Deploy the ASA Virtual on Hyper-V

You can deploy the ASA virtual using Microsoft Hyper-V.

Important Beginning with 9.13(1), the minimum memory requirement for the ASA virtual is 2GB. If your current ASA virtual runs with less than 2GB of memory, you cannot upgrade to 9.13(1) from an earlier version without increasing the memory of your ASA virtual machine. You can also redeploy a new ASA virtual machine with version 9.13(1).

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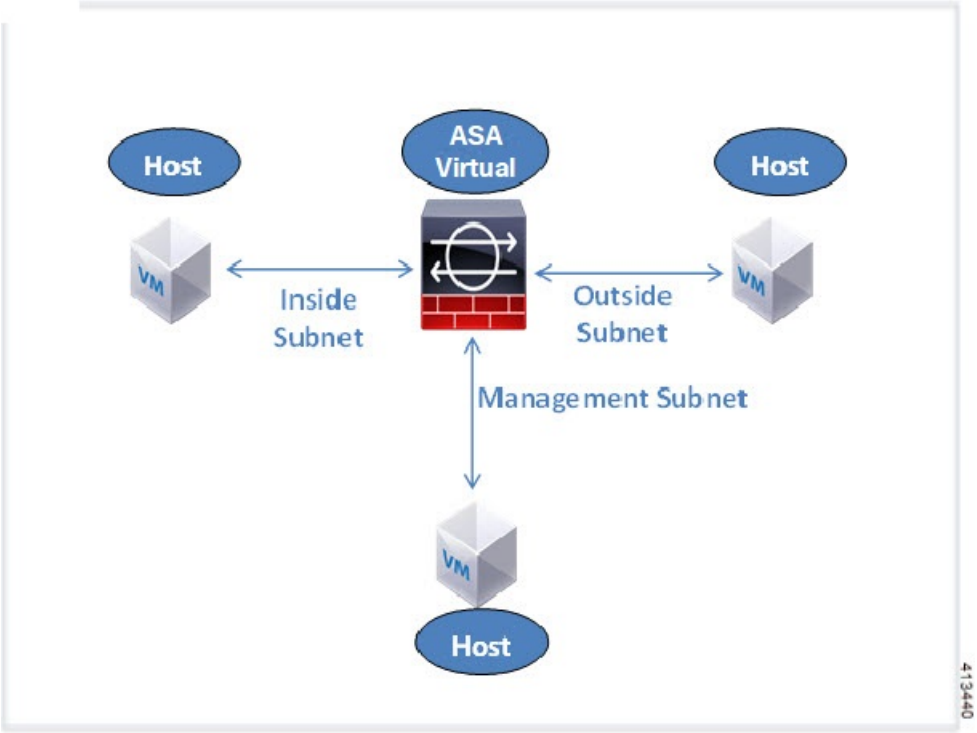
Overview

You can deploy Hyper-V on a standalone Hyper-V server or through the Hyper-V Manager. For instructions to install using the Powershell CLI commands, see Install the ASA virtual on Hyper-V Using the Command Line, page 46. For instructions to install using the Hyper-V Manager, see Install the ASA virtual on Hyper-V Using the Hyper-V Manager, page 46. Hyper-V does not provide a serial console option. You can manage Hyper-V through SSH or ASDM over the management interface. See Configuring SSH, page 54 for information to set up SSH.

The following figure shows the recommended topology for the ASA virtual in Routed Firewall Mode. There are three subnets set up in Hyper-V for the ASA virtual—management, inside, and outside.

Figure 1: Recommended Topology for the ASA Virtual in Routed Firewall Mode



Guidelines and Limitations

- Platform Support
  - Cisco UCS B-Series servers
  - Cisco UCS C-Series servers
  - Hewlett Packard Proliant DL160 Gen8
- OS Support
  - Windows Server 2019
  - Native Hyper-V

Note The ASA virtual should run on most modern, 64-bit high-powered platforms used for virtualization today.

- File format

  Supports the VHDX format for initial deployment of the ASA virtual on Hyper-V.
- Day 0 configuration

You create a text file that contains the ASA CLI configuration commands that you need. See Prepare the Day 0 Configuration File for the procedure.

- Firewall Transparent Mode with Day 0 configuration

  The configuration line 'firewall transparent' must be at the top of the day 0 configuration file; if is appears anywhere else in the file, you could experience erratic behavior. See Prepare the Day 0 Configuration File for the procedure.

- Failover

  The ASA virtual on Hyper-V supports Active/Standby failover. For Active/Standby failover in both routed mode and transparent mode you must enable MAC Address spoofing on all the virtual network adapters. See Configure MAC Address Spoofing. For transparent mode in the standalone ASA virtual, the management interface should not have the MAC address spoofing enabled because the Active/Standby failover is not supported.

- Hyper-V supports up to eight interfaces. Management 0/0 and GigabitEthernet 0/0 through 0/6. You can use GigabitEthernet as a failover link.

- VLANs

  Use the **Set-VMNetworkAdapterVLan** Hyper-V Powershell command to set VLANs on an interface in trunk mode. You can set the NativeVlanID for the management interface as a particular VLAN or '0' for no VLAN. Trunk mode is not persistent across Hyper-V host reboots. You must reconfigure trunk mode after every reboot.

- Legacy network adapters are not supported.
- Generation 2 virtual machines are not supported.
- Microsoft Azure is not supported.

Prerequisites

- Install Hyper-V on MS Windows 2012.
- Create the Day 0 configuration text file if you are using one.

  You must add the Day 0 configuration before the ASA virtual is deployed for the first time; otherwise, you must perform a write erase from the ASA virtual to use the Day 0 configuration. See Prepare the Day 0 Configuration File for the procedure.

- Download the ASA virtual VHDX file from Cisco.com.

  http://www.cisco.com/go/asa-software

Note A Cisco.com login and Cisco service contract are required.

- Hyper-V switch configured with at least three subnets/VLANs.
- For Hyper-V system requirements, see Cisco Secure Firewall ASA Compatibility.

Prepare the Day 0 Configuration File

You can prepare a Day 0 configuration file before you launch the ASA virtual. This file is a text file that contains the ASA virtual configuration that will be applied when the ASA virtual is launched. This initial configuration is placed into a text file named “day0-config” in a working directory you chose, and is manipulated into a day0.iso file that is mounted and read on first boot. At the minimum, the Day 0 configuration file must contain commands that will activate the management interface and set up the SSH server for public key authentication, but it can also contain a complete ASA configuration. The day0.iso file (either your custom day0.iso or the default day0.iso) must be available during first boot.

Before you begin

We are using Linux in this example, but there are similar utilities for Windows.

- To automatically license the ASA virtual during initial deployment, place the Smart Licensing Identity (ID) Token that you downloaded from the Cisco Smart Software Manager in a text file named ‘idtoken’ in the same directory as the Day 0 configuration file.
- If you want to deploy the ASA virtual in transparent mode, you must use a known running ASA config file in transparent mode as the Day 0 configuration file. This does not apply to a Day 0 configuration file for a routed firewall.
- You must add the Day 0 configuration file before you boot the ASA virtual for the first time. If you decide you want to use a Day 0 configuration after you have initially booted the ASA virtual, you must execute a **write erase** command, apply the day 0 configuration file, and then boot the ASA virtual.

Procedure

Step 1 Enter the CLI configuration for the ASA virtual in a text file called “day0-config”. Add interface configurations for the three interfaces and any other configuration you want.

The fist line should begin with the ASA version. The day0-config should be a valid ASA configuration. The best way to generate the day0-config is to copy the desired parts of a running config from an existing ASA or ASA virtual. The order of the lines in the day0-config is important and should match the order seen in an existing show run command output.

Example:

```
ASA Version 9.5.1
!
interface management0/0
nameif management
 security-level 100
 ip address 192.168.1.2 255.255.255.0
 no shutdown
interface gigabitethernet0/0
 nameif inside
 security-level 100
 ip address 10.1.1.2 255.255.255.0
 no shutdown
interface gigabitethernet0/1
 nameif outside
 security-level 0
 ip address 198.51.100.2 255.255.255.0
 no shutdown
```

```
http server enable
http 192.168.1.0 255.255.255.0 management
crypto key generate rsa modulus 1024
username AdminUser password paSSw0rd
ssh 192.168.1.0 255.255.255.0 management
aaa authentication ssh console LOCAL
```

Step 2 (Optional) Download the Smart License identity token file issued by the Cisco Smart Software Manager to your computer.

Step 3 (Optional) Copy the ID token from the download file and put it a text file that only contains the ID token.

Step 4 (Optional) For automated licensing during initial ASA virtual deployment, make sure the following information is in the day0-config file:

- Management interface IP address
- (Optional) HTTP proxy to use for Smart Licensing
- A route command that enables connectivity to the HTTP proxy (if specified) or to tools.cisco.com
- A DNS server that resolves tools.cisco.com to an IP address
- Smart Licensing configuration specifying the ASA virtual license you are requesting
- (Optional) A unique host name to make the ASA virtual easier to find in CSSM

Step 5 Generate the virtual CD-ROM by converting the text file to an ISO file:

```
stack@user-ubuntu:-/KvmAsa$ sudo genisoimage -r -o day0.iso day0-config idtoken
I: input-charset not specified, using utf-8 (detected in locale settings)
Total translation table size: 0
Total rockridge attributes bytes: 252
Total directory bytes: 0
Path table size (bytes): 10
Max brk space used 0
176 extents written (0 MB)
stack@user-ubuntu:-/KvmAsa$
```

The Identity Token automatically registers the ASA virtual with the Smart Licensing server.

Step 6 Repeat Steps 1 through 5 to create separate default configuration files with the appropriate IP addresses for each ASA virtual you want to deploy.

Deploy the ASA Virtual with the Day 0 Configuration File Using the Hyper-V Manager

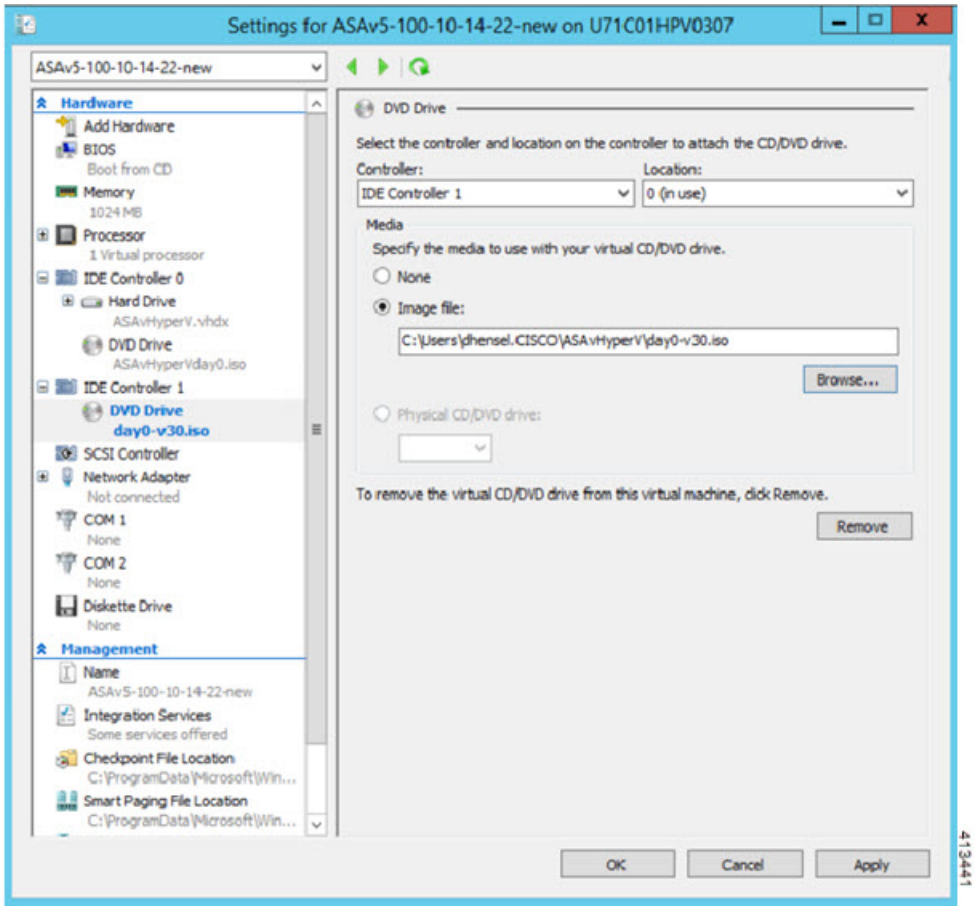
After you set up the Day 0 configuration file (Prepare the Day 0 Configuration File), you can deploy it using the Hyper-V Manager.

Procedure

Step 1 Go to **Server Manager** > **Tools** > **Hyper-V Manager**.

Step 2 Click **Settings** on the right side of the Hyper-V Manager. The Settings dialog box opens. Under **Hardware** on the left, click **IDE Controller 1**.

Figure 2: Hyper-V Manager



Step 3 Under **Media** in the right pane, select the **Image file** radio button, and then browse to the directory where you keep your Day 0 ISO configuration file, and then click **Apply**. When you boot up your ASA virtual for the first time, it will be configured based on what is in the Day 0 configuration file.

Deploy the ASA Virtual on Hyper-V Using the Command Line

You can install the ASA virtual on Hyper-V through the Windows Powershell command line. If you are on a standalone Hyper-V server, you must use the command line to install Hyper-V.

Procedure

Step 1 Open a Windows Powershell.

Step 2 Deploy the ASA virtual:

Example:

```
new-vm -name $fullVMName -MemoryStartupBytes $memorysize -Generation 1 -vhdpath
C:\Users\jsmith.CISCO\ASAvHyperV\$ImageName.vhdx -Verbose
```

Step 3 Depending on your ASA virtual model, change the CPU count from the default of 1.

Example:

```
set-vm -Name $fullVMName -ProcessorCount 4
```

Step 4 (Optional) Change the interface name to something that makes sense to you.

Example:

```
Get-VMNetworkAdapter -VMName $fullVMName -Name "Network Adapter" | Rename-vmNetworkAdapter -NewName
mgmt
```

Step 5 (Optional) Change the VLAN ID if your network requires it.

Example:

```
Set-VMNetworkAdapterVlan -VMName $fullVMName -VlanId 1151 -Access -VMNetworkAdapterName "mgmt"
```

Step 6 Refresh the interface so that Hyper-V picks up the changes.

Example:

```
Connect-VMNetworkAdapter -VMName $fullVMName -Name "mgmt" -SwitchName 1151mgmtswitch
```

Step 7 Add the inside interface.

Example:

```
Add-VMNetworkAdapter -VMName $fullVMName -name "inside" -SwitchName 1151mgmtswitch
Set-VMNetworkAdapterVlan -VMName $fullVMName -VlanId 1552 -Access -VMNetworkAdapterName "inside"
```

Step 8 Add the outside interface.

Example:

```
Add-VMNetworkAdapter -VMName $fullVMName -name "outside" -SwitchName 1151mgmtswitch
Set-VMNetworkAdapterVlan -VMName $fullVMName -VlanId 1553 -Access -VMNetworkAdapterName "outside"
```

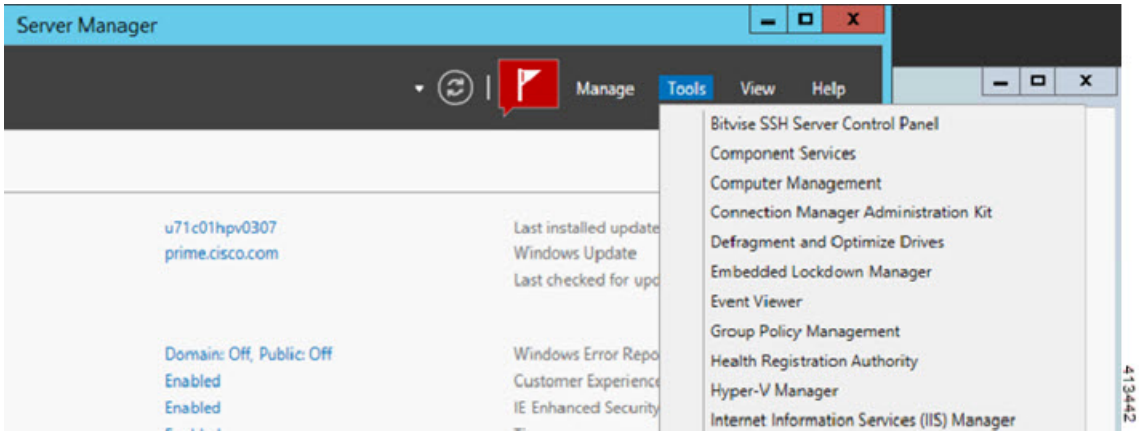
Deploy the ASA Virtual on Hyper-V Using the Hyper-V Manager

You can use the Hyper-V Manager to install the ASA virtual on Hyper-V.

Procedure

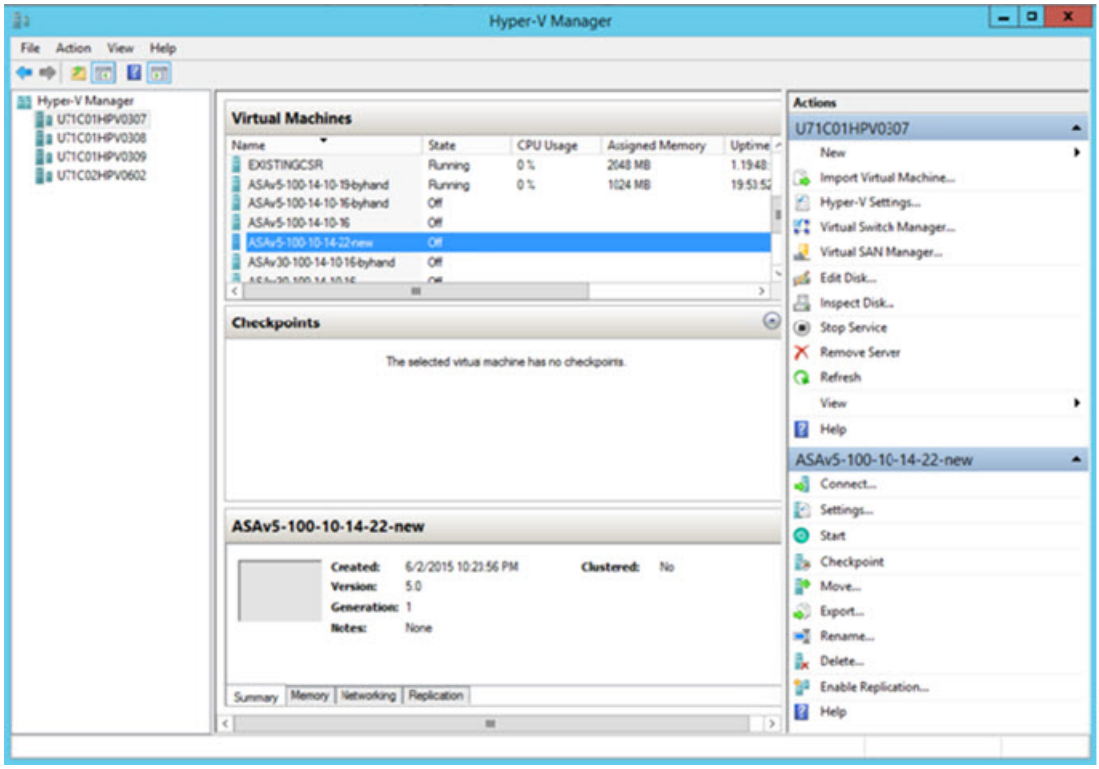
Step 1 Go to **Server Manager** > **Tools** > **Hyper-V Manager**.

Figure 3: Server Manager



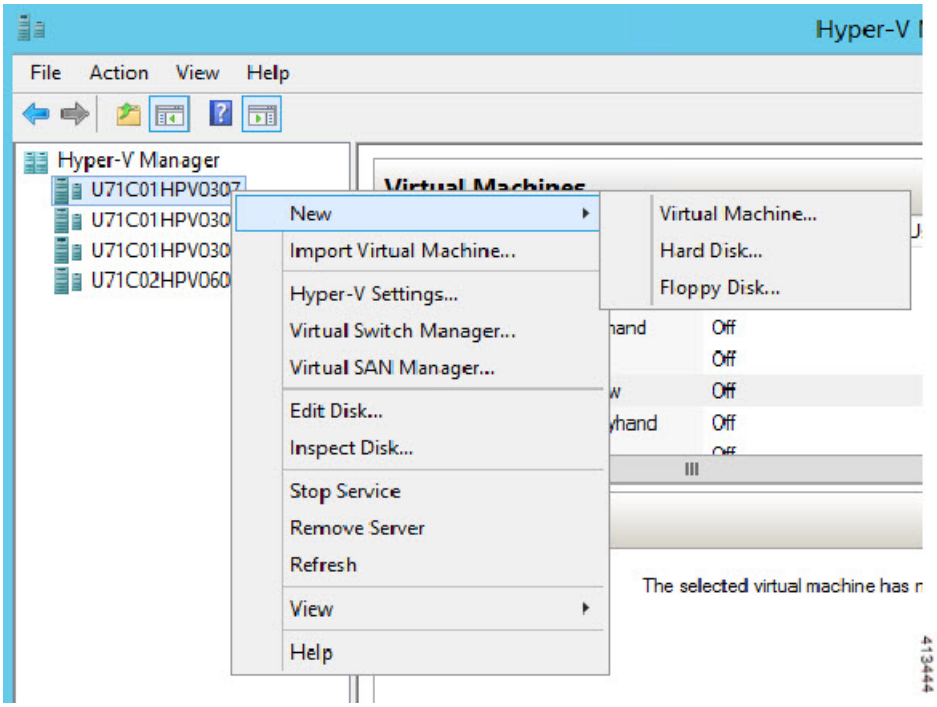
Step 2 The Hyper-V Manager appears.

Figure 4: Hyper-V Manager



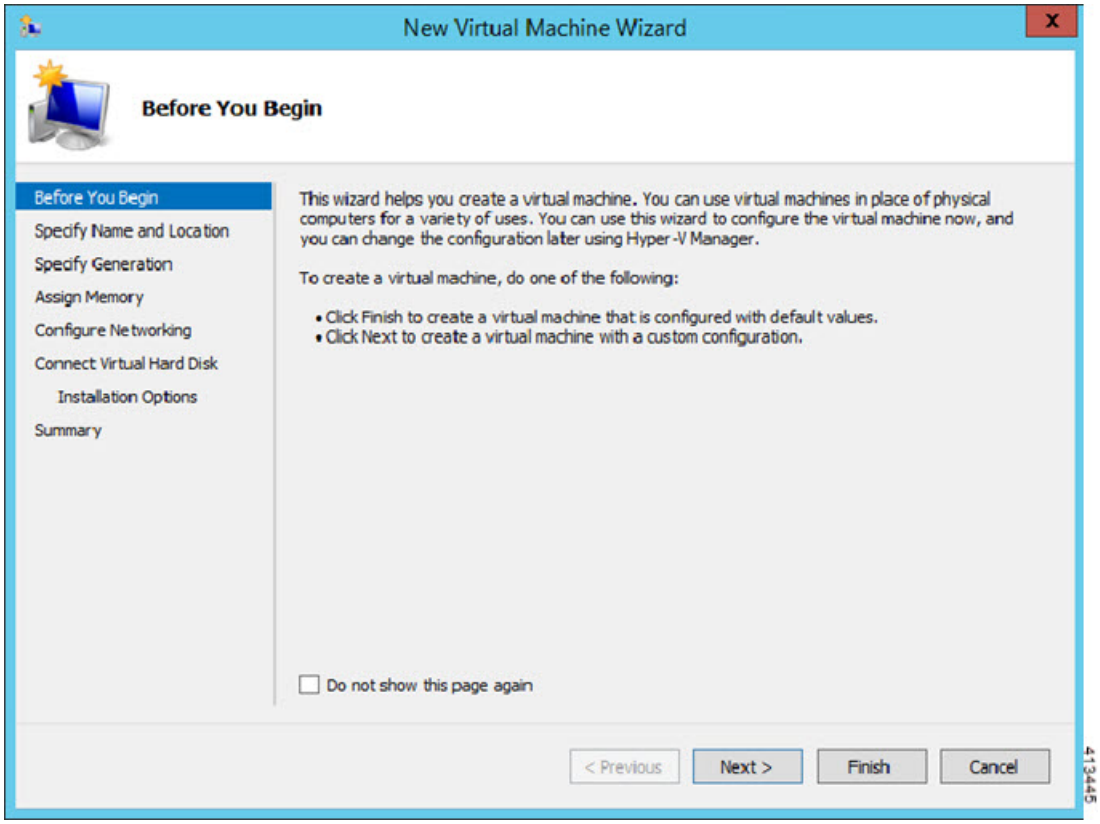
Step 3 From the list of hypervisors on the right, right-click the desired Hypervisor in the list and choose **New** > **Virtual Machine**.

Figure 5: Launch New Virtual Machine



Step 4 The New Virtual Machine Wizard appears.

Figure 6: New Virtual Machine Wizard



Step 5 Working through the wizard, specify the following information:

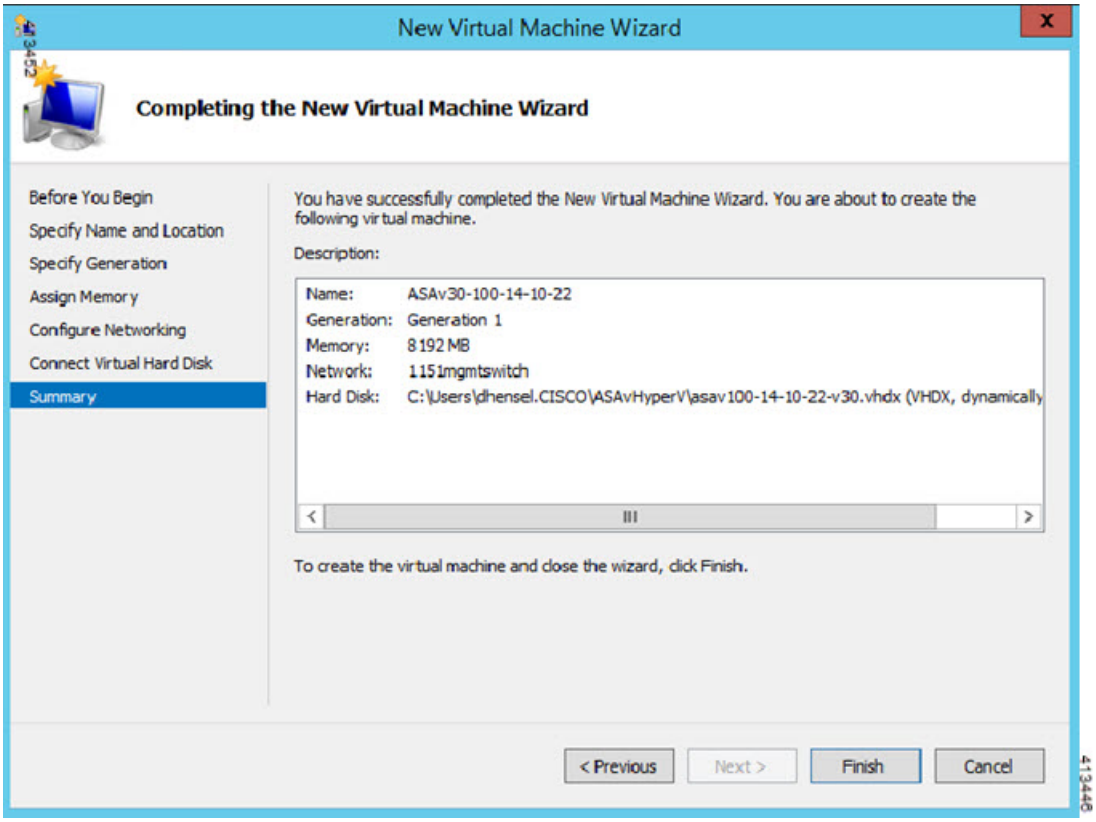
- Name and location of your ASA virtual
- Generation of your ASA virtual

  The only Generation supported for the ASA virtual is **Generation 1**.
- Amount of memory for your ASA virtual (1024 MB for 100Mbps, 2048 MB for 1Gbps, 8192 MB for 2Gbps)
- Network adapter (connect to the virtual switch you have already set up)
- Virtual hard disk and location

  Choose **Use an existing virtual hard disk** and browse to the location of your VHDX file.

Step 6 Click Finish and a dialog box appears showing your ASA virtual configuration.

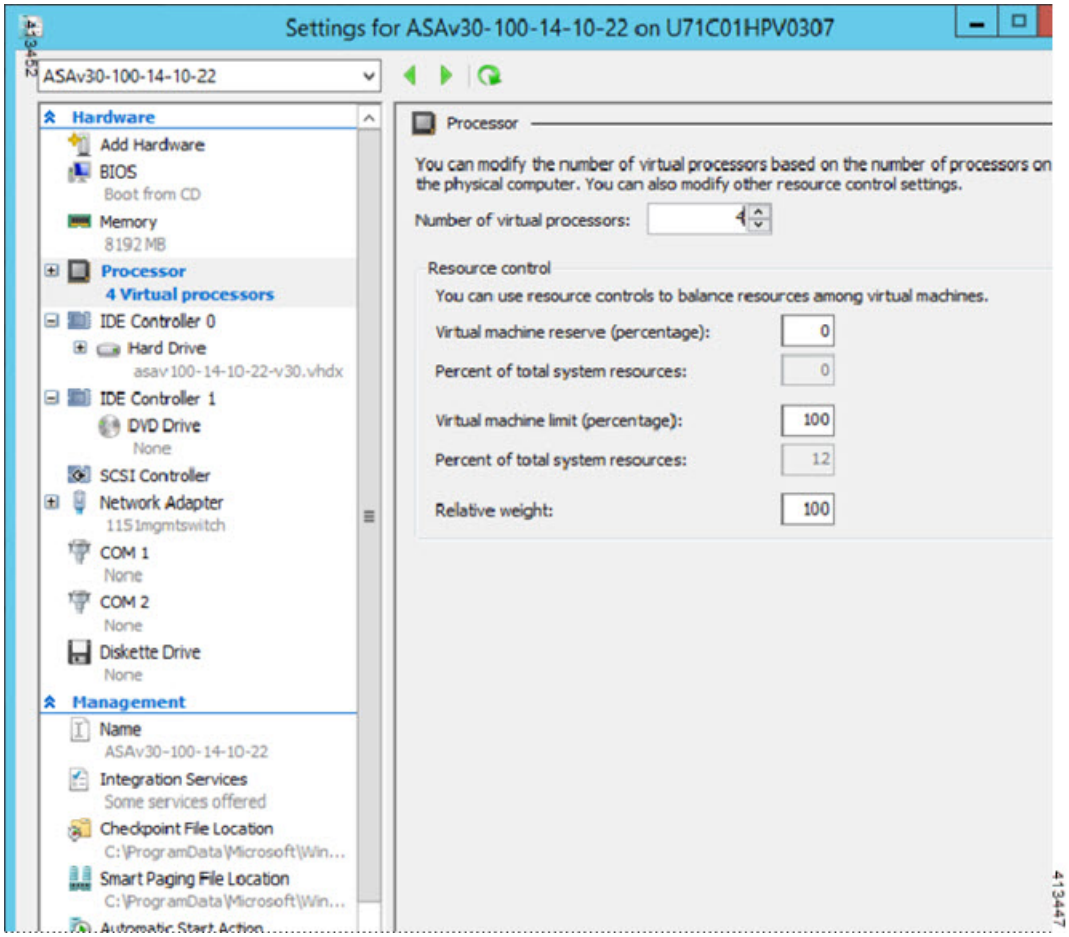
Figure 7: New Virtual Machine Summary



Step 7 If your ASA virtual has four vCPUs, you must modify the vCPU value before starting up your ASA virtual. Click **Settings** on the right side of the Hyper-V Manager. The Settings dialog box opens. Under the Hardware menu on the left, click **Processor** to get to the Processor pane. Change the **Number of virtual processors** to 4.

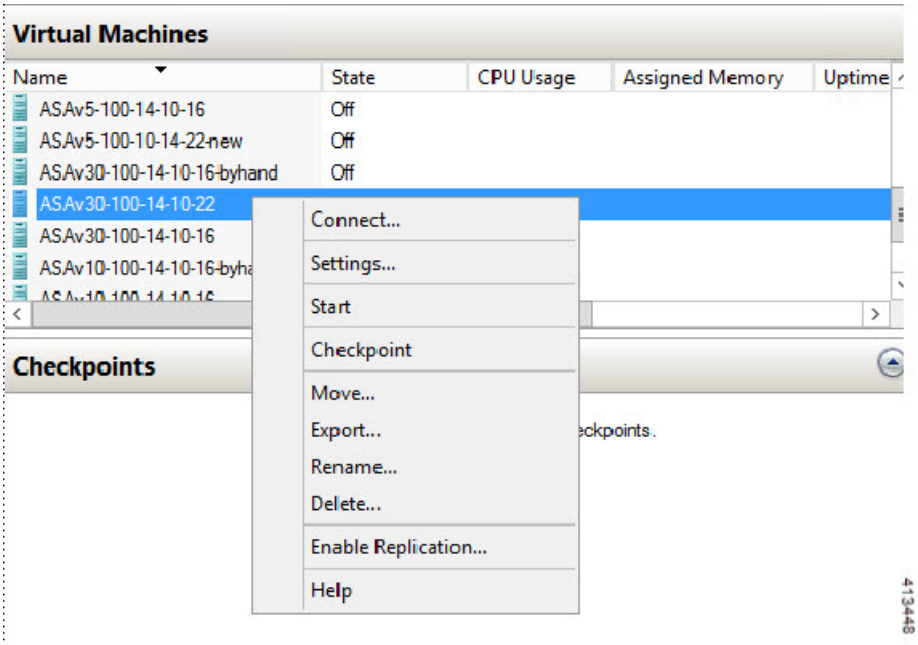
The 100Mbps and 1Gbps entitlements have one vCPU, and the 2Gbps entitlement has four vCPUs. The default is 1.

Figure 8: Virtual Machine Processor Settings



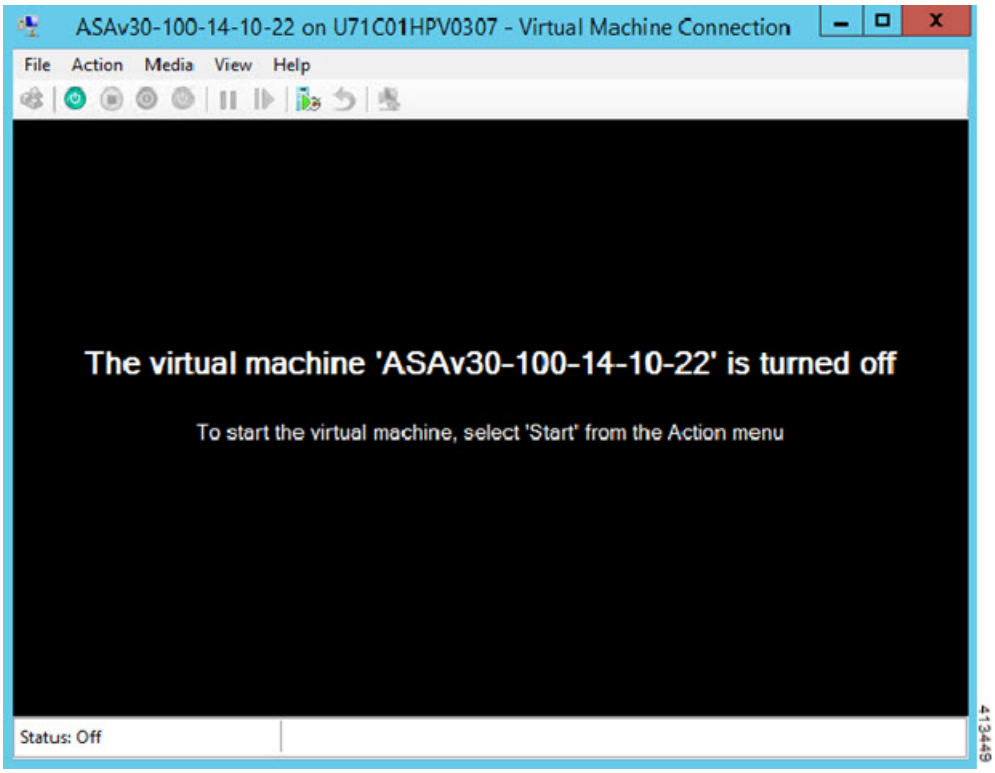
Step 8 In the Virtual Machines menu, connect to your ASA virtual by right-clicking on the name of the ASA virtual in the list and clicking **Connect**. The console opens with the stopped ASA virtual.

Figure 9: Connect to the Virtual Machine



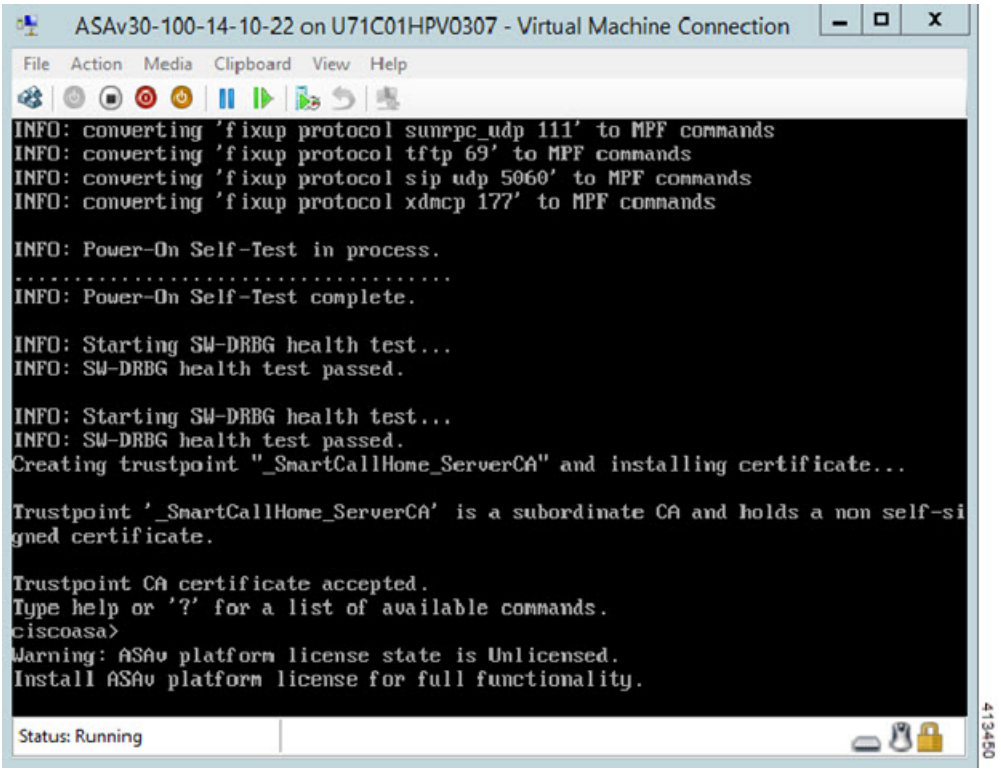
Step 9 In the Virtual Machine Connection console window, click the turquoise Start button to start the ASA virtual.

Figure 10: Start the Virtual Machine



Step 10 The boot progress of the ASA virtual is shown in the console.

Figure 11: Virtual Machine Boot Progress



Add a Network Adapter from the Hyper-V Manager

A newly deployed ASA virtual has only one network adapter. You need to add at least two more network adapters. In this example, we are adding the inside network adapter.

Before you begin

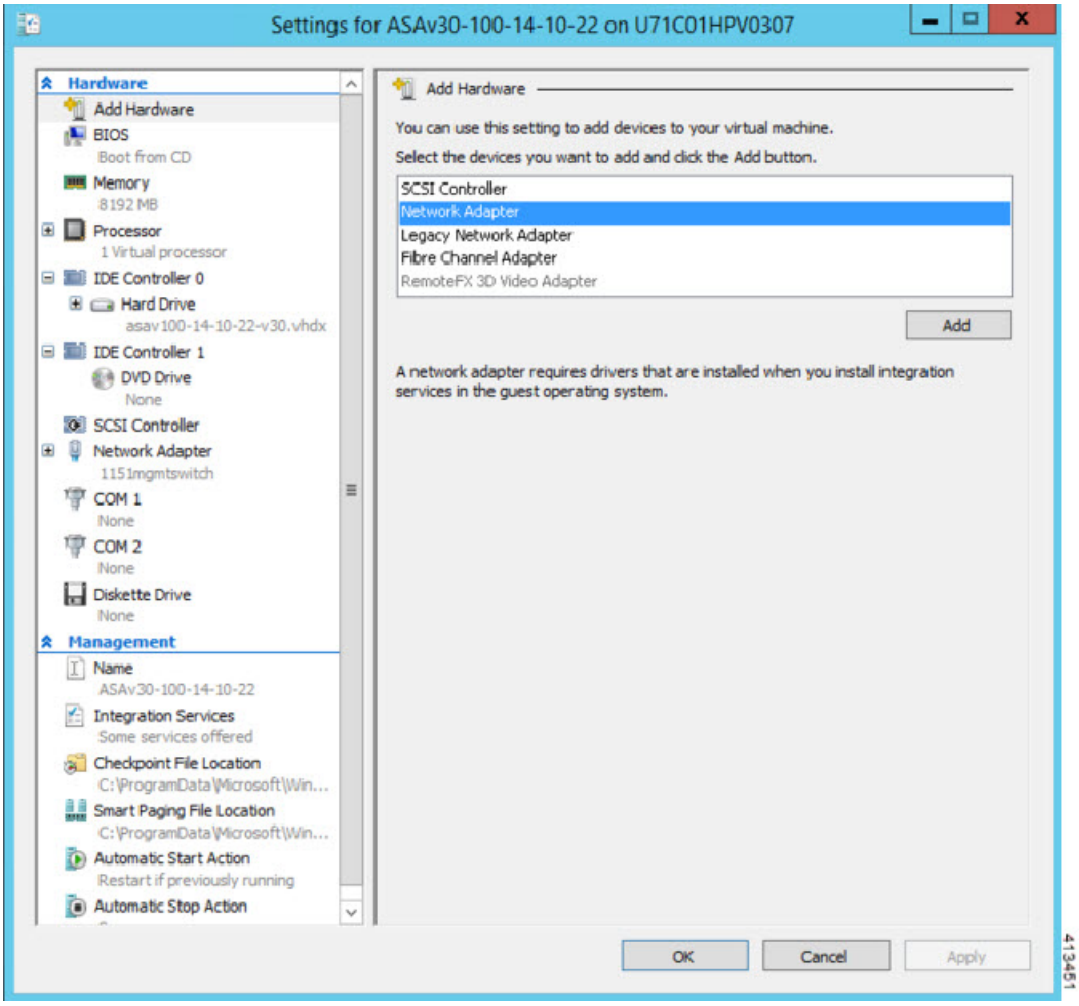
- The ASA virtual must be in the off state.

Procedure

Step 1 Click **Settings** on the right side of the Hyper-V Manager. The Settings dialog box opens. Under the Hardware menu on the left, click **Add Hardware**, and then click **Network Adapter**.

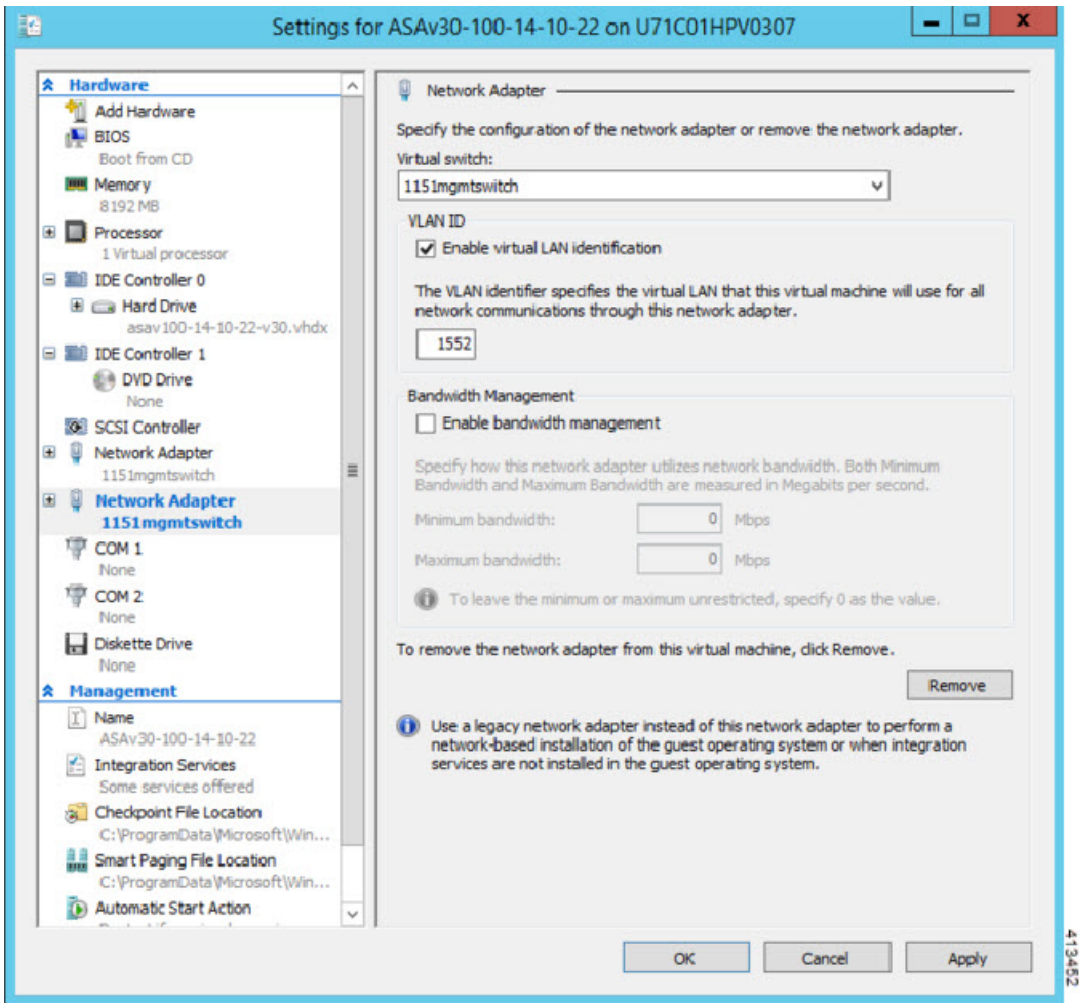
Note
Do NOT use the Legacy Network Adapter.

Figure 12: Add Network Adapter



Step 2 After the network adapter has been added, you can modify the virtual switch and other features. You can also set the VLAN ID here if needed.

Figure 13: Modify Network Adapter Settings



Modify the Network Adapter Name

In Hyper-V, a generic network interface name is used, 'Network Adapter.' This can be confusing if the network interfaces all have the same name. You cannot modify the name using the Hyper-V Manager. You must modify it using the Windows Powershell commands.

Procedure

Step 1 Open a Windows Powershell.

Step 2 Modify the network adapters as needed.

Example:

```
$NICRENAME= Get-VMNetworkAdapter -VMName 'ASAvVM' -Name "Network Adapter"
rename-VMNetworkAdapter -VMNetworkAdapter $NICRENAME[0] -newname inside
rename-VMNetworkAdapter -VMNetworkAdapter $NICRENAME[1] -newname outside
```

MAC Address Spoofing

For the ASA virtual to pass packets in transparent mode and for HA Active/Standby failover, you must turn on MAC address spoofing for ALL interfaces. You can do this in the Hyper-V Manager or using Powershell commands.

Configure MAC Address Spoofing Using the Hyper-V Manager

You can use the Hyper-V Manager to configure MAC spoofing on Hyper-V.

Procedure

Step 1 Go to **Server Manager** > **Tools** > **Hyper-V Manager**.

The Hyper-V Manager appears.

Step 2 Click **Settings** on the right side of the Hyper-V Manager to open the settings dialog box.

Step 3 Under the **Hardware** menu on the left:

a. Click **Inside** and expand the menu.

b. Click **Advanced Features** to get to the MAC address option.

c. Click the **Enable MAC address spoofing** radio button.

Step 4 Repeat for the Outside interface.

Configure MAC Address Spoofing Using the Command Line

You can use the the Windows Powershell command line to configure MAC spoofing on Hyper-V.

Procedure

Step 1 Open a Windows Powershell.

Step 2 Configure MAC address spoofing.

Example:

```
Set-VMNetworkAdapter -VMName $vm_name\
-ComputerName $computer_name -MacAddressSpoofing On\
-VMNetworkAdapterName $network_adapter\r"
```

Configure SSH

You can configure the ASA virtual for SSH access over the management interface from the Virtual Machine Connection in the Hyper-V Manager. If you are using a Day 0 configuration file, you can add SSH access to it. See Prepare the Day 0 Configuration File for more information.

Procedure

Step 1 Verify that the RSA key pair is present:

Example:

```
asav# show crypto key mypubkey rsa
```

Step 2 If there is no RSA key pair, generate the RSA key pair:

Example:

```
asav(conf t)# crypto key generate rsa modulus 2048

username test password test123 privilege 15
aaa authentication ssh console LOCAL
ssh 10.7.24.0 255.255.255.0 management
ssh version 2
```

Step 3 Verify that you can access the ASA virtual using SSH from another PC.

CPU Usage and Reporting

The CPU Utilization report summarizes the percentage of the CPU used within the time specified. Typically, the Core operates on approximately 30 to 40 percent of total CPU capacity during nonpeak hours and approximately 60 to 70 percent capacity during peak hours.

vCPU Usage in the ASA Virtual

The ASA virtual vCPU usage shows the amount of vCPUs used for the data path, control point, and external processes.

The Hyper-V reported vCPU usage includes the ASA virtual usage as described plus:

- ASA Virtual idle time
- %SYS overhead used for the ASA virtual machine

CPU Usage Example

The **show cpu usage** command can be used to display CPU utilization statistics.

Example

```
Ciscoasa#show cpu usage

CPU utilization for 5 seconds = 1%; 1 minute: 2%; 5 minutes: 1%
```

The following is an example in which the reported vCPU usage is substantially different:

- ASA Virtual reports: 40%
- DP: 35%
- External Processes: 5%
- ASA (as ASA Virtual reports): 40%
- ASA idle polling: 10%
- Overhead: 45%