Installing an IBM InfoSphere VDP Appliance on a VMware Server

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1 Requirements for Installing an IBM InfoSphere VDP Appliance on VMware

The following sections provide the requirements for installing an IBM InfoSphere VDP Appliance on a VMware server:

- vSphere Server Requirements on page 1
- Requirements for VDP Appliances That WILL Use Dedup Policies on page 3
- Requirements for VDP Appliances That WILL NOT Use Dedup Policies on page 4
- IBM InfoSphere VDP Appliance Storage Requirements on page 5
- IBM InfoSphere VDP Appliance Networking Requirements on page 6

vSphere Server Requirements

An IBM InfoSphere VDP Appliance must be installed on a vSphere server configured specifically for a VDP Appliance.

Ensure the vSphere host has **sufficient memory and CPUs/Cores reserved** to accommodate your IBM InfoSphere VDP Appliance licenses. See Requirements for VDP Appliances That WILL Use Dedup Policies on page 3 and Requirements for VDP Appliances That WILL NOT Use Dedup Policies on page 4 for details.

Do not share the IBM InfoSphere VDP Appliance's resources with other VMs. See the *A VMware vCenter Administrator's Guide to IBM InfoSphere Copy Data Management* section on Permissions.

vSphere Host and vCenter 5.0 for 30TB and 50TB Licenses

IBM InfoSphere VDP Appliances with 30TB and 50TB licenses require more than 7 processors/cores and so must be installed on vSphere hosts and vCenters running 5.0 or later.

> ***Note:*** *VMware's vSphere host and vCenter 5.0 requirement is not limited to the VDP Appliance. All VMs with more than 7 processors/cores must run on vSphere host and vCenter 5.0 or later. Not adhering to this requirement may result in the failure of capture and access operations.*

VDP Appliances on Licensed/Unlicensed vSphere Host

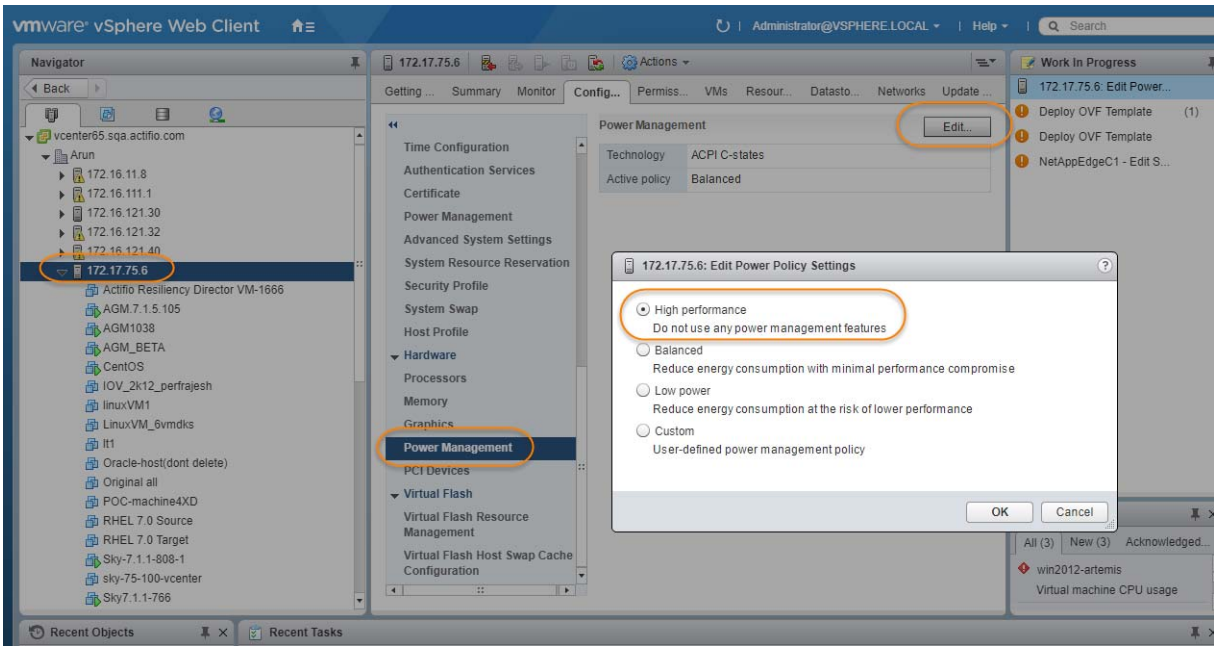
If an appliance is installed on an unlicensed (free) vSphere host, the Policy Templates for that VDP Appliance **CANNOT** capture other VMs and applications installed on that vSphere host.

If an appliance is installed on an unlicensed (free) vSphere host, the Policy Templates for that VDP Appliance **CAN** capture and access VMs and applications on licensed vSphere hosts and applications on physical servers.

If an appliance is installed on a licensed vSphere host, the Policy Templates for that VDP Appliance **CAN** capture VMs and applications on the vSphere host on which the VDP Appliance is installed. Policy Templates for that VDP Appliance can also capture VMs and applications on other licensed vSphere hosts and applications on physical servers.

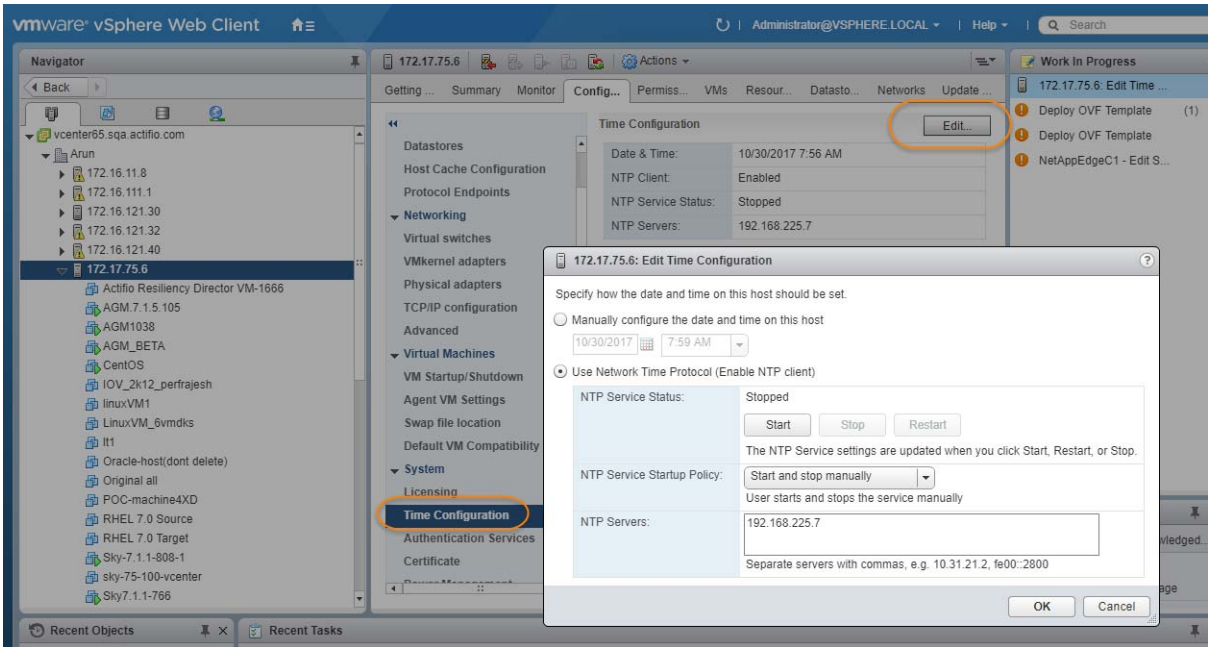
vSphere Host Power Management Off

Power management can interfere with the operation of a VDP Appliance. Ensure that power management for the ESX host is set to **High Performance**.



vSphere NTP

Do not use VMware Tools periodic time synchronization for the VDP Appliance's VM. Use NTP instead.



Requirements for VDP Appliances That WILL Use Dedup Policies

The following table allows you to compare the requirements and capabilities of licenses for VDP Appliances that will protect data in both the Snapshot and Dedup Pools.

Requirement	License				
	1TB	5TB	10TB	30TB	50TB
Cores required. [a] [b]	1	2	4	8[c]	12[c]
Cores required for encryption at rest. [a] [b]	2	4	6	10[c]	15[c]
Minimum Reserved Memory	6GB	10GB	16GB	48GB	72GB
Minimum Disk Space for Primary Pool. [d]	200GB				
Minimum Disk Space for Snapshot Pool. [d]	10GB				
Minimum Disk Space for Dedup Pool. [d]	100GB				
SSD Minimums [e]	Optional: 11GB	Optional: 53GB	Optional: 103GB	Required: 308GB	Required: 512GB
Maximum VDisks	1000			3000	5000

a. Minimum 2 GHz per core. Required cores can be spread across multiple CPUs, with multiple CPUs providing slightly better performance. The cores and CPU **must be reserved** and the balloon driver must be turned off. Any paging or swapping will cause significant performance impact and in some cases result in the appliance deadlocking.

b. Sockets have a multiplying effect on the number of cores. Depending on how your VMware license is configured, select a combination of sockets and cores to achieve the required number of cores.

c. Requires vSphere Host and vCenter 5.0 or later.

d. See IBM InfoSphere VDP Appliance Storage Requirements on page 5. Must be Thick Provision Eager Zeroed.

e. See Adding an SSD to an IBM InfoSphere VDP Appliance on page 27 for details on adding SSDs.

Requirements for VDP Appliances That WILL NOT Use Dedup Policies

This table allows you to compare the requirements and capabilities of VDP Appliance licenses for VDP appliances that will protect data in Snapshot Pools only.

Requirement	License		
	60TB	120TB	200TB
Cores required.[a] [b]	4	6	8
Cores required for encryption at rest. [a] [b]	6	8	10
Minimum Reserved Memory	16GB	32GB	48GB
Minimum Disk Space for Primary Pool [c]	200GB		
Minimum Disk Space for Snapshot Pool	10GB		
Required Disk Space for Dedup Pool if appliance WILL NOT use dedup policies.	100GB		
Maximum VDisks	10,000		

a. Minimum 2 GHz per core. Required cores can be spread across multiple CPUs, with multiple CPUs providing slightly better performance. The cores and CPU **must be reserved** and the balloon driver must be turned off. Any paging or swapping will cause significant performance impact and in some cases result in the appliance deadlocking.

b. Sockets have a multiplying effect on the number of cores. Depending on how your VMware license is configured, select a combination of sockets and cores to achieve the required number of cores.

c. See IBM InfoSphere VDP Appliance Storage Requirements on page 5. Must be Thick Provision Eager Zeroed.

IBM InfoSphere VDP Appliance Storage Requirements

The VDP Appliance uses three storage pools: Primary Pool, Snapshot Pool, and the Dedup Pool. The appliance uses the Dedup Pool even if it does not support Dedup policies. Each pool **MUST:**

- Reside on a separate RAID-6 array.
- Reside on a RAID-6 array that supports at least 100 IOPS per disk.
- Use 7200 RPM disks, 10,000 RPM disks are preferred.
- Have a performance profile of 35 random reads per second per TB with 64KB read size or 10 random writes per second per TB with 64 KB write size.

  Note: *Run the IOPerf tool prior to VDP Appliance installation to ensure adequate performance. IBM InfoSphere representatives have access to a document that details how to run IOP.*

- Use **Thick Provision Eager Zero** disks.

  Note: *Using thin provisioned disks can result in data loss.*

To size a VDP Appliance, you must consider the amount of data to be captured, its type, change rate, growth, and how long it will be retained. These variables and others are considered in the VDP solution sizing tool.

The sizing tool will recommend how to allocate space for at least three **Thick Provisioned Eager Zero** disks:

- **Primary Pool:** One 400 GB disk used by the IBM InfoSphere VDP Appliance.
- **Snapshot Pool:** Accommodates the full copies (snapshots) to be retained, plus enough space for future growth. A minimum of 10 GB is required. You can add additional disks in vSphere to accommodate growth. The Snapshot Pool requires its own SCSI controller set to VMware Paravirtual. See Adding SCSI Controllers on page 14 for details.
- **Dedup Pool:** Accommodates the deduplicated data to be retained, plus enough space for future growth. A minimum of 1TB is required. You can add additional disks in vSphere to accommodate growth. The Dedup Pool requires its own SCSI controller set to VMware Paravirtual. See Adding SCSI Controllers on page 14 for details.

  For VDP Appliances that are not licensed for deduplication, you must add a Dedup Pool disk of 1TB. Such configurations however do not require a separate SCSI controller.

  Note: *Do not resize disks for Snapshot and Dedup Pools. If additional storage is needed, add disks.*

When creating disks, ensure that the **Mode** is set to **Independent** and **Persistent**.

IBM InfoSphere VDP Appliance Networking Requirements

VDP Appliances require the following network settings:

- **Static IPs:** You must provide static IPs for all NICs on VDP Appliances.
- **VMXNET3:** VDP Appliances that use 30 TB licenses and greater must use the VMXNET3 Ethernet adapter. These adapters enable 10GB performance.
- **Adding NICs:** By default, the VDP Appliance comes with a single NIC. To add additional NICs, see Adding and Configuring Additional Network Interfaces on page 23.
- **iSCSI:** The VDP Appliance uses iSCSI to mount data. Ensure that iSCSI is turned on for the VDP Appliance's vSphere host, and for the servers that host the data the VDP Appliance will capture and manage.

  When capturing an entire vSphere VM, iSCSI does not need to be configured on the vSphere host that hosts the VM to be captured. Once the VM has been captured, to present the VM to another vSphere host, including the vSphere host from which it was captured, the vSphere host must have iSCSI configured.

  When capturing individual applications on a VM, rather than capturing the entire VM, iSCSI must be configured on the VM's vSphere host.

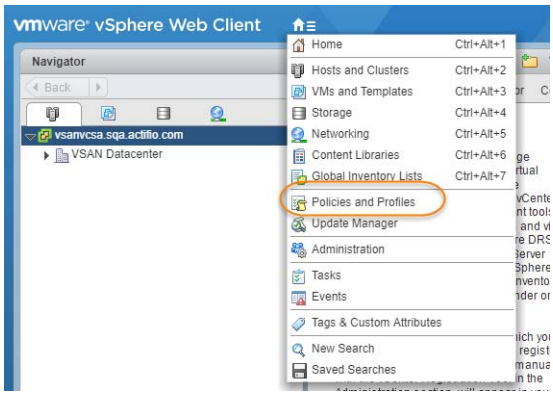
  The Snapshot pool and the Dedup pool must each have their own SCSI controller set to **VMware Paravirtual**.

2 VMware vSAN Requirements

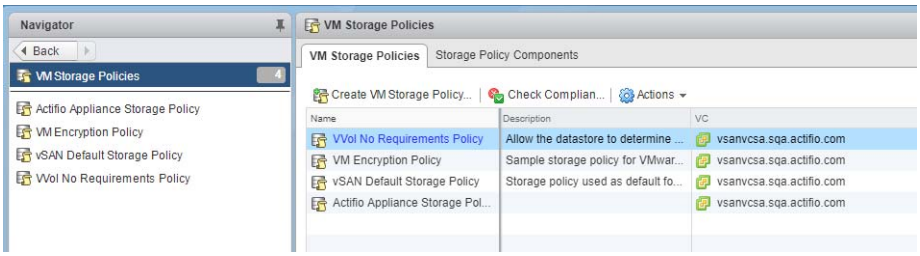
If the IBM InfoSphere VDP Appliance will use VMware's vSAN storage, then you must consider the VMware vSAN storage policy used when you deploy the VDP Appliance OVA. The best practice is to use the vSAN Default Storage Policy.

VMware provides detailed step-by-step instructions on how to create and modify VMware vSAN storage polices.

1. From a vSAN data center's top bar drop down menu, select Policies and Profiles:



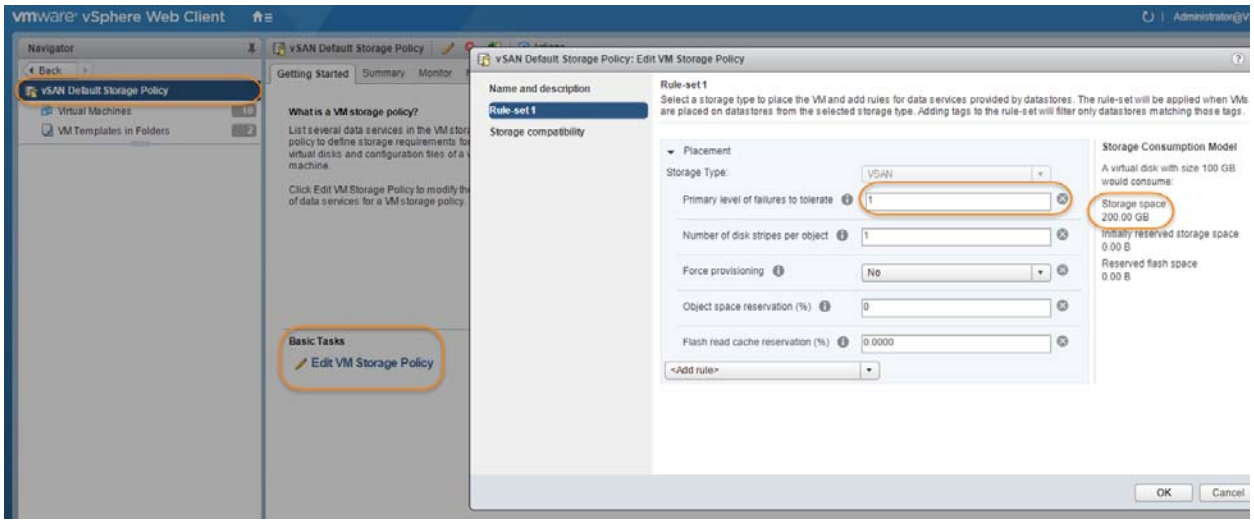
2. From VM Storage Policies, either create a new policy or select and edit an existing policy:



3. The vSAN policy sets the rules for fault tolerance (Primary level of failures to tolerate). You must consider how the fault tolerance settings will impact storage.

   A policy with a Primary level of failures to tolerate set to 1 or more will allow the VDP Appliance fault tolerant operations across the ESX cluster. Setting the value of Primary level of failures to tolerate to a value of "n" will increase the storage requirements "n" times. For example, if a policy has 100 GB of storage and a level of 1, then it will require 200 GB of storage.

   From the policy editor, set Primary level of failures to tolerate to the required level. Pay attention to how your setting impacts storage.



4. Make other settings as needed.
5. Click OK and the policy is complete.

3 Deploying the IBM InfoSphere VDP Appliance OVA

This chapter provides instructions for deploying and configuring the VDP Appliance Open Virtual Appliance (OVA) using the best practices detailed in Requirements for Installing an IBM InfoSphere VDP Appliance on VMware on page 1.

Deploying the VDP Appliance OVA on page 9

Configuring CPUs, Cores, and Memory on page 13

Adding SCSI Controllers on page 14

Adding Disks on page 16

Adding Network Interfaces on page 17

Turning the Balloon Driver Off on page 18

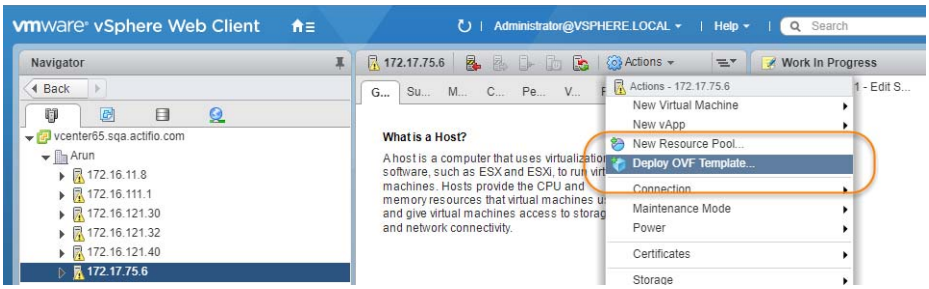
Note: *At this point the VM must be powered down. Later on, you will power on the VM.*

Deploying the VDP Appliance OVA

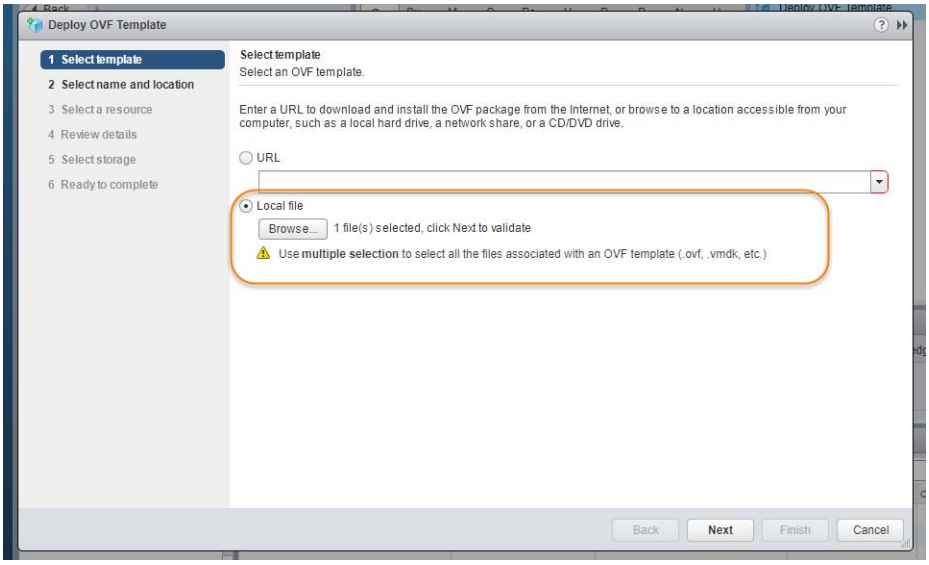
Once you have obtained a copy of the VDP Appliance OVA from your IBM InfoSphere representative:

Note: *30TB and 50TB licenses require vCenter 5.0 or later.*

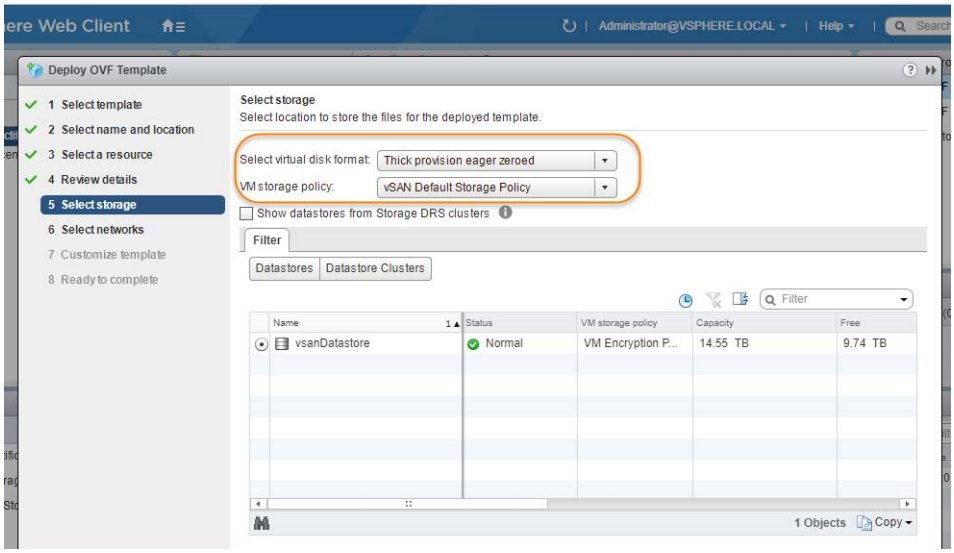
1. From the vSphere web client, select the host for the VDP Appliance VM.
2. From the vSphere web client's Actions drop down menu, select Deploy OVF Template:



3. Browse to the OVA file:

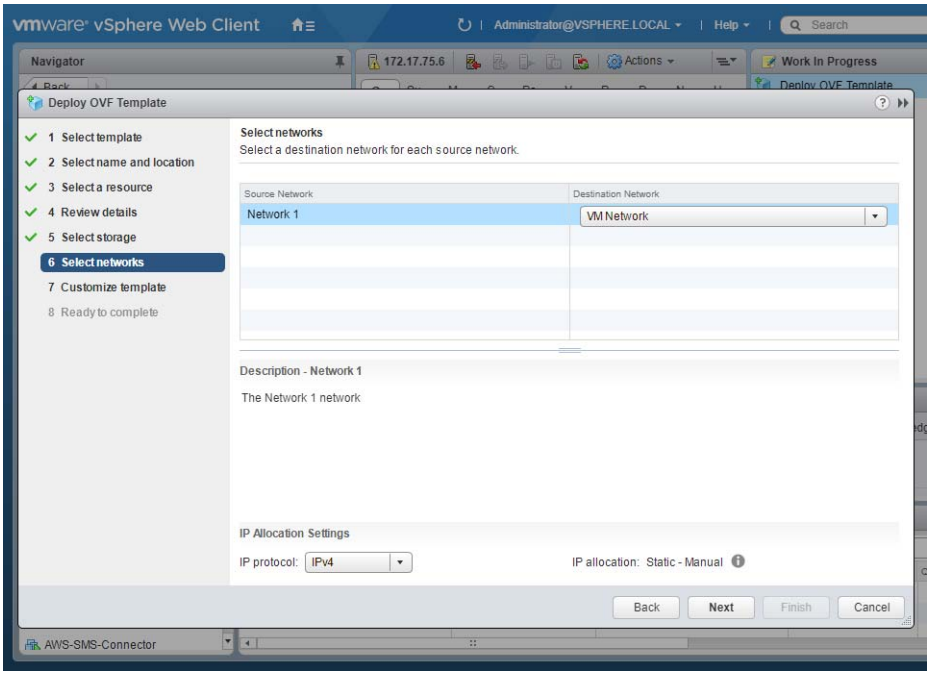


4. Complete the deployment like any other OVF template including:
   - Enter a name for the VDP Appliance.
   - Select the cluster/host to store the VDP Appliance.

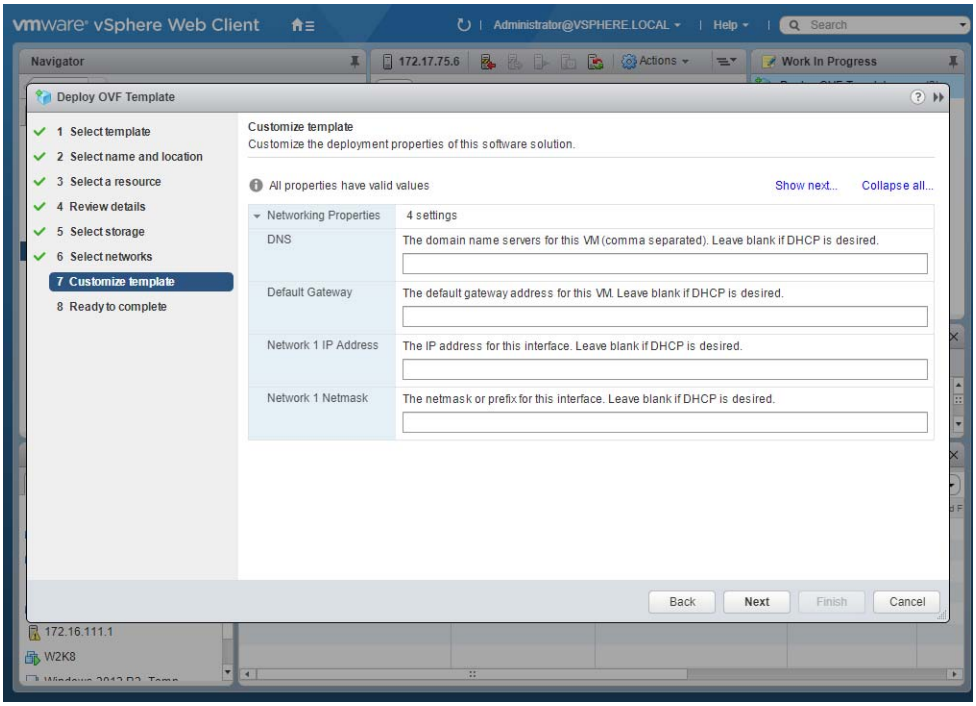


5. When selecting storage: Select *Thick provisioned eager zero* and ensure that the storage selected has enough room to accommodate the 130GB OS Volume.

6. If the VDP Appliance will use VMware vSAN (recommended), then select the vSAN policy created for the appliance's fault tolerance requirements. See VMware vSAN Requirements on page 7 for details.

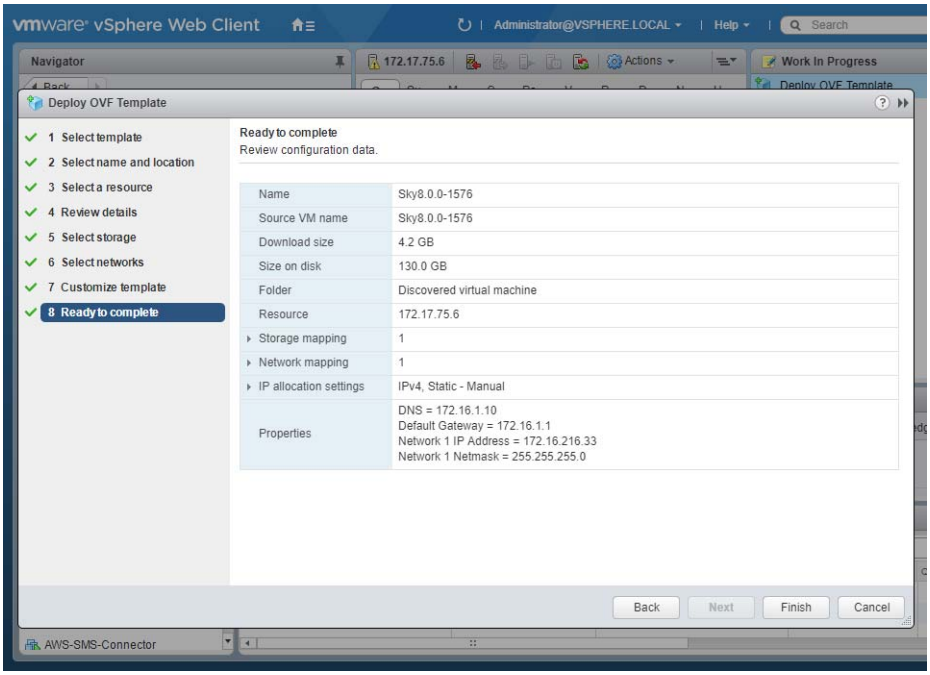


7. Select the network for the management interface. For appliances that require multiple networks, you will add those networks after the VDP Appliance is completely installed.



8. For network settings, enter a static IP, Gateway, DNS, and Netmask. DO NOT use DHCP.

9. Click Next and review your settings:



You can use the Back button to go back and make changes.

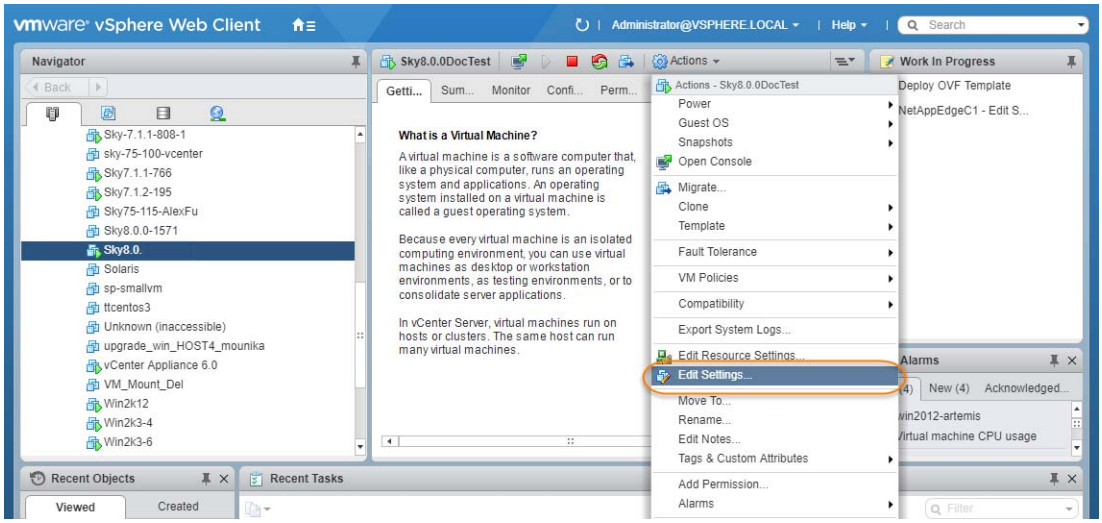
10. Click Finish and your VDP Appliance VM will be deployed.

Configuring CPUs, Cores, and Memory

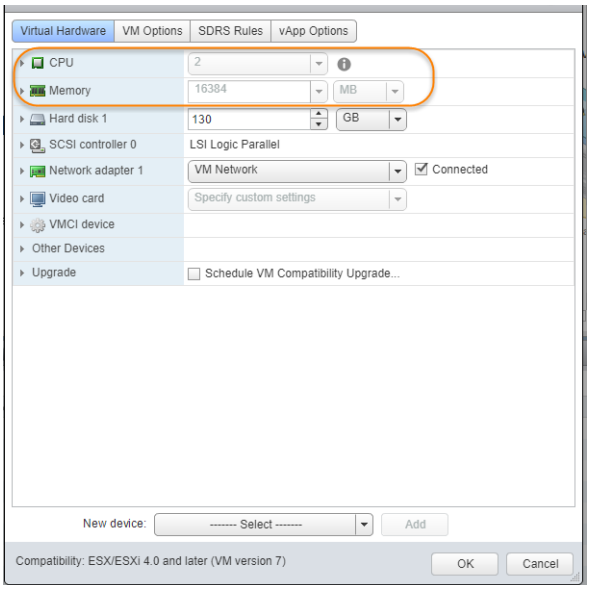
Once the VM has been deployed, reserve and configure its CPUs, cores, and memory according to your license requirements. See Requirements for VDP Appliances That WILL Use Dedup Policies on page 3 or Requirements for VDP Appliances That WILL NOT Use Dedup Policies on page 4 for details.

To configure CPUs, cores, and memory:

1. Select the VDP Appliance VM.



2. From the Actions drop down menu, select Edit Settings. The Edit Settings dialog box is open to the Virtual Hardware tab:



3. Reserve the memory, CPUs, and cores to meet your VDP Appliance license requirements. See Requirements for VDP Appliances That WILL Use Dedup Policies on page 3 for details.

4. Review the Hardware Summary to ensure you have properly reserved memory, CPUs, and cores.

Adding SCSI Controllers

The VDP Appliance VM requires three disks, each with its own SCSI controller:

1. The VM's operating system and the Primary pool disk can both use the 0:0 controller.
2. The Snapshot Pool uses the 1:0 controller. Disks assigned to the Snapshot Pool will use 1:x
3. The Dedup Pool uses the 2:0 controller. Disks assigned to the Dedup Pool will use 2:x.

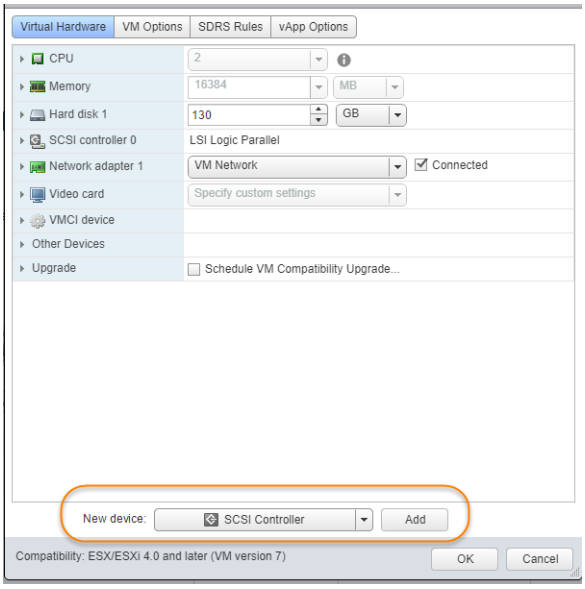
The controllers for the Snapshot Pool and Dedup Pool must be set to VMware Paravirtual.

Note: *VDP Appliances that are not licensed for deduplication do not require a separate SCSI controller for the Dedup Pool disk(s).*

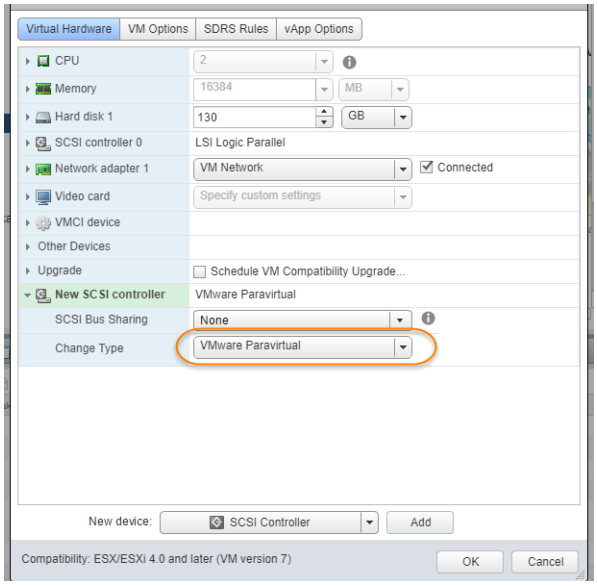
A controller can accommodate up to 16 disks. If you find it necessary to create more than 15 disks for a Snapshot or Dedup Pool, you will need to define a new controller.

To add SCSI controllers as VMware Paravirtual:

1. Select the VDP Appliance VM.
2. From the Actions drop down menu, select Edit Settings. The Edit Settings dialog box is open to the Virtual Hardware tab.
3. From the New Device drop down menu at the bottom of the dialog box, select SCSI controller.



4. Click Add and the options for the SCSI controller are displayed.
5. Expand the options under the New SCSI Controller
6. Select VMware Paravirtual and then click OK.



7. Add another SCSI Controller as needed.
8. Click OK to close the Edit Settings dialog box.

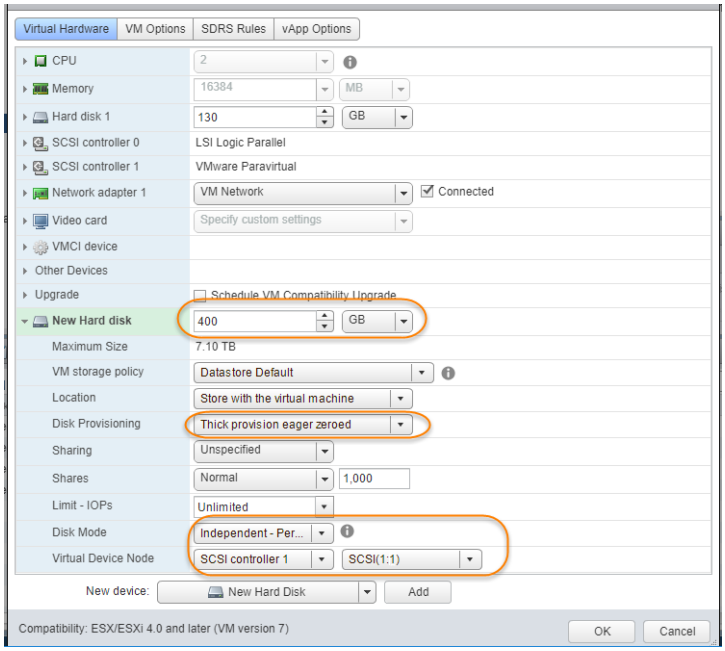
Once you have defined the controllers, you can add disks and assign them to their respective controllers. See Adding Disks on page 16.

Adding Disks

Once the SCSI controllers are created and are configured, configure the VM's disks as follows.

> ***Note:*** *The disks defined here will be placed into storage pools later.*

1. On the Hardware tab, select **Add**:



2. In the Add Hardware dialog, select **Hard Disk**.

> ***Note:*** *Disks **MUST BE THICK PROVISIONED EAGER ZEROED**. Thin provisioned disks will cause capture operations to fail and the loss of data.*

3. Your VDP Appliance requires at least three **Thick Provision Eager Zeroed** disks.

   To size your VDP Appliance, your IBM InfoSphere representative considered the amount of data to be captured, its type, change rate, growth and how long it would be retained. This same information is required to allocate space for the VDP Appliance's disks.

   - One 400GB disk for the Primary Pool. This disk is used by the VDP Appliance.
   - One disk for the Snapshot Pool. Allocate enough space to accommodate the full copies (snapshots) to be retained, plus enough space for growth. A minimum of 10 GB is required. You can add additional disks in vSphere to accommodate growth.
   - One disk for the Dedup Pool. Allocate enough space to accommodate the deduplicated data to be retained, plus enough space for growth. A minimum of 1TB is required. You can add additional disks in vSphere to accommodate growth.

   For VDP Appliances that are not licensed for deduplication, you must add a Dedup Pool disk of 1TB. Such configurations do not require a separate SCSI controller.

> ***Note:*** *The pool names associated with these disks are used in* Configuring an IBM InfoSphere VDP Appliance.

4. For the disks that will be assigned to the Snapshot Pool and Dedup Pool, from the Virtual Device Node drop down menu, select the SCSI controller you created to which this disk will be assigned.
    - Disks for the Snapshot Pool use 1:x
    - Disks for the Dedup Pool use 2:x.
5. Under Mode, check **Independent** and accept the default of **Persistent**.
6. Click **OK** and the disk is configured.

Once you have finished configuring all of the disks, you can power up the VM.

> ***Note:*** *Do not resize disks for Snapshot and Dedup Pools. If additional storage is needed, add disks.*

Adding Network Interfaces

Once the VDP Appliance is up and running, you can add additional network interfaces. For environments that require multiple NICs (for example, one NIC for data storage and another NIC for management), you must manually add network adapters to the VDP Appliance VM and then configure the additional adapters through the System Management user interface. See Adding and Configuring Additional Network Interfaces on page 23 for details.

For VDP Appliance network requirements, see IBM InfoSphere VDP Appliance Networking Requirements on page 6.

Worker Thread Errors

Worker Thread errors such as:

```
2016-05-26 13:21:39.138 INFO Worker_Thread_Job_0593710 SC6164: Error: 1732: Worker thread
failed: write failed for "\\?\C:\Windows\act\Staging_584181\SPARK CRM04\F_2016-03-
01T211433.vhd": The storage device is unresponsive [0x8003020a]
```

Indicate either:

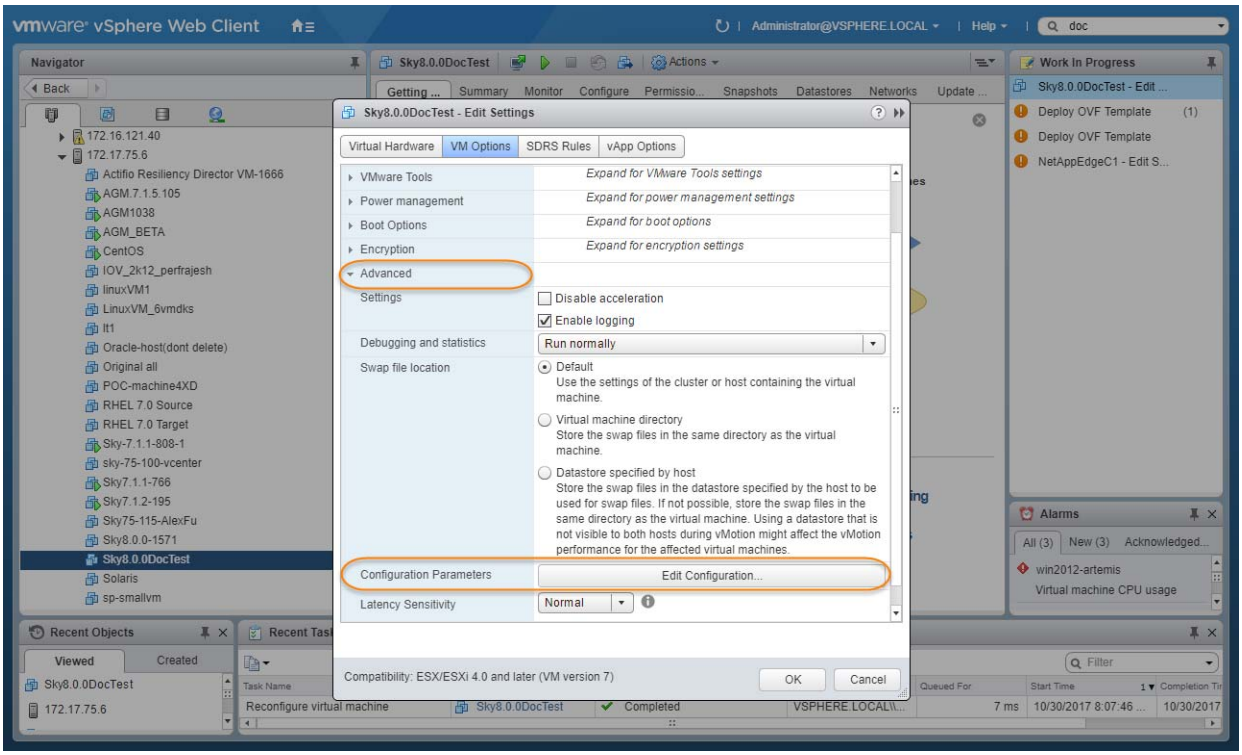
- Memory for the VDP Appliance has been incorrectly allocated.
- The bandwidth for the network on which the VDP Appliance resides is consumed by other devices.

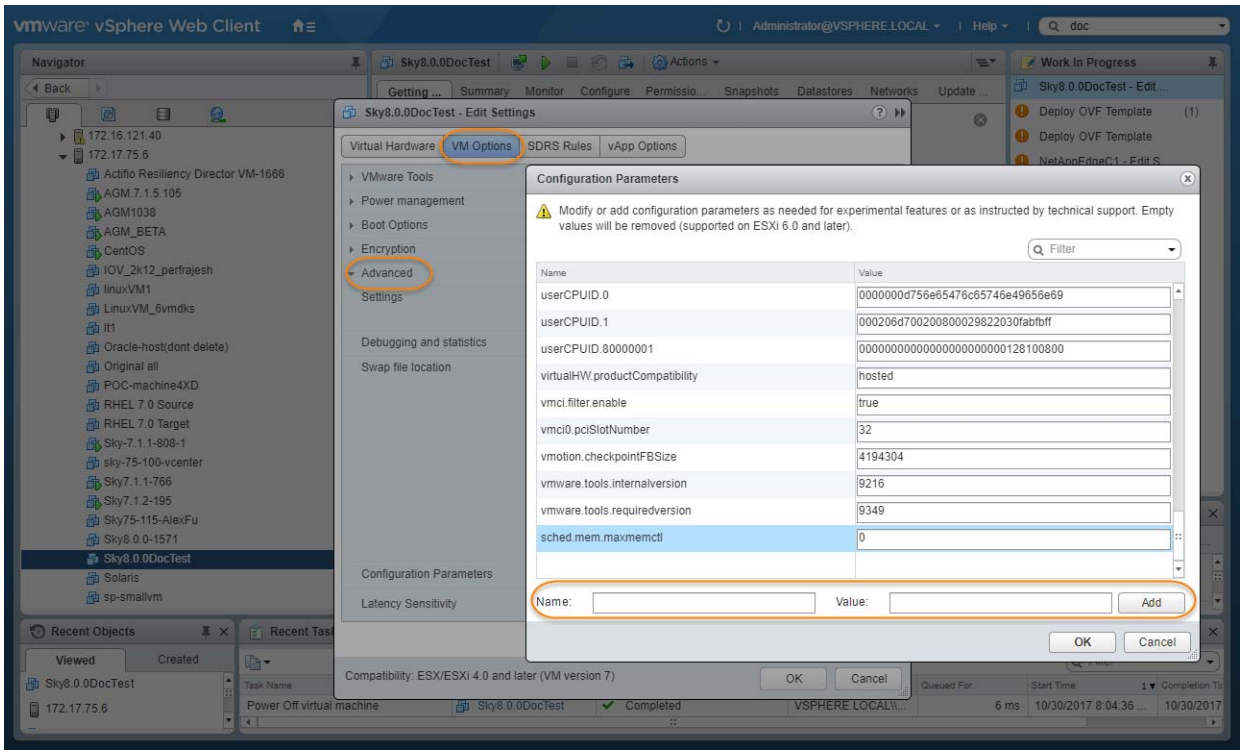
Turning the Balloon Driver Off

Once the VM has been configured, before you can configure the VDP Appliance, you must power down the VDP Appliance VM and turn off the Ballooning Driver. The balloon driver must be turned off because any paging or swapping will cause significant performance impact, and in some cases result in the VDP Appliance deadlocking.

To turn off the ballooning driver:

1. Log into the vSphere host as a user with administrative rights.
2. Shut down the VDP Appliance.
3. From the Actions drop down menu, select Edit Settings.
4. Click the VM Options tab.
5. On the left-hand side of the VM Options tab, click Advanced.
6. Click Edit Configuration.



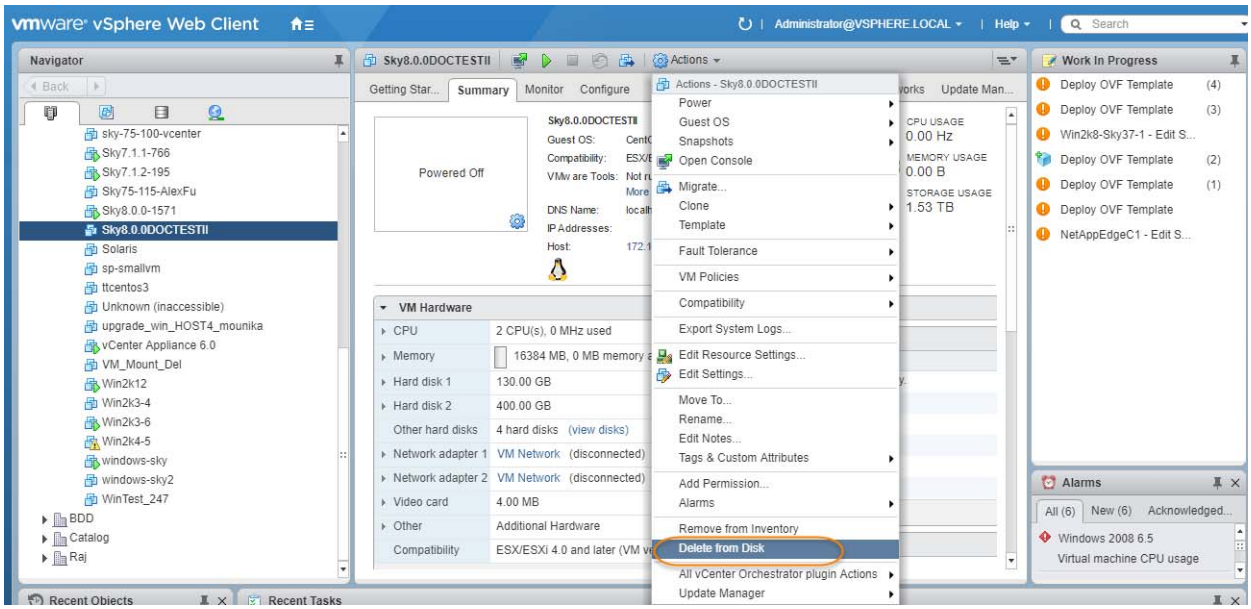


7. In the space provided for Name, enter **sched.mem.maxmemctl**.
8. In the space provided for Value, enter **0**.
9. Click **Add**. Ballooning is turned off.
10. Click **OK** and exit out of the Edit Settings dialog boxes.
11. Power up the VDP Appliance VM and continue on to Chapter 4, Configuring an IBM InfoSphere VDP Appliance.

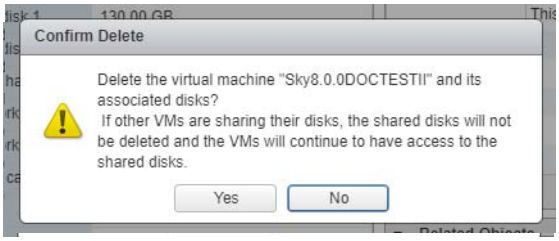
Deleting an IBM InfoSphere VDP Appliance VM

To delete an IBM InfoSphere VDP Appliance VM:

1. From the vSphere Web Client's left-hand navigation frame, select the VDP Appliance VM to be deleted.
2. Power down the VDP Appliance VM.



3. From the VMware Web Client's Action drop down menu, select **Delete from Disk**. This option is only available if the VM is powered down.
4. When you click Delete from Disk, a confirmation message is displayed. Ensure that the VM name displayed in the confirmation message is the name of the VDP Appliance VM you want to delete.



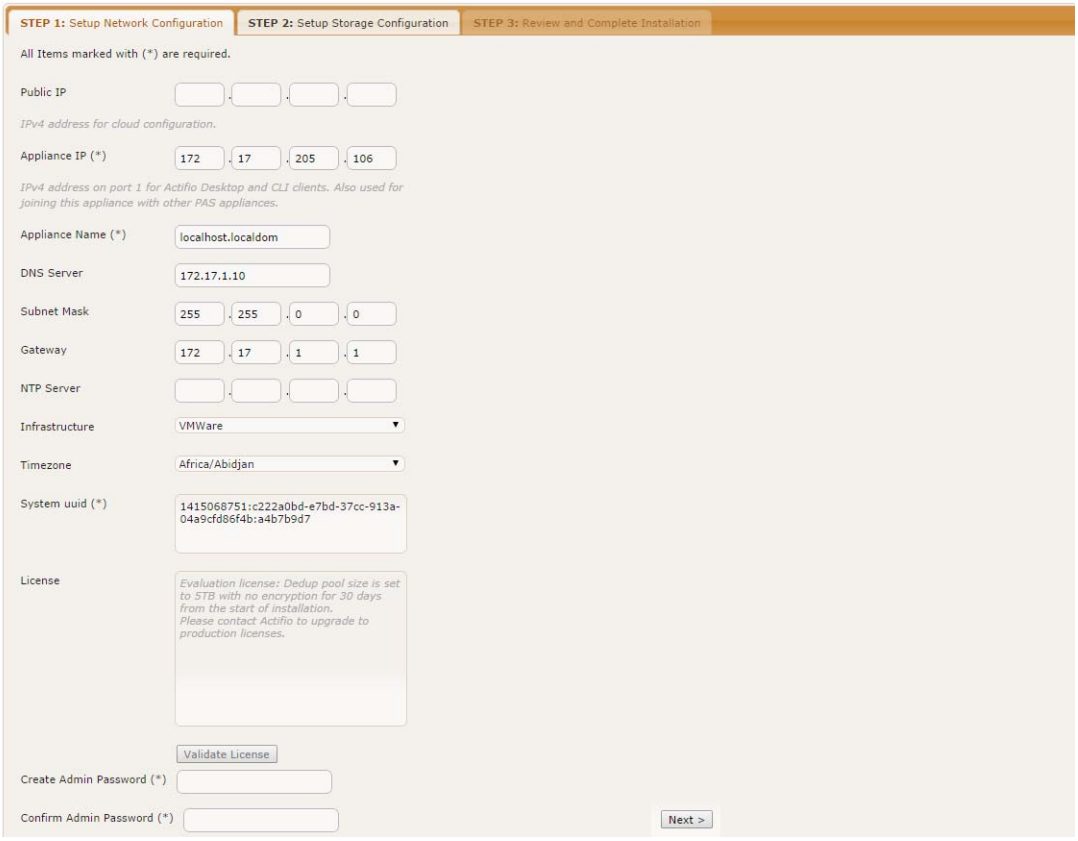
5. If the name in the confirmation message matches the name of the VDP Appliance VM that you want to delete, then click **Yes** and the VDP Appliance VM and its disks will be deleted.

4 Configuring an IBM InfoSphere VDP Appliance

After the VM is configured and powered up, it is ready to be configured as an IBM InfoSphere VDP Appliance.

Note: *For the following procedure you will need the IP address of the VM. The VM's IP is on the VM's vSphere Summary page.*

1. Open a browser and in the address space, enter the IP of the newly configured VDP Appliance VM: http://<VM IP address>/.
2. The installer opens the first of three tabs:



3. If your VDP Appliance will sit behind a firewall, then in the spaces provided enter the Public IP.
4. Ensure that the auto-discovered VDP Appliance IP address is correct.
5. In the space provided, enter a name for the VDP Appliance.
6. Ensure that the auto discovered network IP addresses are correct.
7. From the Infrastructure drop down menu, select VMware.

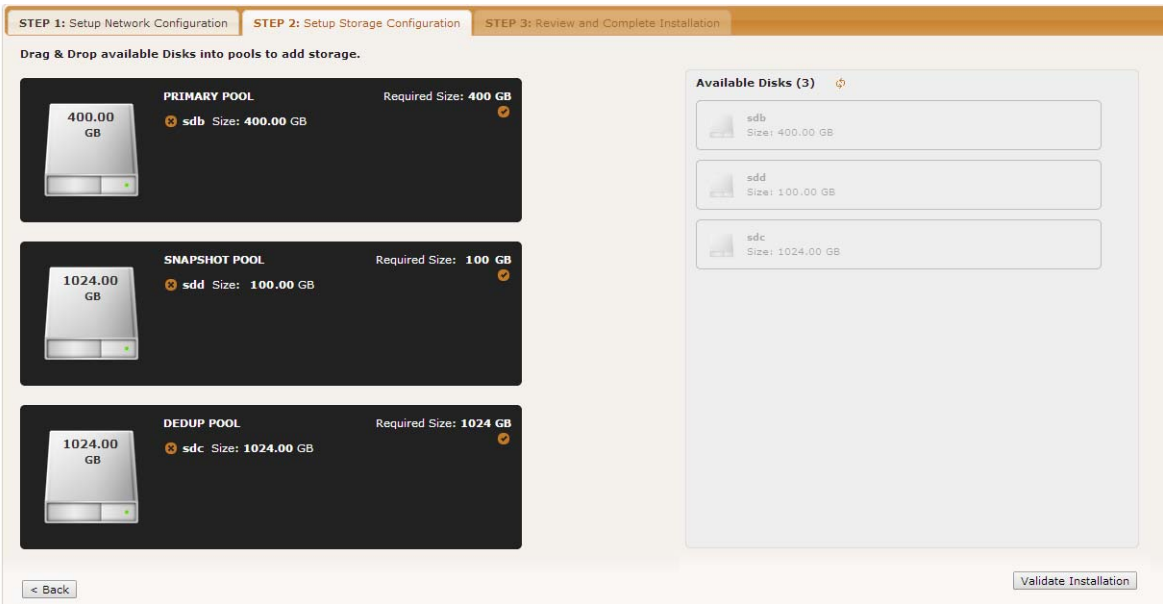
8. Set the time zone as needed.
9. If you are installing the VDP Appliance as an evaluation, leave the License Number field set to the default setting and go to Step 14.

Note: *The 5TB license is used for evaluations. If you decide to purchase a VDP Appliance, you may keep the 5TB appliance, or contact your IBM InfoSphere representative to resize the VDP Appliance to match the new license.*

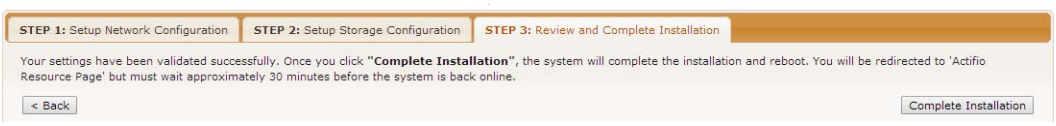
If you are not installing this VDP Appliance as an evaluation, then capture the system UUID and include it in an email license key request for each install to IBM InfoSphere Support. IBM InfoSphere will use the UUID to generate the VDP Appliance license key.

10. In the space provided, paste the license key you obtained from the IBM InfoSphere representative.
11. Click **Validate License** to ensure the validity of the license entered.

    If the license is valid, the Managed Data License (MDL) size will be displayed in a popup window. If there are any optional add-ons included in the license, they will also be shown here.
12. If you are using an encryption license, a Pass phrase field is displayed. Enter a pass phrase, record the pass phrase and keep it in a secure location.
13. In the spaces provided create a password for the first Admin user of the VDP Appliance.
14. Click **Next**, and the Step 2 tab contents are displayed:



15. Select and drag the Available Disks to the pools for which they were created.
16. Click **Validate Installation**. The VDP Appliance installer validates the settings, and if no issues are encountered, advances to the third tab. Any issues will appear in a yellow field at the top of the page 2.
17. The third tab provides the opportunity to review choices and go back to make changes as needed.



18. Once choices are verified, click Complete Installation and the VDP Appliance will reboot. The reboot may take several minutes. The user interface will become responsive before the appliance is ready for use. Do not attempt any operations until the Dedup light on the Dashboard shows green.

A Adding and Configuring Additional Network Interfaces

Adding additional network interfaces to an IBM InfoSphere VDP Appliance requires:

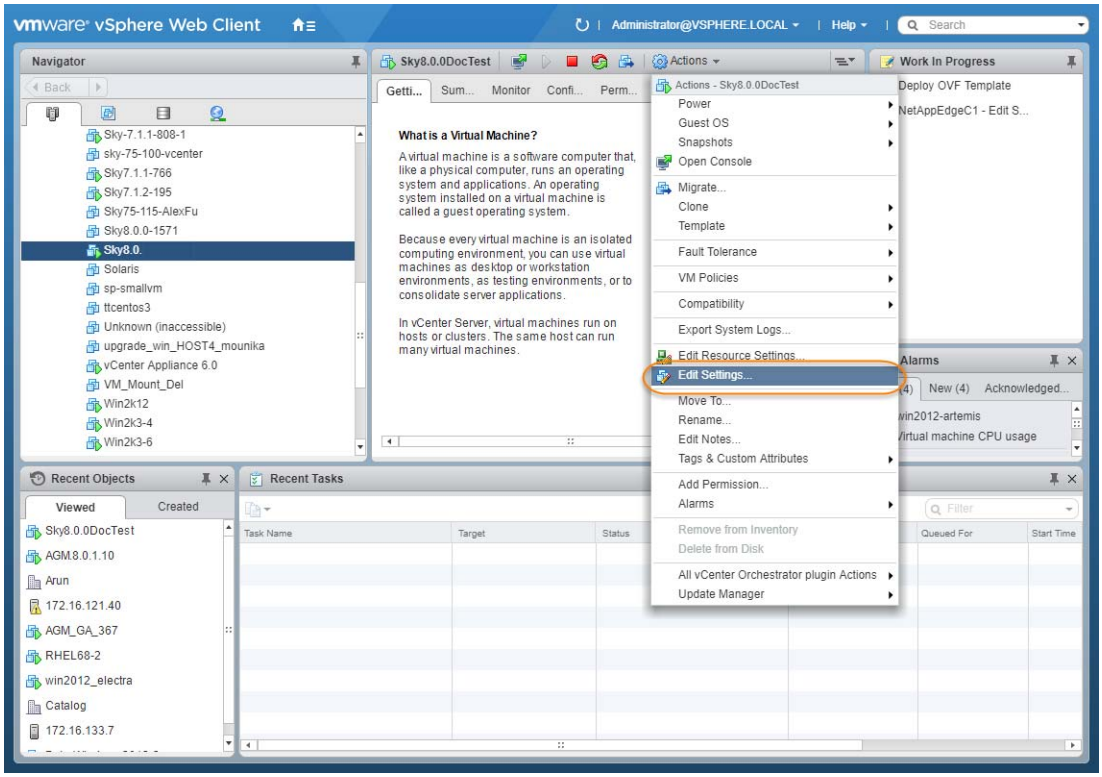
Adding a New Network Adapter

Configuring a VDP Appliance VM Network Adapter

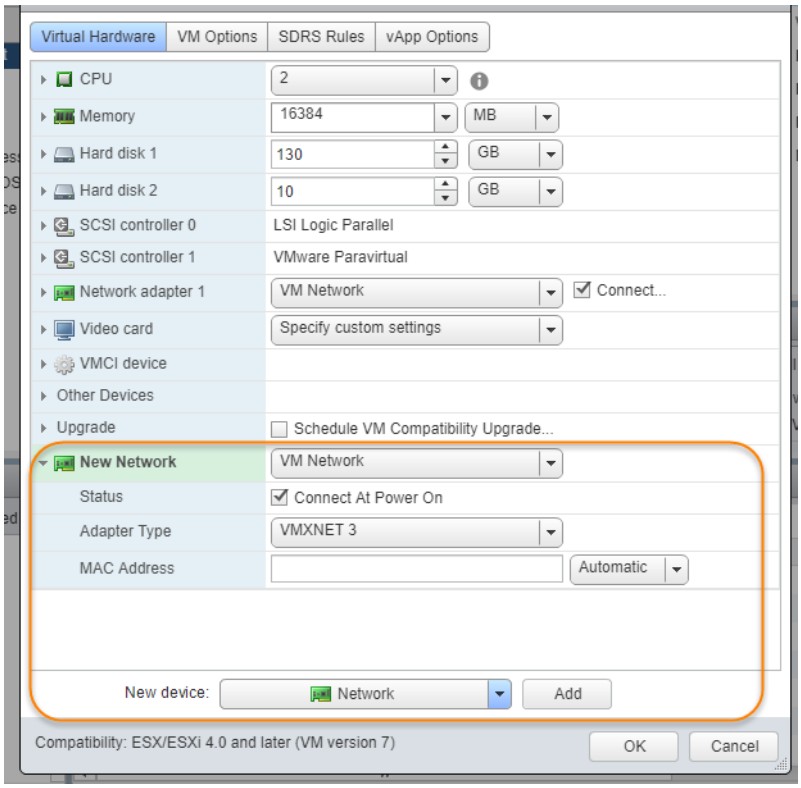
Adding a New Network Adapter

To add a new network adapter to an VDP Appliance VM:

1. In vSphere, select the VDP Appliance VM.



2. From the Actions drop down menu, select Edit Settings. The Edit Settings dialog box is open to the Virtual Hardware tab.
3. From the New Device drop down menu at the bottom of the page, select Network.



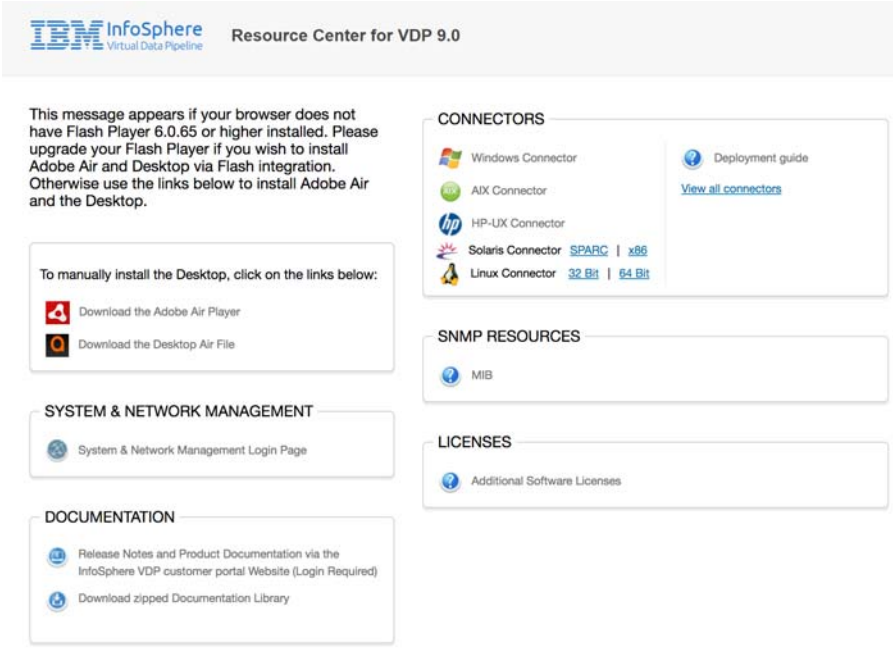
4. Click **Add**.
5. Expand the options under the New Network and ensure it is using the **VMXNET3** option.
6. Click **OK** on the Edit Settings dialog box and the new network adapter is added.
7. Once the network adapter is added, use the System Management user interface to configure the network. You can reach the System Management user interface from the Resource Center (at the IP address of the VDP Appliance).

Configuring a VDP Appliance VM Network Adapter

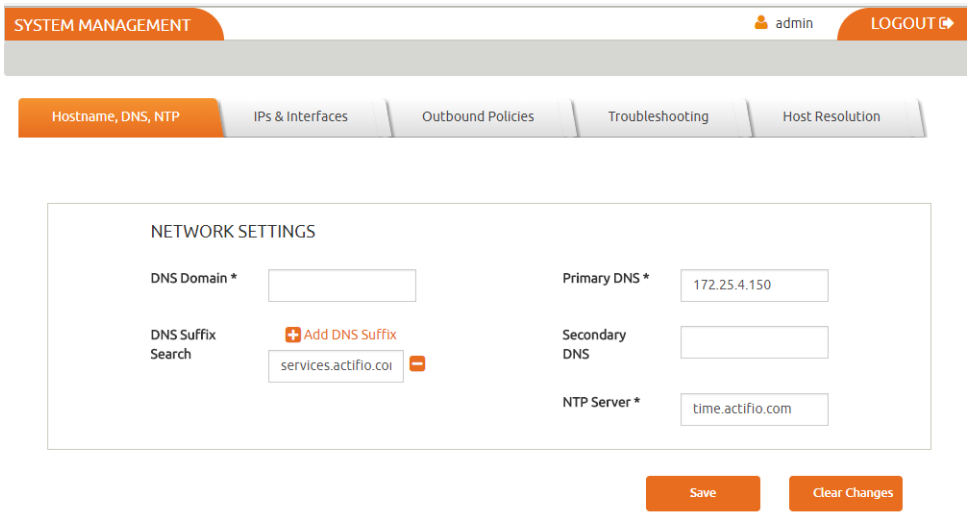
The System Management user interface is used to configure VDP Appliance network adapters. You access the System Management user interface from the Resource Center.

To display the VDP Appliance's resource page:

1. Open a browser to the VDP Appliance's Resource Center HTTP://<appliance IP address>/.

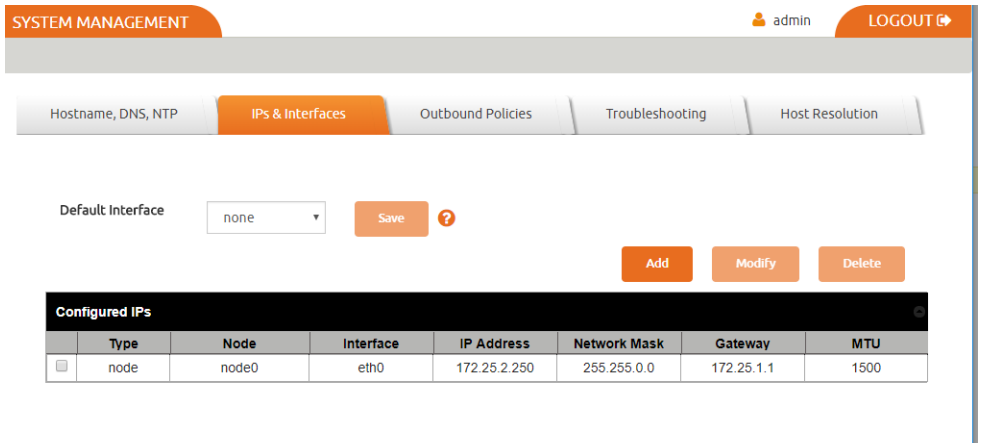


2. Click System & Network Management Login Page.
3. Log in using the VDP Appliance's administrator credentials, and the System Management interface is displayed.

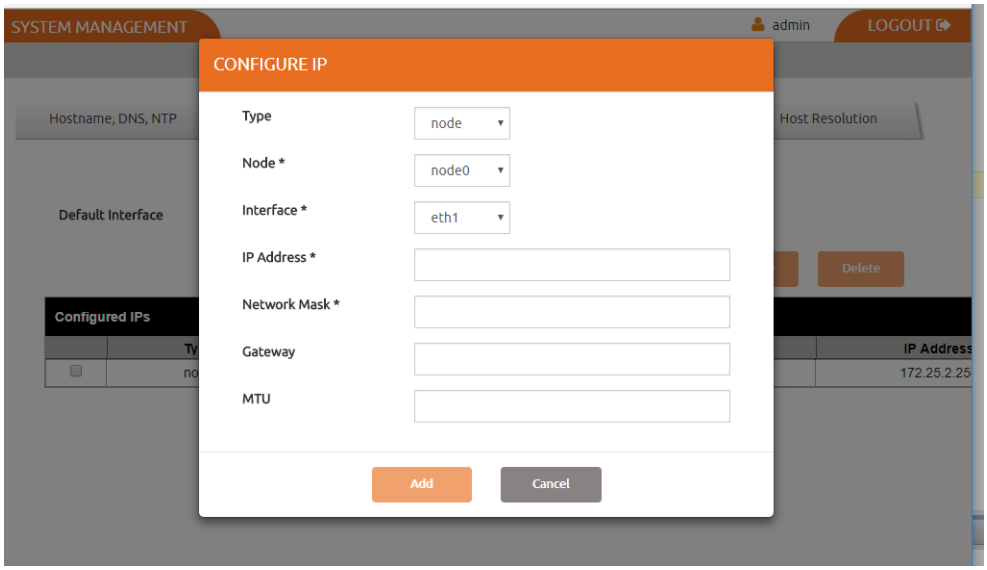


4. Ensure that the DNS and NTP settings are correct.

5. Click the IPs and Interfaces tab, and the IP and Interfaces settings are displayed:



6. Click **Add** and the Configure IP dialog box is displayed:



7. Ensure Type is set to Node.
8. Ensure Node is set to Node0.
9. Select the interface you created on the IBM InfoSphere VDP Appliance VM. In this example it is eth1.
10. In the spaces provided enter:
    - A static IP address
    - A network mask
    - A Gateway
    - MTU (Maximum Transmission Unit) can be used to tune the performance characteristics of traffic on an interface. There are many dependencies to consider when adjusting the MTU, as all network devices and servers involved in passing network traffic must support the specified MTU, and there must be space reserved for protocol overhead. If you are not sure what value to use, it is best to leave this at the default value of 1500.
11. Click **Add** and the interface is configured.

B Adding an SSD to an IBM InfoSphere VDP Appliance

VDP Appliances that have a dedup pool of 30 TB and greater must use an SSD.

IBM InfoSphere VDP Appliance SSD Requirements

Dedup Pool	SSD Size	Optional/Required
50TB	512GB	Required
30TB	308GB	Required
10TB	103GB	Optional
5TB	53GB	Optional
1TB	11GB	Optional

Note: *If the dedup pool is built entirely from an SSD, then there is no need to add an SSD.*

1. You need the VDP Appliance configuration to configure the SSD from IVGM. To install IVGM, see ***Installing and Upgrading InfoSphere VDP - Global Manager on a VMware Server***.
2. Use the hypervisor vendor's best practices to physically add an SSD to a hypervisor.
3. Once the SSD has been added, see Adding an SSD to a VDP Appliance on page 28.

VMware Versions

VDP Appliances are delivered with VMware Virtual Machine Compatibility Level 7. This allows VDP Appliances to work with older versions of ESX.

For a VDP Appliance to identify SSDs automatically, both of the following must be true:

- The vSphere hosting environment must be version 5.5.0 or greater.
- The VM Compatibility must be updated to version 10.

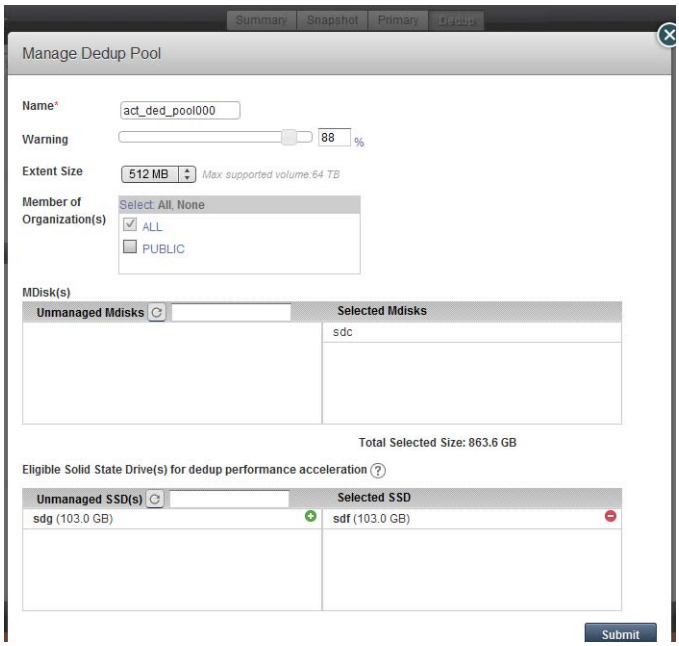
Adding an SSD to a VDP Appliance

Once a hypervisor has been updated with the required SSD, modify the VDP Appliance's Dedup Pool as follows:

1. Open the IVGM to the **Domain Manager** and right-click the appliance that will get the SSD. Select **Configure Appliance**.
2. The Appliance Configuration page opens. Under System/Configuration, select **Storage Pools**.
3. Select the **Dedup** tab. The Dedup Pool information page opens.

4. Click the pencil icon next to the Dedup Pool name and the Manage Dedup Pool page is displayed. If necessary, scroll down until the SSD section of the window is visible.
5. In the Unmanaged SSDs column, click the **+** sign next to the SSD you added for the IBM InfoSphere VDP Appliance, and it will move to the Selected SSD(s) column.

Note: *If the SSD you installed is under unmanaged MDisks and not under Unmanaged SSDs, select the SSD and click the Tag link. This tags the selected disk as an SSD; it will appear in the Selected SSD column.*



6. Click **Submit** and the SSD is added to the VDP Appliance.

Note: *Only SSDs large enough to meet your VDP Appliance's license requirements appear in the dialog box.*