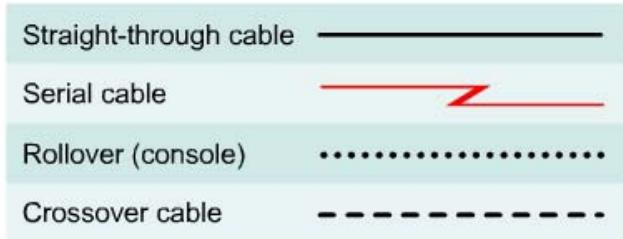
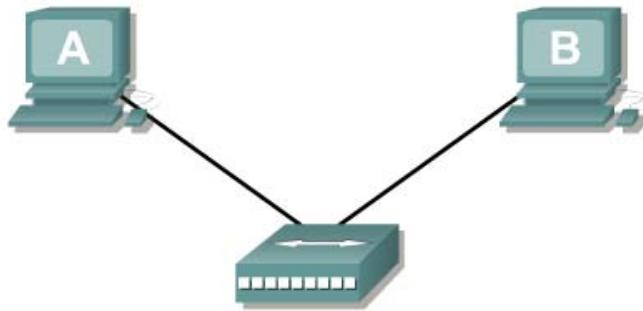


Lab 5.1.13a Building a Hub-based Network – Instructor Version



Objective

- Create a simple network with two PCs using a hub
- Identify the proper cable to connect the PCs to the hub
- Configure workstation IP address information
- Test connectivity using the `ping` command

Background / Preparation

This lab focuses on the ability to connect two PCs to create a simple hub-based Ethernet LAN using two workstations. A hub is a networking concentration device sometimes referred to as a multiport repeater. Hubs are inexpensive and easy to install, but they permit collisions to occur. They are appropriate for a small LAN with light traffic.

In addition to the physical and data link connections, which are Layers 1 and 2, the computers must also be configured with the correct IP network settings, which is Layer 3, so that they can communicate. Since this lab uses a hub, a basic Category 5/5e UTP straight-through cable is needed to connect each PC to the hub. This is referred to as a patch cable or horizontal cabling, which is used to connect workstations and a typical LAN. Start this lab with the equipment turned off and with cabling disconnected. Work in teams of two with one person per PC. The following resources will be required:

- Two workstations with an Ethernet 10/100 NIC installed
- Ethernet 10BaseT or Fast Ethernet hub

- Several Ethernet cables, which are straight-through and crossover, to choose from for connecting the two workstations

Step 1 Identify the proper Ethernet cable and connect the two PCs to the hub

- a. The connection between the two PCs and the hub will be accomplished using a Category 5 or 5e straight-through patch cable. Locate two cables that are long enough to reach from each PC to the hub. Attach one end to the NIC and the other end to a port on the hub. Be sure to examine the cable ends carefully and select only a straight-through cable.
- b. What kind of cable is required to connect from NIC to hub? [straight-through](#)
- c. What is the category rating of the cable? [Category 5 or 5e](#)
- d. What is the AWG wire size designation of the cable? [24 AWG](#)

Step 2 Verify the physical connection

- a. Plug in and turn on the computers. To verify the computer connections, insure that the link lights on the both PC NICs and the hub interfaces are lit. Are all link lights lit? [Yes](#)

Step 3 Access the IP settings window

Note: Be sure to write down the existing IP settings, so that they can be restored at the end of the lab. These include IP address, subnet mask, default gateway, and DNS servers. If the workstation is a DHCP client, it is not necessary to record this information.

Windows 95/98/Me users should do the following:

- Click on **Start > Settings > Control Panel** and then click the **Network** icon.
- Select the TCP/IP protocol icon that is associated with the NIC in this PC and click on **Properties**.
- Click on the **IP Address** tab and the **Gateway** tab.

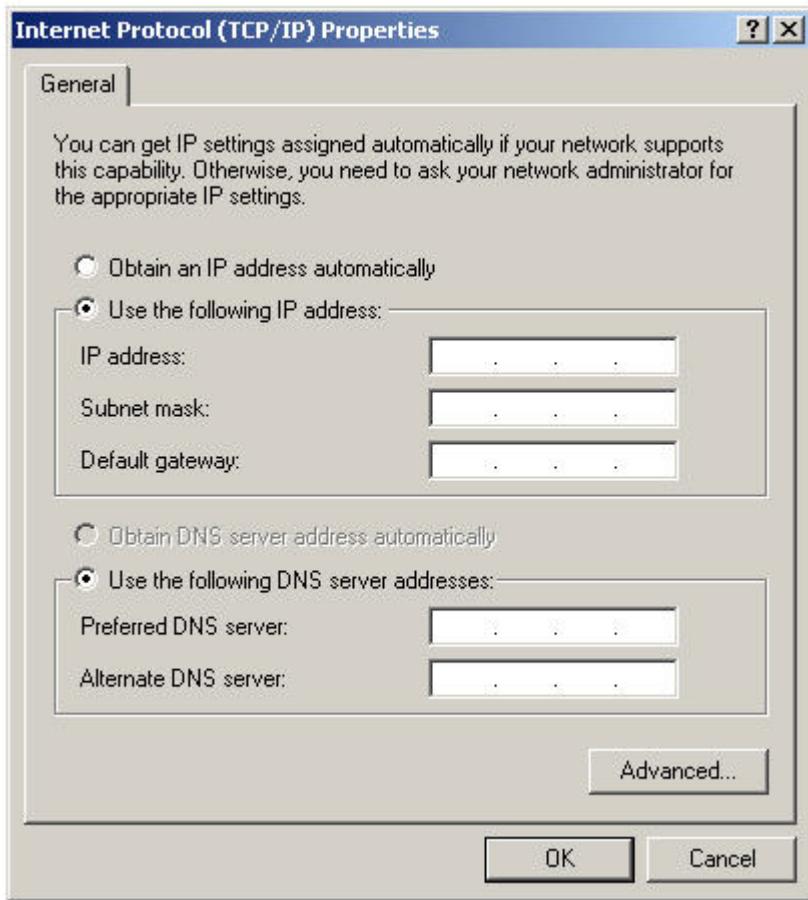
Windows NT/2000 users should do the following:

- Click on **Start > Settings > Control Panel** and then open the **Network and Dial-up Connections** folder.
- Click and open the **Local Area Connection** icon.
- Select the TCP/IP protocol icon that is associated with the NIC in this PC.
- Click on **Properties** and click on **Use the following IP address**.

Windows XP users should do the following:

- Click on **Start > Settings > Control Panel** and then click the **Network Connection** icon.
- Select the Local Area Network Connection and click on **Change settings of this connection**.
- Select the **TCP/IP protocol** icon that is associated with the NIC in this PC.
- Click on **Properties** and click on **Use the following IP address**.

See the example below:



Step 4 Configure TCP/IP settings for the two PCs

- Set the IP address information for each PC according to the information in the table.
- Note that the default gateway IP address is not required, since these computers are directly connected. The default gateway is only required on local area networks that are connected to a router.

| Computer | IP Address | Subnet mask | Default Gateway |
|----------|-------------|---------------|-----------------|
| PC – A | 192.168.1.1 | 255.255.255.0 | Not Required |
| PC – B | 192.168.1.2 | 255.255.255.0 | Not Required |

Step 5 Access the Command or MS-DOS prompt

- Use the Start menu to open the Command Prompt (MS-DOS-like) window:

Windows 95/98/Me users should do the following:

Start > Programs > MS-DOS Prompt

Windows NT/2000 users should do the following:

Start > Programs > Accessories > Command Prompt

Windows XP users should do the following:

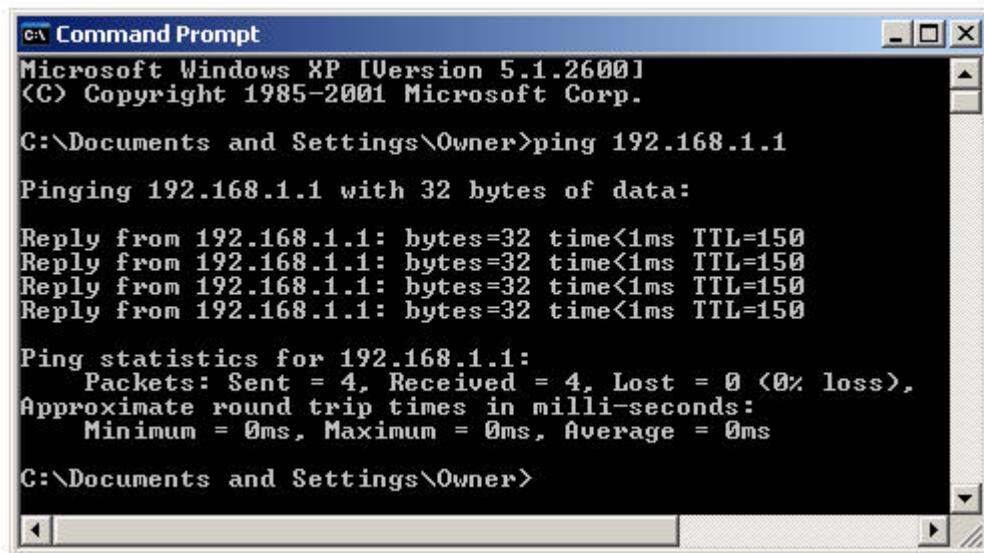
Start > Programs > Accessories > Command Prompt

Step 6 Verify that the PCs can communicate

- a. Test connectivity from one PC to the other through the hub by pinging the IP address of the opposite computer. Use the following command at the command prompt.
`C:>ping 192.168.1.1 (or 192.168.1.2)`
- b. Look for results similar to those shown below. If not, check the PC connections and TCP/IP settings for both PCs. What was the ping result?

Results could possibly be: Sent=4 Received=3 Lost=1 (this is due to ARP)

Any other results probably indicate an error



```
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\Owner>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time<1ms TTL=150

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

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

Step 7 Confirm the TCP/IP network settings

Windows 95 / 98 / Me users should do the following:

- a. Type the `winipcfg` command from the MS-DOS Prompt. Record the results.

Answers will vary depending on if Computer A or B is used.

Examples for Computer A

IP Address: 192.168.1.1

Subnet Mask: 255.255.255.0

Default Gateway:

Windows NT / 2000 / XP users should do the following:

- b. Type the `ipconfig` command from the Command Prompt. Record the results.

Answers will vary depending on if Computer A or B is used.

Examples for Computer B

IP Address: 192.168.1.2

Subnet Mask: 255.255.255.0

Default Gateway:

Step 8 Restore the PCs to their original IP settings, disconnect the equipment, and store the cables