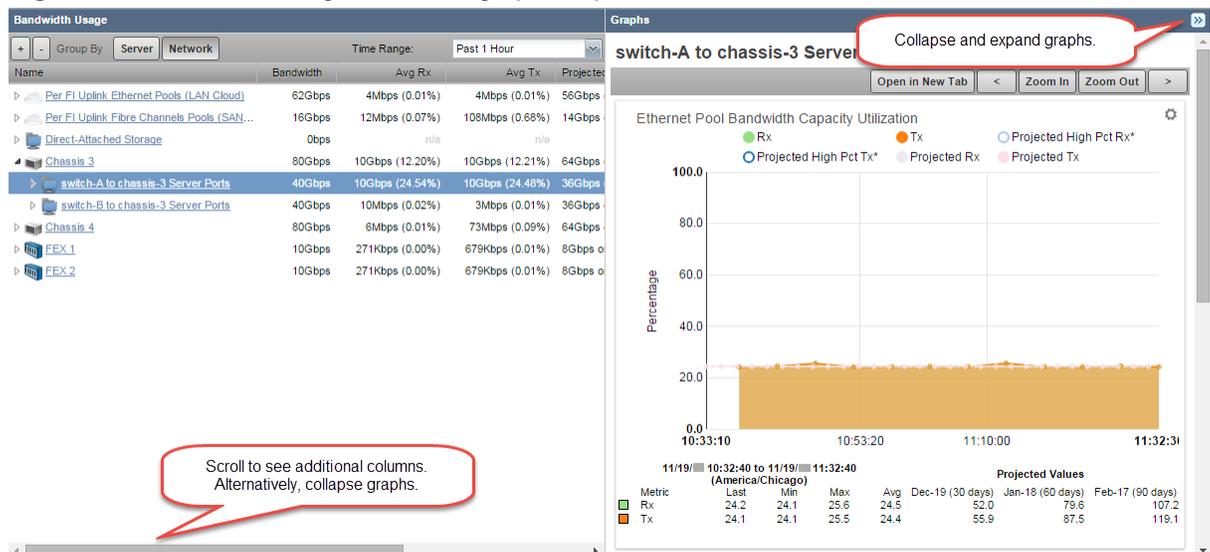
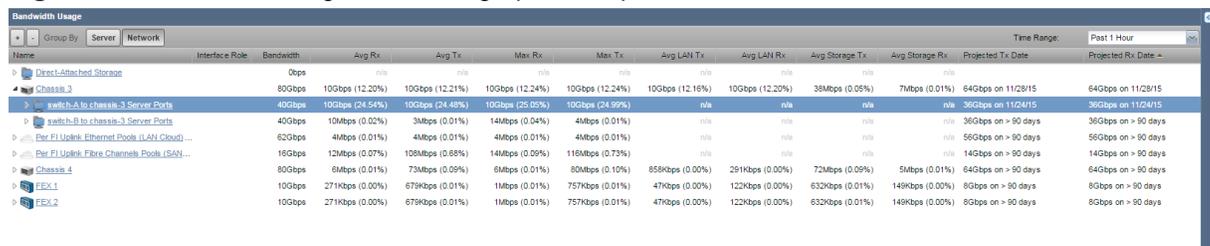


Figure 24: Bandwidth Usage View with graphs collapsed



To work with the **Bandwidth Usage View**:

- To see server devices and components, click **Server**.
- To see network devices and components, click **Network**.
- To drill down into lower-level infrastructure, click the expand/collapse arrows to the right of the resource name.

Note The aggregation pool values (such as the top level chassis/fex) are calculated at an interval of 10 minutes, which might result in some variance compared to the sum of the values of the underlying parts.

- To view additional columns, slide the horizontal scroll bar to the right.
- To hide or show graphs, click the collapse/expand button in the upper right corner of the graph.
- To customize the column headings in the table, click the down arrow to the right of any column heading, and then select **Columns**.
- To select the past hour, past six hours, or the past day, click the **Time Range** drop-down menu.

To work with graphs:

- To highlight information in a graph, hover over a data source at the top of the graph.
- To toggle information on and off in a graph, click a data source at the top of the graph.
- To see information for a specific point in time, hover over the graph.
- For a larger view, pop out the graph in a new tab.
- To change the graph's time line, click **Zoom in**, **Zoom Out**, **<**, and **>**.

Organizing your monitored infrastructure

IT administrators are typically responsible for the administration and management of hundreds, or even thousands, of monitored devices. In addition, each monitored device might contain hundreds of individual components, which must also be monitored. Tracking events and overall status for every resource can quickly become overwhelming.

To ease the task of monitoring large numbers of devices and components, Cisco UCS Performance Manager provides a holistic view into the health and status of monitored devices by using the following organizational containers. These containers (groups) are easy to create, organize, and traverse, and can be based on company organization, function, or location.

- Host groups
- Integrated infrastructure groups
- Component groups

Host groups enable you to create a logical grouping of Windows and Linux servers or VMs. Using host groups, you can easily see events for the group of devices as a whole. You can set up host groups by

- Operating system type; for example, create a group for all Windows devices and another group for all Linux devices.
- Geographic location; for example, create a group for all devices in Austin and another group for all devices in London.
- Function; for example, create separate groups for devices in the Finance department, the Marketing department, Production systems, Test systems, and so on.

Integrated infrastructure groups provide a convenient way to view the system as a combined resource instead of as individual pieces. Integrated infrastructure is a collection of the following device types that function as an optimized computing package.

- Compute, which includes Cisco UCS and UCS Mini devices that are the primary source of servers or VMs.

Servers and VMs that run operating systems are not considered compute resources, and therefore cannot be added to an integrated infrastructure group.

- Network, including supported switches such as the Cisco Nexus series.
- Storage, including storage devices such as the EMC and NetApp devices.
- Virtualization, including Hyper-V or VMware hypervisors.

Note The integrated infrastructure functionality is only available with a Cisco UCS Performance Manager license.

Component groups provide a logical way to view and manage individual components of a monitored device. For example, a Cisco UCS device can have many components such as Ethernet ports, blade servers, aggregation pools, and so on. When you add components to a component group, you can view all events for the group in a single location; display component graphs with all components on the same graph; view the group's dependents and dependencies; monitor or lock individual components in the group or the entire group. Components that you add to a group maintain their original permissions.

The following example shows a component group that consists of the chassis group, with two nested groups for specific geographical locations.

Figure 25: Component groups



Creating host groups

Create a host group of devices that you are already monitoring.

- 1 Navigate to the **Infrastructure** page.
- 2 In the left pane, click **Host Groups**.
- 3 In the lower-left portion of the left pane, click **Add**.
The **Add Group** dialog box appears.
- 4 Enter a name and description of the host group (for example, Production or Austin), and then click **Submit**.
The new name appears under the **Host Groups** device class. To refresh the tree, right-click the device class and choose **Refresh Tree**.
- 5 To display a list of monitored devices, click **Devices** or a device class.
- 6 Click the row of the server (OS) devices that you want to add to the host group.

Note Be sure to click anywhere on the row that is not a hyperlink to select it. If you click a hyperlink, you will be taken to the specific details page.

- 7 Drag-and-drop the selected devices on the name of the host group and accept the move action.

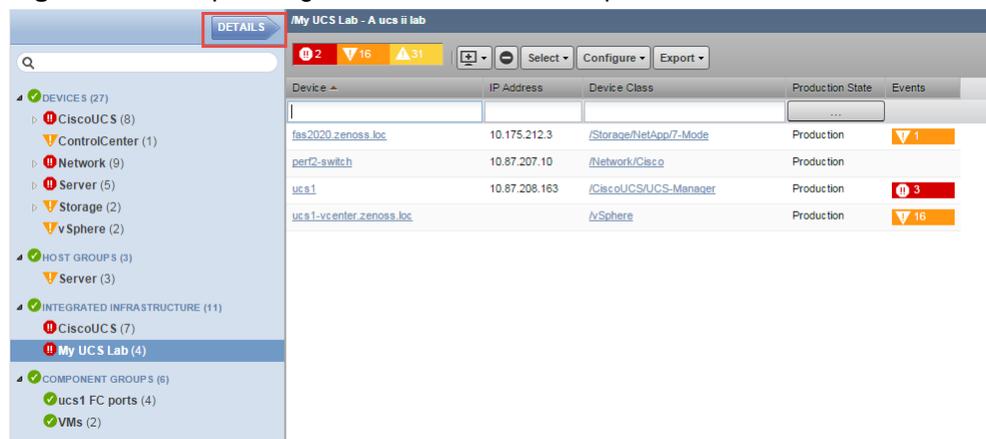
Creating integrated infrastructure groups

Use an integrated infrastructure group to understand and detect issues within that infrastructure.

Note You cannot add individual servers or VMs to an integrated infrastructure group; however, you can add them to host groups. For more information, see [Working with host groups](#).

- 1 Navigate to the **Infrastructure** page.
- 2 In the left pane, click **Integrated Infrastructure**.
- 3 With the integrated infrastructure device class selected, at the bottom of the **Devices** panel, click **Add**. The **Add Integrated Infrastructure** dialog box appears.
- 4 Enter a name and description, and then click **Submit**.
The new group appears under the **Integrated Infrastructure** device class. To refresh the tree, right-click the device class and choose **Refresh Tree**.
- 5 Add members to the new integrated infrastructure as follows:
 - a In the left pane, click **Devices**.
 - b Select the rows of the devices that you want you to add, and then drag and drop the rows on the new integrated infrastructure group.
 - c Click **OK**.
The group displays devices as they are added, including a list of open events and their severity, as shown in the following figure.

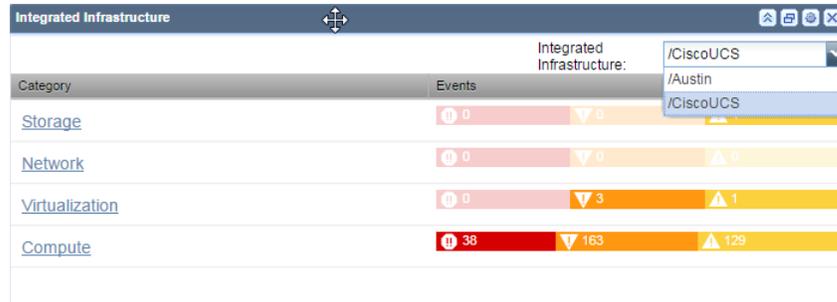
Figure 26: Example Integrated Infrastructure Group



- 6 After you create and populate an integrated infrastructure group, you can display information about the group as a bundled set of resources. For examples, perform the following steps on an integrated infrastructure group;
 - a In the left pane, click **Dynamic View**.
The **Dynamic View** displays the hierarchy of the components, organized by type, and components that have open events. (See
 - b Under **Integrated Infrastructure**, highlight the integrated infrastructure name, and then click **Details**. The **Devices** pane displays quick-access links as follows:
 - **Devices**
 - **Events**
 - **Device Administration**
 - **Dependency View**
 - **Dynamic View**

Using the Integrated Infrastructure portlet

For a quick summary of the overall health of the major components of your integrated infrastructure, use the **Integrated Infrastructure** portlet. The portlet summarizes event information for each area of your integrated infrastructure: storage, network, virtualization, and compute.

Figure 27: Integrated Infrastructure portlet

To use the portlet, complete the following tasks.

- 1 Create an integrated infrastructure group to populate the portlet, as described in [Creating integrated infrastructure groups](#) on page 25.
- 2 Add the **Integrated Infrastructure** portlet to the dashboard, as described in [Adding a portlet to the Dashboard](#) on page 8.
- 3 From the **Integrated Infrastructure** drop-down menu, choose an integrated infrastructure or host group.
- 4 Navigate to the **Event Console**.
- 5 Click a resource or component to go the overview page.
The overview page provides access to additional information, including graphs, component graphs, dependencies, and other components. The available options vary based on the resource type.
- 6 Continue to drill down in any area of interest until you reach the cause of the reported event.

Creating component groups

- 1 Navigate to the **Infrastructure** page.
- 2 In the left pane, click **Component Groups**.
- 3 In the lower-left portion of the left pane, click **Add**.
The **Add Component Group** dialog box appears.
- 4 Enter a name and description, and then click **Submit**.
The component group appears under the **Component Groups** device class. To refresh the tree, right-click the device class and choose **Refresh Tree**.
- 5 In the left pane, select the component group name.
- 6 In the right pane under the component group name, click **Add**.
The **Add to Component Group** dialog box appears.
- 7 In the search field, enter a component type, such as blade servers.
The **Search Results** area displays matching components.
- 8 Click the row (not the hyperlink name) of one or more components, and then click **Add**.
- 9 To save the group and close the dialog box, click **Close**.
- 10 To view component graphs:
 - a In the left pane, click the group name.
 - b At the top of the left pane, click **Details**.
 - c Click **Component Graphs**, and then check **All on Same Graph**.
For more information, see [Working with graphs](#) on page 18.
- 11 To view events for the component group, click **Events**.
- 12 To disable monitoring of one or more components:
 - a In the upper right corner of the left pane, click **See All**.
 - b Select the components to disable.
 - c Click **Action** (gear) and choose **Monitoring**.
 - d In the **Monitoring** pop-up window, click **Yes**.

Reports

Reports provide historical performance data in a tabular or graphical format. The following report categories are available. (If you are using a Cisco UCS Performance Manager Express license, a smaller set of reports is available.)

- Cisco UCS Capacity Reports
- Cisco UCS Reports
- Enterprise Reports
- Monitoring Capabilities Reports
- Performance Reports
- System Reports
- vSphere

Each report category contains multiple reports. Each report has several options that help you define the content of the report. Procedures presented later in this guide explain how to create reports. For more information, refer to the *Cisco UCS Performance Manager Administration Guide*.

Generating a report

Cisco UCS Performance Manager reports are grouped into categories. Use the report parameters to generate a report with a specific set of data.

- 1 In the top navigation bar, click **Reports**.
- 2 Expand a report category and select a specific report.
The report is generated using the default parameters.
- 3 To see the reports, scroll down.
- 4 To customize the displayed data, configure the report options.
- 5 To export the report to a CSV file, click **export**.

Understanding performance and capacity utilization

2

This chapter shows you how to use Cisco UCS Performance Manager to analyze integrated infrastructure performance. Example procedures illustrate how to determine whether resources can handle additional workload using remaining capacity, are close to capacity, or have reached full capacity.

Cisco UCS Performance Manager enables you to analyze system resources and components to identify potential versus actual capacities. For example, you can

- Determine how close a component is to maximum capacity, and plan for potential expansion or restructure.
- Determine a component's amount of available remaining capacity, and whether a device is over-subscribed or has additional resources that you can use to alleviate over-subscription or help eliminate bottlenecks.
- Determine whether IO module server ports, Ethernet uplinks, and FC uplinks are or have been congested, and act to alleviate the congestion or potentially forecast the next cyclic congested event.
- Identify sources of and explore ways to address congestion, such as moving service profiles between chassis.
- Determine whether virtual or physical workloads and applications are affected by UCS server CPU and memory configuration, and plan for or make changes to server configurations or hardware components.
- Compare current and historical performance across converged infrastructure components to identify where constraints exist and decide whether and how to remove them.

Working with service profiles

A *service profile* is a software definition of a server and its LAN and SAN network connectivity. It defines a single server and its storage and networking characteristics. The **Service Profile** portlet provides an at-a-glance status of all service profiles that are modeled in a specific domain or across all domains. To access detailed information for a specific profile, in the portlet, click a profile name.

Figure 28: Service Profile portlet

Events	Name	Oper	Domain	Server	Organization	Logical Server	Type	Avg CPU Util	Avg LAN UR Rx	Avg LAN UR Tx	Avg SAN UR Rx
✓	Alpha (Alpha)	ok	ucs1	ESX -- 10.87.208...	[org-Austin Lab	ucs1-3-7.zenoss.j	vSphere	31.92 %	9Gbps	16Gbps	23Mbps
✓	Buckwheat (Buckwheat)	ok	ucs1	Rack Server 1	[org-Austin Lab	ucs1-rn1.zenoss.j	vSphere	9.97 %	48Kbps	7Kbps	372Mbps
✓	Service Profile (Exam3)	ok	ucs1	ESX -- 10.87.208...	[org-Austin Lab	ucs1-3-8.zenoss.j	vSphere	10.77 %	10Gbps	14Mbps	9Kbps
✓	Service Profile (Exam4)	ok	ucs1	ESX -- 10.87.208...	[org-Austin Lab	ucs1-4-8.zenoss.j	vSphere	24.75 %	7Gbps	9Gbps	30Mbps
✓	Service Profile (Linux)	ok	ucs1	Rack Server 2	[org-Austin Lab			n/a	4Kbps	65bps	n/a
⚠	Service Profile (Testwi)	un...	ucs1		[org-Austin Lab			n/a	n/a	n/a	n/a
✓	Service Profile (Windo)	ok	ucs1	Window Server 10	[org-Austin Lab	ucs1-4-7	Hyper-V	2.40 %	143Kbps	236Kbps	1Kbps

Filter and sort features enable you to work efficiently with many profiles. Filtering works in real-time as you type characters in the text field. Filter on any columns that contain a text string, such as **Name**, **Server**, **Domain**, **Type**, including hidden columns. Sorting works for all columns.

For each profile, the **Service Profile** portlet contains the following information:

- **Events** — Displays the highest-level severity event. For detailed event information, navigate to the **Event Console**.
- **Name** — Displays the service profile name.
- **Operational state** — Displays the operational state of the server as defined in the service profile.
- **Domain** — Displays the UCS domain name.
- **Server** — The blade or rack server as defined in the service profile.
- **Logical server** — The related device associated with the service profile. Related devices can be hypervisors (Hyper-V or vSphere), or a Windows or Linux server.
- **Type** — Indicates the type of logical server as defined in the service profile, as follows:
 - Hyper-V
 - vSphere
 - Windows server
 - Linux server
- **Organization** — Displays the container hierarchy, for example, `organization or root/tier/server name`.
- **Local** — A flag indicating whether a service profile comes from UCS central.

By default, the **Service Profile** portlet shows average utilization for

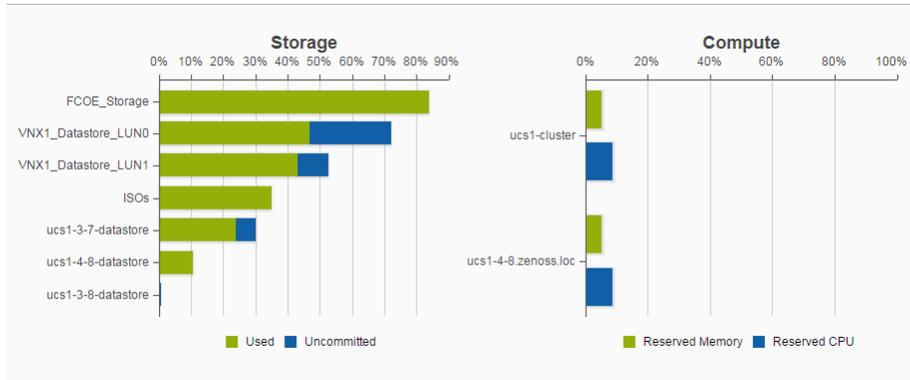
- CPU
- LAN Tx
- LAN Rx
- SAN Tx
- SAN Rx

For hypervisors, you can also display hidden columns showing maximum utilization for CPU, LAN, and SAN. To view statistics for Windows and Linux servers, click the link in the **Logical Server** column.

- 1 To add the **Service Profile** portlet to the dashboard, follow the steps in [Adding a portlet to the Dashboard](#) on page 8.
- 2 To change the default view:
 - a To view a different domain, select it from the **Domain** drop-down menu.
 - b To view all domains, select **Domain > All Domains**.
 - c To find a specific service profile in a domain, in the **Filter** text field, enter the first few characters of the name.
 - d To change the sort order, click any column heading and then click **Sort Ascending** or **Sort Descending**.

Viewing VMware farm storage and compute utilization

Use Cisco UCS Performance Manager to identify oversubscribed resources and those that have extra capacity. Without using vSphere or providing vSphere credentials, you can view the top datastores by percentage used, and the top hosts based on CPU and memory usage.

Figure 29: VM storage and compute statistics

To view VMware farm information:

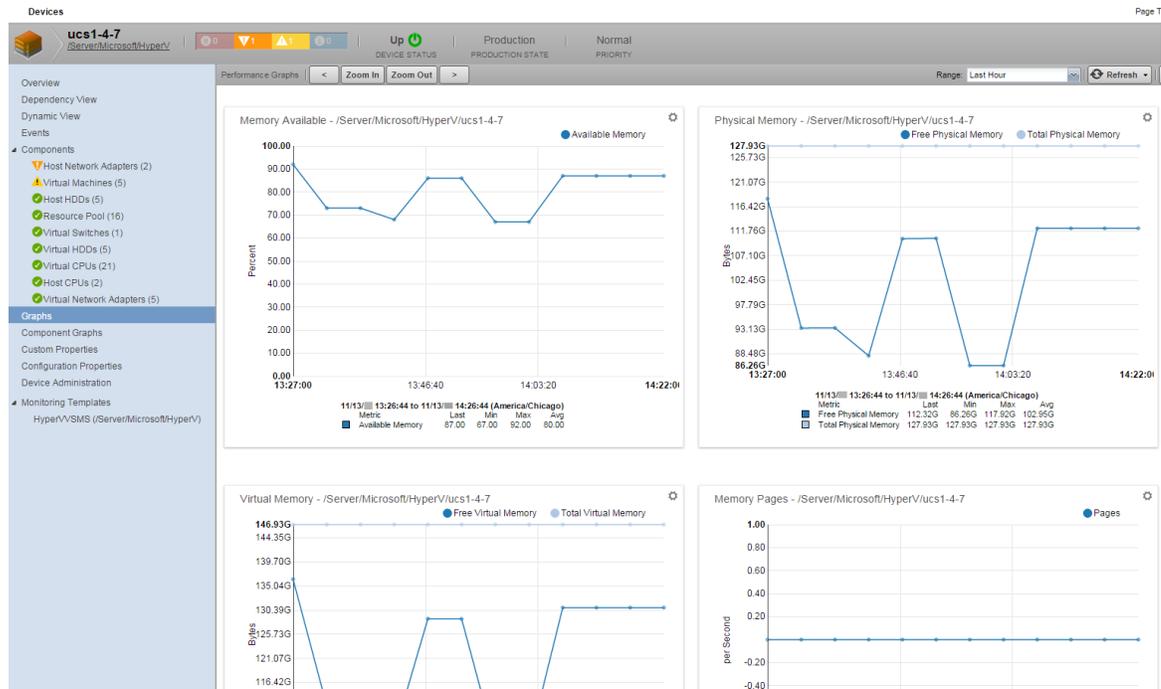
- 1 Navigate to the **Infrastructure** page.
- 2 In the left pane, choose **Devices > vSphere**.
- 3 Click a vSphere device name.
- 4 For OS information, scroll down and on the right, review the **OS Model** information.

Viewing Hyper-V performance

For Hyper-V devices, you can view performance graphs and dependency information, and drill down to detailed component information.

- 1 Choose **Infrastructure > Devices > Server**.
The server list appears on right side of the page.
- 2 Select a Hyper-V device.
If necessary, expand the **Server > Microsoft** category or enter the string `Hyper-V` in the search box beneath the **Device Class** column heading.
The overview page for the Hyper-V device appears.
- 3 To view performance information, in the left pane, click **Graphs**.

Figure 30: Hyper-V performance graphs



- 4 To see additional views or more information, use navigation tools in the left pane.

Viewing OS performance

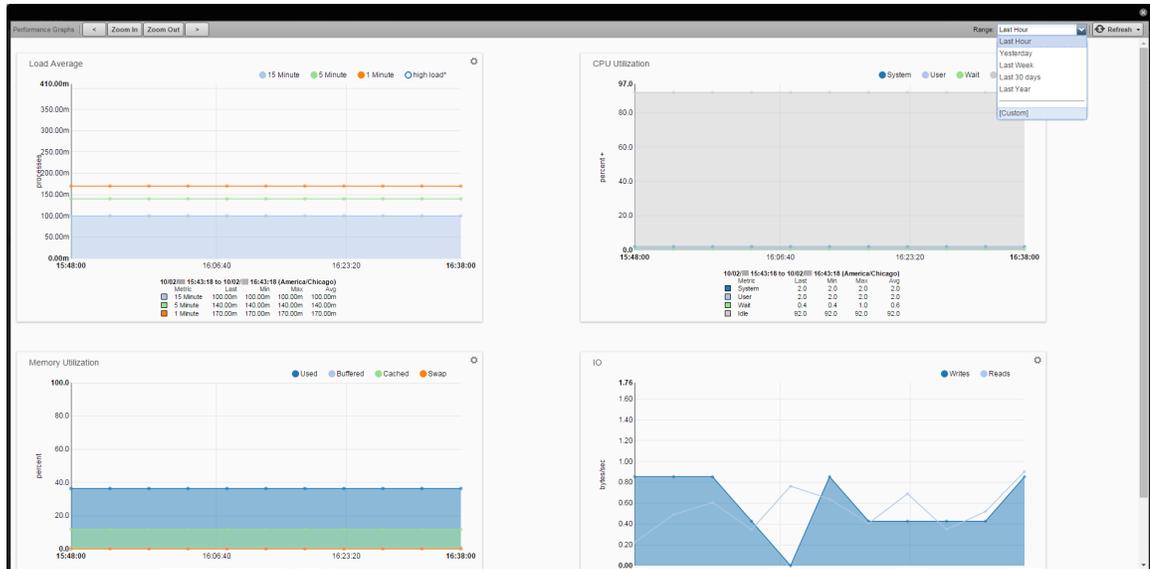
Cisco UCS Performance Manager enables you to survey and monitor operating system performance. Review historical and real-time performance and usage data of components such as CPU and memory.

To review OS performance information:

- 1 Choose **Infrastructure > Devices > Server**.
- 2 Drill down the server categories to find a server, such as Linux server, and click the device name. The device overview page appears, and describes the OS model and version.
- 3 In the left pane, click **Graphs**.

The following graphs are displayed:

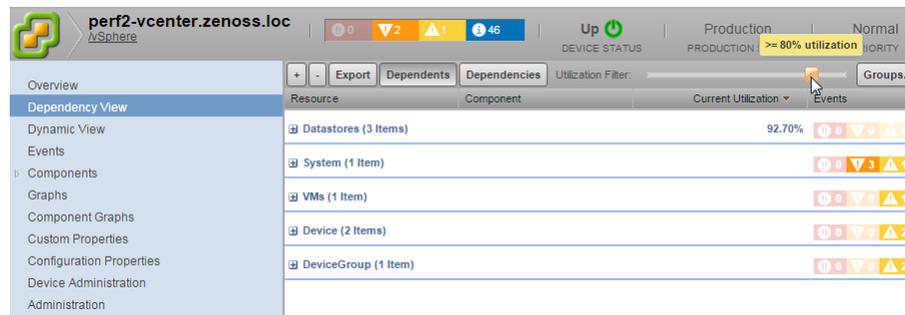
- Load Average
- CPU Utilization
- Memory Utilization
- I/O

Figure 31: Operating system performance graphs

- 4 To customize the view, use the graph tools and **Range** drop-down menu.

Detecting high utilization resources

To quickly locate resources with high utilization, use the **Dependency View**. The **Utilization Filter** helps you focus on resources that meet a specified utilization percentage. The filter setting is saved per user, per device, until you change it.

Figure 32: Dependents with $\geq 80\%$ utilization

- 1 Navigate to **Infrastructure > Devices**, and expand **Cisco UCS**.
- 2 Select a UCS Manager device.
- 3 In the device's overview page, click **Dependency View**. Dependents of the device are displayed. By default, all resources that are currently using $\geq 0\%$ utilization are displayed.
- 4 Slide the **Utilization Filter** to the right until it reaches $\geq 80\%$. Resources that match the filter are displayed at the top of the table, followed by all resources that have a warning, critical, or error status, regardless of their current utilization.
- 5 To see resources that depend on the device, click **Dependents**. The utilization filter remains at $\geq 80\%$.
- 6 View and work with graphs for a component. For example:
 - a To expand or collapse the components of a group, click + beside the group (such as **Ethernet Ports**). Alternatively, click **Groups** and select a group.

- b Click on an Ethernet port row (not the component name link).
If graphs are available for the selected resource, they are displayed on the right.
- c To analyze the graph data, use the graph tools.
- d To save the information to a CSV file, click **Export**.

Finding the server with highest utilization

To find the server in a domain with the highest bandwidth usage, see the **Dashboard**. The following portlets include utilization information:

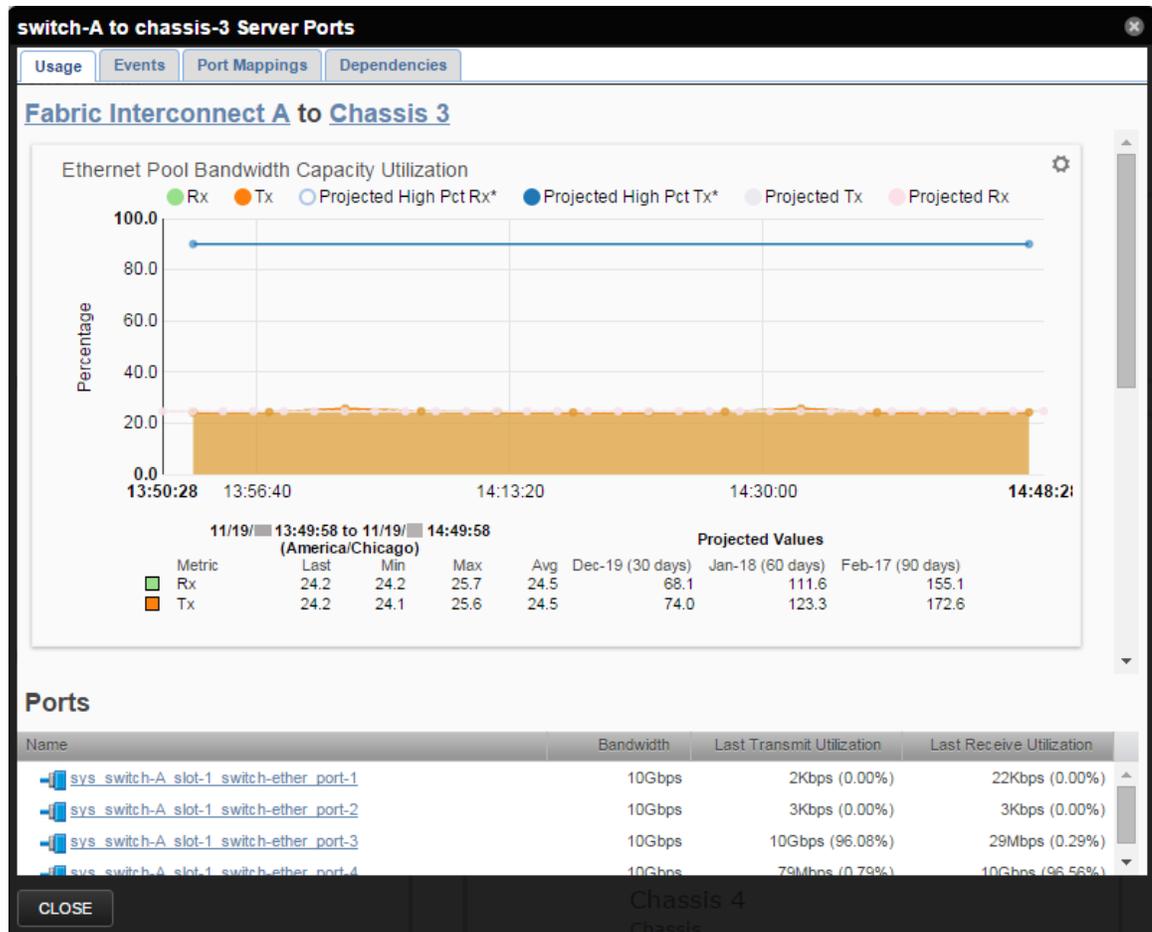
- Domain Overview — Shows utilization and open event counts.
- Service Profiles — Shows current fabric utilization across all domains or any single domain.
- Chassis Capacity — Shows utilization by chassis for a single domain.
- UCS Inventory — Shows total number of blades and how many are associated with service profiles.

Determining chassis capacity utilization

To determine whether a selected chassis is used to its full capacity and to explore chassis information, use the **Topology** view.

- 1 Navigate to **Dashboard > Topology**.
- 2 In the left pane, click a UCS domain.
- 3 In the **Topology** view, double-click a fabric interconnect to chassis connection.
A popup window for the switch to chassis server ports appears, as shown in the following example.

Figure 33: Ethernet Pool Bandwidth Capacity Utilization graph



The **Usage** tab graphs include values for capacity utilization, projected high utilization percentage, projection dates, and total data transferred in Gbps. In the example graph, the **Avg Rx** value is 24.5%, which leaves bandwidth for additional transactions.

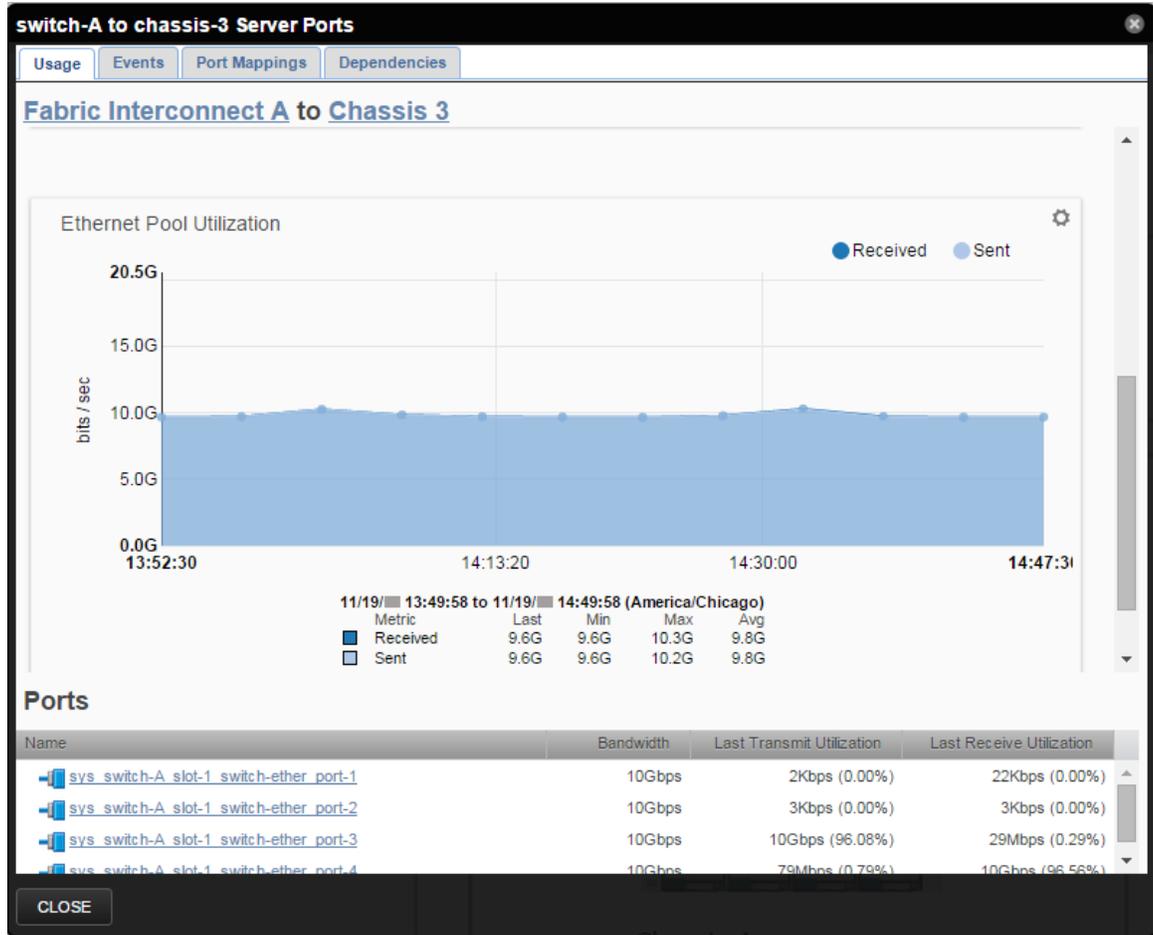
The **Ports** area shows that four ports connect from Switch-A to Chassis-3. The **Bandwidth** column shows that each port has a maximum capacity of 10 Gbps. Therefore, total capacity is 40 Gbps for both receiving and sending data.

4 Review and work with **Usage** tab information and graphs as follows:

- a To display the threshold value, click **Projected High Pct Rx**.
- b Review the 30, 60, and 90 day **Projected Values**.

Projections are calculated on data that was collected over the last 10 days. A value of N/A or zero means that data is insufficient to make a projection.

- c Scroll to the **Ethernet Pool Utilization** graph that shows total throughput. In the following example, the total average of received and sent data is 19.6 Gbps out of a total capacity of 40 Gbps.

Figure 34: Ethernet Pool Utilization graph

Determining blade server capacity utilization

The **Chassis** page displays graphs that identify which blade servers are the heaviest users of chassis bandwidth within the chassis.

- 1 Navigate to **Infrastructure > Devices**.
- 2 In the right pane, click the name of a device.
- 3 In the left pane, click **Components > Chassis**.
- 4 In the left pane, click **Bandwidth Usage**.
On the right, the **Bandwidth Usage** page appears.
- 5 To list the components of a chassis, click the expansion arrow.
In the following example, the projected columns show when the chassis will reach 64 Gbps based on the average Tx utilization over the last ten days.

Figure 35: Bandwidth Usage for a chassis

Name	Bandwidth	Avg Rx	Avg Tx	Projected Tx Date	Projected Rx Date
Chassis 3	80Gbps	1.9Mbps (0.00%)	810.6Kbps (0.00%)	64Gbps on > 90 days	64Gbps on > 90 days
ESXi -- 10.87.208.166 (Service Profile ESXi 3 7 SAN ...)		1.9Mbps	806.8Kbps		
ESXi -- 10.87.208.167 (Service Profile ESXi 3 8 SAN)		2.0Kbps	3.7Kbps		
Chassis 4	80Gbps	40.5Kbps (0.00%)	70.8Kbps (0.00%)	64Gbps on > 90 days	64Gbps on > 90 days
Window Server 10.87.208.168 (Service Profile Windows...)		39.4Kbps	70.6Kbps		
ESXi -- 10.87.208.169 (Service Profile ESXi 4 8 SAN)		1.1Kbps	209.1bps		

- Review the columns for total bandwidth, averages for received and sent data, and the **Projected Tx Date** and **Projected Rx Date** columns.

Note The aggregation pool values (the top level chassis or FEX) are calculated at an interval of ten minutes, which might result in variance compared to the sum of the values of the underlying parts.

- Click the row of a component (not the hyperlink name), and review the available graphs; for example, **Blade Server Utilization** and **Service Profile Utilization**.

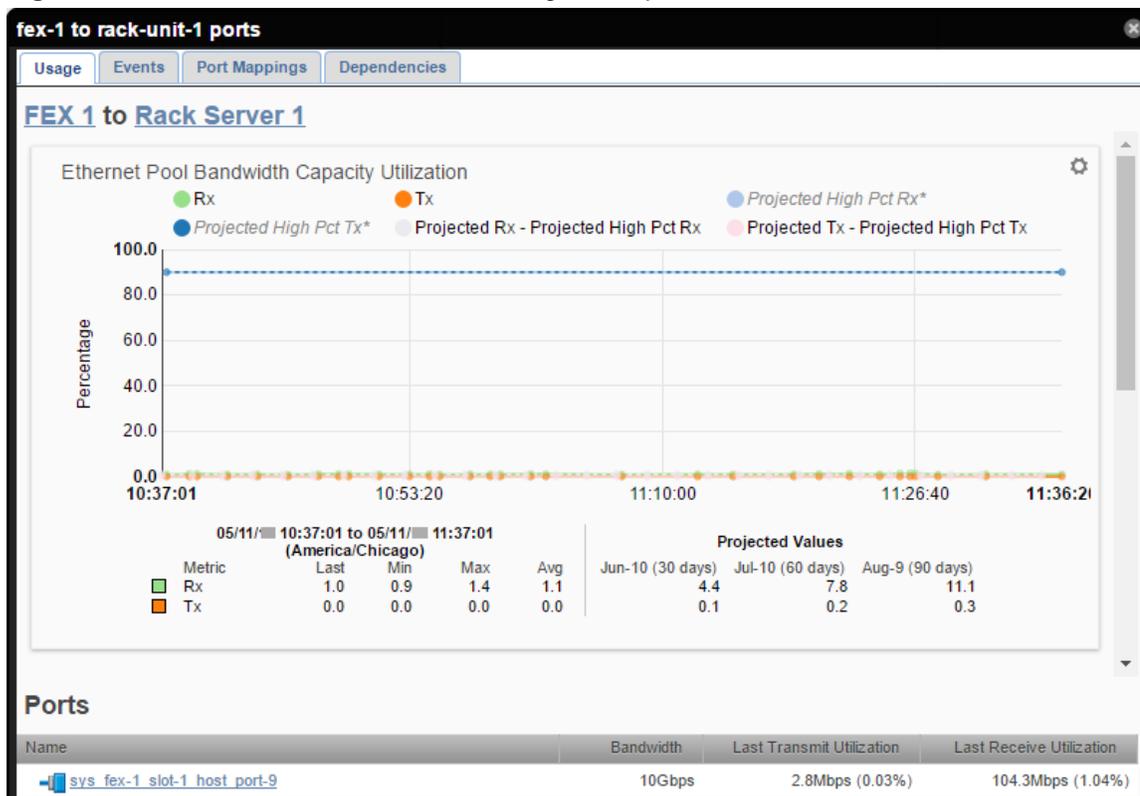
Finding congestion between a fabric extender and a rack server

To determine whether network congestion exists between a fabric extender and a rack server, use the **Topology** view and analyze the throughput, capacity, and remaining capacity values.

- Navigate to **Dashboard > Topology**.
- On the left in the **All Domains** pane, click a UCS device.
The device's topology appears.
- Double-click a connection line between a fabric extender and a rack server.
A fabric extender to rack server window appears.

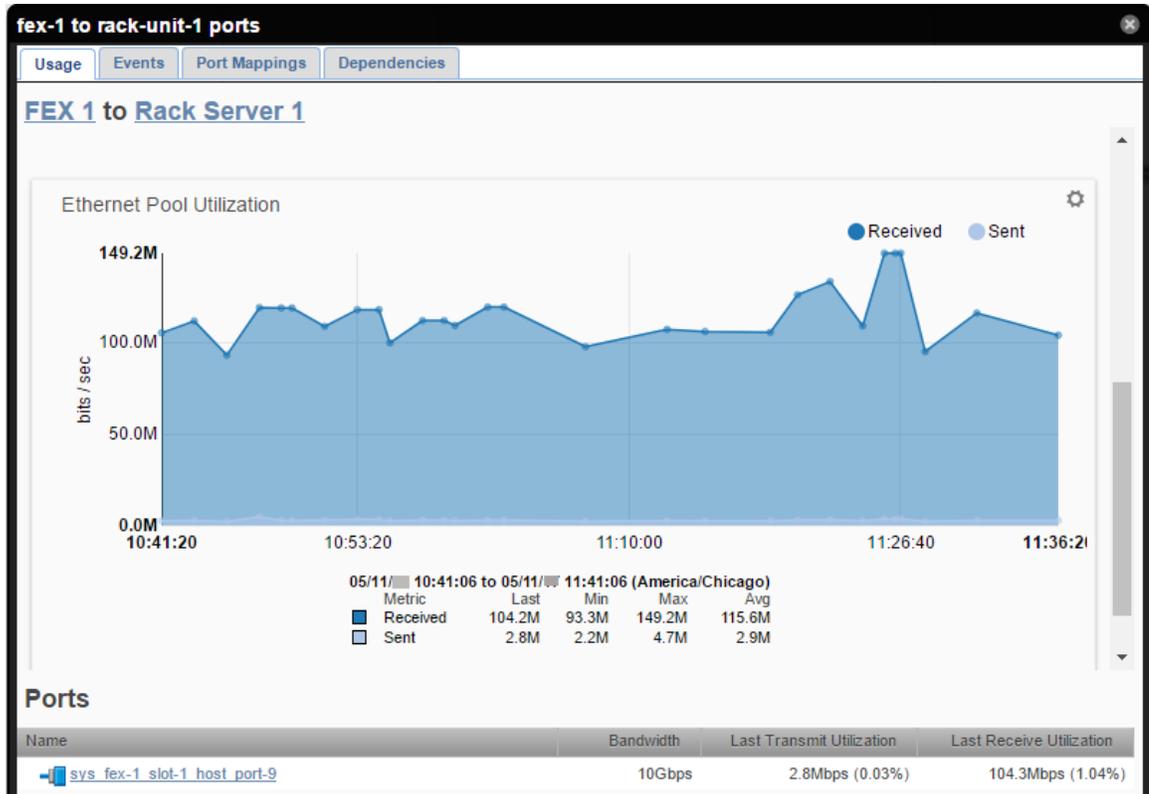
In the following example, the **Ports** sections shows that the connecting port's capacity is 10 Gbps.

Figure 36: Fabric extender to rack server usage example



- 4 Scroll to and review the **Ethernet Pool Utilization** graph. The following example shows that minimal data is being sent and received, leaving almost the full capacity of the 10 Gbps port available for additional transactions. In this example, congestion is not an issue.

Figure 37: Ethernet Pool Utilization graph example

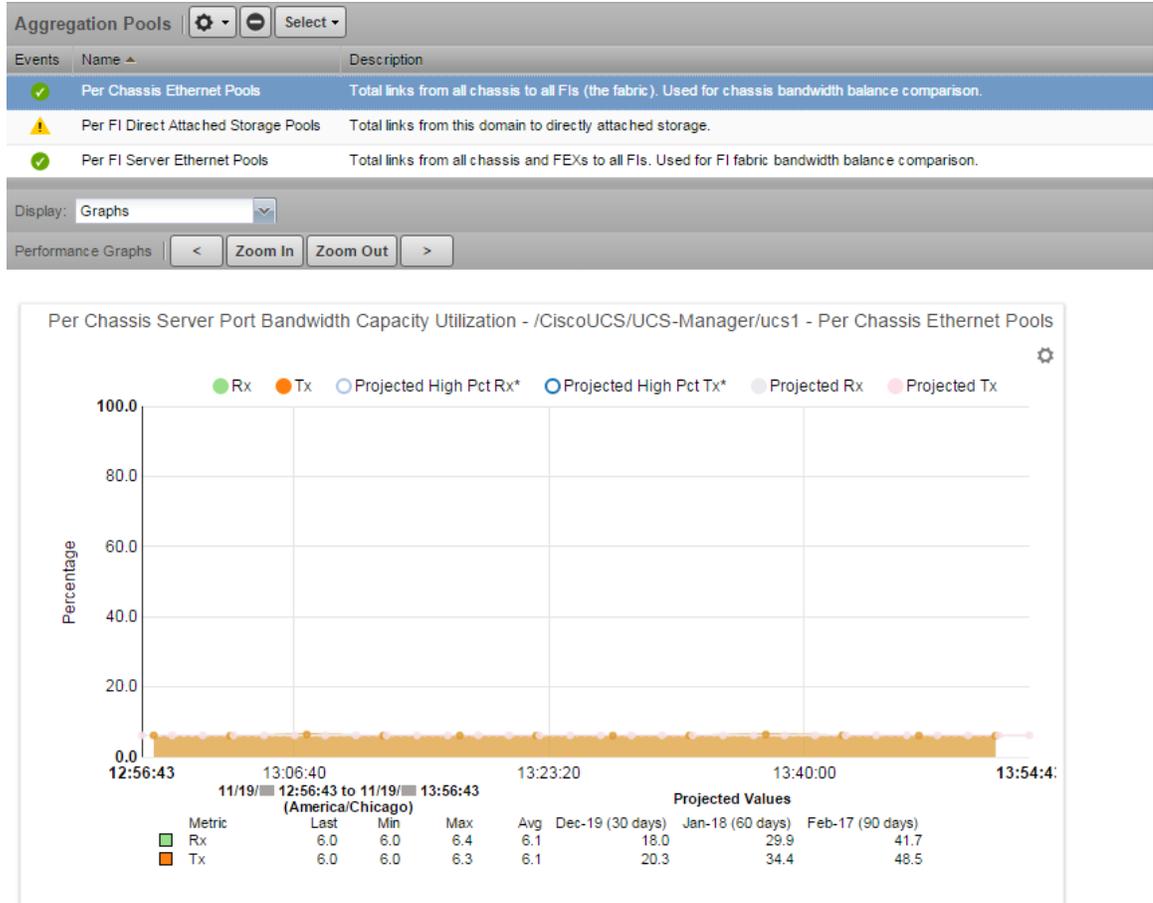


Exploring domain port channel capacity utilization

You can access current and historical data about capacity usage of domain port channels and drill down into each component within a domain.

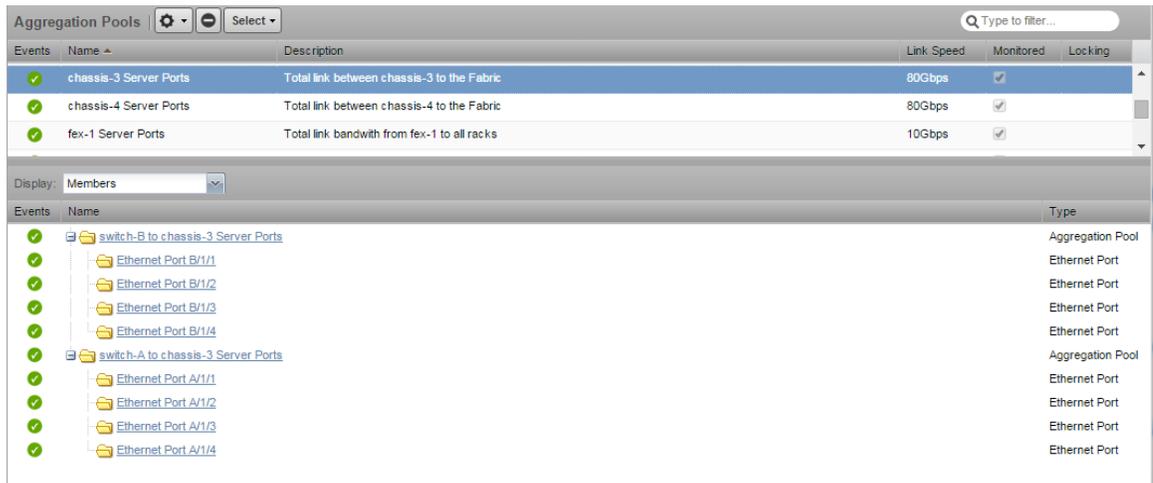
- 1 Navigate to **Infrastructure > Devices > CiscoUCS**.
- 2 Click a device name.
- 3 To view LAN uplink information, in the left pane, click **Components > Aggregation Pools**.

Figure 38: Ethernet pool bandwidth capacity utilization graph



- 4 To view information about the uplink members, click **Display > Members**. The aggregation pool members are displayed.
- 5 From the aggregation pools table, click a chassis name. The ports for each switch on the chassis are displayed.

Figure 39: Chassis port members



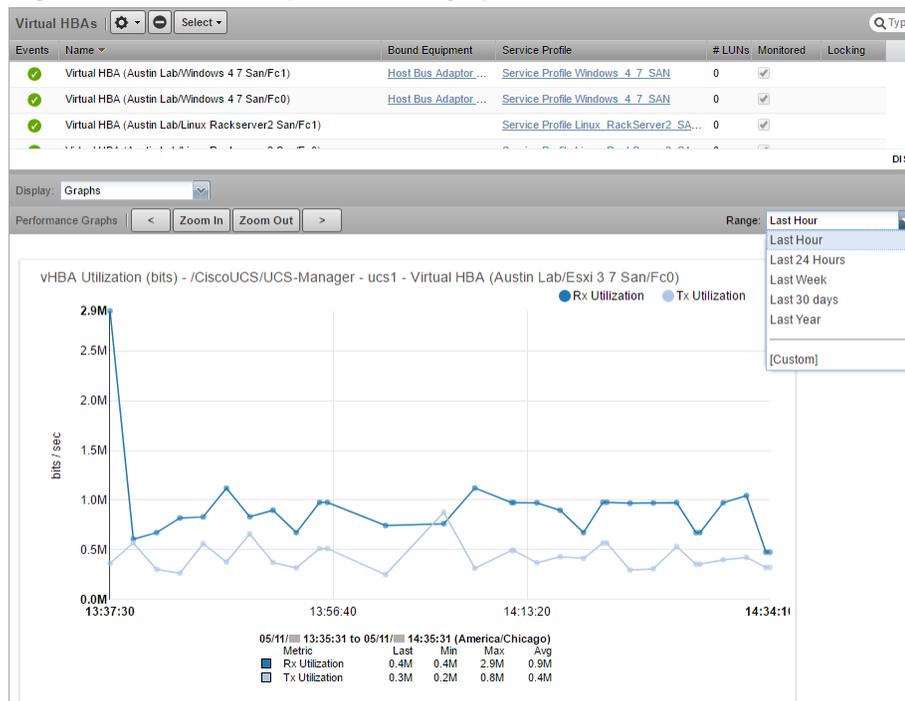
- 6 To view graphs, click **Display > Graphs**.

Determining virtual adapter capacity utilization

View information about the virtual adapters in your infrastructure, including the associated service profiles and historical capacity data.

- 1 Navigate to **Infrastructure > Devices > CiscoUCS**.
- 2 Select a Cisco UCS device.
- 3 Click **Components > > Service Profiles**.
- 4 In the right pane, select a profile.
- 5 Click **Display > vHBA Capacity**.
The table of vHBAs appears and shows the average and maximum utilization for Rx and Tx.
- 6 To see more information about an adaptor, click the adaptor name.
The performance graph for the vHBA appears.

Figure 40: Virtual HBA performance graph



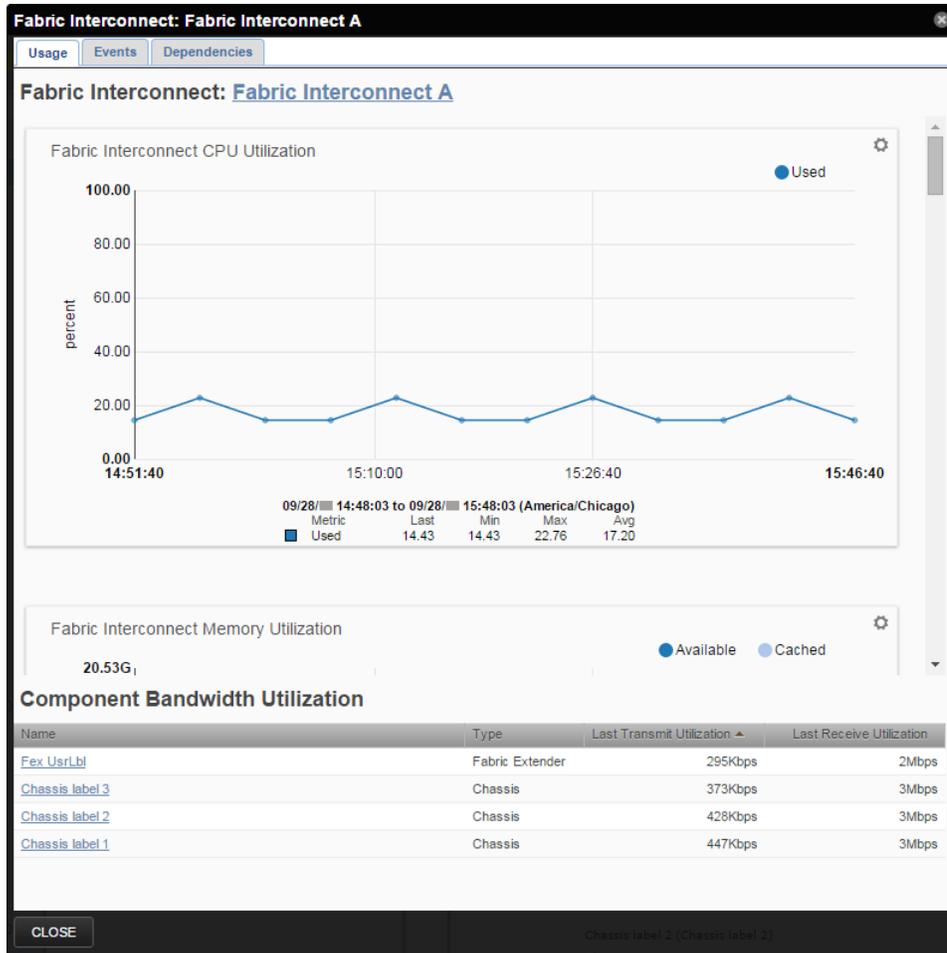
- 7 To view historical data, on the performance graph toolbar, click **Range**.
- 8 To view virtual NIC usage, in the left pane, click **Components > Virtual NICs**.
- 9 To view all NICs for a specific profile, sort the **Service Profile** column.

Exploring fabric interconnect congestion

The **Topology** view shows a graphical interpretation of a switch performance and tabular data for each Ethernet port. The tabular data includes the port slot location, bandwidth, and utilization information. If additional information is required, you can drill down to specific components. The following example shows how to select a network component and drill down into the performance data for its Ethernet ports.

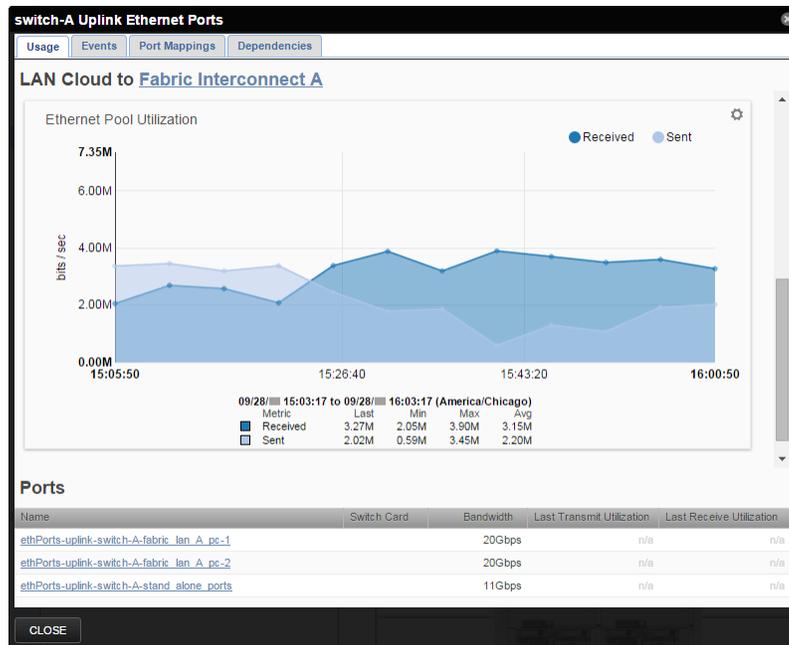
- 1 Navigate to **Dashboard > Topology**.
The **Topology** view appears.
- 2 Click a component, such as a fabric interconnect.
The following example shows fabric interconnect usage information.

Figure 41: Fabric interconnect usage information



- 3 Analyze the data to determine whether the component and its associated connections are performing appropriately.

Identifying and correcting components that do not perform as required helps to prevent and alleviate congestion in the network. The following example shows the relative congestion of the LAN uplink to switch-A connection. Because the last values are 3.27 Mbps for received and 2.02 Mbps for sent data, they are not yet close to the maximum available bandwidth of 10Gbps, so congestion is very low. If these values increase to approach the 10Gbps maximum available bandwidth, congestion increases and eventually leads to network issues.

Figure 42: Congested Switch A Uplink Ethernet Ports

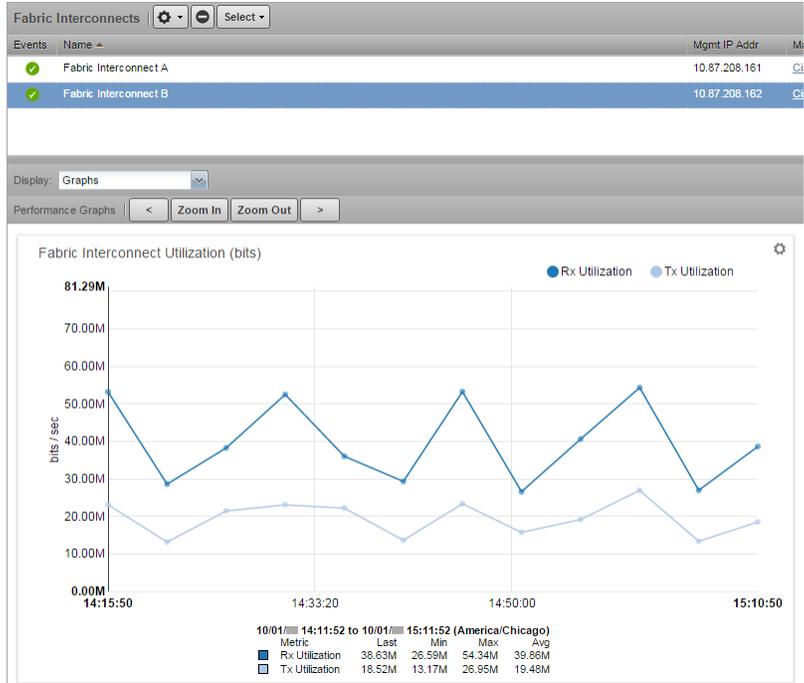
- 4 To display the overview page for a component, click the component name.

Exploring fabric utilization and capacity

You can view and analyze component and port utilization information for a fabric interconnect. The **Fabric Interconnects** page displays graphs that show health checks, bandwidth utilization, remaining capacity, northbound utilization, LAN Cloud utilization, SAN Cloud utilization, and direct storage utilization. Graphs help you identify the heaviest consumers of bandwidth in the domain. Remaining capacity data indicates how much unused bandwidth capacity is available for each chassis.

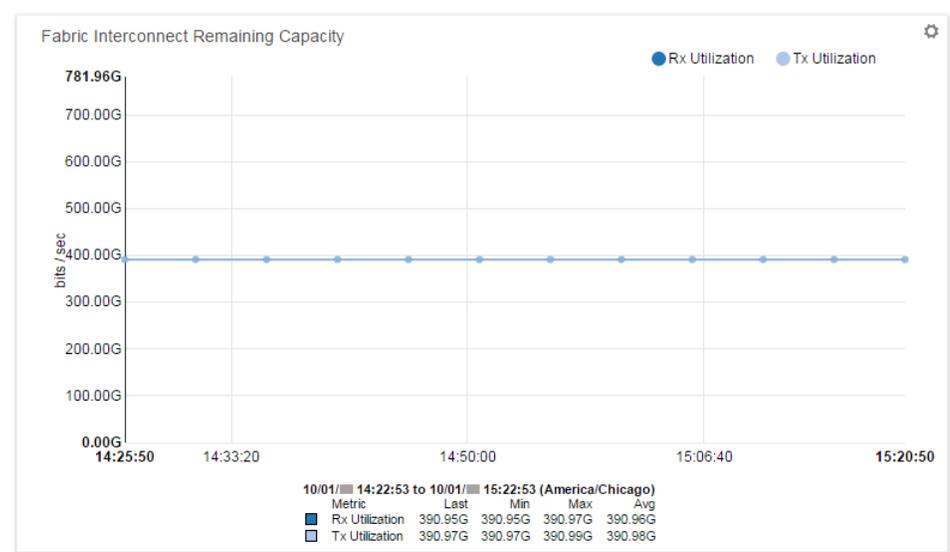
- 1 Navigate to **Infrastructure > Devices**.
- 2 Select a Cisco UCS device.
The device's overview page appears.
- 3 Click **Components > Fabric Interconnects**.
In the right pane, the **Fabric Interconnects** page appears.
- 4 Select a fabric interconnect row, and then click **Display > Graphs**.
- 5 Scroll down to the **Fabric Interconnect Utilization (bits)** graph.
In the following example, received bits per second is 40.79 Mbps on average, and sent bits per second is approximately 17.5 Mbps.

Figure 43: Fabric Interconnect Utilization (bits) graph



- 6 Scroll down to the **Fabric Interconnect Remaining Capacity** graph. In the following example, average utilization is 390.96 Gbps, which leaves approximately 50% remaining capacity.

Figure 44: Fabric Interconnect Remaining Capacity graph



- 7 Scroll through the graphs to see utilization by direction to the LAN Cloud, SAN Cloud, direct-attached storage, and northbound utilization.
- 8 To display data for the components or ports within the fabric interconnect, click **Display**, and then click **Component Bandwidth Capacity** or **Ports Capacity**. In the following example, the table displays average sent and received utilization percentage for each chassis.

Fabric Interconnects											
Events	Name	Mgmt IP Addr	Manufacturer	Model	Total Memory	# Switch Cards	# PSUs	# Fans	# Ports	Status	Monitored
✓	Fa...	10.87.208.161	Cisco	UCS-FI-6248UP	15.8GB	2	2	2	48	Up	✓
✓	Fa...	10.87.208.162	Cisco	UCS-FI-6248UP	15.8GB	2	2	2	48	Up	✓

Component Bandwidth Ca							
Events	Name	Distinguished Name	Type	Avg Util Rx	Avg Util Tx	Max Util Rx	Max Util Tx
✓	Rack Server 2	sys/rack-unit-2	Rack Server	6Kbps	42bps	7Kbps	288bps
✓	Chassis 3	sys/chassis-3	Chassis	8Gbps (10.58%)	13Gbps (15.75%)	10Gbps (12.79%)	14Gbps (17.12%)
✓	Chassis 4	sys/chassis-4	Chassis	8Gbps (10.13%)	4Gbps (4.97%)	10Gbps (11.94%)	5Gbps (6.19%)
✓	FEX 2	sys/fex-2	Fabric Extender	84Kbps (0.00%)	876Kbps (0.01%)	229Kbps (0.00%)	952Kbps (0.01%)

- 9 In the data tables, you can review and work with data; for example:
- Sort a column from highest to lowest utilization or vice versa.
 - To search for a role, such as *server*, in the **Type to filter** field, enter the role.
 - To display a different time/date range, click **Range** and select **Last Hour**, **Last Day**, or the **Last Week**.

Monitoring network and storage performance and utilization

3

This chapter contains concepts and procedures to help you understand current and historical utilization and capacity of your network and storage infrastructure.

Monitoring and correcting network congestion

Network congestion occurs when an increase in data transmissions results in a proportionately smaller increase or throughput reduction across the network. Congestion can result from more data being sent across a network than it can handle.

Applications send data as packets across the network, traversing network devices such as fabric extenders, fabric interconnects, Ethernet ports, routers, and switches. The buffers on over-subscribed devices can fill up and overflow, and data packets are lost. This state can cascade into even greater congestion because applications must retransmit lost packets, which results in additional data traffic across the network.

If this cyclic cascade continues, the network can become paralyzed and fall into a state of congestive collapse. This state that ensues when congestion increases to the point that throughput drops to and remains at very low levels, and adversely affects the performance of applications and devices.

Correcting or preventing congestion is important to keeping a network running smoothly for users and applications. Use Cisco UCS Performance Manager tools to analyze collected data to identify active network congestion issues and make informed decisions about how to correct the issues.

The collected data includes projected, current, and historical performance data, and component, connection, and provisioning data. By analyzing that data, you can identify and isolate for rehabilitation any potential inadequacies or pinch points in your network, and plan for and prevent future network congestion issues.

Use Cisco UCS Performance Manager tools to

- Identify and reconfigure service profiles that contribute to low performance.
- Move service profiles between servers to enhance server performance.
- Identify and rectify server provisioning, including processor and memory configurations.
- Locate and correct bandwidth inequities. For example, identify network components with critically small available remaining capacity. To bring the network in balance, redistribute bandwidth between components with appropriate available remaining capacity or add equipment.
- Use historical data from the various performance logs to determine patterns and cycles to plan for future network stress.

Using performance data to detect congestion

The *network fabric* consists of the collection of components and their interconnections and interfaces that make up the network. For the network to function at its theoretical maximum, all components must function effectively, individually and together as a cooperative unit. Because Cisco UCS Performance Manager provides a view into the network fabric, you can analyze performance data that network management tools cannot access. This performance data encompasses components such as server ports, Ethernet links, FC uplinks, and so on.

Analyze data returned from these components to determine whether congestion exists, and what additional effects the congestion is generating. Detect congestion by observing the performance data of specific network components that show low throughput or exceptionally high usage rates. Low-performing or over-subscribed components can contribute to or be the result of congestion.

Constraints are any limitations within the fabric that affect performance of the network, measured as throughput or relative available remaining capacity. Constraints that affect data flow within the network can result in network congestion and potentially network paralysis or collapse. These constraints can take the form of component over-subscription, component misuse, inadequate provisioning or configuration, or failing components or architecture.

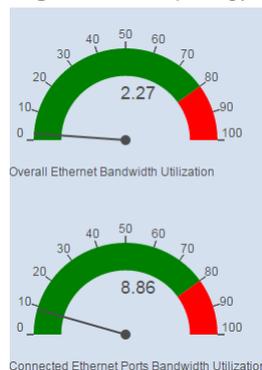
Using network topology to review performance capacity

A quick method to determine how close your network is to maximum performance capacity is to display the **Topology** view and analyze it for information about the connection quality between various components.

To display the **Topology** view, navigate to the **Dashboard** and click **Topology**. You can then click a component, connection line, or an event icon for more information.

The **Topology** view includes graphical bandwidth usage information in the form of speedometer dials for both overall and port bandwidth usage. It also provides a click-able diagrammatic map of device connections.

Figure 45: Topology view: bandwidth dials



Reviewing historical utilization and congestion

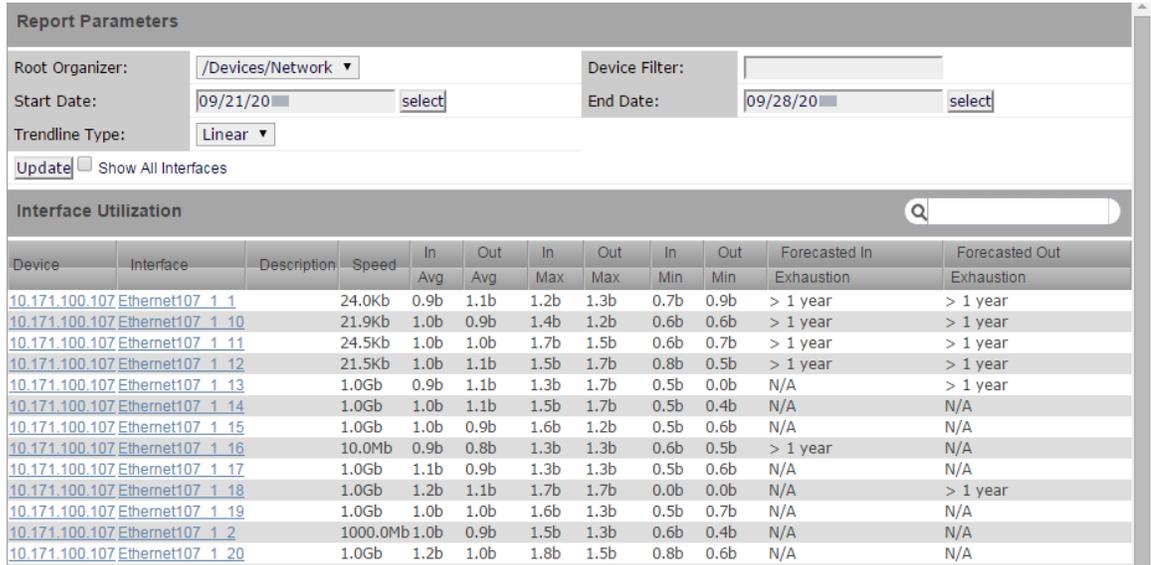
Cisco UCS Performance Manager uses historical log data to generate reports. Options for each type of report refine the data.

To view historical information about interface utilization:

- 1 Navigate to **Reports > Cisco UCS Capacity Reports > Interface Utilization**. In the right pane, the **Report Parameters** page appears.
- 2 In **Root Organizer**, choose **/Devices/Network**.
- 3 Select start and end dates.
- 4 Click **Update**.

In the lower section of the right pane, the Interface Utilization report displays historical data for the interface.

Figure 46: Interface Utilization report



- 5 For each interface, review the in and out average, and maximum and minimum values.
- 6 To identify interfaces that are causing or might cause network congestion, review the **Forecasted In Exhaustion** and **Forecasted Out Exhaustion** values for each interface.
- 7 To display the page for a device or interface, click its name.

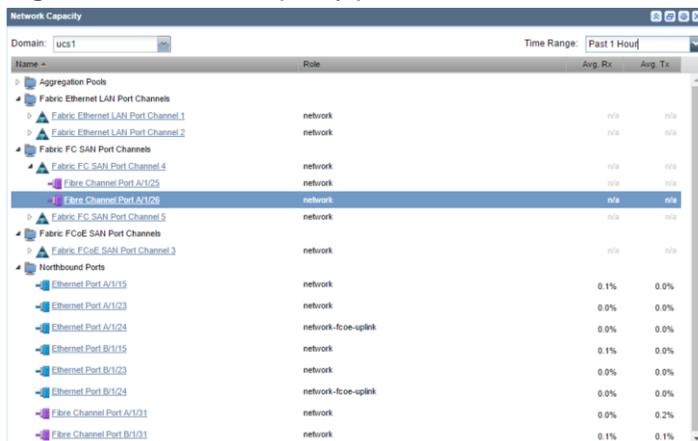
Viewing northbound port utilization by domain

The **Network Capacity** portlet provides bandwidth utilization for a specific domain from the fabric interconnects to northbound LAN and SAN clouds.

The portlet displays ports that are operational and currently mapped to another device for a specific time range. It shows the port name and role, the average Tx and Rx utilization, and event summary. You can add columns for maximum Tx and Rx utilization.

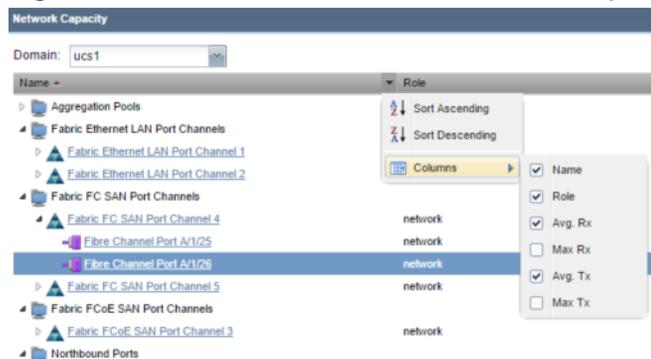
- 1 Add the **Network Capacity** portlet to the **Dashboard**, as described in [Adding a portlet to the Dashboard](#) on page 8. The **Network Capacity** portlet appears on the **Dashboard**.

Figure 47: Network Capacity portlet



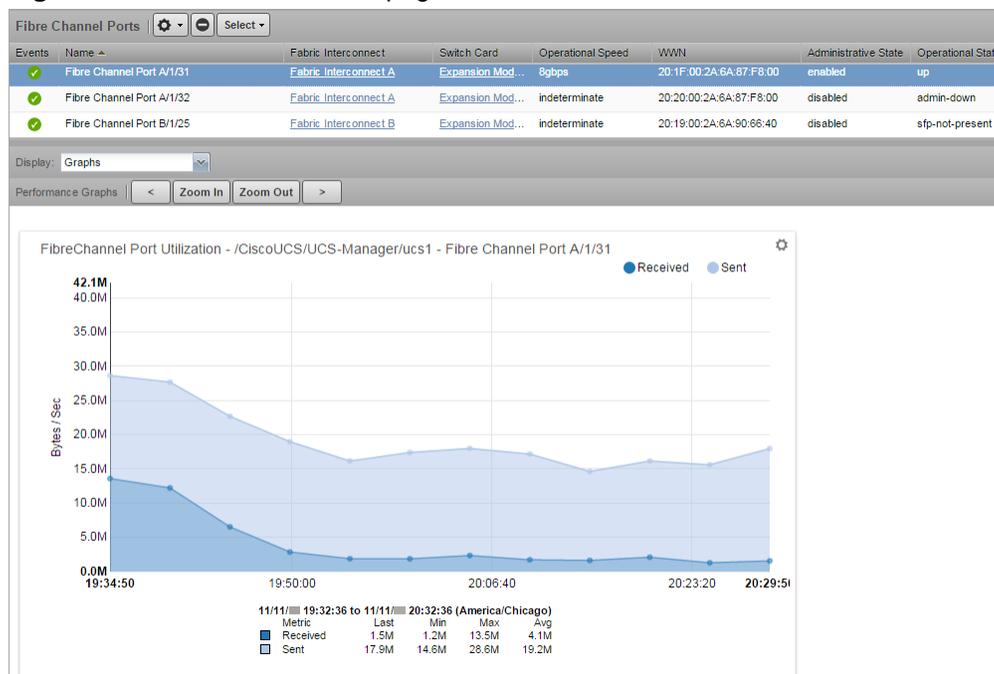
- To view information for a specific domain, in the upper right corner, click **Domain** and choose from the drop-down list.
- To change the time range, click **Time Range** and choose the range.
- To add maximum utilization information, near the right side of any column, click the drop-down menu, click **Columns**, and then click **Max Tx** and **Max Rx**.

Figure 48: Add Max Tx and Max Rx to Network Capacity portlet



- For additional information about a particular port, click the port name. The corresponding information page appears. The following example shows the **Fibre Channel Ports** page.

Figure 49: Fibre Channel Ports page



- Review utilization graphs or use the **Display** drop-down menu to continue working with the selected component.

Reviewing storage utilization and capacity

Cisco UCS Performance Manager monitors EMC storage devices, NetApp filers, and local storage (datastores) of Hypervisor devices. To review storage capacity and utilization, use the following methods:

- Review information for the device and its components by starting at the **Infrastructure** page.
- Get at-a-glance information on the **Storage Capacity** portlet, and then focus on a device.

- Generate a **Storage Utilization vs Capacity** report.

The procedures that follow describe how to use each of these methods.

Reviewing storage devices and components

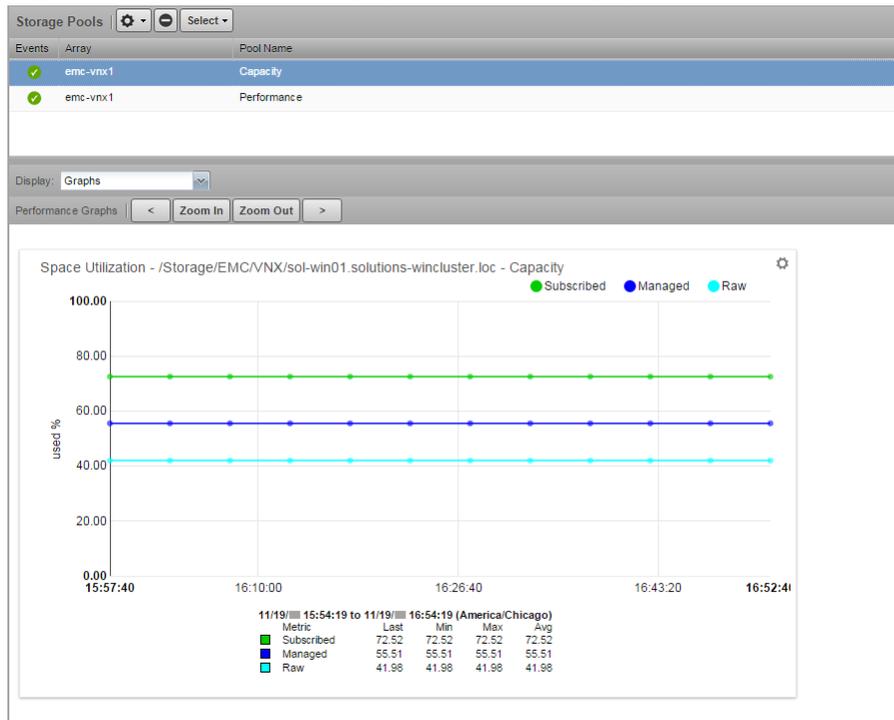
Review storage capacity and utilization by drilling into the storage infrastructure. Based on your findings, you can determine whether a resource is oversubscribed or experiencing other issues. You can then make necessary adjustments to correct the problem. This procedure provides examples for an EMC device and a NetApp filer.

- 1 Navigate to the **Infrastructure** page.
- 2 In the left pane, expand the **Storage** organizer.
- 3 In the right pane, click a storage device.
The device's overview page appears.
- 4 In the left pane, drill down into the device's component list. For example:

- For an EMC device, click **Storage Pools**.

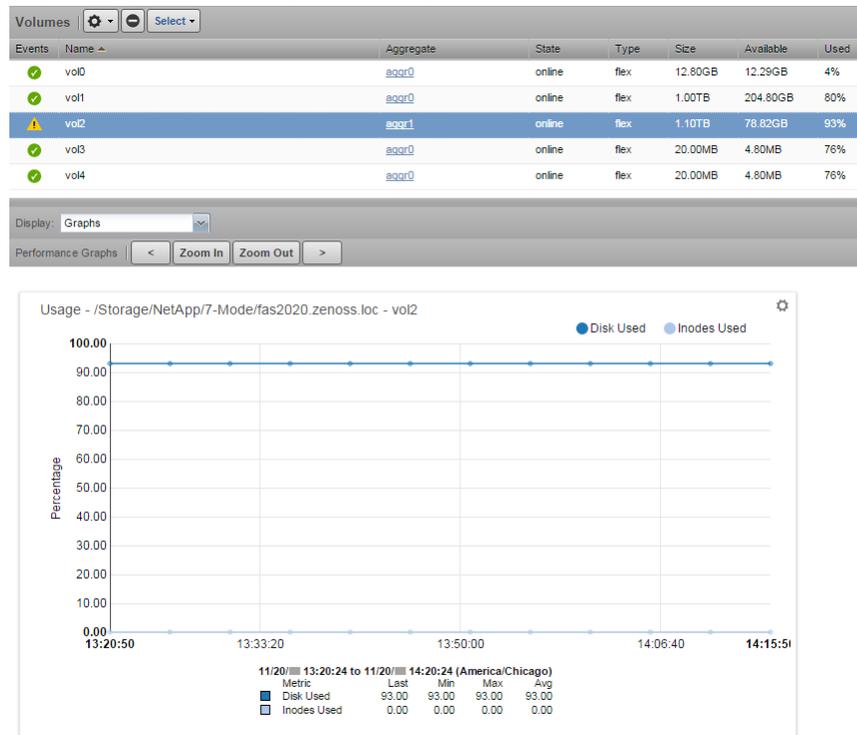
The **Storage Pools** page includes a list of arrays with the corresponding graphs for the selected array. The following example of the **Space Utilization** graph shows the current subscribed, managed, and raw percentages for the selected storage pool. **Raw** represents the raw disk capacity minus RAID and other overhead. In this case, the **Subscribed** value appears to be oversubscribed when compared to the **Managed** and **Raw** percentages. You can address the **Subscription** percentage by adding drives to the pool.

Figure 50: Space Utilization graph for EMC storage pools



- For a NetApp filer, click **Volumes**.

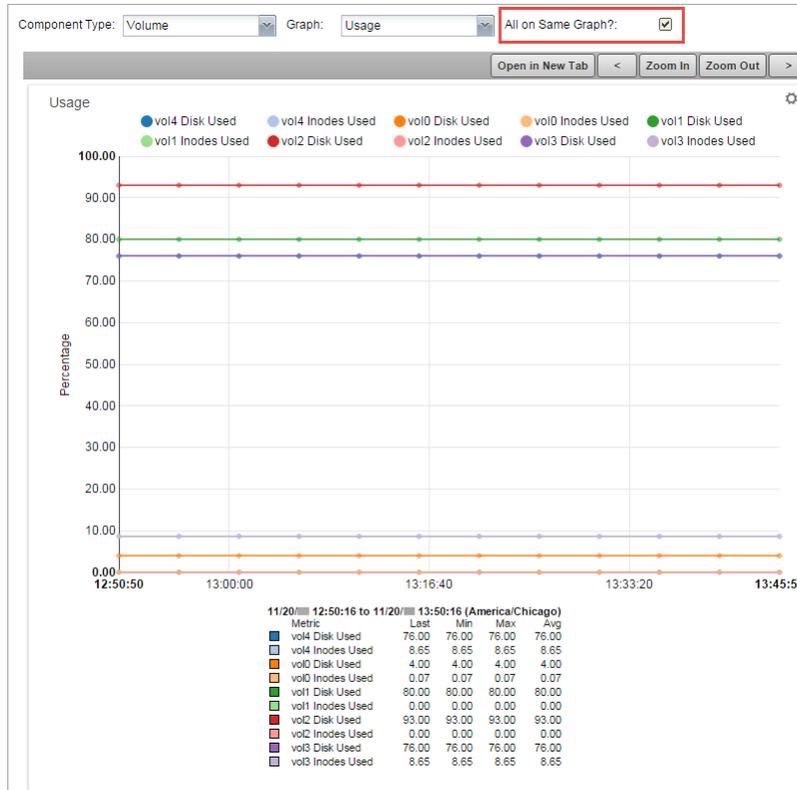
The **Volumes** page includes a list of volumes with corresponding graphs for the selected volume. The following example shows that **vol3** is at 93% utilization, leaving 78.82GB available out of the total 1.10TB of space. The graph also depicts 93% current usage.

Figure 51: NetApp Usage for a single volume

- 5 To review information and graphs for another component, in the left pane, select the component.
- 6 To see view multiple components of the same type on a single graph:
 - a In the left pane, click **Component Graphs**.
 - b At the top of the graph page, from **Component Type**, select an option.
 - c From **Graph**, select an option, and then click **All on Same Graph**.

The following example graph shows usage for all volumes on the same graph.

Figure 52: Usage graph for all NetApp volumes

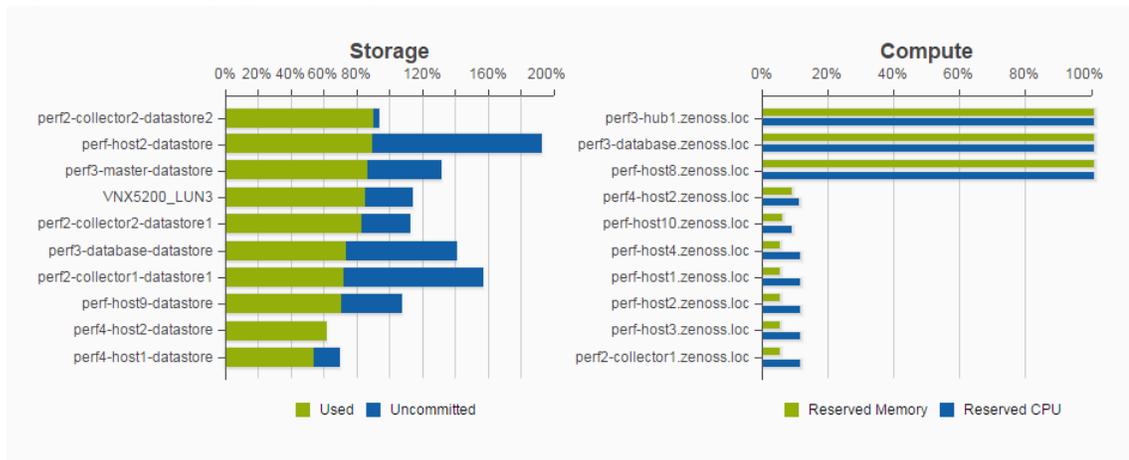


- d To hide or show data for a component, in the graph's upper legend, click the component name. **All on Same Graph** provides a quick visual perspective on where potential storage issues exist and where you have extra storage space that can help alleviate a problem.
- e To display a list of dependents and dependencies for the selected storage component, click **Dependency View**.

Reviewing hypervisor storage

Cisco UCS Performance Manager supports vSphere and Hyper-V devices, which provide local storage. Review storage information to identify oversubscribed resources and those that have extra capacity.

- 1 Navigate to **Infrastructure > Devices**, and then select a virtual device:
 - For a vSphere device, select **vSphere**.
 - For a Hyper-V device, select **Server > Microsoft > HyperV**.
 For the top ten datastores and hosts, storage and compute information appears.

Figure 53: Storage graph for hypervisor

Viewing capacity utilization of storage devices

Before you can display data for storage devices (for example, EMC and NetApp) and the vCenter server appliance, you must model the devices and monitor them. After you model and monitor these devices, storage capacity information appears.

Use the **Storage Capacity** portlet to view capacity utilization of currently modeled and monitored storage devices.

Figure 54: Storage Capacity portlet

Client	LUN / Export	Volume	Pool	Array
	/vol/vol2	vol2	aggr1	fas2020.zenoss.loc
	/vol/vol2/lun1	vol2	aggr1	fas2020.zenoss.loc
	/vol/vol1	vol1	aggr0	fas2020.zenoss.loc
VNX1_Datastore_LUN0	LUN_0	LUN_0	Performance	emc-vnx1
VNX1_Datastore_LUN0	LUN_0	LUN_0	Performance	emc-vnx1
	/vol/vol4	vol4	aggr0	fas2020.zenoss.loc
	/vol/vol3	vol3	aggr0	fas2020.zenoss.loc
	/vol/vol3/rdmlun1	vol3	aggr0	fas2020.zenoss.loc
	/vol/vol4/rdmlun2	vol4	aggr0	fas2020.zenoss.loc
VNX1_Datastore_LUN1	LUN_1	LUN_1	Capacity	emc-vnx1
VNX1_Datastore_LUN1	LUN_1	LUN_1	Capacity	emc-vnx1

aggr1
99.0% used: 1.1TB / 1.1TB

The **Storage Capacity** portlet uses visual indicators as follows:

- Color shows usage on an exponential curve, between green and red. Green indicates a usage of 50% or less, going up the color spectrum to red, which typically indicates a usage greater than 90%.
- Gradient becomes darker as the percent usage increases.
- As the percent usage increases, the colored gradient bar lengthens.
- Hover over a colored bar to display the component's actual percentage used.

The **Client** column displays the device that uses the storage component. N/A in the column means that no devices are using that storage component, or the client device itself is not being monitored.

- 1 Add the **Storage Capacity** portlet to the **Dashboard**, as described in [Adding a portlet to the Dashboard](#) on page 8.

- By default, components with the highest LUN/Export, volume, and pool utilization are listed first. To view a different perspective on storage capacity, click a column heading and choose **Sort Ascending** or **Sort Descending**.
- With the portlet added to the **Dashboard**, hover over an item to view a tooltip with current usage and capacity information. For example:

Figure 55: Storage Capacity tooltip



- To investigate a specific resource, click the client name hyperlink. The component's page appears.

Figure 56: Datasets page



- To continue working with the selected component, review the available graphs or select an option from the **Display** drop-down menu.

Analyzing storage utilization versus capacity

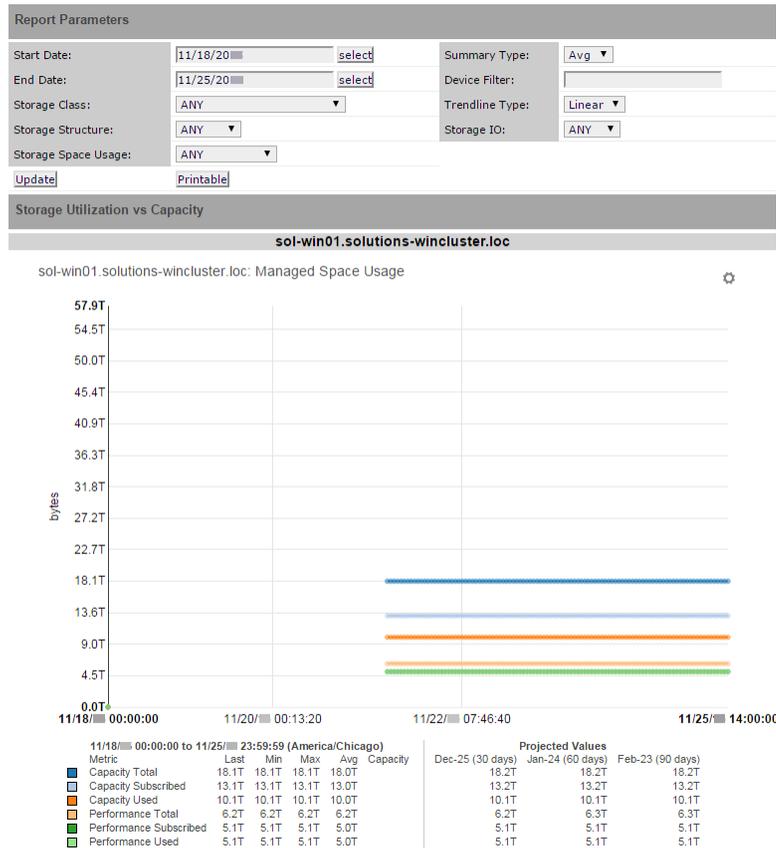
Cisco UCS Performance Manager automatically generates the **Storage Utilization vs. Capacity** report when you select the report. You can customize the report by setting report parameter options. Use information in the report to determine whether to make adjustments to your overall storage utilization plan.

The **Storage Utilization vs. Capacity** report is only available with a full Cisco UCS Performance Manager license.

- Navigate to the **Reports** page.
- Expand **Cisco UCS Capacity Reports** and click **Storage Utilization vs. Capacity**.

The report using the default settings appears. The report contains information for the last seven days and includes all currently monitored storage classes and structures.

Figure 57: Default Storage Capacity vs Utilization report



- 3 Review the current **Report Parameter** settings.
- 4 To review graphs available in the report, scroll down.
- 5 To print the report, click **Printable**.
- 6 To modify the report:
 - a Select start and end dates.
 - b Select options from the **Report Parameter** drop-down menus.
 - c Click **Update**.

Working with capacity projections and finding available capacity

4

This chapter describes how to work with projected capacity exhaustion dates, trend lines, and predictive thresholds.

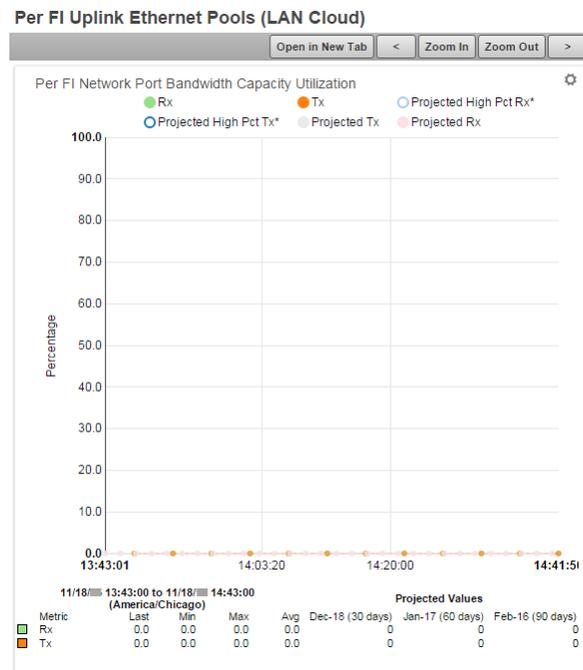
Cisco UCS Performance Manager helps you determine where available remaining capacity exists in your system. You can then alter resource allocation to make use of the available remaining capacity and alleviate over-subscription to other components.

Usage and available remaining capacity data is available for individual ports, or collectively by role in the **Aggregation Pools** view. Aggregation pools are logical bundles of multiple physical network interfaces within a UCS domain, and are similar to network device port channels.

Viewing projected bandwidth exhaustion dates

From the **Bandwidth Usage** view, you can see the projected capacity exhaustion dates for both Rx and Tx. The projected exhaustion dates alert you to a potential bandwidth issue before a threshold is crossed.

- 1 Navigate to the **Infrastructure** page.
- 2 Expand the **CiscoUCS** organizer and select a device.
The device's overview page appears.
- 3 In the left pane, click **Components > Fabric Interconnects**.
The **Fabric Interconnects** page appears.
- 4 In the left pane, click **Bandwidth Usage**.
The **Bandwidth Usage** page appears, and by default, lists the network-related components that belong to the device.
- 5 To view the device's network-related components, beside **Group By**, click **Network**.
- 6 Expand the component names until you reach a fabric interconnect uplink.
- 7 To view the **Projected Values** in the **Bandwidth Capacity Utilization** graph, highlight the row of the uplink.
If there is not enough collected data to make a projection, the projected values are zero.
- 8 To see **Projected Tx Date** and **Projected Rx Date**, use the horizontal scroll bar in the table.
- 9 Review graphs on the right side of the page. (The graphs vary by component.)
 - a To view the currently defined thresholds in a **Bandwidth Capacity Utilization** graph, click **Projected High Pct Tx*** and **Project High Pct Rx***.
 - b To move the graph along the time-line, click the right arrow.
 - c To view details for a particular data point, hover over the graph.

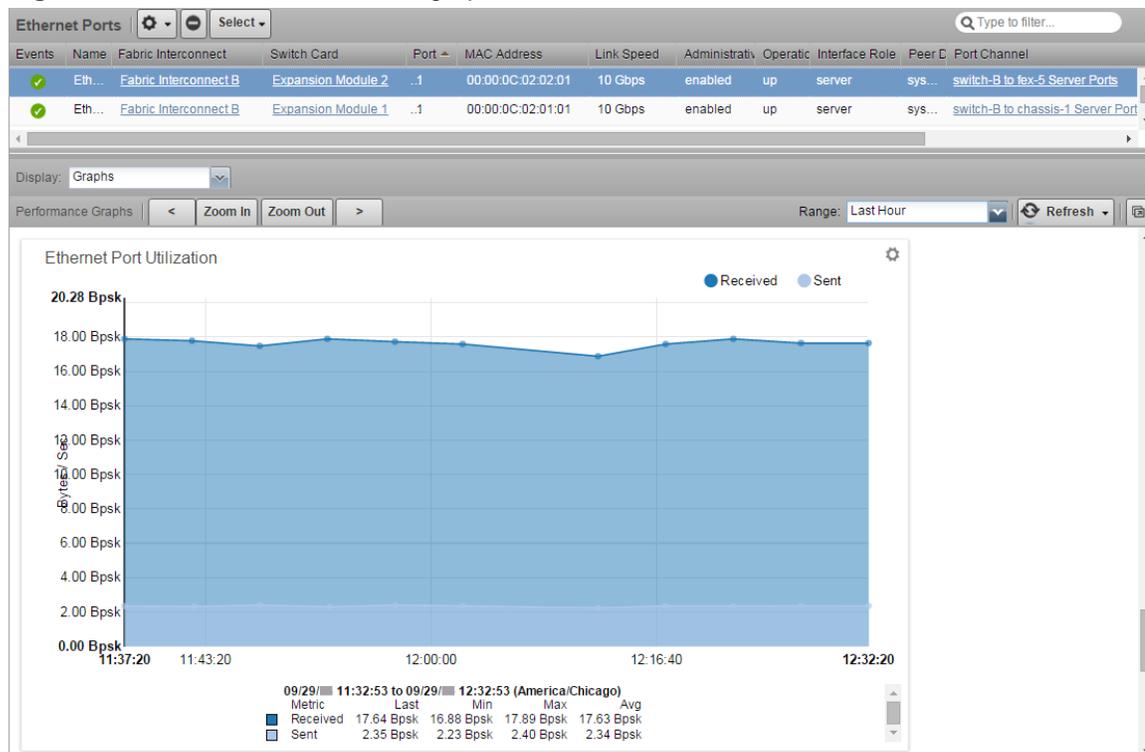
Figure 58: Graph with projected exhaustion dates

- d To export the graph data, click the gear icon and select **Export to CSV**.

Finding remaining capacity for components

You can determine available remaining capacity values for most system components. The following example shows how to determine the remaining capacity for an Ethernet port.

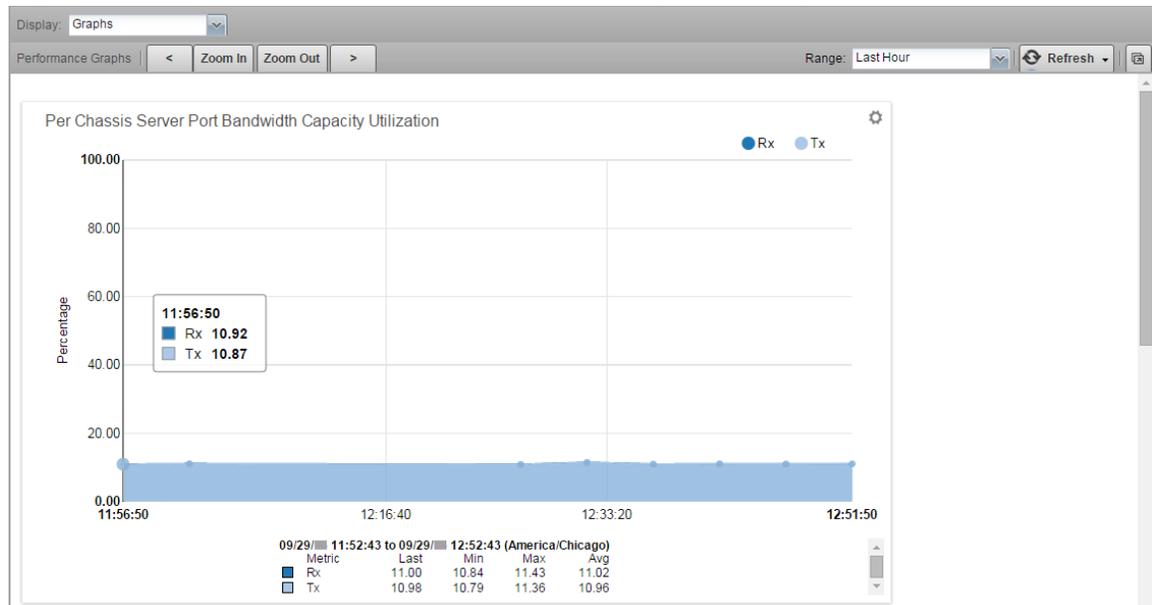
- 1 Navigate to the **Infrastructure** page and expand the **CiscoUCS** container.
- 2 Select a device.
The device's overview page appears.
- 3 In the left pane, click **Components > Ethernet Ports**.
The page displays Ethernet ports information at the top and performance graphs at the bottom.
- 4 Click a port name that has a value listed in the **Port Channel** column.
- 5 Review graphs for bandwidth capacity and Ethernet port utilization.

Figure 59: Ethernet Port Utilization graph

Finding remaining capacity for an aggregation pool

An *aggregation pool* is a logical bundling of multiple physical network interfaces, commonly known as a *port channel*. For example, the **Per Chassis Ethernet Pool** includes all links from all chassis to all fabric interconnects, and is used for chassis bandwidth balance comparison. The following example shows how to find remaining capacity for an aggregation pool.

- 1 Navigate to the **Infrastructure** page and expand the **CiscoUCS** organizer.
- 2 Select a device.
The device's overview page appears.
- 3 Click **Components > Aggregation Pools**.
The page displays aggregation pool information at the top and performance graphs at the bottom. .
- 4 Review the **Per Chassis Server Port Bandwidth Capacity Utilization** graph.

Figure 60: Per Chassis Server Port Bandwidth Capacity Utilization graph

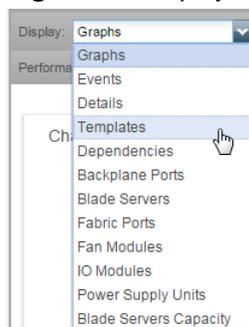
For more information about aggregation pools, refer to the *Cisco UCS Performance Manager Administration Guide*.

Creating a predictive threshold

A threshold defines a value that a data point should not go beyond. When a threshold is reached, Cisco UCS Performance Manager generates an event. You can customize an existing default threshold or create a new threshold.

The following procedure shows you how to create a predictive threshold for a chassis.

- 1 Modify the graph template:
 - a Navigate to the **Infrastructure** page and expand the **CiscoUCS** organizer.
 - b Select a device.
The device's overview page appears.
 - c Click **Components** > **Chassis**, and then select a chassis.
 - d From the **Display** drop-down menu, choose **Templates**.

Figure 61: Display menu

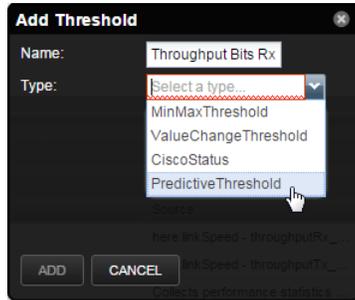
- e From the **Template** drop-down menu, choose **UCSCapChassis**.

Figure 62: Template menu



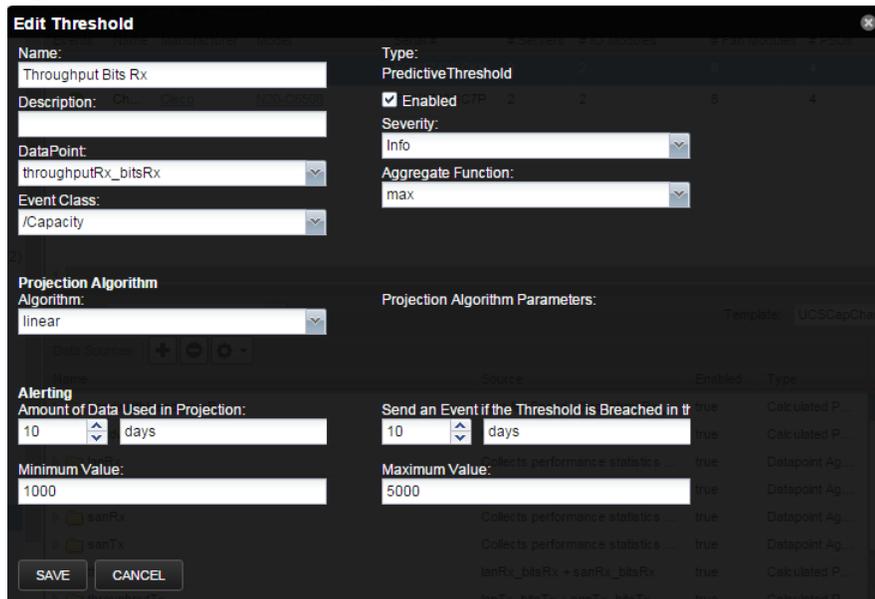
- 2 Create a new threshold:
 - a To the right of **Thresholds**, click +.
 - b Enter a name for the threshold; for example, *Throughput Bits Rx*.
 - c For the type, select **Predictive Threshold**.

Figure 63: Add Threshold dialog box



- d Click **Add**.
The new threshold is added to the **Thresholds** table.
- 3 Edit the threshold values:
 - a Double-click the new threshold name.
The **Edit Threshold** dialog box appears.
 - b From the **DataPoint** drop-down menu, select **throughputRx_bitsRx**.
 - c In the **Minimum Value** and **Maximum Value** options, enter numeric value.

Figure 64: Edit Threshold dialog box



- d Click **Save**.
The new predictive threshold is added to the device.

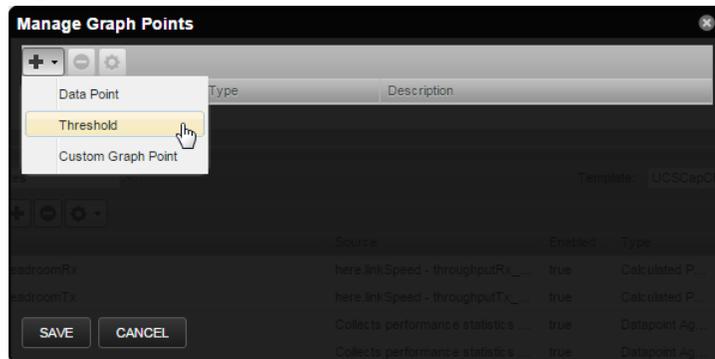
Adding a trend line to a graph

Trend lines show the projected utilization of a device or component over a specified time range.

Before completing this procedure, create a new predictive threshold, as described in [Creating a predictive threshold](#) on page 59.

- 1 Navigate to the **Infrastructure** page and expand the **CiscoUCS** organizer.
- 2 Select a device.
The device's overview page appears.
- 3 Select **Components** > **Chassis**, and then select a chassis.
- 4 From the **Display** drop-down menu, choose **Templates**.
- 5 Create a new graph, or choose an existing graph.
- 6 From the action drop-down menu, select **Manage Graph Points**.
The Manage Graph Points dialog box appears.
- 7 Click + > **Threshold**.

Figure 65: Manage Graph Points



- 8 Select the threshold (for example, **Throughput Bits Rx**), and then click **Submit**.
- 9 In the **Manage Graph Points** dialog box, click **Save**.
- 10 To view the trend line, change the **Display** drop-down menu to **Graphs**, and scroll down to the graph.

Note By default, the trend line calculation includes only the last ten days of data. There might not be enough data to see the trend line appear on the graph. However, you can view the projected exhaustion dates in the lower right corner.
