

vCloud Air - Hybrid Cloud Manager

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Preface

The Hybrid Cloud Manager Installation and Administration Guide describes how to install or update VMware® vCloud Air® Hybrid Cloud Manager.

You complete the following tasks from the vSphere® Web Client:

- Deploy the Hybrid Cloud Manager service virtual appliance, and configure software-defined WAN components.
- Extend on-premises VLAN and VXLAN networks from your data center to vCloud Air.
- Migrate workloads to the cloud and back.

Intended Audience

This document is for system administrators familiar with VMware vSphere virtualization and virtual networking concepts.

Related Documentation

In addition to this document, see the following documentation:

- [VMware vCloud Air Hybrid Cloud Manager Release Notes](#).
- [VMware vSphere Documentation 5.5u3 | 6.0u2](#).
- [vCloud Air Advanced Networking Guide](#), including [Direct Connect for vCloud Air](#).
- [vCloud Air Advanced Networking Services Guide](#).

VMware Technical Publications Glossary

VMware Technical Publications provides a glossary of terms that might be unfamiliar to you. For definitions of terms as they are used in VMware technical documentation, go to <http://www.vmware.com/support/pubs>.

Introducing Hybrid Cloud Manager

vCloud[®] Air Hybrid Cloud Manager[™] technology seamlessly integrates vSphere[®] vCenter[™] networks into vCloud Air. Hybrid networking extends your on-premises vSphere[®] vCenter[™] networks into vCloud Air, supporting bidirectional virtual machine (VM) mobility.

This introduction summarizes the tasks you can accomplish and the features that support and enhance migration and network extension.

Hybrid Cloud Manager owns the source and destination encryption and decryption processes, ensuring consistent security and providing admission for hybrid workflows such as virtual machine migration and network extension. Hybrid Cloud Manager creates an optimized, software-defined WAN to increase stretched network performance, enabling performance approaching LAN speed. Hybrid Cloud Manager also enables bidirectional workload and VMware NSX[®] security policy migration to vCloud Air Advanced Networking services. Hybrid Cloud Manager integrates with vSphere vCenters and is managed from the vSphere Web Client.

Layer 2 Network Extension

Securely stretch a network from a vCenter to a vCloud Air virtual data center (vDC).

- Hybrid Cloud Manager provides two Layer 2 appliances: the Layer 2 Concentrator (L2C) and the High Throughput Layer 2 Concentrator (HT L2C).
- Extended networks link to vCloud Air Advanced Network Services (ANS) edge appliances in the Org Gateway position.
- You can deploy multiple standard Layer 2 concentrators to achieve scalability and increase throughput from your vCenter.
- Virtual machines migrated through the Cloud Gateway and over stretched Layer 2 can retain their IP and MAC addresses.

Virtual Machine Migration

Hybrid Cloud Manager moves live virtual machines in three ways: low-downtime migration, vSphere vMotion migration, and cold migration.

Low-Downtime Migration

Low-downtime migration relies on vSphere Replication, which is a distributed technology implemented in the VMware ESX[®]/ESXi[®] hypervisor. The Hybrid Cloud Manager creates a replica of a live virtual machine, moves it to a vCloud Air vDC, and performs a switchover to power off the source virtual machine and power on the migrated virtual machine.

The migration path is always through the Cloud Gateway. The transport can be the Internet, a Layer 2 stretched network, or a Direct Connect line.

A virtual machine can be migrated multiple times in either direction.

vMotion Migration

Uses vMotion to transfer a live virtual machine across a network stretched to the vCloud Air. vMotion migration is also called zero-downtime migration, or cross-cloud vMotion. See [Migration with vMotion](#).

Cold Migration

Transfer a powered-off virtual machine to vCloud Air over a stretched network.

Common Features

- Optional software-defined WAN optimization, if installed, increases migration, throughput, and speed.
- Migration can be scheduled to occur at a specified time.
- A migrated virtual machine can keep its host name, virtual machine name, or both.

Networking Features

The following networking features are built into the Cloud Gateway and the Layer 2 Concentrators.

Intelligent Flow Routing

Automatically selects the best connection based on the Internet path, efficiently flooding the entire connection so that workloads are moved as fast as possible. When larger flows, such as backup or replication, cause CPU contention, smaller flows are routed to less busy CPUs, improving performance of interactive traffic

Proximity Routing

Ensures that forwarding between virtual machines connected to stretched and routed networks both on-premises and in the cloud is symmetrical.

Security

- The Cloud Gateway offers Suite B-compliant AES-GCM with IKEv2, AES-NI offload, and flow-based admission control.
- Hybrid Cloud Manager owns the source and destination encryption and decryption processes, ensuring consistent security and providing admission for hybrid workflows such as virtual machine migration and network extension.
- A security policy defined in your vCenter and assigned to a virtual machine can be migrated with the virtual machine.

Understanding the Hybrid Cloud Manager Deployment Process

2

Hybrid Cloud Manager supports a many-to-many relationship between on-premises vCenters and vCloud Air virtual data centers. vCenter Server in Linked Mode is supported. This topic provides a high-level overview of how the installer interacts with both the on-premises data center and the vCloud Air virtual data center.

During the installation, the Hybrid Cloud Manager virtual appliance is imported and configured as a plug-in for the on-premises vCenter. You then use the plug-in to configure the Software-Defined WAN service deployment. The automated configuration provisions each hybrid service appliance as a virtual machine in your on-premises vCenter, and deploys a corresponding virtual machine in your vCloud Air virtual data center.

To successfully deploy you must have:

- Sufficient resources for the virtual appliances.
- Your network must permit the appliances to communicate with both local and remote virtual appliances, and other virtual machines.

This chapter includes the following topics:

- [“Deployment Overview,”](#) on page 9
- [“Deployment Component Performance,”](#) on page 10
- [“Hybrid Cloud Manager Service Virtual Appliances,”](#) on page 11

Deployment Overview

The Hybrid Cloud Manager virtual machine is installed first, and it manages the installation of any other service virtual machine appliances on premises and in the cloud.

The following is a summary of the basic installation tasks. If you want to upgrade an existing deployment, see [“Upgrade Hybrid Cloud Manager,”](#) on page 51.

- 1 Log into My VMware and download the Hybrid Cloud Manager OVA file from: <https://my.vmware.com/group/vmware/details?downloadGroup=HCM200&productId=343>.
- 2 From the vSphere Web Client, install the Hybrid Cloud Manager service virtual appliance in the on-premises vCenter that connects to vCloud Air. See [“From vSphere to vCloud Air,”](#) on page 45.
- 3 From the vSphere Web Client, register a vCloud Air endpoint with the Hybrid Cloud Manager plug-in. See [“From vCloud Air to vSphere,”](#) on page 46. Registration establishes the one-to-one relationship between the on-premises Hybrid Cloud Manager and a vCloud Air virtual data center.
- 4 Identify the architecture you want to use. See [Chapter 3, “Choosing a Deployment Architecture,”](#) on page 15.

- 5 Install and configure the service virtual appliances.

For each appliance installed on premises, the installer provisions a corresponding service virtual appliance in the target vCloud Air virtual data center.

After the installation, Hybrid Cloud Manager controls both local and remote service virtual appliances. In your vCloud Air virtual data center, Hybrid Cloud Manager manages the provisioned Software-Defined WAN components as a service, so they are not editable, or even visible, in your vCloud Air virtual data center.

Deployment Component Performance

Your architecture planning can include the VMs you want to migrate, the networks used for virtual machine traffic, and the networks you want to extend. This topic summarizes some maximum and minimum values for the deployment components.

vSphere vCenter

The Hybrid Cloud Manager appliance must be installed on the vCenter that requires hybrid services. There can be only one Hybrid Cloud Manager deployment per vCenter. This restriction applies to linked mode: the Hybrid Cloud Manager management appliance is only installed in the primary vCenter. The Hybrid Cloud Manager supports up to five registered vCenters (in linked mode).

Cloud Registrations

The maximum number of cloud endpoints is ten. To find the number of endpoints, Hybrid Cloud Manager tracks vCenter connections to the cloud.

Hybrid Cloud Manager Processes

[Table 2-1](#) lists the number of processes you can run concurrently, through the UI or with scripts.

Table 2-1. Maximum Number of Migration and Network Extension Processes

On Premises	Limit	Comment
Max concurrent low downtime migration tasks	15	Total migration tasks (forward and reverse combined) per Hybrid Cloud Manager deployment.
Max concurrent standard Layer 2 stretching tasks	20	Simultaneous stretch operations. Applies to the extend network "Select source port groups" wizard page.
Max concurrent HT L2C stretching tasks	1	
Max concurrent vMotion migration tasks	1	

vCloud Air Network Services

Hybrid Cloud Manager is an **add-on** to the vCloud Air service. [Table 2-2](#) estimates the performance for each option and each Layer 2 Concentrator appliance.

High throughput L2 extension performance numbers are based on jumbo frames and Direct Connect private line connectivity. Results over Internet paths or private lines with 1500 byte MTU can degrade performance by 15% to 20%. However, the LAN side still supports jumbo frames.

Table 2-2. Hybrid Cloud Manager Performance Estimates

Hybrid Cloud Manager	Transport	Standard L2C	HT L2C
Standard		Licensed for up to 100 Mbps	N/A
Advanced	TCP/SSL Internet or Direct Connect	~600–700 Mbps at 10–15 ms latency	N/A
Enterprise		N/A	3–4 Gbps@ 100 fps per network

Stretched Networks

When you decide which networks to stretch, consider the workloads on the network, and determine whether a high throughput stretched network is required. Your architecture can include both standard and high throughput Layer 2 Concentrators.

- The standard L2C stretches vLANs and VXLANs. You can use trunking to maximize a single appliance for low throughput cases (500 Mbps or below).
- The HT L2C stretches a single VLAN. If you are using a Direct Connect line, an HT L2C appliance makes the best use of the bandwidth. An HT L2C is required if you need zero-downtime migration (vMotion).

Table 2-3. Layer 2 Stretched Network Limits

On Premises	Limit	Comment
Max standard L2 stretched networks	~200	200 is the number of stretched networks tested, not a true limit.
Max HT L2C	1	One stretched network per HT L2C appliance.

NOTE When you must connect more than ten stretched networks to vCloud Air, you need Advanced Networking Services Premium with the sub interface feature enabled.

Hybrid Cloud Manager Service Virtual Appliances

The installation package is an OVA file containing the Hybrid Cloud Manager plug-in. You install and configure the Hybrid Cloud Manager management appliance, then use Hybrid Cloud Manager to configure the service appliance virtual machines.

Hybrid Cloud Manager provisions and sizes the service virtual appliances, as shown in [Table 2-4](#).

Table 2-4. Virtual Machine Resource Requirements

Virtual Machine	vCPUs	RAM	Disk 1	Disk 2	Comment
Hybrid Cloud Manager	4	12 GB	60 GB	N/A	Required management plug-in.
Hybrid Cloud Gateway	8	3 GB	1.5 GB	N/A	Required. Note, the size of the gateway increased in v2.0.
Layer 2 Concentrator (L2C)	6	8 GB	500 MB	2 GB	Optional for migration, required for stretched Layer 2, or migration over stretched Layer 2.
High Throughput L2C (HT L2C)	8	2 GB	1 GB	512 Mb	Required for vMotion. New in 2.0.
WAN Optimizer	8	14 GB	30 GB	70 GB	Optional.

During the service virtual appliance deployment, you select an on-premises host or cluster to host the Cloud Gateway and Layer 2 Concentrator virtual machines. Hybrid Cloud Manager deploys the WAN Optimizer to the host that vSphere considers most suitable.

- [Hybrid Cloud Manager](#) on page 12
The Hybrid Cloud Manager plug-in is deployed on-premises only. It manages the service virtual appliances for the SD-WAN.
- [Hybrid Cloud Gateway](#) on page 12
The Hybrid Cloud Gateway maintains a secure channel between vSphere and a vCloud Air.
- [Layer 2 Concentrators](#) on page 12
The Network Extension Service extends a Layer 2 network from the on-premises vSphere data center to vCloud Air.
- [WAN Optimization](#) on page 13
Hybrid Cloud Manager uses software-defined WAN Optimization.

Hybrid Cloud Manager

The Hybrid Cloud Manager plug-in is deployed on-premises only. It manages the service virtual appliances for the SD-WAN.

The Hybrid Cloud Manager virtual appliance is an extension to your vCenter. It is deployed as a virtual machine. The Hybrid Cloud Manager appliance file structure contains all the hybrid service virtual appliances. The Hybrid Cloud Manager oversees the deployment and configuration of the Cloud Gateway, the Layer 2 Concentrators, and WAN Optimization virtual appliance both on-premises and in the cloud.

When you install the Hybrid Cloud Manager virtual appliance, you can select thin or thick provisioning for the hard drive. By default, hard drives for the service virtual appliances are thinly provisioned.

After the service virtual appliance configuration and deployment is done, you log in to this virtual machine to use the Hybrid Cloud Manager Management Portal.

Hybrid Cloud Gateway

The Hybrid Cloud Gateway maintains a secure channel between vSphere and a vCloud Air.

Hybrid Cloud Manager uses strong encryption to bootstrap a site-to-site connection to vCloud Air. The secure channel between vSphere and vCloud Air achieves multi-tenancy for vSphere protocols that are not tenant-aware, and to prevent networking "middle mile" security problems.

The Cloud Gateway also incorporates vSphere replication technology to perform bidirectional migration.

Layer 2 Concentrators

The Network Extension Service extends a Layer 2 network from the on-premises vSphere data center to vCloud Air.

The Layer 2 Concentrator virtual service appliances make extension possible. The Layer 2 Concentrators have two interfaces:

- **Internal trunk interface:** Handles virtual machine traffic on-premises for the extended networks using a translational bridge mapping to a corresponding stretched network in vCloud Air.
- **Uplink interface:** Hybrid Cloud Manager uses this interface to send encapsulated overlay traffic to and from vCloud Air. Application data travels through this interface.

As shown in [Table 2-5](#), the two concentrators are based on different technology. The newer high-throughput L2C is a much larger appliance, as described in [Table 2-4](#).

Table 2-5. Comparing Layer 2 Concentrators

Feature	Standard L2C	HT L2C
Transport	TCP/SSL, Internet, or Direct Connect	IP SEC, Direct Connect
IP Address	Can use default non-routable IP in a fleet deployment, or a routable IP address	Requires routed management IP address in all deployments.
NAT rules	Yes	Yes
Proximity routing	Yes	Yes
Jumbo frame support	No	Yes
Max connections per vLAN	Many	One

Layer 2 Appliance Position in the Single- Path Deployment

The configuration wizard's default strategy is to define the Cloud Gateway, then place the Layer 2 Concentrator "behind" the Cloud Gateway. The WAN optimizer bootstraps from the Cloud Gateway so it uses the gateway's address by default, as shown in [Figure 1](#).

- If the appliance is a standard L2C, this "single-path" strategy routes all traffic through the Cloud Gateway and uses only one IP address. Internally, the Layer 2 Concentrator is assigned a non-routable IP address, so the IP address assigned to the Cloud Gateway is the only one consumed.
- If you are using an HT L2C, you must assign a routable IP address, therefore two IP addresses are consumed.

Layer 2 Appliance Position for an Alternate Path

If you have a single-path deployment you can add multiple "standalone" appliances, where an L2C with a unique IP address forms a separate edge. Standalone appliances can be used to route vLANs through the cloud gateway, to extend a network to vCloud Air, or to carry communication between virtual machines.

- If you use an HT L2C to extend a network, each vLAN can have only one HT L2C connection. A Direct Connect private line is a typical.
- The standard L2C permits multiple connections, for scaling out a deployment. See "[Network Extension](#)," on page 17.

WAN Optimization

Hybrid Cloud Manager uses software-defined WAN Optimization.

The WAN Optimization appliance is an optional, yet highly recommended, component that performs WAN conditioning to reduce effects of latency. It also incorporates Forward Error Correction to negate packet loss scenarios, and deduplication of redundant traffic patterns. Altogether, these reduce bandwidth use and ensure the best use of available network capacity to expedite data transfer to and from vCloud Air.

- Virtual machine migration relies on the combination of Cloud Gateway and WAN Optimization appliance to achieve unparalleled mobility between vSphere on-premises and vCloud Air.
- Layer 2 extension benefits from WAN optimization when the data path is routed through the Cloud Gateway.

Choosing a Deployment Architecture

The most common use case is to install the Hybrid Cloud Manager, then install a single-path configuration.

A single path architecture uses the Cloud Gateway for migration, network extension, and network communication. This single-path architecture is sometimes called a "fleet" installation. [Table 3-1](#) summarizes the possible use cases, and what the minimal installation entails.

In addition to the fleet configuration, your architecture can include Layer 2 Concentrators that create alternate paths used to extend networks into the cloud, or to handle communication among virtual machines. The Cloud Gateway handles all migration and any network traffic for appliances in the fleet, while the independent Layer 2 Concentrators handle communication among virtual machines. By separating the migration path from the data path, you minimize the chance of migration workloads interfering with communication between VMs.

- Network extension with either concentrator requires a virtual distributed switch.
- A standard Layer 2 Concentrator can create multiple connections.
- A high-throughput Layer 2 Concentrator can connect to only one vLAN. vMotion requires a high-throughput L2C and a stretched network.
- Networking bandwidth is limited by your purchased hybrid networking option or your native bandwidth, whichever is smaller. Layer 2 extension speeds listed in [Table 3-1](#) and [Table 3-2](#) are maximums and may vary based on factors beyond our control. For best results, use the vCloud Air Direct Connect service.

Table 3-1. Minimum Requirements for Single Path Use Cases

#	Use Cases	HCM			Cloud Gateway	WAN Opt	Std L2C	HT L2 C	Comments
		S	A	E					
1	Migration, up to 100 Mbps	X			X	O	O	L	
2	Migration, 100+ Mbps		X		X	1 Gbps	O	L	
3	Extension, up to 100 Mbps	X	O		X	100 Mbps	X	L	
4	Extension and migration, up to 1 GB		X	X	X	1 Gbps	X	X	L, Z, DC
5	Extension and migration, up to 4 GB			X	X	1 Gbps	X	X	L, Z, DC

S | A | E: Standard | Advanced | Enterprise. Minimum Requirement: X. Optional: O.

WAN Opt enhances processing speed for workloads passing through the Cloud Gateway. WAN Opt speed is unrelated to network speed.

L: Low downtime migration, Z: Zero downtime migration (vMotion), DC: Direct Connect.

Table 3-2. Minimum Requirements for Separate Path Use Cases

#	Use Cases	HCM			Cloud Gateway	WAN Opt	Std L2C	HT L2C	Comments
		S	A	E					
6	Network extension, up to 1 GB	X	X		X	1 Gbps	X	O	L, Z, DC
7	Network extensions, up to 4 GB			X	X	1 Gbps	O	X	L, Z, DC

S | A | E: Standard | Advanced | Enterprise. Minimum Requirement: X. Optional: O.

WAN Opt enhances processing speed for workloads passing through the Cloud Gateway. WAN Opt speed is unrelated to network speed.

L: Low downtime migration, Z: Zero downtime migration (vMotion), DC: Direct Connect.

The remainder of this chapter discusses specific Hybrid Cloud Manager features. Some features require a specific configuration, so determine your feature requirements when planning your architecture.

- [Migration Only](#) on page 16
You can perform migration with a minimal configuration. Other than the Hybrid Cloud Manager, only the Hybrid Cloud Gateway appliance is required.
- [Network Extension](#) on page 17
You can extend a network using either of the Layer 2 concentrators.
- [IP Address Requirements](#) on page 19
To deploy the Hybrid Cloud Manager, you must have the proper number of IP addresses available both on-premises and in your target vCloud Air data center.
- [Proximity Routing](#) on page 20
Proximity Routing is a networking feature you can enable when you configure the Cloud Gateway.
- [MAC Address Retention](#) on page 21
The option to retain the MAC address is a check box in the migration wizard. It is only visible for replication-based migration.
- [Security Policy Migration](#) on page 21
The Policy Migration feature enables NSX distributed firewall rules to be moved from an on-premises vCenter to a vCloud Air virtual data center.

Migration Only

You can perform migration with a minimal configuration. Other than the Hybrid Cloud Manager, only the Hybrid Cloud Gateway appliance is required.

In [Table 3-1](#), cases 1 and 2 are for migrating without a Layer 2 extension. The basic difference between cases 1 and 2 is that greater speed is possible with the Hybrid Cloud Manager Advanced option.

The minimum requirement for low-downtime migration is vCenter 5.5 Update 3, or vCenter 6.0 or greater. Your vSphere host must be ESXi 5.5 or higher. It is possible to migrate virtual machines without network extension. In this case, the virtual machine obtains a new IP address using the Guest Customization service after it is migrated. If you choose to stretch a network, you must have a distributed virtual switch in your vSphere vCenter.

WAN Optimization can improve speed in the situations described in [“WAN Optimization,”](#) on page 13. Configuring the Hybrid Cloud Gateway to use a high-speed line (such as a Direct Connect) improves speed by providing a higher bandwidth link for WAN optimized traffic.

Migrating virtual machines on extended networks into vCloud Air is advantageous because it reduces downtime and the configuration does not change on the virtual machine. The virtual machine can retain the IP addresses, MAC addresses, computer names, and virtual machine names. Retaining these properties greatly simplifies the migration to vCloud Air and enables easy return trips to the on-premises data center. The Network Extension feature requires a vSphere Distributed Switch, which is available with vSphere Enterprise Plus Edition.

Table 3-3. Minimum Software Requirements for Cross-Cloud vMotion

vSphere vCenter	Transport	vCloud Air Dedicated Cloud, vDC
vCenter 5.5 Update 3 or greater	250 Mbps or greater	Hybrid Cloud Manager Advanced Hybrid Cloud Manager Enterprise
Distributed Virtual Switch	HT L2C recommended	Advanced Networking Services: Standard or Premium
eSXi 5.5 or greater		

Network Extension

You can extend a network using either of the Layer 2 concentrators.

Before you configure Layer 2 network extension, you must be certain that you have the prerequisites, as explained in, “[Verify Layer 2 Installation Environment](#),” on page 26.

Use cases 3 through 7 in [Table 3-1](#) rely upon network extension. A Layer 2 concentrator is required to stretch your on-premises network to vCloud Air and enable seamless migration between the data center and the cloud. Suppose that you have an application and a database on separate virtual machines in your vCenter, and you migrate the application into the Cloud.

- If you are using the default deployment configuration (single path), both migration traffic and extended network traffic are routed through the Cloud Gateway. WAN optimization (if installed) and intelligent routing, are applied to all workloads. See “[Single Path](#),” on page 18.
- The migration path and the data path are separate in cases 6 and 7. As usual, the Cloud Gateway maintains the secure channel, which gets the benefits of WAN optimization. Typically you route communication traffic between virtual machines over the alternate path so migration workloads do not affect communication traffic.

Data traffic between virtual machines uses the data paths established by the Layer 2 concentrators. See “[Separate Paths for Migration Traffic and Layer 2 Extension Traffic](#),” on page 18.

Table 3-4. Minimum Product Versions for Network Extensions

vSphere vCenter	Transport	vCloud Air Dedicated Cloud, vDC
vCenter	licensed for up to 100 Mbps	Hybrid Cloud Manager Standard
dVS	~600–700 Mbps at 10–15 ms latency	Hybrid Cloud Manager Advanced
1 Management IP for Hybrid Cloud Manager	HT 3–4 Gbps at 1500 fps per network	Hybrid Cloud Manager Enterprise Advanced Networking Services Standard or Advanced
+1 IP for Cloud Gateway (fleet)		2 sequential IP addresses for each Cloud Gateway
+1 IP for each alternate path L2C or HT L2C		+1 IP for each alternate path L2C or HT L2C

The remainder of this section summarizes how Layer 2 Concentrator configuration affects the network extension use cases.

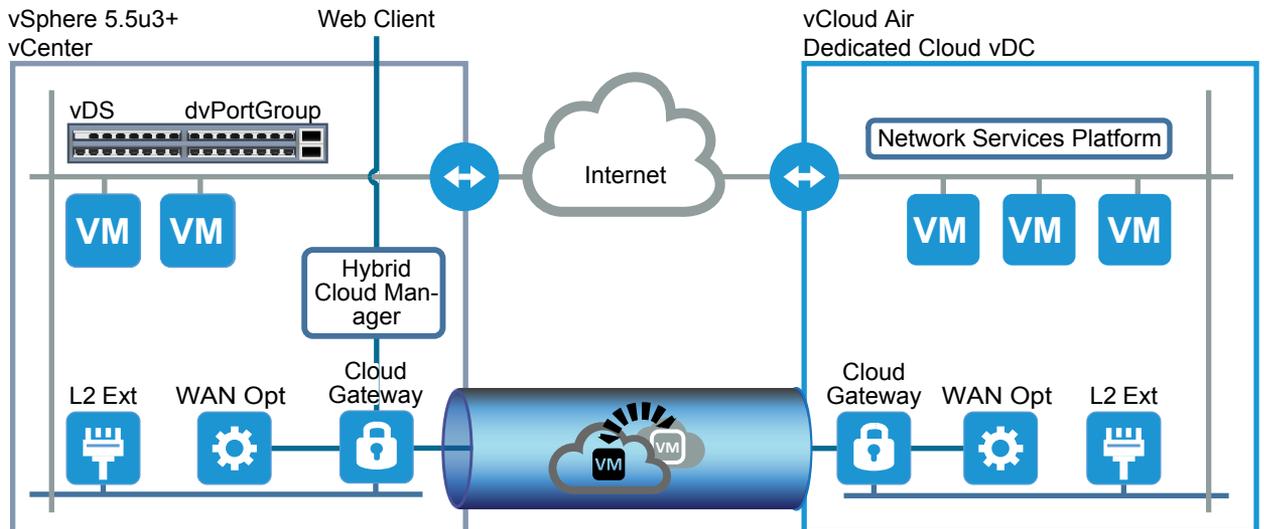
Single Path

This topic describes the default virtual service appliance deployment, where the Layer 2 concentrator and WAN optimization appliances route stretched traffic through the Hybrid Cloud Gateway. The default configuration applies WAN Optimization (if installed) and intelligent routing.

Figure 3-1 illustrates the single-path configuration.

The benefits of this default configuration are:

Figure 3-1. Installation Components in Single Path Configuration



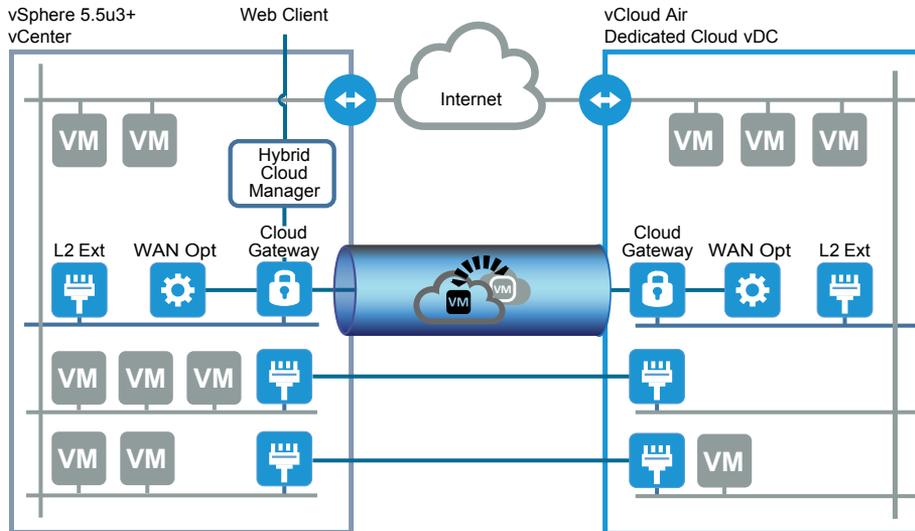
- Lower encryption overhead (enabling better performance)
- Improved cryptography (IPSEC Suite B, instead of SSL)
- WAN Optimization
- Fewer IP addresses consumed if the default configuration is used

Separate Paths for Migration Traffic and Layer 2 Extension Traffic

In this configuration, a Layer 2 Concentrator path passes through the Hybrid Cloud Gateway and additional Layer 2 concentrators use separate encrypted channels.

Migration tasks are automatically routed through the Cloud Gateway. Other tasks, such as application communication, can be routed over Layer 2 Concentrators that form an alternate path. Layer 2 extension creates a separate encrypted channel that is typically used for a stretched network, or communication between virtual machines, for example, application traffic. The Layer 2 Concentrator can be either a standard appliance or the high throughput Layer 2 Concentrator.

Workloads passing through the cloud gateway benefit from WAN optimization and intelligent routing. Both Layer 2 concentrators create secure encrypted connections but without WAN optimization the speed is affected, in comparison to the Cloud Gateway. The lack of WAN optimization is less noticeable with small packets, or when the data path is already encrypted or on a private circuit.

Figure 3-2. Single Path Configuration With Alternate Path Layer 2 Concentrators

IP Address Requirements

To deploy the Hybrid Cloud Manager, you must have the proper number of IP addresses available both on-premises and in your target vCloud Air data center.

This topic addresses how to calculate the number you need.

vMotion Address

Maintaining a separate network for vMotion is a common practice in the on-premises data center. The Hybrid Cloud Gateway must have access to the vMotion network. If it does not, you need an extra IP address to communicate with the vMotion network.

On Premises

- One IP address for the Hybrid Cloud Manager appliance.
- One for each Hybrid Cloud Gateway, add one if there is a separate vMotion network.
- One for each standard Layer 2 Concentrator, if not using the automatically assigned IP address.
- One for each HT L2C.

vCloud Air

- Two IP addresses per Hybrid Cloud Manager appliance connected to the vCloud Air virtual data center. The addresses can be used to connect to the Internet or one or more Direct Connect lines.
- Add one if there is a separate vMotion network connection.

If your target virtual data center does not have enough available IP addresses, you can purchase more.

- 1 Log in to vCloud Air, and from the Dashboard tab, click the target vDC.
- 2 On the lower right, under Related Links, click "Purchase More Resources."

- When My VMware opens, click Purchase Add-ons and add more IP addresses to your service ID.

For more about IP addresses in vCloud Air, see [Allocation of Public IP Addresses](#).

Proximity Routing

Proximity Routing is a networking feature you can enable when you configure the Cloud Gateway.

Proximity routing ensures that forwarding between virtual machines connected to stretched and routed networks, both on-premises and in the cloud, is symmetrical. This feature requires Advanced Networks Services with Dynamic Routing configured between the customer premises and the cloud.

When users extend their networks to the cloud, Layer 2 connectivity is stretched onto vCloud air networks. However, without route optimization, Layer 3 communication requests must return to the on-premises network origin to be routed. This return trip is called "tromboning" or "hairpinning." Tromboning is inefficient because packets must travel back and forth between the network origin and the Cloud, even when both source and destination virtual machines reside in the Cloud.

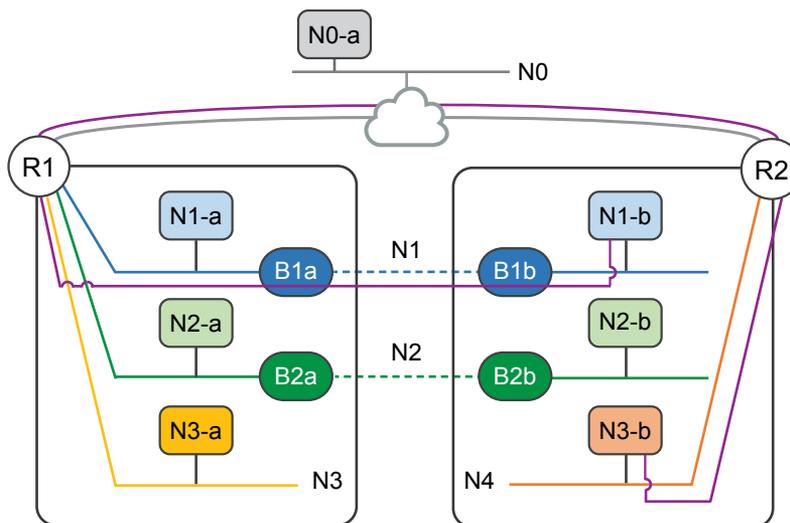
In addition to inefficiency, if the forwarding path includes stateful firewalls, or other inline equipment that must see both sides of the connection, communication might fail. Virtual machine communication (without route optimization) failure occurs when the egress path exiting the cloud can be either the stretched Layer 2 network or the Org Routed Network. The on-premises network does not know about the stretched network "shortcut." This problem is called asymmetric routing. The solution is to enable proximity routing so the on-premises network can learn the routes from vCloud Air.

The Cloud Gateway maintains an inventory of virtual machines in the cloud. It also understands the virtual machine state, which can be:

- Transferred to the cloud with vMotion (zero-downtime migration).
- Migrated to the cloud using host-based replication (low-downtime migration).
- Created in the cloud (on a stretched network).

To prevent tromboning, vCloud air uses intelligent route management to choose routes appropriate to the virtual machine state.

Figure 3-3. Asymmetric Routing With Proximity Routing Solution



In the diagram above, the N*a components on the left reside in the on-premises data center, and the N*b component on the right reside in the cloud.

R1 is the default gateway for N1-b, therefore, N1-b must return to R1 to route traffic through R2. To prevent asymmetric routing, vCloud Air injects host routes into the on-premises network.

- If the virtual machine was newly created in the cloud, or it was moved with low-downtime migration, the host route is injected immediately.
- If the virtual machine was transferred using vMotion, the route is not injected until the virtual machine reboots. Waiting until after the reboot ensures that the on-premises stateful devices continue to service the existing session until the virtual machine reboots. After the reboot, the routing information is consistent both on-premises and in the cloud.

That is, R1 can use routing to reach a specific virtual machine through R2, rather than using the locally connected extended Network. R2 fully owns the path for other networks to reach virtual machines with Proximity Routing enabled.

MAC Address Retention

The option to retain the MAC address is a check box in the migration wizard. It is only visible for replication-based migration.

By default, “Retain MAC” is enabled if the source virtual machine is in a stretched network, and disabled when the network is not stretched. If you do not retain the MAC address, the virtual machine obtains a new address when the migration is done. The decision to retain a MAC address or acquire a new one can impact the migration process and the post-migration network traffic flow.

You might retain the MAC address for one of the following reasons:

- Licenses based on the MAC address: Some software pairs the license to the MAC address of the VM. Changing the MAC address of a virtual machine invalidates the license.
- Linux NIC order: In Linux, if you change the MAC address on a virtual machine, the NIC Ethernet device number might change after a reboot. A device number change can alter the NIC presentation order within the operating system, breaking applications or scripts that depend on NIC order.
- Less downtime if the network is stretched: If the virtual machine is migrated over a stretched network, enabling “Retain MAC” minimizes downtime because the network does not have to learn a new MAC address.
- The check box is on the “Select destination network” page:
 - When you are using the bidirectional migration wizard to go from vSphere to vCloud[®] Air[™]. See [“From vSphere to vCloud Air,”](#) on page 45.
 - When you run the migration wizard from the context menu. See [“Migrate a Selected Virtual Machine From a vCenter to vCloud[®] Air[™],”](#) on page 45.
 - When you migrate from vCloud[®] Air[™] to vSphere, the check box is on the “Select virtual machine(s)” page. See [“From vCloud Air to vSphere,”](#) on page 46.

Security Policy Migration

The Policy Migration feature enables NSX distributed firewall rules to be moved from an on-premises vCenter to a vCloud Air virtual data center.

Policy Migration is possible when you use low-downtime migration or vMotion to move a virtual machine over a network stretched with the High Throughput Layer 2 Concentrator.

- The on-premises data center must be running NSX 6.2.2 or greater.
- In vSphere, the security policy is a single NSX Section which can contain many rules. There can be only one Section (policy) per Org vDC.
- You can name a Set of IP addresses or MAC addresses to participate in the policy. The name of the MAC Set or IP Set cannot exceed 218 characters.

- All rules in a Section must have a unique name. Do not leave a rule name blank.
- Supported rules specify Layer 3 IP addresses or IP Sets, or Layer 2 MAC addresses or MAC Sets as the source or destination.

NOTE Rules that specify security groups or application groups for the source or destination are not migrated.

- Any change to the migrated policy is propagated to all VMs that use the policy.

Preparing Your Installation Environment

4

Before installing Hybrid Cloud Manager, verify that your environment can support the tasks you want to accomplish.

The basic software requirements are as follows:

- vSphere 5.5u2 ep7, 5.5 U3, or vSphere 6.0u2 or higher.
- If NSX is used, version 6.2.2 or higher. NSX is required for policy migration.
- If you intend to use cross-cloud vMotion, the same affinity restrictions apply across clouds as they do on-premises. See the [EVC and CPU Compatibility FAQ](#).

Before installing or upgrading, you decide which new features you want to deploy, and contact [VMware Global Support Services](#) (GSS) before starting the process.

For example, to use cross-cloud vMotion, your vSphere NSX version and your vCloud Air Network Services Platform version must be compatible. If you share your configuration with Support, they can ensure that the vCloud Air environment is compatible before you start the upgrade or installation process.

- [Configure Network Connectivity](#) on page 23
Hybrid Cloud Manager must traverse the public Internet and your private lines, and connect to data center components, such as networks, switches, and port groups.
- [Verify the Minimum Installation Environment](#) on page 25
Before installing Hybrid Cloud Manager, verify that your environment can support the tasks you want to accomplish.
- [Verify Layer 2 Installation Environment](#) on page 26
Stretching a network requires a vSphere enterprise plus edition.
- [Install the vSphere Air Web Client Integration Plug-In](#) on page 26
You must install the vSphere Web Client integration plug-in. With the Web client, you can use a browser to connect to a vCenter Server system and manage an ESXi host.

Configure Network Connectivity

Hybrid Cloud Manager must traverse the public Internet and your private lines, and connect to data center components, such as networks, switches, and port groups.

[Port Access Requirements](#) lists ports that must be opened so that Hybrid Cloud Manager virtual appliances can install successfully.

Both your vSphere environment and your vCloud Air environment must permit Network Time Protocol (NTP) clock synchronization among vSphere on-premises devices and the vCloud Air Dedicated Cloud devices. UDP port 123 must be accessible to Hybrid Cloud Manager virtual appliances and networks. If you have installed NTP Servers, you can specify them when you [“Install the Hybrid Cloud Manager Appliance,”](#) on page 27.

Table 4-1. Port Access Requirements

Source	Target	Port	Protocol	Purpose	Services
HCM	Customer DNS	53	TCP /UDP	Name resolution.	DNS
HCM	vCloud Director API URL	443	TCP	Hybrid Cloud Manager to vCloud Air registration.	
HCM	vCenter Server	443	TCP	Hybrid Cloud Manager REST service.	HTTPS
Web Browser	HCM	9443	TCP	Hybrid Cloud Manager Virtual Appliance Management Interface for Hybrid Cloud Manager system configuration.	HTTPS
Admin Network	HCM	22	SSH	Administrator SSH access to Hybrid Cloud Manager. Only necessary if you configured SSH in Step 5d .	HTTPS
HCM	ESXi Hosts	902	TCP	Send management and provisioning instructions from Hybrid Cloud Manager to ESXi Hosts in vCloud Air.	internal
HCM	vCenter SSO Server	7444	TCP	vSphere Lookup Service.	
HCM	NTP Servers	123	UDP	Time synchronization.	
HCM	Syslog	User Configured		Connection between Hybrid Cloud Manager (the client) and the Syslog server. Values for the Syslog port and protocol you specified in the vSphere Web Client (for example, port 514 for UDP protocol).	
HCM	Cloud Gateway	8123	TCP	Send host-based replication service instructions to the Hybrid Cloud Gateway.	HTTP
HCM	Cloud Gateway	9443	TCP	Send management instructions to the local Hybrid Cloud Gateway using the REST API.	HTTPS
Cloud Gateway	L2C	443	TCP	Send management instructions from Cloud Gateway to L2C when L2C uses the same path as the Hybrid Cloud Gateway.	HTTP
Cloud Gateway	L2C	8443	TCP	Bidirectional management instructions from Cloud Gateway to L2C, when L2C uses an alternate data path.	HTTP
L2C	L2C (remote)	443	TCP	Bidirectional management instructions from Cloud Gateway to L2C, when L2C uses an alternate data path.	HTTP
Cloud Gateway	ESXi Hosts	80, 902	TCP	Management and OVF deployment.	internal
ESXi Hosts	Cloud Gateway	31031, 44046	TCP	Internal host-based replication traffic.	internal
Cloud Gateway	ESXi Hosts	8000	TCP	vMotion (zero-downtime migration)	
Cloud Gateway (local)	Cloud Gateway (remote)	50	IP	IP protocol to encapsulate hybrid network traffic for the bidirectional tunnel.	IPSEC

Table 4-1. Port Access Requirements (Continued)

Source	Target	Port	Protocol	Purpose	Services
Cloud Gateway (local)	Cloud Gateway (remote)	4500	UDP	Internet key exchange (IKEv2) to encapsulate workloads for the bidirectional tunnel. Network Address Translation-Traversal (NAT-T) is also supported.	IPSEC
Cloud Gateway (local)	Cloud Gateway (remote)	500	UDP	Internet key exchange (ISAKMP) for the bidirectional tunnel.	IPSEC

Verify the Minimum Installation Environment

Before installing Hybrid Cloud Manager, verify that your environment can support the tasks you want to accomplish.

On Premises

- Virtual Center created with vSphere 5.5 Update 3 or 6.0 Update 2.
- vMotion and policy migration features require NSX version 6.2.2 or higher.
- A vSphere service account with the Administrator vCenter Server system role assigned to it. See <https://pubs.vmware.com/vsphere-60/index.jsp?topic=%2Fcom.vmware.vsphere.security.doc%2FGUID-93B962A7-93FA-4E96-B68F-AE66D3D6C663.html>.
- In the vCenter, enough disk space for Hybrid Cloud Manager and the associated service appliances you install, as stated in “[Hybrid Cloud Manager Service Virtual Appliances](#),” on page 11.
- Sufficient IP addresses for the on-premises VMs provisioned during the installation. See “[IP Address Requirements](#),” on page 19 for the minimum requirements for each configuration.
- Ports and firewalls opened as required. See “[Configure Network Connectivity](#),” on page 23. You must know whether your single sign-on (SSO) service (the lookup service) is local to the current vCenter or in an external location.

If the SSO server is remote, you must identify the URL of the vCenter, external SSO Server, or Platform Services Controller (PSC) that runs the external lookup service. When you register the Hybrid Cloud Manager with the vCenter, you must supply this URL.

If a vCenter does not have its own internal instance of the lookup service, it might be for one of the following reasons:

- vCenter 6.0u2 is running an external Platform Services Controller.
- The vCenter is in linked mode (where the secondary vCenter uses the SSO service from the primary vCenter or an external SSO service).

vCloud Air

- vCloud[®] Air[™] Dedicated Cloud subscription service account with the Account Administrator role. See [User Privileges by Role](#).
- Hybrid Cloud Manager add-on service. See <http://vcloud.vmware.com/service-offering/hybrid-cloud-manager>. You can buy the add-on with a purchase order, or you can use the VMware Subscription Purchasing program.
- Purchasing the Hybrid Cloud Manager add-on service automatically opens a vCloud[®] Air[™] operations ticket that upgrades your vCloud[®] Air[™] Edge Gateway to enable Advanced Network Services (ANS). To install, your My VMware Account must report that the vCloud[®] Air[™] Edge Gateway is the Advanced Network Services edition, and the Hybrid Cloud Manager add-on service status is “available”.

- You must have a virtual data center with sufficient resources for the VMs you want to migrate. You must know the vDC name, and the IP address of the vCloud Air endpoint.
- You must also know the vCloud Director API URL. You can find the URL in your vCloud[®] Air[™] Dashboard, under “Virtual Data Center Details.”
- When you want to connect more than ten stretched networks to a vCloud Air edge, you need Advanced Networking Services Premium with the sub interface feature enabled.

Verify Layer 2 Installation Environment

Stretching a network requires a vSphere enterprise plus edition.

Your vSphere vCenter must meet the following requirements to support Layer 2 extension.

- Must have a vSphere Distributed Switch (vDS). The distributed switch is available with vSphere Enterprise Plus Edition.
- When installed, the on-premises Layer 2 concentrator service appliance must have access to a vNIC port and any vLANs you want to stretch.
- If you choose to stretch a network over the public Internet or your own VPN (on an alternate path), then the L2C virtual machine in your vCloud Air virtual data center also requires an IP address. You must know the remote IP address before you configure the Layer 2 concentrator. See [Port Access Requirements](#).
- If your architecture specifies multiple Layer 2 concentrators, each must have an IP address on-premises and in the cloud.

Install the vSphere Air Web Client Integration Plug-In

You must install the vSphere Web Client integration plug-in. With the Web client, you can use a browser to connect to a vCenter Server system and manage an ESXi host.

The Hybrid Cloud Manager is delivered as an open virtualization archive (OVA) file. To install an OVA file, the vSphere Web Client must have the client integration plug-in installed. See the documentation or the video for this task:

- Version 5.5u1: [Documentation](#) | [Video](#)
- Version 6: [Documentation and Video](#)

Installing and Configuring Hybrid Cloud Manager

5

You install the Hybrid Cloud Manager management appliance on premises, and register it with the vCenter and one or more vCloud Air endpoints.

Procedure

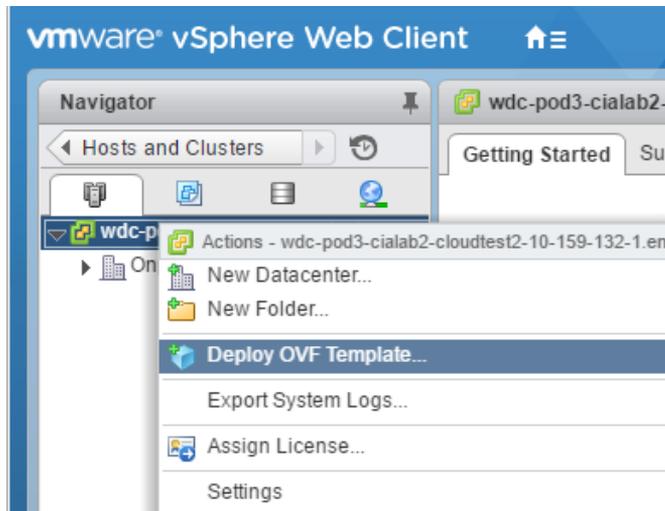
- 1 [Install the Hybrid Cloud Manager Appliance](#) on page 27
Install the Hybrid Cloud Manager appliance in your on-premises vCenter.
- 2 [Register the Hybrid Cloud Manager With the vCenter](#) on page 31
Register the Hybrid Cloud Manager plug-in in the vSphere® Web Client and start the Hybrid Cloud Manager management service.
- 3 [Configure the Proxy Settings](#) on page 33
You can configure Hybrid Cloud Manager to work with a proxy server.
- 4 [Register the Hybrid Cloud Manager With a vCloud Air Endpoint](#) on page 34
Associate the Hybrid Cloud Manager (on premises) with a vCloud® Air™ endpoint.

Install the Hybrid Cloud Manager Appliance

Install the Hybrid Cloud Manager appliance in your on-premises vCenter.

Procedure

- 1 Log in to My VMware and download the Hybrid Cloud Manager OVA file from the [product download page](#).
To verify the OVA file, take note of the MD5. After the file downloads, do an MD5 checksum.
- 2 Open a browser and log in to the vSphere® Web Client. (This task cannot be performed from the vSphere Client.)
View the Home tab.
- 3 In the Inventories Trees list, click **Host and Clusters**.
Expand the hierarchy to show the data centers.
- 4 Right-click the target data center and select **Deploy OVF Template** from the context menu (it might take a few seconds for the Deploy OVF Template menu item to appear). The Deploy OVF template wizard opens.



- a Select "Local file" and click **Browse** to find the OVA file you downloaded to your computer. Click **Next**.
- b On the "Review details" page, click the "**Accept extra configuration options**" check box and click **Next**.
- c On the "Accept EULAs" page, scroll down to review the VMware end-user license agreement. Click **Accept** and **Next**.
- d On the "Select name and folder" page, edit the name (if necessary) and select the location for the Hybrid Cloud Manager. Click **Next**.
- e On the "Select a resource" page, select the installation location.
- f On the "Select storage" page, select the storage for the Hybrid Cloud Manager and click **Next**. From the "Select virtual disk format" drop-down menu, you can select thin or thick provisioning.
- g On the "Setup networks" page, map the Hybrid Cloud Manager adapter to a host network chosen from the Destination drop-down menu.

5 On the “Customized template” page, enter the values specific to your environment.

a Passwords.

The default user name for both the command-line interface (CLI) and the Web user interface is: admin. You need the “admin” user and password to log in to the Web user interface (see “Log in to the Hybrid Cloud Manager Management Portal”). You also have a root user account that has a password that you can set.

Enter and reenter the CLI “admin” user password.

Enter and reenter the root user password. In the future, if you need help from VMware Global Support Services (GSS), you might be asked to share the root password so they can troubleshoot your system.

b Network Properties.

Enter the hostname for the Hybrid Cloud Manager VM. Enter the network IPv4 address, the IPv4 prefix (the CIDR), and the default gateway. The following values are samples:

Customize template
Customize the deployment properties of this software solution

i All properties have valid values [Show next...](#) [Collapse all...](#)

▶ Passwords	2 settings
▼ Network properties	7 settings
Hostname	The hostname for this VM. <input type="text" value="HCM_1"/>
Network 1 IPv4 Address	The IPv4 Address for this interface. Leave this empty for DHCP base IP assignment. <input type="text" value="192.168.200.101"/>
Network 1 IPv4 prefix	The IPv4 prefix for this interface. <input type="text" value="24"/>
Default IPv4 Gateway	The default gateway for this VM. <input type="text" value="192.168.200.1"/>
Network 1 IPv6 Address	The IPv6 Address for this interface. <input type="text"/>
Network 1 IPv6 Prefix	The IPv6 Prefix for this interface. <input type="text"/>

c DNS.

Click **DNS**, and enter the IP addresses for DNS servers (separated by spaces) and the domain search list. The values in the following screenshot are samples:

Customize template
Customize the deployment properties of this software solution

i All properties have valid values Show next... Collapse all...

▶ Passwords	2 settings
▶ Network properties	7 settings
▼ DNS	2 settings
DNS Server list	The DNS server list (space separated) for this VM. <input type="text" value="192.168.20.8 172.168.19.8"/>
Domain Search List	The domain Search list (space separated) for this VM. <input type="text" value="eng.vmware.com vmware.com my.vmware.com"/>
▶ Services Configuration	2 settings

d Services Configuration.

Click Services Configuration, and enter the NTP server list (separated by spaces) for the Hybrid Cloud Manager VM. Checking **Enable SSH** gives an administrator SSH access to the Hybrid Cloud Manager virtual management appliance. If you enable SSH, plan to address the security risk.

Customize template
Customize the deployment properties of this software solution

i All properties have valid values Show next... Collapse all...

▶ Passwords	2 settings
▶ Network properties	7 settings
▶ DNS	2 settings
▼ Services Configuration	2 settings
NTP Server List	The NTP server list (space separated) for this VM. <input type="text" value="172.168.20.8 192.168.20.8"/>
Enable SSH	Enabling SSH service is not recommended for security reasons. <input type="checkbox"/>

6 Review the vService bindings page. Click **Next** to continue, or to change previous screens, click **Back**.

7 On the “Ready to complete” page:

- a Check the **“Power on after deployment”** check box.
- b Review the Hybrid Cloud Manager settings, and click **Finish**. It might take several minutes for the Hybrid Cloud Manager appliance to power on.

To check the status, go to the vSphere® Web Client home page, and in the Home tab, go to Inventories and click Hosts and Clusters. Expand the data center hierarchy, and click the Hybrid Cloud Manager service virtual machine to display a summary in the center pane.

the Summary tab, the console reads “Powered On” and the **Play** button is green.

The Hybrid Cloud Manager is powered on and ready to be registered with the vCenter.

Register the Hybrid Cloud Manager With the vCenter

Register the Hybrid Cloud Manager plug-in in the vSphere® Web Client and start the Hybrid Cloud Manager management service.

Prerequisites

The Hybrid Cloud Manager virtual appliance must be powered on before it can be registered.

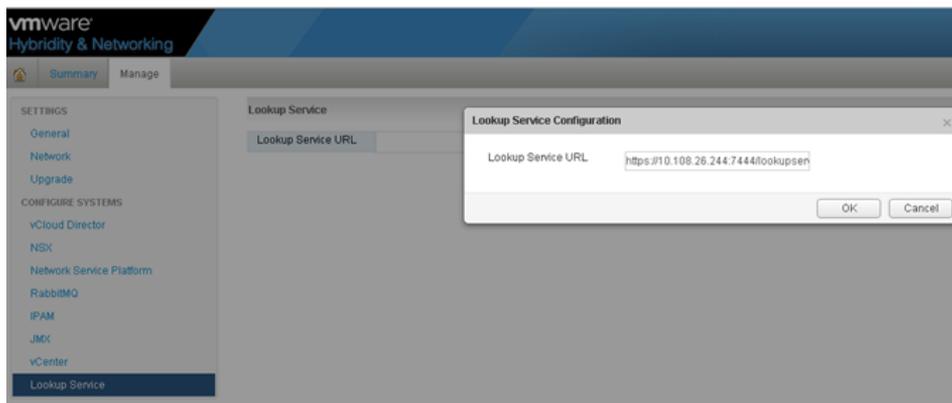
Procedure

- 1 Log in to Hybrid Cloud Manager service virtual appliance. See [““Log in to the Hybrid Cloud Manager Management Portal,”](#) on page 51.”
- 2 Click the Manage Settings tile.
 - a In the left pane, under Configure Systems, select vCenter.
 - b Click the **Add vCenter** button on the upper right.
 - c Enter the IP address of the vCenter Server in the form `https://<vCenter-host-name>` or `https://<vCenter-IP-address>`.

For example, `https://My-vCenter` or `https:// 10.108.26.211`.
 - d Enter the vCenter Server user name and password. The account you use must have the vCenter Administrator role.
 - e Click **OK**. Do not restart when you see the "You need to restart the app" message. Proceed to [Step 3](#).

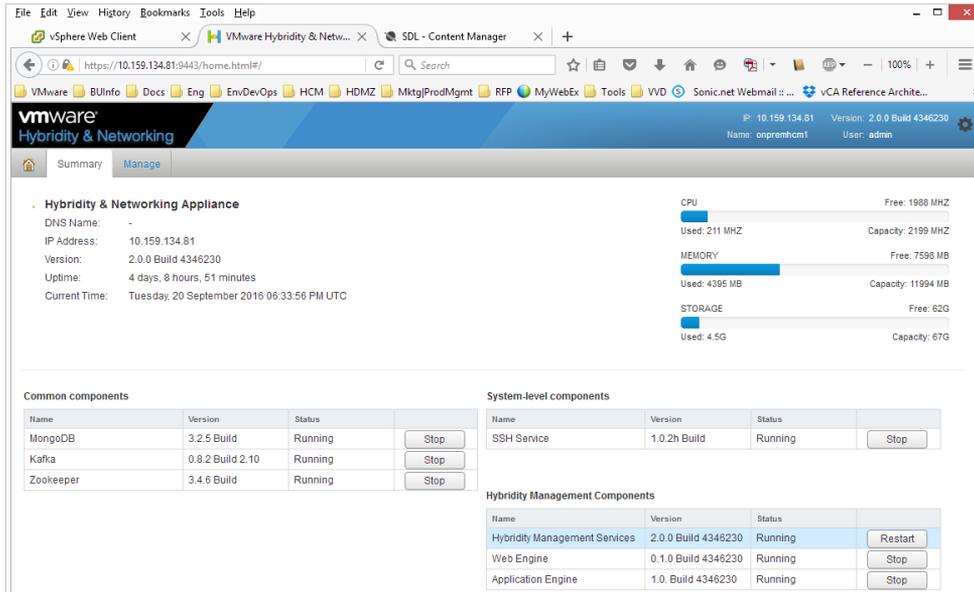
You need to restart the Application Engine for your changes to take effect !

- 3 Configure the lookup service. See [“Verify the Minimum Installation Environment,”](#) on page 25.
 - a Click the Manage tab.
 - b Click Lookup Service (on the left under Configure Systems).
 - c Click the Edit button on the far right of the Lookup Service URL text box.
 - d Enter the lookup service endpoint in the following form:
 - vCenter Server 5.5*: `https://ssoip:/7444/lookupservice/sdk`
 - vCenter Server 6.0u2: `https://ssoip/lookupservice/sdk`
 - e Click **OK**. Do not restart when you see a message to restart the Web Engine. Proceed to [Step 4](#).



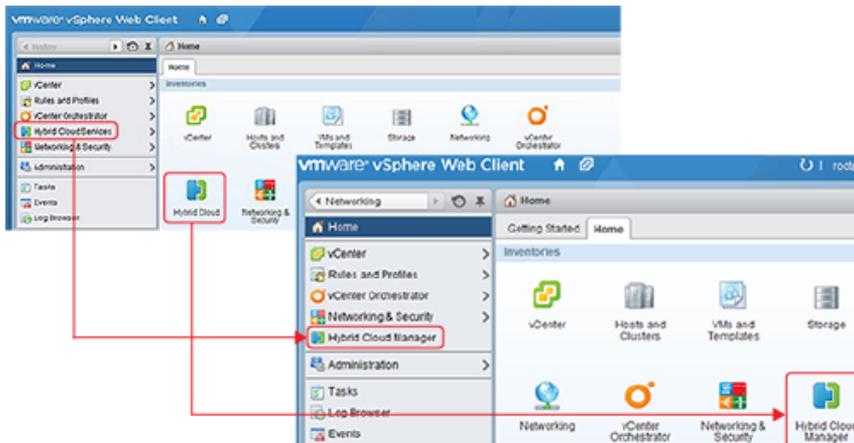
- Click the Summary tab, and find the Hybridity Management Components section.

Stop and start both the application engine and the Web engine.



- To finalize the registration, log out of the vSphere® Web Client. Log back in to verify that the screen update has occurred.

Notice the existing Hybrid Cloud icon and the Hybrid Cloud Services menu item on the left, as indicated in red the following screenshot. The Hybrid Cloud Manager registration updates these labels as shown in the following screenshot. In the inventory, Hybrid Cloud Services becomes Hybrid Cloud Manager, and the icon label also becomes Hybrid Cloud Manager.



Configure the Proxy Settings

You can configure Hybrid Cloud Manager to work with a proxy server.

Table 5-1. Proxy Server Settings

Argument	Description
<code>-Dhttps.proxyHost=<proxy-server></code>	IP address or hostname of the proxy server, if name resolution is in place
<code>-Dhttps.proxyPort=<proxy-server-port></code>	IP port required for the proxy server
<code>-Dhttp.nonProxyHosts="localhost 127.* <other-local-IP-ranges>"</code>	IP addresses, subnets, or domain names that can be accessed without going through the proxy server. You provide these values in a string, where the names or addresses are separated with the character. Wildcards are supported. For example: "localhost 127.* corp.mydomain.com 192.168.* 172.16.* 10.* <additional-host>"

Perform the manual configuration process after you register the Hybrid Cloud Manager service virtual appliance with the vCenter, and before you register the Hybrid Cloud Manager with the vCloud Air Endpoint.

To configure the proxy, modify the `/etc/rc.d/init.d/app-engine` and `/etc/rc.d/init.d/web-engine` scripts to include the proxy information, and then restart both services.

Prerequisites

Before configuring the proxy settings, you must know:

- The proxy server IP address or host name (for example, `proxy.xyz.com`)
- The proxy port number on the proxy server (for example, 8080)
- The subnets, domain names, or host IP addresses that do not need to use the proxy server. Specify both the local domain name and the private subnet to avoid using the proxy server for your local network.

Procedure

- 1 Log in to the Hybrid Cloud Manager service virtual appliance using the console or remote SSH.
- 2 Supply the admin user name and password you set when you installed the Hybrid Cloud Manager. If you did not set your own login information, the default user name is **admin**, and the default password is **vmware**.
- 3 Switch user to root.
- 4 Change directory to: `/etc/rc.d/init.d`
- 5 Make copies of the original `web-engine` and `app-engine` scripts.
- 6 Edit `/etc/rc.d/init.d/app-engine` to add the proxy information, as shown in the following sample.

```
java -Xmx2048m -Xms2048m -XX:MaxPermSize=512m -Dhttps.proxyHost=myproxy.mycompany.com
-Dhttps.proxyPort=8080
-Dhttp.nonProxyHosts="localhost|127.*| 192.168.* | 172.16.* | 10.*" -DUSE_HTTP_TUNNELING=true
-Djavax.xml.bind.JAXBContext=com.sun.xml.internal.bind.v2.ContextFactory
-Djsse.enableSNIExtension=false
-Dext.properties.dir=/etc/hybridity/app-engine
-Dlogback.configurationFile=/etc/hybridity/app-logback.xml
-jar /usr/local/platform-jars/application-engine-1.0.jar >> $LOG_FILE 2>&1 &date >> $LOG_FILE
echo "Done."
```

- 7 Edit /etc/rc.d/init.d/web-engine to add the proxy information.


```
java -Xmx2048m -Xms2048m -XX:MaxPermSize=512m
-Dhttps.proxyHost=proxy.xyz.com -Dhttps.proxyPort=8080
-Dhttp.nonProxyHosts="localhost|127.*| 10.* | *.eng.xyz.com"
-Djsse.enableSNIExtension=false -DsslEnabled=false
-Dext.properties.dir=/etc/hybridity/web-engine
-Dspring.config.location=/etc/hybridity/web-engine/application.properties
-Dlogging.config=/etc/hybridity/web-logback.xml
-jar /usr/local/platform-jars/web-server-0.1.0.war >> $LOG_FILE 2>&1 &
echo "Done."
```
- 8 From a browser, specify the IP address for the Hybrid Cloud Manager appliance and log in to the Hybrid Cloud Manager Management Portal.
- 9 Go to the Summary tab.
- 10 Under Hybridity Management Components, find the "Web Engine" service listed under "Hybridity Management Components."
- 11 Stop and start the Web engine and the application engine.
- 12 Go to the vSphere Web client, log out, and log back in.

Register the Hybrid Cloud Manager With a vCloud Air Endpoint

Associate the Hybrid Cloud Manager (on premises) with a vCloud[®] Air[™] endpoint.

Follow these steps to obtain the ORG URL From vCloud[®] Air[™].

Prerequisites

- To register, you must know the Org URL for the vCloud[®] Air[™] virtual data center.
- The account you use to register must be a service account with the vCloud[®] Air[™] Account Administrator role.

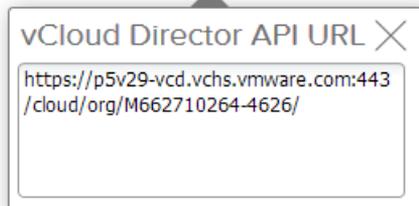
Procedure

- 1 Log in to vCloud[®] Air[™] and click the My Subscriptions tile.
 - a On the Dashboard tab, click the tile for the target virtual data center.
 - b To the right, under Related Links, click the vCloud Director API URL link. A text box with the Org URL opens.

RELATED LINKS

➔ [Purchase More Resources](#)
Memory, Storage or CPU
(Service ID: M662710264)

➔ [vCloud Director API URL](#)



- 2 Copy the Org URL from the text box, and save it for the registration procedure.

- 3 Log in to the vSphere® Web Client. In the Home view, click Hybrid Cloud Manager in the listing on the left, or in the Inventories panel on the right.

The Hybrid Cloud Manager Getting Started page opens.

- 4 Under Basic tasks, click **Register new Cloud**.

The Register new Cloud window opens.

- 5 In the Cloud URL text box, enter the ORG URL you copied from vCloud® Air™, excluding the colon and the port number.

Fill in your vCloud® Air™ user name and password and click **Register**. The “Cloud registrations” section now displays the vCloud® Air™ endpoint.

When the registration is finished, the Hybrid Services and Extended Networks tabs display information on the migration and extension services.

Installing and Configuring Hybrid Services

6

The installer provisions and configures a virtual machine for each service virtual appliance. The service virtual machines are deployed both on-premises and in the cloud.

Prerequisites

- The Hybrid Cloud Manager must be installed on premises, and registered with a vCloud Air endpoint.
- The target virtual data center must have sufficient resources. See [“IP Address Requirements,”](#) on page 19 and [“Verify the Minimum Installation Environment,”](#) on page 25.
- [Configuration Overview](#) on page 37
The configuration procedure assumes that you are configuring all service virtual appliances, however, they are not all required.
- [Start Hybrid Service Virtual Appliance Installation and Configuration](#) on page 38
You can install and configure service virtual appliances using a simple Web interface.
- [Configure the Hybrid Cloud Gateway](#) on page 38
This topic describes how to configure the Hybrid Cloud Gateway service virtual appliance.
- [Configure the Network Extension Service](#) on page 39
This topic describes how to configure a Network Extension service. You can perform this task for a single path deployment, or for a standalone network extension on an alternate path.
- [Stretching a Layer 2 Network to vCloud Air](#) on page 40
This procedure extends a Layer 2 network from the on-premises data center to vCloud[®] Air[™].

Configuration Overview

The configuration procedure assumes that you are configuring all service virtual appliances, however, they are not all required.

- The Hybrid Cloud Gateway is required. See [“Configure the Hybrid Cloud Gateway,”](#) on page 38.
- To install WAN optimization, check the WAN Optimization Service box when you start the installation. See [“Start Hybrid Service Virtual Appliance Installation and Configuration,”](#) on page 38. No further configuration is required.
- To configure the Network Extension service, see [“Configure the Network Extension Service,”](#) on page 39. You can defer deploying an optional appliance and return to the Hybrid Services page and install the appliance later.
- You might choose to install an optional appliance and uninstall if the need arises, however, removing an appliance can require application downtime. See [“Uninstall Hybrid Virtual Service Appliances,”](#) on page 50.

Start Hybrid Service Virtual Appliance Installation and Configuration

You can install and configure service virtual appliances using a simple Web interface.

Use this procedure to install service virtual appliances. After the installation, you can also configure additional Layer 2 Concentrators.

Prerequisites

The Hybrid Cloud Manager must be installed and registered with the vCloud Air endpoint.

Procedure

- 1 Log in to the vSphere Web Client. On the Home tab, click the Hybrid Cloud Manager icon.
- 2 Click the Hybrid Services tab.
- 3 Click **Install Service**.
The "Choose Hybrid Services" page opens.
- 4 Select the Services you want to install.
- 5 Click **Next**.

What to do next

If you are installing, the next step is to configure the Hybrid Cloud Gateway. See ["Configure the Hybrid Cloud Gateway,"](#) on page 38.

A Layer 2 concentrator can be added to an existing installation at any time, provided you have the resources to support the extension. See ["Configure the Network Extension Service,"](#) on page 39.

Configure the Hybrid Cloud Gateway

This topic describes how to configure the Hybrid Cloud Gateway service virtual appliance.

Prerequisites

Follow the steps in "Start the Hybrid Service Virtual Appliance" and check Hybrid Cloud Gateway. On the Hybrid Cloud Gateway page, provide the following values:

Procedure

- 1 **Network:** The switch that connects the Hybrid Cloud Gateway management interface. In use cases 1 and 2, it can be a standard virtual switch or a virtual distributed switch. For any configuration using Layer 2 extension, it must be a virtual distributed switch.
- 2 **Cluster/Host:** Select the Cluster or Host in which you want to deploy the Cloud Gateway.
- 3 **Datastore:** Select the datastore in which you want to deploy the Cloud Gateway.
- 4 **VM/Hostname:** This value is optional.
- 5 Provide the **IP address/CIDR**, **Default Gateway**, and **DNS server** to use for the Cloud Gateway management interface.
To enter multiple addresses for the DNS server, separate them with commas.
- 6 Under **Extended (optional)**, choose the vMotion network (if applicable), and set the admin and root passwords. These passwords are specifically for the Hybrid Cloud Gateway appliance. The user name and password do not have to match what you configured the Hybrid Cloud manager appliance.
- 7 Click **Next**.

Configure the Network Extension Service

This topic describes how to configure a Network Extension service. You can perform this task for a single path deployment, or for a standalone network extension on an alternate path.

Prerequisites

Follow the steps in, “Start the Hybrid Service Virtual Appliance,” and select the Network Extension service. (If you have already installed the Single Path configuration, Network Extension is your only choice).

- [Monitor Service Appliance Deployment](#) on page 39
You can use the task console to monitor deployment progress for a service virtual machine.
- [View Tunnel Status](#) on page 40
This procedure describes how to view the Cloud Gateway tunnel status.

Procedure

- 1 On the Network Extension Service page, select a virtual distributed switch from the Distributed Switch drop-down menu.

If you are installing a standard Layer 2 Concentrator, you see the "Route stretched networks via Hybrid Cloud Gateway" check box. It is not there for the high throughput L2C.

- If you check “Route stretched networks via Hybrid Cloud Gateway,” the installer determines a reasonable placement for the Layer 2 Concentrator (based on the switch) and populates the placement information accordingly.
 - If you do not check the box, you must manually enter the placement information in the next step.
- 2 Set the route for the L2 Concentrator placement. (If you checked “Route stretched networks via Hybrid Cloud Gateway,” the values you provided cannot be edited.)
 - **Network:** The deployment network for the Layer 2 Concentrator’s management interface.
 - **Compute:** The deployment cluster or host for the Layer 2 Concentrator.
 - **Datastore:** Deployment datastore for the Layer 2 Concentrator.
 - **VM/Hostname:** This value is optional.
 - 3 Specify the Network Parameters for the local Layer 2 Concentrator.
 - If this option is disabled, you use the default parameters provided by the installer.
 - If the port group you selected in the Hybrid Cloud Gateway page Network drop-down menu is not part of the distributed switch, check “Specify the Network Parameters for the local Layer 2 Concentrator.” Now you can edit the “Extended Configurations” text boxes.
 - (Optional) **Extended Configurations:** Set the admin and root passwords for this specific Layer 2 Concentrator.

Click **Next**.

- 4 On the “Ready to complete” page, review the information, and click **Finish**.

Monitor Service Appliance Deployment

You can use the task console to monitor deployment progress for a service virtual machine.

Procedure

- 1 Log in to the vSphere® Web Client. On the Home tab, click the Hybrid Cloud Manager icon.
The Hybrid Cloud Manager pane opens.

- 2 Click the Hybrid Services tab.
You can monitor the virtual appliance deployment from the Task console.
- 3 Go to the Recent Tasks panel and ensure that you are viewing All Users' Tasks, as marked in yellow in the following screen capture.
- 4 Click **More Tasks** to open the Task Console.
In the Task Console, watch the deployment tasks.
- 5 When all tasks are completed, go to the inventory list and click Hybrid Cloud Manager.
- 6 In the central panel, click the Hybrid Services tab.
Review the configuration summary for the hybrid service virtual appliances.

View Tunnel Status

This procedure describes how to view the Cloud Gateway tunnel status.

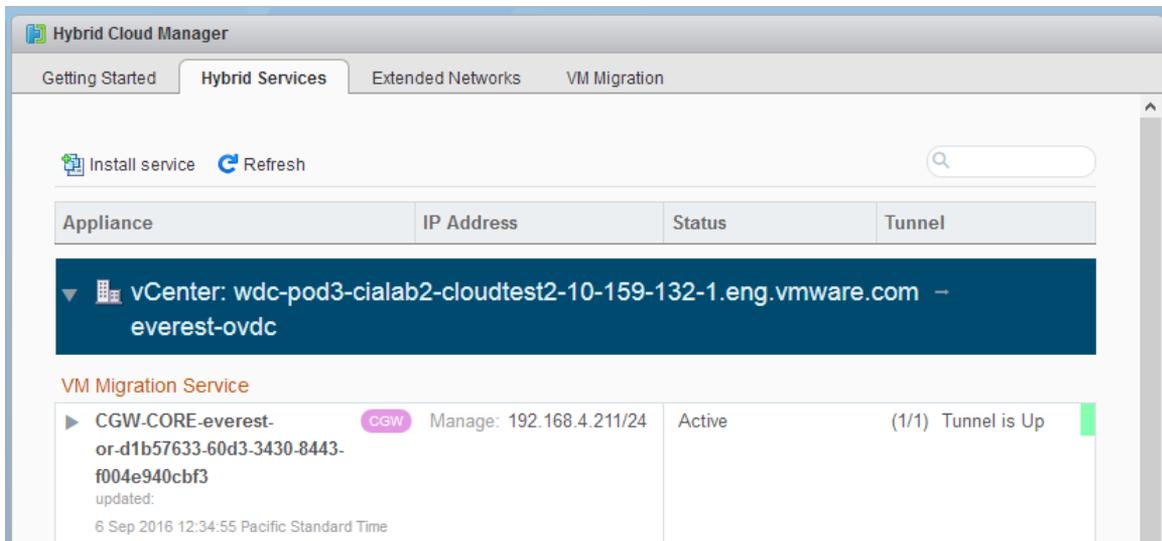
Prerequisites

The network extension service must be up if you want to stretch a network.

Procedure

- ◆ To check the tunnel status from the Web client, select Hybrid Cloud Manager in the inventory, and click the Hybrid Services tab.

The following screenshot shows a successful Hybrid Cloud Gateway tunnel. CGW is the acronym for the Hybrid Cloud Gateway. The status is "Active," and on the far right, the tunnel is color-coded green.



Stretching a Layer 2 Network to vCloud Air

This procedure extends a Layer 2 network from the on-premises data center to vCloud[®] Air[™].

Prerequisites

- You can only stretch vLAN tagged port groups (other than vLAN type None, or vLAN ID 0). VXLANs are considered VLANs.

- This process uses the “Extend Network” wizard. You must run the wizard from the vSphere® Web Client networking inventory view. Although the wizard is visible from other views, you must be in the inventory context to get the correct information.

Procedure

- 1 Log in to the vSphere® Web Client. On the Home tab in the central pane, click the Networking icon in the Inventories list.
- 2 In the Networking hierarchy, identify the port group for the network you want to extend.
- 3 Right-click the port group, and from the context menu, select Hybridity Actions and select “Extend Network.”

The “Extend network to vCloud® Air™” wizard opens.

- 4 On the “Select source port groups” page, confirm the port group information and enter the Gateway IP address and prefix for the network. Click **Next**.
- 5 On the “Select destination gateway” page:
 - a Select the vCloud® Air™ Organization from the Organization menu.
 - b Select the vCloud® Air™ virtual data center from the menu.
 - c Leave **Proximity Routing** disabled if you want a VM within vCloud® Air™ to use the on-premises gateway to access the Internet. By default, traffic originating from a VM in vCloud® Air™ traverses the Layer 2 data path back to the on-premises data center and out to the default gateway. If you check **Proximity Routing**, a VM within vCloud® Air™ can access the Internet without traversing the Layer 2 data path to vSphere. See “[Proximity Routing](#),” on page 20.
 - d Select the remote destination gateway from the list of gateways (click the row). Click **Next**.
- 6 On the “Ready to complete” page, review all values provided. Click **Finish**.
- 7 To track the progress of the network extension, go to the Recent Tasks window, click the All tab, and ensure that you are viewing All Users’ Tasks. To open the Task Console, click **More Tasks**.

The network extension is done when the “Extend Network” task status is “Completed.”

Migrating a Virtual Machine

Hybrid Cloud Manager enables bidirectional migration: from on-premises to the cloud, or from the cloud to the on-premises data center. Hybrid Cloud Manager uses replication technology during the migration process.

Replication technology is integrated in the Hybrid Cloud Gateway virtual appliance. You do not need to install any additional replication software.

Low-Downtime Migration

Low-downtime migration uses host-based replication to move a live virtual machine from a vCenter to a virtual data center (or the opposite direction). To reduce downtime, the source VM remains online during the replication and is bootstrapped on the destination ESX host after replication completes.

- 1 A Hybrid Cloud Manager migration request triggers the following actions:
 - Replication begins a full synchronization transfer into a vCloud[®] Air[™] virtual data center. The time it takes to replicate is a function of the size of the VM and available bandwidth.
 - Replication bandwidth consumption varies depending on how the workload changes blocks on the disk.
- 2 When full synchronization finishes, a delta synchronization occurs.
- 3 When the delta synchronization finishes, Hybrid Cloud Manager triggers a switchover. You can start immediately or delay the switchover until a specific time.
- 4 Following the switchover, the source VM is powered-off, and the migrated replica is powered-on. If for some reason the VM cannot power on, the new VM is powered off (or remains powered off) and the original is powered on. You must have sufficient resources to power on the VM.
- 5 Hybrid Cloud Manager renames the powered off original VM to avoid a naming conflict with the migrated VM. Hybrid Cloud Manager appends a binary timestamp to the original VM name.

If you have not enabled “Retain MAC,” the migrated VM obtains a new MAC address. See [“Duplicate MAC Address,”](#) on page 53.

The migration is done. Hybrid Cloud Manager copies the original VM to the “Migrated VMs” folder in the vSphere Templates view. You can recover a saved VM.

Cross-Cloud vMotion

Cross-cloud vMotion transfers a live virtual machine from a vSphere vCenter to a vCloud Air virtual data center. Cross-cloud vMotion requires a stretched network, formed with a High Throughput Layer 2 Concentrator and 250 Mbps or above throughput capability. The vMotion transfer captures the virtual machine's active memory, its execution state, its IP address, and its MAC address.

NOTE The virtual machine hardware version must be at least version 9, or cross-cloud vMotion might fail.

You can speed up the migration if you use a direct connection. You can also use a combination of Hybrid Networking Premium (which supplies up to 1 Gbps), and WAN Optimization (which provides data deduplication and compression).

Cold Migration

Cold migration uses the same data plane as cross-cloud vMotion to transfer a powered-off virtual machine over an extended network. Its IP address and MAC address are preserved. The virtual machine requirements and restrictions are the same as for vMotion.

- [Migrate Virtual Machines Using the Bidirectional Wizard](#) on page 44
Using the vSphere Web Client, you can access the bidirectional migration wizard from the Hybrid Cloud Manager Getting Started tab. This wizard handles all migration details, including multiple virtual machines.
- [Checking Your Virtual Machine Before Migration](#) on page 47
To migrate a virtual machine, you must have a secure connection maintained by the Hybrid Cloud Gateway, and the VM must meet the requirements in this topic.
- [Monitor a Migration](#) on page 47
You can monitor the progress of a replication-based migration from the user interface, or from the command line.
- [View Migrated Virtual Machines](#) on page 48
When Hybrid Cloud Manager powers on a successfully migrated virtual machine, it powers off the original virtual machine and stores it in a folder in the vCenter. The stored virtual machines remain until you manually delete them.

Migrate Virtual Machines Using the Bidirectional Wizard

Using the vSphere Web Client, you can access the bidirectional migration wizard from the Hybrid Cloud Manager Getting Started tab. This wizard handles all migration details, including multiple virtual machines.

- [From vSphere to vCloud Air](#) on page 45
This task describes using the bidirectional wizard to migrate a virtual machine from the on-premises vCenter to vCloud Air.
- [Migrate a Selected Virtual Machine From a vCenter to vCloud[®] Air[™]](#) on page 45
This procedure migrates a selected virtual machine from the vCenter to vCloud[®] Air[™] in fewer steps. It is convenient but it is limited because it only migrates one VM, and it only works from vSphere to vCloud[®] Air[™].
- [From vCloud Air to vSphere](#) on page 46
This procedure describes how to use the bidirectional wizard to migrate a virtual machine from vCloud Air to vSphere.

From vSphere to vCloud Air

This task describes using the bidirectional wizard to migrate a virtual machine from the on-premises vCenter to vCloud Air.

Procedure

1 Log in to the vSphere® Web Client and select Hybrid Cloud Manager.

2 Click the VM Migration tab and click the “Migrate VM” icon.

The Migrate Virtual Machines wizard opens.

3 On the “Select direction” page, select the direction.

4 On the “Select migration type” page, select the replication-based migration switchover method that suits your purpose.

- **Replication-based migration:** A replica of the live machine is transferred to a new location in the cloud, then the original is powered off and the migrated VM is powered on. A stretched network is supported, but not required.
- **vMotion migration:** A live virtual machine is transferred to a new location on a stretched network.
- **Cold migration:** Migrates an offline virtual machine to a new location on a stretched network.

Click **Next**.

5 On the “Select source” page, expand the vCenter drop-down menu hierarchy and select the parent object for the VM you want to migrate. Click **Next**.

On the “Select virtual machine(s)” page, check the VMs you want to migrate and click **Next**.

6 On the “Select vCenter” page, select a vCenter from the drop-down menu. Click **Next**.

7 On the “Select destination” page, select an organization. Selecting the organization populates the virtual data center table. In the table, select a data center, and click **Next**.

8 On the “Select destination network” page, select an NSX Edge from the drop-down menu.

For replication-based migration, if you want to retain the MAC address, check **Retain MAC**. This option does not appear for vMotion or cold migration.

9 On the “Select storage tier” page, make a selection and click **Next**.

10 On the “Ready to complete” page, review the selections and click **Finish** to start the VM migration.

11 To monitor the migration from the UI,

You can also view the Task Console, as described in [“Monitor Service Appliance Deployment,”](#) on page 39 and look for the “Migrate VM” task.

12

When the status is “Completed,” the VM has been migrated and powered on in vCloud® Air™. See also, [“Monitor a Migration,”](#) on page 47 “Monitor a Migration from the Command Line.”

Migrate a Selected Virtual Machine From a vCenter to vCloud® Air™

This procedure migrates a selected virtual machine from the vCenter to vCloud® Air™ in fewer steps. It is convenient but it is limited because it only migrates one VM, and it only works from vSphere to vCloud® Air™.

The migration takes several minutes depending on the size of the VM and your available bandwidth. See [“Monitor a Migration,”](#) on page 47 for ways to check the migration progress.

Procedure

- 1 On the Hosts and Clusters page, right-click the VM you want to migrate, and from the context menu, select “Hybridity Actions,” and select “Migrate to vCloud Air.”

The migration wizard opens. On the “Select migration type” page, vMotion migration is preselected.

- **Replication-based migration:** A replica of the live machine is transferred to a new location in the cloud, then the original is powered off and the migrated VM is powered on. A stretched network is supported, but not required.
- **vMotion migration:** A live virtual machine is transferred to a new location on a stretched network.
- **Cold migration:** Migrates an offline virtual machine to a new location on a stretched network.

Choose a migration type and click **Next**.

- 2 Select a virtual machine.
- 3 On the “Select destination” page, select an organization. This populates the virtual data center table. In the table, select a data center, and click **Next**.
- 4 On the “Select destination network” page, select an NSX Edge from the drop-down menu.
If you want to retain the MAC address, check **Retain MAC**.
- 5 On the “Select storage tier” page, make a selection and click **Next**.
- 6 On the “Ready to complete” page, review the selections and click **Finish** to start the VM migration.

To monitor the migration from the UI, you can view the Task Console, as described in “Monitor Service Virtual Appliance Deployment” and look for the “Migrate VM” task. When the status is “Completed,” the VM has been migrated and powered on in vCloud[®] Air[™]. See also, “[Monitor a Migration](#),” on page 47.

From vCloud Air to vSphere

This procedure describes how to use the bidirectional wizard to migrate a virtual machine from vCloud Air to vSphere.

Procedure

- 1 Log in to the vSphere[®] Web Client and select Hybrid Cloud Manager. On the Getting Started tab, locate the “Basic tasks” list, and select “Migrate Virtual Machine.”

The “Migrate Virtual Machine” wizard opens.

- 2 On the “Select migration type” page, select the replication-based migration switchover method that suits your purpose.

Click **Next**.

- 3 On the “Selected virtual machine(s)” page, check one or more VMs.

See “[MAC Address Retention](#),” on page 21 for details on the “Retain MAC” option.

- 4 On the “Select vCenter” page, select a vCenter from the drop-down menu.

Click **Next**.

- 5 On the “Select destination resource” page, expand the hierarchy and select the parent object for the VMs you want to migrate.

Click **Next**.

- 6 On the “Select host” page, click in the Destination Network to expand the menu, and make a choice.

- 7 On the “Select destination” page, click in the Destination Network to expand the menu, and make a choice.
- 8 On the “Select storage” page, select a format and click **Next**.
- 9 On the “Ready to complete” page, review the selections and click **Finish** to start the VM migration.

Checking Your Virtual Machine Before Migration

To migrate a virtual machine, you must have a secure connection maintained by the Hybrid Cloud Gateway, and the VM must meet the requirements in this topic.

Migration Requirements

Before you migrate a virtual machine, be sure that it meets these conditions.

- The virtual machine must be powered on.
- The underlying architecture, regardless of OS, must be x86.
- If you are using vMotion, the hardware version must be greater than 9.
- The hardware version must be less than 10.
- VMs with Raw Disk Mapping in compatibility mode can be migrated.

Unsupported

Virtual machines with the following attributes are not supported for migration.

- Exceed 2 TB.
- Share VMDK files.
- Have virtual media or ISOs attached.
- Hardware version less than 9.

Monitor a Migration

You can monitor the progress of a replication-based migration from the user interface, or from the command line.

View the Task Console, as described in “[Monitor Service Appliance Deployment](#),” on page 39, and look for the “Migrate VM” task. When the status is “Completed,” the VM has been migrated and powered on in vCloud[®] Air[™].

This procedure uses an unrelated VM in the same vCenter to track the progress of a migrating VM.

Procedure

- 1 Identify the VM to migrate, and choose an observer VM that can ping the migrating VM.
- 2 From the user interface, start migrating the VM, and monitor it from the task console.
- 3 Using SSH, log in to the ESXi host running the observer VM.
- 4 Run the following command to obtain the virtual machine ID (the `vmid`).

```
# vim-cmd vmsvc/getallvms | grep -i vmname
```

- 5 Run the following commands to monitor the replication state, where the `vmid` is the value obtained in the previous step.

```
# vim-cmd hbrsvc/vmreplica.getState vmid
# vim-cmd hbrsvc/vmreplica.queryReplicationState vmid
```

- 6 **ICMP Ping:** Monitor the continuous ping you started earlier.

You see an interruption in the continuous ping during the switchover. However, the test ping quickly resumes after the “Migrate VM” task completes (as reflected in the task console).

View Migrated Virtual Machines

When Hybrid Cloud Manager powers on a successfully migrated virtual machine, it powers off the original virtual machine and stores it in a folder in the vCenter. The stored virtual machines remain until you manually delete them.

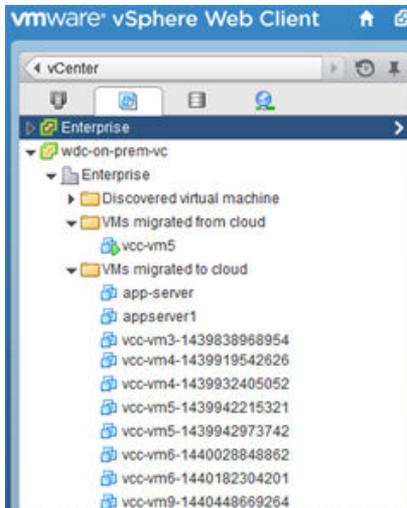
Prerequisites

Migrated virtual machines.

Procedure

- 1 After the migration, view the vCenter and note the folders labeled “VMs migrated from the cloud,” and “VMs migrated to the cloud.”
 - As replicas, the powered-off VMs have the original name, with a binary timestamp appended.
 - You can treat migrated VMs like any other VMs. For example, you can move a VM to a different location and power it on.
- 2 You can manually delete any unwanted VMs within these folders.
Deletion is final, unless you have a backup solution in place.

In the following screenshot, the powered on the virtual machine vcc-cm5 has been migrated back and forth several times.



Modifying or Uninstalling Hybrid Cloud Manager

8

You can upgrade an existing installation, or remove some or all of a Hybrid Cloud Manager deployment. Some actions might require coordination with VMware Global Support Services.

- [Unstretch a Layer 2 Network](#) on page 49
Unstretching a Layer 2 network is necessary if you want to remove the associated Layer 2 concentrator service virtual appliance, or if you want to uninstall Hybrid Cloud Manager.
- [Uninstall Hybrid Virtual Service Appliances](#) on page 50
You might want to remove a service appliance if you change your mind about your installation architecture, or if you are preparing to uninstall Hybrid Cloud Manager.
- [Uninstall Hybrid Cloud Manager](#) on page 50
You can uninstall the Hybrid Cloud Manager if you intend to remove Hybrid Cloud Manager from your on-premises data center.
- [Log in to the Hybrid Cloud Manager Management Portal](#) on page 51
You can administer the Hybrid Cloud Manager deployment from the Management Portal, a browser-based user interface.
- [Upgrade Hybrid Cloud Manager](#) on page 51
You can upgrade an existing Hybrid Cloud Manager installation. The upgrade occurs while the service virtual machines are running. Your previous networking capabilities remain the same.

Unstretch a Layer 2 Network

Unstretching a Layer 2 network is necessary if you want to remove the associated Layer 2 concentrator service virtual appliance, or if you want to uninstall Hybrid Cloud Manager.

Procedure

- 1 Check your stretched networks.
From the Hybrid Cloud Manager plug-in page, view the Hybrid Services tab and check the Network Extension Service section. If there are active or scheduled jobs, wait until they are complete (or stop them) before continuing.
- 2 To remove the network, click the red X (on the right).
- 3 Click **OK** to confirm.

Uninstall Hybrid Virtual Service Appliances

You might want to remove a service appliance if you change your mind about your installation architecture, or if you are preparing to uninstall Hybrid Cloud Manager.

Use the Hybrid Cloud Manager to administer appliances, as outlined in the following procedure.

Prerequisites

NOTE Never delete virtual appliances from the vSphere inventory. Always use the management portal to interact with service virtual appliances.

- Cancel or reset the execution time for any migrations that might occur during the uninstallation task.
- Check the vSphere Web Client task console for any running migrations, and wait until they are complete.
- Ensure that there are no active Hybrid Cloud Manager tasks of any type.

Procedure

- 1 In the vSphere Web Client interface, select the Hybrid Cloud Manager plug-in from the left panel.
- 2 In the center pane, click the Hybrid Services tab. The center pane displays a list of the installed appliances.

Locate the Hybrid Cloud Gateway appliance and click the entry to display the details.
- 3 On the lower right, click the red X to remove the appliance.

If a stretched network does not share an IP address with the Hybrid Cloud Gateway, you must remove it separately. Expand the Network Extensions Service details, and click the red X icon to remove the Layer 2 Concentrator.

The Hybrid Cloud Gateway and any hybrid service virtual appliances that use the Hybrid Cloud Gateway are removed from both the vCenter and the vCloud Air vDC.

Uninstall Hybrid Cloud Manager

You can uninstall the Hybrid Cloud Manager if you intend to remove Hybrid Cloud Manager from your on-premises data center.

Follow these steps to uninstall the Hybrid Cloud Manager virtual machine.

Procedure

- 1 Unstretch all Layer 2 networks, as described in, [“Unstretch a Layer 2 Network,”](#) on page 49.
- 2 Remove the hybrid service virtual appliances, as described in, [“Uninstall Hybrid Virtual Service Appliances,”](#) on page 50.
- 3 In your on-premises vCenter, power off the Hybrid Cloud Manager virtual machine.
- 4 Delete the Hybrid Cloud Manager virtual machine.

At this point, all virtual service appliances are removed. The following elements might remain behind:

- Logs
- Migrated VMs

What to do next

You can choose to back up the migrated virtual machines and logs manually, or delete them.

Log in to the Hybrid Cloud Manager Management Portal

You can administer the Hybrid Cloud Manager deployment from the Management Portal, a browser-based user interface.

Procedure

- 1 In a Web browser, enter the IP address assigned to the Hybrid Cloud Manager, and specify port 9443.

For example: `https://hcmip:9443`.

The Hybrid Cloud Manager user interface opens in a Web browser window using SSL. If necessary, accept the security certificate. The VMware Hybridity and Networking login screen opens.

- 2 Enter the user name and password.

By default, the user name is `Admin`. The password is the value you supplied when you installed the Hybrid Cloud Manager virtual appliance.

The Hybridity & Networking Appliance Management page opens.

What to do next

From the management portal, you can upgrade appliances, start or stop services, and locate logs.

Upgrade Hybrid Cloud Manager

You can upgrade an existing Hybrid Cloud Manager installation. The upgrade occurs while the service virtual machines are running. Your previous networking capabilities remain the same.

Prerequisites

The upgrade is performed on the on-premises Hybrid Cloud Manager service virtual machines. The corresponding virtual machines in the cloud are upgraded automatically. Before the upgrade, ensure that all service virtual machines are powered on.

- Back up the Hybrid Cloud Manager service virtual appliance.
- Log in to the Hybrid Cloud Manager Management Portal to perform the following tasks:
 - Take note of the current version and the build number on the top right side of the banner. Alternatively, click the **Manage** tab, and on the left under **Settings**, click **Upgrade**. This screen also shows the current software version and the upgrade state.
 - Go to the Home page and click **Download Tech Support Log**. It takes several seconds to collect the log information.

The log is a compressed archive (tar.gz).

In the Tech Support Log box, click the **Download** button, and specify the file location.

Procedure

- 1 Go to <https://my.vmware.com/web/vmware> and log in to your My VMware account to download the upgrade bundle.
 - a Click the **View & Download Products** tab, and search for the Hybrid Cloud Manager upgrade bundle. The category is: **Infrastructure as a Service > vCloud Air > Hybrid Cloud Manager.**"
 - b Click the **Download Now** button.

The download is a `tar.gz` file whose name includes the version number and the build number (for example `VMware-Hybridity-<name>-2.#.#-#####`).

NOTE Do not unzip or extract the contents.

- 2 Log in to the Hybrid Cloud Manager Management Portal.
 - a Click the Manage Settings button to open the Manage tab.
 - b From the Settings category on the left, click Upgrade.
 - c On the far right, click the Upgrade button.
 - d In the Upgrade window, click Browse and choose the upgrade file you downloaded earlier.

Wait until the upgrade procedure completes (it can take several minutes). The Hybrid Cloud Manager login page appears.
- 3 Log in to the Hybrid Cloud Manager again and confirm that the version has changed, and the build number on the top right matches the upgrade bundle you installed.

The Hybrid Cloud Manager restarts.

If the upgrade is not successful, download the tech support log.

What to do next

Open a ticket with VMware Global Support Services at: <https://my.vmware.com/group/vmware/contact-vmware>. Include the logs you created before and after the installation attempt.

Troubleshooting

You can upgrade an existing installation, or partially, or fully remove a Hybrid Cloud Manager deployment. Some actions might require coordination with VMware Global Support Services.

Solution

- [Cloud Registration Fails](#) on page 53
Hybrid Cloud Manager does not retry if credentials are incorrect. The credentials must authenticate before Hybrid Cloud Manager attempts to log in and start the cloud registration.
- [Duplicate MAC Address](#) on page 53
When you retain the MAC address when migrating, you might inadvertently create a duplicate MAC address. You can change the MAC address for the migrated virtual machine.
- [High Host Resource Consumption](#) on page 54
If all service virtual appliances reside on the same host, certain situations might exhaust the host's resources.

Cloud Registration Fails

Hybrid Cloud Manager does not retry if credentials are incorrect. The credentials must authenticate before Hybrid Cloud Manager attempts to log in and start the cloud registration.

Cloud Registration can fail when you mistype the credentials, or change vCloud Air credentials after Hybrid Cloud Manager registers with vCloud Air, causing a mismatch.

To update the credentials in the Web client, go to the Hybrid Cloud Manager Getting Started tab, and under "Basic tasks," choose, "Register new Cloud."

Duplicate MAC Address

When you retain the MAC address when migrating, you might inadvertently create a duplicate MAC address. You can change the MAC address for the migrated virtual machine.

Problem

After migration, there are communication problems among your virtual machines.

Cause

You created a duplicate MAC address during the migration process.

Solution

- 1 In the vSphere client, power off the virtual machine.

- 2 In the inventory, right-click the virtual machine and choose Edit Settings... from the context menu.
The Edit Settings window opens.
- 3 On the Virtual Hardware tab, expand the Network adapter.
- 4 Next to the MAC Address text box, choose "Manual" from the drop-down menu.
The MAC Address text box is editable.
- 5 Specify a unique MAC address.
- 6 Click **OK**.

Check to see whether the unique MAC address solves your communication problem.

High Host Resource Consumption

If all service virtual appliances reside on the same host, certain situations might exhaust the host's resources.

Problem

In rare cases, the Hybrid Cloud Manager service virtual machines can exhaust a host's CPU and disk resources.

Cause

Some users have seen this issue when all virtual appliances were installed on one physical host. Given this configuration, performance degrades when the following things happen concurrently:

- The network has high latency, or packet loss, or both. Migration or data transport is slow because you are using the public Internet or a busy network.
- The WAN Optimizer is consuming bandwidth to encrypt and compress (or decrypt and uncompress) large workloads.
- There is high application traffic between on-premises VMs and migrated VMs.

Solution

If you are running out of resources, contact VMware Global Support Services (GSS):
<https://my.vmware.com/group/vmware/contact-vmware>.

Before you change your data center configuration, communicate your requirements to GSS. They can work with you to reconfigure your environment with a minimum amount of downtime. Only GSS can reconcile changes in your on-premises data center and the vCloud Air virtual data center.

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