



CompTIA A+ Lab Series v2

Lab 3: Networking Essentials

Document Version: **2015-04-21**



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Development was funded by the Department of Labor (DOL) Trade Adjustment Assistance Community College and Career Training (TAACCCT) Grant No. TC-22525-11-60-A-48; The National Information Security, Geospatial Technologies Consortium (NISGTC) is an entity of Collin College of Texas, Bellevue College of Washington, Bunker Hill Community College of Massachusetts, Del Mar College of Texas, Moraine Valley Community College of Illinois, Rio Salado College of Arizona, and Salt Lake Community College of Utah.

This workforce solution was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties or assurances of any kind, express or implied, with respect to such information, including any information on linked sites, and including, but not limited to accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability or ownership.

Contents

Introduction	3
Objective: Explore the Network Options in a Windows Workgroup Network.....	3
Lab Topology	6
Lab Settings.....	7
1 Create a Peer-to-Peer Workgroup Network for Computers Running Different Windows Operating Systems	8
1.1 Implement the Workgroup Settings in Windows XP	8
1.2 Implement the Workgroup Settings in Windows 7	11
1.3 Conclusion	13
2 Inspect the Network Interface Card and LAN Configurations	14
2.1 Checking Device Manager for the Network Interface Card Drivers on Windows XP	14
2.2 Checking Device Manager for the Network Interface Card Drivers on Windows 7	16
2.3 Verify Local Area Connection Properties and Firewall Settings on Windows XP	17
2.4 Viewing the TCP/IP Settings Windows XP	20
2.5 Verify Local Area Connection Properties and View the TCP/IP Settings Windows 7	22
2.6 Verify Firewall Properties on Windows 7	24
2.7 Test Connectivity Between LAB-3 Workgroup Computers	26
2.8 Conclusion	27
3 Share Data and Resources on the Network.....	28
3.1 Share a Folder in Windows XP and Accessing It from a Windows 7 Computer.....	28
3.2 Conclusion	37
4 Using Network Command-Line Utilities.....	38
4.1 Conclusion	39
References	40



Introduction

This lab is part of a series of lab exercises designed to supplement coursework and provide students with a hands-on training experience based on real world applications. This series of lab exercises is intended to support courseware for CompTIA A+® certification.

A computer network is a collection of two or more connected computers that allow users to exchange information, share resources, communicate through applications like email, and to connect to the Internet. All devices that will connect to a network require specific network hardware and basic configurations to be operational. Network interface cards and drivers, network medium, and interconnecting devices are all part of the necessary hardware. Network server software, network client software, and network protocols are the software components which that interact with network hardware and facilitate communication between computers. Understanding network types, components, and protocols and services are all part of being a competent PC technician.

This lab includes the following tasks:

1. Configure Windows clients to connect to a workgroup network
2. Test network connectivity between computers
3. Share data and resources on the network
4. Using network command-line utilities

Objective: Explore the Network Options in a Windows Workgroup Network

Some of the labs in this series focus on single PCs and how to manage and maintain individual systems. In a large network environment, the network type to set up will most likely be a client/server model. In a small network like the one represented in this lab series, the workgroup or peer-to-peer model would be an acceptable choice. Factors other than size should guide the decision for the network model, but that is outside the scope of this lab.

In this lab, students will explore how to take a PC from a stand-alone computer to being part of a peer-to-peer network as well as the concepts and skills necessary to set up, configure, and troubleshoot a workgroup network with Windows clients. They will configure computers to connect to a network, test network connections, and set up resource sharing between the Windows clients using Windows set up tools, networking wizards, and the command-line interface (CLI).

There are many similarities and few differences between Windows versions when it comes to network configuration. In this lab both Windows XP and Windows 7 clients will be configured to connect to the network. The focus of the lab is setting up computer clients to function in a small workgroup network.



Key terms for this lab:

Peer-to-peer network (workgroup) – There is no dedicated server or hierarchy among the computers. All of the computers are equal and therefore known as peers with no centralized administration of resources.

Client/server network – Clients rely on servers for resources such as storage space, printing, and sometimes processing power. Clients are typically less powerful systems than servers. Centralized administration is part of the client/server network model.

Network interface card (NIC) – The NIC provides a physical connection between the network media and the computer's internal components; it is used to connect the computer to the network. Every device on a network that needs to transmit and receive data must have a NIC installed.

Network interface device drivers – Like all hardware, NICs must have device driver software installed to allow application and operating system software to communicate with the hardware.

Network media – The path over which the communication signal travels. Examples of media are twisted pair cable, fiber optic cable, and wireless signals.

Interconnecting Devices – A variety of devices such as hubs, switches, and routers that are used to connect network segments.

Network protocols – Network protocols are standards that allow computers to communicate. A protocol defines how computers identify one another on a network, the form that the data should take in transit, and how this information is processed once it reaches its final destination. Protocols also define procedures for data transmissions.

TCP/IP Protocol Suite – TCP stands for Transmission Control Protocol and IP stands for Internet Protocol. The TCP/IP protocol suite is group of related protocols managed by the Internet Engineering Task Force (IETF). It is the protocol suite used for Internet communication.

TCP/IP Utilities – To help manage the TCP/IP protocol suite there are many different utilities. For example, ping is a utility that is used to test connectivity, and ipconfig is a diagnostic utility for IP configurations, Dynamic Host Configuration Protocol (DHCP), and Domain Name System (DNS) settings.

Ping - The ping command is one of the most useful commands in the TCP/IP protocol. It sends a series of packets to another system, which in turn sends back a response. This utility can be extremely useful for troubleshooting problems with remote hosts. Pings are also called ICMP echo requests/replies, since they use the Internet Control Message Protocol (ICMP).



Tracert – Tracert (trace route) is a command-line utility that enables you to verify the route to a remote host.

Netstat – The netstat (network statistics) utility is used to check out the inbound and outbound TCP/IP connections on your machine.

Net Services Commands – Powerful set of tools used to diagnose network problems on a Windows computer from a command line interface (CLI).

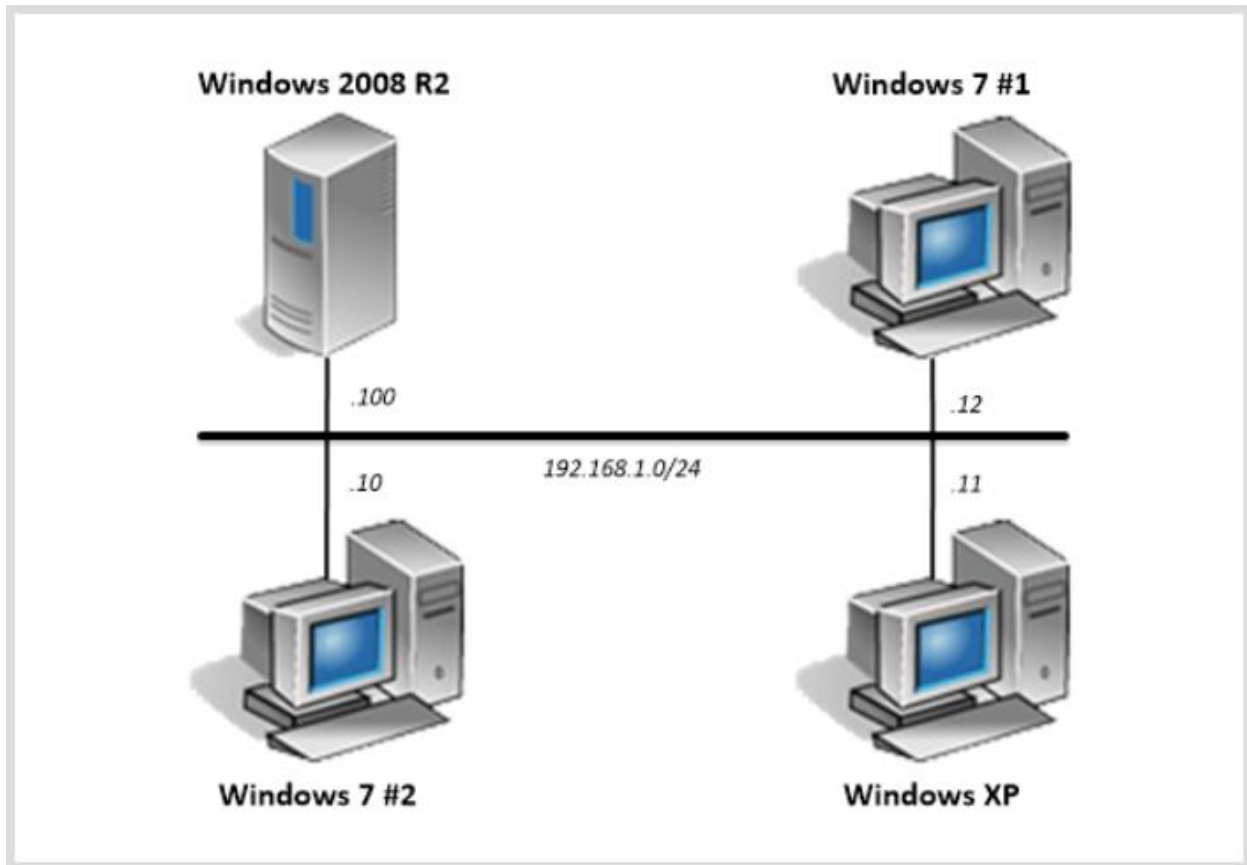
Nbtstat – Nbtstat is a command line utility that shows NetBIOS over TCP/IP information.

Nslookup – Nslookup (Name Server Lookup) is a command-line utility that enables you to verify entries on a DNS server.

Ipconfig – With Windows-based operating systems, you can determine the network settings on the client's network interface cards, as well as any that a DHCP server has leased to your computer, by typing the following at a command prompt: ipconfig /all.

Firewall – A firewall is software or hardware that checks information coming from the Internet or a network and either blocks it or allows it to pass through to your computer, depending on your firewall settings.

Lab Topology



Lab Settings

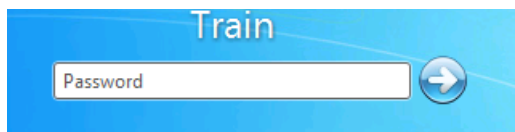
The following table includes settings necessary to complete the lab.

Log in to the following virtual machines before starting the tasks in this lab:

Virtual Machine	IP Address	Account (if needed)	Password (if needed)
Windows 7 #1	192.168.1.12/24	Train	Train1ng\$
Windows 7 #2	192.168.1.10/24	Train	Train1ng\$
Windows XP	192.168.1.11/24	Train	Train1ng\$

Windows Login (applies to all Windows machines)

1. Click on the icon on the topology that corresponds to the machine you wish to log into.
2. Use the PC menu in the NETLAB+ Remote PC Viewer to send a **Ctrl-Alt-Del** (version 2 viewer), or click the **Send Ctrl-Alt-Del** link in the bottom right corner of the viewer window (version 1 viewer).
3. In the password text box, type **Train1ng\$** and press **Enter** to log in.



You are using the Train account, which has administrator privileges, to complete the tasks in this lab. You must be an administrator or have administrator privileges to complete some of the tasks in this lab.

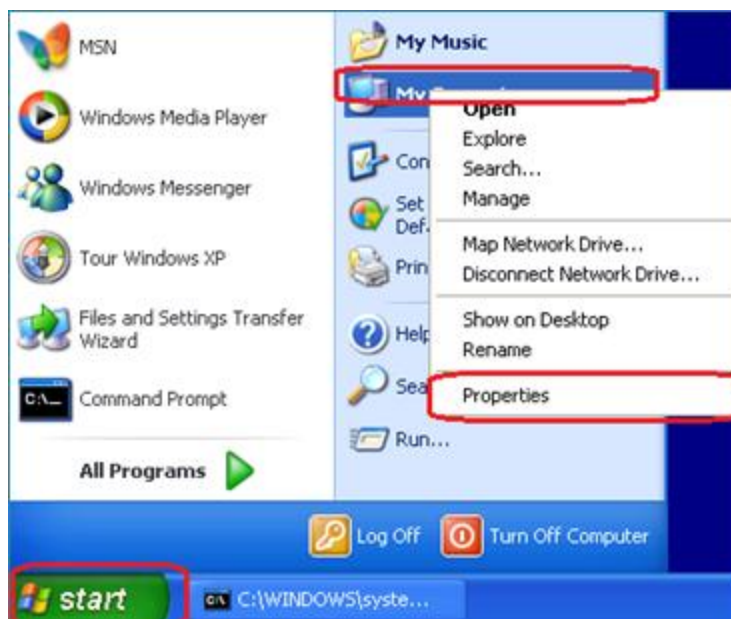
1 Create a Peer-to-Peer Workgroup Network for Computers Running Different Windows Operating Systems

In order to set up a network correctly, with the functionality needed to be productive, good planning is important. Some steps in the planning process are: review the status of the network card and the protocols installed on the computer, make decisions about the TCP/IP configuration parameters and computer settings and determine which resources are going to be shared and allocate them. When a Windows operating system is installed, a computer name and workgroup are automatically created. Computers must have unique computer names and all belong to the same workgroup in order to communicate and share resources. While it is possible to use the defaults for these configurations, it is recommended that the computer name and workgroup be descriptive and in a scheme that fits the network implemented.

1.1 Implement the Workgroup Settings in Windows XP

It is very important that workgroup systems have a common administrator account when any level of system management is required. This account will have the same username and password on all workgroup systems. This account has been configured for you on the systems in the topology.

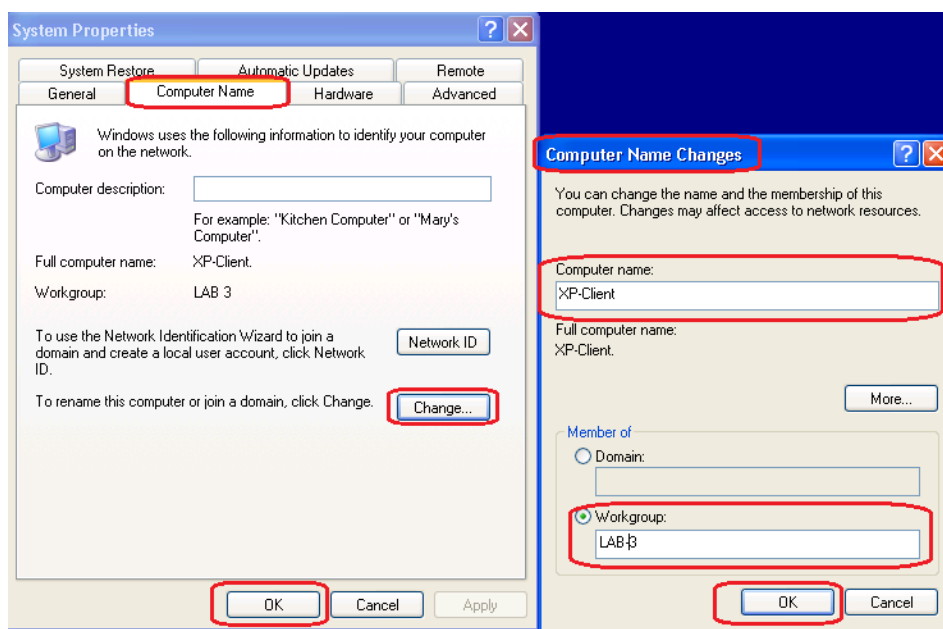
1. Use the instructions in the **Lab Settings** section to log on to the Windows XP machine, if you are not logged in already.
2. On the Windows XP machine, go to **Start->My Computer**, right-click and select **Properties**. The **System Properties** sheet will open to the **General** tab.



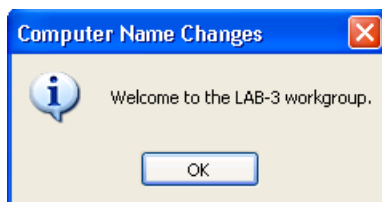
3. Click on the **Computer Name** tab. On this tab, you will be making changes specific to how the computer will be identified on the network. Windows has criteria that must be followed when selecting these naming changes.

Computer Name	Workgroup Name
Unique in a workgroup	Must be the same for all computers that need to share resources
Up to 15 characters long	Up to 15 characters long
Cannot be the same as the Workgroup Name	Cannot be the same as the Computer Name
May contain any alphanumeric (a-z and 0-9) characters, as well as special characters except for ; : " < > * + = \ ?	May contain any alphanumeric (a-z and 0-9) characters, as well as special characters except for ; : " < > * + = \ ?

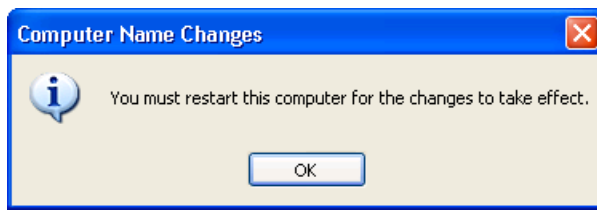
4. On the Computer Name tab, click on the **Change...** button to open the **Computer Name Changes** dialog box.
- Type **XP-Client** in the Computer Name text field to modify the current computer name.
 - Select the radio button next to Workgroup and type **LAB-3** in the Workgroup text field to modify the current workgroup name. This name is case-sensitive.
 - Click **OK**.



5. You will be welcomed to the new workgroup. Click **OK**.



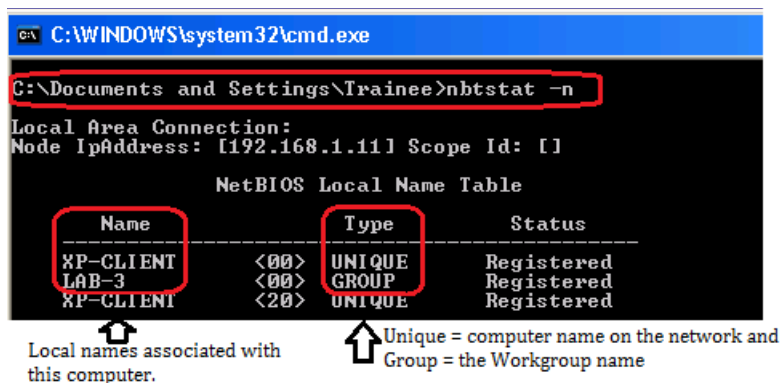
- Next, you will be informed that you need to restart the computer for the changes to take effect. Click **OK**.



- Click **OK** to close the System Properties dialog box.
- When prompted to restart your machine, click **Yes**.



- When it reboots, log back into the Windows XP machine.
- Click **Start->Run**, type **cmd** in the box and then click **OK**. This will open the command prompt in Windows XP.
- At the prompt, type **nbtstat -n** and then press **Enter** to verify that the settings are changed and are correct.
- Once verified, type **exit** and then press **Enter** at the prompt to close the CLI.



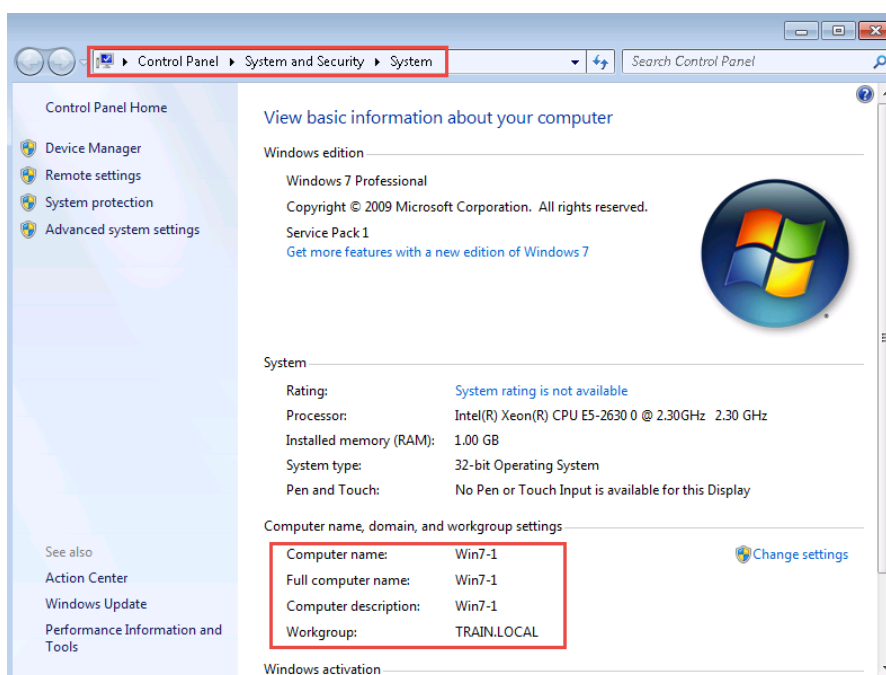
Nbtstat is a Windows command-line tool that allows you to access the NetBIOS name tables for your Windows network. Using the **nbtstat -n** option is a quick method to display the name table of the local computer. Typing **nbtstat** without any options will display help on how to use the command with correct syntax.

1.2 Implement the Workgroup Settings in Windows 7

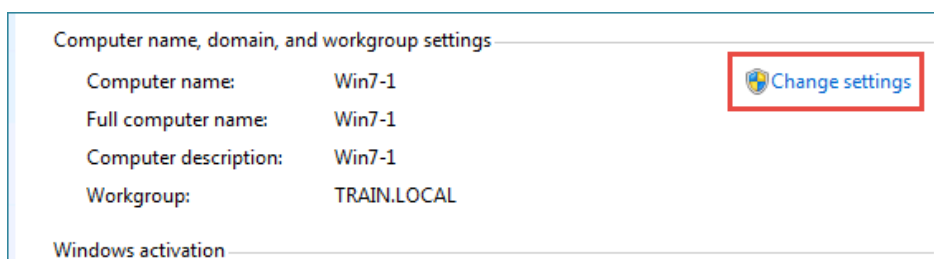
Once verified on the Windows XP machine, you will need to configure the Windows 7 #1 machine to join the new workgroup.

If all the computers that are being configured for a peer-to-peer network are running the Windows 7 operating system, they can be configured using a new feature in Windows 7 called HomeGroup. HomeGroup allows the connection of two or more Windows 7 computers to share resources. Unlike workgroups in Windows XP, HomeGroup automatically turns on file and printer sharing to effortlessly share files and printers with other computers in the HomeGroup.

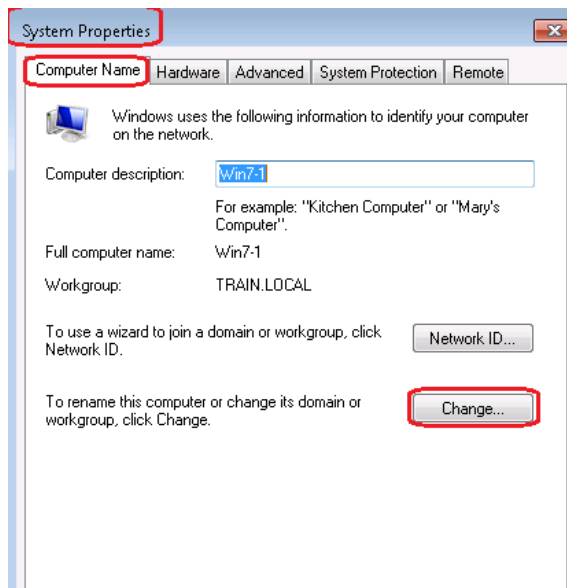
1. Use the instructions in the **Lab Settings** section to log on to the Windows 7 #1 machine, if you are not logged in already.
2. On the Windows 7 #1 machine go to **Start->Computer->Properties**. The **System** applet will open. Here, you can read the current computer name and workgroup.



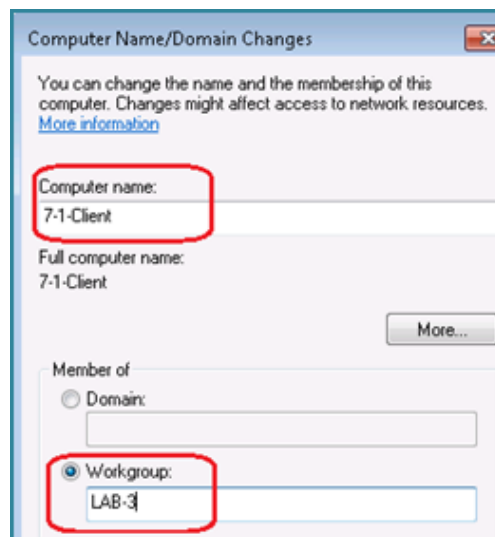
3. On the System applet main page, click **Change settings**. This will open to the Computer Name tab on the **System Properties** page.



4. On the **Computer Name** tab, click on the **Change...** button to open the Computer Name/Domain Changes dialog box.

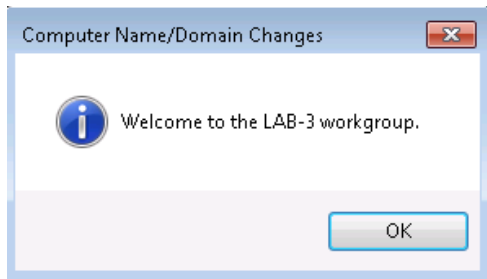


- a. Type **7-1-Client** in the Computer name text field to modify the current computer name.
- b. Select the radio button next to **Workgroup** and type **LAB-3** in the text field to modify the current workgroup name.

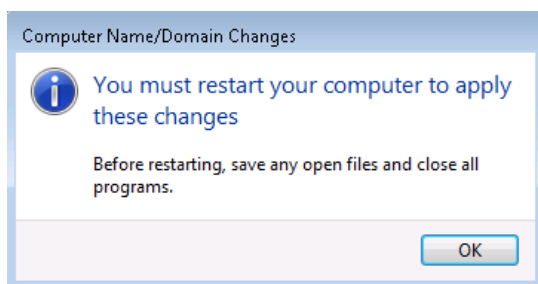


- c. Click **OK**.

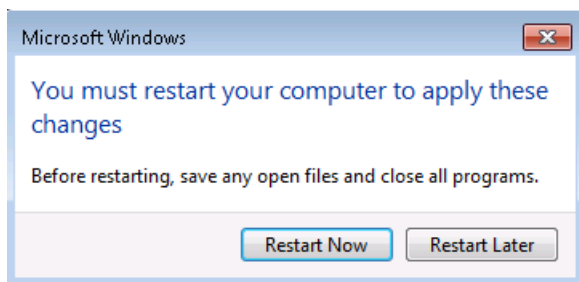
5. You will be welcomed to the new workgroup. Click **OK**.



6. Next, you will be informed that you need to restart the computer for the changes to take effect. Click **OK**.



7. Click **Close** to close the **System Properties** sheet.
8. When prompted to restart your machine, click **Restart Now**.



9. After the machine reboots, log back into the Windows 7 #1 machine, verify that the settings are changed and are correct. This can be done by accessing the **System** applet as in the previous steps or by using the **nbstat -n** command at the CLI.

1.3 Conclusion

Workgroups provide an important way for small office/home office networks to be established. Workgroups allow the sharing of resources without the complexity of the client/server network model. Users manage their own computer systems while still having the ability to share resources with other users or "peer" computers within the workgroup. Windows operating systems allow the creation of workgroups, but do not automatically turn on sharing when creating a workgroup.

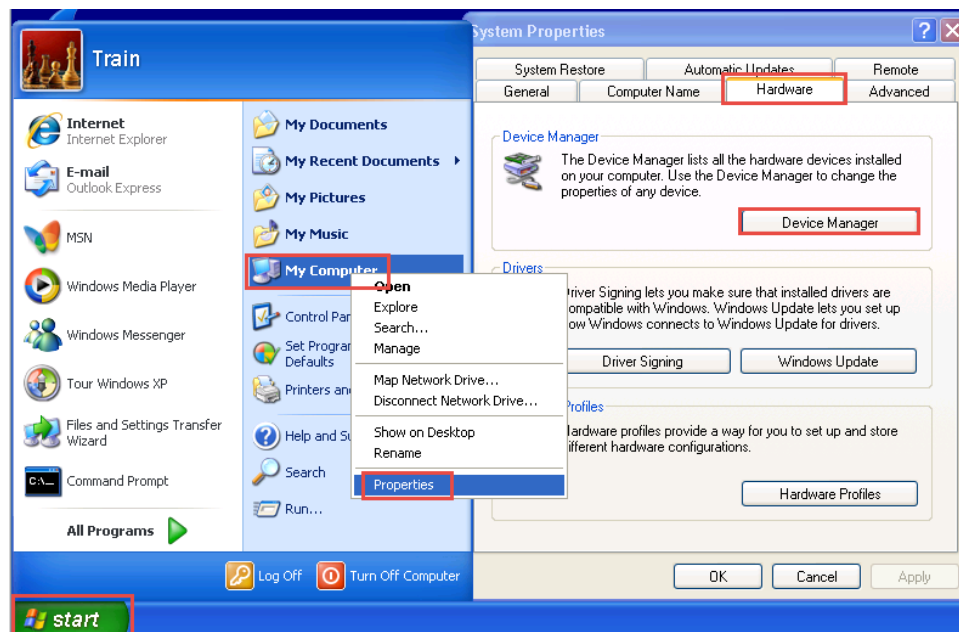
2 Inspect the Network Interface Card and LAN Configurations

Network interface cards (NICs) are an essential hardware component to network connectivity. As with all hardware devices, NICs must have the proper driver installed for the computer operating system to interact with the hardware. The driver translates the configuration and specification between the OS and the hardware. The NIC must also have the correct properties configured to communicate with the other computers in its network. TCP/IP configuration parameters and other protocols must be in place with the correct services enabled on all computers in the same workgroup in order for them to connect and share resources. Firewall settings may also have to be adjusted for communication to happen.

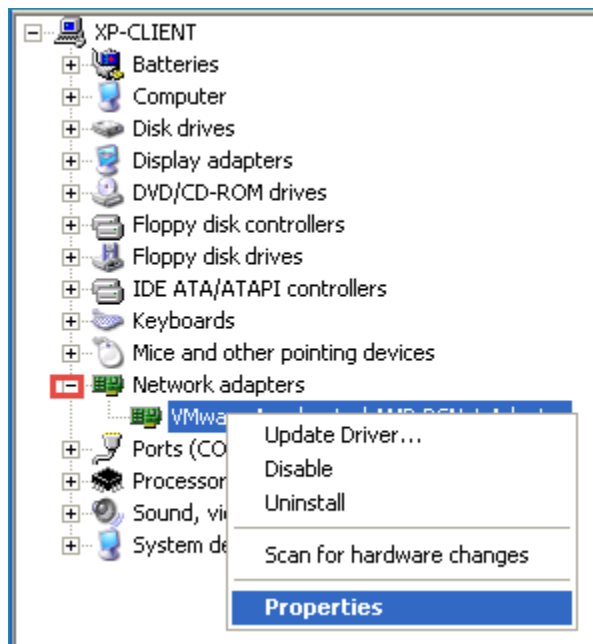
2.1 Checking Device Manager for the Network Interface Card Drivers on Windows XP

The Device Manager will allow users to view and control drivers for the hardware installed in the computer. The network card is a required hardware component for network connectivity.

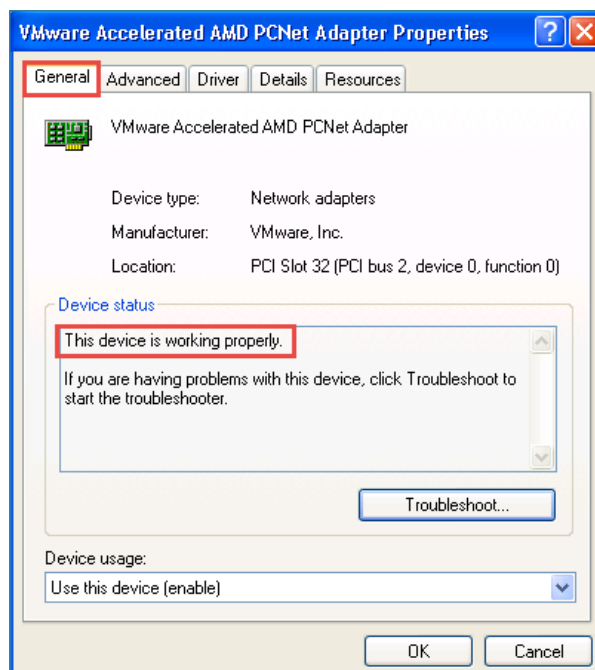
1. Use the instructions provided in the **Lab Settings** section to log on to the Windows XP machine, if you are not logged in already.
2. On the Windows XP machine, click **Start->My Computer**, right-click and select **Properties**. This will open the **Systems Properties**.
 - a. Click on the **Hardware** tab.
 - b. Click on the **Device Manager** button to open the utility.



- c. Click on the **+ sign** next to **Network adapters**. This shows the NICs installed on the system.



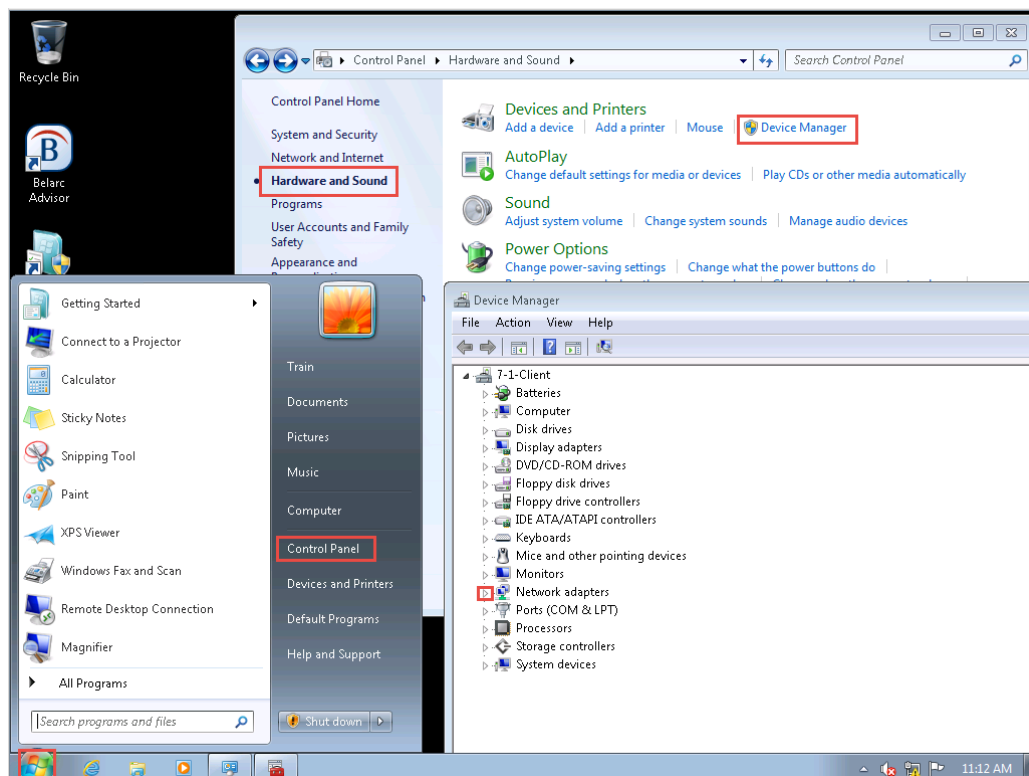
- d. Right-click on the **adapter** and click **Properties** on the context menu. Notice on the **General** tab, under the **Device status** heading, you can see if the device is working properly or needs troubleshooting.



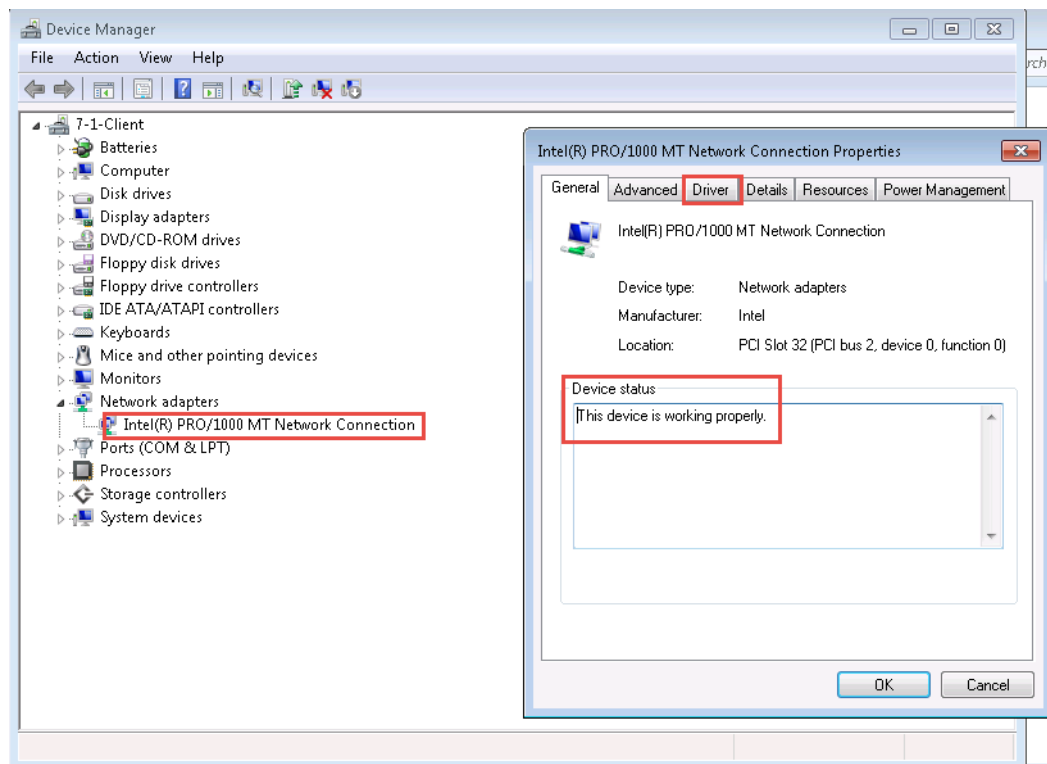
- e. Click **OK** to close the **Network Connections Properties**.
- f. Click the **"X"** in the upper-right corner to close **Device Manager**.
- g. Click the **OK** to close the **System Properties**.

2.2 Checking Device Manager for the Network Interface Card Drivers on Windows 7

1. Use the instructions provided in the **Lab Settings** section to log on to the Windows 7 #1 machine, if you are not logged in already.
2. On the Windows 7 #1 machine, view the NIC drivers by accessing **Device Manager** through **Control Panel**.
 - a. Begin by clicking on **Start->Control Panel**.
 - b. **Click on Hardware and Sound.**
 - c. Under the **Devices and Printers** heading click on **Device Manager**. The Device Manager tool will open to the default view, which is **device by type**.
 - d. **Click on the arrow next to Network adapters** in the default view list. This identifies the Network adapter installed on this system.



- e. Right-click on the **adapter** and click **Properties** on the context menu. Notice on the **General** tab under the **Device status** heading you can see if the device is working properly or needs troubleshooting.



- f. Click through the other tabs to refresh what other information can be found on the properties sheet.
- g. Click **OK** to close the **Network Connections Properties**.
- h. Click the "X" in the upper-right corner to close **Device Manager**.
- i. Click the "X" in the upper-right corner to close the **System** applet.

2.3 Verify Local Area Connection Properties and Firewall Settings on Windows XP

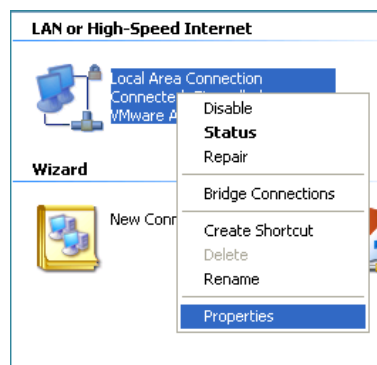
Now that the review of the network card status is complete. Verifying the protocols installed on the computer and decisions about the TCP/IP configuration parameters need to be finalized. To accomplish this, we need to access the LAN connections properties. Remember in order for workgroups to connect, the configured systems need to agree on the protocols and LAN network settings.

1. Use the instructions provided in the **Lab Settings** section to log on to the Windows XP machine, if you are not logged in already.
2. View settings on the **Network Connections** utility to learn what protocols are installed on this system.
 - a. Click on the **Start->Control Panel->Network Connections** in the **Control Panel** to see the **Local Area Connection** icon.

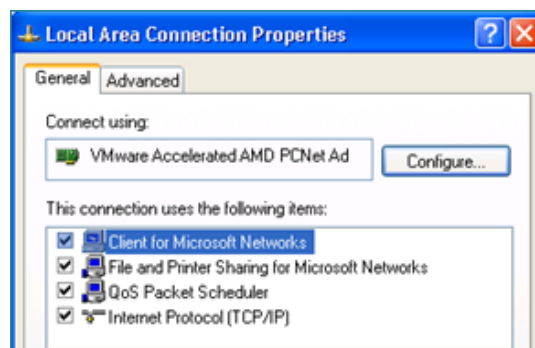
In this case, there is only one NIC installed on the system so there is only icon shown. Multiple Local Area Connection icons will appear if multiple NICs are installed on the system.



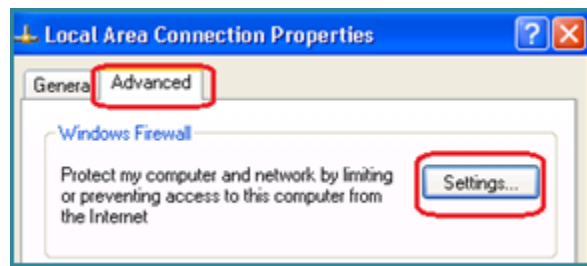
- b. Read the information associated to the **Local Area Connection**. Notice that it indicates **Connected**, and **Firewalled**.
- c. Right-click **Local Area Connection**->**Properties**.



- d. Inspect the **General** tab for the list of protocols and services installed on this computer that are being used for communication. They will have a check in the box next to them. You should see **Client for Microsoft Networks**, **File and Printer Sharing for Microsoft Networks**, and **Internet Protocol (TCP/IP)** all checked. If they are not, add a check in the box where one is missing. In order for the LAB-3 workgroup to connect and share resources on Windows clients, these protocols and services are necessary.

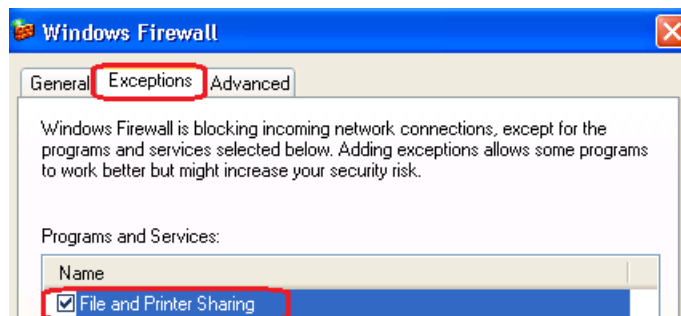


- e. Click on the **Advanced** tab and then click the **Settings** button. This will give you access to the firewall configuration.



As noted earlier, this Local Area Connection is **Firewalled**. Some settings on the firewall can prevent connectivity testing and resource sharing. The settings are put in place to protect hosts on the network. You can completely disable the firewall; however, this is not a recommended practice as it would leave the system very vulnerable. Choosing to enable just what is necessary for a system to function in the network is a more desirable option. For this lab, you will create protocol exceptions and enable services in the firewall to allow ICMP and file and print services.

- f. Click on the **Exceptions** tab then put a check in the box next to **File and Printer Sharing** to enable it. Click **OK**.

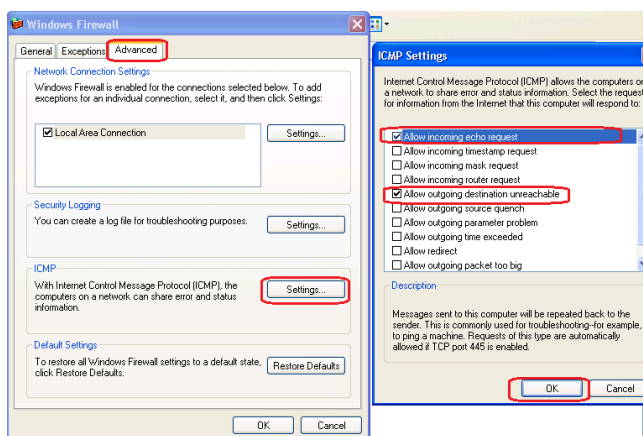


3. Next, click on the **Advanced** tab and in the **ICMP** section, click the **Settings** button.

Internet Control Message Protocol (ICMP) is an error reporting and diagnostic protocol that can be used to report errors in communication, availability of hosts, and network congestion. Ping is a utility that uses the ICMP echo reply and echo requests packets to test the reachability of hosts on the network.

- a. **Check** the box next to **Allow incoming echo request**, if it is not already checked.
- b. **Check** the box next to **Allow outgoing destination unreachable**.

- c. Click **OK** to close **ICMP Settings**.



- d. Click **OK** to close to **Windows Firewall**.
 e. Click **OK** to close **Local Area Connections Properties**.
 f. Click the "X" in the upper-right corner to close **Network Connections**.

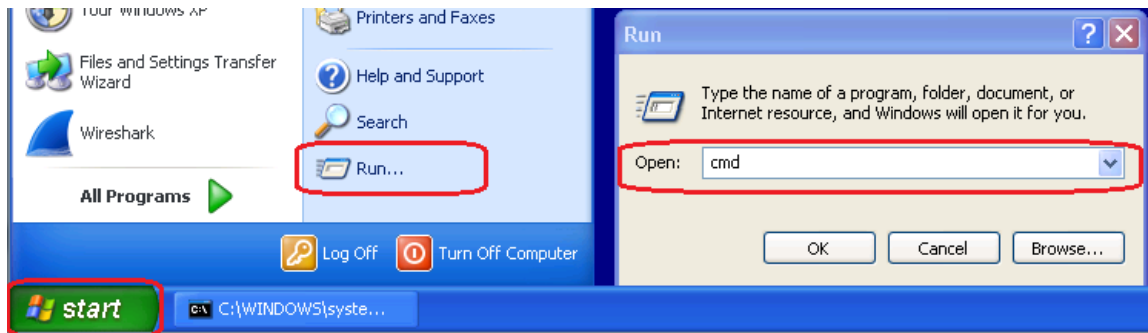
2.4 Viewing the TCP/IP Settings Windows XP

As we continue to verify the necessary configurations, you will be viewing the TCP/IP settings. The Windows XP and Windows 7 #1 systems are now in the same workgroup LAB-3, they have unique computer names, and they are running the necessary protocols for Windows workgroups. The next step will be confirming that all of the hosts within the LAB-3 workgroup belong to the same subnet. The IP address settings of the computers need to be in the same subnet and the computers need to have unique host addresses for communicating.

To determine the IP address configuration on the lab computers, you will be using the `ipconfig` command. The command `ipconfig /all` displays all current TCP/IP network configuration values. When using Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS) settings, you can use various switches with `ipconfig` to request new dynamically assigned IP addresses, manage the DNS client cache, and register new DNS records. Used without any switches, the `ipconfig` command displays the IP address, subnet mask, and default gateway for all NICs active on the computer. You will view the IP address setting at the CLI by issuing the `ipconfig` command.

1. Use the instructions provided in the **Lab Settings** section to log on to the Windows XP machine, if you are not logged in already.

- Click **Start**->**Run**, then type **cmd** in the **Open** text box and click **OK**. This will open the command prompt in Windows XP.



- Type **ipconfig** at the command prompt and press **Enter** to display the current IP address, subnet mask, and default gateway of all the NICs configured on the computer.

```

C:\WINDOWS\system32\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.
C:\Documents and Settings\Trainee>ipconfig

Windows IP Configuration

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . : 
    IP Address. . . . . : 192.168.1.11
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1

C:\Documents and Settings\Trainee>
  
```

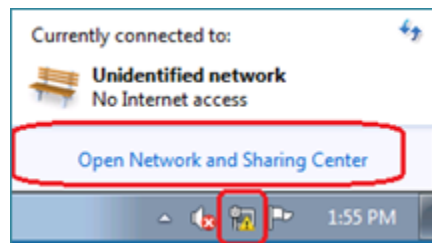
- Document the IP address, Subnet Mask, and Default Gateway on the Windows XP machine to use in order to verify that the workgroup LAB-3 machines are on the same network.

IP address	Subnet Mask	Default Gateway

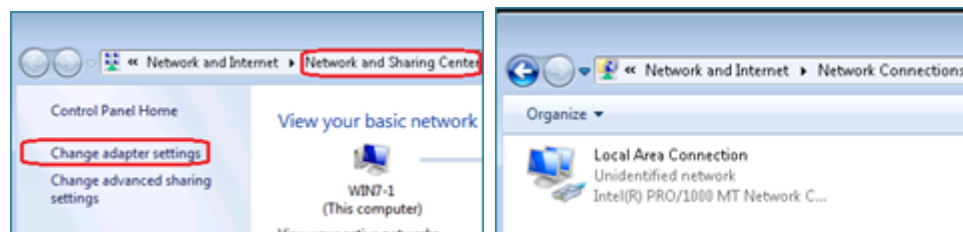
2.5 Verify Local Area Connection Properties and View the TCP/IP Settings Windows 7

The review of the network card status in Windows XP is complete. Now we must review the network card status of the Windows 7 #1 machine. To accomplish this, you will access the Network and Sharing Center in Windows 7.

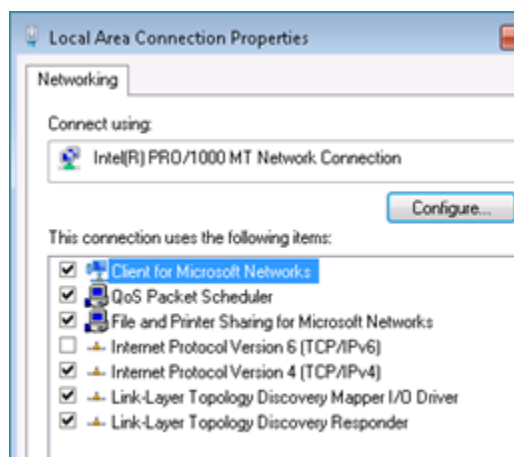
1. Use the instructions in the **Lab Settings** section to log on to the Windows 7 #1 machine, if you are not logged in already.
 - a. Left-click the **Network and Sharing Center** icon on the **Task Bar**, then click **Open Network and Sharing Center**.



- b. Click **Change Adapter settings** on the left panel to access the **Local Area Connection**. Notice the information about whether the firewall is configured is not provided with the link in Windows 7.



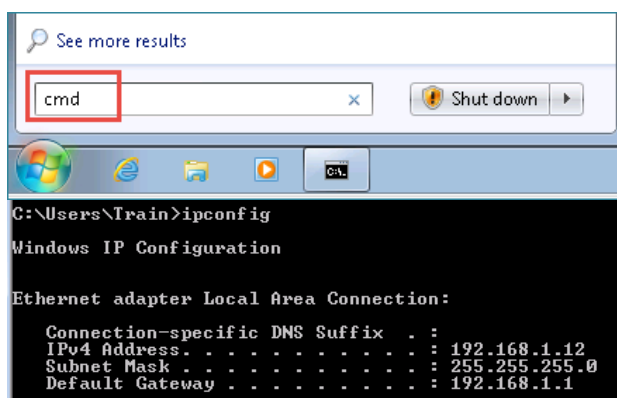
- c. Right-click **Local Area Connection**->**Properties**. This will open the Local Area Connections Properties window.



- d. Inspect the **Networking** tab for the list of protocols installed on this computer used for connection. You should see **Client for Microsoft Networks, File and Printer Sharing for Microsoft Networks, and Internet Protocol Version 4 (TCP/IPv4)** checked because these are needed in order for the workgroup LAB-3, to connect and share resources on Windows clients. If any of these are unchecked put a check in the necessary box or boxes.
- e. Click **OK** to close the **Local Area Connections Properties** sheet.
- f. Click the "X" in the upper-right corner to close Network Connections.

Just as you did on the Windows XP machine, you will view the IP address setting at the CLI by issuing the ipconfig command.

2. Click **Start**, type **cmd** in the search box and press **Enter**. This will open the command prompt on the Windows 7 #1 machine.
3. Type **ipconfig** at the command prompt and press **Enter** to display the current IP address, subnet mask, and default gateway of all the NICs configured on the computer.



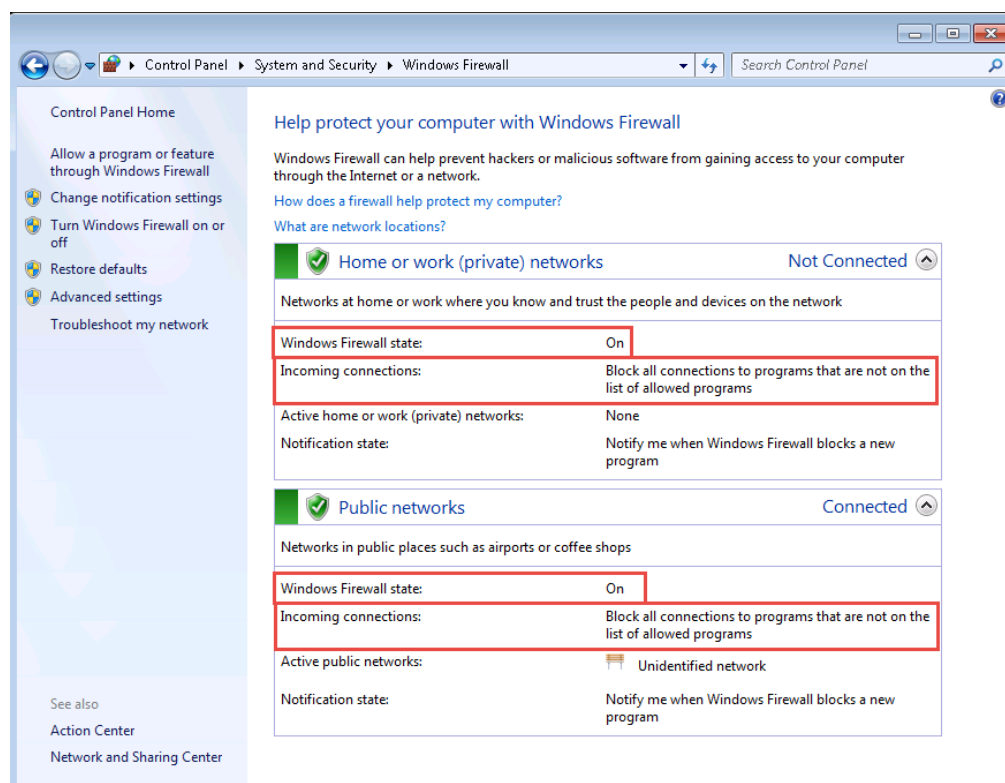
4. Document the IP address, Subnet Mask, and Default Gateway on Windows 7 #1 to use in order to verify that the workgroup LAB-3 machines are on the same network.

IP address	Subnet Mask	Default Gateway

2.6 Verify Firewall Properties on Windows 7

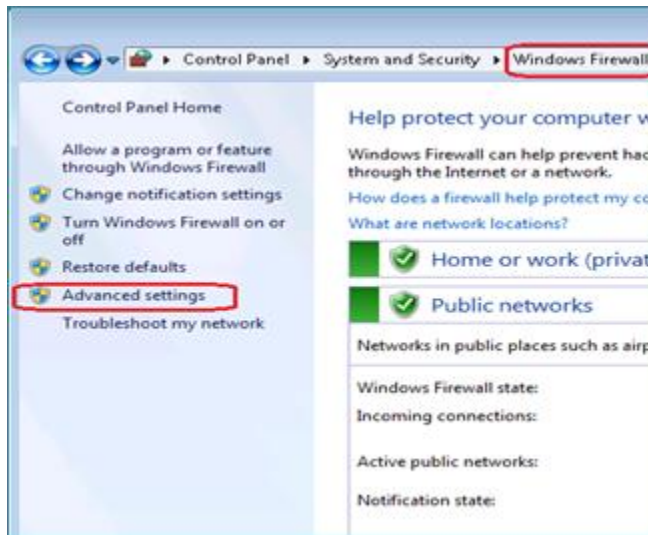
In Windows XP it was easy to see that the firewall was enabled from the **Local Area Connection** icon information. In the Windows 7 operating system there is no information listed at the icon, so you will have to access the **Windows Firewall** page to check the settings.

1. Use the instructions provided in the **Lab Settings** section to log on to the Windows 7 #1 machine, if you are not logged in already.
2. Click **Start->Control Panel->System and Security->Windows Firewall**
 - a. Locate the settings on the home page to see that the Windows Firewall is enabled and blocking incoming programs that are not on the allowed list. Click the drop-down arrow next **Home or work (private) networks** and **Public networks** to expand the viewable area as seen in the graphic.



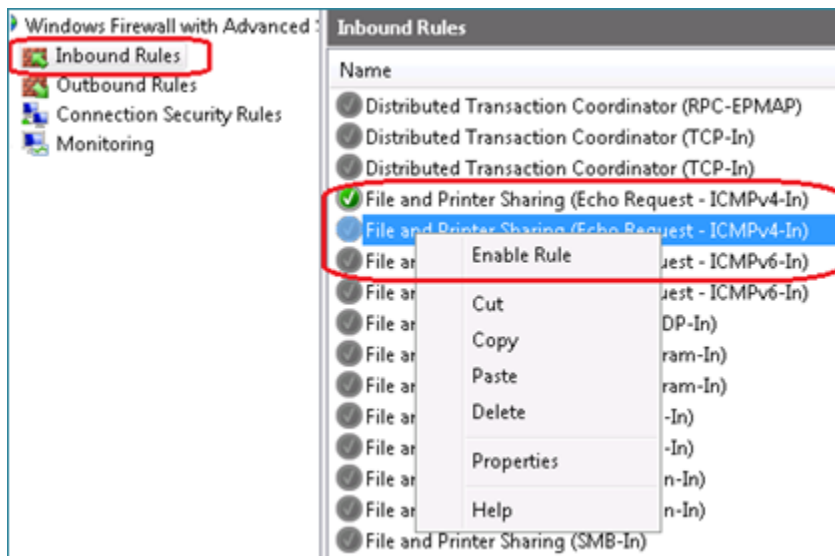
As with Windows XP, changes to the firewall settings will need to be made on the Windows 7 #1 machine in order to be able to test connectivity and share resources in the workgroup, LAB-3.

3. In the left panel of the Windows Firewall home page, click **Advanced Settings**.



This opens Windows Firewall with Advanced Security. Here, you will create the exceptions on the Windows 7 #1 machine for ICMP and File and Printer Sharing.

4. In the left panel, click on **Inbound Rules**.
5. Next, in the middle panel titled **Inbound Rules**, scroll down to find the rules named **File and Printer Sharing (Echo Request - ICMPv4-In)**. The list is alphabetical.
6. Right-click each named **File and Printer Sharing (Echo Request - ICMPv4-In)** rule and click **Enable Rule**. Be sure the circled check mark is now displayed in a green circle.



7. Close **Windows Firewall Advanced Security** by clicking the "X" in the upper right corner.
8. Close **Windows Firewall** by clicking the "X" in the upper-right corner.

2.7 Test Connectivity Between LAB-3 Workgroup Computers

1. Use the instructions in the **Lab Settings** section to log on to the Windows 7 #1 and the Windows XP machines, if you are not logged in already.
2. Use the ipconfig command or gather the information from the previous two tables to complete the table below and compare IP addressing information on all systems in the LAB-3 workgroup.

Machine ID	IP address	Subnet Mask	Default Gateway
Windows XP			
Windows 7 #1			

Note that the subnet masks match and the hosts are all on the same network, the IP addresses of the hosts are unique. This verifies that the TCP/IP configurations meet the correct parameters for the Workgroup network connectivity.

You will be using another TCP/IP utility, **ping**, in the CLI to test for network connectivity. The ping command sends ICMP request messages to the remote device. If the remote system hears the ICMP request they respond with ICMP reply messages. In a Windows-based system, four data packets are sent by default. Carefully observe the output of the ping command. You should receive a response similar to the one in the graphics below.

3. Access the command line on the Windows XP machine (click **Run**, type **cmd** in the box and then click **OK**).
4. Type **ping**, and then a space, followed by the IP address of Windows 7 #1 at the prompt. Press **Enter**.

Was the ping successful? _____

Pinging the IP address of Windows 7 #1 verifies that the Windows XP machine can connect with another host in the LAB-3 workgroup because it receives a successful reply from the remote device.

```
C:\Documents and Settings\Trainee>ping 192.168.1.12
Pinging 192.168.1.12 with 32 bytes of data:
Reply from 192.168.1.12: bytes=32 time<1ms TTL=128
Reply from 192.168.1.12: bytes=32 time<1ms TTL=128
Reply from 192.168.1.12: bytes=32 time<1ms TTL=128
Reply from 192.168.1.12: bytes=32 time<1ms TTL=128
Ping statistics for 192.168.1.12:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

5. Access the command line on the Windows 7 #1 machine (click **Start**, type **cmd** in the search box and press **Enter**).
6. Type **ping** followed by the IP address of Windows XP at the prompt. Press **Enter**.

7. Was the ping successful? _____

Pinging the IP address of the Windows XP machine verifies that the Windows 7 #1 machine can connect with another host in the LAB-3 workgroup.

```
C:\Users\Train>ping 192.168.1.11

Pinging 192.168.1.11 with 32 bytes of data:
Reply from 192.168.1.11: bytes=32 time<1ms TTL=128
Reply from 192.168.1.11: bytes=32 time<1ms TTL=128
Reply from 192.168.1.11: bytes=32 time<1ms TTL=128
Reply from 192.168.1.11: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

2.8 Conclusion

Configuring Windows workgroup names is just a piece of the larger task of setting up peer-to-peer networking. Workgroup clients must be in the same subnet to connect to each other. TCP/IP configurations settings, such as the type of clients to be connected, protocols, and services being used must be verified. In the Windows workgroup configuration common TCP/IP settings are:

Client - Adds a client to the configuration (must have at least one).

Protocol - In Microsoft operating systems TCP/IP is the default (must have a protocol to communicate). Internet protocols (TCP/IP) can be IPv4 or IPv6

Service - File and Printer Sharing must be enabled for other computers on the network to gain access.

3 Share Data and Resources on the Network

In this task, you will create and share a folder and map a network drive for the LAB-3 workgroup computers to share resources. The Windows XP machine and the Windows 7 #1 are in the same workgroup, so they may allow each other access to their files and other resources. As long as systems are on the same local area network they can directly access shared resources in the workgroup to which they are joined.

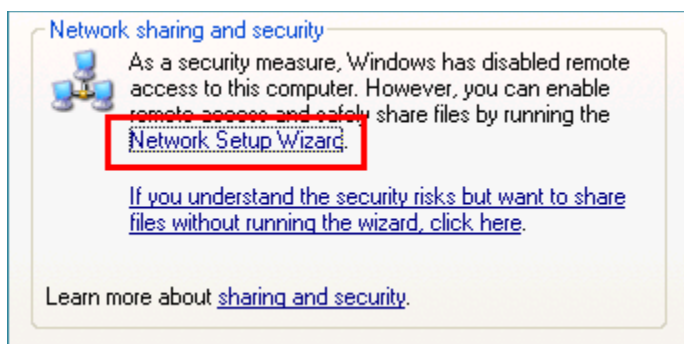
3.1 Share a Folder in Windows XP and Accessing It from a Windows 7 Computer

The functionality of the Windows workgroup lies in being able to share resources. Once connectivity is established, the configuration of resource sharing is necessary.

1. Use the instructions in the **Lab Settings** section to log on to the Windows XP machine, if you are not logged in already.
2. On the Windows XP machine, click **Start->My Computer**.
3. Right-click **Shared Documents->Sharing and Security...**



4. In the **Network sharing and security** section, click **Network Setup Wizard**.



5. Click **Next**.
6. Click **Next** after reading the checklist.

7. On the **Connection Methods** page, select the radio button next to **Other** (this is what best describes this computer). Click **Next**.

Select the statement that best describes this computer:

☐ This computer connects directly to the Internet. The other computers on my network connect to the Internet through this computer.
[View an example.](#)

☐ This computer connects to the Internet through a residential gateway or through another computer on my network.
[View an example.](#)

☒ Other

Learn more about [home or small office network configurations.](#)

8. On the **Other Internet connection methods** page, select the radio button next to **This computer belongs to a network that does not have an Internet connection**. Click **Next**.

Network Setup Wizard

Other Internet connection methods...

Select the statement that best describes this computer:

☐ This computer connects to the Internet directly or through a network hub. Other computers on my network also connect to the Internet directly or through a hub.
[View an example.](#)

☐ This computer connects directly to the Internet. I do not have a network yet.
[View an example.](#)

☒ This computer belongs to a network that does not have an Internet connection.
[View an example.](#)

Learn more about [home or small office network configurations.](#)

< Back **Next >** Cancel

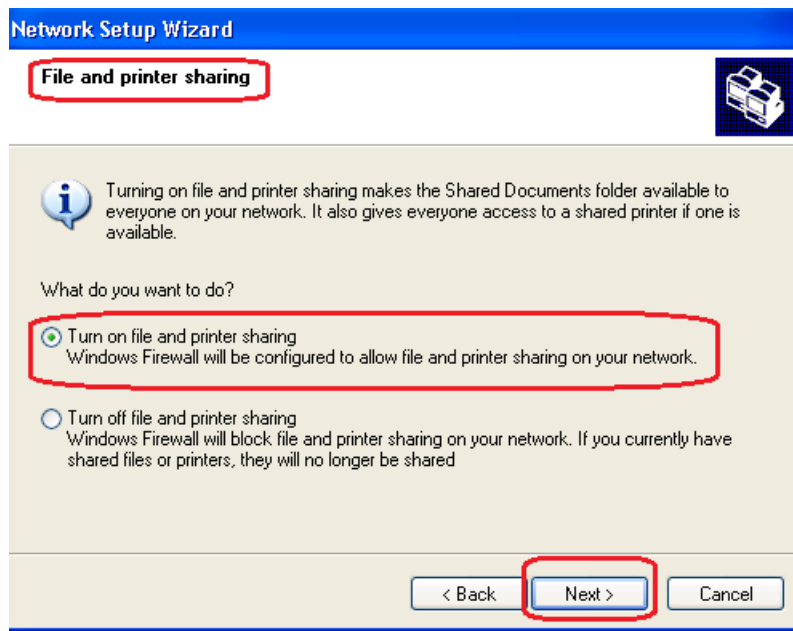
9. On the **Give this computer a description and name** page, verify that the name is **XP-Client**. Click **Next**.

The screenshot shows the 'Network Setup Wizard' window. The title bar is blue with the text 'Network Setup Wizard'. Below the title bar, the main heading 'Give this computer a description and name.' is enclosed in a red rectangle. To the right of the heading is a small icon of a computer. The main area has a light beige background. It contains a 'Computer description:' label followed by a text input field. Below this field, it says 'Examples: Family Room Computer or Monica's Computer'. Below that is the 'Computer name:' label followed by a text input field containing 'XP-CLIENT'. Below this field, it says 'Examples: FAMILY or MONICA'. Further down, it states 'The current computer name is WINXP.' At the bottom, there is a link 'Learn more about [computer names and descriptions](#).' and three buttons: '< Back', 'Next >', and 'Cancel'. The 'Next >' button is highlighted with a red rectangle.

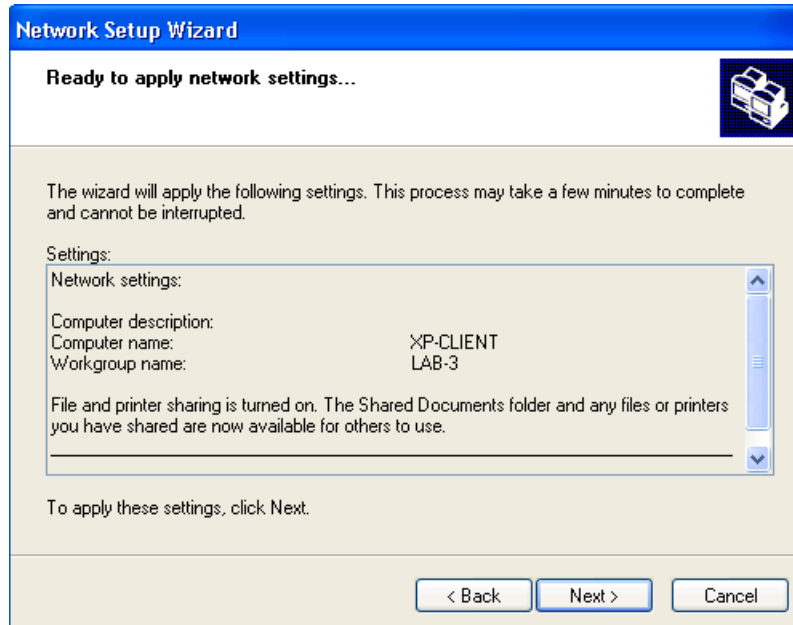
10. On the **Name your network** page, verify that the Workgroup name is **LAB-3**. If it is not, type in **LAB-3**. Click **Next**.

The screenshot shows the 'Network Setup Wizard' window. The title bar is blue with the text 'Network Setup Wizard'. Below the title bar, the main heading 'Name your network.' is enclosed in a red rectangle. To the right of the heading is a small icon of a computer. The main area has a light beige background. It contains the text 'Name your network by specifying a workgroup name below. All computers on your network should have the same workgroup name.' Below this text is the 'Workgroup name:' label followed by a text input field containing 'LAB-3'. Below this field, it says 'Examples: HOME or OFFICE'. At the bottom, there are three buttons: '< Back', 'Next >', and 'Cancel'. The 'Next >' button is highlighted with a red rectangle.

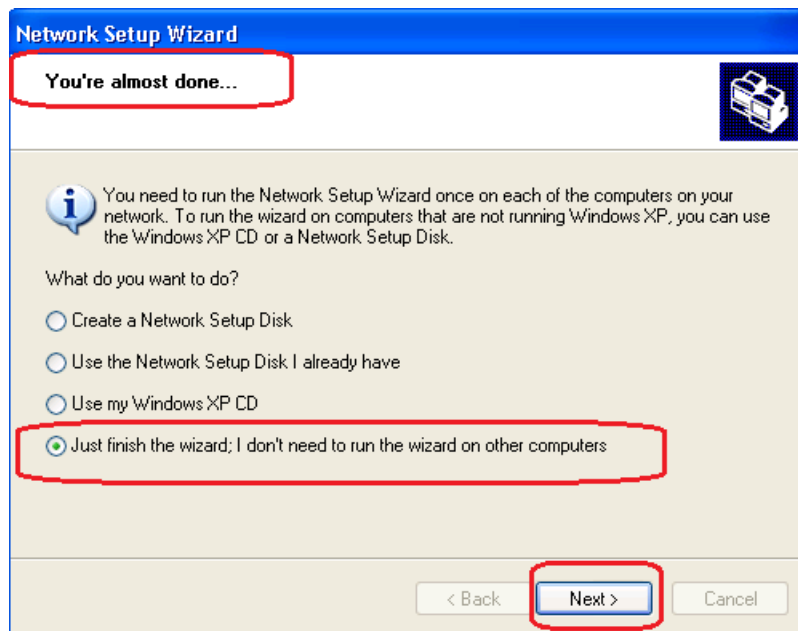
11. On the **File and Printer sharing** page, verify that the radio button next to **Turn on file and printer sharing** is selected. If it is not, select it. Click **Next**.



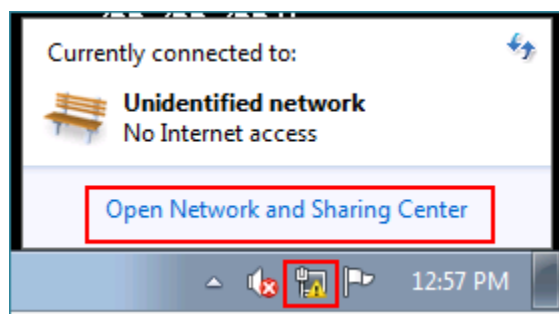
12. Review that the setting on the **Ready to apply network settings...** page are correct. Click **Next**.



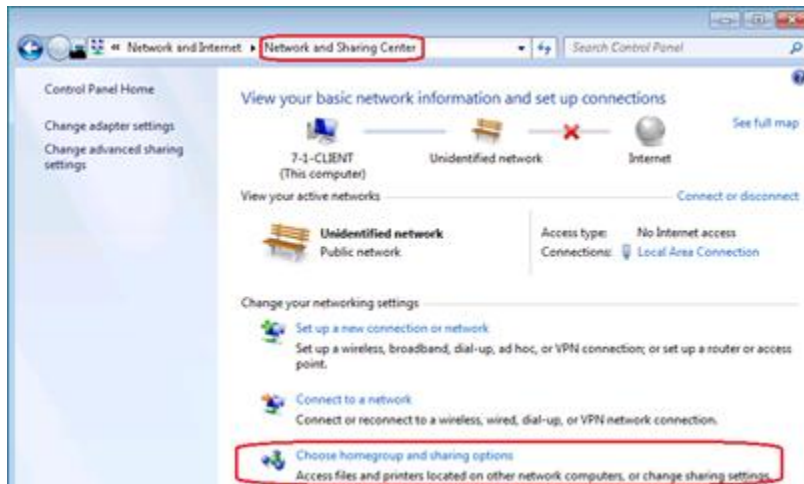
13. On the **You're almost done...** page, verify that the radio button next to **Just finish the wizard** is selected. If it is not, select it. Click **Next**.



14. Click **Finish** to complete the **Network Setup Wizard**.
15. Click **OK** to close **Shared Documents Properties**
16. Click **Yes** if asked to restart your computer and log back in when reboot is completed.
(this step may not appear).
17. You have now shared the **Shared Documents** folder.
18. Click **Start->My Computer** (if not already open) and view the **Shared Documents** folder icon to see that it has been shared.
19. Use the instructions in the **Lab Settings** section to log on to the Windows 7 #1 machine, if you are not logged in already.
20. Left-click the **Network and Sharing Center** icon on the Task Bar and click **Open Network and Sharing Center**.

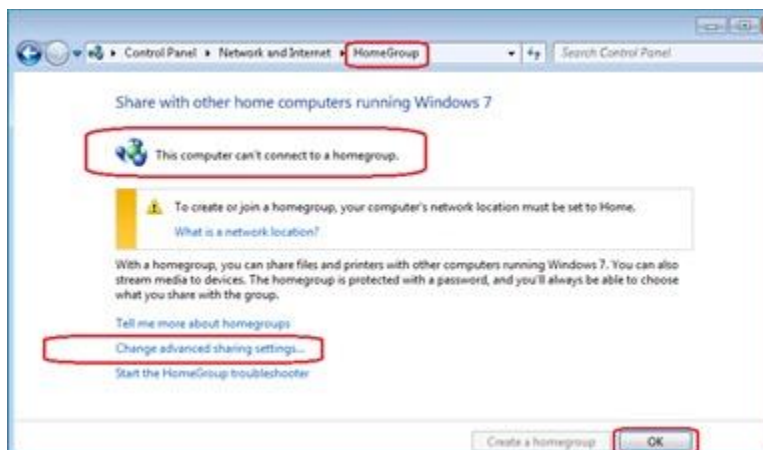


21. Click on **Choose homegroup and sharing options** to access the HomeGroup page.

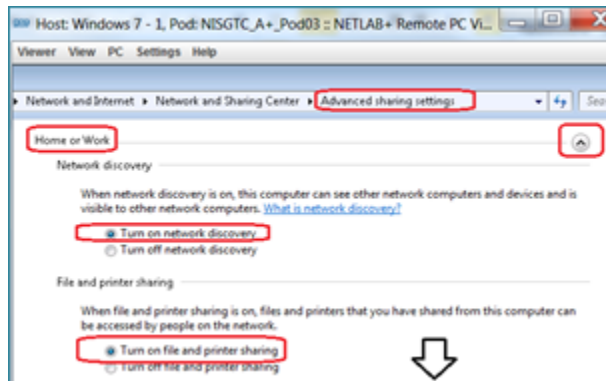


22. Click **Change advanced sharing settings** on the Homegroup page; this will open the **Advanced sharing settings** page.

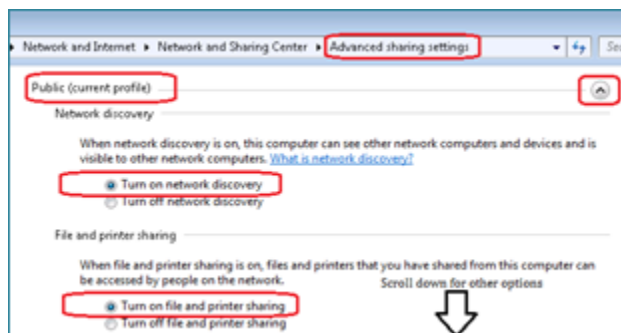
Notice the statement **This computer can't connect to a homegroup** on the **Advanced sharing settings** page. Remember, HomeGroup is only available on the Windows 7 operating system and because the resources are being shared among a Windows XP system and Windows 7, advanced sharing needs to be configured to allow the workgroup to function.



23. Click the drop-down arrow next to **Home or Work** on the **Advanced sharing settings** page.
- Click on **Turn on network discovery**.
 - Click on **Turn on file and print sharing**.
 - Click on **Turn on sharing so anyone with network access can read and write in the Public folders**.
 - Click on **Use user accounts and passwords to connect to other computers**.

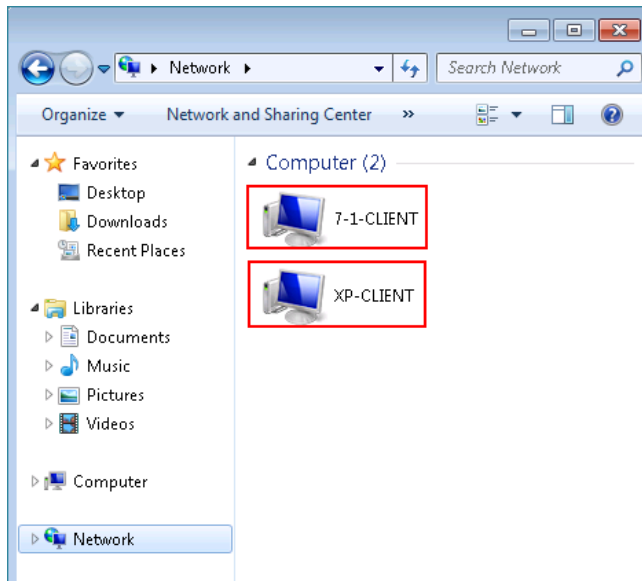


24. Click the drop down arrow next to **Public (current profile)** on the **Advanced sharing settings** page.
- Click on **Turn on network discovery**.
 - Click on **Turn on file and print sharing**.
 - Click on **Turn on sharing so anyone with network access can read and write in the Public folders**.

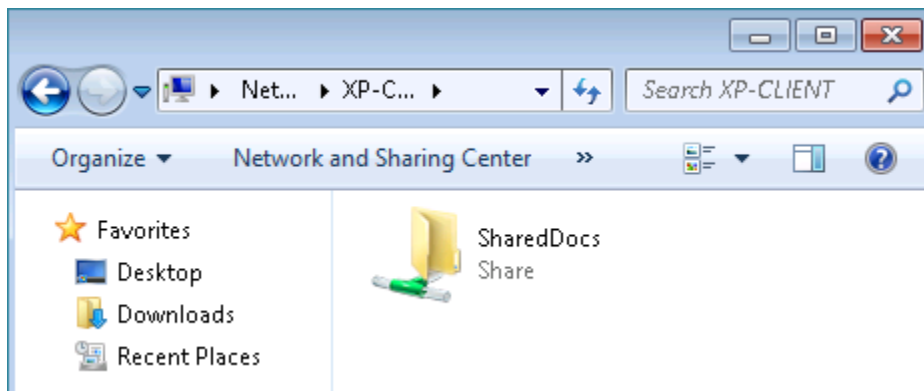


25. Click the **Save Changes** button.
26. Click **Log off now**. Log back on to the Windows 7 #1 machine.
27. Go to **Start->Computer**.

28. In the left panel, click **Network**. This will display all the computers and devices discovered on the network computers. Notice you will see the Windows 7 #1 computer and the Windows XP computer, but not the other computers in the topology, since they are not in the LAB-3 workgroup.

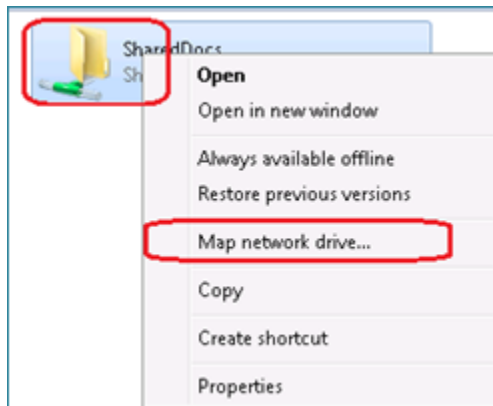


29. Double-click on **XP-CLIENT** to locate the **Shared Documents** folder. The two workgroup LAB-3 computers are now sharing resources.



Now you will map a network drive to the shared folder to for easy access to it. Mapping the share means that you will assign a drive letter to the remote folder so it will appear as a local resource and you will not have to look for it or locate it on the network each time you need access.

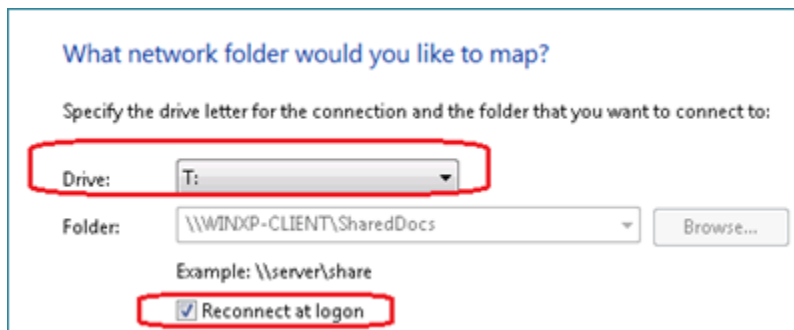
30. Right-click on the **SharedDocs**->**Map a network drive...**



31. Click the drop-down arrow next to **Drive:** and select **T** as the drive letter.

32. Review the information in the **Folder:** text area to be sure it is the correct share.

33. Check **Reconnect at login**.

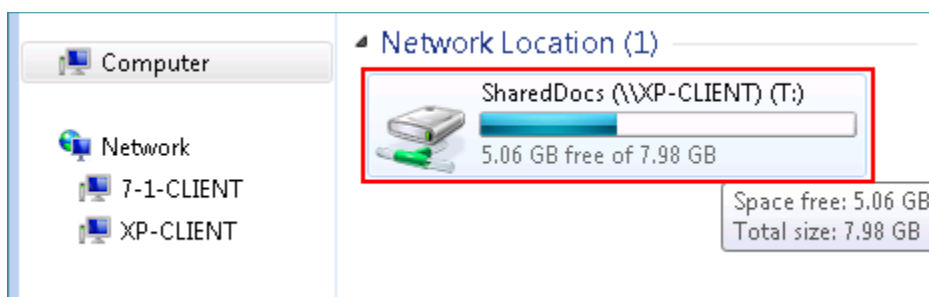


34. Click **Finish**.

35. Close all open windows.

36. Click **Start->Computer**.

37. Locate the share under the **Network Location**.



3.2 Conclusion

The functionality of the Windows workgroup lies in being able to share resources. Once connectivity is established, the configuration of resource sharing is necessary. Sharing between computers running different Windows operating systems can be done using the workgroup feature. Once shares have been created, drive mapping can be configured to make accessing the resource easier and more convenient.



4 Using Network Command-Line Utilities

All of the computers that you are working with in the lab are connected by a network. They all belong to the same subnet and should be able to connect to each other. Hardware issues, firewall settings, incorrect IP addressing information, and errors in network configurations can all account for problems with network connectivity. In this task, you will be using command-line tools to view useful information for both network configuration and troubleshooting.

1. Use the instructions in the **Lab Settings** section to log on to the Windows 7 #2 machine, if you are not logged in already.
2. Click **Start**, type **cmd** and press **Enter**. The command-line interface window opens. (If you were to log on to the Windows XP machine you would go to **Start->Run**, type **cmd**).
3. Type **ipconfig** to see the TCP/IP configuration information. This will show the basic Windows IP configuration. If you want to see more information about the adapters than just basic, type **ipconfig /all**. This gives detailed information about each adapter on the system.

```

C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\Train>ipconfig /all

Windows IP Configuration

Host Name . . . . . : Win7-2
Primary Dns Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No

Ethernet adapter Local Area Connection: Physical NIC

Connection-specific DNS Suffix . :
Description . . . . . : Intel(R) PRO/1000 MT Network Connection
Physical Address. . . . . : 00-50-56-9C-7E-0C
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . : Yes
IPv4 Address. . . . . : 192.168.1.10(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.1.1
DNS Servers . . . . . : 192.168.1.1
                        192.168.1.100
NetBIOS over Tcpip. . . . . : Enabled

Tunnel adapter isatap.{05338BDE-CD7F-44DE-B487-C6E9D5BF60D4}: IPv6 tunnel

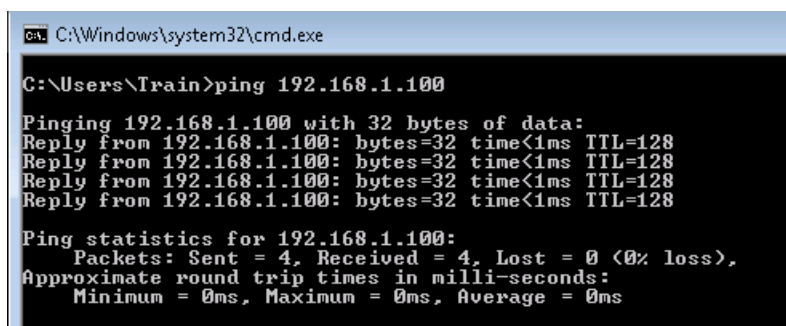
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Description . . . . . : Microsoft ISATAP Adapter
Physical Address. . . . . : 00-00-00-00-00-00-00-E0
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . : Yes

Tunnel adapter Teredo Tunneling Pseudo-Interface: IPv6 and other protocols

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Description . . . . . : Teredo Tunneling Pseudo-Interface
Physical Address. . . . . : 00-00-00-00-00-00-00-E0
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . : Yes
  
```

Important settings to help with troubleshooting IPv4 connections.

- At the command prompt, type **ping 192.168.1.100** and press **Enter**, as observed in the ipconfig output. This is the IP address of the DNS server. Using the ping command will verify connectivity to the DNS server.



```
C:\Windows\system32\cmd.exe

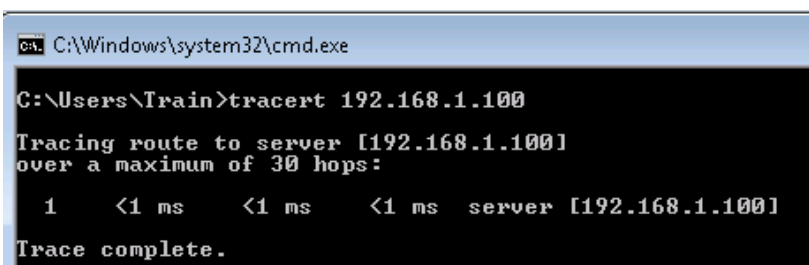
C:\Users\Train>ping 192.168.1.100

Pinging 192.168.1.100 with 32 bytes of data:
Reply from 192.168.1.100: bytes=32 time<1ms TTL=128
Reply from 192.168.1.100: bytes=32 time<1ms TTL=128
Reply from 192.168.1.100: bytes=32 time<1ms TTL=128
Reply from 192.168.1.100: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

The results of the **ping** are successful and connectivity is active with the DNS server.

- At the command prompt, type **tracert 192.168.1.100** and press **Enter**. This command is very helpful in providing a roadmap of the route the packets take to get to a remote host. In the event the ping was unsuccessful, tracert would show the point in the path that a hop was unreachable.



```
C:\Windows\system32\cmd.exe

C:\Users\Train>tracert 192.168.1.100

Tracing route to server [192.168.1.100]
over a maximum of 30 hops:
  0  <1 ms  <1 ms  <1 ms  server [192.168.1.100]
Trace complete.
```

Based on the output of the command, it can be determined that the DNS server is on the same local area of the Windows 7 #2 machine and does not use a router because the only hop was directly to the DNS server.

- At the command prompt, type **net accounts** and press **Enter**. This command allows you to view account settings and make changes to various account options from the command-line. If you are unable to access the GUI and need to make a new account for troubleshooting this command is invaluable.

4.1 Conclusion

Knowing how to use network command-line tools is important to a PC technician, especially when the GUI becomes unavailable. It is not very often that you will encounter computers that exist in a stand-alone environment, so knowledge of network CLI tools is a must if you are going to be troubleshooting.

References

1. Troubleshooting device conflicts with device manager:
<https://support.microsoft.com/kb/133240/EN-US>
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3. Windows Firewall:
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4. How to manage users in Windows 7:
http://www.pcworld.com/article/171933/manage_users_in_windows_7.html
5. Share files:
<http://windows.microsoft.com/en-us/windows7/share-files-with-someone>
6. Create a shortcut:
<http://windows.microsoft.com/en-us/windows7/create-a-shortcut-to-map-a-network-drive>

