CHAPTER 27

Monitoring Data Center Configurations

Data Center is a centralized repository, either physical or virtual for the storage, management, dissemination of data and information organized around a particular manner. In other words, it is a facility used to house computer systems and associated components, such as telecommunications and storage systems. It generally includes redundant or backup power supplies, redundant data communication connections, environmental controls such as air conditioning or fire suppression, and security devices.

Cisco Prime Network supports the following network elements as part of data centers:

- Cisco Nexus 1000V network element
- Cisco Nexus 2000 network element
- Cisco Nexus 5000 network element
- Cisco Nexus 7000 network element
- Cisco Unified Computing System (UCS)

Prime Network supports the following technologies as part of data center:

- Virtual Port Channel (vPC), page 27-2
- Cisco FabricPath, page 27-6
- Virtualization, page 27-9

User Roles Required to Work with Data Center Configurations

Table 27-1 identifies the GUI default permission or device scope security level that is required to work with Prime Network Vision. Prime Network Vision determines whether you are authorized to perform a task as follows:

- For GUI-based tasks (tasks that do not affect devices), authorization is based on the default permission that is assigned to your user account.
- For element-based tasks (tasks that do affect elements), authorization is based on the default permission that is assigned to your account. That is, whether the element is in one of your assigned scopes and whether you meet the minimum security level for that scope.

For more information on user authorization, see the *Cisco Prime Network 3.10 Administrator Guide*.

By default, users with the Administrator role have access to all managed elements. To change the Administrator user scope, see the topic on device scopes in the *Cisco Prime Network 3.10 Administrator Guide*.

Table 27-1 Default Permission/Security Level Required for the Data Center Configurations

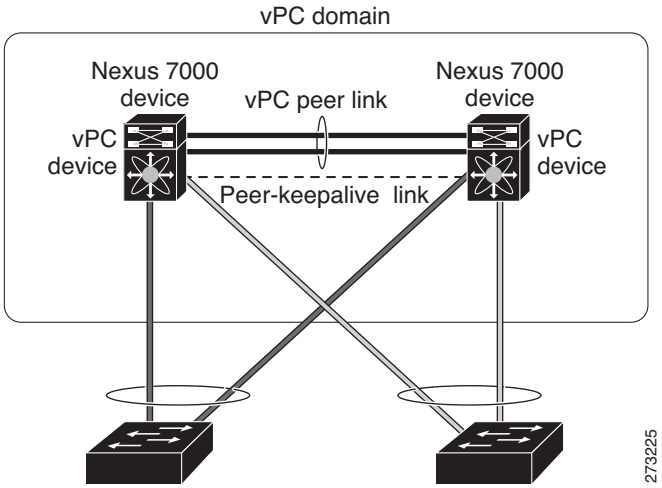
Task	Viewer	Operator	OperatorPlus	Configurator	Administrator
Viewing Virtual Port Channel Configuration	X	X	X	X	X
Viewing vPC Configuration	X	X	X	X	X
Viewing Cisco FabricPath Configuration	X	X	X	X	X
Monitoring Cisco FabricPath Configuration	X	X	X	X	X
Viewing Virtual Data Centers	X	X	X	X	X
Viewing the Data Stores of a Data Center	X	X	X	X	X
Viewing the Host Servers of a Data Center	X[1]	X[1]	X[1]	X[1]	X[1]
Viewing the Virtual Machines of a Data Center	X[1]	X[1]	X[1]	X[1]	X[1]

1. For users to be able to view VMs and hypervisors, a user's device scope must include all relevant vCenter VNEs.

Virtual Port Channel (vPC)

A Virtual Port Channel (vPC) allows links that are physically connected to two different Cisco Nexus 7000 or Cisco Nexus 5000 series network elements to appear as a single port channel by a third device as shown in Figure 27-1. The third device can be a switch, server, or any other networking device that supports port channels. A vPC can provide Layer 2 multipathing, which allows you to create redundancy and increase bisectional bandwidth by enabling multiple parallel paths between nodes and allowing load balancing traffic. You can use only Layer 2 port channels in the vPC.

Figure 27-1 vPC Architecture



A vPC consists of the following components:

- Two vPC peer switches, among which one is primary and one is secondary. The system formed by the two peer switches is referred to as a vPC domain.
- A peer link, also known as multichassis EtherChannel trunk (MCT), which connects the vPC peer switches. A peer link is a redundant 10 Gigabit Ethernet Port Channel ,which is used to carry traffic from one system to the other when needed and to synchronize forwarding tables.
- vPC member ports that form the PortChannel and are split between the vPC peers.
- A routed link, called as a vPC peer-keepalive or fault-tolerant link is a Layer 3 Gigabit Ethernet link, used to resolve dual-active scenarios where the peer link connectivity is lost.

A vPC domain is associated to a single Virtual Device Context (VDC), so all vPC interfaces belonging to a given vPC domain must be defined in the same VDC. You must have a separate vPC peer link and peer keepalive link infrastructure for each VDC deployed. Consolidating a vPC pair (two vPC peer devices of the same domain) in two VDCs of the same physical device is not supported. The vPC peer link must use 10-Gigabit Ethernet ports for both ends of the link; otherwise, the link will not be formed.

A vPC provides the following benefits:

- Allows a single device to use a port channel across two upstream devices
- Eliminates STP blocked ports
- Provides a loop-free topology
- Uses all available uplink bandwidth
- Provides fast convergence in case of link or a device failure
- Provides link level resiliency
- Assures high availability

Prime Network supports vPC on Cisco Nexus 5000 series and Cisco Nexus 7000 series network elements.

This topic contains the following sections:

- Viewing Virtual Port Channel Configuration, page 27-4
- Viewing vPC Configuration, page 27-5

Viewing Virtual Port Channel Configuration

To view the vPC configuration details in Prime Network Vision:

Step 1 Right-click on the required device and choose the **Inventory** option.

Step 2 In the Inventory window, choose **Logical Inventory** > **VPC Domain**. The vPC domain details are displayed in the content pane as shown in Figure 27-2.

Figure 27-2 vPC Domain in Logical Inventory

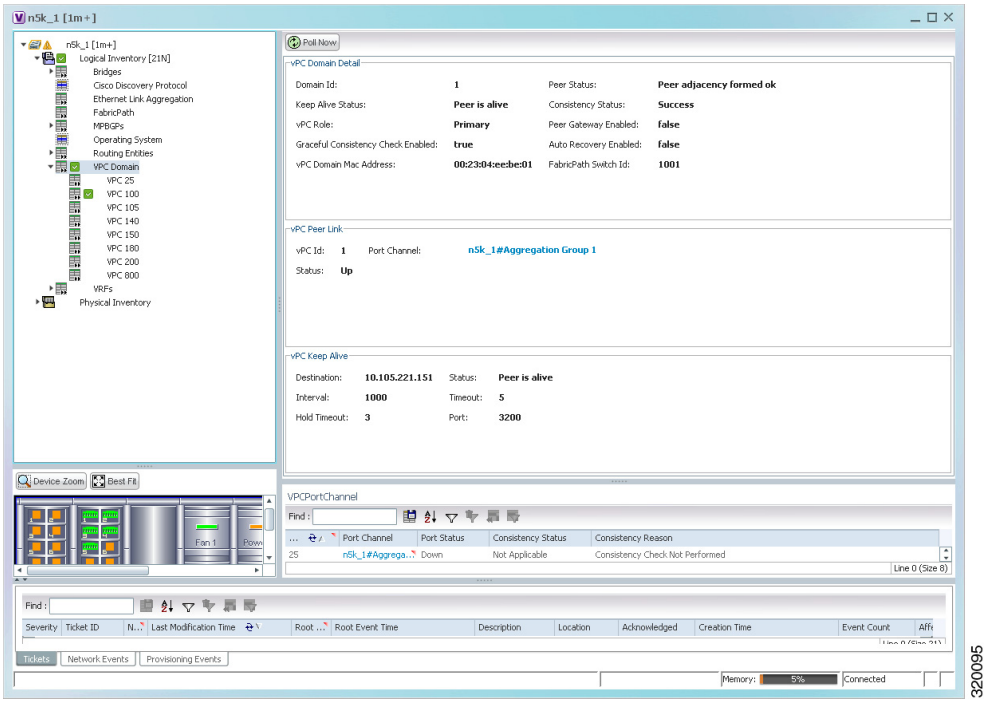


Table 27-2 describes the vPC domain details.

Table 27-2 vPC Domain Properties

Field Name	Description
Domain ID	Unique ID that is used to identify the vPC peer links and ports connected to the vPC downstream devices.
Peer Status	Status of the peer link.
Keep Alive Status	Status of the keep alive link, which could be Alive or Down.
Consistency Status	Consistency status of the vPC, which could be Success or Failed.
vPC Role	Role of the vPC, which could be Primary or Secondary.
Peer Gateway Enabled	Status of the peer gateway, which could be Enabled or Disabled.
Graceful Consistency Check Enabled	Indicates whether graceful consistency check is enabled or disabled. This consistency check helps in preventing traffic drops.
Auto Recovery Enabled	Indicates whether auto recovery is enabled or disabled.

Table 27-2 vPC Domain Properties (continued)

Field Name	Description
vPC Domain Mac Address	MAC address of the vPC domain.
FabricPath Switch ID	ID of the FabricPath switch connected to the vPC.
vPC Peer Link	
vPC ID	Unique ID for vPC peer link.
Status	Status of the port channel used for communication, which could be Up or Down.
Port Channel	vPC used as the port channel for communication. Click the hyperlink, to view the relevant Ethernet link aggregation node in the physical inventory.
vPC Keep Alive	
Destination	Destination IP address of the peer switch.
Status	Status of the keep alive link, which could be Alive or Down.
Interval	Interval time required to check whether the peer switch is active or inactive.
Timeout	Time taken by the peer switch to respond.
Hold Timeout	Amount of time during which the peer switch information is stored.
Port	Interface used for the communication.
VPC Port Channel	
vPC ID	Unique virtual Port Channel ID.
Port Channel	Ethernet link used as the port channel for communication. Click the hyperlink, to view the relevant Ethernet link aggregation node in the physical inventory.
Port Status	Status of the vPC, which could be Up or Down.
Consistency Status	Consistency status of the vPC, which could be Success or Failed.
Consistency Reason	Reason for the consistency status.

Viewing vPC Configuration

The following commands can be launched from the inventory by right-clicking **VPC Domain** and choosing **Commands > Show.** Before executing any commands, you can preview them and view the results. If desired, you can also schedule the commands. To find out if a device supports these commands, see the *Cisco Prime Network 3.10 Supported Cisco VNEs*.

Note You might be prompted to enter your device access credentials while executing a command. Once you have entered them, these credentials will be used for every subsequent execution of a command in the same GUI client session. If you want to change the credentials, click **Edit Credentials**. The Edit Credentials button will not be available for SNMP commands or if the command is scheduled for a later time.

Command	Navigation	Description
Show Port Channel Capacity	*Right-click on the VPC node* > **Commands** > **Show**	Use this command to view and confirm the port channel capacity details.
Show vPC		Use this command to view the vPCs available for the selected domain.
Show vPC Consistency Parameters		Use this command to view the vPC consistency parameters.

Cisco FabricPath

Cisco FabricPath is an innovation in Cisco NX-OS software that brings the stability and scalability of routing to Layer 2. It provides a foundation to build a scalable fabric—a network that itself looks like a single virtual switch from the perspective of its users. The switched domain does not have to be segmented anymore, providing data center–wide workload mobility. Because traffic is no longer forwarded along a spanning tree, the bisectional bandwidth of the network is not limited, and massive scalability is possible.

Cisco FabricPath introduces an entirely new Layer 2 data plane by encapsulating the frames entering the fabric with a header that consists of routable source and destination addresses. These addresses are the address of the switch on which the frame was received and the address of the destination switch to which the frame is heading. From there, the frame is routed until it is reaches the remote switch, where it is de-encapsulated and delivered in its original Ethernet format.

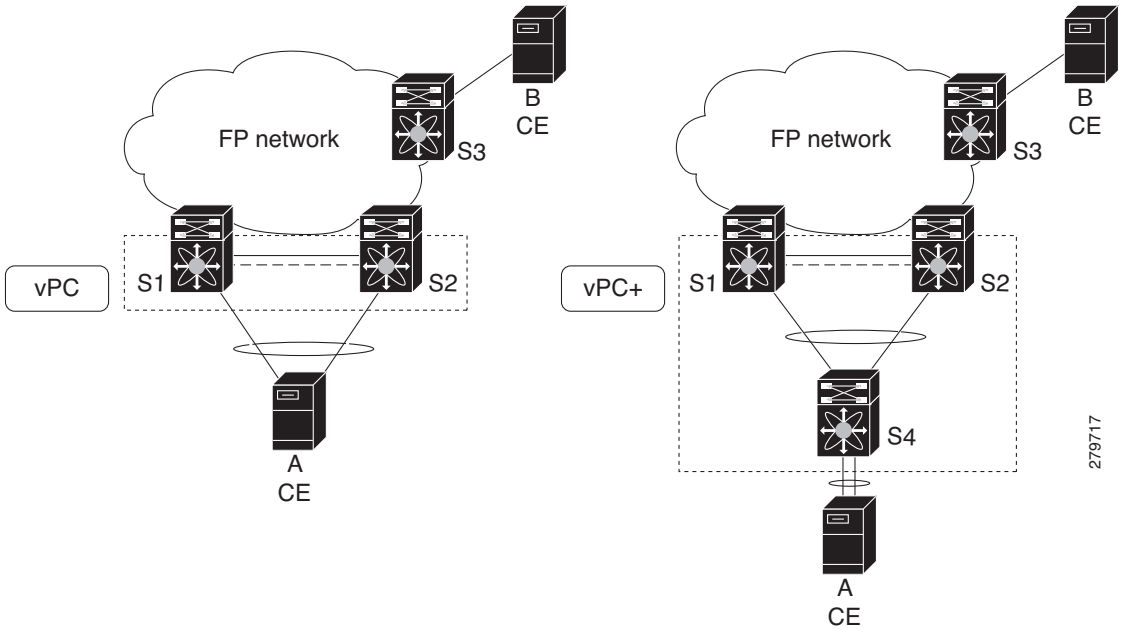
Cisco FabricPath provides the following features:

- Allows Layer 2 multipathing in the FabricPath network.
- Provides built-in loop prevention and mitigation with no need to use the Spanning Tree Protocol (STP).
- Provides a single control plane for unknown unicast, broadcast, and multicast traffic.
- Enhances mobility and virtualization in the FabricPath network.

The system randomly assigns a unique switch ID to each device that is enabled with FabricPath. After you enable FabricPath on the devices, you can configure an Ethernet interface or a port channel interface as a FabricPath interface. If one member of the port channel is in FabricPath mode, then all the other members will also be in FabricPath mode. After you configure the interface as a FabricPath interface, it automatically becomes a trunk port, capable of carrying traffic for multiple Virtual Local Area Networks (VLANs).

Prime Network supports Cisco FabricPath on Cisco Nexus 5000 series and Cisco Nexus 7000 series network elements. Figure 27-3 shows a Cisco FabricPath architecture.

Figure 27-3 Cisco FabricPath Architecture



This topic contains the following sections:

- Viewing Cisco FabricPath Configuration, page 27-7
- Monitoring Cisco FabricPath Configuration, page 27-9

Viewing Cisco FabricPath Configuration

To view the FabricPath configuration in Prime Network Vision:

Step 1 Right-click on the required device and choose the **Inventory** option.

Step 2 In the Inventory window, choose **Logical Inventory > FabricPath**. The FabricPath configuration details are displayed in the content pane as shown in Figure 27-4. You can also view the properties, by right-clicking the FabricPath node and choosing **Properties**.

Figure 27-4 Cisco FabricPath Node in Logical Inventory

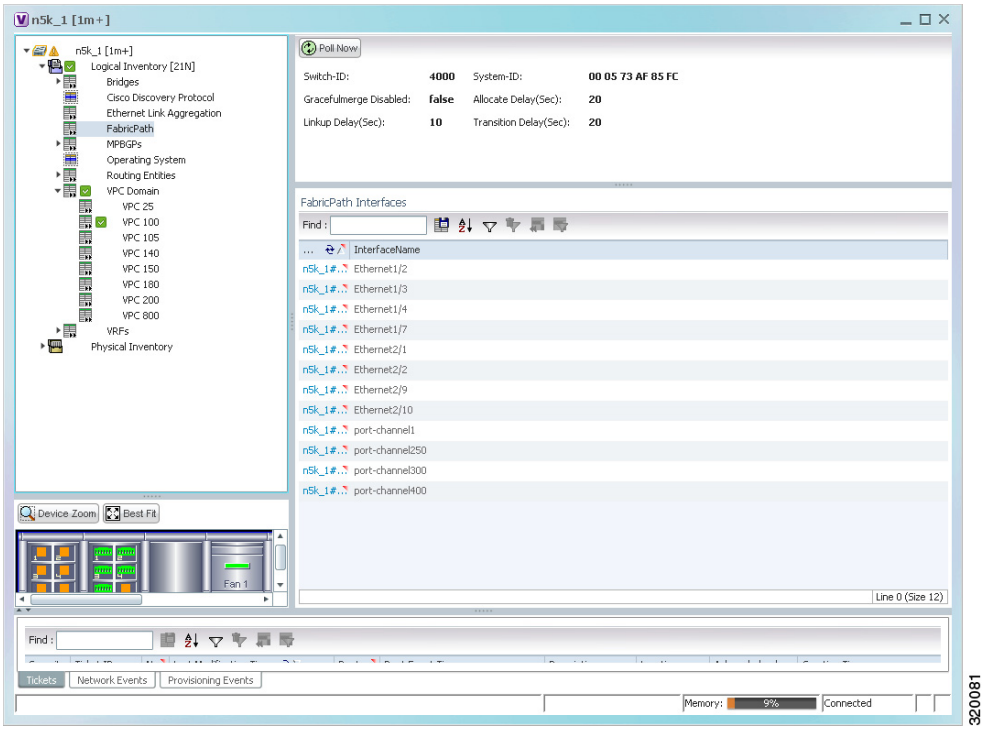


Table 27-3 describes the FabricPath configuration details.

Table 27-3 Cisco FabricPath Configuration

Field Name	Description
Switch ID	Unique ID of the Cisco FabricPath virtual switch.
System-ID	System MAC address of the Cisco FabricPath.
Gracefulmerge Disabled	Indicates whether graceful merge feature is enabled are not. Value could be **True** or **False**. If this feature is enabled, the switch would be effectively linked to the Cisco FabricPath network. If disabled, you may experience traffic drops.
Allocate Delay (sec)	Time delay during new resource propagation.
Linkup Delay (sec)	Time delay for detecting conflicts during linkup sessions.
Transition Delay (sec)	Time delay during transition of value propagation.
FabricPath Interfaces	
Port	Ethernet link, which is configured as a Cisco FabricPath. Click the hyperlink to view the interface link in physical inventory.
Interface Name	Name of the interface for which switch port mode is configured as a Cisco FabricPath.

Monitoring Cisco FabricPath Configuration

The following commands can be launched from the inventory by right-clicking **FabricPath** and choosing **Commands > Show.** Before executing any commands, you can preview them and view the results. If desired, you can also schedule the commands. To find out if a device supports these commands, see the *Cisco Prime Network 3.10 Supported Cisco VNEs*.

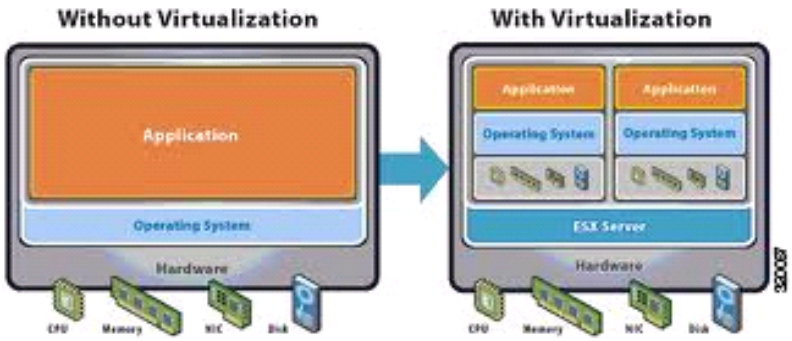
Note You might be prompted to enter your device access credentials while executing a command. Once you have entered them, these credentials will be used for every subsequent execution of a command in the same GUI client session. If you want to change the credentials, click **Edit Credentials**. The Edit Credentials button will not be available for SNMP commands or if the command is scheduled for a later time.

Command	Navigation	Description
FabricPath Conflict	*Right-click on the FabricPath node* > **Commands > Show**	Use this command to view the Cisco FabricPath conflicts.
MAC Address-Table Learning Mode		Use this command to view the MAC address-table learning mode.

Virtualization

Virtualization is a concept of creating a virtual version of any resource, such as hardware platform, operating system, storage device, or network resources, as shown in Figure 27-5. It provides a layer of abstraction between computing, storage and networking hardware, and the applications running on it. Virtual infrastructure gives administrators the advantage of managing pooled resources across the enterprise, allowing IT managers to be more responsive to dynamic organizational needs and to better leverage infrastructure investments.

Figure 27-5 Virtualization Concept



The various components of virtualization are:

Hypervisor (Host Server)

A hypervisor, also called a blade server, a virtual machine manager, or a host server, is a program that allows multiple operating systems to share a single hardware host. Each operating system appears to have the host's processor, memory, and other resources all to itself. However, the hypervisor is actually controlling the host processor and resources, allocating what is needed to each operating system in turn and making sure that the guest operating systems (called virtual machines) do not disrupt each other.

Virtual Machine

A virtual representation of a real machine using software that provides an operating environment, which can run or host a guest operating system.

Guest Operating System

An operating system running in a virtual machine environment that would otherwise run directly on a separate physical system.

Data Store

A data store represents a storage location for virtual machine files. It can be a Virtual Machine File System (VMFS) volume, a directory on Network Attached Storage, or a local file system path.

Data Center

Data Center serves as a container for hosts, virtual machines, networks, and data stores.

Prime Network supports virtualization on Cisco UCS network element.

The following topics explain how to view and monitor virtual data center properties in Prime Network Vision:

- Viewing Virtual Data Centers, page 27-10
- Viewing the Data Stores of a Data Center, page 27-11
- Viewing the Host Servers of a Data Center, page 27-11
- Viewing the Virtual Machines of a Data Center, page 27-14

Viewing Virtual Data Centers

To view the virtual data centers in the logical inventory:

Step 1 Right-click on the required device and choose the **Inventory** option.

Step 2 In the Inventory window, choose **Logical Inventory** > **Fabric Interconnect** > **Compute Virtualization**. The virtual data centers are listed in the content pane.

Table 27-4 describes the virtual data center properties.

Table 27-4 Virtual Data Center Properties

Field Name	Description
Name	Name of the data center.

Table 27-4 Virtual Data Center Properties (continued)

Field Name	Description
Manager	IP address of the vCenter, which manages the virtual data center.
Description	The description of the data center.

Step 3 Right-click on a data center and choose **Properties** to view more details.

Viewing the Data Stores of a Data Center

To view the details of data stores available for a data center:

Step 1 Right-click on the required device and choose the **Inventory** option.

Step 2 In the Inventory window, choose **Logical Inventory** > **Fabric Interconnect** > **Compute Virtualization** > *Data Center* > **All Data Stores**. The available data stores are displayed in the content pane. You can view the data store properties from the table or by right-clicking the required data store and choosing **Properties**.

Table 27-5 describes the data store properties.

Table 27-5 Data Store Properties

Field Name	Description
Name	Name of the data store.
Storage Type	Type of data storage for the data store.
Capacity	Capacity of the data store, in GB.
Free Space	Free space of the data store, in GB.
Accessible	Indicates whether the data store is accessible or not. Value could be True or False.

Viewing the Host Servers of a Data Center

To view the host centers of a data center:

Step 1 Right-click on the required device and choose the **Inventory** option.

Step 2 In the Inventory window, choose **Logical Inventory** > **Fabric Interconnect** > **Compute Virtualization** > *Data Center* > **All Host Servers**. Choose a host server and the details are displayed in the content pane as shown in Figure 27-6.

Figure 27-6 Host Server Details

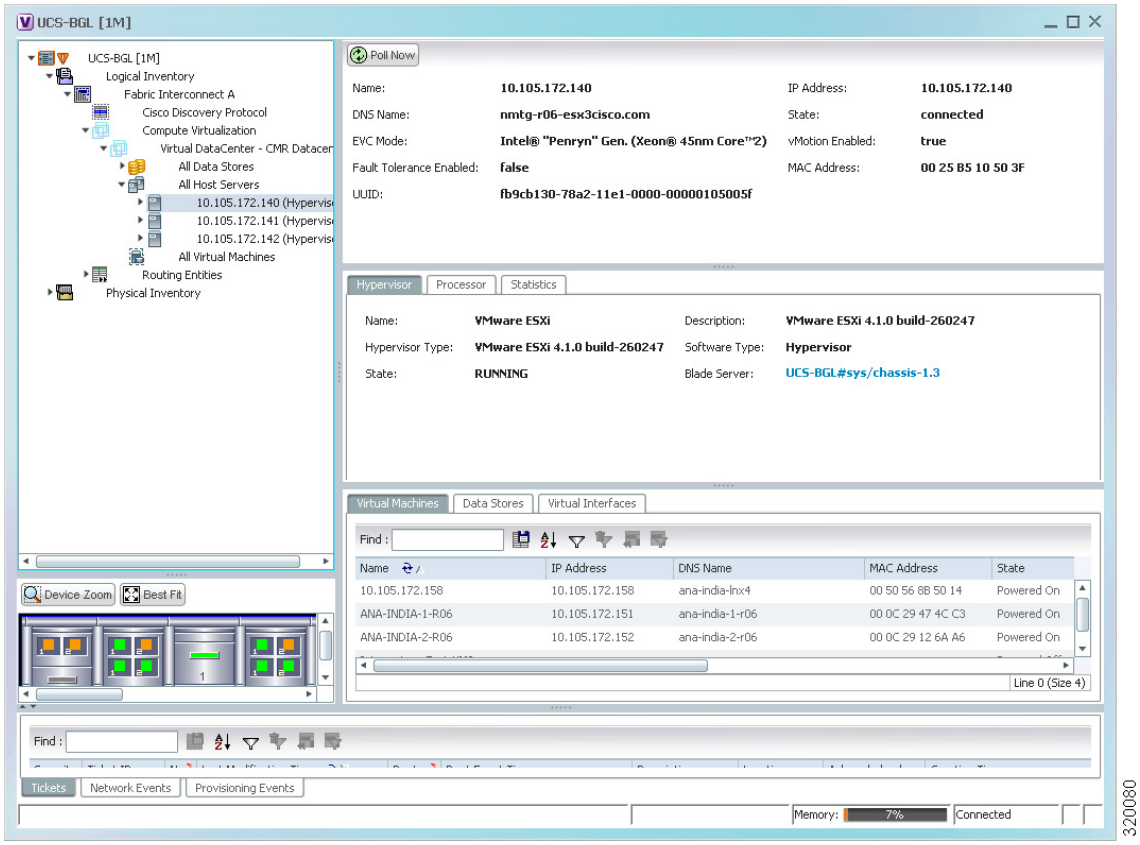


Table 27-6 describes the host server details.

Table 27-6 Host Servers of a Data Center

Field Name	Description
Name	Name of the host server.
IP Address	The IP address of the host server.
DNS Name	The domain name of the host sever.
State	Management state of the host server.
EVC Mode	Enhanced vMotion Capability (Evc) of the host server.
VMotion Enabled	Indicates whether vMotion service is enabled or not. vMotion service helps in migrating the virtual machines from one host server to another, when a particular host server is down.
Fault Tolerance Enabled	Indicates whether fault tolerance service is enabled or not. This service provides continuous availability by protecting the primary virtual machine with a secondary virtual machine that runs simultaneously on a separate host.
MAC Address	MAC address of the host server.
UUID	The unique ID of the host server.

Table 27-6 Host Servers of a Data Center (continued)

Field Name	Description
Hypervisor tab	
Name	Name of the hypervisor running on the host server.
Description	Description of the hypervisor.
Hypervisor Type	Type of the hypervisor.
Software Type	Type of software used by the hypervisor.
State	State of the hypervisor, which could be Running, Runnable, Waiting, Exiting, or Other.
Blade Server	Link to the blade server in which the host server is located. Click the hyperlink to view the blade server details in the physical inventory. Click the **Associated Service** link in the blade server properties in the Physical Inventory window, to return to the host server properties.
Processor tab	
Name	Name of the processor used by the host server.
Description	Description of the processor used by the host server.
CPU	Number of central processing units (CPUs) available for the host server.
Cores per CPU	Number of cores per CPU available for the host server.
Rated Speed	Rated speed of the processor, in GHz.
Used Speed	Actual used speed of the processor, in GHz.
Hyper Threading Enabled	Indicates whether hyper threading is enabled for the host server or not. Hyper threading helps to improve parallelization of computations.
RAM Size	RAM size of the processor, in GB.
Statistics tab	
CPU Usage	CPU usage by the host server, in GHz.
Memory Usage	Memory usage by the host server, in GB.
Virtual Machines tab	
Name	Name of the virtual machine associated with the host server.
IP Address	IP address of the virtual machine.
DNS Name	Domain name of the virtual machine.
MAC Address	MAC address of the virtual machine.
State	Execution state of the virtual machine, which could be Powered On, Powered Off, or Suspended.
VM Version	Hardware version of the virtual machine.
Virtual CPU	Number of virtual CPUs configured for the virtual machine on the host server.
Minimum Required EVC Mode	Minimum required EvC of the virtual machine.
Software Type	Type of the software used by the virtual machine.

Table 27-6 Host Servers of a Data Center (continued)

Field Name	Description
Data Stores tab	
Data Store Name	Name of the data store associated with the host server.
Associated Data Store	Click the hyperlink to view the associated data store under the **All Data Stores** node.
Virtual Interfaces tab	
Name	Name of the network endpoint of the virtual entity.
Type	Type of the virtual entity network endpoint.
IP Address	Primary IP address of the virtual entity network endpoint.
MAC Address	MAC address of the virtual entity network endpoint.
Duplex Mode	Communication mode, which could be one of the following: • Half—Transmit data in one direction at a time. • Full—Transmit data in both the directions at the same time.

Viewing the Virtual Machines of a Data Center

To view the virtual machines for a data center:

Step 1 Right-click on the required device and choose the **Inventory** option.

Step 2 In the Inventory window, choose **Logical Inventory** > **Compute Virtualization >** *Data Center* > **All Virtual Machines**. A list of virtual machines is displayed in the content pane as shown in Figure 27-7.

Figure 27-7 Virtual Machine Details

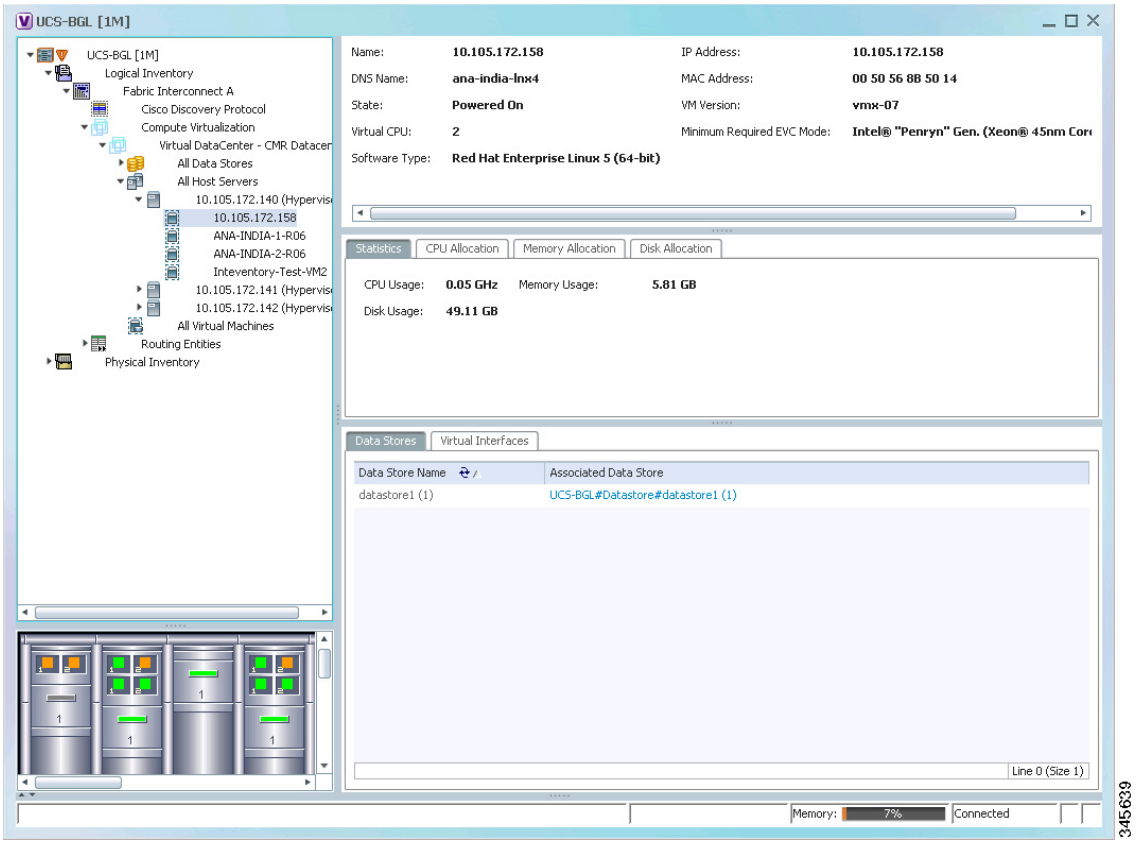


Table 27-7 describes the virtual machine details available in the list.

Table 27-7 Virtual Machines

Field Name	Description
Name	Name of the associated data center.
Virtual Machines	
Virtual Machine	Name of the virtual machine.
Hypervisor	Name of the hypervisor associated with the virtual machine.
IP/DNS Name	IP address or the domain name of the virtual machine.
Mac Address	Mac address of the virtual machine.

Step 3 Click the hyperlinked virtual machine name to view more details about the virtual machine. Prime Network Vision takes you to the virtual machine node under the mapped host server in the logical inventory. You can view the virtual machine properties on the content pane or by right-clicking the virtual machine and choosing **Properties**.

Table 27-8 describes the properties of the virtual machine.

Table 27-8 Virtual Machine Properties

Field Name	Description
Name	Name of the virtual machine.
IP Address	IP address of the virtual machine.
DNS Name	Domain name of the virtual machine.
MAC Address	MAC Address of the virtual machine.
State	Execution state of the virtual machine, which could be Powered On, Powered Off, or Suspended.
VM Version	Hardware version of the virtual machine.
Virtual CPU	Number of virtual CPUs configured for the virtual machine on the host server.
Minimum Required EVC Mode	Minimum required EvC of the virtual machine.
Software Type	Type of the software used by the virtual machine.
Statistics tab	
CPU Usage	CPU usage by the virtual machine, in GHz.
Memory Usage	Memory usage by the virtual machine, in GB.
Disk Usage	Amount of disk space used by the virtual machine, in GB.
Active Guest Memory Usage	Active guest memory used by the virtual machine, in GB.
CPU Allocation tab	
Resource Type	The type of resource, which in this instance is CPU.
Maximum Allocation	Maximum CPU allocation for the virtual machine, in GHz.
Unlimited Maximum Allocation	Unlimited maximum allocation capacity availability check for the virtual machine. Value could be true or false.
Expandable Allocation	Expandable allocation availability for the virtual machine. Value could be true or false.
Share	Relative importance of the virtual machine for CPU allocation, which could be High, Normal, or Low.
Custom Share Weight	Custom share weight assigned to the virtual machine.
Memory Allocation tab	
Maximum Allocation	Maximum memory allocation for the virtual machine, in GB.
Overhead Allocation	Overhead memory allocation for the virtual machine, in GB.
Unlimited Maximum Allocation	Unlimited maximum allocation capacity availability check for the virtual machine. Value could be true or false.
Expandable Allocation	Expandable allocation availability for the virtual machine. Value could be true or false.
Share	Relative importance of the virtual machine for memory allocation, which could be High, Normal, or Low.

Table 27-8 Virtual Machine Properties (continued)

Field Name	Description
Custom Share Weight	Custom share weight assigned to the virtual machine.
Disk Allocation tab	
Resource Type	The type of resource, which in this instance is Disk.
Guaranteed Allocation	Guaranteed resource allocation for the virtual machine, in GB.
Maximum Allocation	Maximum disk allocation for the virtual machine, in GB.
Unlimited Maximum Allocation	Unlimited maximum allocation capacity availability check for the virtual machine. Value could be true or false.
Expandable Allocation	Expandable allocation availability for the virtual machine. Value could be true or false.
Custom Share Weight	Custom share weight assigned to the virtual machine.
Data Stores tab	
Data Stores Name	Name of the data store associated with the virtual machine.
Associated Data Sore	Click the hyperlink to view the associated data store under the **All Data Stores** node.
Virtual Interfaces tab	
Name	Name of the network endpoint of the virtual entity.
Type	Type of the virtual entity network endpoint.
IP Address	Primary IP address of the virtual entity network endpoint.
MAC Address	MAC address of the virtual entity network endpoint.
Duplex Mode	Communication mode, which could be one of the following: • Half—Transmit data in one direction at a time. • Full—Transmit data in both the directions at the same time.