

How To Create A Direct Connection Using Ethernet Crossover Cable In Windows XP

Mark E. Donaldson

If you have only two computers (desktop PCs or laptops) and both computers have either built-in or additional Ethernet network adapters, you can connect both computers directly using a crossover cable. Crossover cable is an Ethernet cable (Cat 5, Cat 5e or Cat 6) that has pins 1, 2, 3, 6 on one end crossed to pins 3, 6, 1, 2 on the other end respectively. Like standard (straight-through) Ethernet cable, crossover cable is also terminated with RJ-45 connectors. Please note, if one of your computers has an auto-crossover (a.k.a. auto-switching or auto-MDI/MDIX) Ethernet port, you can connect them using either crossover or straight-through cable. Most Gigabit Ethernet (10/100/1000BaseT) adapters have auto MDI/MDIX function. Therefore, if you have it installed in one computer, you can connect it with other computer using a standard Ethernet cable.



The direct Ethernet connection works like an Ethernet network that is equipped with Ethernet hardware, i.e. hub, switch, or router. It can be used to share files, folders, drives, printers, and peripherals. It can also be used to share an Internet connection or play a networked game.

Most consumer Ethernet adapters in use today are Fast Ethernet (10/100BaseT) with autosensing which means the direct Ethernet connection can switch from/to 10 Mbps or 100 Mbps link speed depending on line condition. Therefore, a direct connection between two computers using Ethernet crossover cable is faster than using either serial or parallel cable. Moreover, Ethernet cable can reach longer distance (up to 100 meters) without repeater and you don't need to buy additional software to configure the direct connection.

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What should I prepare?



Figure: Diagram of Ethernet (RJ-45) socket compared with telephone (RJ-11) jack. RJ45 has 8 wires, RJ11 has 2 or 4.

1. Make sure your computers have Ethernet ports. An Ethernet port is an RJ-45 female connector (socket). It looks like a wall telephone jack (RJ-11) but a bit larger. If you can't find an Ethernet port, then your computer doesn't have an Ethernet adapter. You must install it first. You may choose internal (PCI card) or external adapter (USB or PCMCIA PC Card)
2. Plug the cable RJ-45 male connectors firmly into Ethernet ports on both computers.
3. If you would like to use the direct cable connection for sharing an Internet connection, check the Internet connection facility on each computer, i.e. whether it has an internal or external modem, whether the modem connects via PCI slot, Ethernet or USB and the physical connection to the Internet using telephone or cable TV line. Decide how you will connect both computers to the Internet.
4. Prepare an empty formatted floppy disk or Windows XP CD-ROM if one of your computers running a previous version of Windows, i.e. Windows 98, Windows 98 SE, Windows ME.

Step-by-Step Instructions

In this example, the first computer will share its Internet connection, therefore it will become the ICS (Internet Connection Sharing) host. The second computer will connect to the Internet via the first computer, therefore it will become the ICS client. If one of your computers is running a previous version of Windows, the computer running Windows XP must become the ICS host.

In the first part, the direct connection will be created using the Network Setup Wizard. In the second part, it will be configured manually via Network Connections folder.

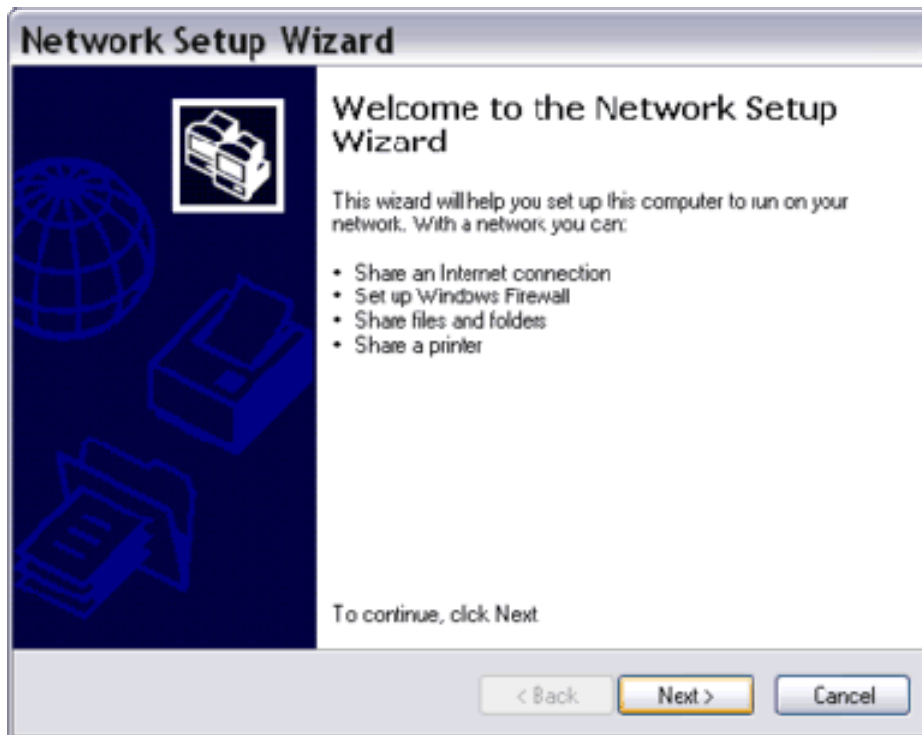
In Windows XP, you must be logged on to your computer as an administrator to complete the step-by-step instructions below. If you are not sure, check it from User Accounts in Control Panel.

Part One : Direct Ethernet connection setup using the Network Setup Wizard Setup on the first computer (1)

1. Open the Network Setup Wizard, and then click Next.

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2. In "Before you continue...", you are reminded to make sure that you've installed network cards, modems, and cables, turn on all computers, and external modems connect to the Internet. Click Next.



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Setup on the first computer (2)

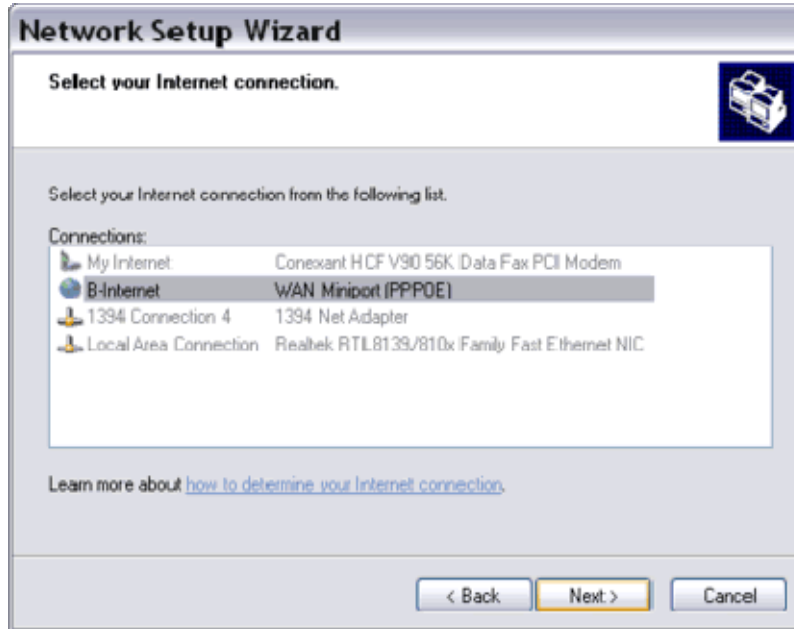
3. In "The wizard found disconnected network hardware.", the network adapters not connected to their counterparts in another computer, will be shown on the list. Check "Ignore disconnected network hardware", then click Next. But if you only see your Ethernet card on the list, it means your Ethernet crossover cable hasn't been plugged in firmly to both computers' Ethernet ports or you might use a wrong cable. In this case, connect the right cable to both computers, leave the checkbox blank, and click Next.
4. In "Select a connection method", select "This computer connects directly to the Internet. The other computers on my network connect to the Internet through this computer." Click Next.



5. In "Select your Internet connection", choose an Internet connection that you will share. Click Next.

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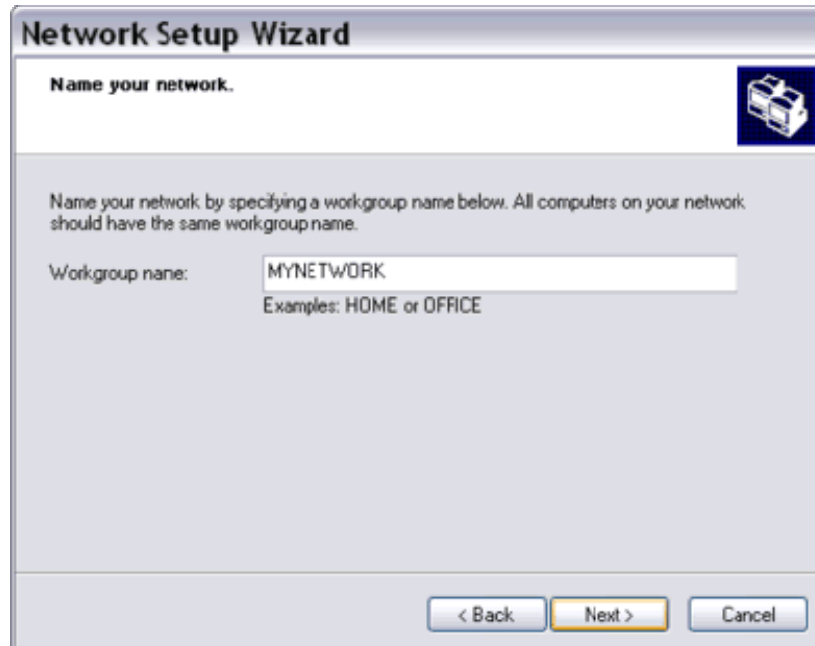
6. In "Select your private connection", choose the Local Area Connection that corresponds with your Ethernet card (NIC). You may select more than one network connections here. In such a case, Windows will create a network bridge between them.
7. In "Give this computer a description and name", enter a description of your computer. The description can be anything but it would be better if you type in a meaningful text that tells you its specific function, who uses the computer, or in which room it is located. Unlike the description, the computer name must be unique in your network.



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8. In "Name your network", specify a workgroup name. The default name is MSHOME. You can leave it or change it. The workgroup name should be the same on all computers.



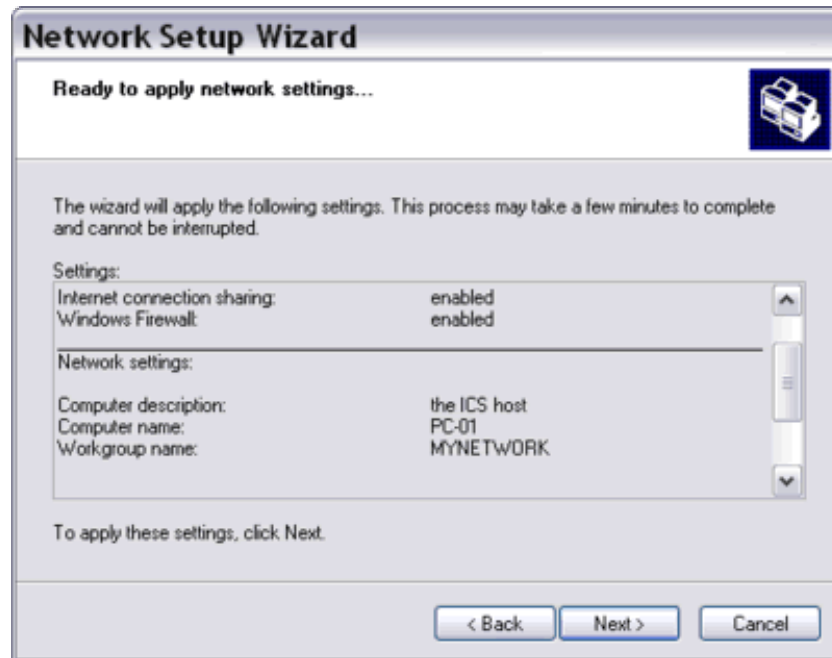
9. In "File and printer sharing", select "Turn on (or off) file and printer sharing". Your choice here will affect Windows Firewall setting. If you turn on file and printer sharing, Windows Firewall will be configured to allow file and printer sharing. You can check it later from the Exceptions tab of Windows Firewall window. If you turn off file and printer sharing, you still can share an Internet connection.



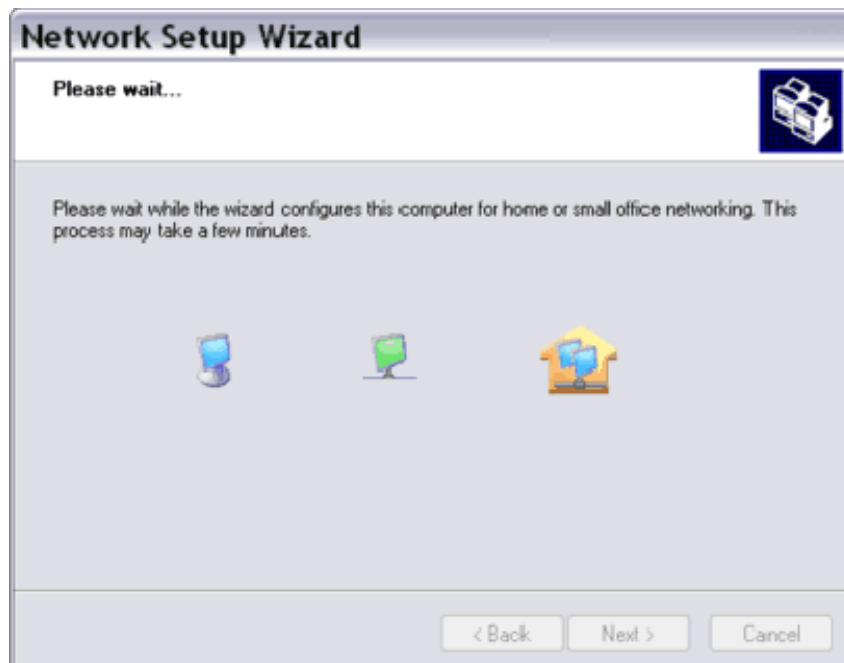
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10. In "Ready to apply network settings...", you are presented with the network settings that have been created through the previous steps. Included on the list are your Internet connection, ICS and Windows Firewall setting, computer name and description, workgroup name, and file and printer sharing setting. You have a chance to check your network configuration and make a change if necessary by clicking Back.



11. In "The wizard configures this computer for network connection", you must wait for the wizard to complete your network configuration. It would take a couple of minutes.



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12. In "You're almost done", you're presented with several choices:

"Create a Network Setup Disk or use Windows XP CD."

"Use the Network Setup Disk I already have."

"Use my Windows XP CD."

"Just finish the wizard; I don't need to run the wizard on other computers."

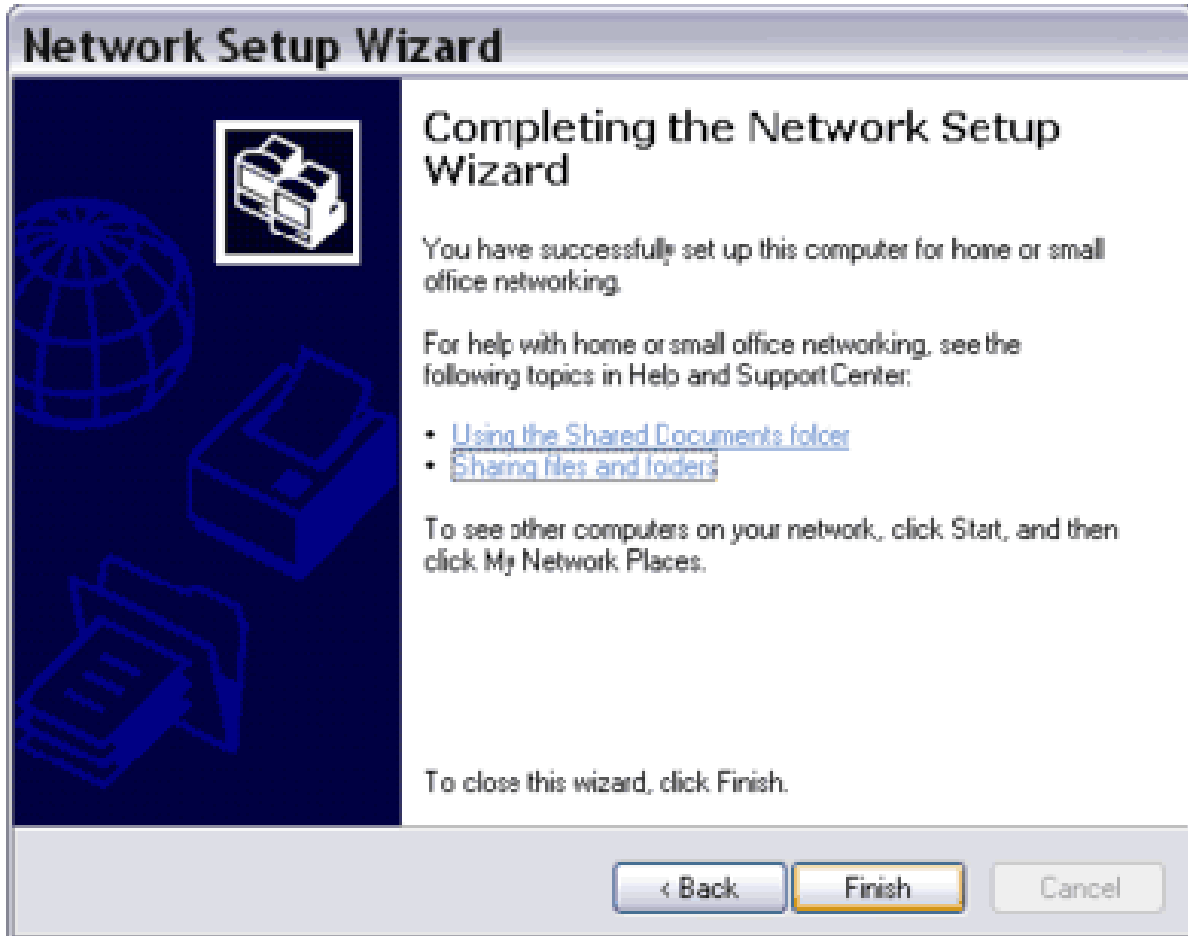
Choose the fourth option. But in case your Windows XP computer wants to connect to a computer running a previous version of Windows (i.e. 98, 98 SE, or ME), choose one of the first three options. Insert a floppy disk if you choose to create a Network Setup Disk, then click Next. Wait while the settings are copied to the disk, then click Next. Otherwise, click Next.



13. Click Finish on the final screen of the Network Setup Wizard.

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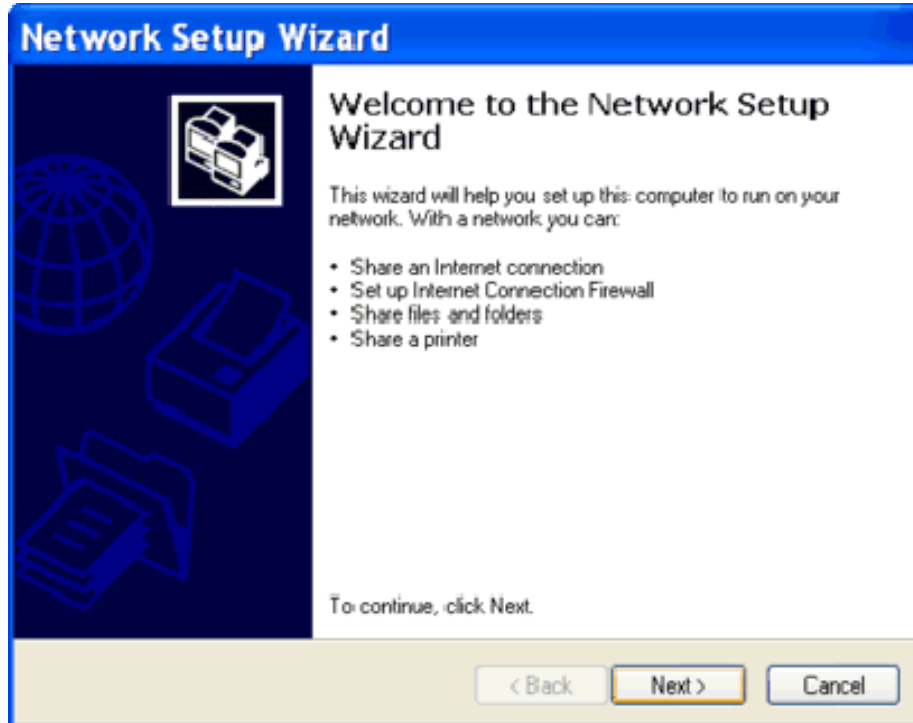


Setup On The Second Computer

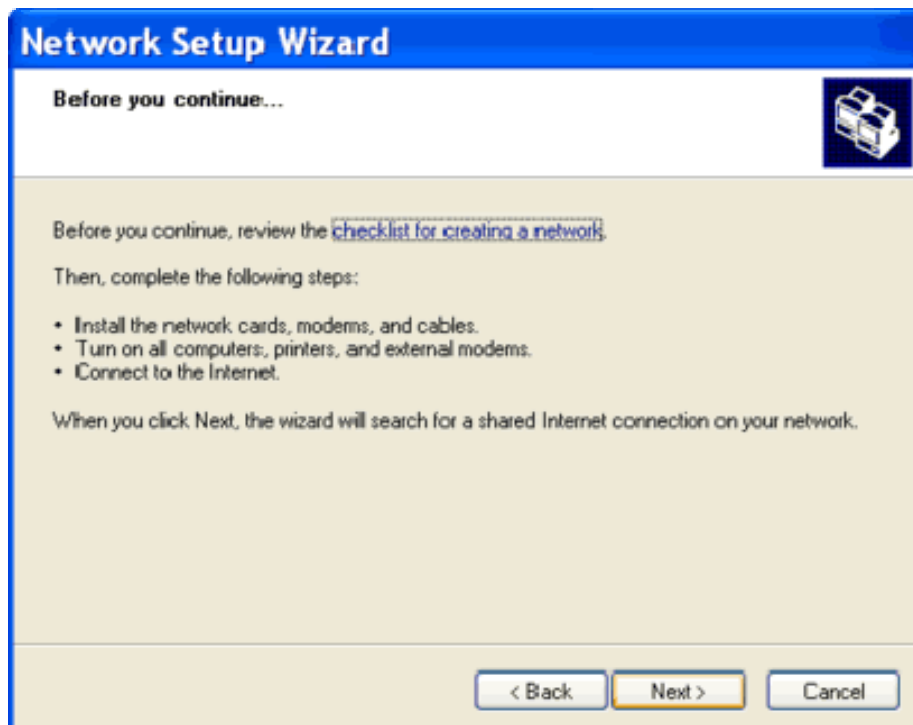
1. If the second computer is running a previous version of Windows, insert the floppy disk (i.e. the result of setup on the first computer) or Windows XP CD to run the Network Setup Wizard. Please note though, the Network Setup Wizard can only be run on computers running Windows 98, Windows 98 SE, Windows ME, and Windows XP. If you use a floppy disk, look for a file named "netsetup". Double-click it to run the Network Setup Wizard. If you use a Windows XP CD, on the CD menu that appears, click "Perform additional tasks" and then "Set up home or small office networking" to run the Network Setup Wizard.

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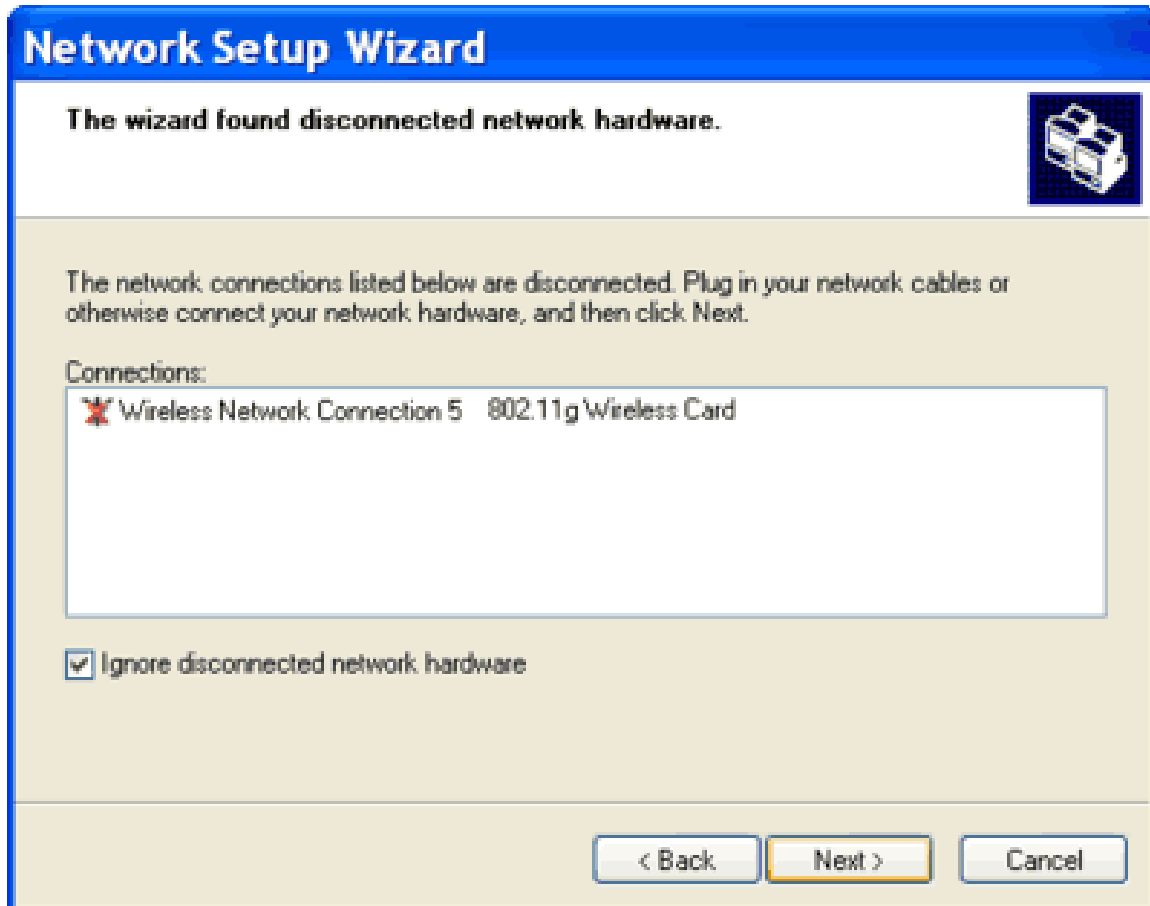
2. In "Before you continue...", if you've installed the Ethernet card in your computer and plug in the crossover cable to the Ethernet port, click Next.



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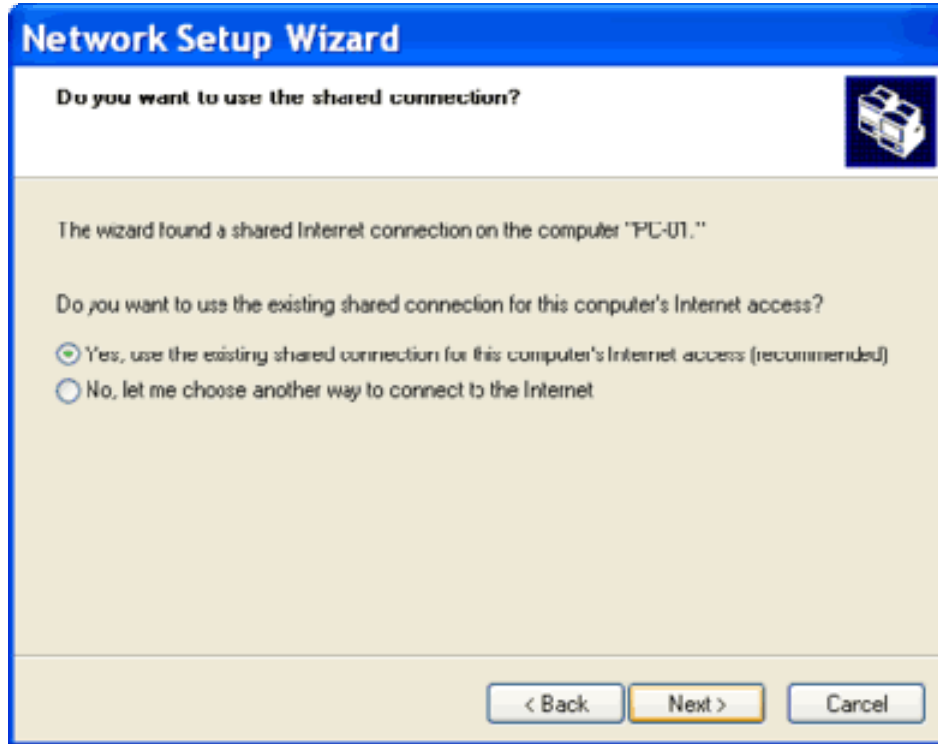
3. In "The wizard found disconnected network hardware", check "Ignore disconnected network hardware" and click Next. But if your Ethernet card that is used for the direct connection is on the list of disconnected network hardware, then you must check again whether you are using the correct crossover cable and whether the cable has been connected firmly to both computers' RJ-45 ports. If the crossover cable and its connection are OK, click Next.



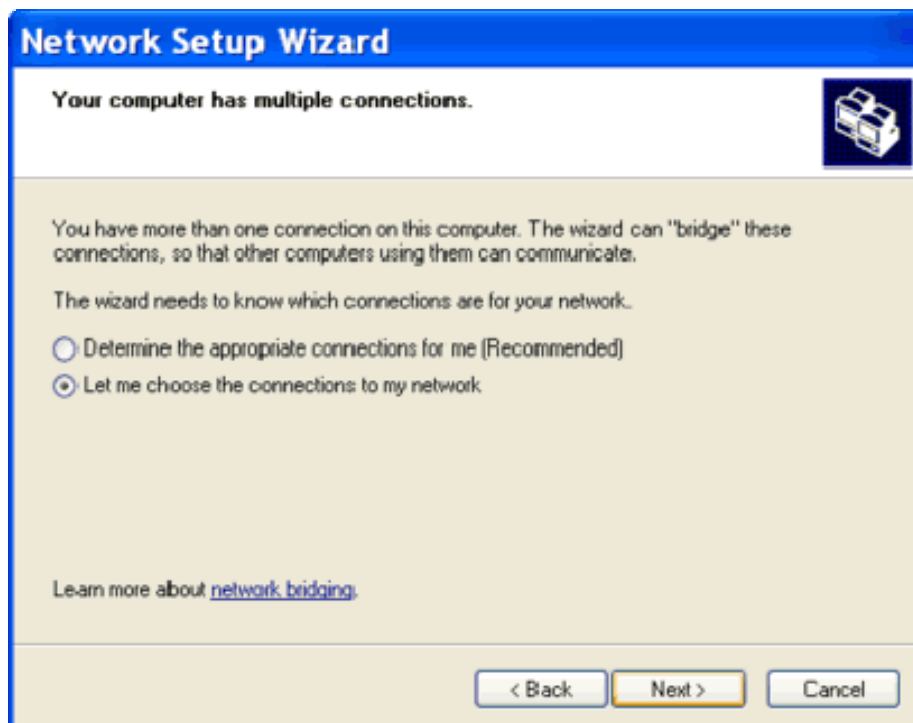
4. In "Do you want to use the shared connection?", choose "Yes, use the existing shared connection for this computer's Internet access" because Windows has found a shared Internet connection on the first computer as the result of setup on the first computer.

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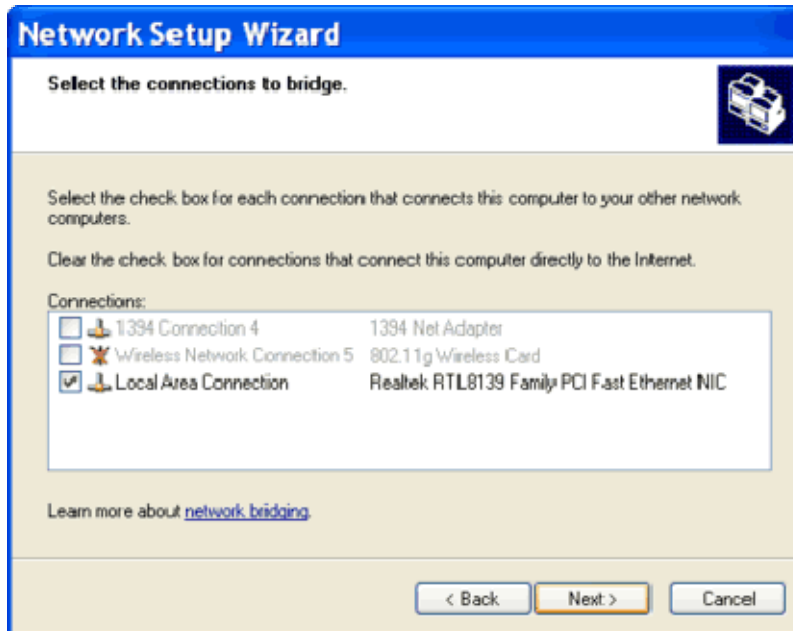
5. In "Your computer has multiple connections.", select "Let me choose the connection to my network". This only appears if you have more than one network adapters installed in your computer.



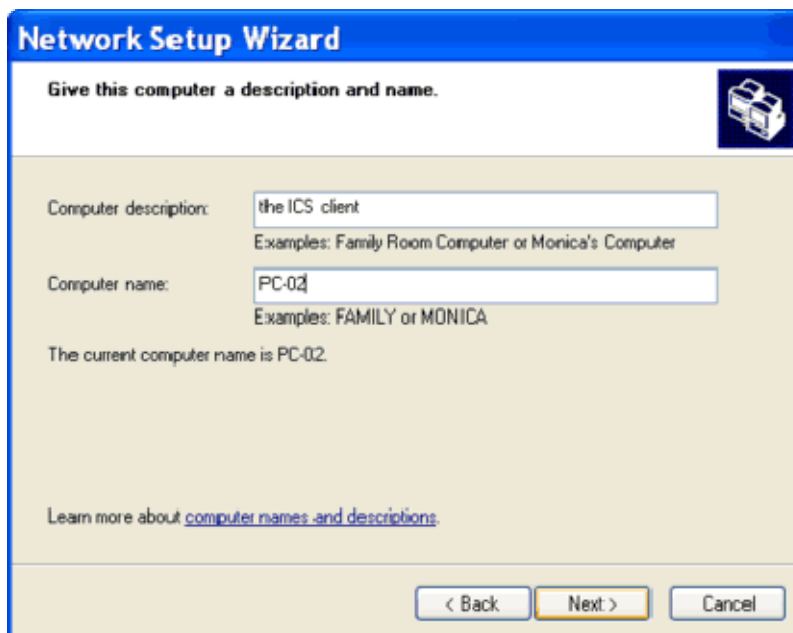
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6. In "Select the connections to bridge", choose the Local Area Connection that corresponds to the Ethernet card that is connected to the first computer. Click Next.



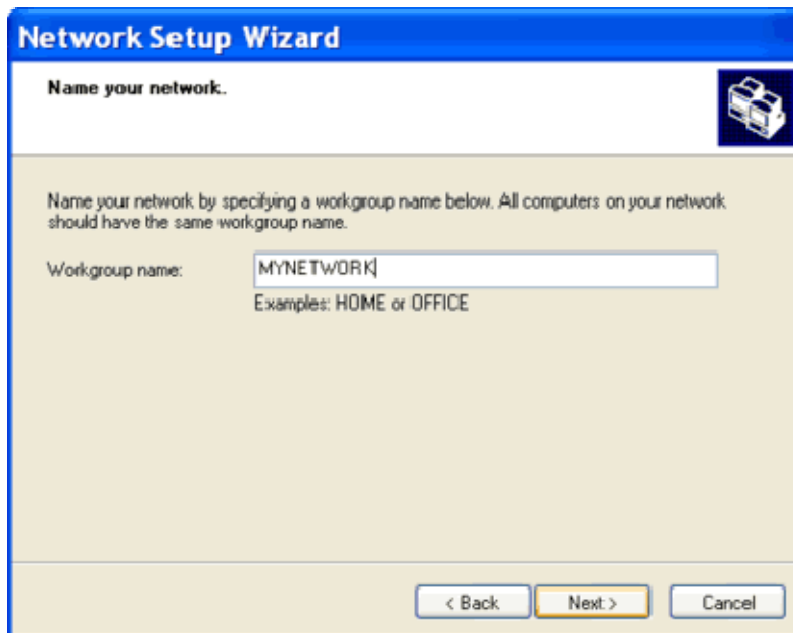
7. In "Give this computer a description and name", type any words that describe your computer. In computer name, enter a different name than the first computer. Then click Next.



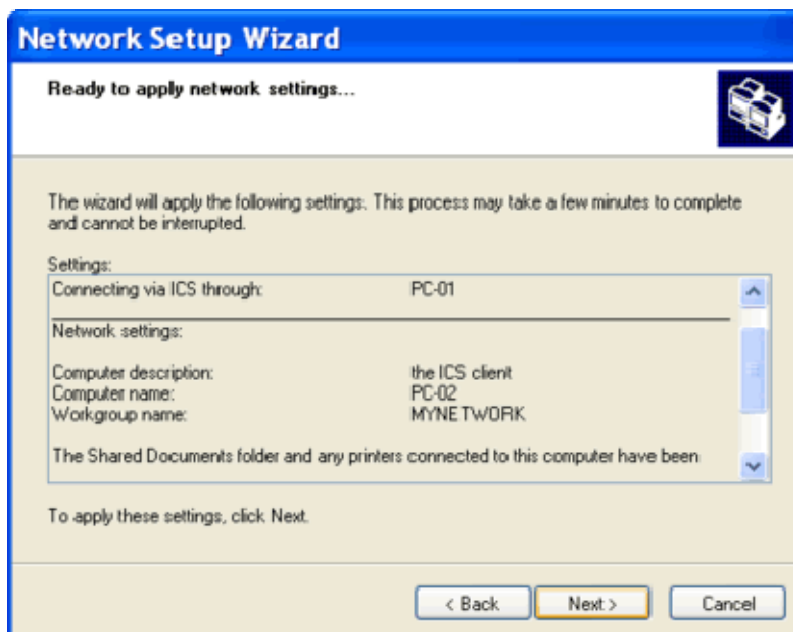
8. In "Name your network", enter the same workgroup name as on the first computer. Click Next.

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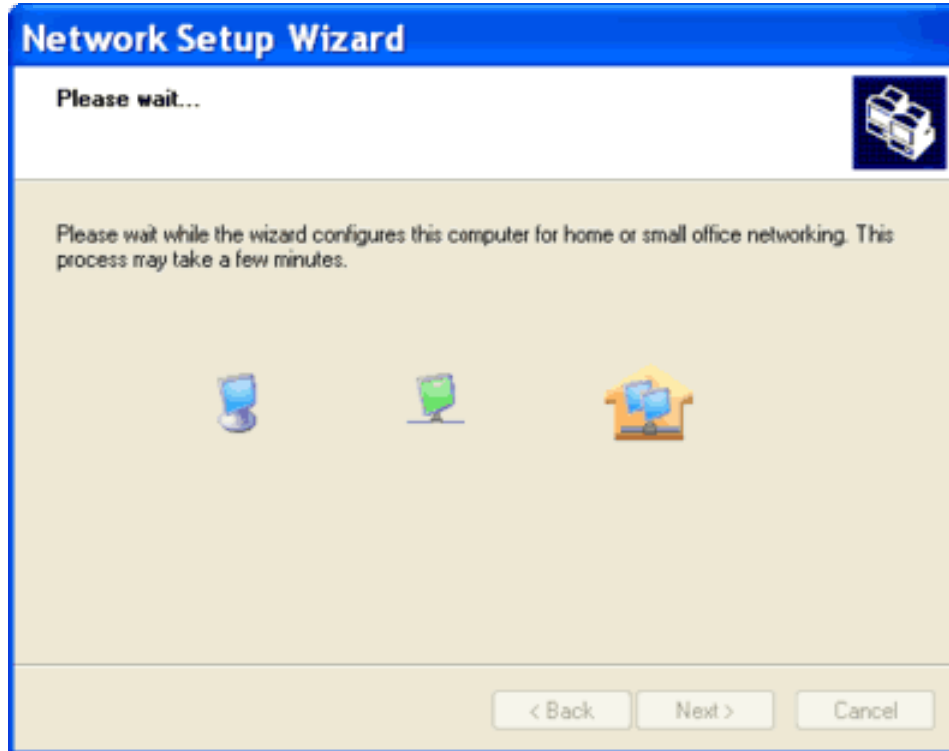
9. In "Ready to apply network settings...", verify the network settings on the wizard which details the ICS host, computer name and description, workgroup name, and file and printer sharing setting. If you want to change the settings click Back, otherwise click Next.



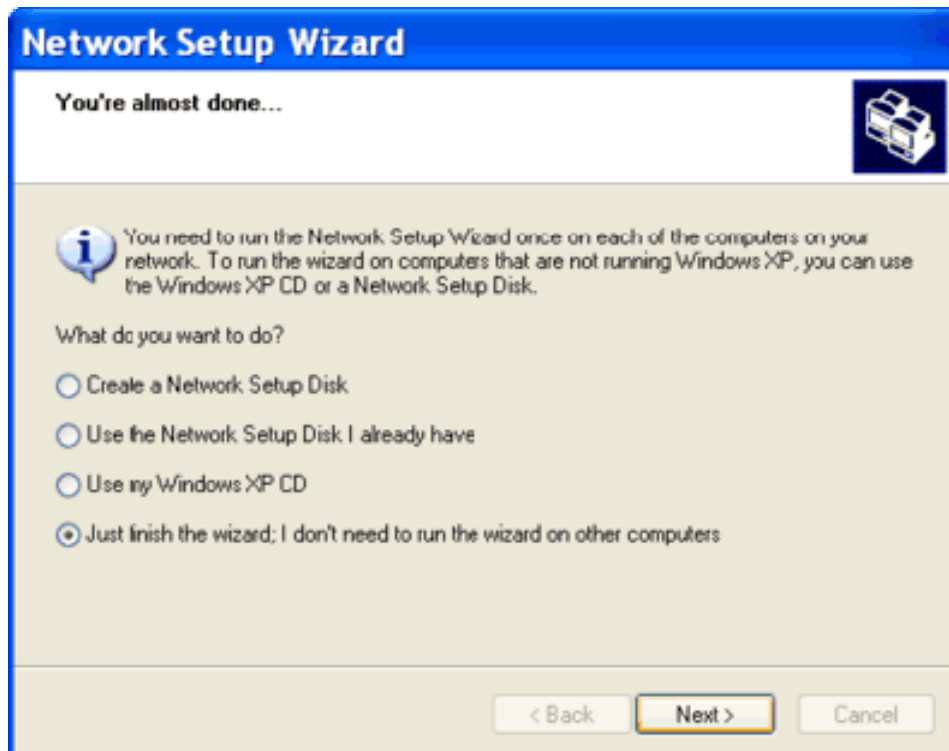
10. In "The wizard configures this computer for network connection", you must wait for the wizard to complete your network configuration. It would take a couple of minutes.

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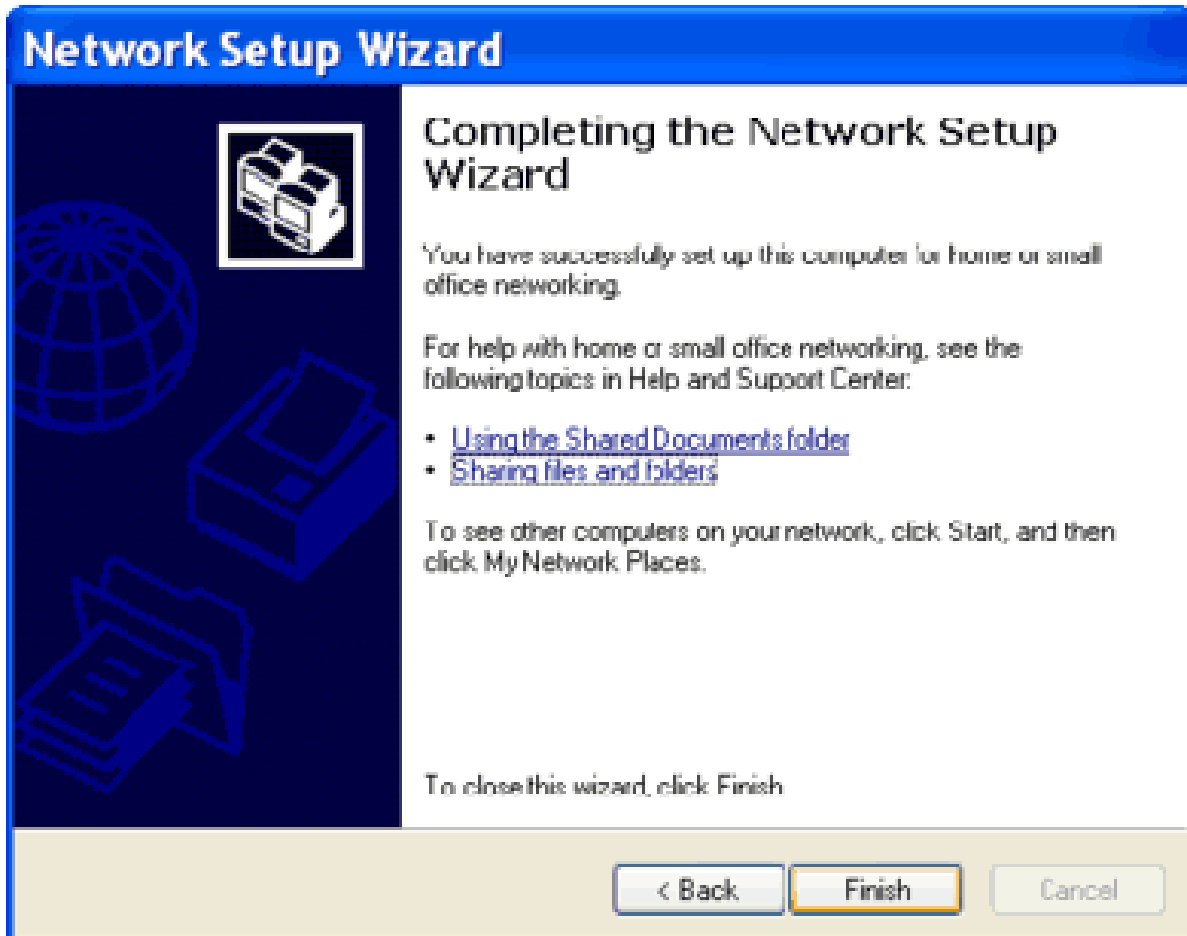
11. In "You're almost done...", select "Just finish the wizard; I don't need to run the wizard on other computers". Click Next.



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12. Click Finish on the Network Setup wizard final dialog.



Now, your direct Ethernet connection between two computers must have been alive. You can check it from My Network Places. If shared folders and printers on both computers are listed, then your network is active. You can test your Internet connection sharing by opening Internet Explorer or other browser on the second computer, and type a web address. Be sure to open a new URL, i.e. not from cached web pages.

Part Two : Direct Ethernet connection setup from Network Connections folder

Defining computer and workgroup name and verifying the Ethernet adapter

1. Define computer and workgroup name for each computer via the Computer Name tab of the System Properties window. To open the System Properties, right-click My Computer icon and select Properties. The computer name must be unique while the workgroup name must be the same. The default workgroup names are MSHOME in Windows XP Home Edition and WORKGROUP in Windows XP Professional Edition. You can leave it or change it, provided both computers have the same workgroup name. If you make a change, you'll have to restart your computer.

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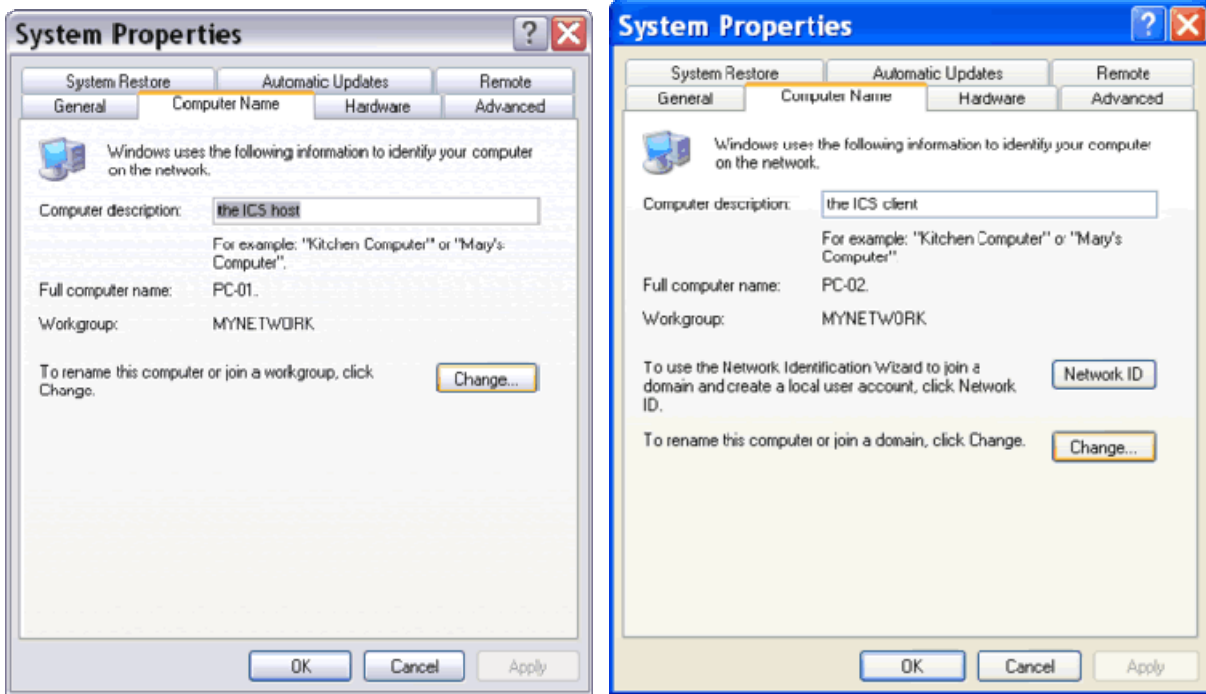


Figure: Different computer names within the same workgroup on System Properties.

2. From the Device Manager, verify that the Ethernet adapter has been installed and enabled on each computer.

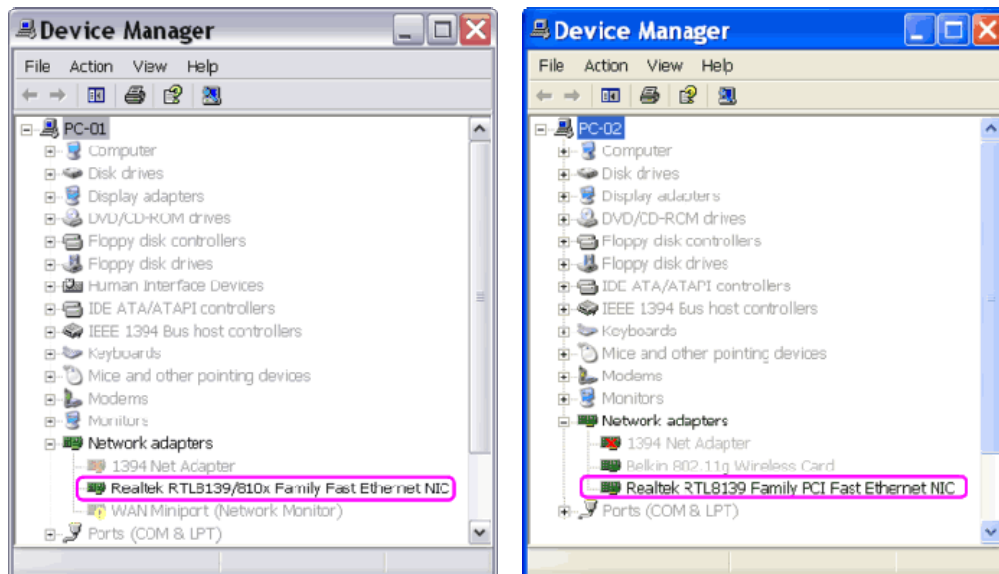


Figure: The (Fast) Ethernet card or NIC is listed on the Device Manager.

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- When the crossover cable hasn't been connected to your computers, the Details pane of the Local Area Connection on Network Connections folder indicates that the network cable is unplugged. You will see the same status, if you use a wrong cable (i.e. a straight-through cable or a cable which is crossed incorrectly) or if your cable's RJ-45 connectors aren't firmly connected to the Ethernet ports.

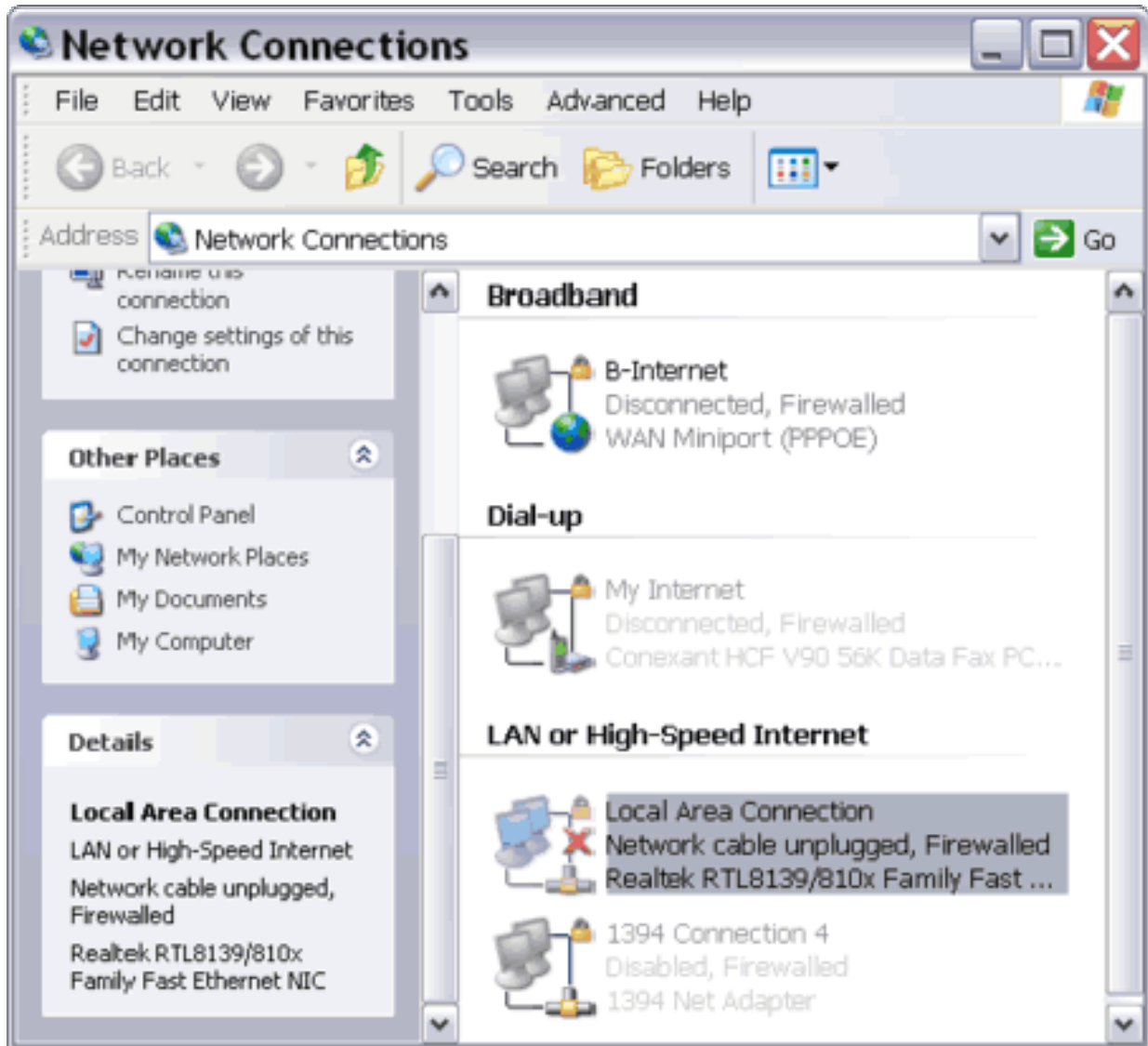


Figure: Network cable is unplugged on the first computer (PC-01)

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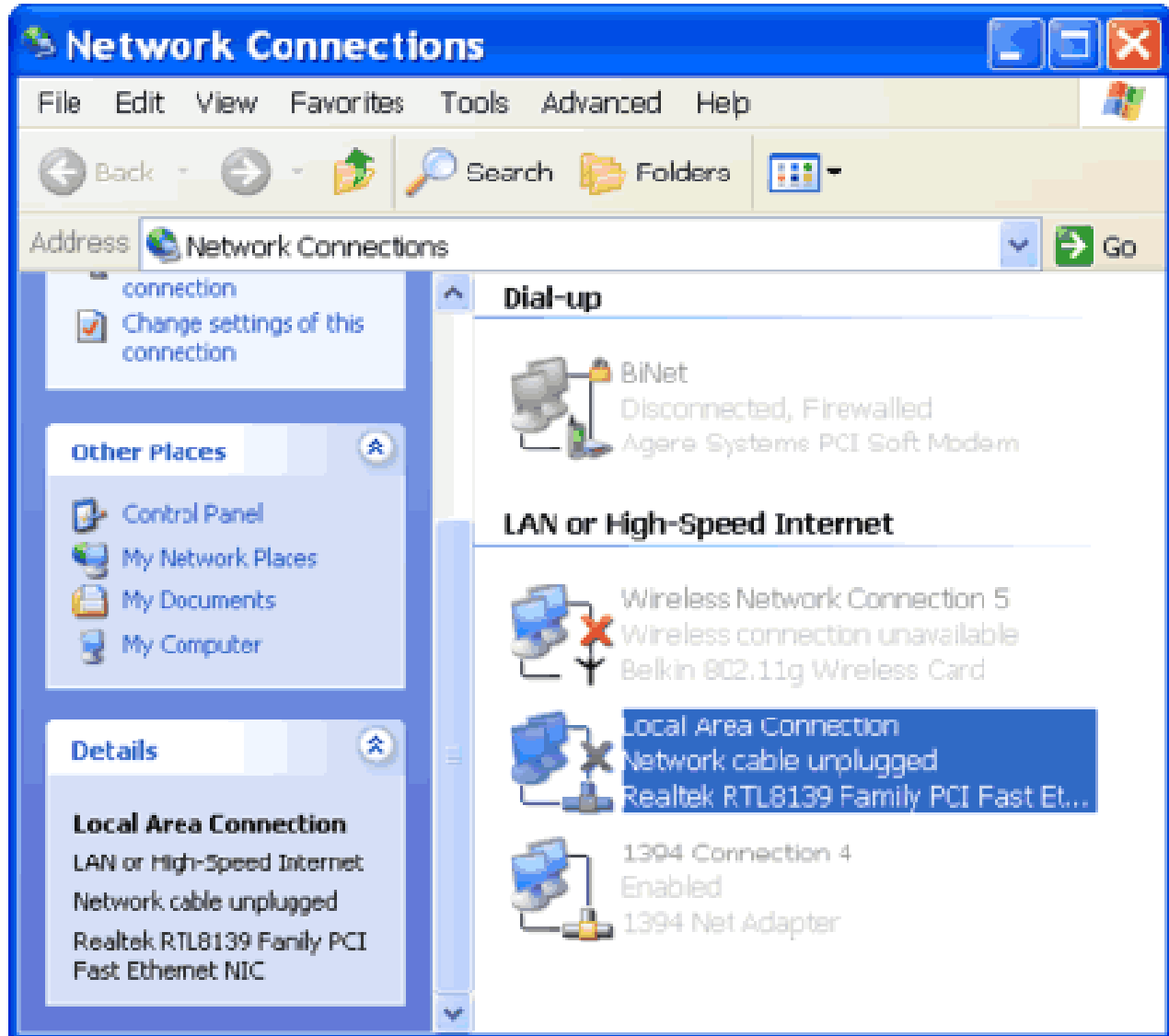


Figure: Network cable is unplugged on the second computer (PC-02)

4. Now plug in your cable to both computers' RJ-45 ports. A short while after you plug the crossover cable to both computers, view the Details pane again. Now each network adapter has a temporary IP address, i.e. 0.0.0.0. This indicates that Windows is still acquiring a network address or trying to find a DHCP server.

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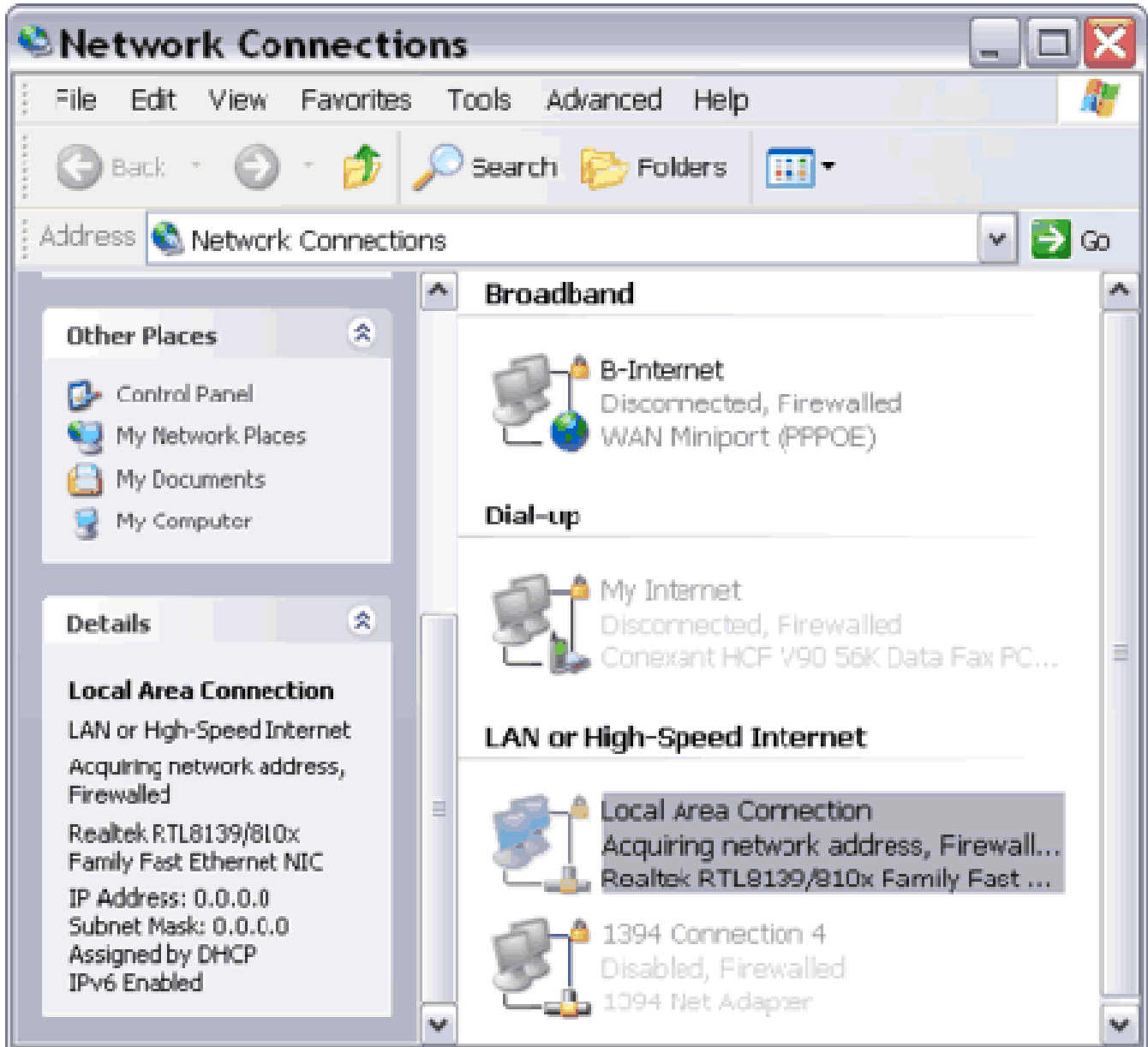


Figure: Temporary IP address and subnet mask 0.0.0.0 on the first computer (PC-01)

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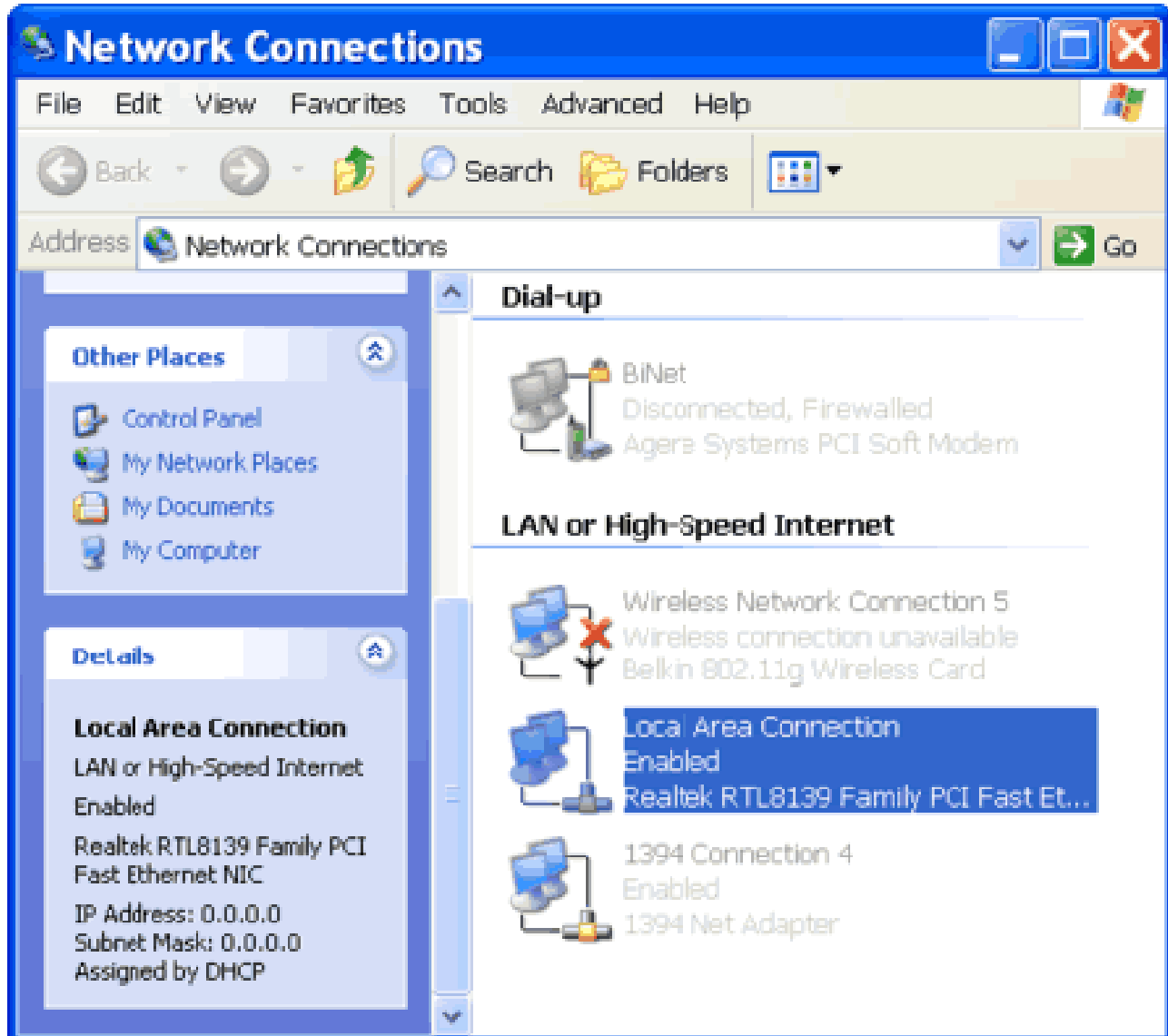


Figure: Temporary IP address and subnet mask 0.0.0.0 on the second computer (PC-02)

5. It may take seconds up to a few minutes for Windows to discover a DHCP server to assign a private (LAN) IP address for a network adapter. Because there is no DHCP server, then it automatically assigns itself a private IP address from an APIPA address range. Automatic Private IP Addressing (APIPA) is a feature that lets a Windows XP computer (and several previous Windows versions namely Windows 98, 98 SE, ME, 2000, Server 2003) assign itself an Internet Protocol (IP) address when a DHCP server is not available. An APIPA IP address is a Class B IP address in this form 169.254.x.y where x and y are decimal numbers. APIPA address range is from 169.254.0.1 to 169.254.255.254 with a subnet mask of 255.255.0.0.

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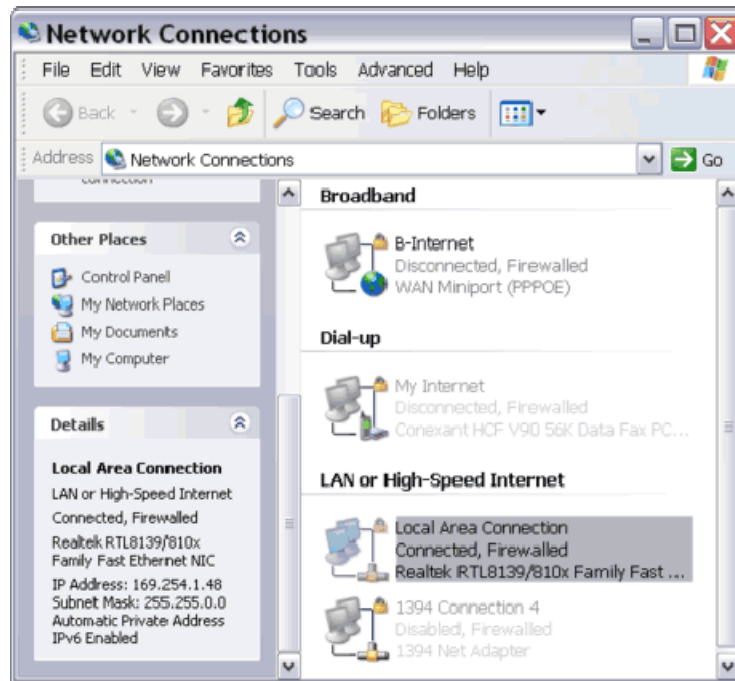


Figure: Private IP address 169.254.x.y & subnet mask 255.255.0.0 on the first computer (PC-01)

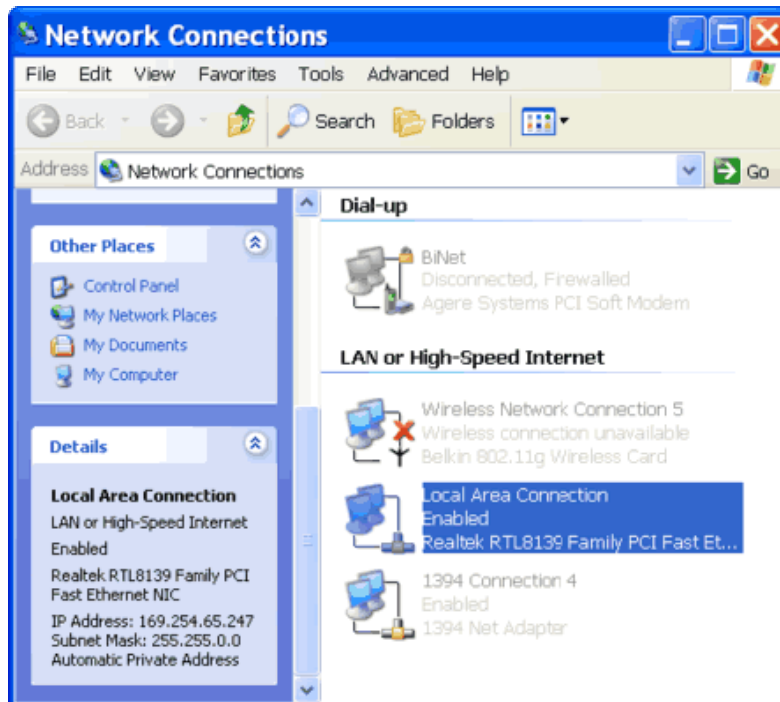


Figure: Private IP address 169.254.x.y & subnet mask 255.255.0.0 on second computer (PC-02)

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6. Windows Firewall that is automatically turned on for every network connection in Windows XP (SP2) must be configured to enable file and printer sharing. Using the Network Setup Wizard, this step is done automatically by the wizard, but now you have to configure it manually. Right-click on the Local Area Connection and select Properties to open the Local Area Connection Properties. On the Advanced tab, click Settings to open Windows Firewall window. On the Exceptions tab, select "File and Printer Sharing" then click OK.

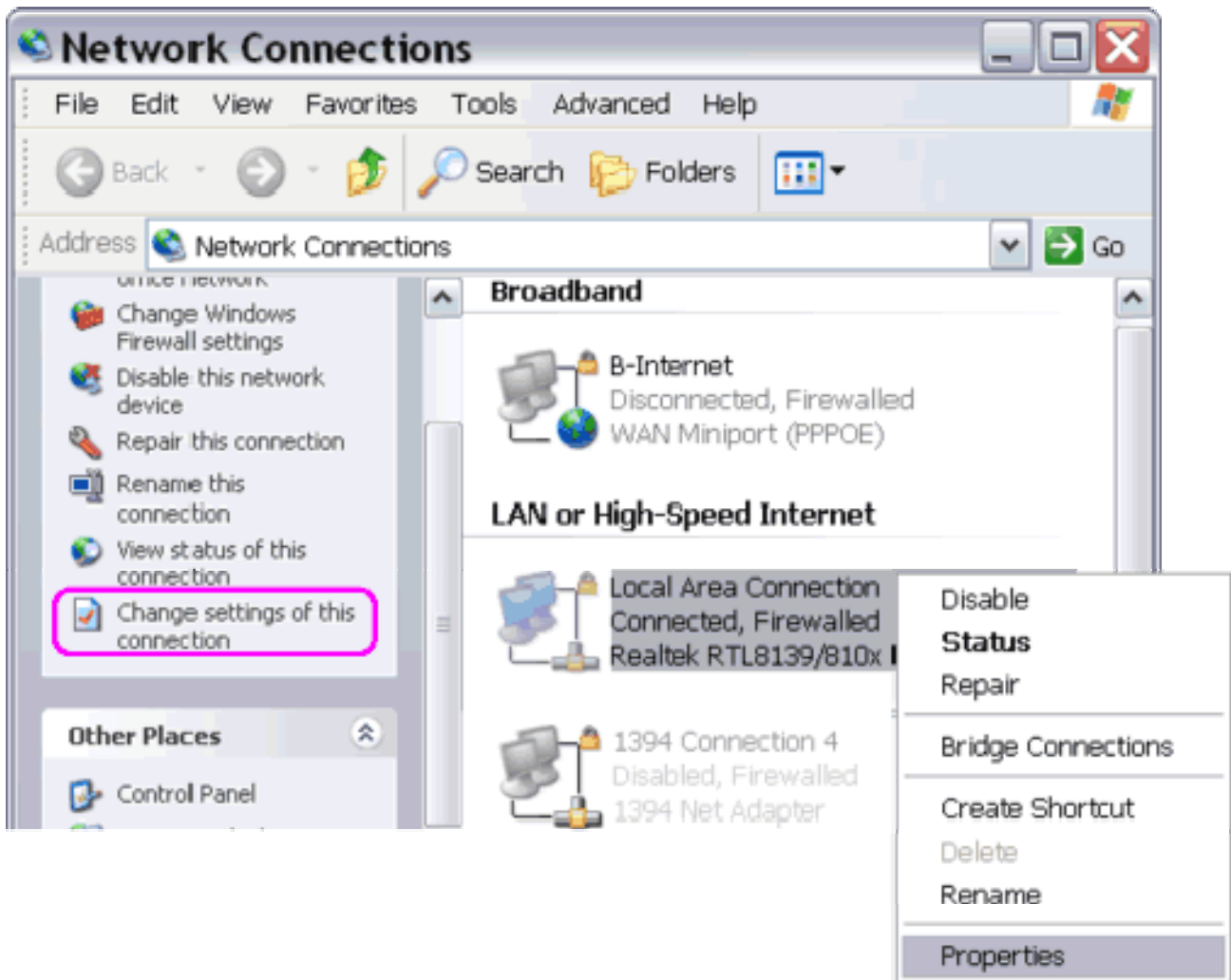


Figure: Right-click on Local Area Connection or click "Change settings..." under Network Tasks to open Local Area Connection Properties window.

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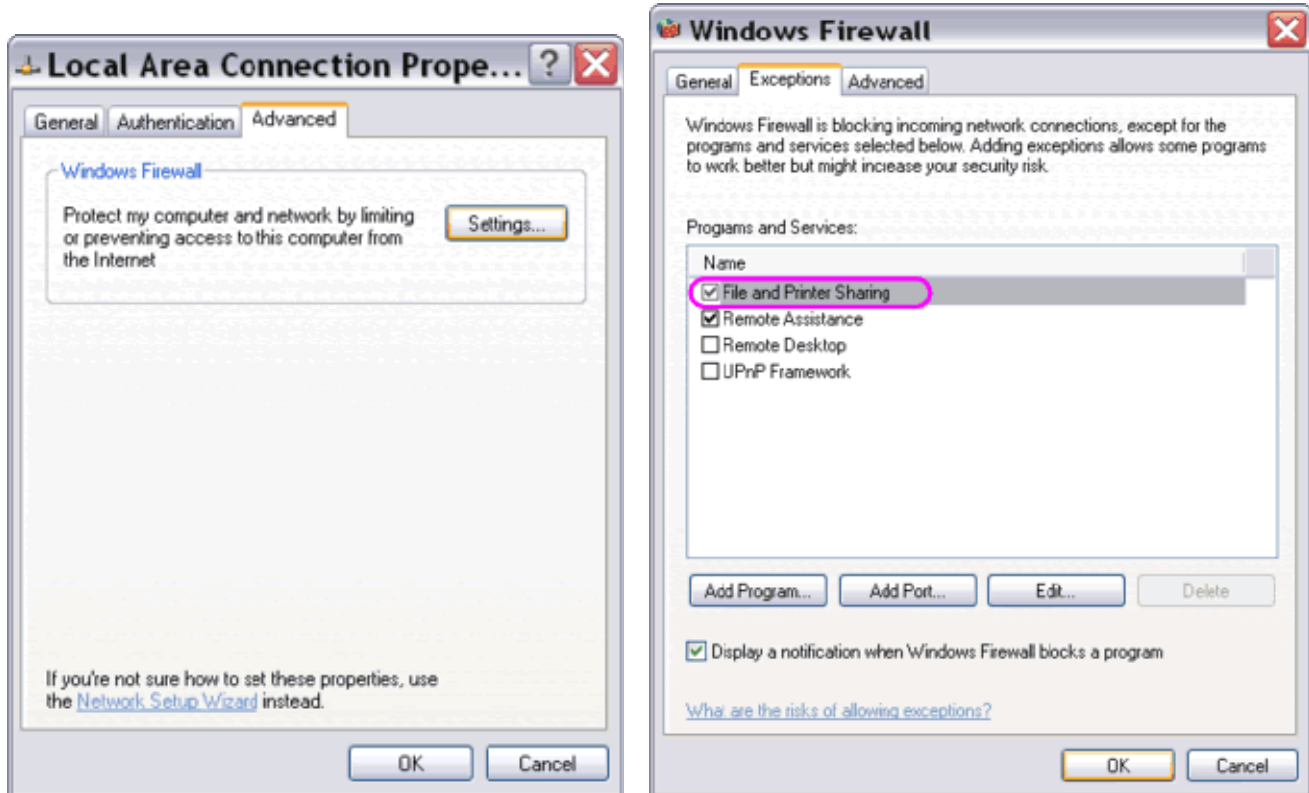


Figure: To enable file and printer sharing from Windows Firewall window.

7. To check whether your network has been alive, open My Network Places. Under Network Tasks, click "View workgroup computers". You will find your computers' names on the right pane. And if you've configured some folders, drives, or printer to be shared, you'll find them by double-clicking a computer's name.

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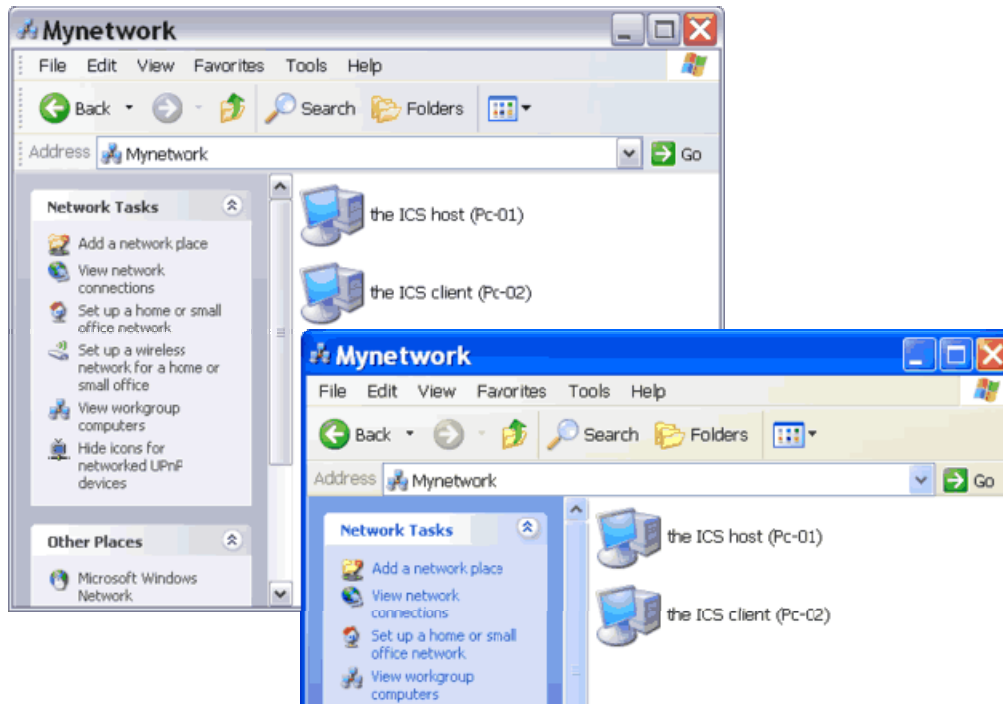


Figure: Viewing workgroup computers from My Network Places.

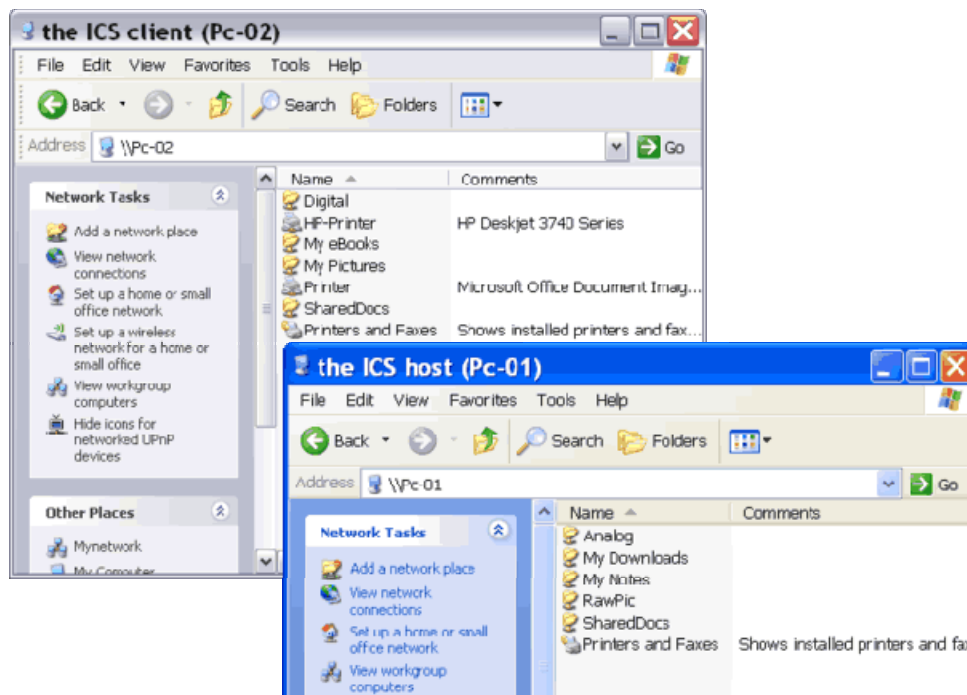


Figure: Exploring shared folders and printers on each computer from My Network Places.

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8. To configure Internet Connection Sharing (ICS), on the first computer which is going to be the ICS host, right-click the Internet connection that will be shared and select Properties to open the Properties window. You can also do this by clicking "Change settings of this connection" under Network Tasks. On the Advanced tab of the Internet connection Properties window, check "Allow other network users to connect through this computer's Internet connection". Select Local Area Connection that corresponds with the Ethernet card which is used for the direct connection from the drop-down box. And click OK.

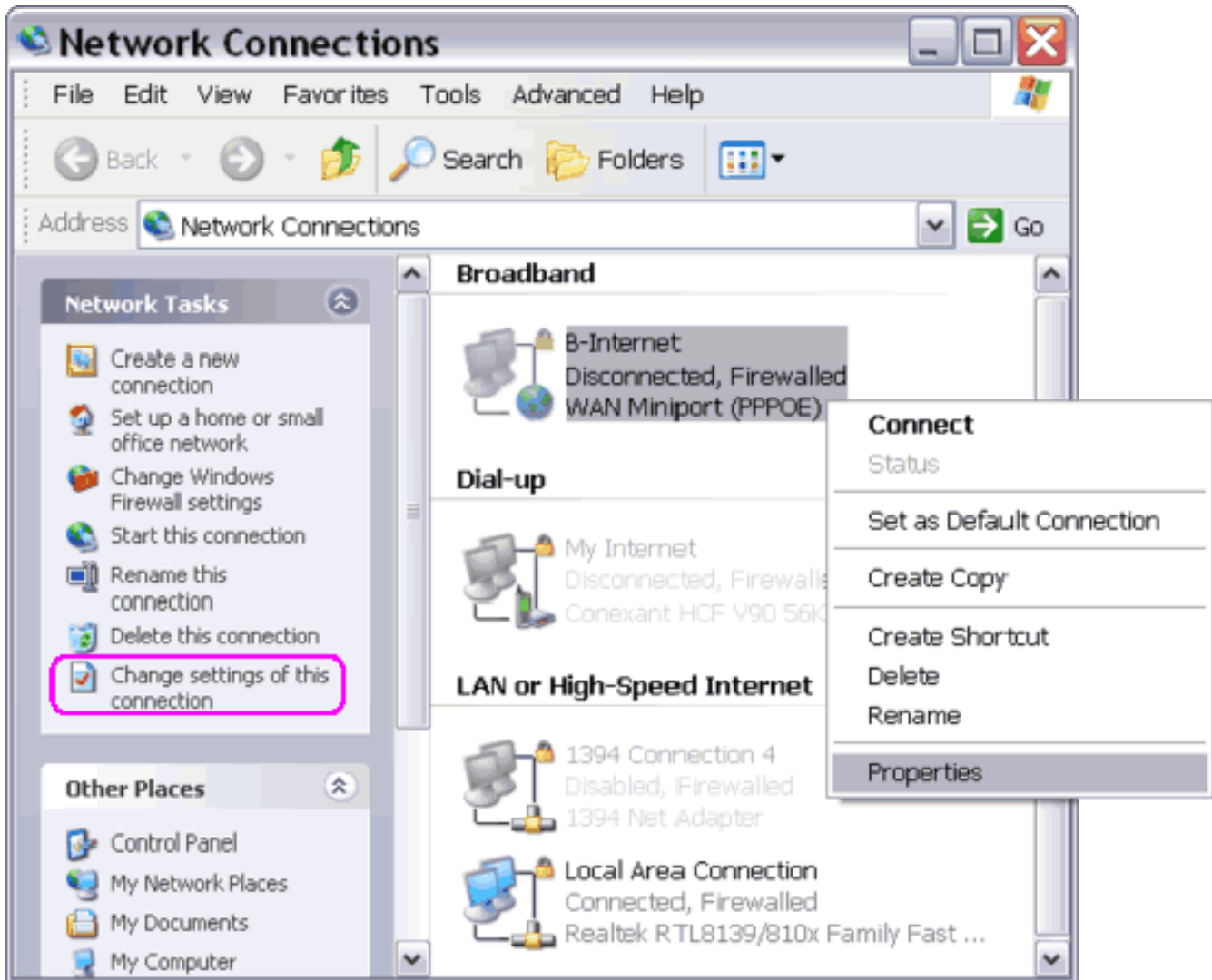


Figure: Decide which Internet connection is going to be shared on the ICS host computer.

On the example above, the Internet connection is a PPPoE Broadband (DSL/Cable) with login from Network Connections folder (in many cases login is done via modem web interface). If your broadband Internet connection is always on, then you must find the Local Area Connection that corresponds with the Ethernet card which connects your host computer to a

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broadband modem under LAN or High-Speed Internet. Rename the Local Area Connection with the name of your Internet connection for easy identification later.

Even if you have a slower Internet connection (such as PSTN/ISDN dial-up or GPRS), you still can share the Internet connection using the above procedure. In this case, your Internet connection must appear under Dial-up.

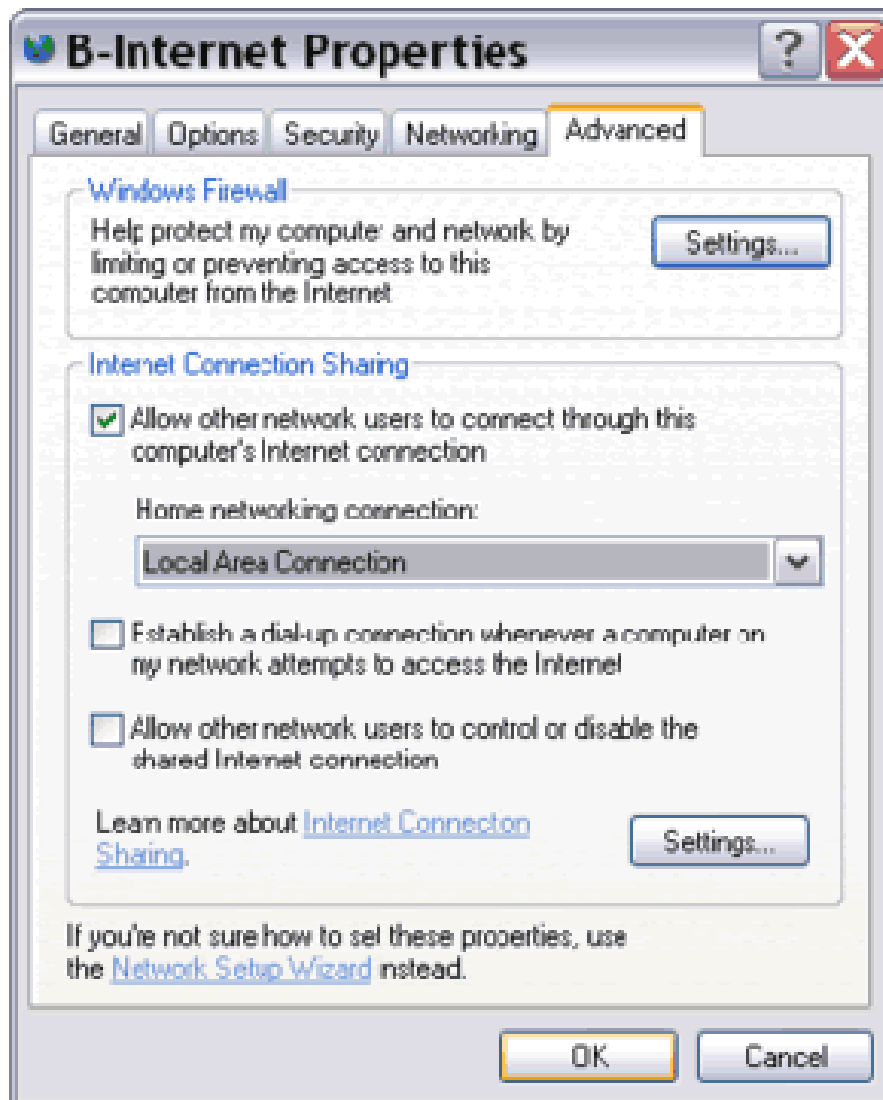


Figure: To enable ICS for the Local Area Connection.

If ICS options aren't available on the Advanced tab of your Internet connection Properties window, your direct Ethernet connection must haven't been working. You'll have to reconfigure it. Please note, if you have more than one network adapters installed in your computer, you'll see a drop-down list providing several home networking connections (LANs). You must select one, i.e. the Local Area Connection that corresponds with the Ethernet card used for the direct connection.

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9. After Internet connection sharing (ICS) was enabled on the host computer, the ICS host changes its IP address from an APIPA address to this private IP address 192.168.0.1 as the gateway to the Internet and the ICS client is assigned another IP address with the same subnet mask by the DHCP server (the ICS host), i.e. 192.168.0.x where x is any integer from 2 to 254. Now, every time the ICS host is connected to the Internet, the ICS client is automatically connected via the ICS host.

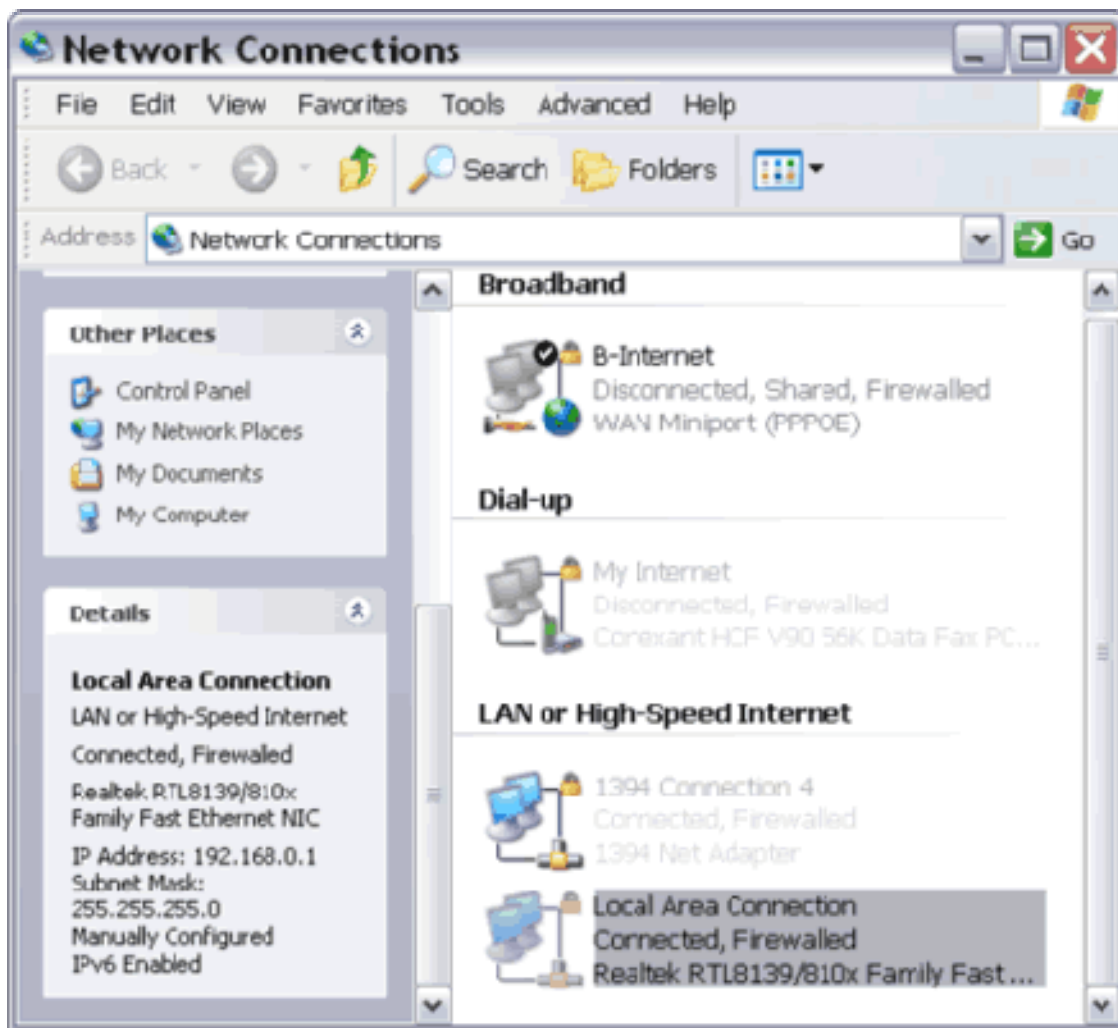


Figure: Private gateway IP address 192.168.0.1 & subnet mask 255.255.255.0 for the ICS host.

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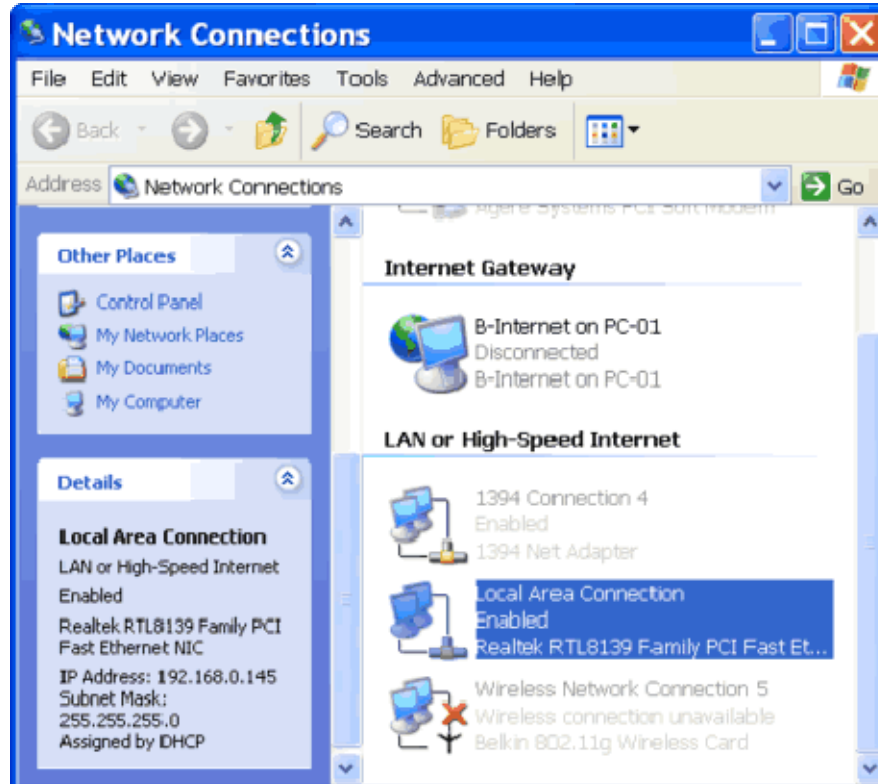


Figure: Private IP address 192.168.0.x (2-254) and subnet mask 255.255.255.0 for the ICS client.

If one of your Ethernet adapters still use an APIPA IP address (i.e. 169.2544.x.y), you are not ready for sharing an Internet connection. Find the solution in the following page.

If you find no workgroup computers in Microsoft Windows Network (in My Network Places) or if you miss one or if it is not accessible and you find this error message "..You might not have permission..", you must check your Windows Firewall setting. Make sure that "File and Printer Sharing" option is selected on the Exceptions tab of Windows Firewall configuration window.

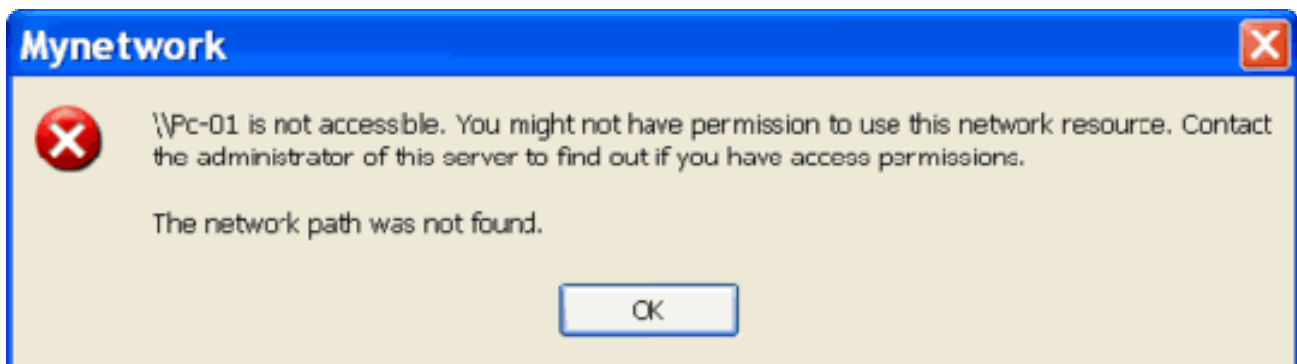


Figure: error message when one PC can not be accessed.

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Other possible cause is Windows is still renewing IP addresses of one or both network adapters. If this is the case, wait for seconds up to a few minutes until Windows assigns an IP address to the network adapter in each PC. If you want to speed up the process, you can try one of these tips:

- On Network Connections folder, right-click Local Area Connection and click Repair or select Local Area Connection then click "Repair this connection" under Network Tasks.

- Click Start, then Run. On the input box, type cmd then click OK to open Command Prompt. Type ping [the computer name or IP address of the computer that you wish to query], e.g. ping PC-01 or ping 192.168.0.1. If you see Reply messages, the connection is up and running.

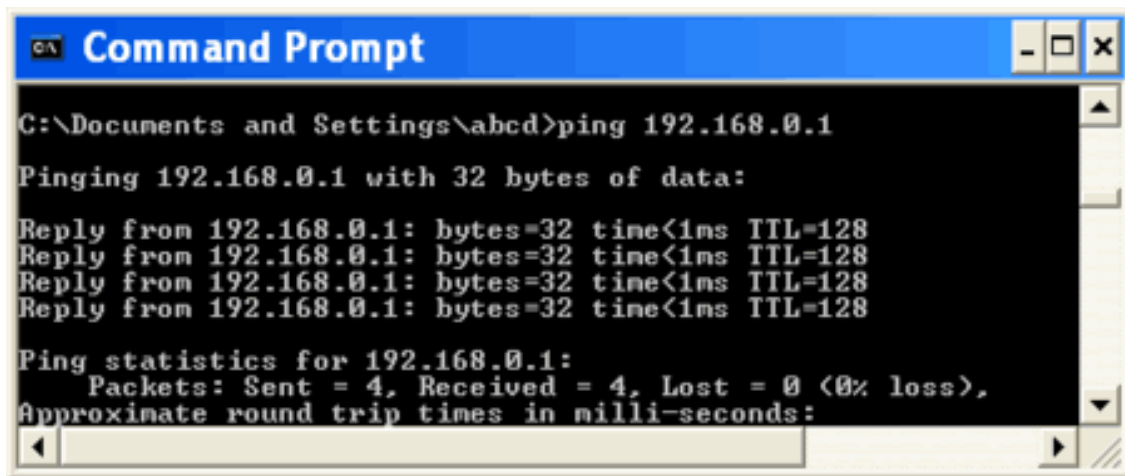


Figure: pinging another computer from Command Prompt window.

When configuring Internet connection sharing (ICS) you may find these message boxes:

- If an Internet connection that requires a user name and password was saved only for you (i.e. "Me only" in the Connect dialog box), you would get this message "The user name and password for this connection were not saved for use by all users...". Click OK on the message box and in the Connect dialog box select "Anyone who uses this computer" under "Save this connection for the following users:".

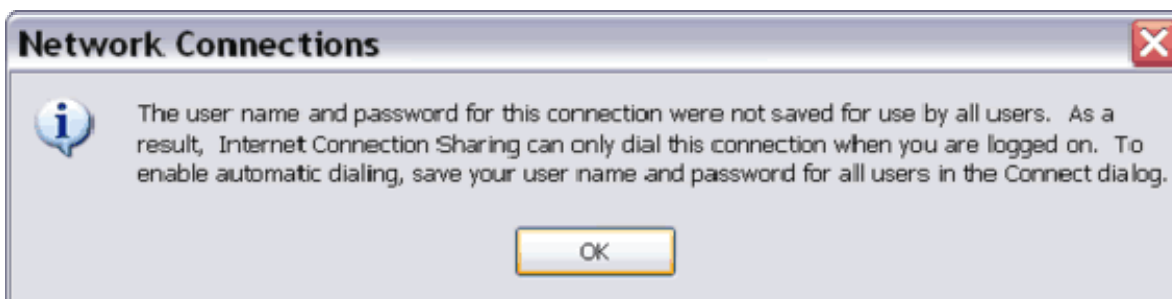


Figure: A notification message if Internet connection was not saved for all users.

How To Create A Direct Connection Using Ethernet Crossover Cable In Windows XP

Mark E. Donaldson

- After setting up ICS on the ICS host, you might get this message "...your LAN adapter will be set to use IP address 192.168.0.1..". This is because the Ethernet adapter on the ICS host is always assigned a private gateway IP address 192.168.0.1 while before it was an APIPA address, i.e. 169.254.x.y. If the ICS client hasn't been changed from 169.254.x.y to 192.168.0.z (where x and y are any integer from 0 to 254, and z from 2 to 254), you will lose the network connection. To renew the IP address of the ICS client by the DHCP server (the ICS host), repair the connection from Network Connections folder or ping the computer name. The last resort is unplug and plug again the crossover cable. Wait until both network adapters are set with IP addresses within the same subnet.

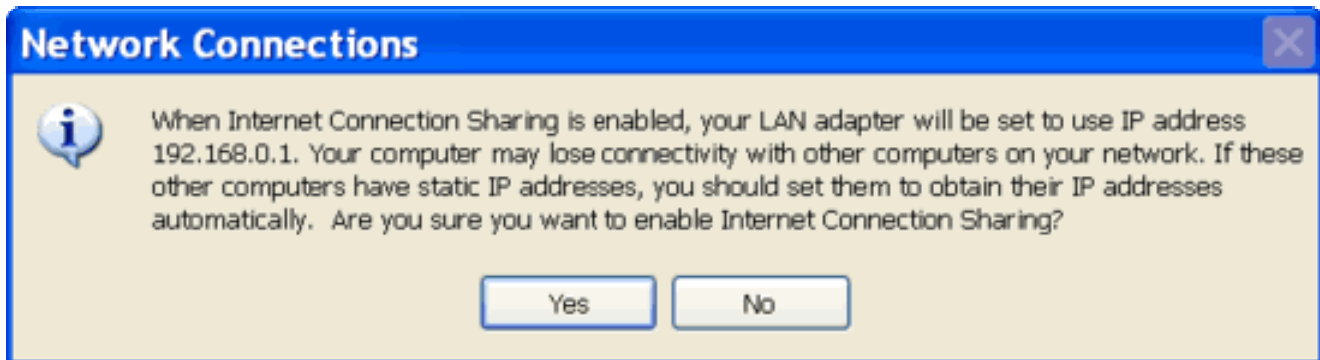


Figure: A notification message when the ICS host' Ethernet adapter IP address will be set to 192.168.0.1