Lesson 9: Creating and Configuring Virtual Networks

MOAC 70-410: Installing and Configuring Windows Server 2012

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Overview

- Exam Objective 3.3: Create and Configure Virtual Networks

- Virtual Networking

- Creating Virtual Switches

Virtual Networking

Lesson 9: Creating and Configuring Virtual Networks

Virtual Networking

- Virtual networking components are used in place of physical ones in a virtual environment, such as:
  - Virtual network adapters
  - Virtual switches
- Allows you to connect to virtual and physical environments
- Hyper-V allows you to create multiple switches and adapters to provide a flexible networking environment

Creating Virtual Switches

Lesson 9: Creating and Configuring Virtual Networks

Creating Virtual Switches

- A switch has a series of ports, each of which is connected to a computer's network interface adapter. Any computer connected to the switch can transmit data to any other computer connected to the same switch.

- Virtual switches created by Hyper-V can have an unlimited number of ports, so administrators don't have to be concerned about connecting switches together or about uplinks and crossover circuits.

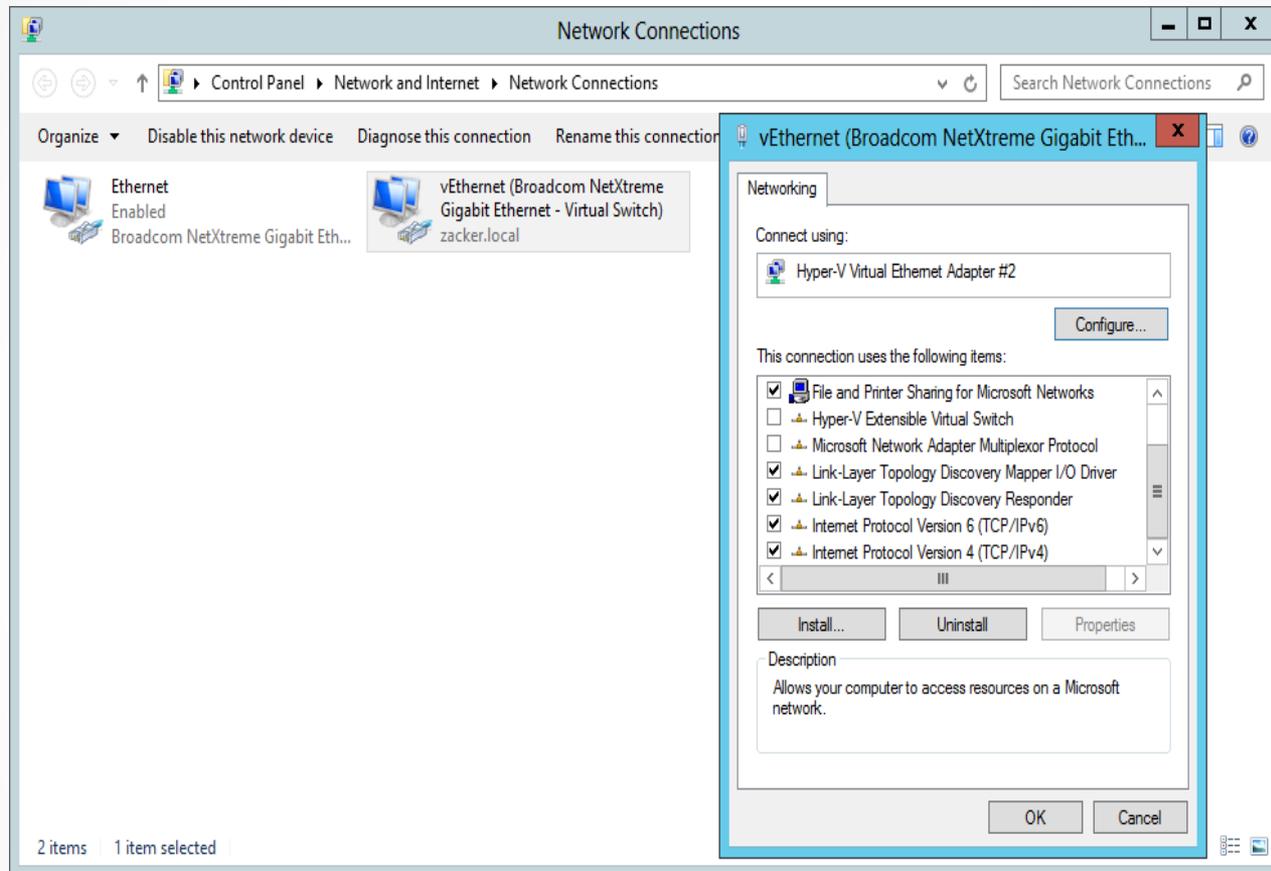# Creating the Default Virtual Switch

- Hyper-V provides you with the opportunity to create a virtual switch for each of the physical network adapters installed in the host computer. These switches enable virtual machines to participate on the networks to which the physical adapters are connected.

- When you create a virtual switch, the networking configuration in the host operating system on the parent partition changes:

  o The new virtual switch appears in the Network Connections window, and if you examine its properties, you can see that the switch is bound to the operating system's TCP/IP client.
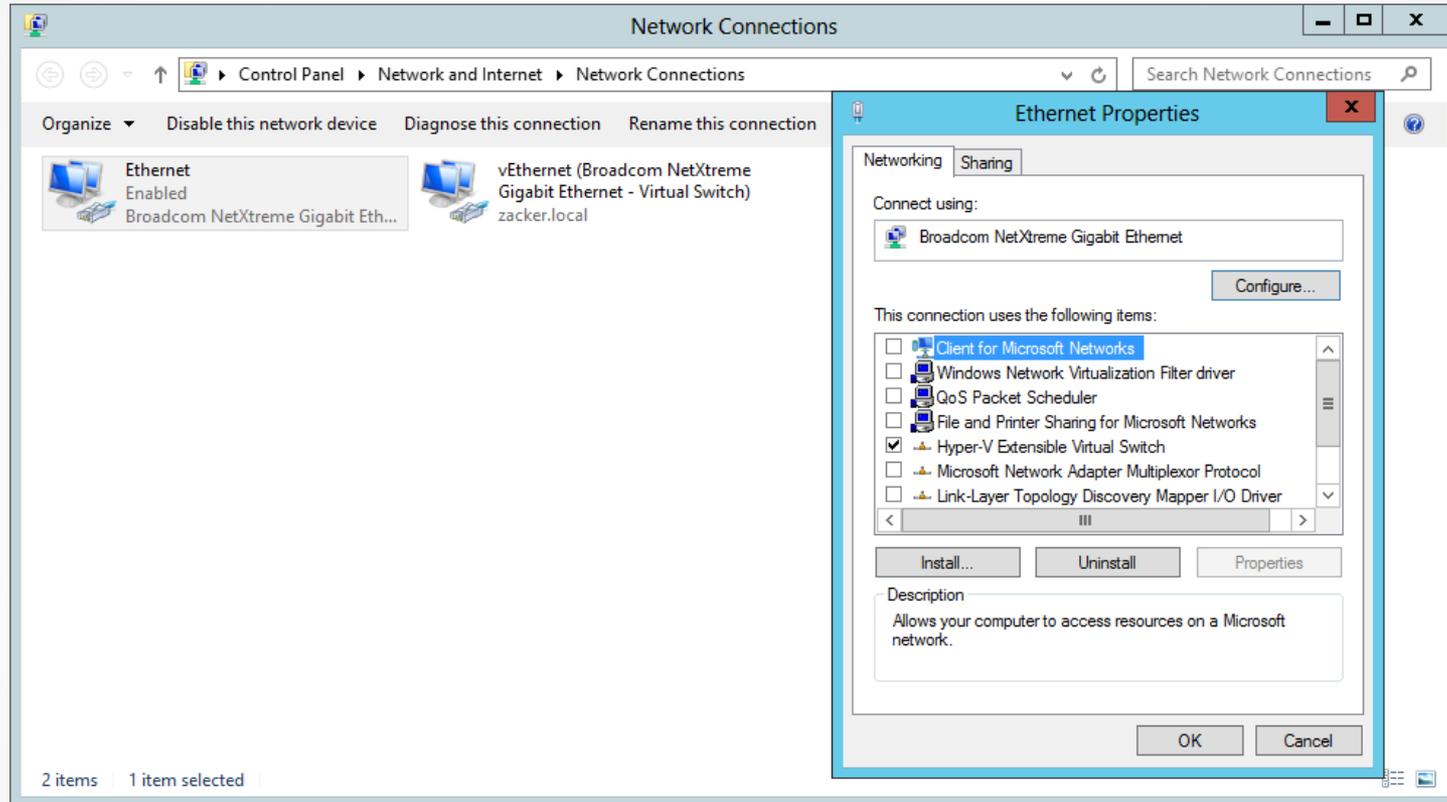
Creating the Default Switch
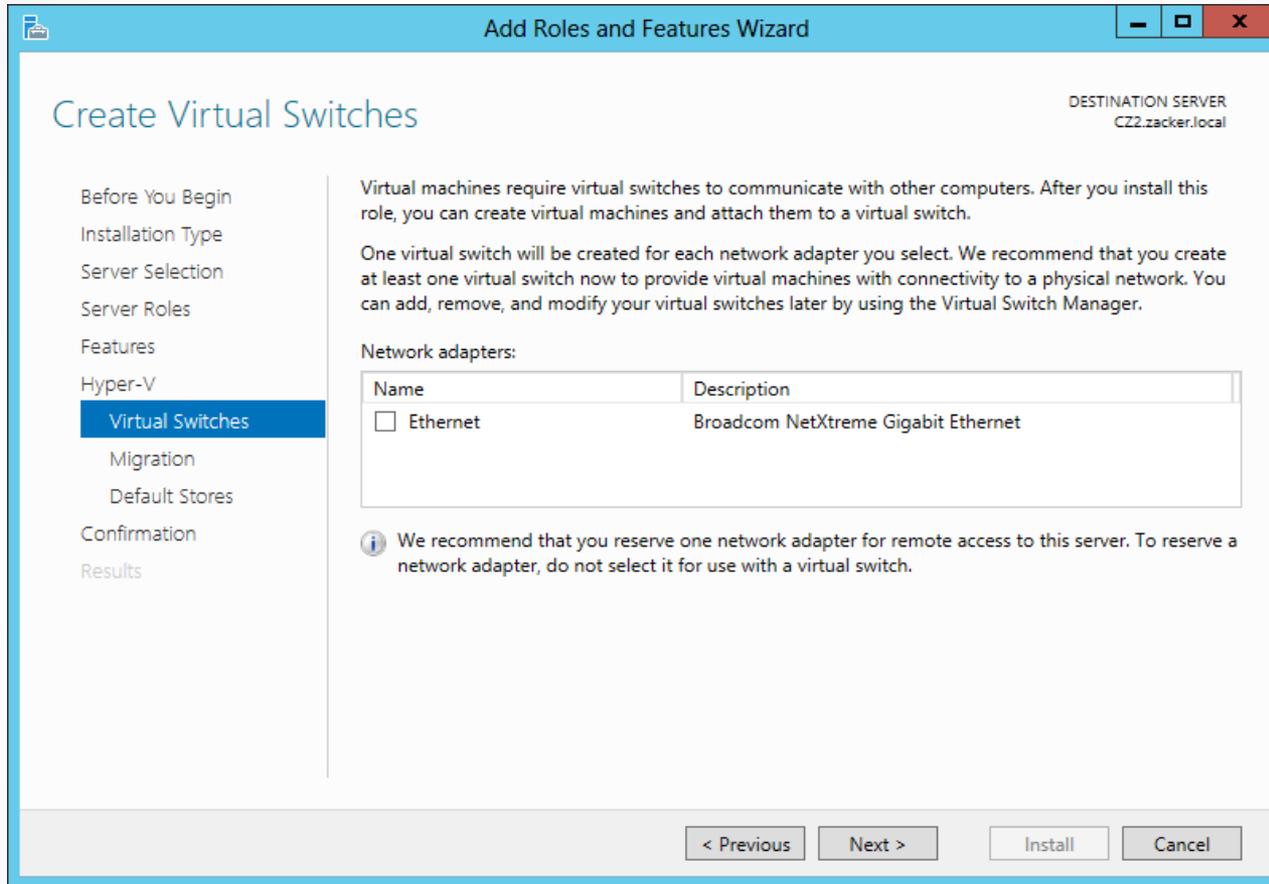
The Create Virtual Switches page, displayed during a Hyper-V role installation

Creating the Default Virtual Switch

A virtual switch and its properties, displayed in the host operating system

Creating the Default Virtual Switch

A network interface adapter in the host operating system, bound to a virtual switch
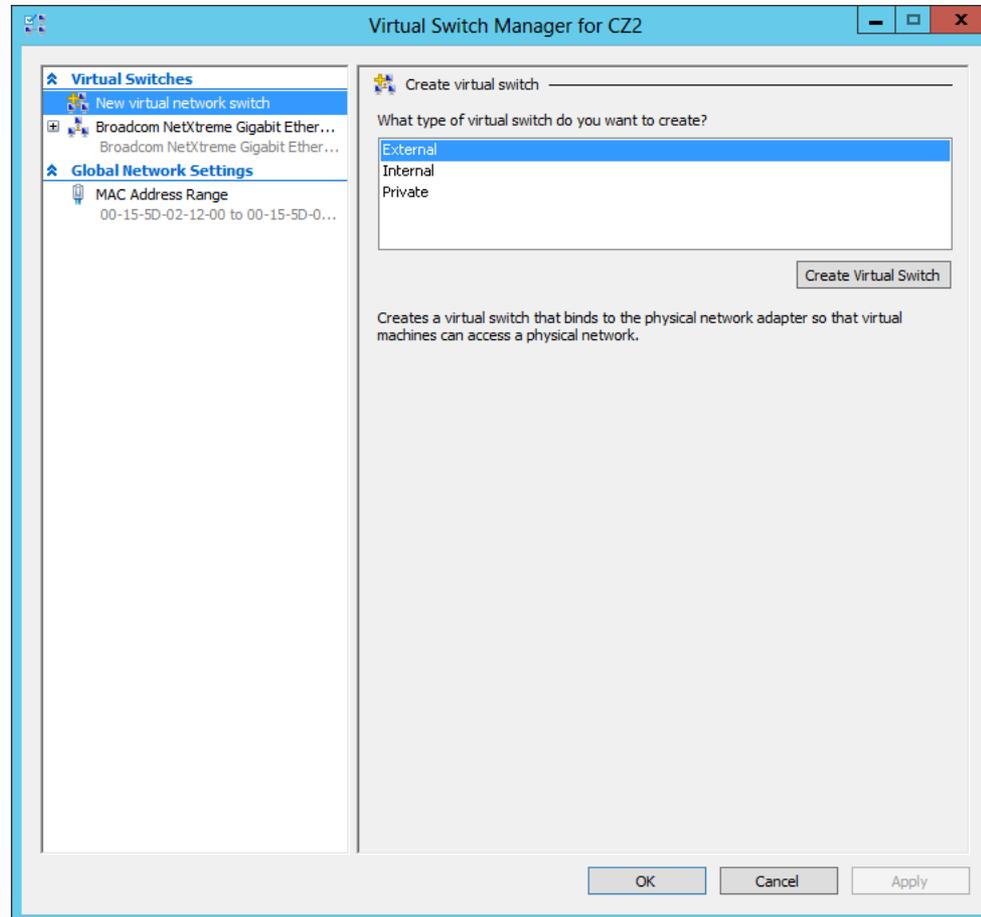
The Default Virtual Switch

- An external network switch provides connections external to the Hyper-V environment

- The virtual network configuration overlays the physical network configuration

- The virtual switch is connected to the physical switch and the network adapter in the host computer is connected to the virtual switch

- It is the same as connecting two physical switches together

Creating a New Virtual Switch

There are three types of switches that you can create in the Virtual Switch Manager:

- **External:** Bound to networking protocol stack in the host OS and connected to a physical network interface adapter in the Hyper-V server. Virtual machines running on the server's parent and child partitions can all access the physical network to which the physical adapter is connected.

- **Internal:** Bound to a separate instance of the networking protocol stack in the host OS, independent from the physical network interface adapter and its connected network. The virtual machines on the child partitions cannot access the physical network through the physical adapter.

- **Private:** Exists only in the Hyper-V server and is accessible only to the virtual machines running on the child partitions.

Create a New Virtual Switch

The Virtual Switch Manager dialog box
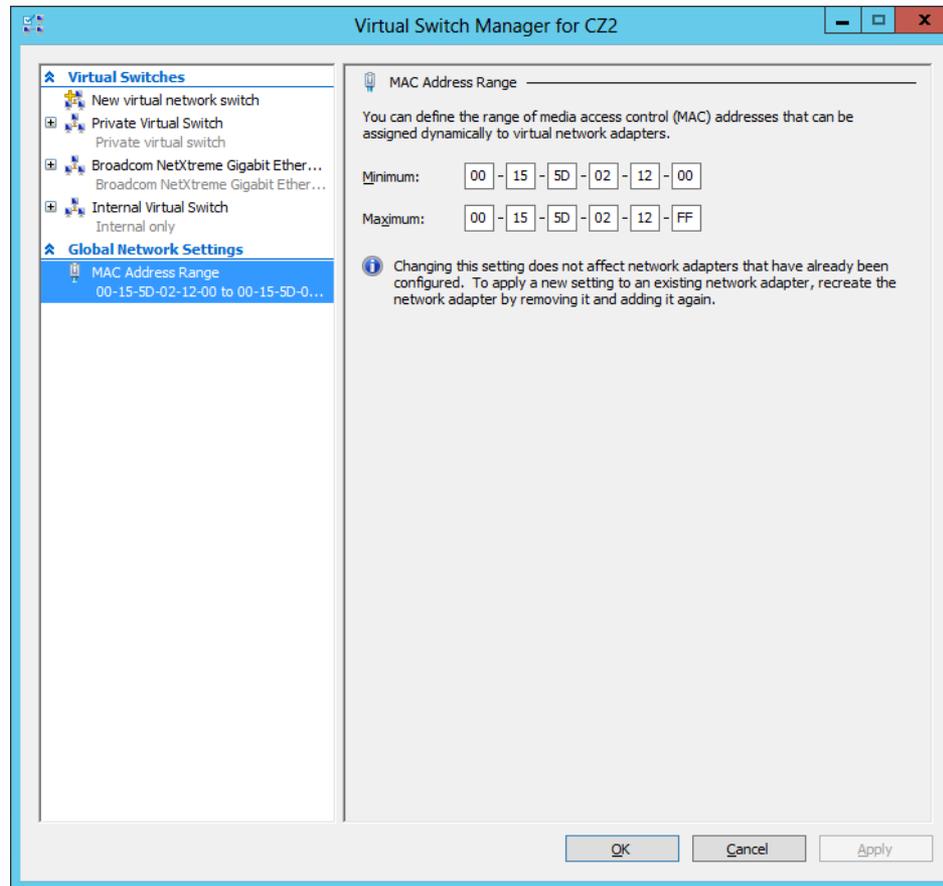
Create a New Virtual Switch
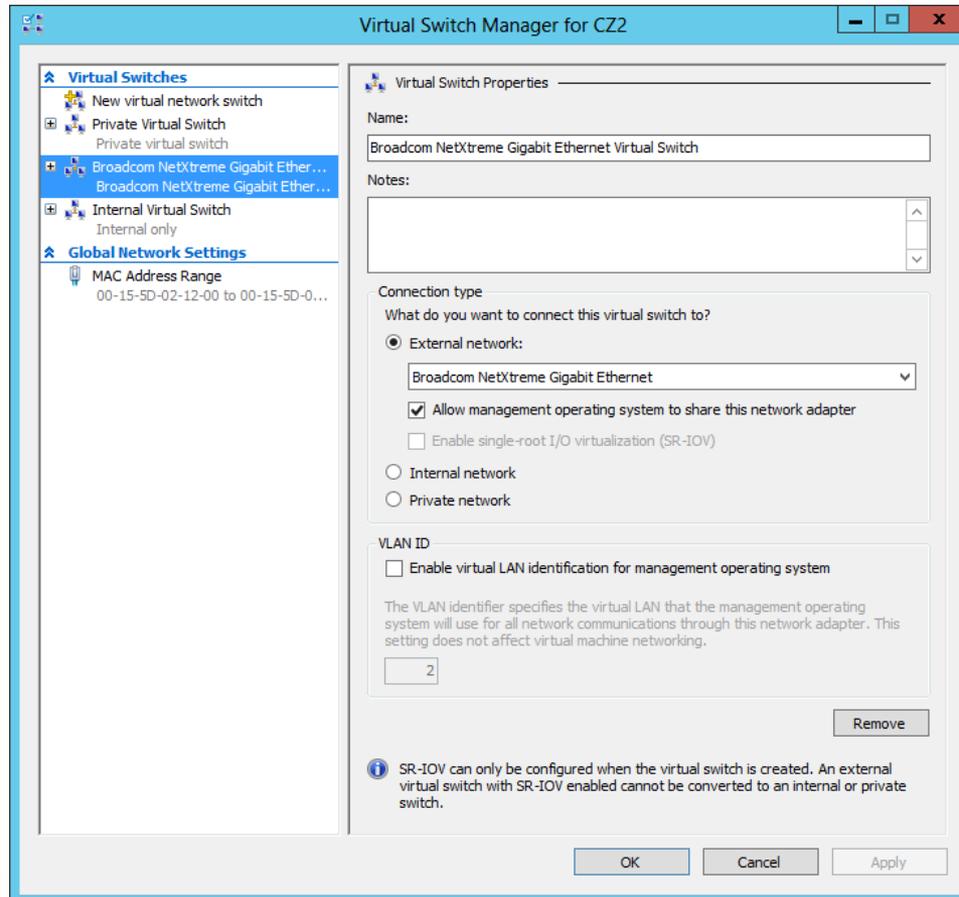
The Virtual Switch Properties page

Configuring MAC Addresses

- Every network interface has a Media Access Control (MAC) address that uniquely identifies the device on the network.

- On physical network adapters, the MAC address is assigned by the manufacturer.

- Hyper-V has a pool of 256 addresses to assign to VMs as you create them.
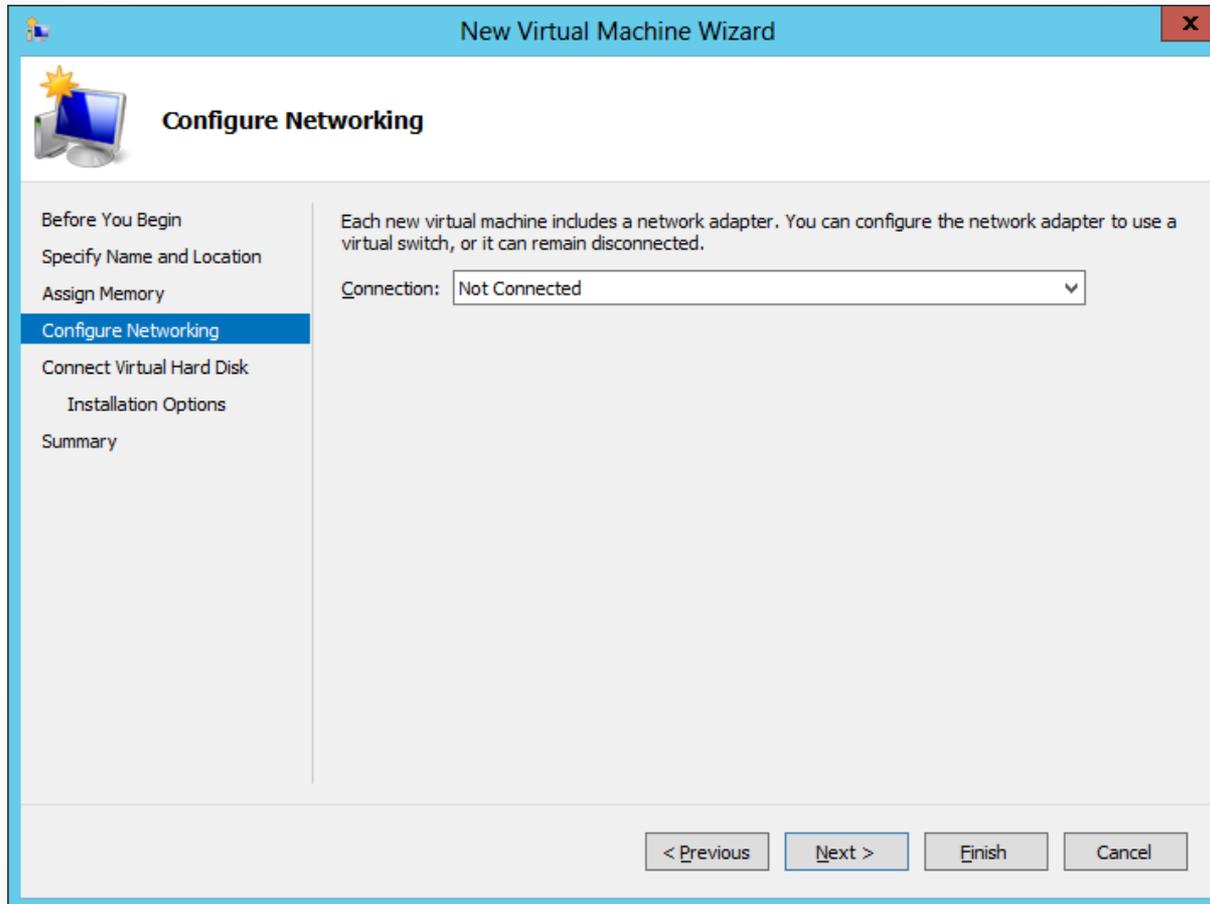
Configuring MAC Addresses

The MAC Address Range in the Virtual Switch Manager
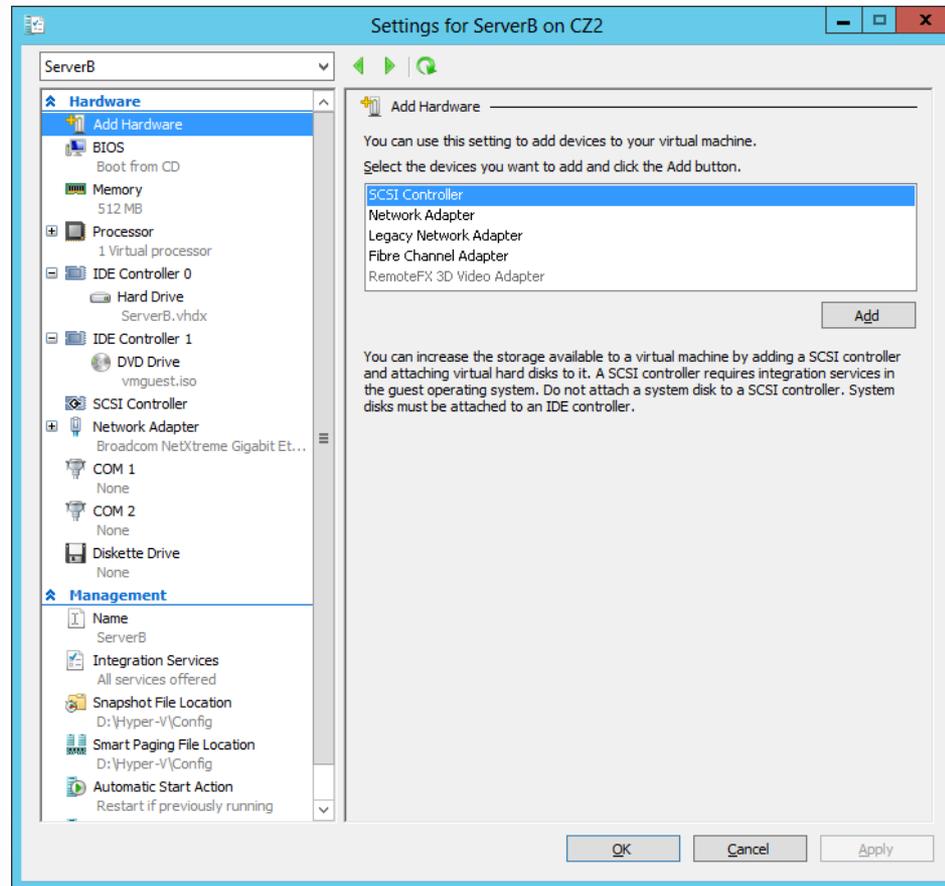
Creating Virtual Network Adapters

Once you have created virtual switches in Hyper-V Manager, you can connect virtual machines to them by creating and configuring virtual network adapters.
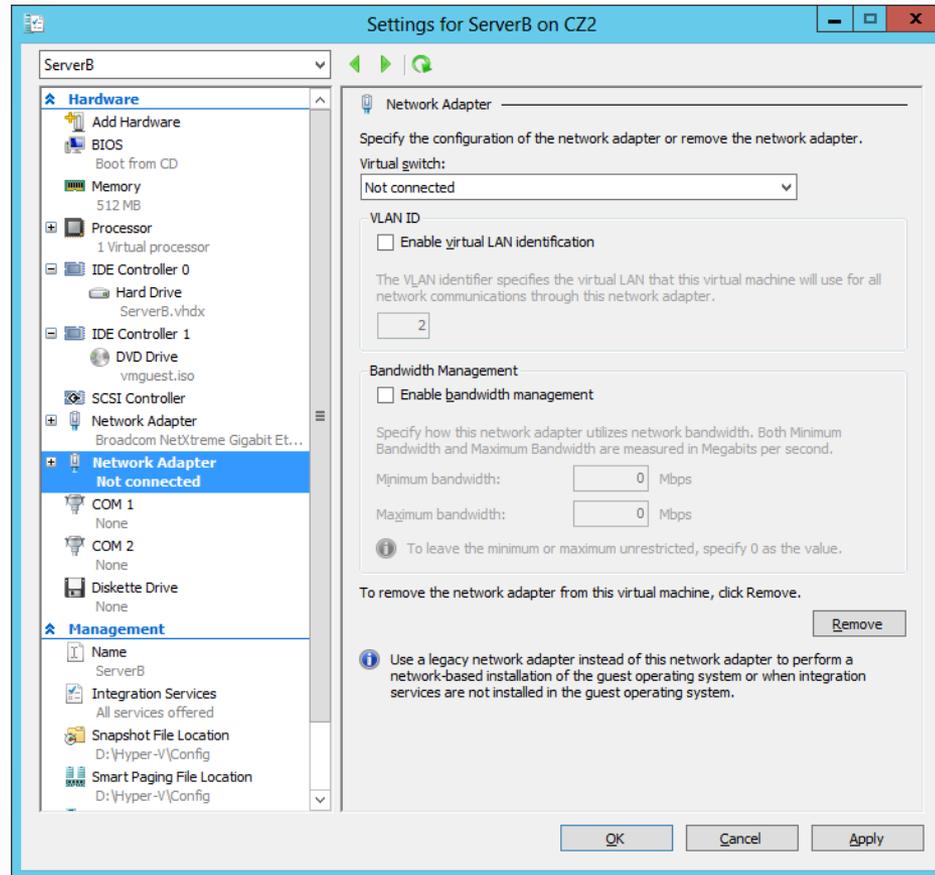
Creating Virtual Network Adapters

The Configure Networking page in the New Virtual Machine Wizard

Create a Virtual Network Adapter

A virtual machine's Settings dialog box

Create a Virtual Network Adapter

A new network adapter in the Settings dialog box

Synthetic Adapters and Emulated Adapters

- **Synthetic adapter**
  - A purely virtual device that does not correspond to a real-world product.
  - Synthetic devices in a virtual machine running on a child partition communicate with the parent partition using a high-speed conduit called the **VMBus**.
- **Emulated adapter** (or a **legacy adapter**)
  - A standard network adapter driver that communicates with the parent partition by making calls directly to the hypervisor, which is external to the partitions, and is substantially slower.

Synthetic Adapters and Emulated Adapters
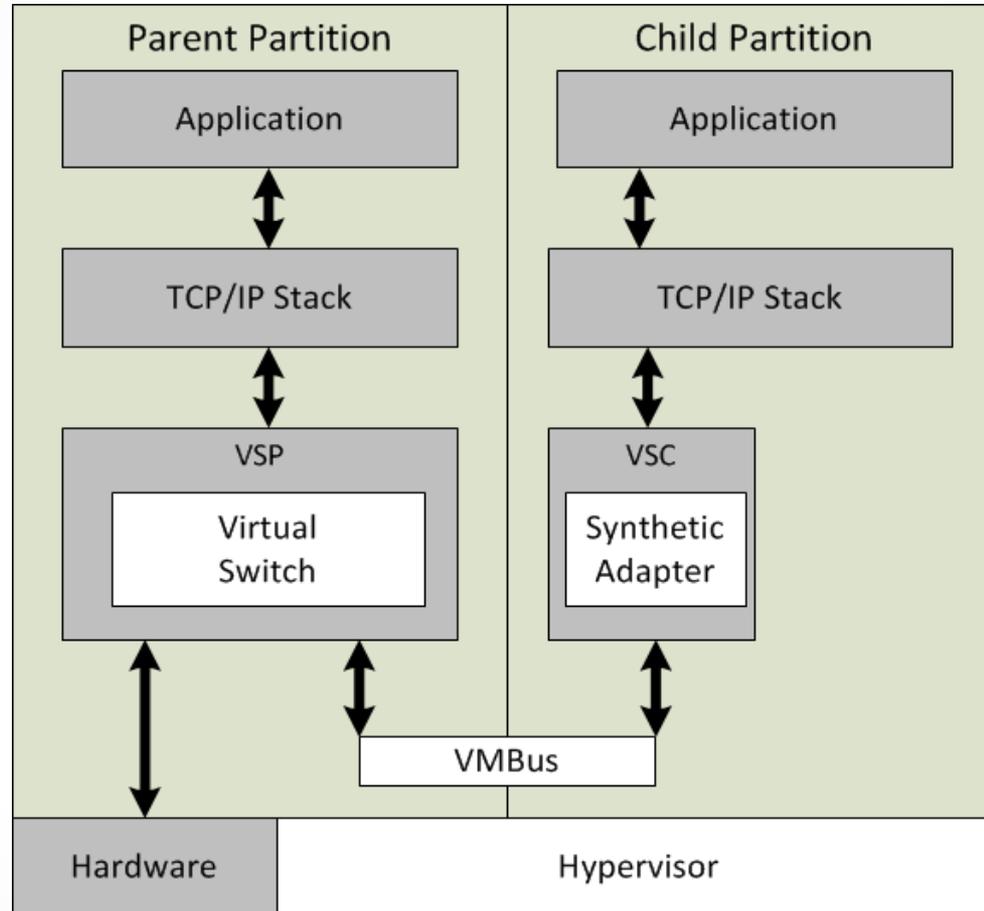
Synthetic network adapters communicate using the VMBus

# Synthetic Adapters and Emulated Adapters
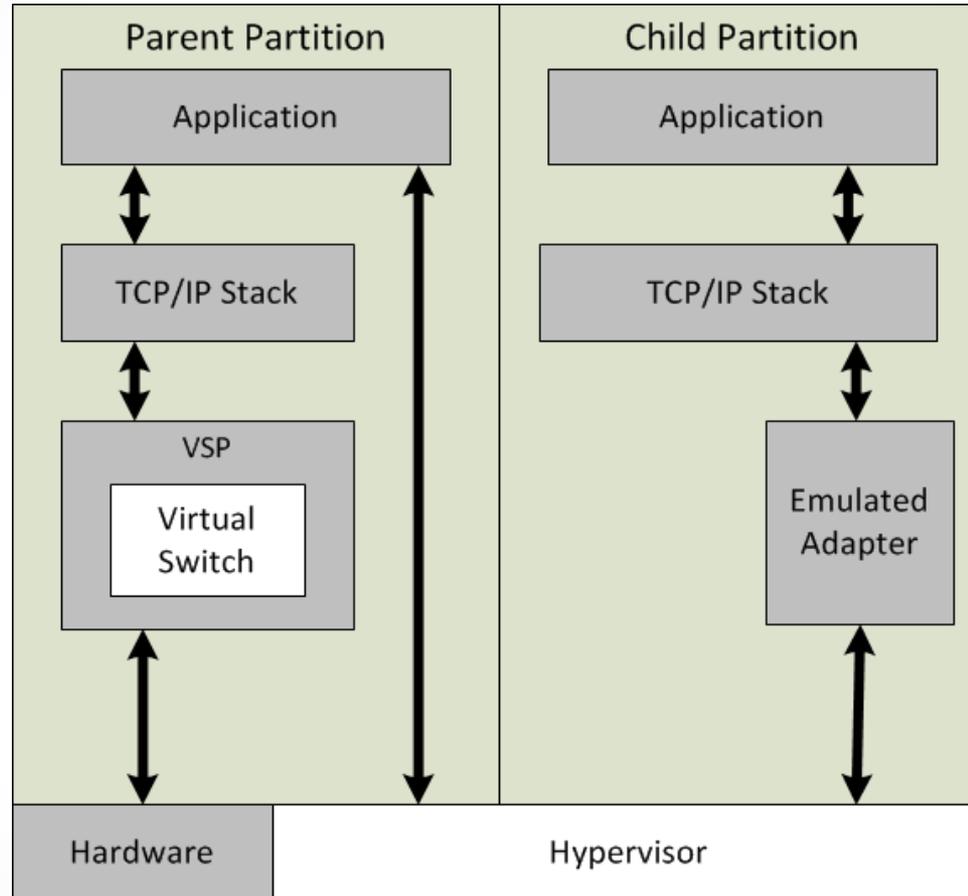
Emulated network adapters communicate using the hypervisor

Configuring Hardware Acceleration Settings

You can configure the following hardware acceleration settings if your network interface adapters supports them:

- **Enable virtual machine queue (VMQ)**: Stores incoming packets intended for VMs in separate queues on the physical network adapter, and delivers them directly to the VMs, bypassing the processing normally performed by the virtual switch on the parent partition.

- **Enable IPsec task offloading**: Uses the components on the network adapter to perform some of the cryptographic functions required by IPsec.

- **Single-root I/O virtualization**: Enables the virtual adapter to take advantage of the SR-IOV capabilities of the physical adapter.

Configuring Hardware Acceleration Settings
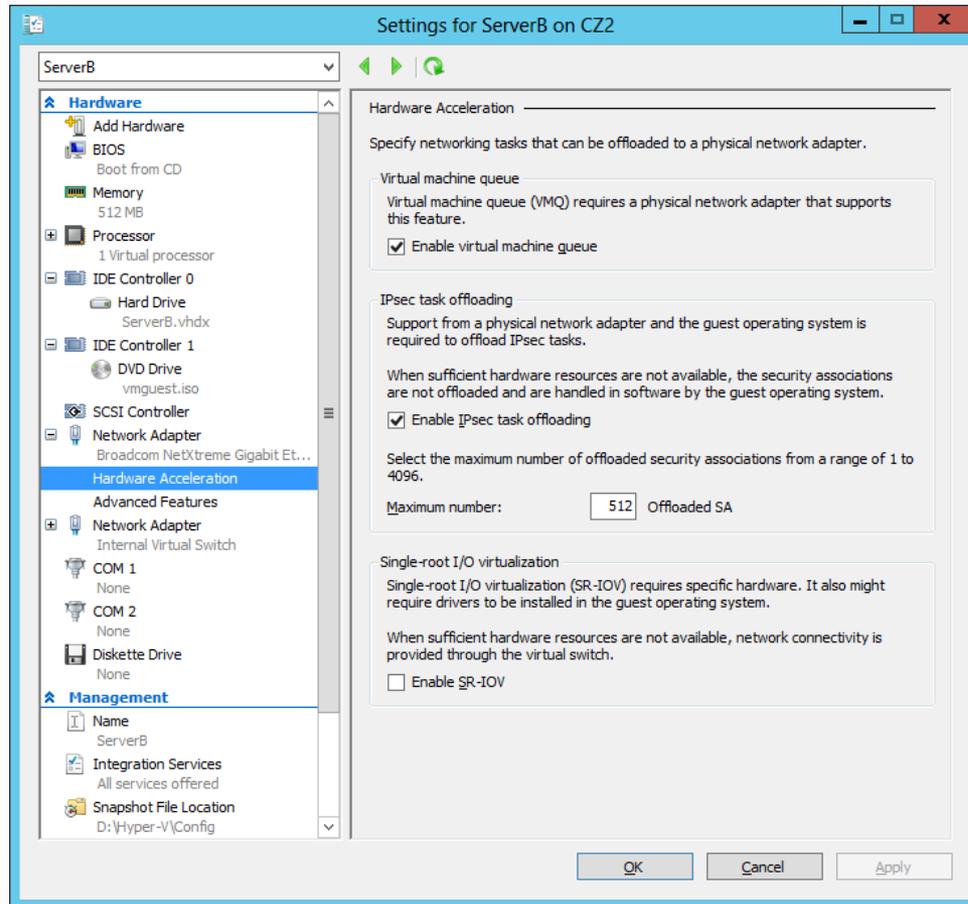
The Network Adapter Hardware Acceleration page in the Settings dialog box

Configuring Advanced Network Adapter Features
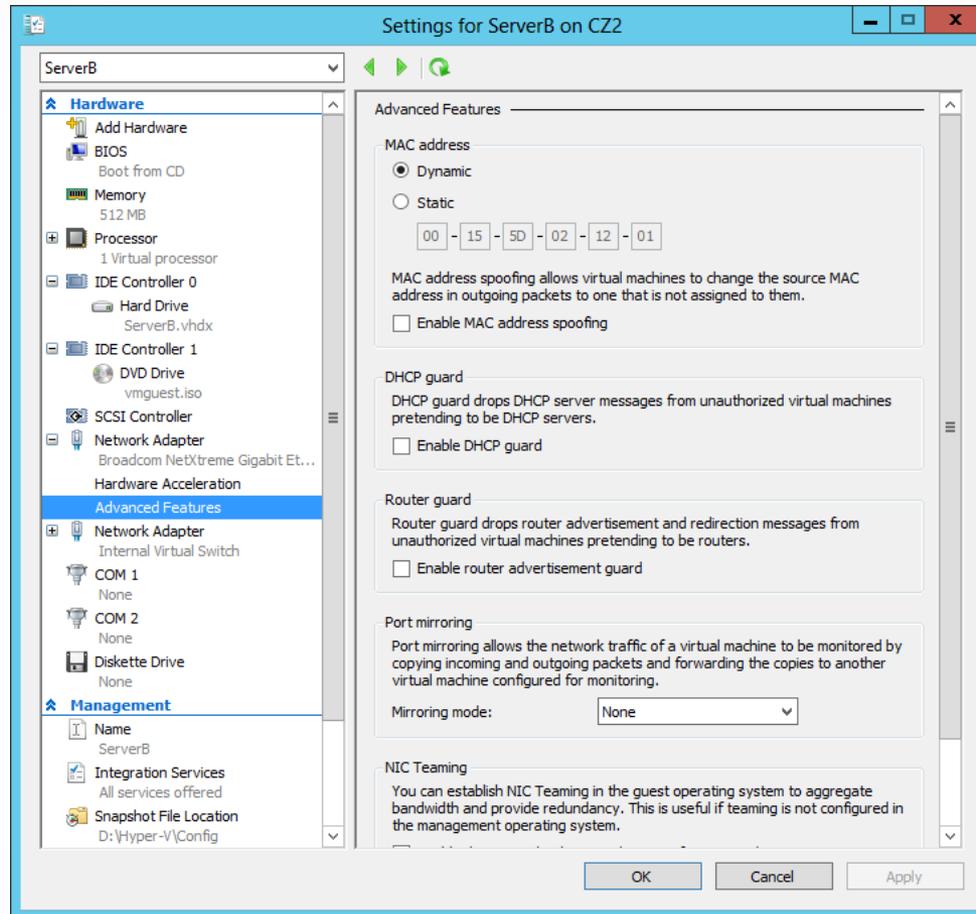
The Network Adapter Advanced Features page in the Settings dialog box

Creating Virtual Network Configurations

Hyper-V makes it possible to

- Extend virtually any existing physical network configuration into its virtual space, or

- Create a completely separated and isolated network within the Hyper-V environment.

Extending a Production Network into Virtual Space

- Microsoft recommends the use of at least 2 physical network adapters in a Hyper-V server, with 1 adapter servicing the parent partition, and the other connected to the child partitions.

- When you have more than 2 physical adapters in the server, you can create separate external virtual network switches for the physical adapters, and connect each one to a separate VM.

Creating an Isolated Network

- By creating internal or private virtual switches, you can create a network that exists only within the Hyper-V space, with or without the parent partition included.

- Excellent for testing and evaluation purposes, or for classroom situations.

- You can also use VLANs to create isolated networks.

Lesson Summary

- Networking is a critical part of creating a virtual machine infrastructure. Depending on your network plan, the virtual machines you create on a Windows Server 2012 Hyper-V server can require communication with other virtual machines, with the computers on your physical network, and/or with the Internet.

- A virtual switch, like its physical counterpart, is a device that functions at layer 2 of the Open Systems Interconnect (OSI) reference model. A switch has a series of ports, each of which is connected to a computer's network interface adapter. Any computer connected to the switch can transmit data to any other computer connected to the same switch.

- Hyper-V in Windows Server 2012 supports three types of switches: external, internal, and private, which you must create in the virtual Switch Manager before you can connect virtual machines to them.

Lesson Summary

- Every network interface adapter has a Media Access Control (MAC) address (sometimes called a hardware address) that uniquely identifies the device on the network.

- Once you have created virtual switches in Hyper-V Manager, you can connect virtual machines to them by creating and configuring virtual network adapters.

- Selecting the Network Adapter option in the Add Hardware page creates what is known in Hyper-V terminology as a synthetic network adapter. Hyper-V supports two types of network and storage adapters: synthetic and emulated (sometimes called legacy).

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