# Experiment 13
Write down the steps to configure ip address in a windows and Linux system.

Use the following steps to setup your LAN connection in Windows XP, when your computer is the device plugged in to your wireless radio or POE.

Note: - You will need your static IP settings and DNS settings before you continue. If you don't have your settings, call into support so we can provide them to you.

1. First, go to the start menu and into Control Panel.
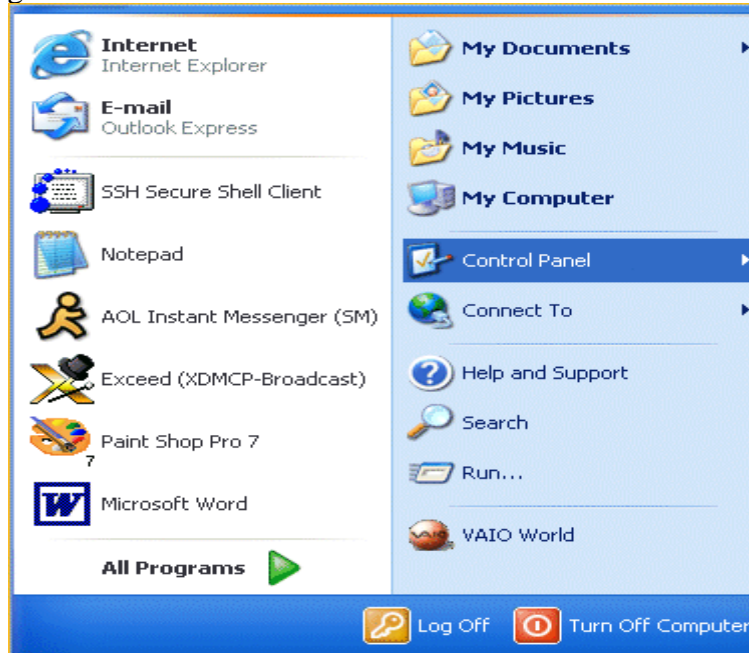
2. Once in Control Panel, if you are in Category view, click on "Switch to Classic View" in the top left.
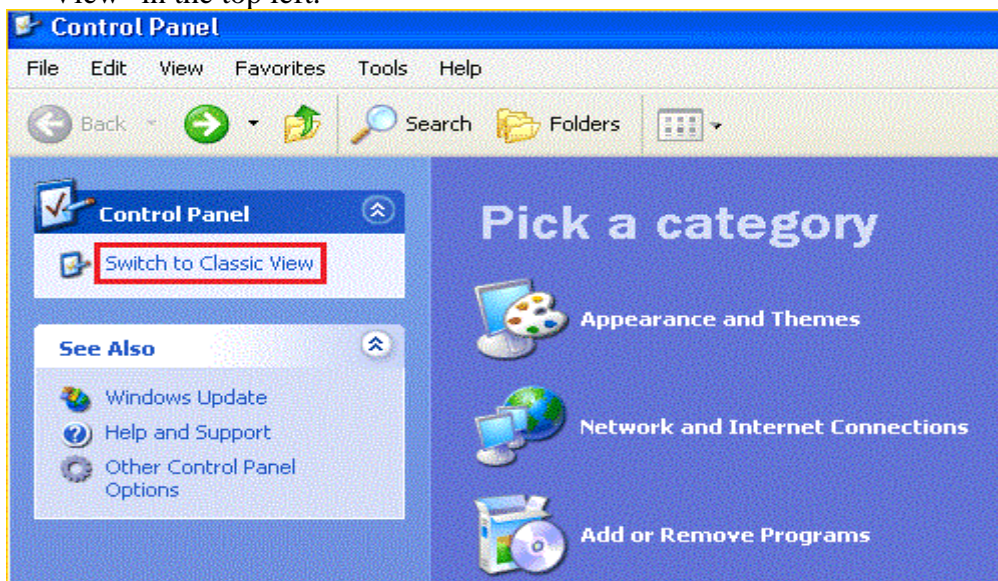
3. Now that you are in classic view, find and double click on Network Connections.

4. Now that you are in Network Connections, right click on your Local Area Connection, and left click on properties.

5. In the Local Area Connections properties window, highlight Internet Protocol, and click on the properties button.
6. In the Internet Protocol (TCP/IP) Properties window, you will need to select "Use the following IP address" and "Use the following DNS server addresses:"Enter in the corresponding settings per their section. If you don't have the settings, or need help with them, call into tech support so we can provide them to you.
7. Once the settings have been entered in, click ok on the Internet Protocol (TCP/IP) Properties window, then click on close on the Local Area Connections properties window.

At this point the Local Area Connection should say connected. See if you can browse to a web site at this time. If you are able to, your setup is complete. If you are not able to browse, call us here at tech support, so we can verify your settings are correct.

Objectives

- Learn to create a simple LAN with two PCs using an Ethernet hub and two straight-through cables to connect the workstations
- Learn to configure and verify the network connectivity.
- Learn about various network related commands

Setting up a simple network

In this experiment, we will learn how to connect two PCs to create a simple Peer-to-Peer network. The instructions for this Lab focus on the Windows 2003 operating system. You will share a folder on one workstation and connect to that folder from the other workstation. This Lab is divided into two exercises as follows:

Exercise:

The two PCs will be connected with a hub between them [Refer Figure 1]. Using a hub allows for more than just two workstations to be connected depending on the number of ports on the hub. Hubs can have from 4 to 32 ports.
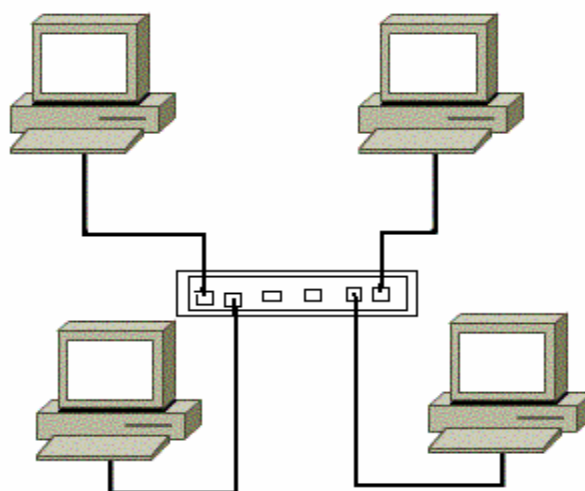
A four node Ethernet LAN using an Ethernet Hub. A UTP cable is used to connect the NIC installed inside the PC to a port on the hub

Network Connection via Hub

Tools / Preparation: The workstations should have Network Interface Cards (NIC)

installed with the proper drivers. The following resources will be required:

1. Two Pentium-based workstations with a NIC in each (NIC drivers should be available)
2. An Ethernet hub (4 or 8 port) and two CAT5 straight-wired cables.

Check Local Area Network Connections

Task: Verify the cables.

Explanation: You should check the cables to verify that you have good layer 1 physical connections.

Exercise: Check each of the two CAT 5 cables from each workstation to the hub. Verify that the pins are wired straight through by holding the two RJ-45 connectors for each cable side by side with the clip down and inspect them. All pins should have the same color wire on the same pin at both ends of the cable. (Pin 1 should match pin 1 and pin 8 should match pin 8 etc.)

Plug in and connect the equipment

Task: Check the workstations and hub for exercise.

Exercise: Check to make sure that the NICs are installed correctly in each workstation. Plug in the workstations and turn them on. Plug the straight through cable from workstation 1 into port 1 of the hub and the cable from workstation 2 into port 2 of the hub. After the workstations have booted, check the green link light on the back of each NIC and the green lights on ports 1 and 2 of the hub to verify that the are communicating. This also verifies a good physical connection between the Hub and the NICs in the workstations (OSI Layers 1 and 2). If the link light is not on it usually indicates a bad cable connection, an incorrectly wired cable or the NIC or hub may not be functioning correctly.

Network Adapters and Protocols

Task: Check the Network Adapter (NIC): Use the Control Panel□System□Device Manager utility to verify that the Network Adapter (NIC) is functioning properly for both workstations. Double click on Network Adapters and then right click the NIC adapter in use. Click Properties to see if the device is working properly.

Explanation: If there is a problem with the NIC or driver, the icon will show a yellow circle with an exclamation mark in it with (possible resource conflict) or a red X indicating a serious problem (device could cause Windows to lock up).

Check the TCP/IP Protocol Settings

Task: Use the Control Panel/Network Connections (or Properties in Context Menu of My Network Places) to display Network Connections Window. Then use Properties in Context Menu of Local Area Connection to display Local Area Connection Properties Window. Select the TCP/IP protocol from the Configuration Tab and click on properties. Check the IP Address and Subnet mask for both workstations on the IP Address Tab.
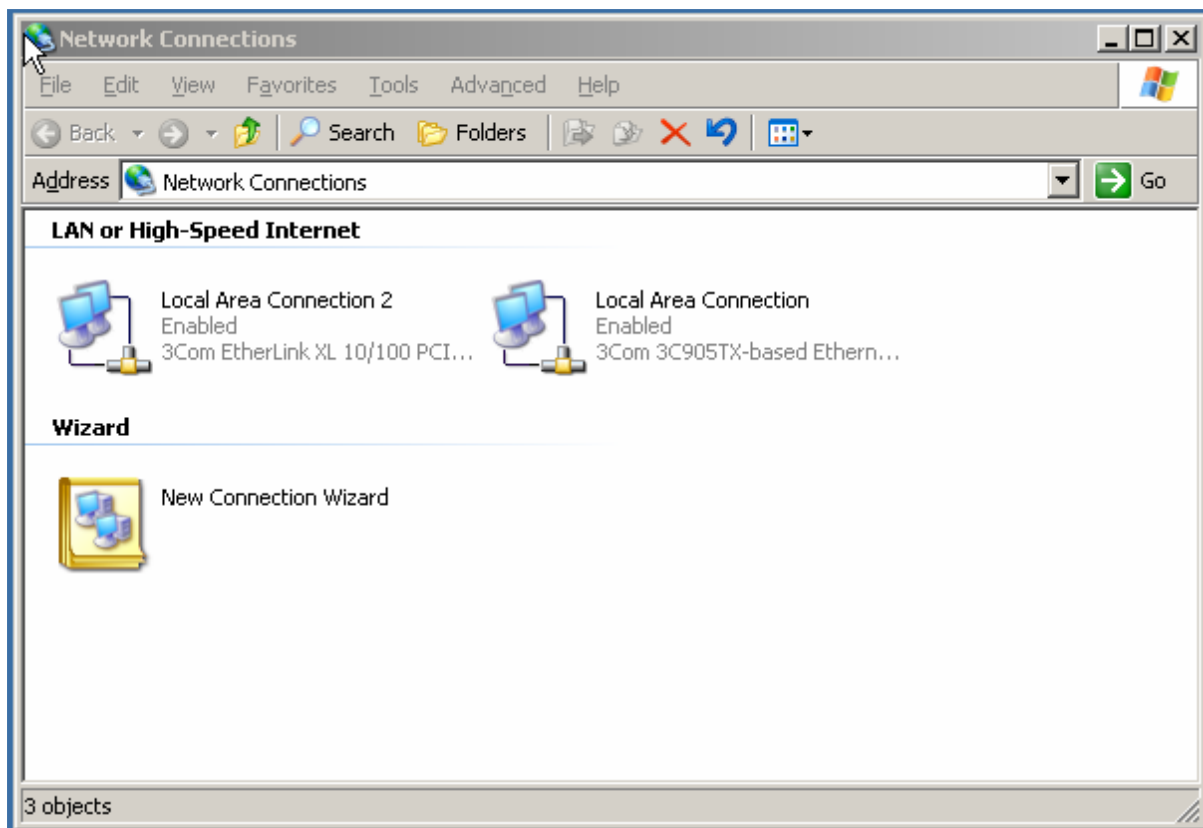
Network Connections Window
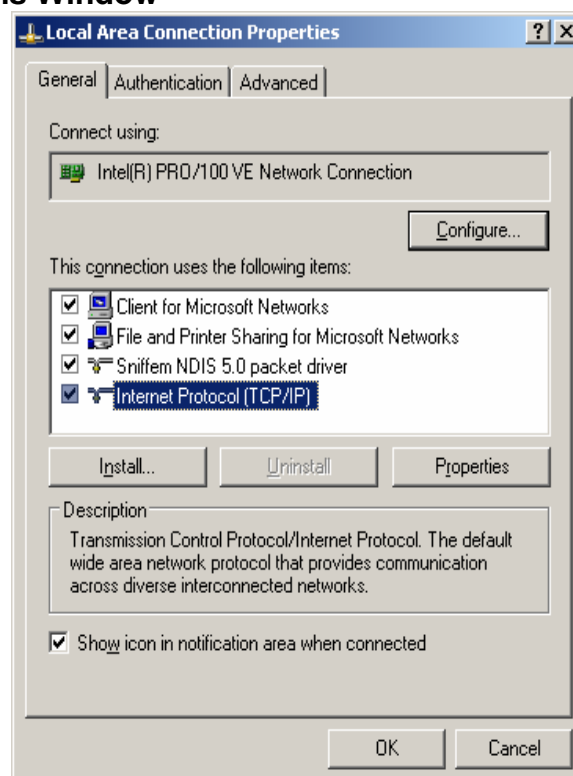
TCP/IP Properties Window

      Explanation: The IP addresses can be set to anything as long as they are compatible and on the same network. Record the existing settings before making any changes in case they need to be set back (for instance, they may be DHCP clients now). For this lab, use the Class C IP network address of 192.168.230.0 and set workstation 1 to static IP address 192.168.230.1 and set workstation 2 to 192.168.230.2. Set the default subnet mask on each workstation to 255.255.0.0. For the purpose of this lab, you can leave the Gateway and DNS Server entries blank.

Network Status commands

- o ifconfig –a
    - Show all interfaces
- o ifconfig <interface name>
    - setup for a particular interface, e.g. ln0
- o ifconfig <interface name> <params>
    - Set params of the interface. Root only. Typically IP address, subnet,
  are set upon bootup in /etc/rc*
- o ping <host>
    - Send an ICMP echo message (one packet) to a host. This may go continually until you hit Control-C. Ping means a packet was sent from your machine via ICMP, and echoed at the IP level. ping tells you if the OS is up; but doesn't tell you if inetd or other daemons are running.
- o netstat <seconds>
    - running error stats + counts on config interface every N seconds
- o netstat –a
    - socket ports and state
- o netstat -s

protocol (tcp etc.) counts and errors
- o netstat -r

  routing table dump
- o netstat –i

    list of interfaces and gives 3 letter interface names If you use the –n flag, host addressed will be numeric and avoid a DNS lookup, which might be faster in some cases. Combine with the other switches.
- o netstat –r

    Print routing tables. The routing tables are stored in the kernel and used by ip to route packets to non-local networks.
- o netstat –at

    listening only TCP(Transmission Control Protocol) port connections using netstat-at. Active Internet connections (Services established)

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1. ifconfig
Syntax:
ifconfig [interface]

Description:
Displays or configures network interfaces. Commonly used to check IP address, MAC address, and interface status. It is deprecated in favor of ip a.

Sample Output:
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
      inet 192.168.1.10 netmask 255.255.255.0 broadcast 192.168.1.255
      inet6 fe80::a00:27ff:fe4e:66a1 prefixlen 64 scopeid 0x20<link>
      ether 08:00:27:4e:66:a1 txqueuelen 1000 (Ethernet)
      RX packets 123456 bytes 123456789 (117.7 MiB)

2. ping
Syntax:
ping [destination]

Description:
Sends ICMP echo requests to a host to test network connectivity.

Sample Output:
PING google.com (142.250.190.14): 56 data bytes
64 bytes from 142.250.190.14: icmp_seq=0 ttl=117 time=23.4 ms
64 bytes from 142.250.190.14: icmp_seq=1 ttl=117 time=24.0 ms
--- google.com ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms

3. netstat -a
Syntax:
netstat -a

Description:
Displays all active connections and listening ports.

Sample Output:
```
Proto Recv-Q Send-Q Local Address        Foreign Address        State
tcp     0     0 0.0.0.0:ssh         0.0.0.0:*              LISTEN
udp     0     0 0.0.0.0:bootpc       0.0.0.0:*
```

4. netstat -at
Syntax:
netstat -at

Description:
Displays only TCP connections.
Sample Output:
```
Proto Recv-Q Send-Q Local Address        Foreign Address        State
tcp     0     0 localhost:mysql       0.0.0.0:*              LISTEN
tcp     0     0 192.168.1.5:ssh       192.168.1.10:54321     ESTABLISHED
```

5. netstat -r
Syntax:
netstat -r

Description:
Displays the kernel routing table.
Sample Output:
nginx
CopyEdit
```
Kernel IP routing table
Destination     Gateway        Genmask        Flags  MSS Window  irtt Iface
0.0.0.0         192.168.1.1    0.0.0.0        UG     0   0       0    eth0
192.168.1.0     0.0.0.0        255.255.255.0  U      0   0       0    eth0
```

6. netstat -x
Syntax:
netstat -x

Description:
Displays Unix domain socket connections.
Sample Output:
```
Active UNIX domain sockets (servers and established)
Proto RefCnt Flags      Type      State       I-Node  Path
unix  2    [ ACC ]   STREAM    LISTENING    12345   /run/systemd/journal/stdout
```

7. netstat -s
Syntax:
netstat -s

Description:
Displays network statistics for each protocol (IP, TCP, UDP, etc.).
Sample Output:
Ip:
    1258 total packets received
    0 forwarded
    0 incoming packets discarded
    1258 incoming packets delivered
Tcp:
    872 active connections openings
    3 failed connection attempts
    0 resets sent

8. netstat -ic
Syntax:
netstat -ic

Description:
Displays interface statistics continuously like iostat.
Sample Output:
Inter-| Receive | Transmit
 face |bytes   packets errs drop fifo frame compressed multicast|bytes   packets errs drop fifo colls carrier compressed
 eth0 1234567 1034   0   0   0   0   0   0 2345678 1045   0   0   0   0   0   0