2

NETWORK STANDARDS AND MODELS

PROJECTS

Project 2.1	Understanding Key Concepts
Overview	Today, manufacturers design and build PCs and operating systems with the assumption that they'll be deployed in a network environment. As a result, understanding network fundamentals, beginning with fundamental terms and concepts, is important.
Outcomes	After completing this project, you will know how to: ▲ identify key terms and concepts related to models and standards ▲ identify key terms and concepts related to the OSI and Internet networking models
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 only be used once.

___	Connectionless transmission	A. Process of inserting markers into data packets to enable a conversation to continue after errors
___	Flow control	B. Communication sessions using connection-oriented transmissions
___	Logical address	C. Two-way data communication where both ends can transmit simultaneously
___	MAC address	D. Transmission method where the receiving system does not acknowledge receipt of data
___	Hop	E. Standard developed and accepted through use and application
___	Ethernet	F. TCP/IP suite protocol used to access web pages
___	Data compression	G. Method of ensuring that data sent to the recipient is in a format that the recipient can process
___	Data encryption	H. Address assigned to a computer through networking software and uniquely identifying the computer to the network

___	Header	I. Standard developed by an official body
___	Reliable transport method	J. Using algorithms to modify data from being ready by anyone other than the sender and intended recipient
___	Data presentation	K. Router passed through during packet routing
___	HTTP	L. Common term for the IEEE 802.3 networking standard
___	Formal standard	M. Term used to refer to data packets at the OSI network layer
___	De facto standard	N. Act of physically shrinking data to minimize network traffic
___	Routing	O. Communication control that prevents a computer from being overwhelmed by incoming traffic
___	Full-duplex communication	P. Information added to describe a data packet, including source and destination computers
		Q. Process of directing packets though an internetwork to the correct destination network
		R. Network device address that is hard coded on the network adapter

Project 2.2	Comparing Network Models
Overview	Standards can be developed by a formal standards organization or come into being through common acceptance and use. Standards have been an important part of network design and development. They help to ensure interoperability between different manufacturers' products. They provide standard, accepted terms for describing network functions and network activity. In short, they provide a standard language for discussing networking.
	Three common network model standards are the **OSI model**, the **DoD model**, and the **Internet model**. You need to understand each of these models, how they are structured, and what occurs at each level.
Outcomes	After completing this project, you will know how to: ▲ identify network model layered structures ▲ recognize activities occurring at different model layers

What you'll need	To complete this project, you will need:
	▲ the following worksheet
Completion time	45 minutes
Precautions	None

■ Part A: Identify Model Layers

In Figure 2-1, fill in the names for each of the model layers in their correct positions. The names follow the figure. All names will be used. Each name may be used more than once.

OSI Model	Internet Model	DoD Model

Figure 2-1: Networking models

Application   Physical

Data Link   Presentation

Host-to-Host   Process

Internet   Session

Network   Transport

Network interface

■ Part B: Understand Layer Use

The following questions refer to network technologies and their relationship with the OSI, DoD, and Internet network models. Answer each question and briefly explain your answer.

1. Why can we say that the NetBEUI protocol does not implement the OSI model Network layer?

    _____

    _____

    _____

2. Which layer in the OSI and Internet models is not considered a layer in the DoD model?

    _____

    _____

3. At which layer are Ethernet and WiFi implemented in the OSI model?

    _____

    _____

4. Into what sublayers is the OSI model Data Link layer is divided?

    _____

    _____

5. In the OSI model, with what other layers does the Transport layer directly interface?

    _____

    _____

6. During the routing process, while passing through a router, datagrams pass through which layers of the Internet model?

    _____

    _____

7. Which two protocols in the TCP/IP protocol suite operate at the Host-to-Host layer of the DoD model?

    _____

    _____

8. Tools that translate an Internet Universal Resource Locator (URL) address to a numeric IP address are provided at which layer of the OSI model?

_____

_____

9. What is the relationship between the OSI, DoD, and Internet model Application layers?

_____

_____

_____

10. At which layer are IP addresses defined in the DoD model?

_____

_____

Project 2.3	Installing Windows 7 Professional or Windows 7 Enterprise Professional or Enterprise
Overview	Microsoft Windows 7 Professional or Windows 7 Enterprise in all its versions is popular choices for network clients.
	One of the keys to having a reliable network is proper installation of client software—in this case, Windows 7 Professional or Windows 7 Enterprise Professional or Enterprise. You are prompted for network configuration information during Windows 7 Professional or Windows 7 Enterprise configuration. You can set configuration parameters at that time, but you also have the option of going back and changing your network configuration as needed. *Note:* For the networking projects found in this project manual to work properly, you should use the Enterprise version.
Outcomes	After completing this project, you will know how to:
	▲ install Windows 7 Professional or Windows 7 Enterprise Professional or Enterprise as a virtual machine
	▲ configure networking parameters
	▲ verify successful installation
What you'll need	To complete this project, you will need:
	▲ network cable plant and connection devices installed (or Project 1.4 completed)
	▲ a Windows 7 Professional or Windows 7 Enterprise installation CD
Completion time	60 minutes (approximate, depending on your computer's configuration and speed)

Precautions The instructions in this project assume you will be setting up a two-node network with one computer running Windows 7 Professional or Windows 7 Enterprise Professional or Enterprise and one computer running Windows Server 2008. If you are deploying the Windows 7 Professional or Windows 7 Enterprise computer as part of a larger classroom network, your instructor will provide you with alternate instructions for configuring network parameters.

If you are adding the Windows 7 Professional or Windows 7 Enterprise computer to an existing network, you should also review the project steps with your network administrator. Your network administrator may need to make changes or additions to the installation instructions.

■ Part A: Prepare for Installation

This project provides instructions for installing Windows 7 Professional or Windows 7 Enterprise Professional or Enterprise from the installation CD and configuring networking parameters. Required parameters include the computer name and TCP/IP address parameters. Your instructor may provide alternate values for some configuration parameters. If so, record them here:

Computer name: _____

IP address: _____

Subnet mask: _____

This project assumes that you will be configuring the computer with a single disk partition. If your computer needs to be configured differently, your instructor will provide you with alternate partitioning instructions. These alternate instructions replace Steps 4 through 7 below.

■ Part B: Install Windows 7 Professional or Windows 7 Enterprise

1. Open your VMWare Player.
2. Choose **Create a New Virtual Machine** and then choose either **Installer Disc** if you have access to a Windows 7 Professional or Windows 7 Enterprise Install DVD or **Installer Disc Image file (iso)** if you downloaded the Demo Windows 7 Professional or Windows 7 Enterprise file referred to earlier. Refer to Figure 2-2.

Figure 2-2: New Virtual Machine Wizard

3. Name your installation **User 1** or the instructor assigned name and number.

Use **P@SSwθrd** (θ = zero) for your password. If you have access to a Windows Product Key, enter it here, as shown in Figure 2-3.

Figure 2-3: New Virtual Machine Wizard: Easy Install Information

Note: If you do not have access to a key, you can still install Windows 7 Professional or Windows 7 Enterprise, but you'll be unable to activate it later. Be sure that you enter the product key to activate Windows within the 30-day grace period. After the 30-day grace period ends, your system will not boot, and you may have to reinstall the copy again.

4. Leave the default name as Windows 7 Professional or Windows 7 Enterprise and choose a location to store your virtual machine. In this case it's being saved to a removable hard drive in a file called "My Virtual Machines\Windows 7 Professional or Windows 7 Enterprise." See Figure 2-4 for an example.
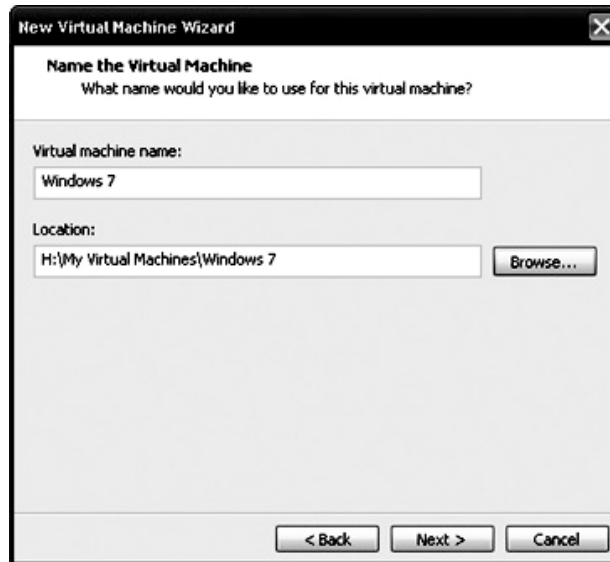

Figure 2-4: New Virtual Machine Wizard: Name the virtual machine

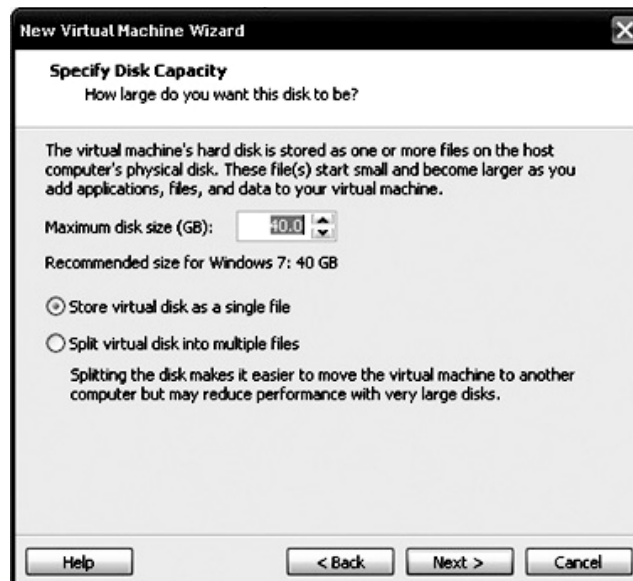5. Accept the default size for the virtual hard drive and storage, as shown in Figure 2-5.

Figure 2-5: New Virtual Machine Wizard: Specify disk capacity

6. In some cases, for a complete installation customizing the hardware is necessary. To do so, click on the **Customize Hardware** button from the next window, as shown in Figure 2-6.

Figure 2-6: New Virtual Machine Wizard: Ready to create virtual machine

7. Choose the **New CD/DVD**, and click the **Advance** button.
8. Choose the **Legacy Emulation** radial and click *OK*.
9. Highlight the **Network Adapter** and click on the **Host Only** radial.
10. Click *OK* and finish.
11. You will first see a window with the peripheral on your computer and then likely a warning about downloading VMWare Tools. Download and install these tools.
12. When the VMware Tools have downloaded, you will see the Windows install screen. *Note:* This step may take some time, so be patient.
13. When the download is complete, your virtual machine will restart.
14. Complete the installation. *Note:* This step may take some time.
15. Remember to have your mouse cursor within the virtual machine and click anywhere inside it. To get it out of the virtual machine, hold *Ctrl + Alt*.

Congratulations! You have successfully created a Virtual Windows 7 Professional or Windows 7 Enterprise Appliance.

Note: The first time you log on, Windows will configure the desktop, and the VMware Tools will install. The virtual machine will then reboot, and you will be ready. Log in and begin your lab projects, as shown in Figure 2-7.

Figure 2-7: User 1 Log In

16. After the machine has rebooted, log on as Administrator and begin configuring your server with the following information.

Computer name:	**Student00**
Password:	**P@SSw0rd**
Confirm password:	**P@SSw0rd**

Set date and time according to your local time zone.

IPv4 address:	**192.168.1.21**
Subnet mask:	**255.255.255.0**
Workgroup:	**BUSICORPWG**

Project 2.4	Configuring and Verify Installation
Overview	After the initial installation, you must configure your new Windows 7 Professional or Windows 7 Enterprise installation to work on your network.
Outcomes	After completing this project, you will know how to: ▲ change a computer's Name and IP address ▲ verify the current status
What you'll need	To complete this project, you will need: ▲ a computer with Windows 7 Professional or Enterprise installed
Completion time	30 minutes (approximate, varies by computer)

Precautions	You must complete Project 2.3, in which you install Windows 7 Professional or Enterprise before starting this project.
	If your computer is part of a network other than a dedicated or private training network, you should check with your network administrator before making any changes.

■ Part A: Configuring Windows 7 Professional or Windows 7 Enterprise

1. Log on to your Windows 7 Professional or Windows 7 Enterprise Virtual Machine and open the control panel by clicking **Start/Control Panel**, as shown in Figure 2-8.
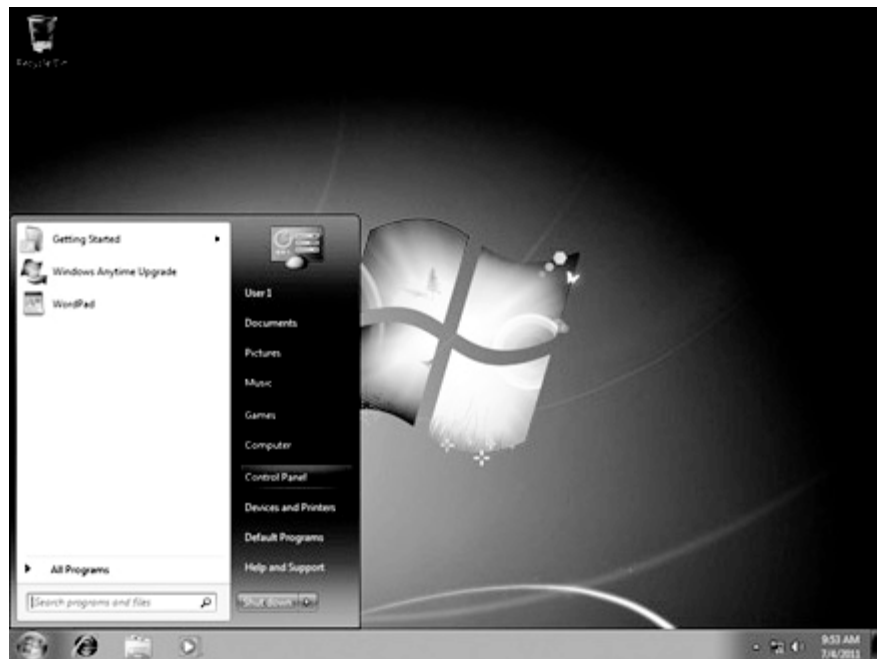
Figure 2-8: Start/Control Panel

2. Choose **Network and Internet/View Network Status and Tasks**, as Figure 2-9 shows.

Figure 2-9: Network and Internet/View network status and tasks

3. Click on **Local Area Connection** and choose the **Properties** button from the **Local Area Connection Status** window (refer to Figure 2-10).
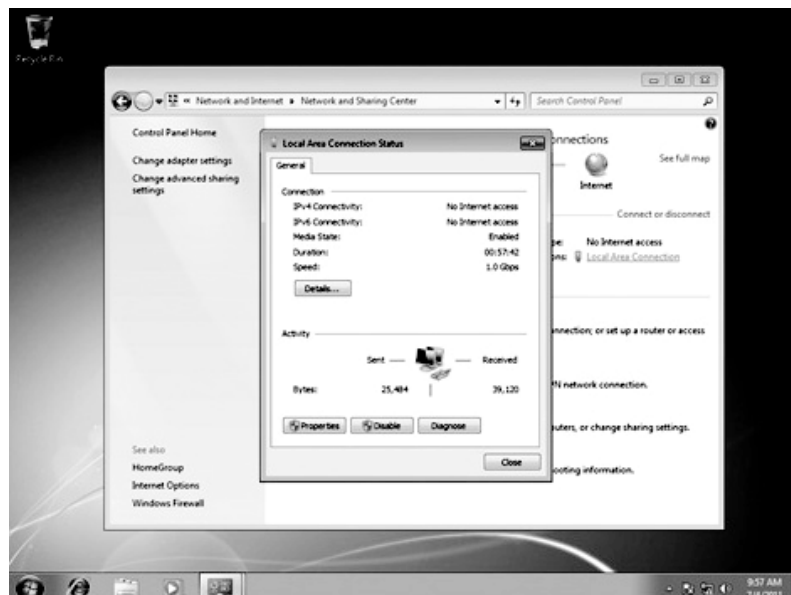

Figure 2-10: Local Area Connection Status

4. Highlight **IPv4** and choose **Properties**.
5. Click on **Use the following IP address** and type in the IP address and subnet mask given to you. Click *OK*, *Close*, and *Close* again, as Figure 2-11 shows.
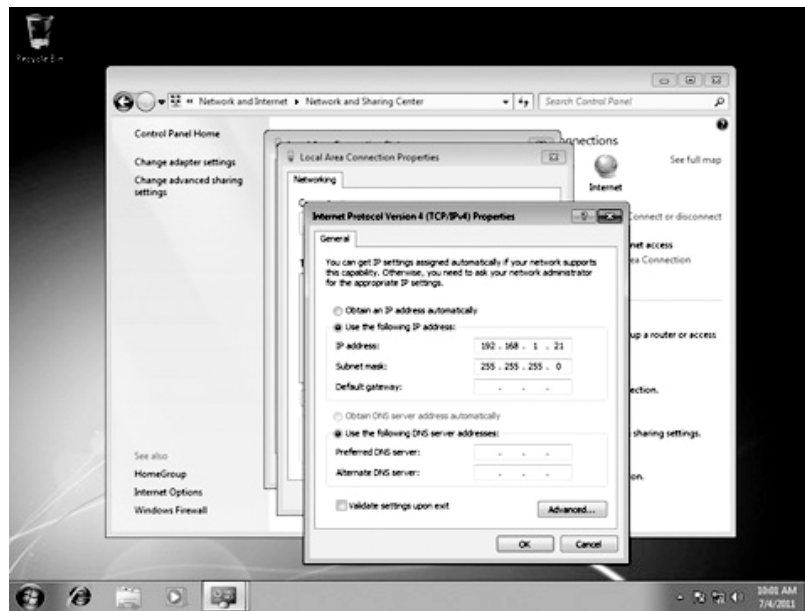
Figure 2-11: Internet Protocol Version 4 properties

6. Click **Start** and right-click on the computer icon. Choose **Properties**.

7. Choose **Change Settings** at the bottom right of the screen and click the **Change** button on the system properties screen, as shown in Figure 2-12. Type in your computer name and workgroup.
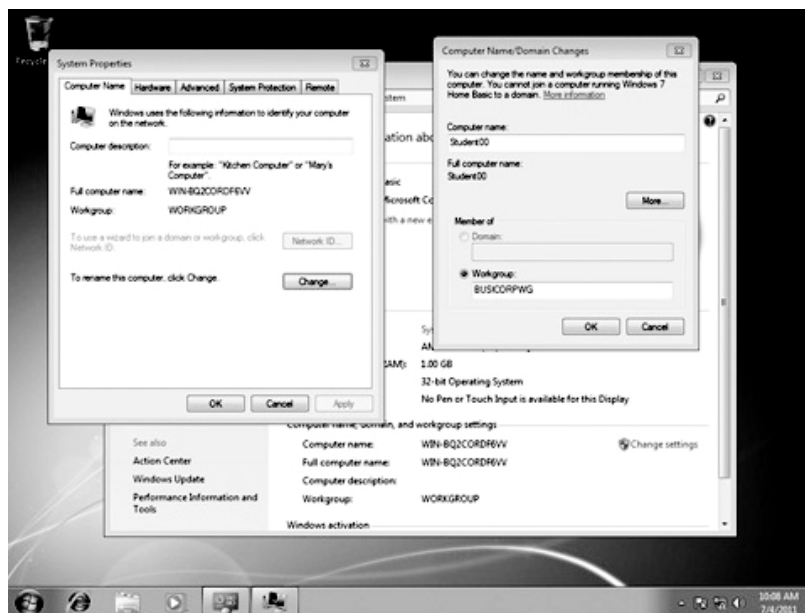

Figure 2-12: Change settings/System properties

8. Click *OK* and you will see a welcome screen. You will then see a notice to restart you computer. Click *OK* and *Restart Now*, like in Figure 2-13.
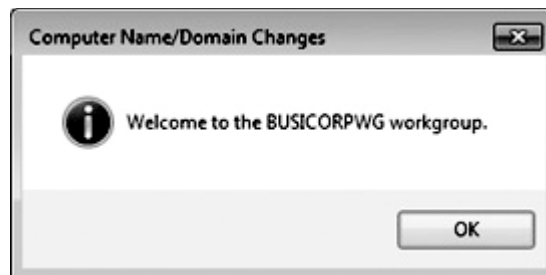
Figure 2-13: Computer Name/Domain changes welcome

■ Part B: Verify the Installation

1. When the Welcome screen displays, log on to your computer.
2. Open the **Start** menu, point to **All Programs** and then to **Accessories**, and then select the **Command Prompt** to open a command prompt window, like in Figure 2-14.

Figure 2-14: Command Prompt

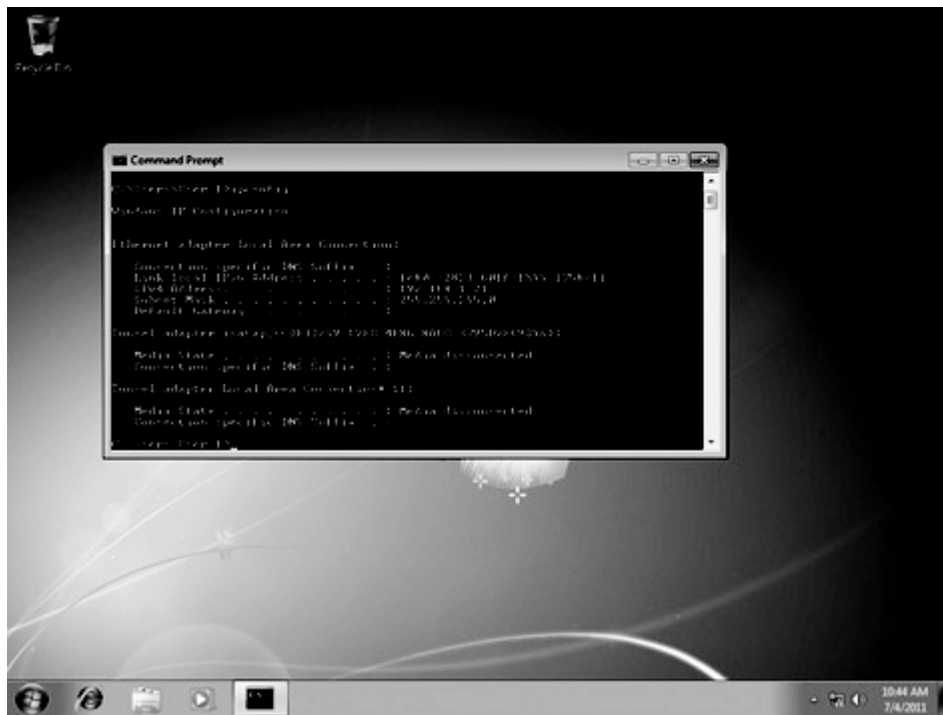3. Type **ipconfig** and press *Enter*, like Figure 2-15 shows.

Figure 2-15: Command prompt/ipconfig

4. Verify that the computer name and IP address reported are the same as the values specified during installation.
5. Type **exit** and press *Enter* to close the **Command Prompt** window.
6. Open the **Start** menu and select **Shut Down**. Select **Turn Off** when prompted to shut down the computer.

Project 2.5	Mapping Network Components
Overview	Microsoft and other operating system manufacturers build network components into their operating systems. You can view and manage the status of these networking components. Many components also have parameters that you can configure to control how your computer communicates on the network.
	Part of understanding these network components is knowing how they are related to each other. One way to do so is to map them to the appropriate network model layers. The standard model, even though it is not strictly adhered to by most manufacturers, is the OSI model. Other common models are the DoD model, which is also known as the TCP/IP model, and the Internet model. The DoD and Internet models are very similar, but do have two differences. The DoD model does not include a physical layer. Also, the layers are named differently, even though the layers in both the DoD and Internet models map to the same layers in the OSI model. The layers supported by both of these models are functionally identical.

Outcomes	After completing this project, you will know how to: ▲ view networking components and parameters
What you'll need	To complete this project, you will need: ▲ the following worksheet ▲ a computer running Windows 7
Completion time	60 minutes
Precautions	Do not make any changes to the computer's configuration unless explicitly told to do so by the project steps. Otherwise, you will view only configuration parameters during this project. You should be logged on as Administrator before starting this project.

This project assumes that the control panel is configured to show selections in classic view, as configured in Project 2.4. If it is not, you should configure the control panel for classic view before you start. The project steps direct you to display various network components and configuration parameters. You will also be asked to display the model layer to which the item belongs. For each component, identify the appropriate OSI, DoD, and Internet model layers and justify your selection.

1. Open the **Start** menu and select **Control Panel**.
2. Double-click **Network Connections** to open the **Network Connections** window.
3. Right-click your local connection and select **Properties** to open the **Local Area Connection Properties** dialog box, as shown in Figure 2-16.

Figure 2-16: Local Area Connection Properties dialog box

4. Select **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties**.
5. With which layer is this IP address information associated?

OSI model: _____

DoD model: _____

Internet model: _____

6. Click *Cancel* to close the **Internet Protocol (TCP/IP) Properties** dialog box and then *Cancel* to close the Local Area Connection Properties dialog box. Close the **Network Connections** window.

7. Open a **Command Prompt** window, type **ipconfig**, and press *Enter*. How does the information reported compare to that in the Internet Protocol (TCP/IP) Properties dialog box.

   _____

   _____

8. What is the IP address?

   _____

9. Type **ipconfig/all** in the **Command Prompt** window. What is the physical address value?

   _____

10. In what numbering system is this reported?

    _____

11. With which network model layer is this value associated?

    OSI model: _____

    DoD model: _____

    Internet model: _____

12. Close the **Command Prompt** window.

13. Open the **Start** menu and select **All Programs/Internet Explorer** to launch the default Web browser, Internet Explorer.

    If configured with Internet access, the default home page will display.

14. With which network model layer is this application associated?

    OSI model: _____

    DoD model: _____

    Internet model: _____

15. Open the **Control Panel** and launch the **System and Security/Windows Firewall**, as Figure 2-17 shows.
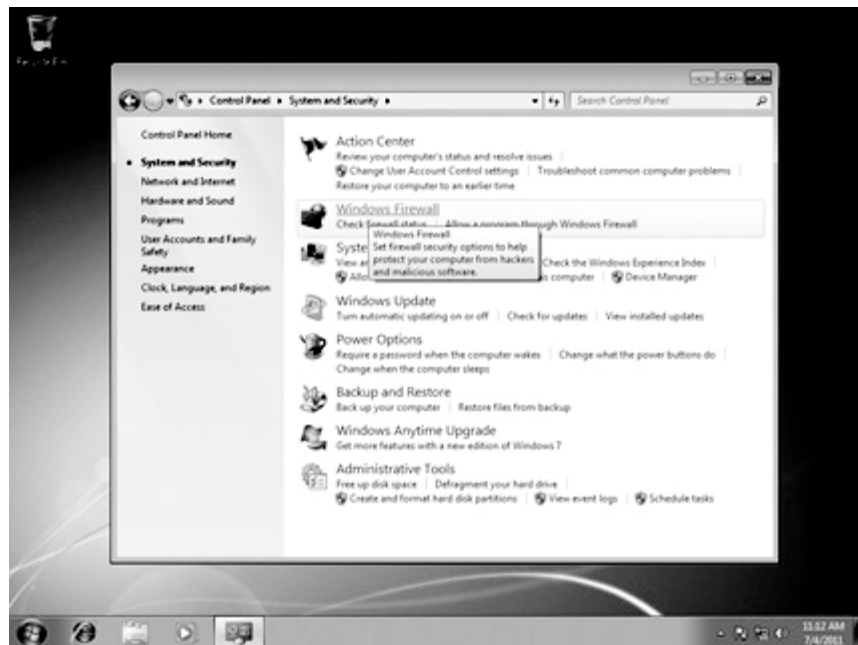
Figure 2-17: System and Security/Windows Firewall

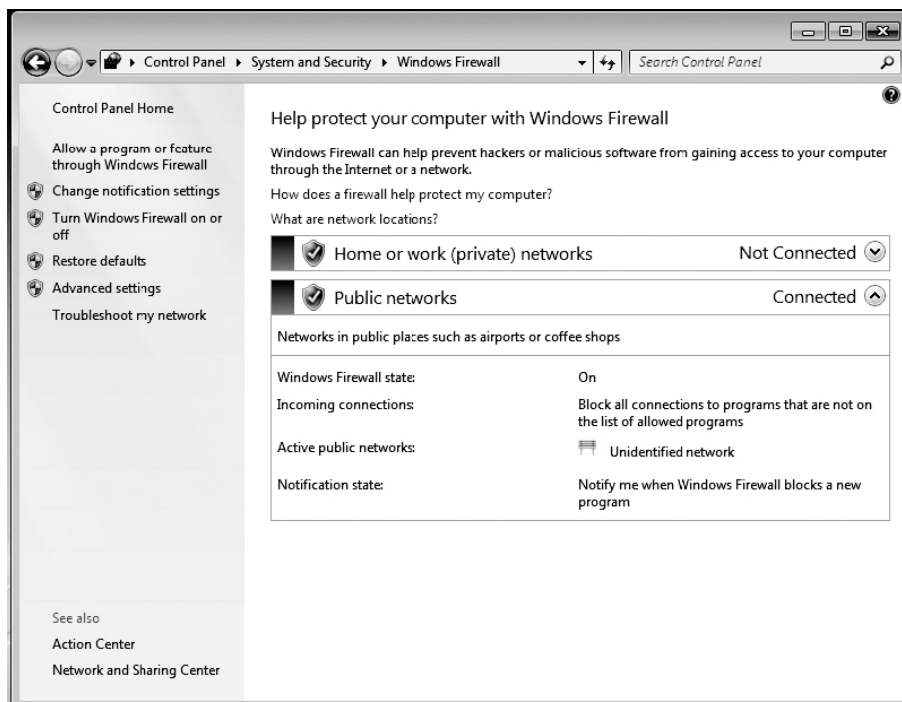The Windows Firewall should be configured as shown in Figure 2-18.

Figure 2-18: Windows Firewall enabled

16. If not configured as in Figure 2-18, change your configuration to match the figure.

17. Click *What else should I know about Windows Firewall.* What protections are listed? What risks not blocked by Windows Firewall are listed?

_____

_____

_____

18. Close the **Help and Support Center** window.

19. Select the **Exceptions** tab in the **Windows Firewall** dialog box, select **File and Printer Sharing**, and click *Edit.* For what protocols are exceptions listed?

_____

_____

20. With which network model layer are these protocols associated?

OSI model: _____

DoD model: _____

Internet model: _____

21. Click *Cancel* to close the **Edit** dialog box and then click *Cancel* to close the **Windows Firewall** dialog box.