5

NETWORK TOPOLOGIES

PROJECTS

Project 5.1	Understanding Key Concepts
Overview	Part of each network's design is its topology. Understanding the role of topology, as well as wired and wireless topologies, you might encounter is important. Understanding the role of topology also includes terms related to OSI layer 2 communication technologies. Because term definitions can sometimes vary on the context in which they are used, being able to recognize terms and how they are used in the context of network topologies is also important.
Outcomes	After completing this project, you will know how to: ▲ identify key terms and concepts related to networking topologies
What you'll need	To complete this project, you will need: ▲ the following worksheet
Completion time	20 minutes
Precautions	None

The worksheet includes a list of networking terms on the left and descriptions on the right. Match each term with the description that it most closely matches. You will *not* use all descriptions. Each description can be used only once.

___	10Base2	A. Network device that can be used to connect two cable segments as a single network segment
___	10BaseT	B. Physical topology in which all devices connect to one central point
___	Coax	C. Access method in which access is managed by means of a rotating token
___	Bus	D. Star topology Ethernet network wired with twisted pair cable
___	Ring	E. Bus topology transmission error that occurs when two or more computers try to transmit at the same time
___	Star	F. Network device that amplifies the network signal to extend network range
___	Collision	G. The physical topology used when implementing a 10Base2 network
___	FDDI	H. Network device used to join network segments

___	IEEE 802.5	I. Cable with a central conductive core surrounded by a dielectric, shield, and insulator
___	IEEE 802.11g	J. Central connection device for a Token Ring network wired as a physical star
___	MAU	K. Bus topology Ethernet network using Thicknet cable
___	Hub	L. Bus topology Ethernet network using Thinnet cable
___	Repeater	M. Fiber-optic dual-ring networking scheme
___	Bridge	N. Physical topology in which devices connect in a circular loop
____	Router	O. Current wireless networking standard
		P. Central connection device for an Ethernet network wired as a physical star

Project 5.2	Recognizing Physical Topologies
Overview	An important part of any network design is the network topology. In modern networks, the network topology can be either a wired or wireless topology. The physical topology can usually be determined through simple observation by looking at the cable and connection devices used.
	As part of documenting a network, you need to be able to draw simple network topologies and to recognize network sketches. During this project you are presented with a series of sketches. You need to identify the topology.
Outcomes	After completing this project, you will know how to:
	▲ recognize physical network topology
What you'll need	To complete this project, you will need:
	▲ the following worksheet
Completion time	10 minutes
Precautions	None

For each of the following figures, identify the topology as bus, ring, star, mesh, or ad hoc. You will use each network type.
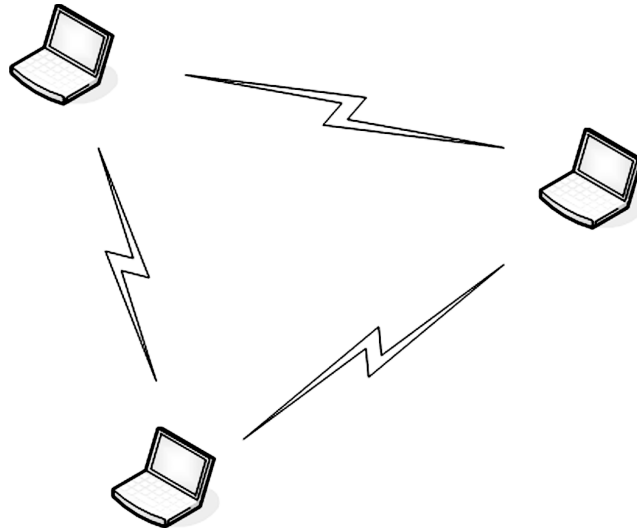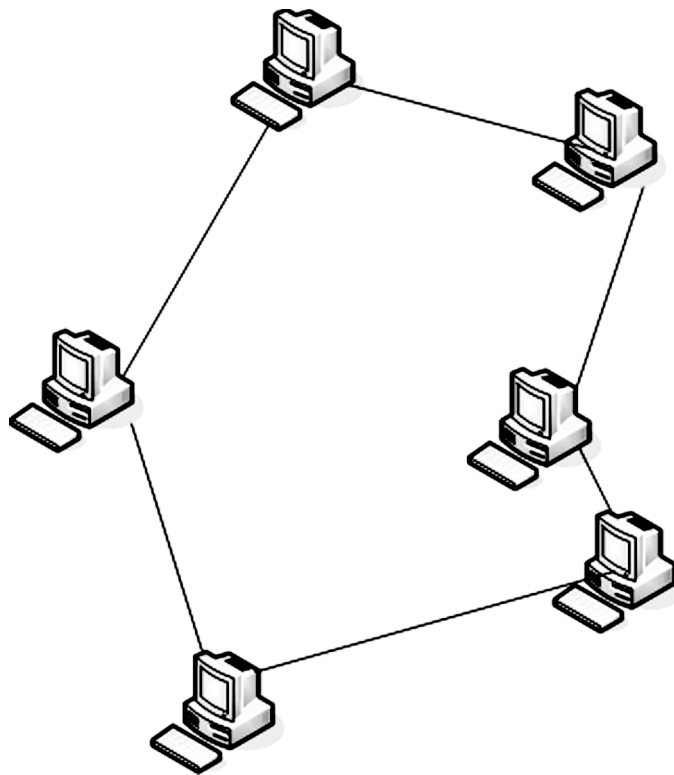

Figure 5-1: Topology #1
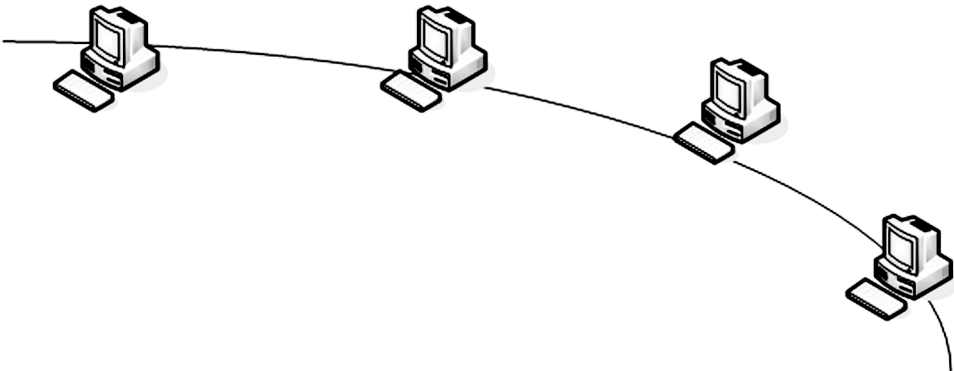
1. _____

Figure 5-2: Topology #2

2. _____

Figure 5-3: Topology #3

3. _____
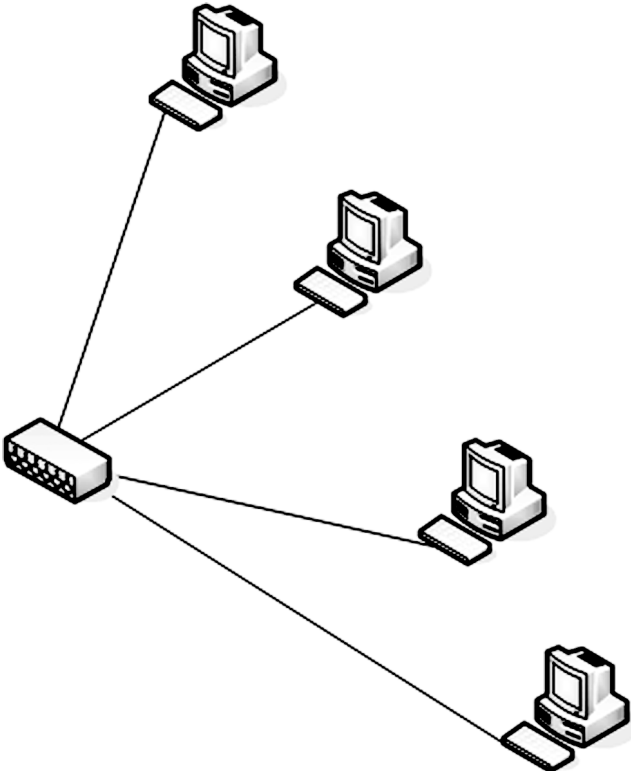
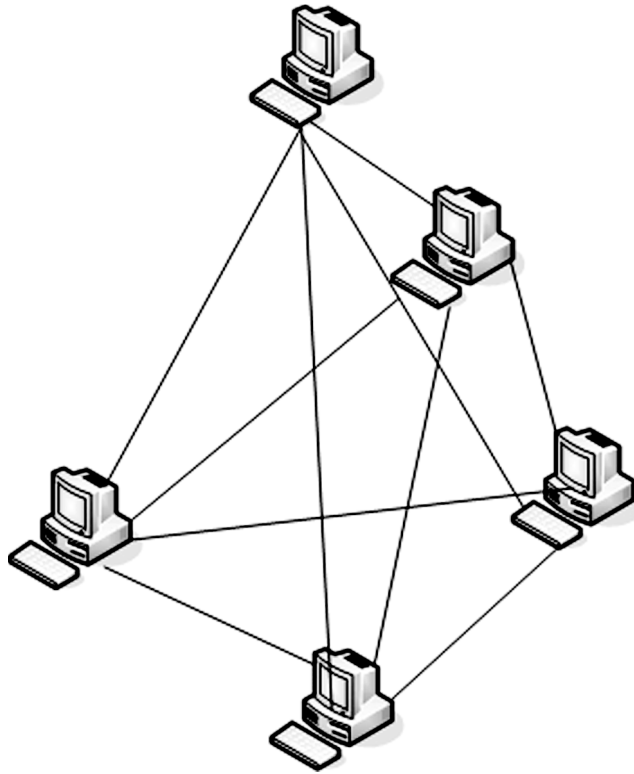**Figure 5-4: Topology #4**

4. _____

Figure 5-5: Topology #5

5. _____

Project 5.3	Recognizing Logical Topologies
Overview	Logical topologies can be more difficult to identify than physical topologies. A **logical topology** looks like one type of topology but works like another. In most cases, the network is wired as a physical star, but operates as either a logical bus or a logical ring. The two most common logical networks are Ethernet and Token Ring networks that are wired as a physical star. Both cases have similarities—the star is formed using central connection devices, and connections to the computers are made using twisted pair cable. The difference between them is that each network is functionally equivalent to bus (for Ethernet) or ring (for Token Ring), with different connection hardware used in each case.
Outcomes	After completing this project, you will know how to: ▲ identify features of a logical ring ▲ identify features of a logical bus
What you'll need	To complete this project, you will need: ▲ the following worksheet
Completion time	20 minutes
Precautions	None

Place each of the following statements in the appropriate column in Table 5-1. You will use all statements. You may use a statement more than once.

Wired as a physical star.

Performance may suffer due to collisions.

Determinant access method.

Uses MAUs to connect computers.

Uses Hubs to connect computers.

Data travels linearly from source to all computers.

Most common logical topology.

Does not suffer from collisions.

Device must wait for open token to transmit.

All computers have equal access to the network.

Most often seen in legacy networks.

Failing node does not cause the entire network to fail.

Devices can be added without interrupting the network.

Table 5-1: Logical Topologies

Logical ring	Logical bus

Project 5.4	Designing a Network
Overview	Although understanding network topology options is important, you also need to know how to apply this knowledge in practical situations. As a result, you need to understand how available topologies relate to network design and deployment options, as well the requirements for deploying a network based on a specific topology.
	During this project, you will answer questions about network design based on a short case study describing network requirements.

Outcomes	After completing this project, you will know how to: ▲ identify the most appropriate network topology selection(s) ▲ identify requirements for deploying a network topology
What you'll need	To complete this project, you will need: ▲ the following worksheet
Completion time	30 minutes
Precautions	None

The Busicorp network currently consists of two unconnected network segments. One segment is wired as a physical bus topology using 10Base2 and the other is wired as a logical Token Ring network. The company has leased additional office space on the same floor of its current offices and is expanding, adding 40 additional computers. You need to design the wired network topology for the new network segment and identify options for connecting the existing network segments.

1. What should you use as the physical topology for the new network segment?

   _____

   _____

   _____

2. What should you use as the logical topology?

   _____

   _____

   _____

3. What hardware will be needed in the computers to connect to the new network segment?

   _____

   _____

   _____

4. What connection equipment, if any, will be needed on the network to connect the computers?

   _____

   _____

   _____

5. What would be needed to connect the new network segments to each of the old network segments and allow them to communicate as one logical network for routing purposes?

    _____

    _____

    _____

6. What would be needed to have each network segment treated as a separate network for routing purposes?

    _____

    _____

    _____

7. What would you have to do if you wanted each of the old network segments to use the same network design as the new segment?

    _____

    _____

    _____

8. How could you justify upgrading the physical bus network?

    _____

    _____

    _____

9. How could you justify upgrading the logical Token Ring network?

    _____

    _____

    _____

10. What could you do if you want to avoid running cable for the new network, but still have the new computers communicate with each other and with the existing computers?

    _____

    _____

    _____

Project 5.5	Network Inventory
Overview	Before you can support and maintain a network, you need to know how it is structured. In other words, you need to understand the physical and logical topology used. You can determine the physical topology by simply looking at how the network is wired. The logical topology can sometimes be determined through observation, but more often requires additional research.
	The process of checking the network to see how it is structured and how computers connect to the network is sometimes referred to as taking the network inventory. You will take an inventory of your network during this project and document the network design.
Outcomes	After completing this project, you will know how to:
	▲ determine the physical topology in use
	▲ determine the logical topology in use
What you'll need	To complete this project, you will need:
	▲ access to your network and connection devices
	▲ client computer running Windows 7 Professional or Windows 7 Enterprise
Completion time	45 minutes (approximate, depending on computer configuration and speed)
Precautions	If you are performing this project on an existing network, you must review the project steps with your network administrator. Your network administrator may need to make changes or additions to the instructions.

Take an inventory of your network and answer the questions that follow:

1. What is the network's physical topology?

   _____

   _____

   _____

2. What connection devices, if any, are used on the network?

   _____

   _____

   _____

3. Describe how your Windows 7 Professional or Windows 7 Enterprise computer is physically connected to the network.

   _____

   _____

   _____

4. Physically disconnect your Windows 7 Professional or Windows 7 Enterprise computer from the network. If you have a built-in wireless adapter, disable the adapter. How does this impact the other computers on the network?

    _____

    _____

    _____

5. What symptoms, if any, do you observe at your Windows 7 Professional or Windows 7 Enterprise computer?

    _____

    _____

    _____

6. Reconnect your Windows 7 Professional or Windows 7 Enterprise computer to the network.

7. Open the **Control Panel/Network and Internet/View Network Status and Tasks** as Figure 5-6 shows.
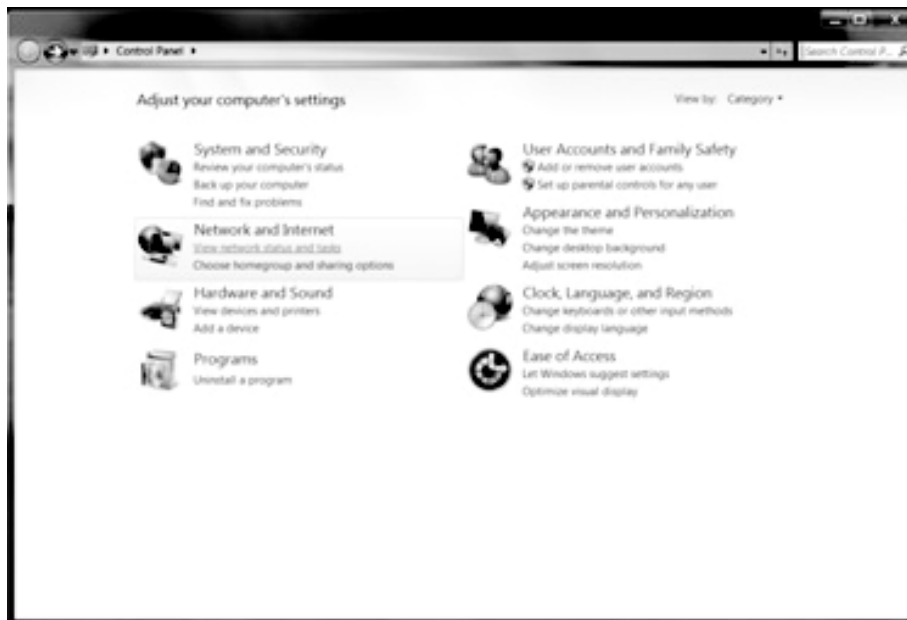

Figure 5-6: Local Area Connection Status dialog box

8. Open **Change Adapter Settings** in the upper left-hand window.

9. Double-click **Local Area Connection** (or double-click **Wireless Connection** if you have a wireless adapter). You should see a dialog box similar to Figure 5-7.
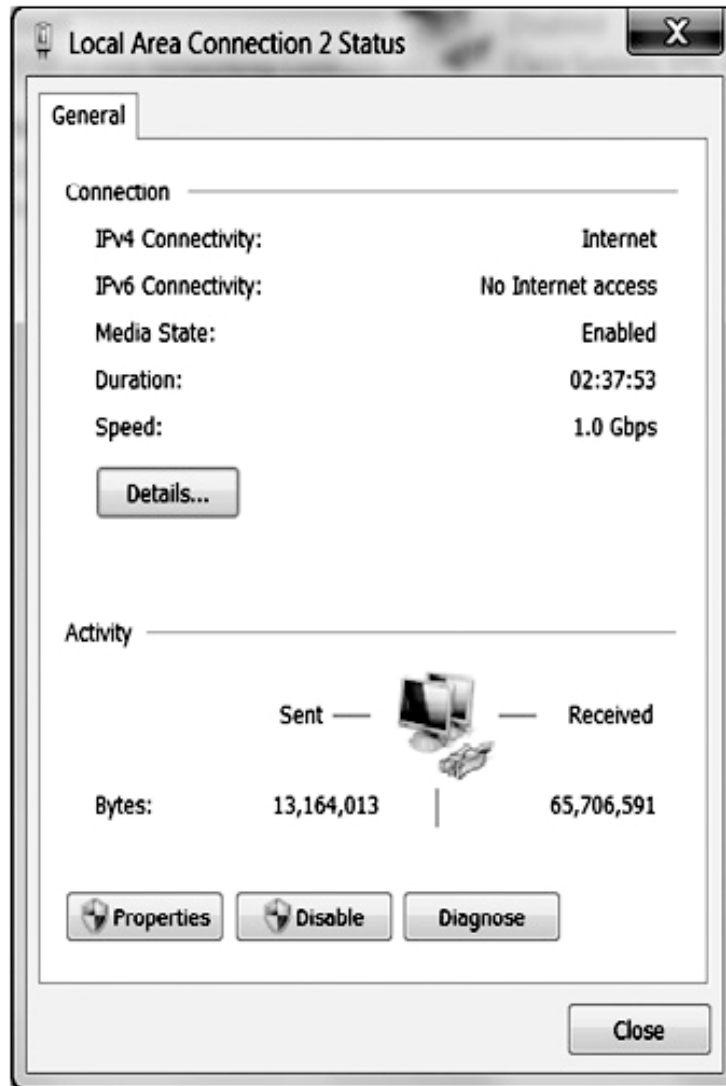

Figure 5-7: Local Area Network status

10. Click **Properties** to display a dialog box similar to the one shown in Figure 5-8.
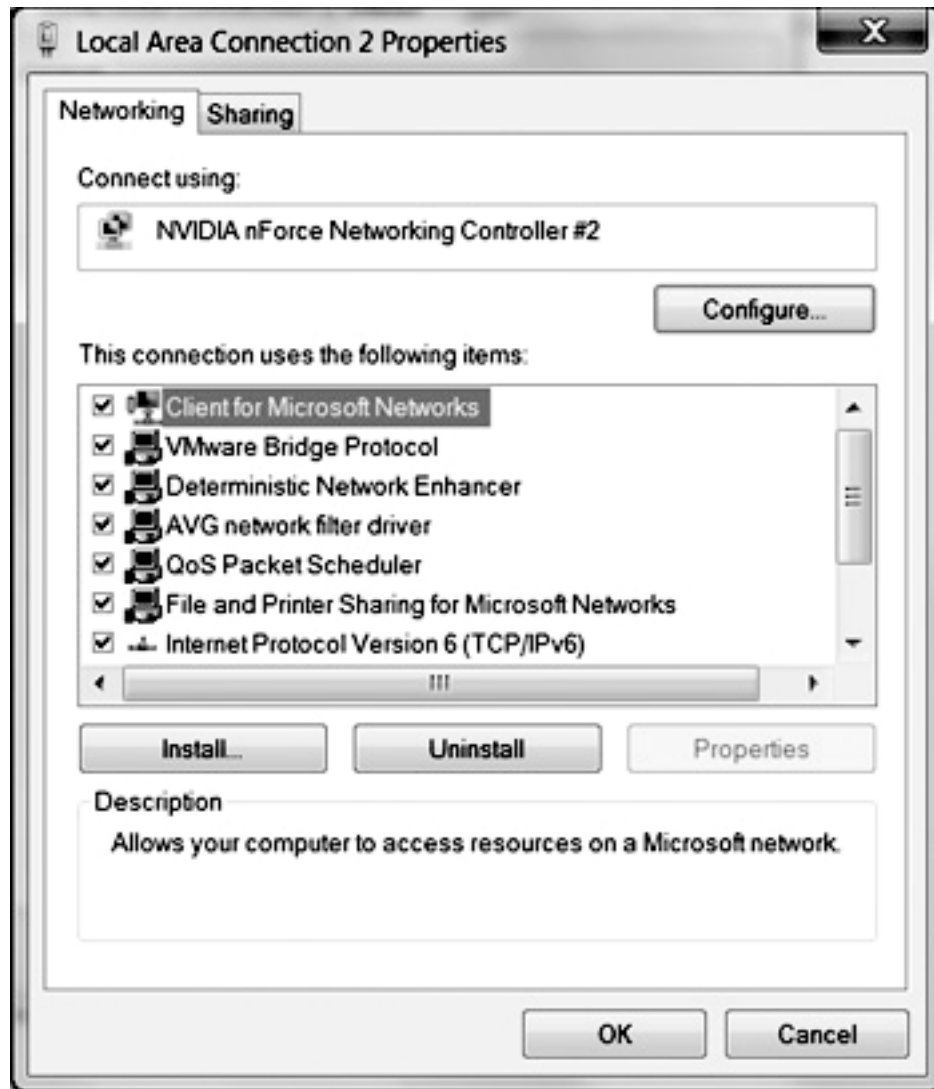

Figure 5-8: Local Area Connection Properties dialog box

11. What is the network adapter listed in the **Connect using** field?

_____

_____

_____

12. How can you tell the logical topology type?

_____

_____

_____

13. What logical topology is your network using?

_____

_____

_____

14. Click *Configure* under **Connect using**. Review the configuration settings and then click *OK*.
15. Close the **Local Area Connection Status** dialog box.
16. Close any open windows.