



## Cisco UCS Performance Manager User Guide

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# Preface

*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 Installation Guide</i>	Provides detailed information and procedures for installing and upgrading Cisco UCS Performance Manager.
<i>Cisco UCS Performance Manager Getting Started Guide</i>	Provides instruction to your system up and running quickly after installation.
<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 use the system.
<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 Migration Guide</i>	Provides detailed information and procedures for migrating data from Cisco UCS Performance Manager version 1.1.x to version 2.0.
<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.

# 1

## Introduction

---

Cisco UCS Performance Manager provides a web-based, graphical interface that helps you visualize and monitor your Cisco UCS infrastructure. It alerts you to current problems and future, potential problems for both 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, but are not limited to:

- 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

Using the wide array of viewpoints, graphs, and reports that are available in Cisco UCS Performance Manager, you can quickly assess the overall health of your entire infrastructure. When it is necessary, you can drill down to specific components that require attention.

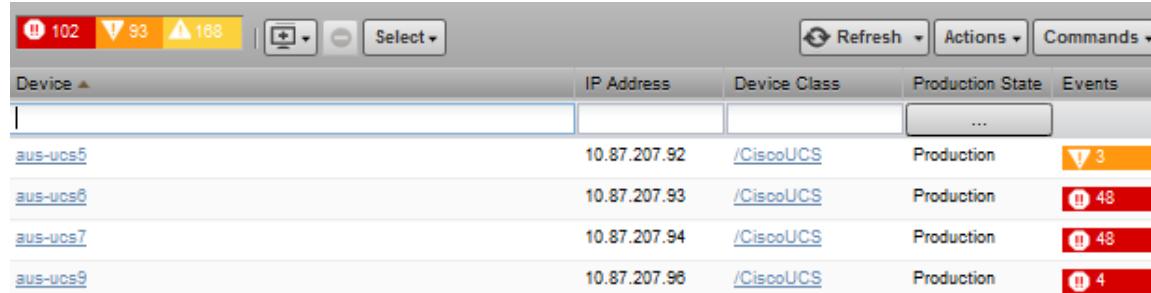
For example, the Dashboard, Topology, and Dynamic View are only some of the views that provide a high-level summary and status of your infrastructure.

Most pages and views contain color-coded indicators and number counts that are 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

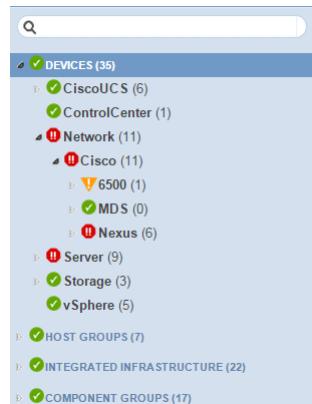
Status indicators are easy to see and interpret, as they display the severity of an event. The following examples show status indicators in the Device view.

**Figure 1:** Device Table with Status Indicators



Device	IP Address	Device Class	Production State	Events
bus-ucs5	10.87.207.92	/CiscoUCS	Production	⚠ 3
bus-ucs6	10.87.207.93	/CiscoUCS	Production	!! 48
bus-ucs7	10.87.207.94	/CiscoUCS	Production	!! 48
bus-ucs9	10.87.207.96	/CiscoUCS	Production	!! 4

**Figure 2:** Devices Navigation with Status Indicators



For every component of your infrastructure, whether it is 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 may also include projected exhaustion dates, and usage trendlines.

Out-of-the-box reports provide current and historical utilization and performance information, in both tabular and graphical format. You can refine the content of a report by using the report configuration options. This will customize the data and give you specific vantage point into the reported data.

This chapter provides a brief introduction to some of the Cisco UCS Performance Manager views, graphs, and reports. For in-depth details on these subjects, 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 also switch between different dashboards using the Dashboards pull-down menu. Dashboards are specific to individual users, so each user can define one or more customized dashboards of their own.

**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

Additional portlets include (but are not limited to):

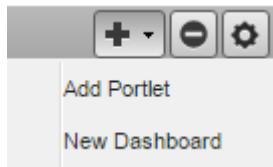
- Chassis Capacity
- Network Capacity
- Server Capacity
- Storage Capacity

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

## Adding a Portlet to the Dashboard

To add a portlet to the Dashboard:

- 1 In the upper, right corner of the Dashboard, click the + button and select **Add Portlet**. The Add Portlet dialog is displayed.

**Figure 4: Add Portlet**

- 2 In the Add Portlet dialog, click the drop-down menu and select a portlet name.
  - 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.

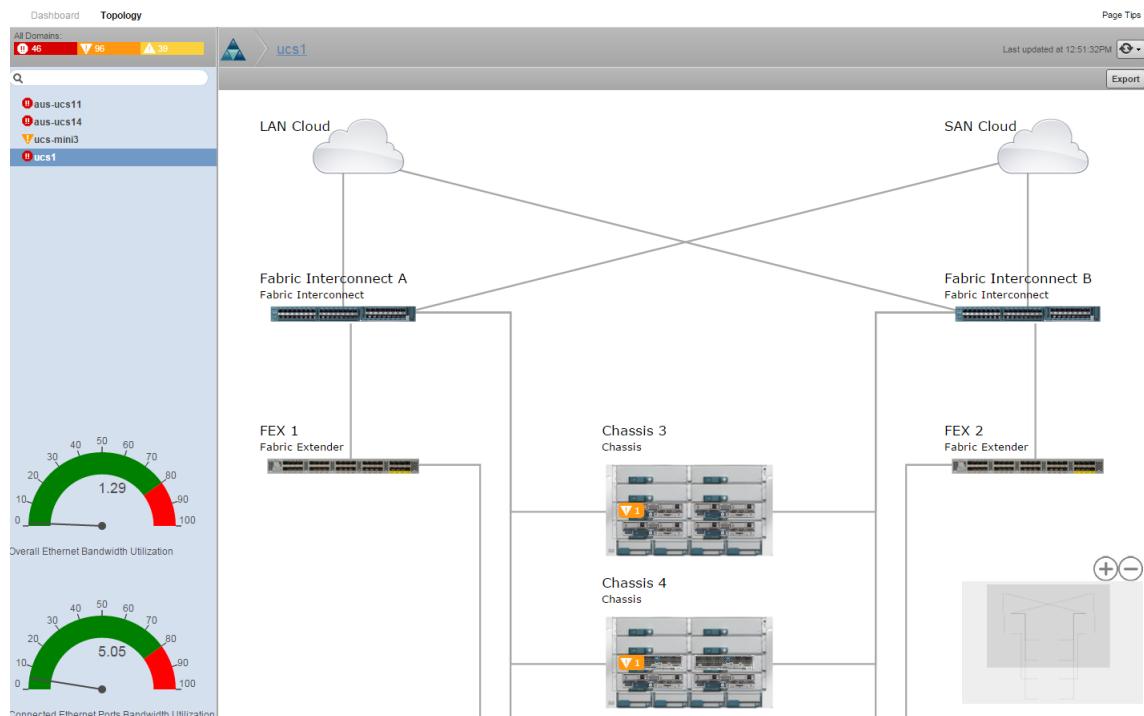
For information on how to further customize the dashboard or create multiple dashboards, refer the *Cisco UCS Performance Manager Administration Guide*.

## Topology View

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

This view shows the event information for all domains in the upper left corner and for each individual domain listed in the Device panel. The Topology view also provides overall bandwidth and port utilization in the gauges located in the lower left corner and event information by component.

Each component, physical connection line, and event on the Topology view is click-able and provides additional information.

**Figure 5: Topology View**

To launch the Topology View:

- Navigate to **Dashboard > Topology**.
- Navigate to **Infrastructure > Devices**, select a device and click **Topology** from the left-side navigation panel.

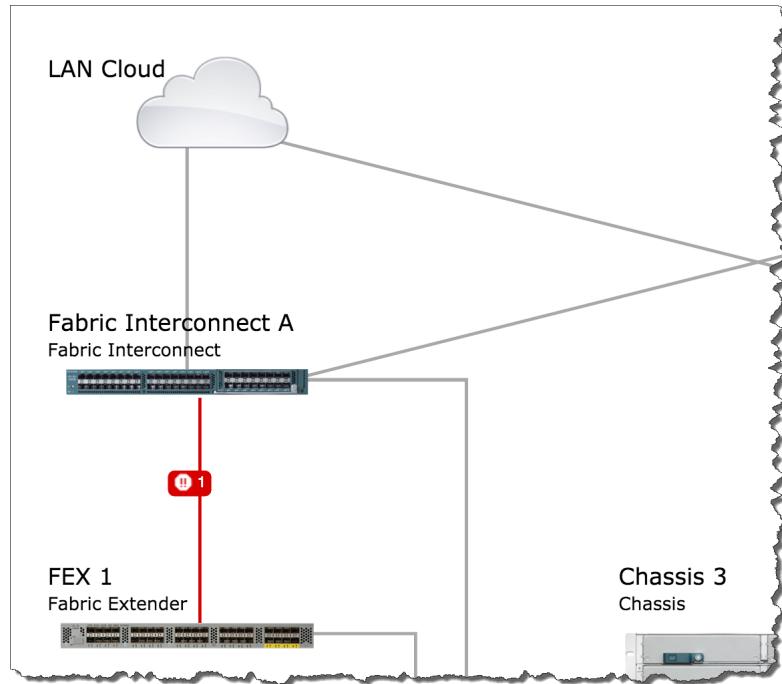
To work with the Topology View:

- Click a network connection, a component, or an event notification icon to see additional information for that item.
- Use the **mini-map** in the lower, right corner to move around the diagram, then click the **+/-** controls to zoom in or out.
- Click the **All Domains** event bar to go the events console.

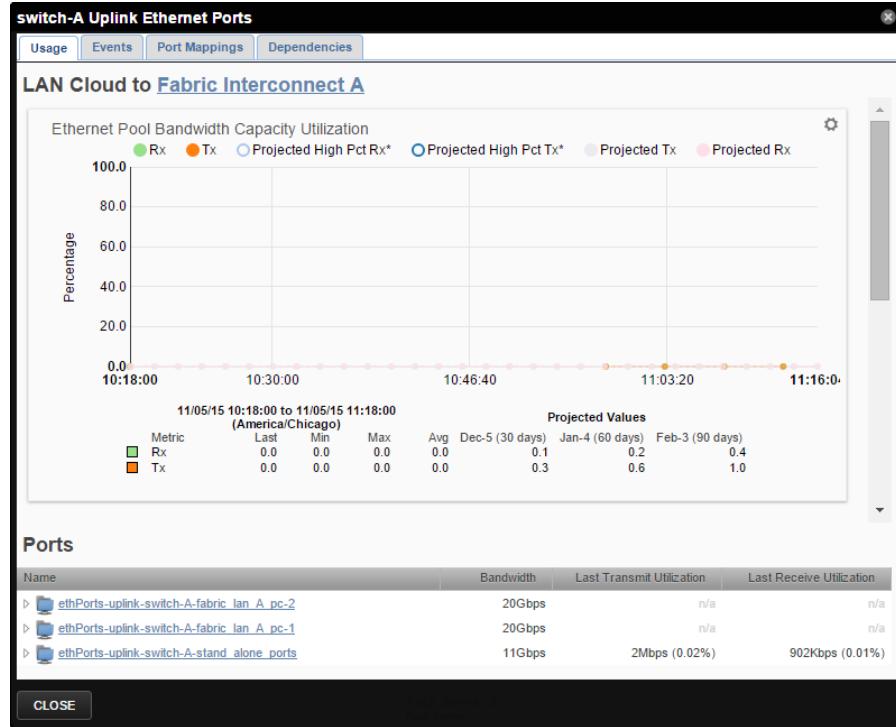
### **Topology-Level Status**

In the Topology View status indicators include color-coded network connection lines drawn between components. For example, a yellow connection line between two components indicates a warning event has occurred on that connection. A colored event icon next to a component indicates an event has occurred on that component.

**Figure 6: Topology View: Critical Event Connection**



You can click any object or any connection to view additional information about the component or the connection between the components. For example, clicking a connection line between a LAN Uplink and the Fabric Interconnect component displays information about Usage, Events, Port Mappings and the Dependencies of the Fabric Interconnect.

**Figure 7:** Ethernet Ports Dialog

The Projected Values shows the projected bandwidth usage over the next 30, 60, and 90 days.

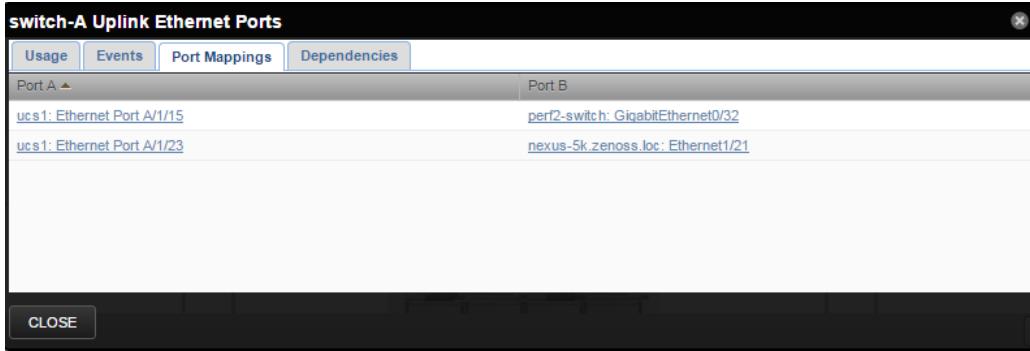
### Using the Topology View to Explore Uplink Connectivity

This procedure provides an example of how you can use the Topology view to explore the uplinks from a Fabric Interconnect. From this view you can quickly get detailed information about the physical connections, all the way down to the slot and port numbers, which can assist you when 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 is displayed.
- 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 is displayed with tabs for **Usage**, **Events**, **Port Mappings**, and **Dependencies**.
- 3 Click the **Port Mappings** tab.  
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 that the uplink connects to.

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 Events Console to view all system-wide events, such as device faults, status events, and performance threshold events.

To access the Events Console:

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



**Figure 9:** Events Console

Event Console							Page Tips	
Status	Severity	Resource	Component	Event Class	Summary	First Seen	Last Seen	Count
...	...	ga-vcenter2.z...	/Status/Pi...	Error communicating with vSphere Endpoint	2015-11-24 10:09:...	2015-11-24 10:53:...	249	
!	Warning	solutions-vce...	10.87.209...	/Perf/Interf...	threshold of Packet Loss exceeded: current value 100.000000	2015-11-23 11:50:...	2015-11-24 10:53:...	1384
!	Warning	solutions-vce...	10.87.209...	/Perf/Interf...	threshold of Packet Loss exceeded: current value 100.000000	2015-11-23 11:50:...	2015-11-24 10:53:...	1384
!	Warning	solutions-vce...	10.87.209...	/Perf/Interf...	threshold of Packet Loss exceeded: current value 100.000000	2015-11-23 11:50:...	2015-11-24 10:53:...	1384
!	Warning	solutions-vce...	10.87.209...	/Perf/Interf...	threshold of Packet Loss exceeded: current value 100.000000	2015-11-23 11:50:...	2015-11-24 10:53:...	1384
!	Warning	ga-vcenter2.z...	/Sphere	modeling failed	2015-11-23 11:50:...	2015-11-24 10:53:...	39841	
!	Warning	ga-88-host-30...	Intel(R) Gi...	/Perf	threshold of InboundErrorsWarning exceeded: current value 248....	2015-11-23 11:55:...	2015-11-24 10:50:...	276
!	Warning	ga-88-host-30...	Intel(R) Gi...	/Perf	threshold of InboundErrorsWarning exceeded: current value 4563...	2015-11-23 11:55:...	2015-11-24 10:50:...	276
!	Warning	ga-88-host-30...	Intel(R) Et...	/Perf	NetConnectionStatus is "Media disconnected".	2015-11-23 11:55:...	2015-11-24 10:50:...	276

**Note** After you add your UCS infrastructure to Cisco UCS Performance Manager, a high number of threshold-related events might be displayed in the Events Console. This 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 particular UCS environment easier to view and understand. For information about how to adjust thresholds see the "Thresholds" section of the *Cisco UCS Performance Manager Administration Guide*.

## Working with the Events Console

The Events Console provides several buttons, menus, and a toolbar that can help you perform common tasks related to events in a quick and efficient manner.

Follow these tips to work with the events table:

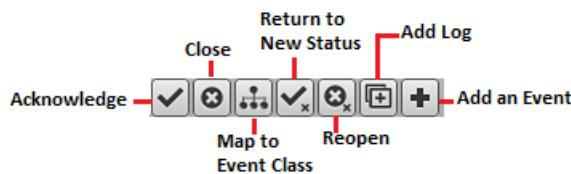
- Double-click an event row (not the Resource, Component, or Event Class hyperlink) to view the event details.
- Use Control-click, Shift-click or **Select > All** to select multiple events.
- Click a column heading to change the sort order or enter a value in the filter text box that appears beneath each 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, typing !!status in the **Event Class** filter will return all of the 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**.
- Click and drag a column heading to a new location to rearrange the order of the columns.
- Click **Refresh** to manually refresh the events or choose a new refresh cycle.
- Click **Export** to save the displayed information in CSV or XML format.
- To customize the events table, select options from the **Configure** menu.
- Use the **Actions** and **Commands** menu to perform administrative operations on the selected resource row(s).

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

## Using the Events Toolbar

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

**Figure 10:** Event Console Toolbar



Click the corresponding toolbar button to perform the following actions:

- Acknowledge an event.
- Close an event.
- Map an event to a specific event class.
- Change an event's status to New.
- Add a log to an event.
- Add (create) a simulated event so that you can test a specific condition.

## Infrastructure

When using Cisco UCS Performance Manager, and in particular, the **Infrastructure** page, you should be familiar with the following terms:

- *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 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

All of these have UCS as the common compute element, Nexus as networking components, and VMware as virtualization.

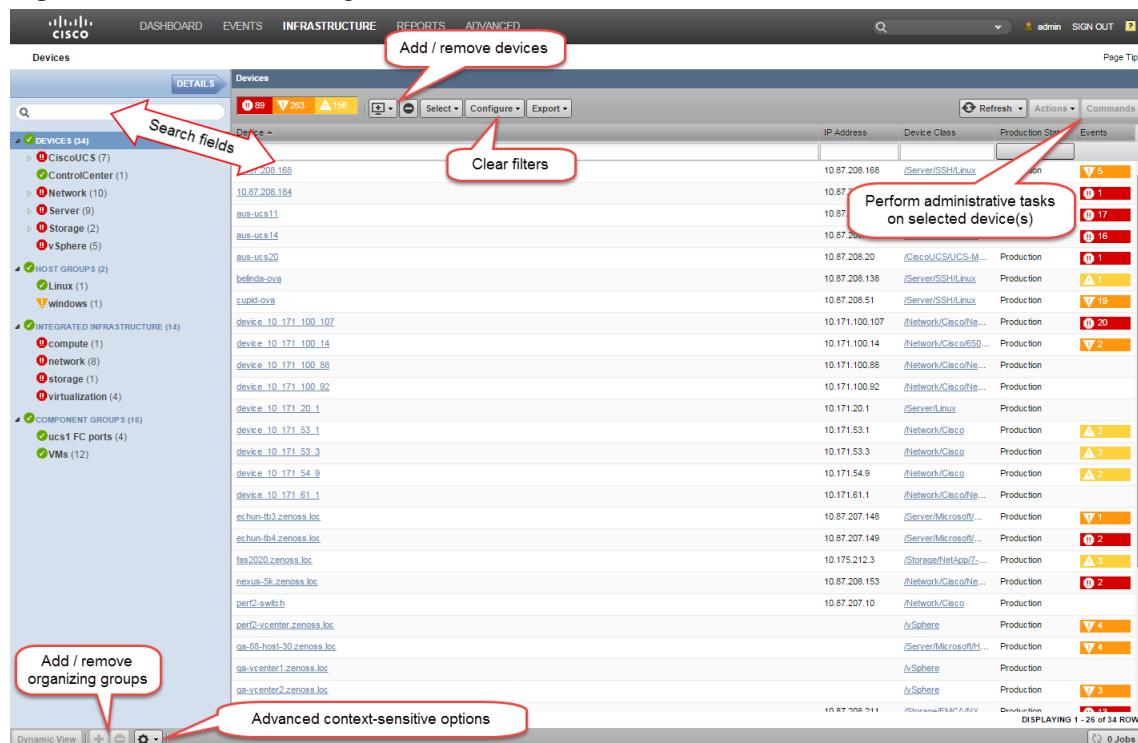
- *Managed resource, resource* — Servers, networks, virtual machines, and other devices in the IT environment.

## Using the Infrastructure Page

To access the Infrastructure page, click **Infrastructure** from the navigation bar at the top of the page.

The Infrastructure page provides several controls and menus that help you find, view, and manage devices. The following illustration highlights several of these tools:

**Figure 11: Infrastructure Page**



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. Click your browser's back button or **Infrastructure** to return to the previous page.

To work with a single device:

- Click the device's hyperlink name.

This opens the device's Overview page, which provides additional information about the device and access to various views, graphs, and the device's individual components. See the following section, *Working with Devices and Components* on page 14, for further detail.

## Exploring Your IT Infrastructure

The left-side navigation on the Infrastructure page, also referred to as the "Devices" panel, provides access to the following device classes and organizing groups:

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

Using the Devices panel on the left side of the page, you can drill into a device class or group to quickly locate a specific device, a group of "common" devices or components, or a "bundled" infrastructure group. Alternatively, you can 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, refer to *Working with Host Groups* on page 22, *Working with Integrated Infrastructure* on page 23, and *Managing Component Groups* on page 26.

## Working with Devices and Components

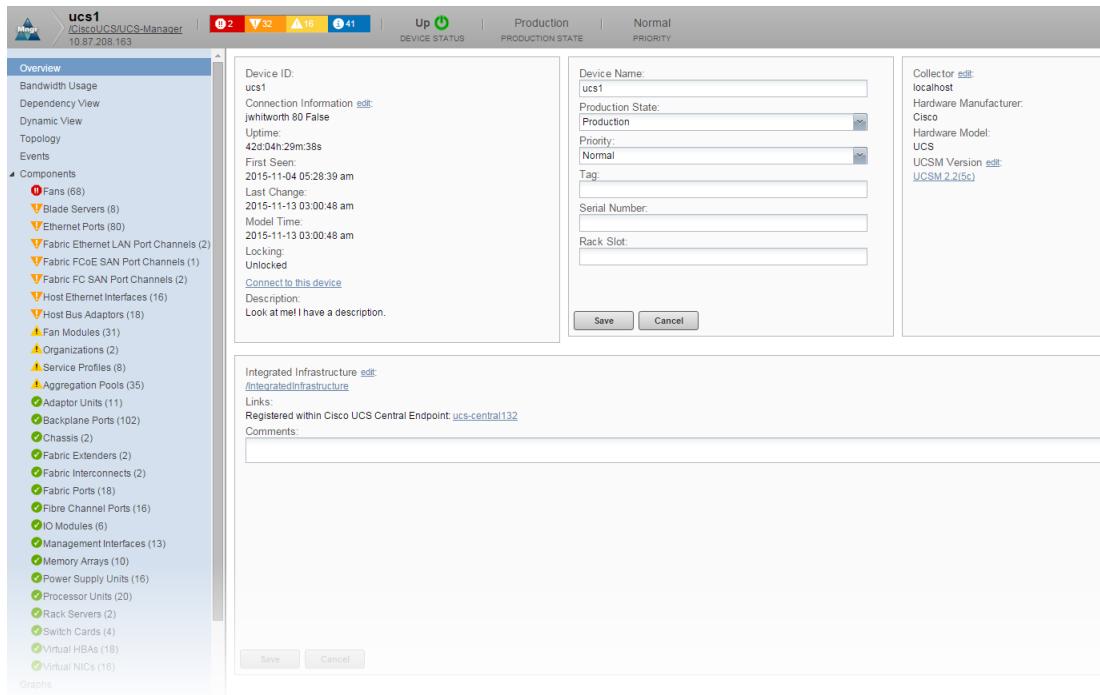
The following procedure explains how to move from working with a device to working with a component and finding detailed information along the way.

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 the component.

- 1 Navigate to the **Infrastructure** page and click a device's hyperlink name under the **Device** column.  
On the right side of the page, the Overview provides additional device detail. Some of these fields are editable.

The left-side navigation panel provides access to different views of the device, Events, an expanded list of Components, Graphs, Component Graphs, Custom Properties, Device Administration, and Monitoring Templates.

**Figure 12:** Overview Page

**2** Select a view, for example **Dynamic View**.

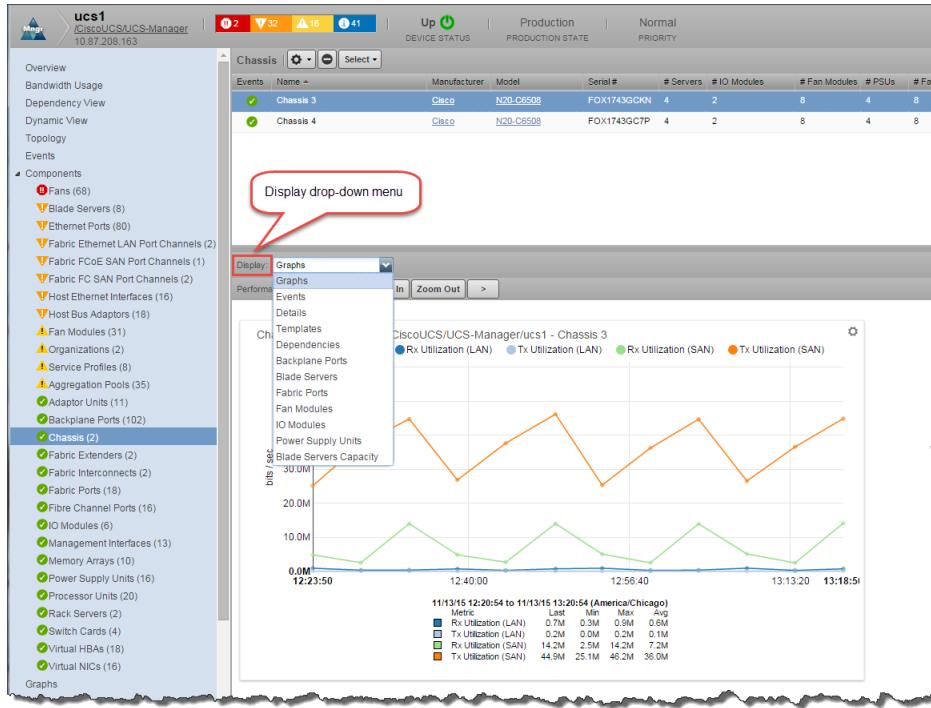
The right side of the page is refreshed with the Dynamic View for this device. The left-side navigation is still visible so you can quickly change the current view, select a component, or choose another option.

**3** From the left-side navigation, select any **Component** you would like to view.  
The component page is displayed.

The top of the page contains a list of the components of the type that you selected.

The lower portion of the page displays graphs for the component selected in the upper portion of the page. If graphs are not available for the component, "No Graph Data" is displayed.

**4** To change the information on the lower half of the page, select an option from the **Display** drop-down menu.

**Figure 13:** Component Page

The lower portion of the page displays the corresponding content.

### Drilling into Device Infrastructure

After selecting a device on the Infrastructure page, you can click a specific component type from the left-side navigation. You can then drill down into the specific component infrastructure to see important details. The following example shows you how to drill down and follow usage from a Fabric Interconnect back to the server.

- 1 To view utilization at the Fabric Interconnect level:
  - a Navigate to **Infrastructure > Devices > CiscoUCS**, then select a UCS Manager device.
  - b Select **Fabric Interconnects**.  
General information and Performance Graphs are displayed for the first Fabric Interconnect in the table.
  - c Scroll through the **Performance Graphs** to see usage and performance information.
- 2 Click **Display > Component Bandwidth Capacity**.  
The average and maximum Rx and Tx for connected components, such as rack servers, Fabric Extenders, and chassis, is displayed.

**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%)

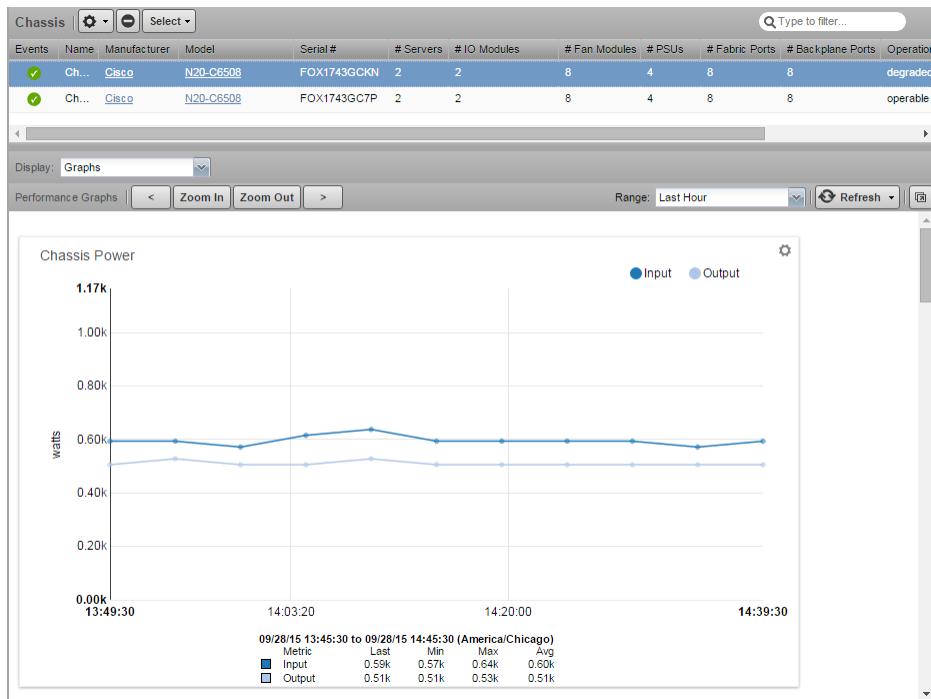
- 3 Change the **Range** to **Last Hour**, **Day**, or **Week** to see historical usage.

**Figure 15:** Range Drop-down Menu

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

- 4 With the Component Bandwidth Capacity still displayed, click the name of a chassis to see utilization and capacity graphs.

The Chassis information and the usage and performance graphs are displayed.

**Figure 16:** Chassis Table and Graphs

- 5 Click **Display > Blade Server Capacity** to see the busiest servers.  
The blade servers for the selected chassis are displayed.
- 6 Click the name of a blade to view the blade server performance and utilization **Graphs**.  
The Blade Servers table and graphs are displayed.
- 7 Select **Display > Service Profile Capacity**.

The Service Profile is displayed in the lower portion of the window and shows the Average and Maximum Utilization for Rx and Tx.

In the upper portion of the window, the Service Profile's manufacturer, model, number of CPUS, and the number of threads and ports is displayed. The operational status, and whether the server is monitored or locked is displayed.

## Working with Graphs

Cisco UCS Performance Manager provides a multitude of graphs for devices and components. The contents of a graph depends on the selected device or component, but typically contains the data points for the managed resource. When viewing a component graph, you can choose to show individual data points or all data points simultaneously. For certain graphs, you can view projected exhaustion dates and trendlines. For more information about projections and timelines, refer to *Working with Capacity Projections* on page 59.

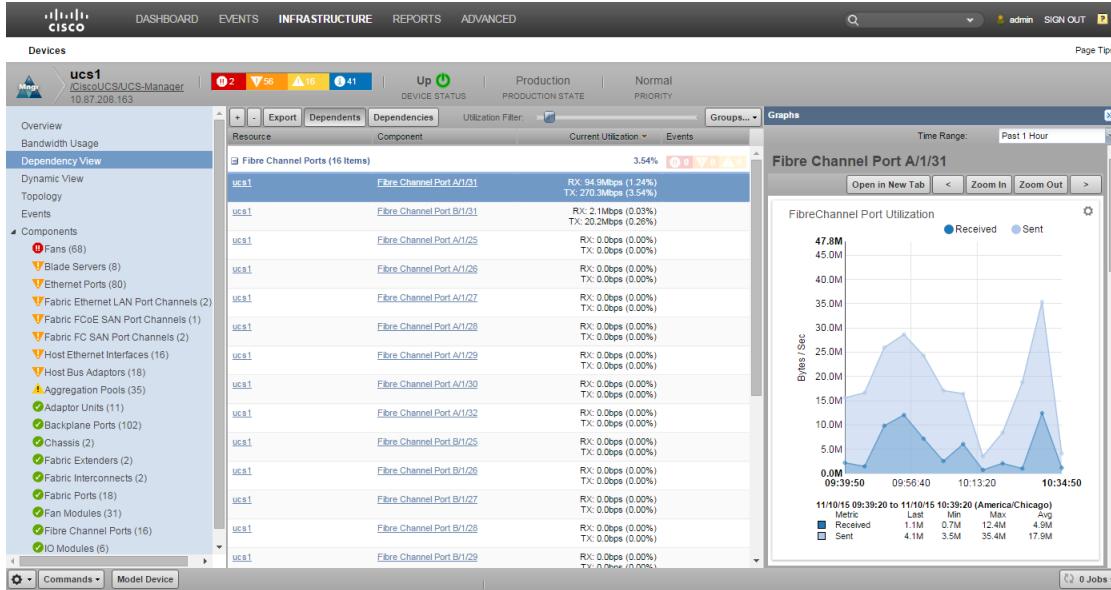
To view device graphs:

- Navigate to the **Infrastructure** page, select a device, and then click **Graphs** from the left-side navigation.

To view component graphs:

- Navigate to the **Infrastructure** page, select a device, and then click **Component Graphs** from the left-side navigation.
- From a device's **Overview** page, click **Dependency View** from the left-side navigation, select a row in the table to view the graphs for the selected component.

**Figure 17: A Component Graph Available in the Dependency View**



To work with graphs, use the graph tools as follows:

- Click **</>** to move the graph view forward or back in time.
- Click **Zoom In / Zoom Out** to narrow or expand the time range displayed in the graph.
- Click **Range** to select a predefined range of time, or choose **Custom** to enter a specific start and end date.
- Hover over a legend description to highlight that particular data set. 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.
- For component graphs, click **All on Same Graph?** to view all data points on the graph at the same time.
- If the graph contains **Projections** in the lower right corner, hover over the information icon to see projected exhaustion dates.
- Use the options available in the **Action** gear to:
  - View the graph definition
  - Export the graph to a CSV
  - Get an HTML link to the graph
  - Expand the graph in a new, standalone window

For information on how to add a trendline to a graph, refer to [Adding a Trendline to a Graph](#) on page 63.

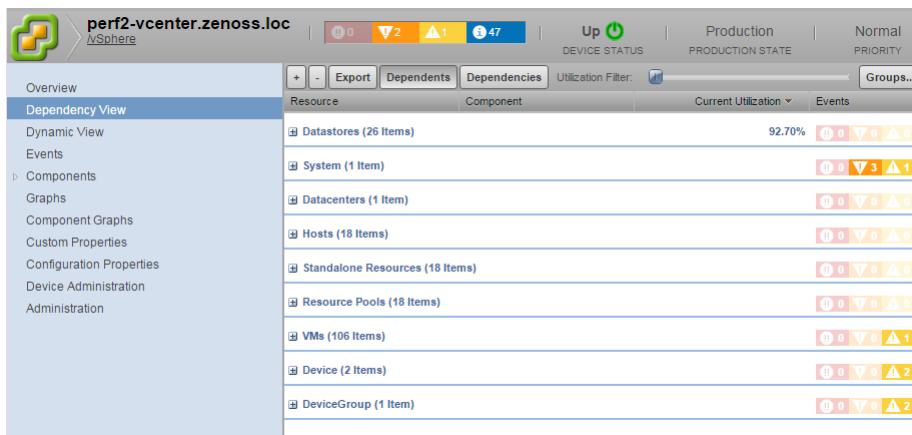
## Using Dependency View

The Dependency View shows you the resources that are dependent on device, as well as the resources that the device depends upon. There are several places where you can see the Dependency view:

- Device Overview page
  - Navigate to **Infrastructure > Devices**, select a device to display the device Overview page, and then click **Dependency View** from the Devices panel.
- Device Component page
  - Navigate to a device Overview page as described above, then expand **Components** in the Device panel, and select the component you are interested in. From the **Display** drop-down list, select **Dependencies**.
- Group Details page (including Host Groups, Integrated Infrastructure, and Component Groups)
  - Navigate to the **Infrastructure > Devices**, then click a group from **Host Groups, Integrated Infrastructure, or Component Groups**. At the top of Devices panel click **Details**. Then, click **Dependency View**.

Regardless of how you navigate to the Dependency View, the functionality remains the same. The following shows a sample Dependency View.

**Figure 18:** Dependency View



To work with the Dependency View:

- Click the + next to a Group name to expand the contents for that group.
- Click the - next to a Group name to collapse the contents for that group.
- Click **Export** to save a copy of the information.
- Click **Dependents** and **Dependencies** to change the view from the resources that depend on the component (Dependents) to the resources the device itself depends upon (Dependencies).

---

**Note** A message is displayed if a resource has no dependents.

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

---

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

- Click **Groups** to change the list of groups currently displayed. Unchecked groups are not displayed. To add a group back to the table, check the group name.
- Click + at the top of the table to expand all groups.
- Click - at the top of the table to collapse all opened groups.

## Using Dynamic View

The Dynamic View displays an architectural overview of your infrastructure and their relationships to other resources. In addition, event information is also displayed for each object in the infrastructure hierarchy.

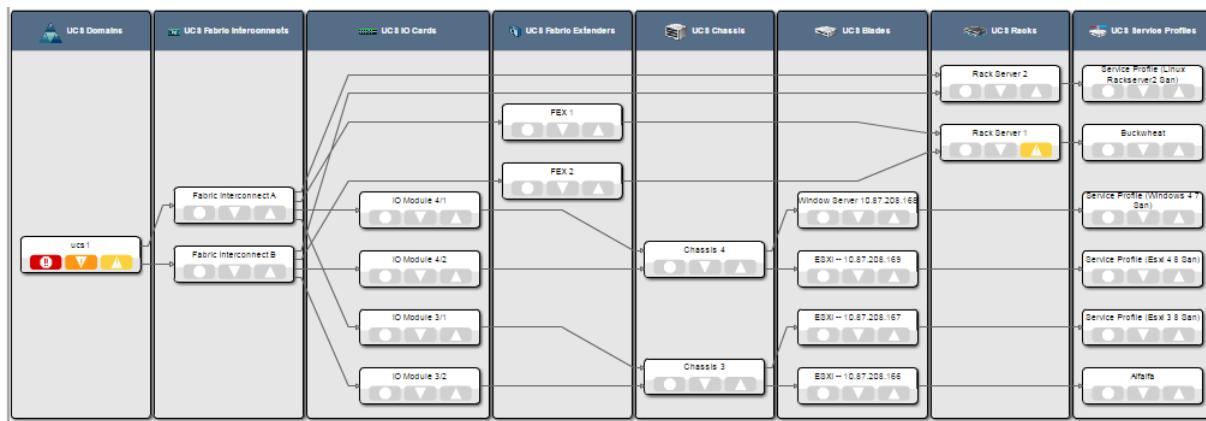
You can access the Dynamic View for the following types of infrastructure:

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

To access Dynamic View:

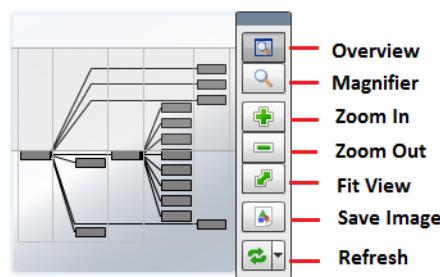
Click **Infrastructure**, select a device, integrated infrastructure or host group, and then click **Dynamic View** from the left-side navigation:

**Figure 19:** Dynamic View

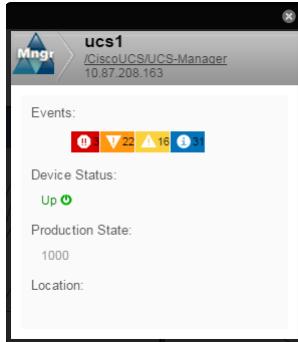


Use the controls located in the upper right corner to change the perspective, save the image, or refresh the image.

**Figure 20:** Dynamic View Controls



Click on an object in Dynamic View to access the Inspector dialog. This dialog contains Events, Device Status, Production Station, and Location for the object.

**Figure 21:** Inspector

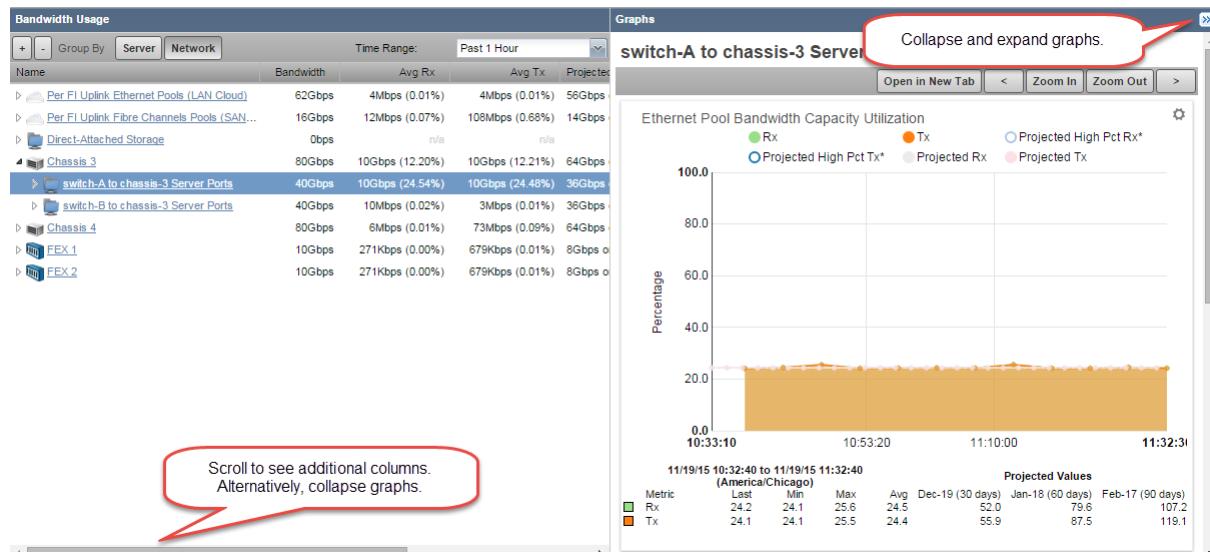
## Using Bandwidth Usage View

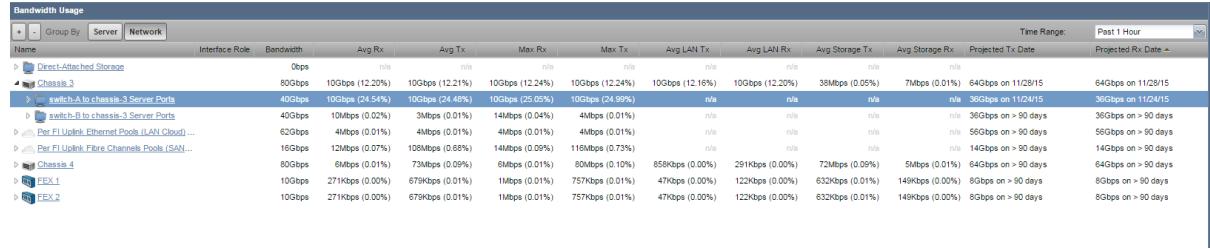
To access Bandwidth Usage View:

- Click **Infrastructure** and select a device to see the device's Overview page. From the left-side navigation, click **Bandwidth Usage**.

Use the Bandwidth Usage View to see bandwidth 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 —Shows the number of days before the maximum capacity will be reached.

**Figure 22:** Bandwidth Usage View with Graphs Expanded

**Figure 23:** Bandwidth Usage View with Graphs Collapsed

To work with this view:

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

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

- Slide the horizontal scroll bar to the right to view additional columns or click the collapse/expand button in the upper right corner of the graph to hide or show graphs.
- Click the down arrow to the right of any column heading and select **Columnsto** to customize which headings appear in the table.
- Click the **Time Range** drop-down menu to select the past hour, past 6 hours, or the past day

To work with the graphs, follow these usage tips:

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

## 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 may 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 using organizational containers. These groups are:

- Host groups
- Integrated infrastructure groups
- Component groups

Groups are easy to create, organize, and traverse and can be based on company organization, function, or location. The following sections describe how to create groups and give examples of how you can use them to monitor health and performance.

### Working with Host Groups

Host Groups allow 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. There are many different use cases for setting up host groups. For example, you can set up different host groups by:

- Operating system type
 

For example, you can have a group for all Windows devices and another group for all Linux devices.
- Geographic location
 

For example, you can groups for all devices in Austin and another group for all devices in London.
- Function
 

For example, all devices in the Finance department, Marketing department, Production systems, Test systems, and so on

### **Creating a Host Group**

To create a host group using devices that are already being monitored:

- 1 Navigate to the **Infrastructure** page to view a list of the monitored devices.
- 2 Click **Host Groups** in the left column.
- 3 Click the **Add** icon in the lower-left portion of the window. The Add Group dialog appears.
- 4 Enter the name and a description of the host group (e.g., Production or Austin). Click **Submit**. The new host group name appears in the left column.
- 5 Click **Devices** or a device class to display a list of monitored devices.
- 6 Select the server (OS) device(s) you want to add to the host group by clicking or control-clicking on each row.

---

**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 device(s) on the name of the host group and accept the move action.
- 8 At anytime, right-click on the name of the host group to refresh the tree or to display it in another window.

### **Working with Integrated Infrastructure**

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**Note** The Integrated Infrastructure functionality is only available with a Cisco UCS Performance Manager license.

Integrated infrastructure is a collection of UCS devices, networking, storage, and virtualization that function as an optimized computing package. Integrated infrastructure includes the following device types:

- Compute — Includes your Cisco UCS and UCS Mini devices that are the primary source of servers or VMs.

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**Note** You cannot add individual servers or VMs to an integrated infrastructure group; however, you can add them to host groups. For more information, refer to *Working with Host Groups* on page 22.

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

- Network — Includes supported switches, such as the Cisco Nexus series.
- Storage — Includes storage devices such as the EMC and NetApp.
- Virtualization — Includes HyperV or VMware hypervisors.

Using Cisco UCS Performance Manager you can create integrated infrastructure groups. These groups are a convenient way to view the system as a combined resource instead of as individual pieces. For example, you can see all combined events for the compute, network, storage, or virtualization resources of the integrated infrastructure.

The following procedures show you how to create an integrated infrastructure group and use the Integrated Infrastructure portlet.

### **Creating Integrated Infrastructure Groups**

You can create an integrated infrastructure group to help you understand and detect issues within that infrastructure.

To create an integrated infrastructure group:

- 1 Navigate to **Infrastructure > Integrated Infrastructure**.
- 2 With the Integrated Infrastructure device class selected, click the **+** button at the bottom of the Devices panel. The **Add Integrated Infrastructure** dialog is displayed.



- 3 Enter a name and description, for example:

```
Name = My UCS Lab
Description = My Development Lab
```

- 4 Click **Submit** to save and dismiss the dialog box.  
The new group is displayed under the Integrated Infrastructure category.
- 5 Add members to the new integrated infrastructure:
  - a Click **Devices** to display the Devices list.
  - b Select the rows of the devices you want you to add, and then drag and drop the rows on top of the new "My UCS Lab" integrated infrastructure group.  
The Copy Devices dialog is displayed.
  - c Click **OK** to confirm and close the dialog.  
My UCS Lab now displays the devices as they are added including a listing of open events and their severity.  
You can refresh the view by right-clicking the new integrated structure name and selecting **Refresh Tree**.

Device	IP Address	Device Class	Production State	Events
fas2020_zenoss_loc	10.175.212.3	/Storage/NetApp7-Mode	Production	V 1
perf2_switch	10.87.207.10	/Network/Cisco	Production	
ucs1	10.87.208.163	/CiscoUCS/UCS-Manager	Production	V 3
ucs1-vcenter_zenoss_loc		/vSphere	Production	V 16

- 6 When you have successfully created and populated your new integrated infrastructure group, you can display information about the group as bundled set of resources. For a few examples, perform the following steps on a integrated infrastructure group.
  - a From the left-side navigation, click **Dynamic View**.  
The Dynamic View displays the hierarchy of the components, organized by type. Components that have open events are also displayed.

**Figure 24:** Dynamic View

- b Under the Integrated Infrastructure category, highlight the integrated infrastructure name, in this example "My UCS Lab," then click **Details** at the top of the Devices panel.

**Figure 25:** Details Button

The Devices panel displays quick access links to **Devices**, **Events**, **Device Administration**, **Dependency View**, and the **Dynamic View**.

- c Click **Events** to see all events for the integrated infrastructure.  
 d Click **Dependency View** to see a list of all dependents and for the integrated infrastructure. If there are no dependent relationships, a message is displayed. To see all dependencies for the integrated infrastructure, click **Dependencies**.

### Using the Integrated Infrastructure Portlet

Before you add the Integrated Infrastructure portlet to the Dashboard, first create an integrated infrastructure group to populate the portlet. For more information, see

The Integrated Infrastructure portlet provides a quick summary of the overall health of the major components of your integrated infrastructure. This portlet summarizes the event information for each area of your integrated infrastructure, which includes:

- Storage — Displays events for storage devices, such as NetApp and EMC.
- Network — Displays events for network devices.
- Virtualization — Displays events for VMs that are part of hypervisor devices.
- Compute — Displays events for Cisco UCS Manager devices.

- 1 To add the Integrated Infrastructure, refer to [Adding a Portlet to the Dashboard](#) on page 7.
- 2 From the newly added Integrated Infrastructure portlet, select an integrated infrastructure (or Host Group) from the portlet drop-down menu:

**Figure 26:** Integrated Infrastructure Portlet

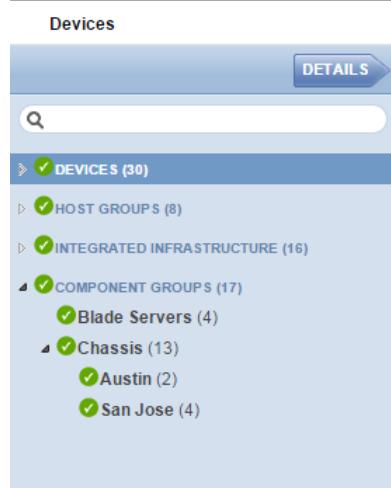
- 3 Click on a **Category**, or its corresponding **Events** bar, to navigate to the Event Console.
- 4 From the Events Console, click a **Resource** or **Component** to go the Overview page for that resource.
- 5 From the Overview page you can easily navigate to additional information, including, but not limited to, Graphs, Component Graphs, the Dependency View, the Dynamic View, and other Components. These 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.

## Managing Component Groups

A monitored device can have a multitude of individual components of a certain type. For example, Cisco UCS device can have a large number of Ethernet ports, blade servers, aggregation pools, and so on. To view and manage components, you can create a logical component group for any type of component.

When you add components to a component group, you can view all of the events for the group in a single location, display component graphs with all of the components on the same graph, and use the Dynamic View and Dependency View to see the group's dependents and dependencies. You can also monitor or lock individual components in the group or the entire group.

The following example shows a component group that consists of chassis, with two nested groups for specific geographical locations. All components added to a group maintain their original permissions.

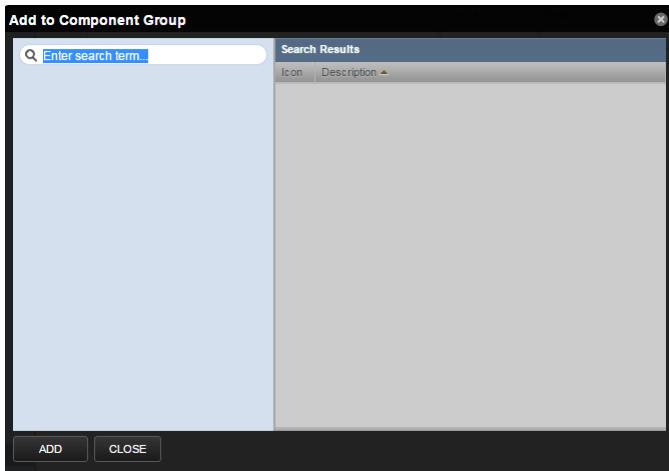
**Figure 27:** Example Component Groups

To create and work with component groups:

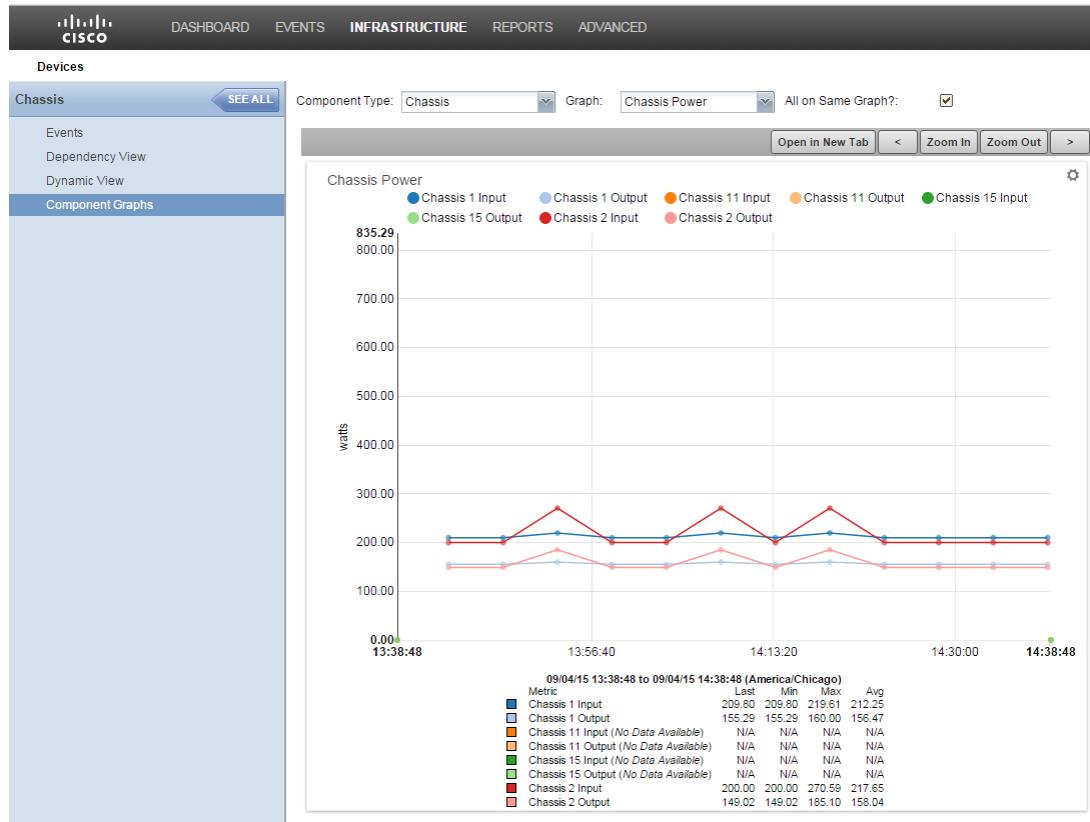
- 1 Navigate to **Infrastructure > Devices**.
- 2 Select the device class **Component Groups**, then click the **+** button at the bottom of the Devices panel. The **Add Component Group** dialog is displayed.

- 3 Enter a suitable **Name**, and an optional **Description**, then click **Submit**.  
The new component group appears under **Component Groups**.
- 4 Under **Component Groups** at the top of the page, click the **Add** button to open the **Add to Component Group** dialog.

**Figure 28:** Add to Component Group Dialog



- 5 In the dialog's search field, enter a component type, such as Blade Servers for example.  
A list of the search for components is displayed in the **Search Results** table.
- 6 Select one or more components, then click **Add**.
- 7 Continue to search for and add components or click **Close** to save the additions and close the Add to Component Group dialog.  
The components are added to the group. You can now work with the new component group. For example:
- 8 To view Component Graphs:
  - a Highlight the new group and click **Details** at the top of the left-side navigation.
  - b Click **Component Graphs**, then check **All on Same Graph**.  
The following example shows all of the chassis in a component group displayed on the same graph. Uncheck this option to see individual graphs for each component.

**Figure 29:** Component Graph

- 9 To view events for the component group, click **Events**.
- 10 To disable monitoring on one or more components, click **See All** at the top of the page.
  - a Select the components you want to disable.
  - b Click **Action > Monitoring**.
  - c Click **Yes** to disable monitoring.

## Reports

Reports provide historical performance data in a tabular or graphical format. To launch the Reports view, click **Reports** from the navigation menu at the top of the window.

For Cisco UCS Performance Manager, the following report categories are available:

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

Each report category contains multiple reports. If you are using a Cisco UCS Performance Manager Express license, a smaller set of reports is available.

Each report has several options that help you define the content of the report.

Several procedures presented later in this guide explain how to create different reports. For detailed information about reports, refer to the *Cisco UCS Performance Manager Administration Guide*.

## Generating a Report

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

To generate a report:

- 1 Click **Reports** from the navigation at the top of the page.  
The Report categories are displayed.
- 2 Expand a report category and select a specific report.  
The report is generated using the default parameters.
- 3 Scroll down to see the report(s).
- 4 If necessary, configure the report options at the top of the report page to customize the displayed data.
- 5 Click the **Action** gear to export the report to a CSV file.

# Understanding Cisco UCS Performance and Capacity Utilization

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2

This chapter shows you how to use Cisco UCS Performance Manager to understand how your Cisco UCS integrated infrastructure is performing. Follow the example procedures in this chapter to determine if resource can handle additional workload using it's remaining capacity, or if it is close to reaching, or has already reached, full capacity.

Using Cisco UCS Performance Manager you can analyze system resources and components to identify potential versus actual capacities. This enables you to:

**Determine how close a component is to maximum capacity.**

This enables you to plan ahead for potential expansion or restructure.

**Determine a component's amount of available remaining capacity.**

This enables you to determine if a device is over-subscribed or has additional resources that can be used to alleviate over-subscription or help eliminate bottlenecks.

**Determine if IO module server ports, Ethernet uplinks, FC uplinks are congested now or historically.**

This enables you to act to alleviate the congestion or potentially forecast when the next cyclic congested event might occur.

**Identify sources of congestion.**

This enables you to explore ways to address the congestion, such as moving service profiles between chassis.

**Determine if virtual or physical workloads and applications are affected by UCS server CPU and memory configuration.**

This enables you to plan for or make changes to the server configurations or hardware components.

**Compare current and historical performance across converged infrastructure components to determine where constraints exist.**

This enables you to identify where the constraints exist and decide if and how the constraints can be removed.

## Working with Service Profiles

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Use the Service Profile portlet for quick, at-a-glance status of all Service Profiles modeled in a specific domain, or across all domains. You get detailed information for a specific profile displayed in this portlet, by clicking the profile name.

To work efficiently with a large number of profiles, use the filter and sort features. The filter works in real-time as you type characters in the filter text box. You can filter on any columns that contain a text string, such as Name, Server, Domain, Type, and so on. The filter even works on hidden columns. The column sort feature works on all columns.

**Figure 30:** Service Profile Portlet

The screenshot shows a table titled "Service Profile" with the following columns: Events, Name, Open, Domain, Server, Organization, Logical Server, Type, Avg CPU Util, Avg LAN Util Rx, Avg LAN Util Tx, Avg SAN Util Rx, and Avg SAN Util Tx. A dropdown menu labeled "Domain" is open, showing options like "ucs1", "ucs-mini3", "ucs1", "aus-ucs14", "aus-ucs20", "aus-ucs11", and "All Domains". The table displays 7 rows of data.

Events	Name	Open	Domain	Server	Organization	Logical Server	Type	Avg CPU Util	Avg LAN Util Rx	Avg LAN Util Tx	Avg SAN Util Rx	Avg SAN Util Tx
ok	Afalfa (Afalfa)	ok	ucs1	...ESXi-10.87.208...	lora-Austin_Lab	...ucs1-3-7.zenoss.l...	vSphere	31.92 %	9Gbps	16Gbps	23Mbps	
ok	Buckwheat (Buckwheat)	ok	ucs1	...Rack Server 1	lora-Austin_Lab	...ucs1-rs1.zenoss.l...	vSphere	9.97 %	48Kbps	7Kbps	372Kbps	
ok	Service Profile (Esxi 3...)	ok	ucs1	...ESXi-10.87.208...	lora-Austin_Lab	...ucs1-3-8.zenoss.l...	vSphere	10.77 %	10Gbps	14Mbps	9Kbps	
ok	Service Profile (Esxi 4...)	ok	ucs1	...ESXi-10.87.208...	lora-Austin_Lab	...ucs1-4-8.zenoss.l...	vSphere	24.75 %	7Gbps	9Gbps	30Mbps	
ok	Service Profile (Linux...)	ok	ucs1	...Rack Server 2	lora-Austin_Lab	...	n/a	4Kbps	65Kbps	n/a	n/a	
un...	Service Profile (Testwi...)	un...	ucs1	...Window Server 10...	lora-Austin_Lab	...ucs1-4-7	Hyper-V	2.40 %	143Kbps	236Kbps	1Kbps	994Kbps

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 Events Console.
- **Name** — Displays the Service Profile name.
- **Operational State** — Displays the operational state of the server defined by the service profile.
- **Domain** — Displays the UCS domain name.
- **Server** — The blade or rack server as defined by the service profile.
- **Logical Server** — The related device associated to 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 defined in the service profile:
  - Hyper-V
  - vSphere
  - Windows server
  - Linux server
- **Organization** — Displays the container hierarchy. For example, organization or root/tier/server name.
- **Local** — A flag indicating if a Service Profile comes from UCS central (unchecked/global) or not (checked/local)

By default, the Service Profile portlet shows Average Utilization for:

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

You can also choose to display the hidden columns for Maximum Utilization for CPU, LAN, and SAN.

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**Note** Utilization information is only provided for hypervisors. To view statistics for Windows and Linux servers, click the Logical Server link.

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To add the Service Profile portlet:

- 1 From the **Dashboard**, click the **Add** icon and select **Add Portlet**.
- 2 In the **Add Portlet** dialog, click the drop-down menu and select **Service Profile**.  
The Add Portlet dialog displays the default settings and a preview of the portlet.
- 3 Optional: Modify the **Configuration** settings.
- 4 Click **Add**.

The Service Profile portlet is added to your Dashboard. The default view is based on the service profile name, in ascending order.

- 5 To change the default view:
  - a To view a different domain, select a domain from the **Domain** drop-down menu.
  - b To view all domains, select **Domains > All Domains**.
  - c To find a specific service profile in a domain, enter the first few characters in of the name in the **Filter** text box.
  - d Click any column heading and select **Sort Ascending** or **Sort Descending**.

## Viewing VMware Farm Information

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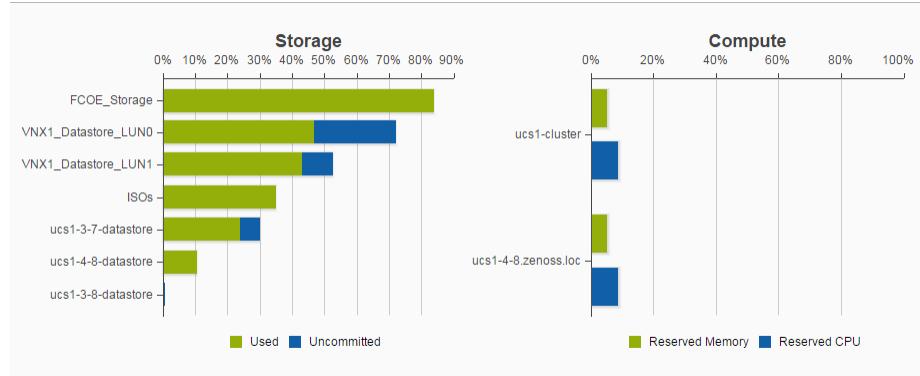
Cisco UCS Performance Manager displays information about VMware farms. It is not necessary to use VSphere or provide vSphere credentials to the entire integrated infrastructure operations team. You can view the top datastores (by percentage used) and the top hosts (based on CPU and memory usage).

To view VMware farm information:

- 1 Navigate to **Infrastructure > Devices > VSphere**.
- 2 Click a VSphere device name.

Storage and Compute information is displayed for the top 10 datastores and hosts. You can use the datastore information to identify oversubscribed resources and those that have extra capacity.

**Figure 31: VM Storage and Compute Statistics**



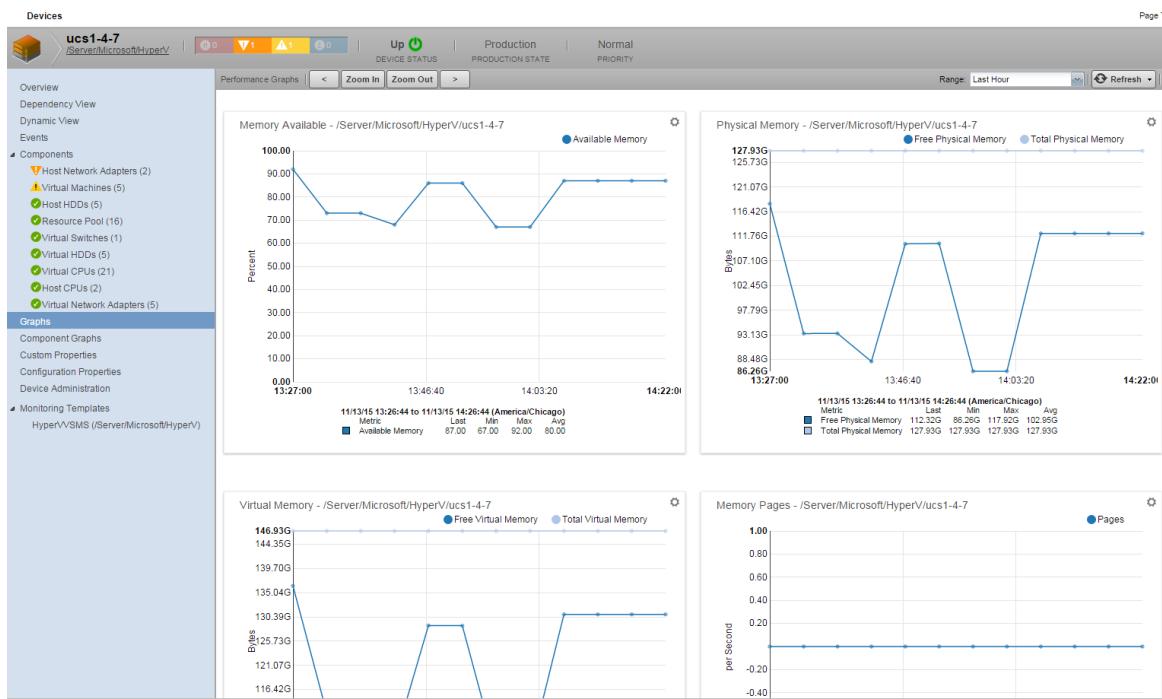
- 3 For OS information, scroll down and review the **OS Model** information on the right side of the page.

## Viewing Hyper-V Information

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To view work with HyperV devices:

- 1 Navigate to **Infrastructure > Devices > Server**.  
The Server list is displayed on right side of the page.
- 2 If you have a large number of servers, you can expand the **Server > Microsoft** category or enter the string "HyperV" in the search box just beneath the **Device Class** column heading.
- 3 Select a Hyper-V device.  
The Overview page for the HyperV device is displayed.
- 4 To performance information, click **Graphs** from the left-side navigation.

**Figure 32:** Hyper-V Performance Graphs

Use the left-side navigation to see additional views, such as the Dependency or Dynamic View, or select a Hyper-V component to drill down for more, detailed information.

## Displaying Operating System Performance

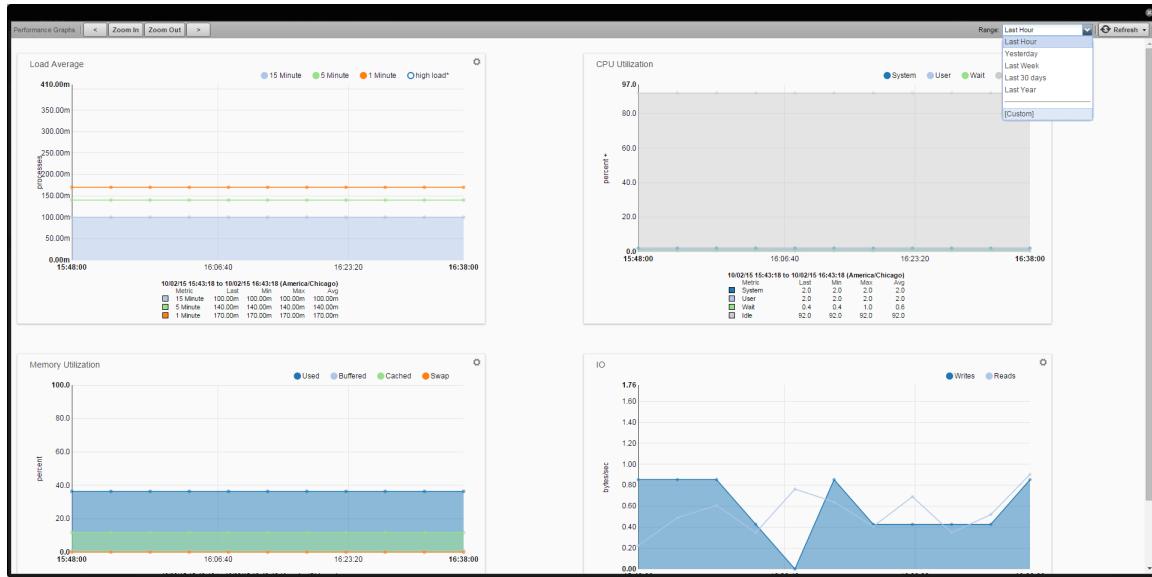
Cisco UCS Performance Manager enables you to survey and monitor operating system performance. You can use it to review historical and real-time performance and usage data of components such as CPU and memory.

To review OS performance information:

- 1 Navigate to **Infrastructure > Devices > Server** to display the list of servers.
- 2 Drill down the server categories to find a server, such as Linux server, for example.
- 3 Click the device name.
- The device Overview page is displayed. This page describes the OS model and version.
- 4 From the Device panel, click **Graphs**.

The following graphs are displayed:

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

**Figure 33:** Operating System Performance Graphs

- 5 Use the graph tools to and Range drop-down menu to customize the view.

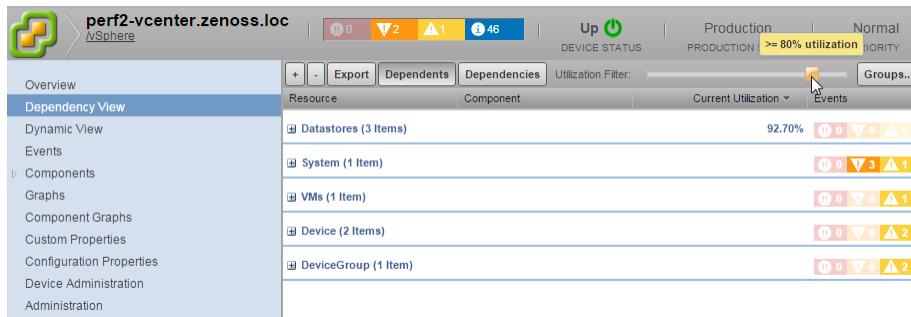
## Using Dependency View to Detect High Utilization

This procedure shows you how to use the Dependency view to quickly locate resources with high utilization. This view provides a Utilization Filter that helps you focus on all resources that meet a specified utilization percentage.

To identify high usage resources:

- 1 Navigate to **Infrastructure > Devices**.
- 2 Under **Devices**, click **Cisco UCS**, then drill down to a UCS Manager device and select it. The Overview page is displayed.
- 3 In the **Overview** panel, click **Dependency View**. The Dependents of this device are displayed. By default all resources currently using  $\geq 0\%$  utilization are displayed.
- 4 Slide the **Utilization Filter** to the right until it reaches  $\geq 80\%$ .

**Note** The 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.

**Figure 34:** Dependents with  $\geq 80\%$  Utilization

- 5 Click **Dependents** to see resources that are dependent on the device.

The Utilization Filter remains at  $\geq 80\%$  when you change the view to dependencies. The filter setting is saved per user, per device, until you change it at some point in the future.

- 6 View graphs for a component. For example:
  - a Click + next to **Ethernet Ports** to expand the group.  
Alternatively, you can click the **Groups** drop-down menu and select a group to expand or collapse the components.
  - 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 side of the page.
  - c Use the graph tools to analyze the graph data.
  - d Click **Export** to save the information to a .csv file.

## Finding the Server with the Highest Utilization in a Domain

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To find the server with the highest bandwidth usage within a domain, you can consult the Dashboard and its portlets. By default, the Dashboard includes the following portlets:

- 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.

You can add additional portlets to enhance the Dashboard capabilities.

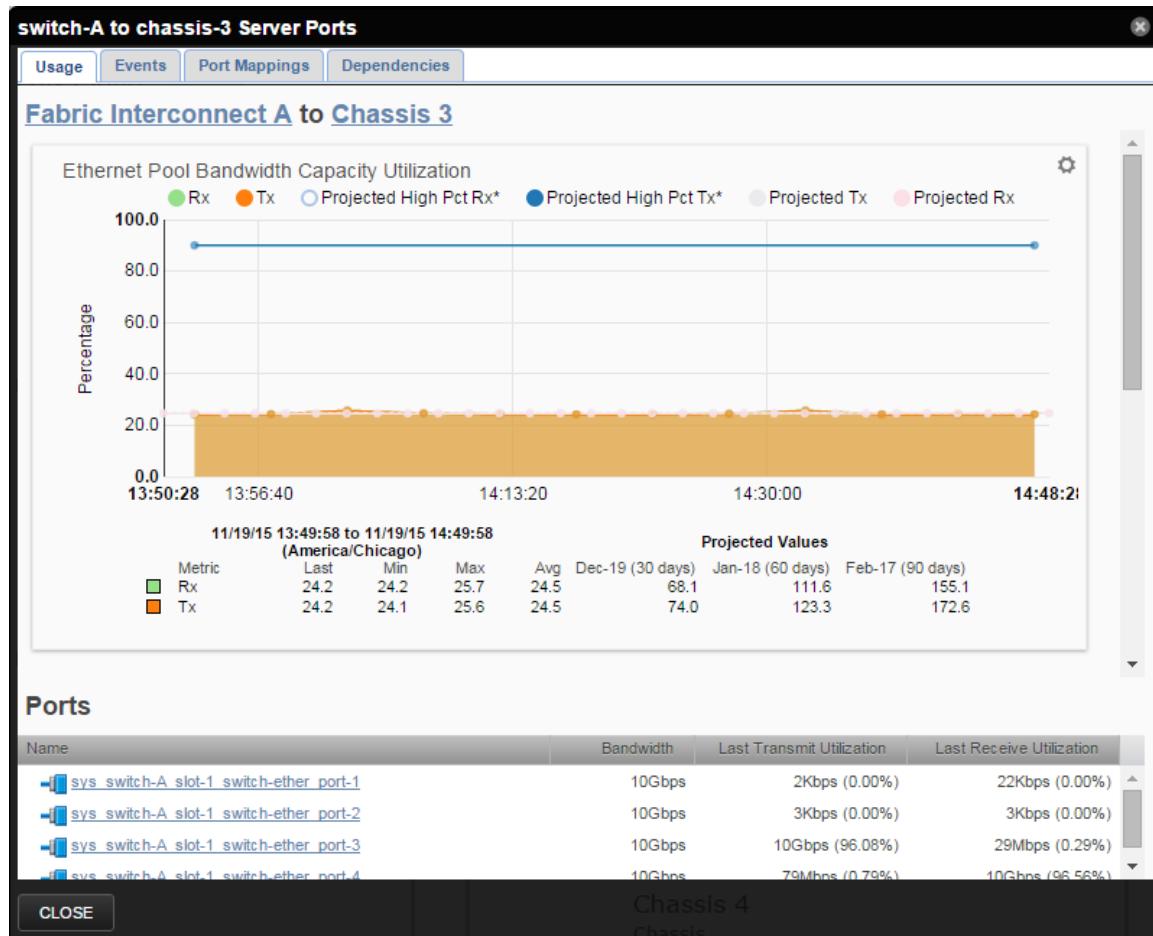
## Determining Chassis Capacity Utilization

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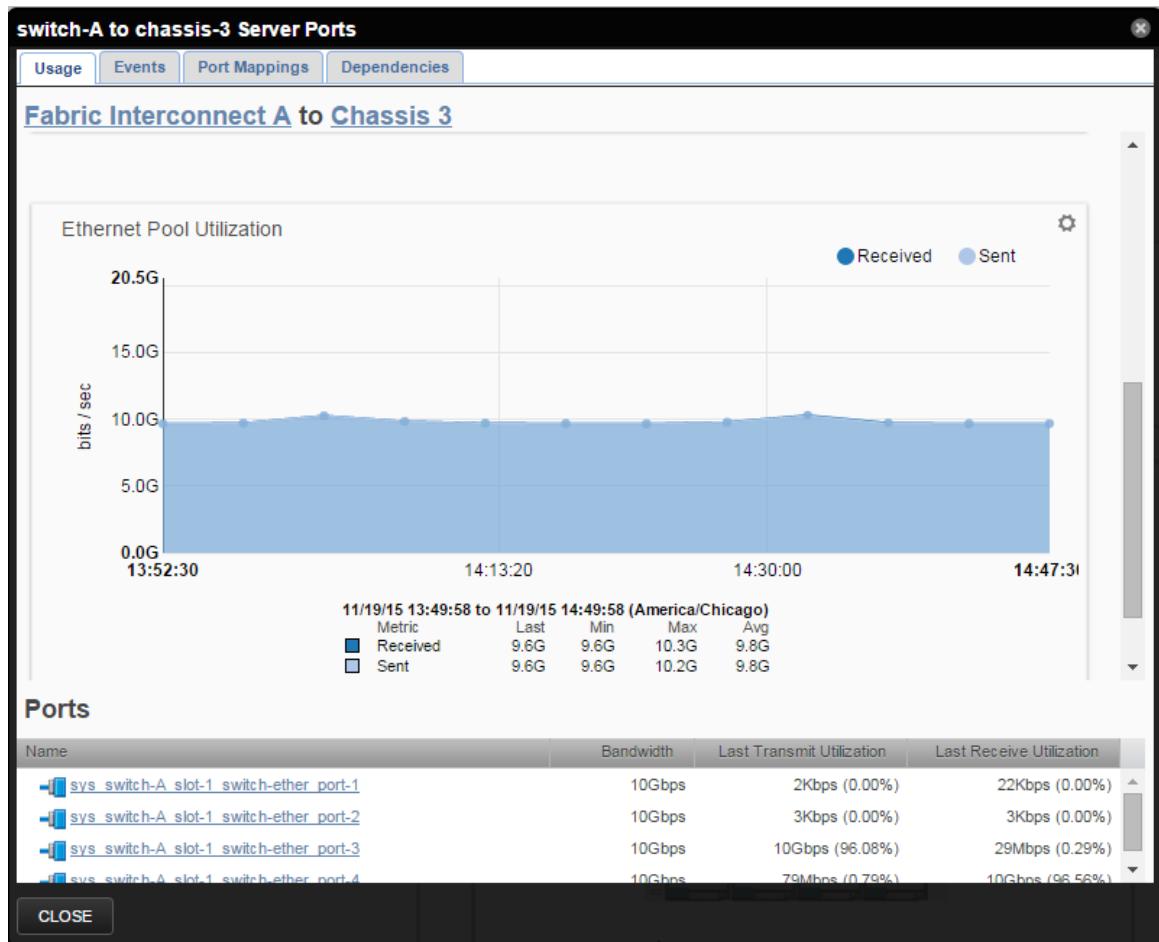
If you want to determine if a selected chassis is being used to its full capacity, you can use the Topology view and explore the chassis information.

To view chassis information from the Topology view:

- 1 Navigate to **Dashboard > Topology**.  
The Topology view is displayed.
- 2 Click a UCS domain.
- 3 Within the Topology view, double-click a Fabric Interconnect to chassis connection.  
A pop-up window for the "switch-to-chassis" Server Ports is displayed. The information on the Usage tab provides graphs that include values for capacity utilization, projected high utilization percentage, projection dates, and total data transferred in Gbps.
- 4 Review the Usage information and graphs:
  - a In the following example, there are four ports connected from Switch-A to Chassis-3. Each port has a maximum capacity of 10Gbps for a total capacity of 40 Gbps for both receiving and sending data.

**Figure 35:** Ethernet Pool Bandwidth Capacity Utilization Graph

- b Notice the **Avg Rx** value in the example above is 24.5%, which leaves bandwidth for additional transactions.
  - c Click **Projected High Pct Rx** to display the threshold value.
  - d Review the 30, 60, and 90 day **Projected Values**.
- The projections are calculated on data collected over the last 10 days. A value of N/A or zero means there is not enough data to make a projection.
- e Scroll to the **Ethernet Pool Throughput Graph**.

**Figure 36:** Ethernet Pool Utilization Graph Example

This graph shows the total throughput, with an average of 19.6 Gbps out of total capacity of 40 Gbps.

## 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**.  
The Devices list is displayed.
- 2 Click the name of a displayed device.
- 3 Click **Components > Chassis**.
- 4 Click **Bandwidth Usage**.  
The Bandwidth Usage page is displayed.
- 5 Click the expansion arrow to drill down and list the components of the chassis.  
Review the columns for total bandwidth and the averages for received and sent data. Notice the **Projected Tx Date** and **Projected Rx Date**.

The following example shows the chassis will reach 64 Gbps on 12/13/15, based on the average Tx utilization over the last ten days.

**Figure 37:** Bandwidth Usage for a Chassis

Bandwidth Usage						
Group By		Server	Network	Time Range:		Past 1 Hour
Name	Interface Role	Bandwidth	Avg Rx	Avg Tx	Projected Tx Date	Projected Rx Date
Chassis 3	80Gbps	9Gbps (10.88%)	13Gbps (16.58%)	64Gbps on 12/13/15	64Gbps on > 90 days	
	ESXi — 10.87.208.166 (...	9Gbps	9Gbps			
	ESXi — 10.87.208.167 (...	33Mbps	5Gbps			
Chassis 4	80Gbps	9Gbps (10.77%)	4Gbps (5.06%)	64Gbps on > 90 days	64Gbps on 12/01/15	
	FEX Attached Rack Servers					
	Directly Connected Rack S...					

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

- Review the available graphs, including the Blade Server Utilization graph and Service Profile Utilization graph for the selected component.

## Finding Congestion Between a Fabric Extender and a Rack Server

To determine if there is network congestion between a Fabric Extender and a rack server, you can use the Topology view and analyze the throughput, capacity and remaining capacity values.

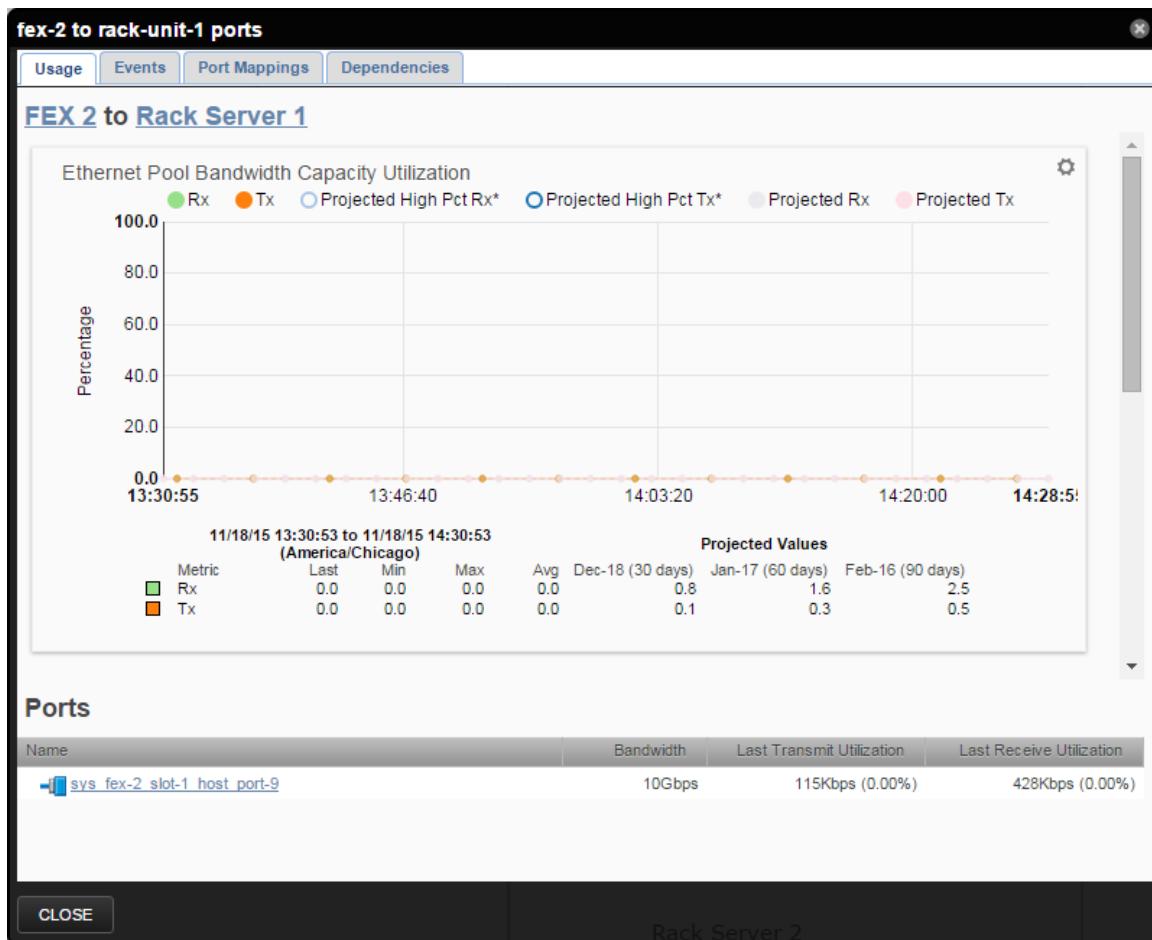
To find congestion between a Fabric Extender and a rack server:

For example:

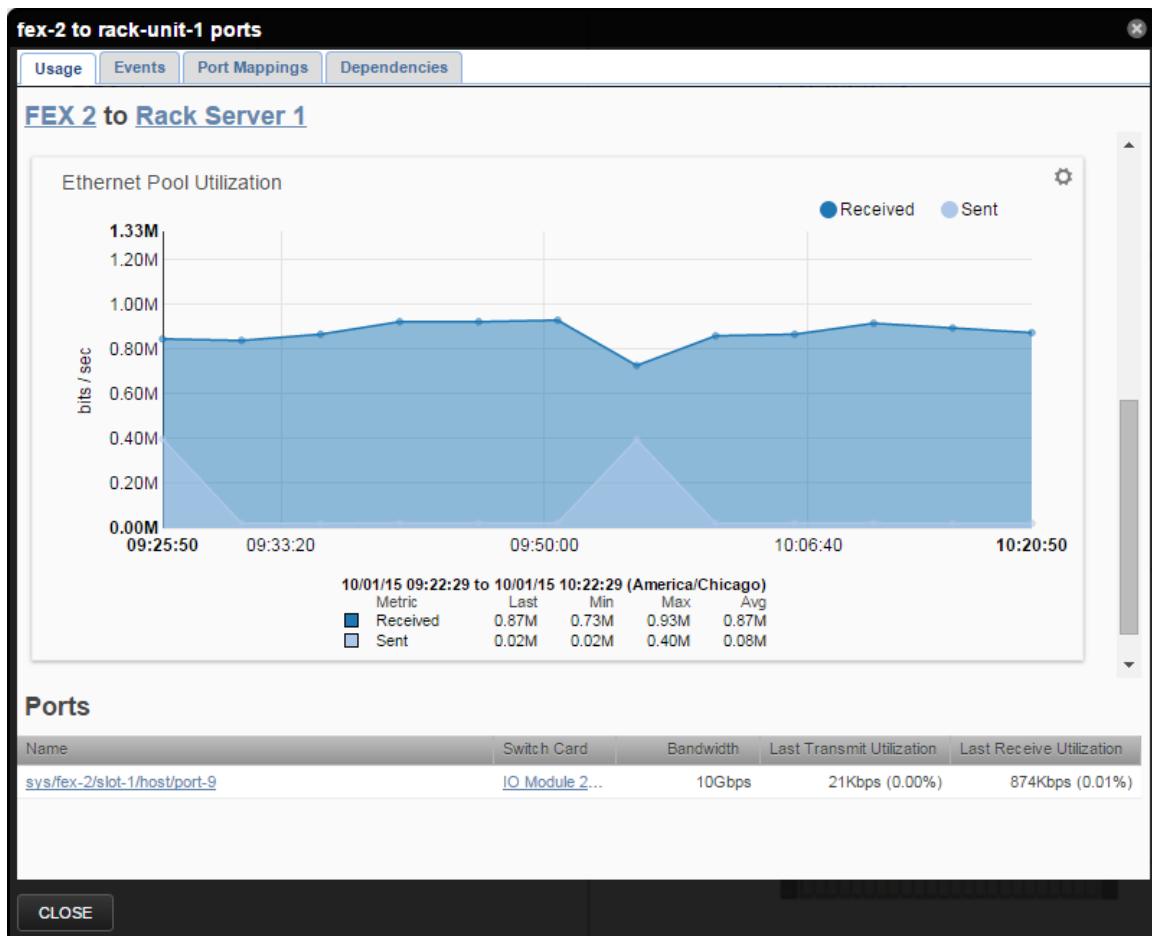
- Navigate to **Dashboard > Topology**.
- From the All Domains panel, click a UCS device.  
The device's topology is displayed.
- Double-click a connection line between a Fabric Extender and a rack server.

A "Fabric Extender to Rack Server" pop-up window is displayed.

In the following example, the Ports sections shows that the connecting port's capacity is 10 Gbps. The Ethernet Pool Bandwidth Utilization graph shows that only 0.01% of the total bandwidth capacity is currently being used.

**Figure 38:** Fabric Extender to Rack Server Usage Example

- 4 Scroll to and review the **Ethernet Pool Bandwidth Utilization** graph.  
This example shows that less than 1 Mb of data is being sent and received, leaving almost the full capacity of the 10 Gbps port available for additional transactions. In this particular example, congestion is not an issue.

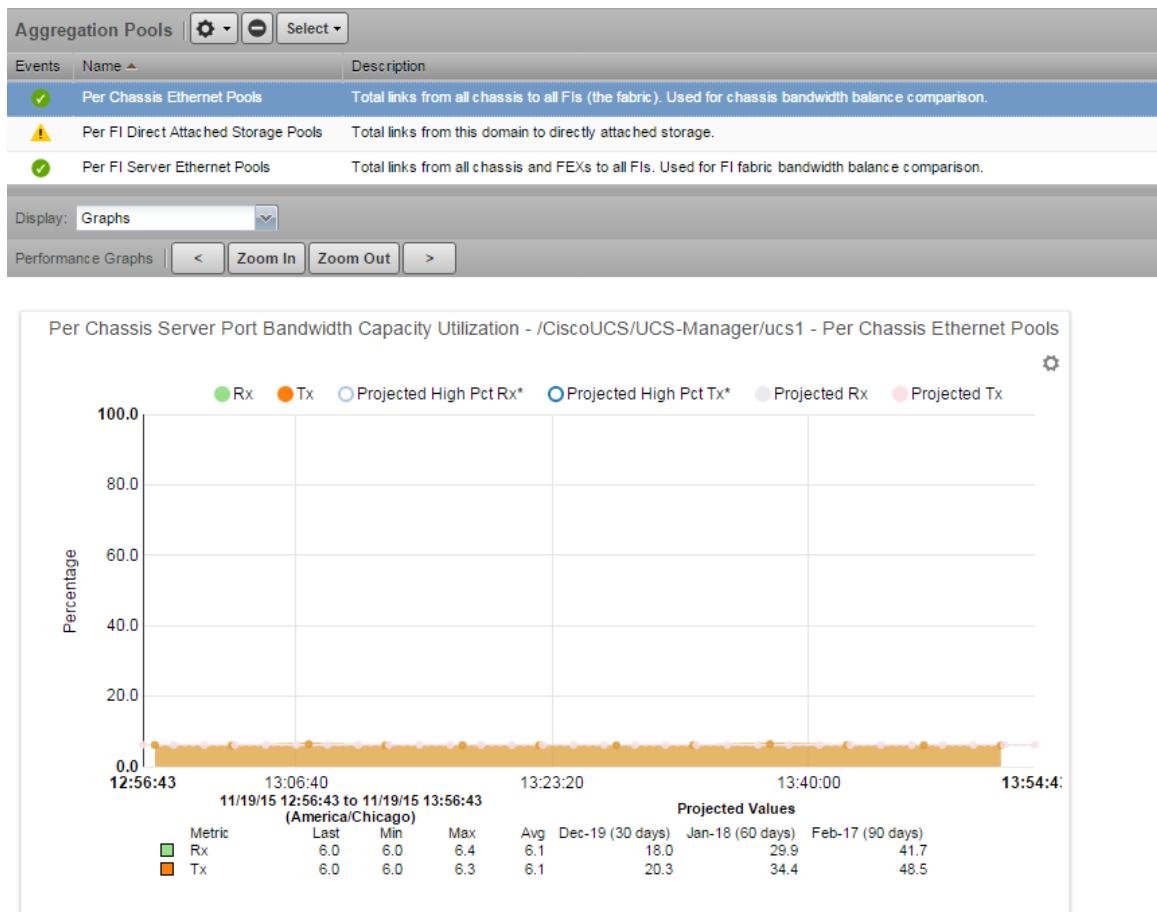
**Figure 39:** Ethernet Pool Utilization Graph Example

## Exploring Current and Historical Capacity of Domain Port Channels

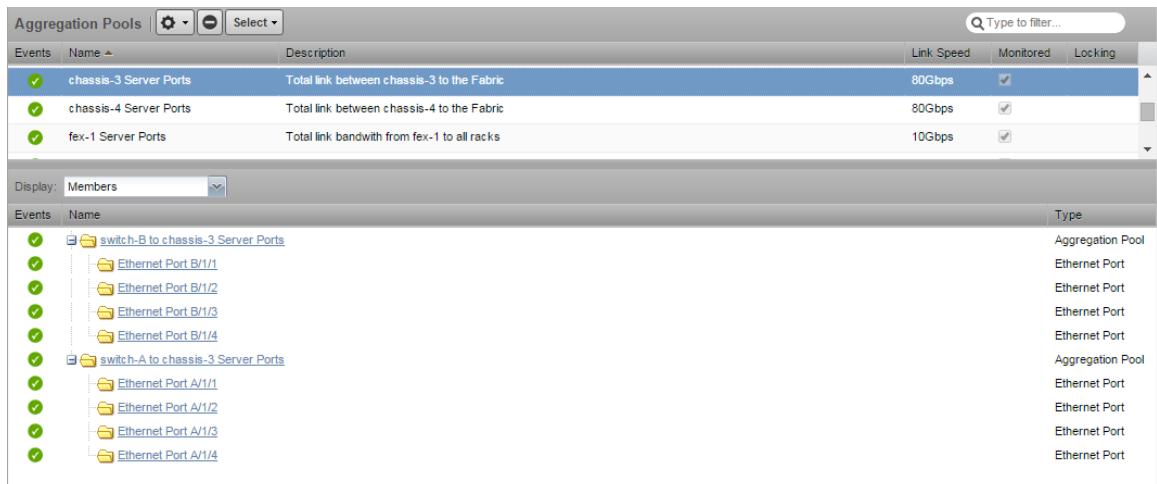
You can access both current and historical data about capacity usage of domain port channels and use the information to drill down into each component within a domain.

To explore domain port channels:

- 1 Navigate to **Infrastructure > Devices > CiscoUCS**, then click a device name.
- 2 From the left-side navigation, click **Components > Aggregation Pools** to view LAN uplink information.

**Figure 40:** Ethernet Pool Bandwidth Capacity Utilization Graph for Selected Aggregation Pool

- 3 From **Display** drop-down menu, select **Members** to view information about the uplink members.  
The Aggregation Pool members are displayed.
- 4 From the Aggregation Pools table, click a chassis name.  
The ports for each switch on the chassis are displayed.

**Figure 41:** Chassis Port Members

- 5 Click **Display > Graphs**.

The following graphs are available:

- Single Chassis Server Port Pool Bandwidth Capacity Utilization
- Single Chassis Server Port Pool Bandwidth Capacity Utilization Balance
- Single Chassis Server Port Pool Bandwidth Utilization

## Determining Virtual Adapter Capacity Utilization

You can view information about the virtual adapters in your infrastructure, including the associated Service Profiles, and historical capacity data.

To view the historical capacity information for a virtual adapter:

1 Navigate to **Infrastructure > Devices > CiscoUCS**, then select a Cisco UCS device.

2 Click **Components > Service Profiles**, then select a profile.

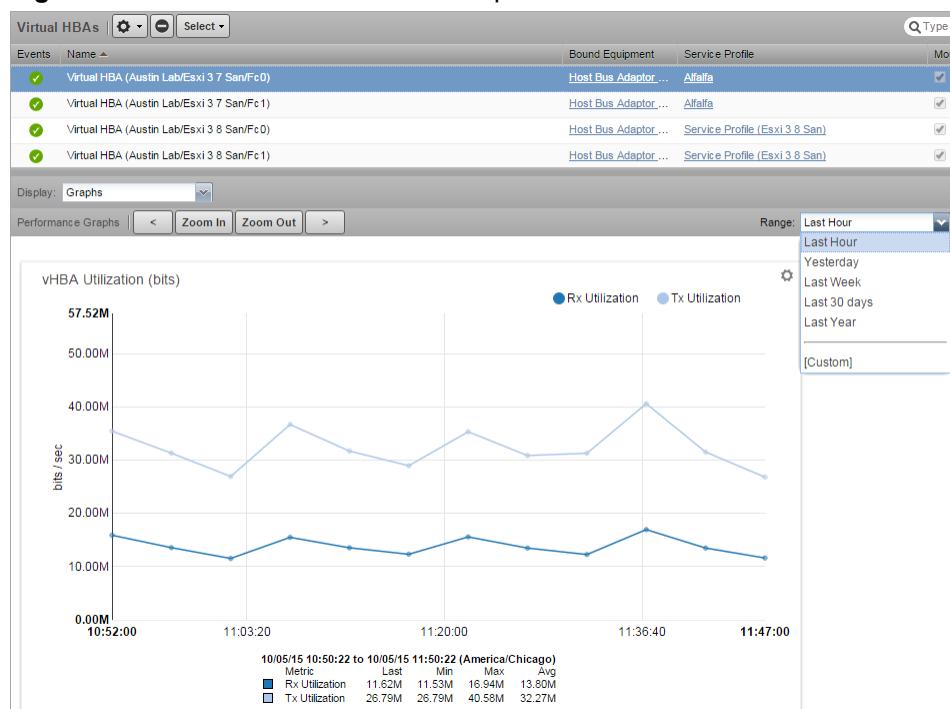
3 From **Display** select **vHBA Capacity**.

The table of vHBAs is displayed and shows the Average Util for Rx and Tx and the Max Util Rx and Tx.

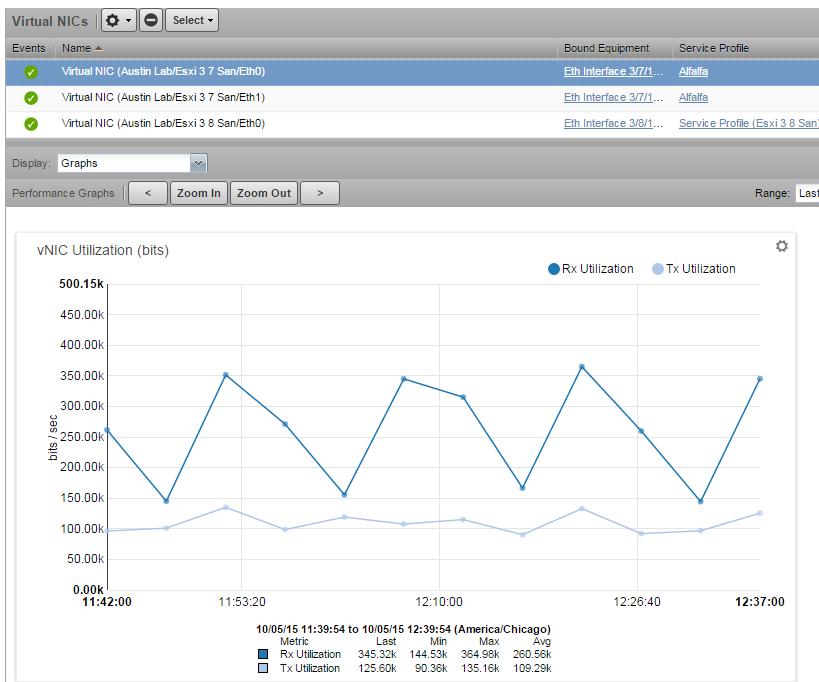
4 Click the name of an adaptor see more information about that adaptor.

The Performance Graph for the vHBA is displayed.

**Figure 42: Virtual HBA Performance Graph**



- 5 Click **Range** on the **Performance Graph** toolbar to view historical data.
- 6 To view virtual NIC usage, click **Components > Virtual NICs**.
- 7 Sort the **Service Profile** column to view all NICs for a specific profile.

**Figure 43:** Virtual NICs Grouped by Profile

## Displaying Fabric Interconnect Usage

To display the usage information for a Fabric Interconnect:

- 1 Navigate to **Infrastructure > Devices**, then select a Cisco UCS device. The Overview page is displayed.
- 2 Click **Components > Fabric Interconnects**. The Fabric Interconnects page is displayed.
- 3 From **Display**, click **Component Bandwidth Capacity** or **Ports Capacity** to view and analyze component and port utilization information.
- 4 Select a column heading drop-down menu and select **Sort Descending** to sort the components from highest to lowest utilization.
- 5 In the **Type to filter** search field, enter a role, such as server to view servers only.
- 6 Change the **Range** to display the **Last Hour**, **Last Day**, or the **Last Week**.

## Displaying Fabric Interconnect Congestion

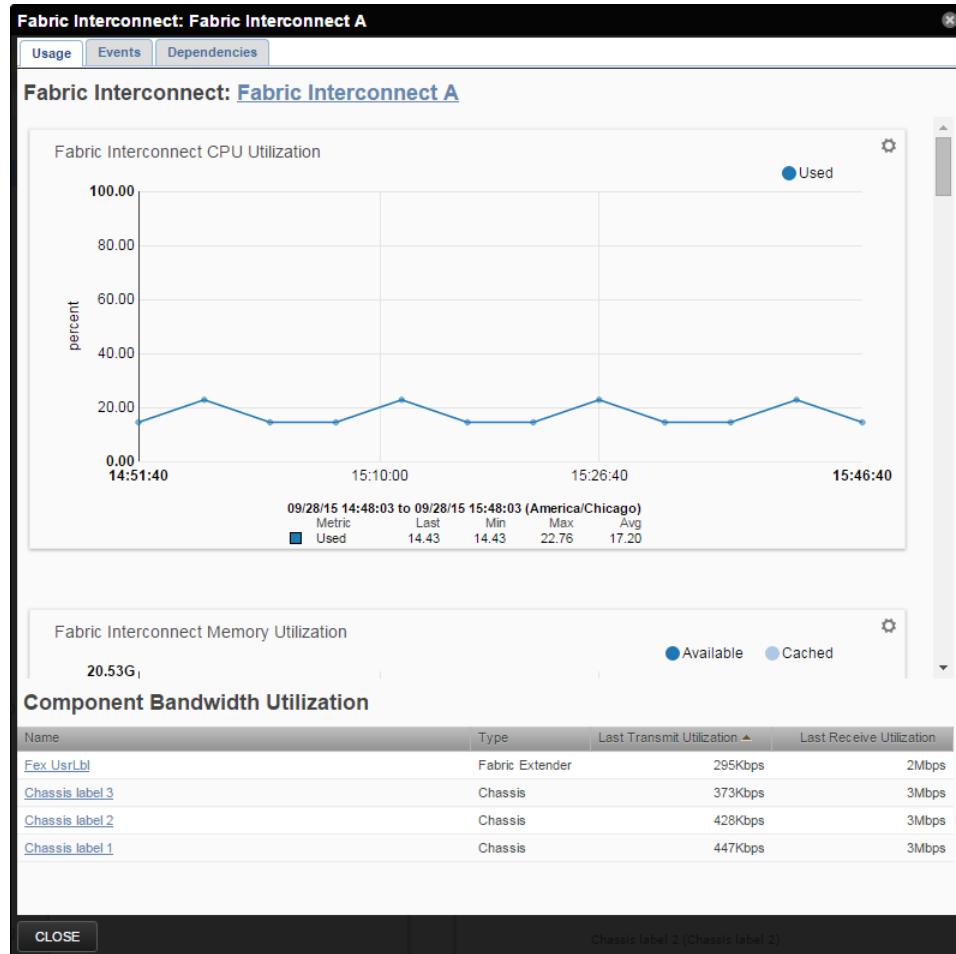
The following example shows how to select a network component and drill down into the performance data for its Ethernet ports. The display shows a graphical interpretation of the switch performance and tabular data for each Ethernet port. The tabular data includes the port slot location, bandwidth and utilization information. If additional information is required, in this example, click on the port name to display the Infrastructure data page for that port.

To view the performance information of Fabric Interconnect:

- 1 Navigate to **Dashboard > Topology**. The Topology view is displayed.
- 2 Click a component, such as a Fabric Interconnect, to display usage information.

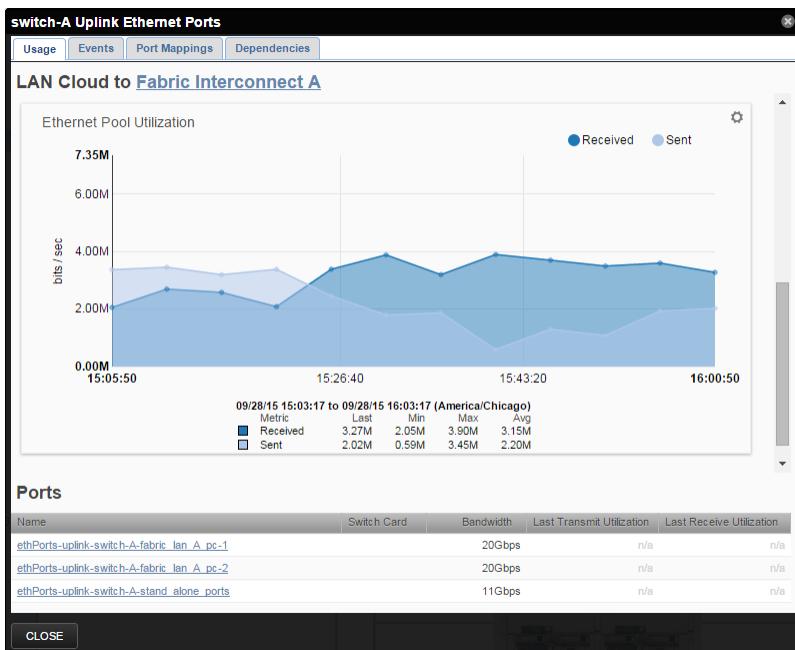
The Fabric Interconnect usage information is displayed:

**Figure 44: Fabric Interconnect Usage Information**



Analyze the data to determine if 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 will eventually lead to network issues.

**Figure 45:** Congested Switch A Uplink Ethernet Ports

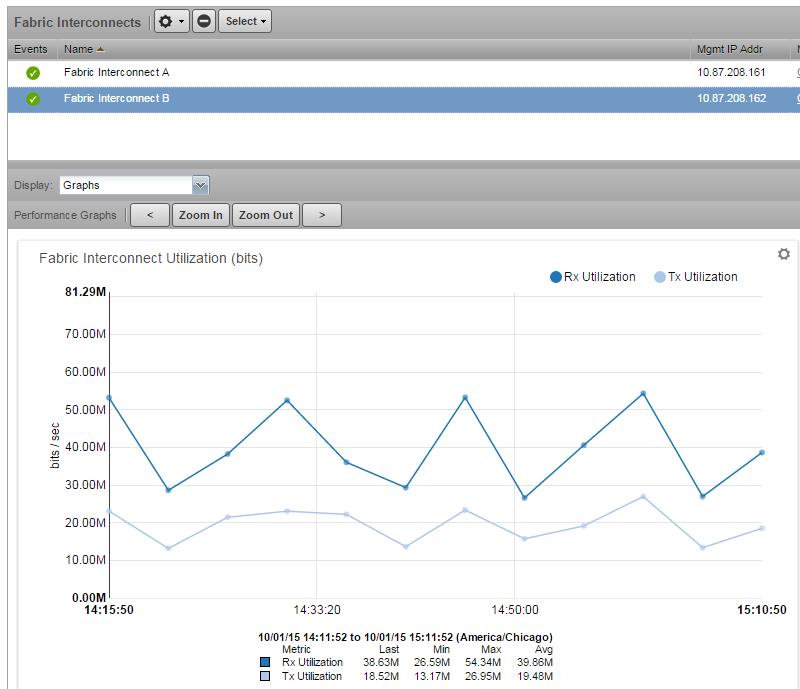
- 3 You can click the name of a component in the pop-up information window to display the Overview page for that component.

## Displaying Fabric Usage Data

The Fabric Interconnects page displays a number of graphs that show several health checks, bandwidth utilization, remaining capacity, northbound utilization, and LAN Cloud, SAN Cloud utilization, and direct storage utilization. These 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.

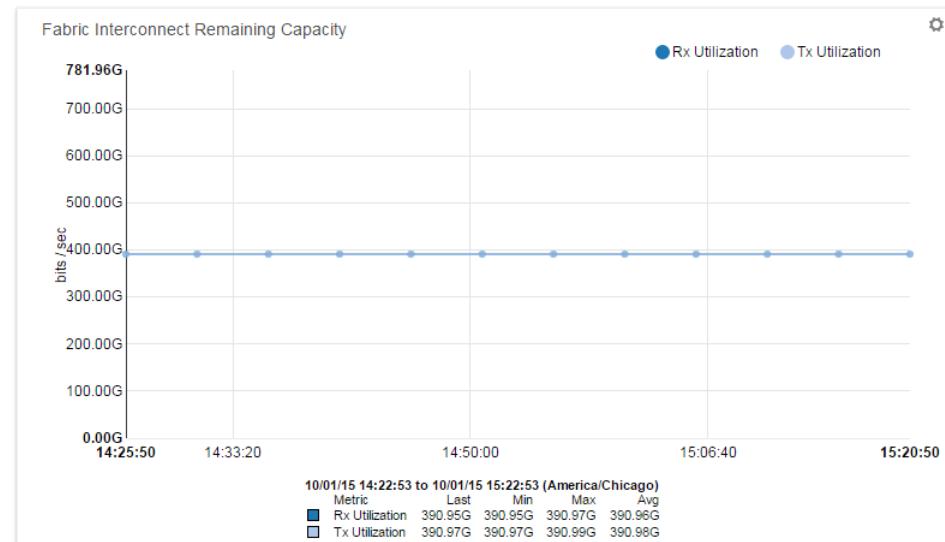
To display fabric usage data:

- 1 Navigate to **Infrastructure > Devices**.
- 2 Select a Cisco UCS device.  
The Overview page is displayed.
- 3 Click **Components > Fabric Interconnects**.  
The Fabric Interconnects page is displayed.
- 4 Select a Fabric Interconnect row.
- 5 Click **Display > Graphs**.
- 6 Scroll down to the **Fabric Interconnect Utilization (bits)** graph.  
The following example shows the received bits per second is 40.79 Mbps on average, and sent bits per second is roughly 17.5 Mbps:

**Figure 46:** Fabric Interconnect Utilization (bits) Graph

- 7 Scroll to the **Fabric Interconnect Remaining Capacity** graph.

The following example shows the average utilization is 390.96 Gbps, which leaves approximately 50% remaining capacity.

**Figure 47:** Fabric Interconnect Remaining Capacity

- 8 Scroll through the graphs to see utilization by direction to the LAN Cloud, SAN Cloud, Direct-Attached Storage, and Northbound Utilization.
- 9 Click **Display > Component Bandwidth Capacity** to display data for the components within the Fabric Interconnect.

In this table you can view the average sent and received utilization percentage for each chassis.

Fabric Interconnects | Select ▾

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	<input checked="" type="checkbox"/>
	Fa...	10.87.208.162	Cisco	UCS-FI-6248UP	15.8GB	2	2	2	48	Up	<input checked="" type="checkbox"/>

Display: 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%)

# 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.

## 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 the 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 so data packets are lost. This state can cascade into even greater congestion because applications must retransmit lost packets that result 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 is the state that ensues when congestion increases to the point that throughput drops to and remains at very low levels and adversely impacts the performance of applications and devices.

The Cisco UCS Performance Manager provides tools to help you identify active network congestion issues and address them. It can also provide data (both historical and projected) to plan and prevent potential network congestion issues in the future.

## Options to Correct Network Congestion

Correcting or preventing congestion is important to keeping a network running smoothly for users and applications. The tools provided by the Cisco UCS Performance Manager enable you to analyze collected data and make informed decisions about how to correct any issue. The collected data that can help diagnose congestion includes performance data (both current and historical), component, connection and provisioning data. When these are analyzed, potential inadequacies or pinch points in your network can be identified and isolated for rehabilitation.

The options available to you to address network congestion issues include:

- Identifying and reconfiguring service profiles that contribute to low performance - or moving service profiles between servers to enhance server performance.
- Identifying and rectifying server provisioning, including processor and memory configurations.
- Locating and correcting bandwidth inequities. This means identifying those network components with critically small available remaining capacity and bringing the network in-balance by redistributing bandwidth between components with appropriate available remaining capacity - or adding additional equipment.
- Using historical data from the various performance logs to determine patterns and cycles to plan for future network stress.

## Network Components and Congestion

Because Cisco UCS Performance Manager provides a view into the network fabric, you can view performance data that network management tools cannot access. This includes performance data for server ports, Ethernet links, FC uplinks, and so. You can analyze the data returned from these components and determine if congestion exists, and what additional effects the congestion is generating. You can 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.

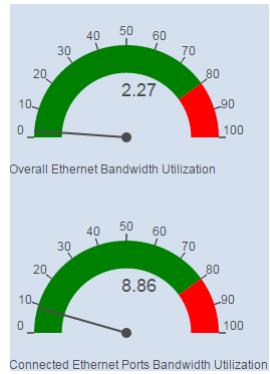
### Fabric Constraints Affect Congestion

The network fabric consists of the collection of components and their interconnections and interfaces that make up your network. For the network to function at its theoretical maximum, all components must function effectively, individually and together as a cooperative unit. Constraints are any limitations within the fabric that affects 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 component(s) 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. 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 your device connections.

**Figure 48:** Topology View: Bandwidth Dials



To display the Topology view, navigate to the Dashboard, and click **Topology**.

With the topology page displayed, you can then click a component, connection line, or an event icon for more detailed information. For additional information on using the Topology view, see [Topology View](#) on page 8.

## Reviewing Historical Congestion

Cisco UCS Performance Manager uses historical log data to generate reports with various information, depending on the type of report. In addition, you can access different report options, depending on the type of report, to further refine the data.

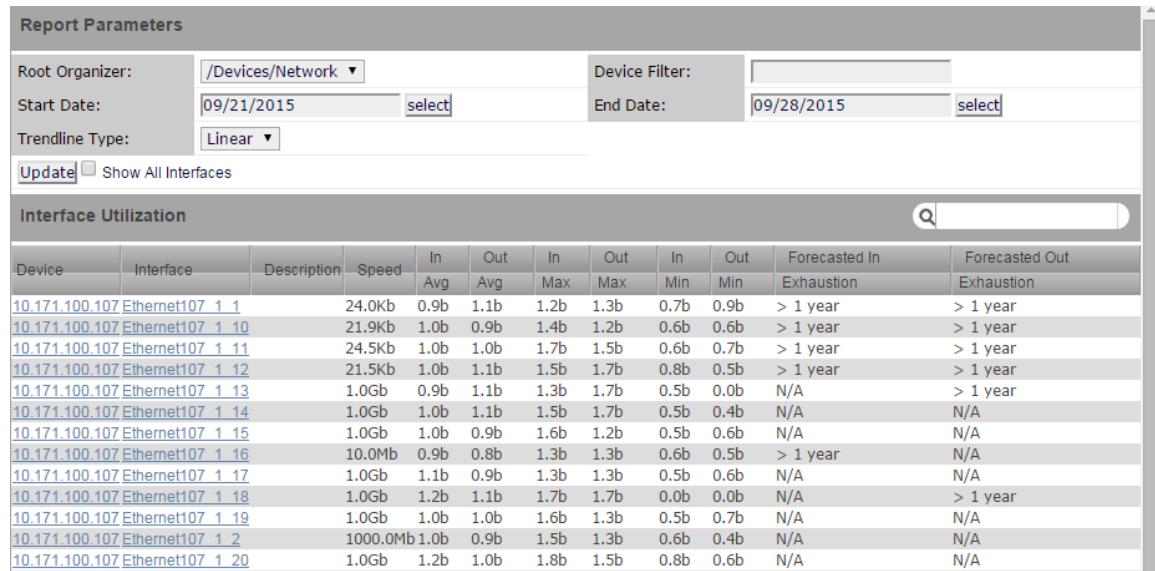
To view the historical information about interface utilization:

- 1 Navigate to **Reports > Cisco UCS Capacity Reports> Interface Utilization**.  
The Report Parameters are displayed.

- 2 In the Report Parameters pane:
  - a For **Root Organizer**, select **/Devices/Network**.
  - b Define the **Start Date** and **End Date** values.
  - c Click **Update** to display the report.

The report displays the historical data for this interface:

**Figure 49: Interface Utilization Report**



The screenshot shows a report interface with a 'Report Parameters' header containing fields for Root Organizer (set to /Devices/Network), Start Date (09/21/2015), End Date (09/28/2015), and Trendline Type (Linear). Below this is a table titled 'Interface Utilization' with columns for Device, Interface, Description, Speed, and various utilization metrics (In Avg, Out Avg, In Max, Out Max, In Min, Out Min) along with Forecasted In and Out Exhaustion. The table lists multiple entries for '10.171.100.107 Ethernet107\_1' with different interface numbers (1\_1 through 1\_20).

Device	Interface	Description	Speed	In Avg	Out Avg	In Max	Out Max	In Min	Out Min	Forecasted In Exhaustion	Forecasted Out Exhaustion
10.171.100.107	Ethernet107_1_1		24.0Kb	0.9b	1.1b	1.2b	1.3b	0.7b	0.9b	> 1 year	> 1 year
10.171.100.107	Ethernet107_1_10		21.9Kb	1.0b	0.9b	1.4b	2.0b	0.6b	0.6b	> 1 year	> 1 year
10.171.100.107	Ethernet107_1_11		24.5Kb	1.0b	1.0b	1.7b	1.5b	0.6b	0.7b	> 1 year	> 1 year
10.171.100.107	Ethernet107_1_12		21.5Kb	1.0b	1.1b	1.5b	1.7b	0.8b	0.5b	> 1 year	> 1 year
10.171.100.107	Ethernet107_1_13		1.0Gb	0.9b	1.1b	1.3b	1.7b	0.5b	0.0b	N/A	> 1 year
10.171.100.107	Ethernet107_1_14		1.0Gb	1.0b	1.1b	1.5b	1.7b	0.5b	0.4b	N/A	N/A
10.171.100.107	Ethernet107_1_15		1.0Gb	1.0b	0.9b	1.6b	1.2b	0.5b	0.6b	N/A	N/A
10.171.100.107	Ethernet107_1_16		10.0Mb	0.9b	0.8b	1.3b	1.3b	0.6b	0.5b	> 1 year	N/A
10.171.100.107	Ethernet107_1_17		1.0Gb	1.1b	0.9b	1.3b	1.3b	0.5b	0.6b	N/A	N/A
10.171.100.107	Ethernet107_1_18		1.0Gb	1.2b	1.1b	1.7b	1.7b	0.0b	0.0b	N/A	> 1 year
10.171.100.107	Ethernet107_1_19		1.0Gb	1.0b	1.0b	1.6b	1.3b	0.5b	0.7b	N/A	N/A
10.171.100.107	Ethernet107_1_2		1000.0Mb	1.0b	0.9b	1.5b	1.3b	0.6b	0.4b	N/A	N/A
10.171.100.107	Ethernet107_1_20		1.0Gb	1.2b	1.0b	1.8b	1.5b	0.8b	0.6b	N/A	N/A

- 3 Review the In and Out Average, Maximum, Minimum values for each interface.
- 4 Review the Forecasted In Exhaustion and Forecasted Out Exhaustion for each interface to identify interfaces that are causing, or will potentially cause, network congestion.
- 5 Click a device or interface link name to go to the corresponding page.

## Viewing Northbound Port Utilization by Domain

Use the Network Capacity portlet to see bandwidth utilization for a specific Domain, from the Fabric Interconnects to northbound LAN and SAN clouds.

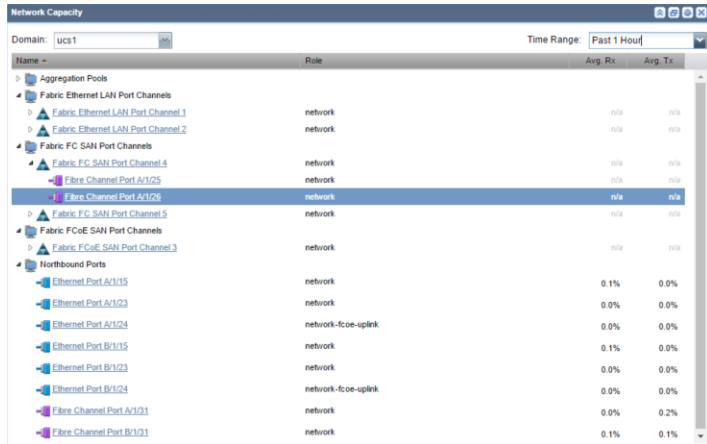
The Network Capacity portlet displays ports that are operational and currently mapped to another device for a specific time range. It contains the port name, its role, the average Tx and Rx utilization, and event summary. You can also add columns for maximum Tx and Rx utilization.

To add the Network Capacity portlet to your Dashboard:

- 1 From the Dashboard, click the **Add** icon and select **Add Portlet**.
- 2 In the Add Portlet dialog, click the drop-down menu and select **Network Capacity**. The Add Portlet dialog displays the default settings and a preview of the portlet.
- 3 Modify the Configuration settings.
- 4 Click **Add**.

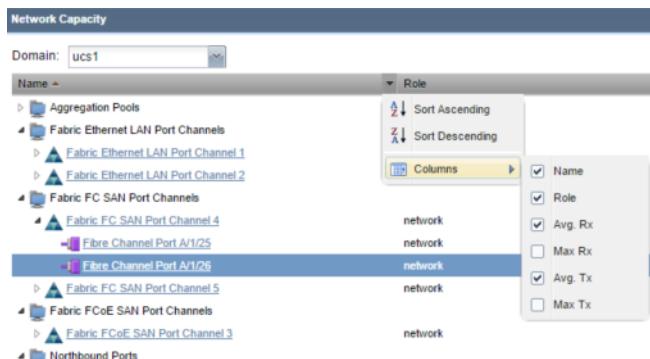
The Network Capacity portlet is displayed on the Dashboard.

**Figure 50:** Network Capacity Portlet

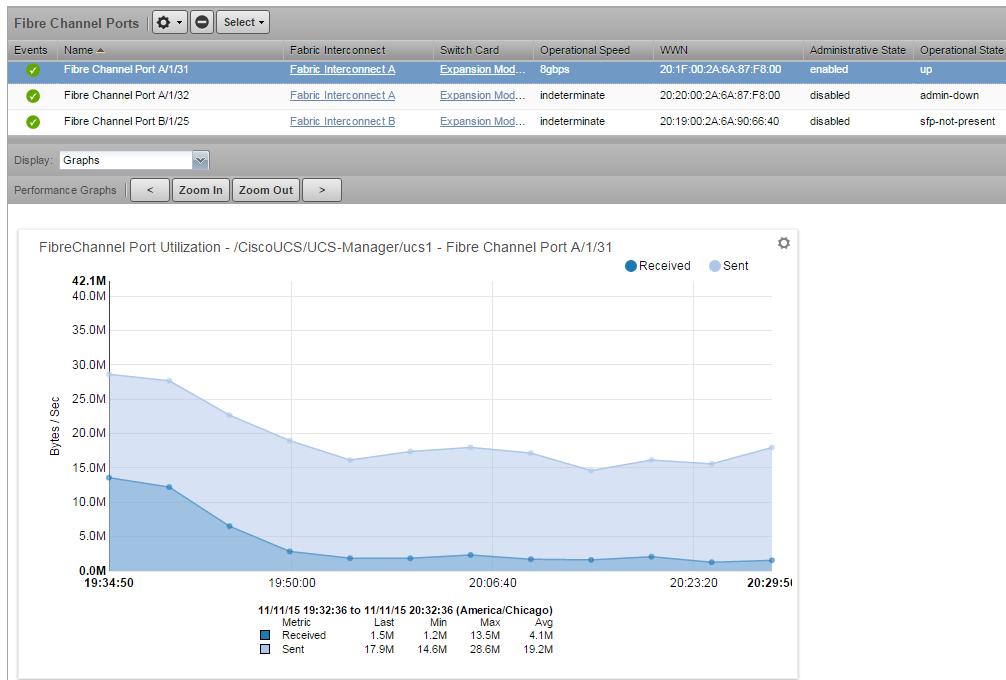


- 5 To view information for a specific Domain, click the **Domain** drop-down menu, located in the upper right corner of the portlet.
  - 6 To change the time range displayed, click the **Time Range** drop-down menu and select the desired range. Options include Past 1 Hour (default), Past 6 Hours, or Past Day.
  - 7 To add maximum utilization information to the portlet, click the drop-down near the right side of any displayed column and click the **Max Tx** and **Max Rx** check boxes.

**Figure 51:** Add Max Tx and Max Rx to Network Capacity Portlet



- 8 For additional information about a particular port, click the port name link. The corresponding information page is displayed. For example, the following image shows the Fibre Channel Ports page:

**Figure 52:** Fibre Channel Ports Page

- 9 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, we recommend that you use one or more of the following methods:

- Review information for the device and its components by starting at the Infrastructure page.
- Use the Storage Capacity portlet to get at-glance-information, then zero 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

Follow this procedure to review storage capacity and utilization by drilling into the storage infrastructure.

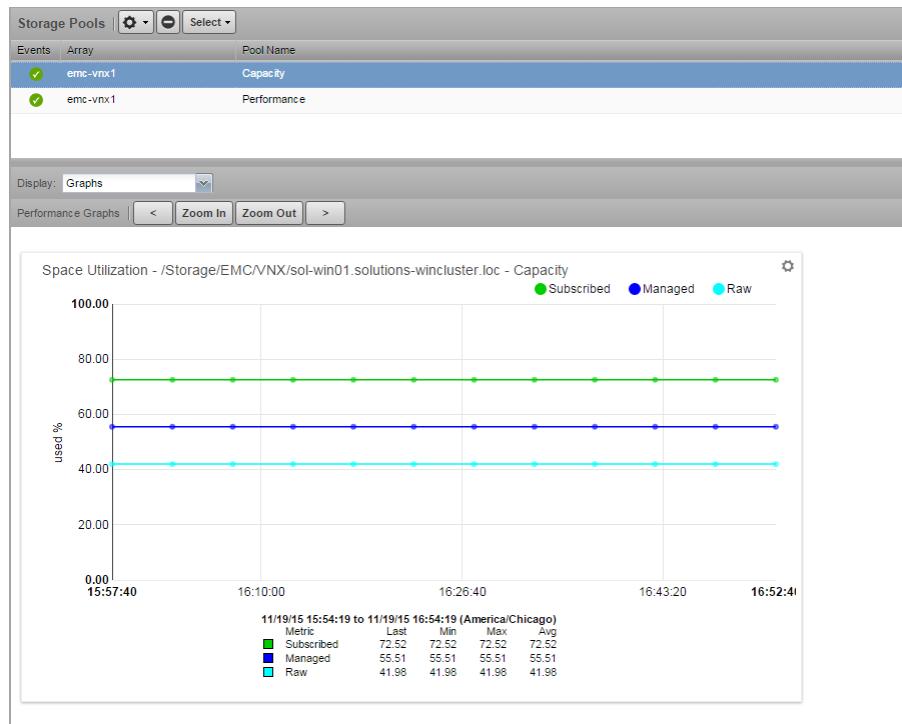
- 1 From the **Infrastructure** page, click **Storage**.
- 2 Drill down into the Storage category and select a storage device of interest.  
The device's Overview page is displayed.
- 3 Drill down further into the device's component list. For example:
  - For an EMC device, click **Components > Storage Pools**. (See next bullet for a NetApp filer example.)

The Storage Pools component page is displayed and includes a list of arrays with the corresponding graphs for the selected array.

The Space Utilization graph at the bottom of the page shows the current **Subscribed**, **Managed**, and **Raw** percentages for the storage pool selected at the top of the page.

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. However, you can address the Subscription percentage by adding drives to the pool.

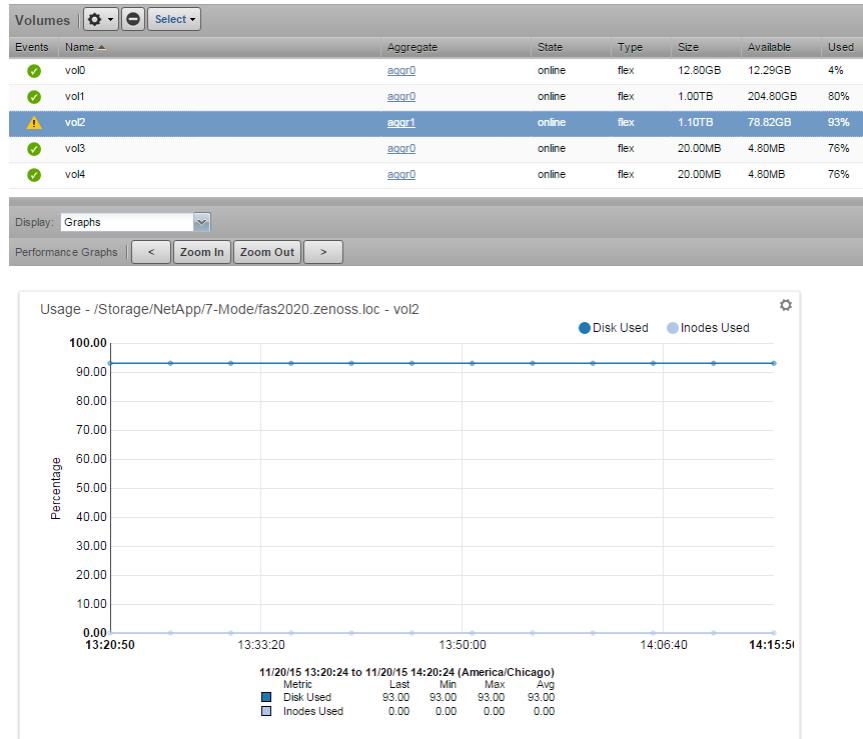
**Figure 53: Space Utilization Graph for EMC Storage Pools**



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

The Volumes component page is displayed and includes a list of volumes with corresponding graphs for the selected volume.

In the following example, the table 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 54:** NetApp Usage for a Single Volume

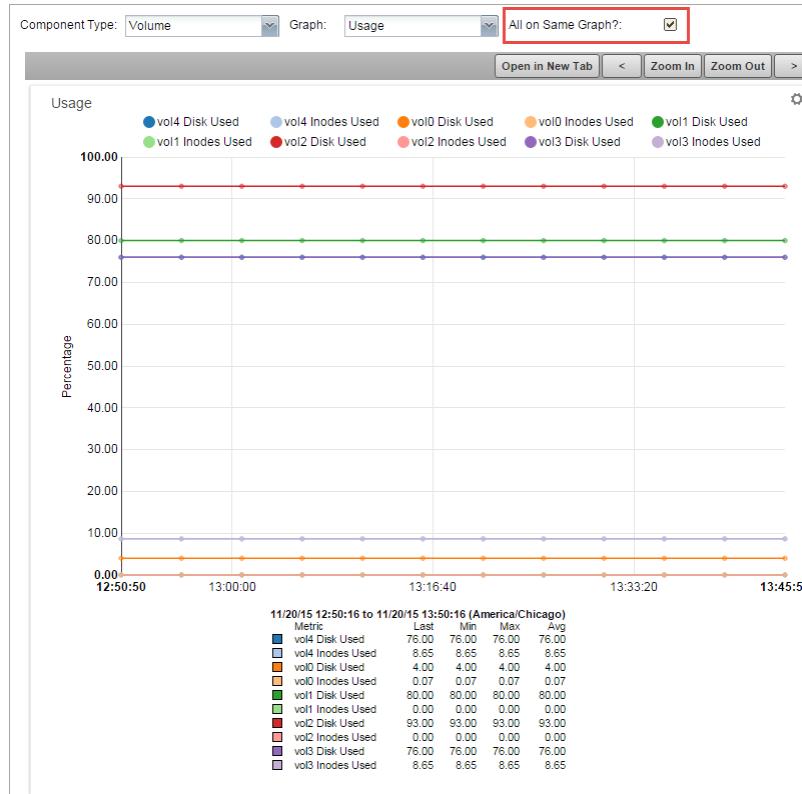
- 4 Continue to click other components of interest from the left-side navigation to review the corresponding information and graphs.

Based on your findings, you can determine if a resource is oversubscribed or experiencing different issue. You can then make the necessary adjustments to correct any problem.

- 5 To see view multiple components of the same type on a single graph:
  - a From the left-side navigation, click **Component Graphs**.
  - b At the top of the graph page, select an option from the **Component Type** drop-down menu.
  - c Select an option from the **Graph** drop-down menu.
  - d Click the **All on Same Graph?** check-box.

A graph for the specified component type appears with all components displayed together.

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

**Figure 55:** Usage Graph for All NetApp Volumes

- e In the graph's upper legend, click the name of a component to hide or show its data . Using the **All on Same Graph** option gives you a quick visual perspective on where potential storage issues exist and where you have extra storage space that can help alleviate a problem. Before you change your current configuration to solve an issue, click the **Dependency View** from the left-side navigation to see a list of dependents and dependencies for the selected storage component.

## Reviewing Hypervisor Storage

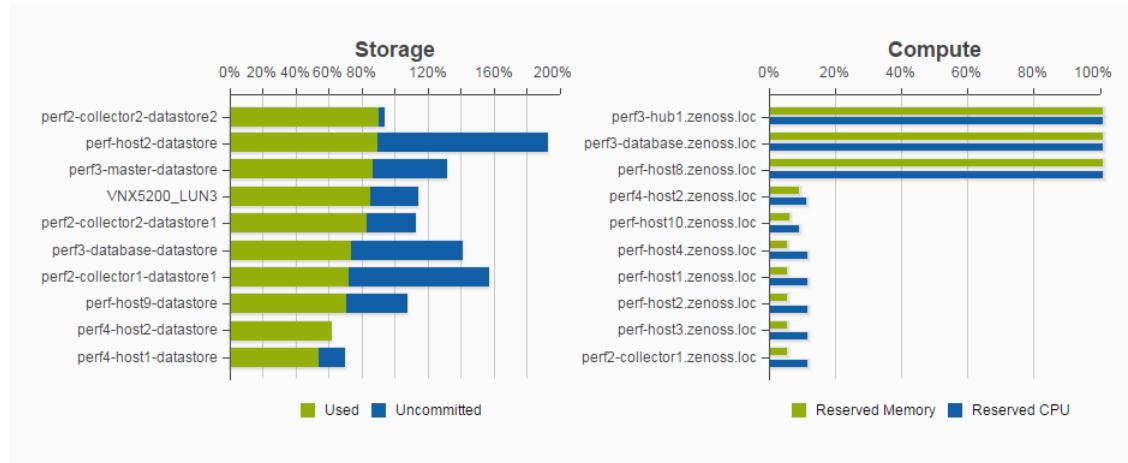
Cisco UCS Performance Manager supports Vsphere and HyperV devices. These devices provide local storage, which should be reviewed for potential utilization issues.

To review hypervisor storage information:

- 1 From the **Infrastructure** page, select a virtual device of interest using one of the following methods.

- For a Vsphere device: Select **Devices > Vsphere**.
- For a HyperV device: Select **Devices > Server > Microsoft > HyperV**.

Storage and Compute information is displayed for the top 10 datastores and hosts. Use the storage information to identify oversubscribed resources and those that have extra capacity.

**Figure 56:** Storage Graph for Hypervisor

## Using the Storage Capacity Portlet

Use the Storage Capacity portlet to get a quick visual display of capacity utilization of all currently modeled and monitored storage devices.

The Storage Capacity portlet uses the following visual indicators:

- **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** — As the percent usage increases, the gradient becomes darker.
- **Width** — As the percent usage increases, the colored gradient bar grows longer.
- **Percentage** — Hovering over a colored bar displays the component's actual percentage used.

**Figure 57:** Storage Capacity Portlet

Storage Capacity				
Client	LUN / Export	Volume	Pool	Array
	/vol/vol2	vol2	aggr1	fas2020.zenoss.loc
	/vol/vol2/lun1	vol2	aggr1	
	/vol/vol1	vol1	aggr0	
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

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

By default, the portlet shows the components with the highest LUN/Export, volume, and pool utilization at the top of the table. However, you can click different column headings and choose **Sort Ascending** or **Sort Descending** for a different visual perspective on storage capacity.

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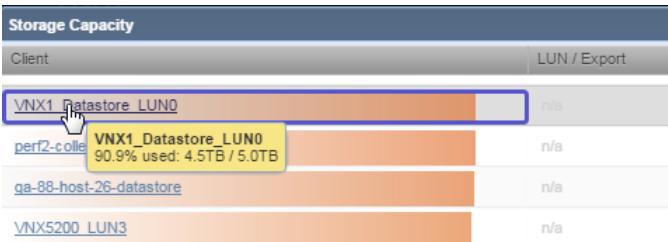
**Note** To display data for storage devices (for example, EMC and NetApp) and the vCenter server appliance, you must *first* model the devices and monitor them. After you model and monitor these devices, storage capacity information is displayed. For example, see /vol/vol2 in the previous image.

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To add the Storage Capacity portlet to your Dashboard:

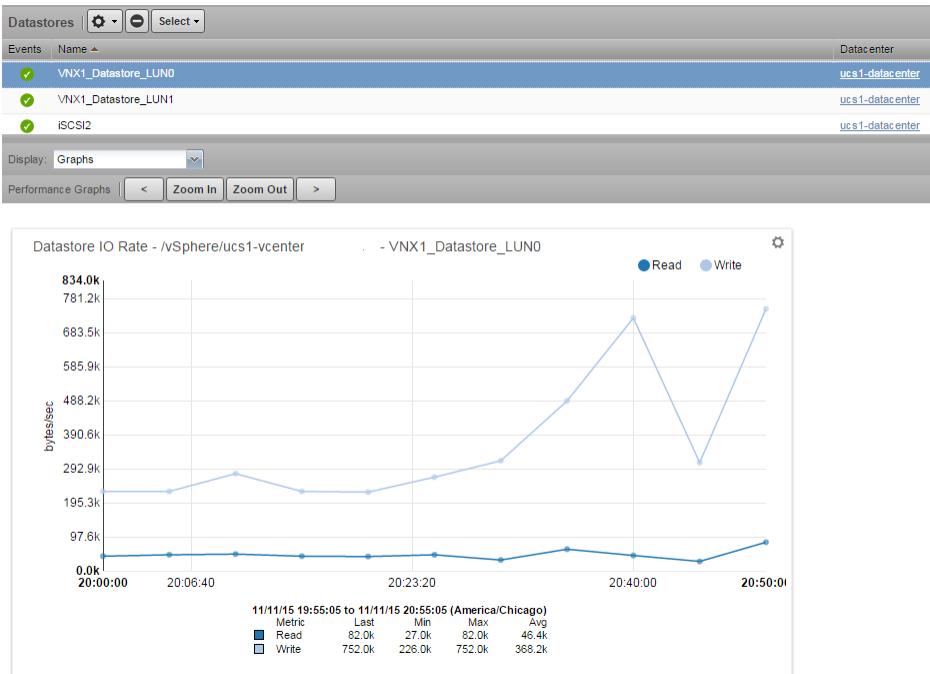
- 1 From the **Dashboard**, click the **Add** icon and select **Add Portlet**.
- 2 In the **Add Portlet** dialog, click the drop-down menu and select **Storage Capacity**. The Add Portlet dialog displays the default settings and a preview of the portlet.
- 3 Optional: Modify the **Configuration** settings.
- 4 Click **Add**.  
The Storage Capacity portlet is added to your Dashboard.
- 5 With the portlet added to the dashboard, hover an item of interest to view a tool tip with current usage and capacity information:

**Figure 58:** Storage Capacity Tool Tip



- 6 To further investigate a specific resource, click the **Client** name hyperlink. The component's page is displayed.

**Figure 59:** Datastores Page



- 7 Review the available graphs or select an option from the **Display** drop-down menu to continue working with the selected component.

## Using the Storage Utilization vs. Capacity Report

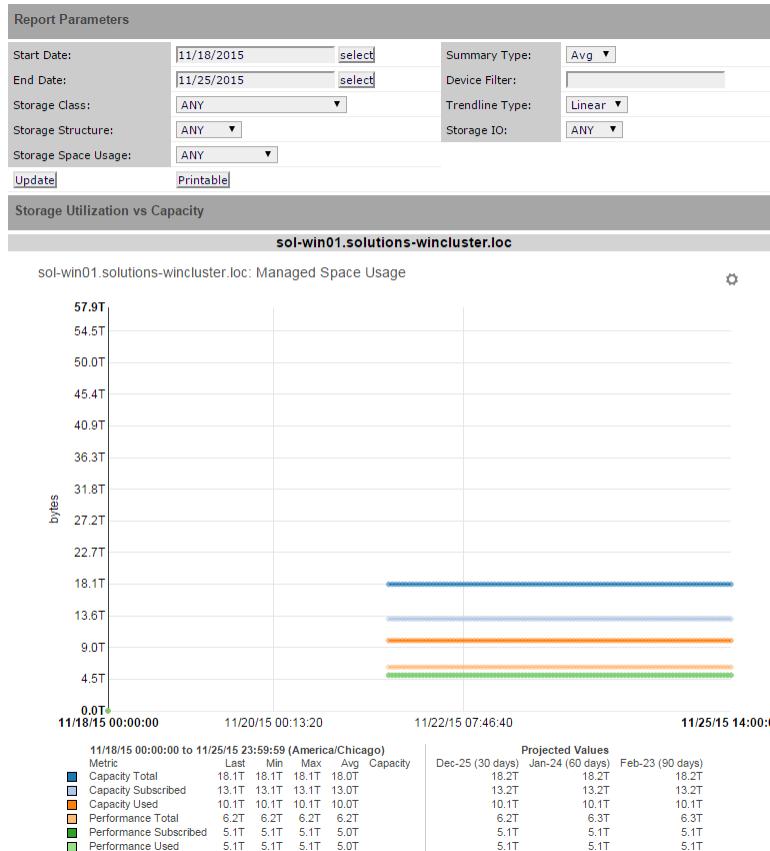
**Note** This report is only available with a full Cisco UCS Performance Manager license.

Cisco UCS Performance Manager automatically generates a Storage Utilization versus Capacity report for you when you select the report. However, you can also create a custom report by setting one or more report parameter options.

To generate the default report:

- From the **Reports** page, navigate to **Cisco UCS Capacity Reports > Storage Utilization vs. Capacity**. A report using the default settings is displayed. It contains information for the last 7 days and includes all currently monitored storage classes and structures.

**Figure 60:** Default Storage Capacity vs Utilization Report



- Review the current **Report Parameter** settings to understand the contents of the report.
- Scroll down to review each of the graphs available in this report.
- To print the report, click **Printable**.
- To modify the report:
  - Select a new **Start Date** and **End Date**.
  - Select a different option from the various **Report Parameter** drop-down menus.
  - Click **Update**.

When you are satisfied with the content of the report, use the information to make any necessary adjustments to your overall storage utilization plan.

# 4

## Working with Capacity Projections

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

### Available Remaining Capacity

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.

Use the Bandwidth Usage view from the Infrastructure > Devices page to see utilization for a particular device or component. Bandwidth usage and available remaining capacity data is also 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. For more information about Aggregation pools, see *Cisco UCS Performance Manager Administration Guide*

### Viewing Projected Bandwidth Exhaustion Dates

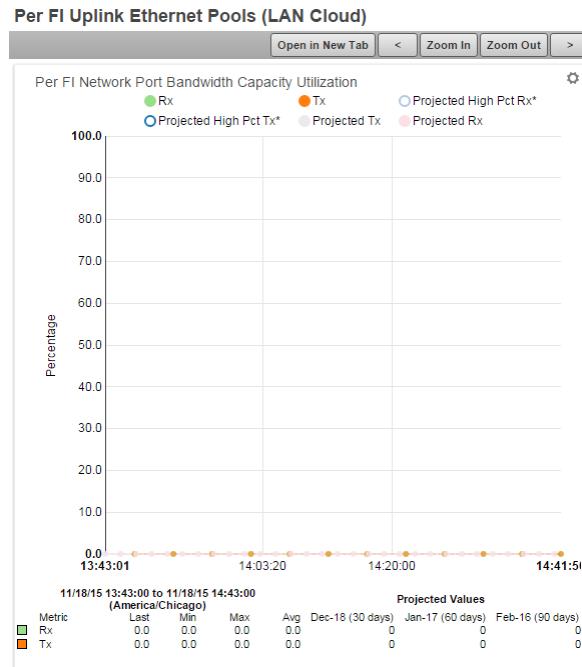
From the Bandwidth Usage view, you can see the projected capacity exhaustion dates for both Rx and Tx. The projected exhaustion dates alert you to a potential bandwidth issue before a threshold is crossed.

To view projected bandwidth exhaustion dates:

- 1 From the Infrastructure page, select a device from the **CiscoUCS** device class.  
The device's Overview page is displayed.
- 2 Click **Components > Fabric Interconnects**.  
The Fabric Interconnects page is displayed.
- 3 Click **Bandwidth Usage**.  
The Bandwidth Usage page is displayed, and by default, lists the network-related components that belong to the device.
- 4 To view the device's network-related components, click the **Group By Network** button.
- 5 Expand the component names until you reach a Fabric Interconnect uplink.
- 6 Highlight the row of the uplink to view the **Projected Values** in the Bandwidth Capacity Utilization graph.  
If there is not enough collected data to make a projection, the Projected Values are zero.
- 7 Use the horizontal scroll bar in the table to see **Projected Tx Date** and **Projected Rx Date**.
- 8 Review the graphs displayed on the right side of the page. (The graphs vary by component.)
  - a In a **Bandwidth Capacity Utilization** graph, click **Projected High Pct Tx\*** and **Project High Pct Rx\*** to view the currently defined thresholds on the graph.
  - b Click the right arrow to move the graph further along the time-line.

- c Hover over the graph to view the details for a particular data point.

**Figure 61: Graph with Projected Exhaustion Dates**



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

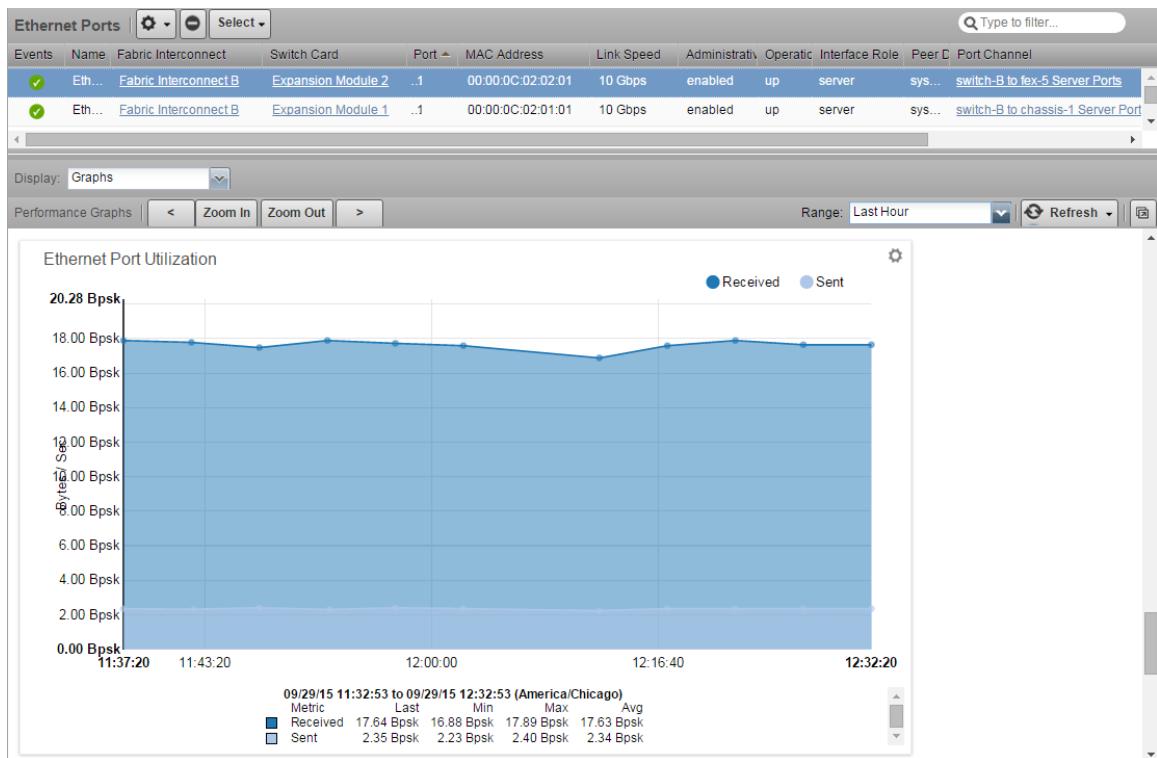
## Identifying the Remaining Capacity for a Component

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

To identify remaining capacity for a Ethernet port:

- 1 Navigate to **Infrastructure > Devices > CiscoUCS**.
- 2 Click a Cisco UCS Manager or Cisco USC Center device.  
The Overview page is displayed.
- 3 Click **Components > Ethernet Ports**.  
The Ethernet Ports information is displayed at the top of the page. Performance Graphs are displayed at the bottom of the page.
- 4 Click a port name that has a value listed in the **Port Channel** column.  
The Ethernet Ports table is displayed at the top of the page. Performance Graphs are displayed in the lower part of the page.
- 5 Review the displayed graphs for bandwidth capacity utilization and ethernet pool utilization:

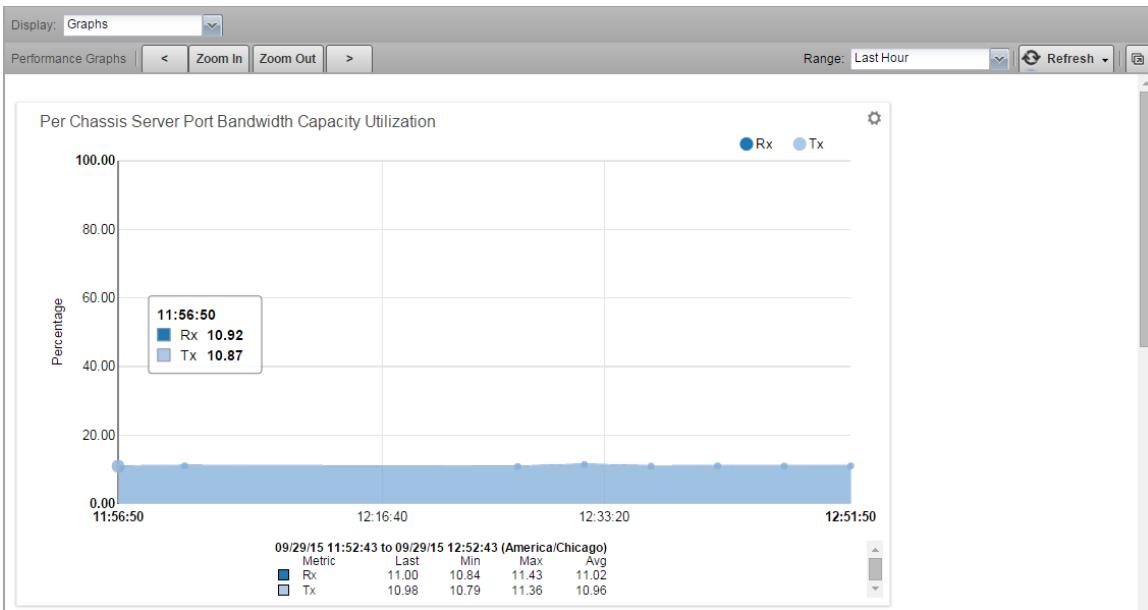
**Figure 62:** Ethernet Port Utilization Graph

## Identifying Remaining Capacity of an Aggregate Pool

The following example shows how to determine 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 Pools includes all links from all chassis to all fabric interconnects, which is used for chassis bandwidth balance comparison. For more examples, see the Aggregation Pools component section of Cisco UCS devices.

To identify remaining capacity for an Aggregation pool:

- 1 Navigate to **Infrastructure > Devices > CiscoUCS**.
- 2 Click a Cisco UCS Manager or Cisco USC Center device.  
The Overview page is displayed.
- 3 Click **Components > Aggregation Pools**.  
The Aggregation Pools information is displayed at the top of the page. Performance Graphs are displayed at the bottom of the page. .
- 4 Review the **Per Chassis Server Port Bandwidth Capacity Utilization** graph. The following image shows an example graph with percentages for Rx and Tx:

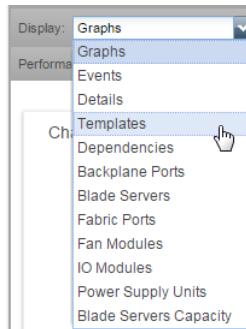
**Figure 63:** Per Chassis Server Port Bandwidth Capacity Utilization Graph

## 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 **Infrastructure > Devices**, then select a **CiscoUCS** device. The selected device's Overview page is displayed.
  - b From the Devices panel, select **Components > Chassis**, and then select a chassis from the Chassis list.
  - c Change the **Display** drop-down menu to **Templates**.

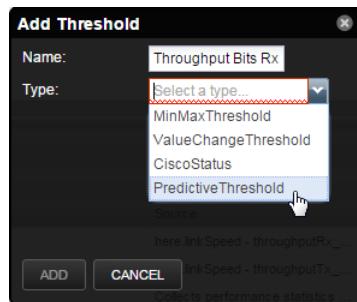
**Figure 64:** Display Menu

- d From the **Template** drop-down menu to **UCSCapChassis**.

**Figure 65:** Template Menu

- 2 Create a new threshold:

- To the right of **Thresholds**, click the + button to add a new threshold.
- Enter a suitable name for the threshold. For this example, enter *Throughput Bits Rx*.
- Select **Predictive Threshold** as the Type.

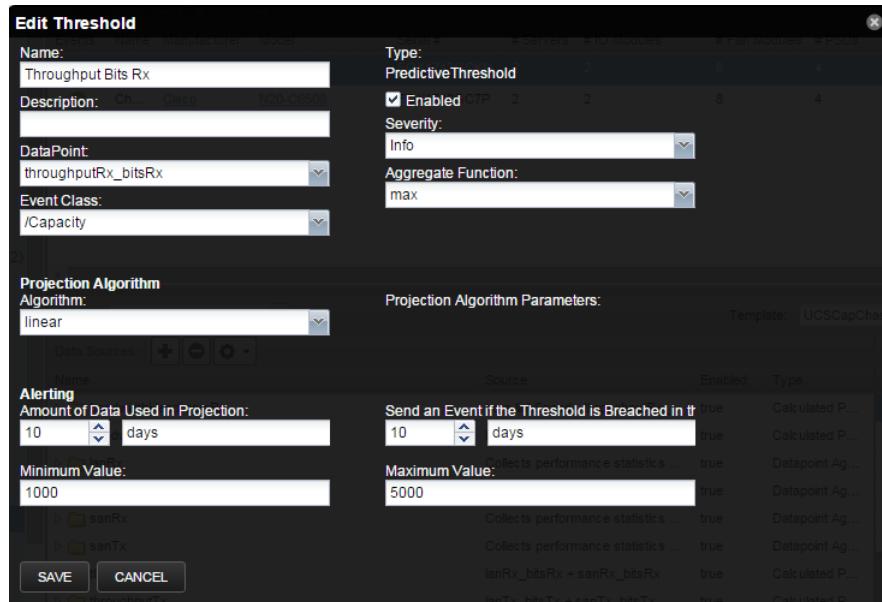
**Figure 66:** Add Threshold Dialog

- Click the **ADD** button.

The new threshold is added to the Thresholds table.

### 3 Edit the threshold values:

- Double-click the new threshold's name or select it and then click the gear button. The Edit Threshold dialog is displayed.
- From the **DataPoint** drop-down menu, select **throughputRx\_bitsRx**.
- Enter a numeric value in the **Minimum Value** and **Maximum Value** options. For this example enter 1000 minimum and 5000 maximum.

**Figure 67:** Edit Threshold Dialog

- Click **Save**.

The new predictive threshold is added to the device. To add a trendline to the graph for this threshold, continue to [Adding a Trendline to a Graph](#) on page 63.

## Adding a Trendline to a Graph

Trendlines show you the projected utilization of a device or component over a specified range of time.

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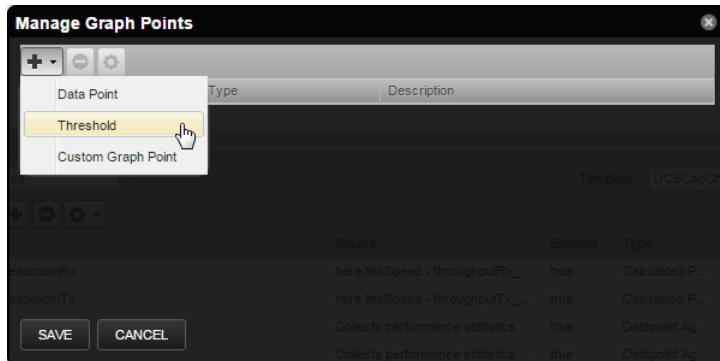
**Note** The following procedure uses the predictive threshold created in the previous procedure. To complete the steps below, create a new predictive threshold following the steps in [Creating a Predictive Threshold](#) on page 62.

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To add a trendline to an existing graph:

- 1 Navigate to **Infrastructure > Devices**, then select a **CiscoUCS** device.  
The selected device's Overview page is displayed.
- 2 From the Devices panel, select **Components > Chassis**, and then select a chassis from the Chassis list.
- 3 Change the **Display** drop-down menu to **Templates**.
- 4 To the right of **Graph Definitions**, click **+** to create a new graph.
- 5 In the **Add Graph Definition** dialog, enter a name for the graph.  
Alternatively, click the name of an existing graph to add the trendline to that graph.
- 6 Select the new graph, then from the gear icon, select **Manage Graph Points**.  
The Manage Graph Points dialog is displayed.
- 7 Click **+** > **Threshold**.

**Figure 68:** Manage Graph Points



- 8 Select the name of the new threshold, (Throughput Bits Rx, if following this example) and click **Submit**.
- 9 In the **Manage Graph Points** dialog, click **Save**.
- 10 To view the trendline, change the **Display** drop-down menu to **Graphs**.
- 11 Scroll down to the new (or existing graph) to view the newly added trendline.

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**Note** By default only the last 10 days of data is used in the trendline calculation. There may not be enough data to see the trendline appear on the graph. However, you can view the projected exhaustion dates in the lower right corner.

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