Network I Lab 02

Connecting peer to peer pcs using cross over Ethernet network cable

build Crossover Cable Construction

Objective

• Build a Category 5 or Category 5e Unshielded Twisted Pair (UTP) Ethernet network patch cable or patch cord.

• Test the cable for continuity and correct pinouts, the correct color of wire on the right pin.

Background

The cable constructed will be a four-pair, eight-wire, straight-through cable, which means that the color of wire on Pin 1 on one end of the cable will be the same as that of Pin 1 on the other end.

Pin 2 will be the same as Pin 2, and so on. The cable will be wired to either TIA/EIA T568B or T568A standards for 10BASE-T Ethernet, which determines what color wire is on each pin.

T568B, also called AT&T specification, is more common in the U.S., but many installations are also wired to T568A, also called ISDN.

Prior to starting the lab, the teacher or lab assistant should have a spool of Category 5 Unshielded Twisted Pair (UTP) cable, RJ-45 (8-pin) connectors, an RJ-45 crimping tool and an Ethernet / RJ-45 continuity tester available.

Work individually or in teams. The following resources will be required:

• One 0.6 to .9 m (2 to 3 ft) length of Category 5 cabling per person or team

• Four RJ-45 connectors, two are extra for spares

• RJ-45 crimping tools to attach the RJ-45 connectors to the cable ends

• Ethernet cabling continuity tester which can test straight-through or crossover type cables, T568A or T568B

• Wire cutters

- use only two pairs to build cross over Ethernet cable as shown

RJ45 Pin # (END 1)	Function	Wire Color	Diagram End #1	RJ45 Pin # (END 2)	Function	Wire Color	Diagram End #2
1	Tx+	White/Orange		1	Tx+	White/Green	
2	Tx-	Orange		2	Tx-	Green	
3	Rx+	White/Green		3	Rx+	White/Orange	
6	Rx-	Green		6	Rx-	Orange	

- Using four pairs to build cross over Ethernet cable as shown

RJ45 Pin # (END 1)	Function	Wire Color	Diagram End #1	RJ45 Pin # (END 2)	Function	Wire Color	Diagram End #2
1	Tx+	White/Orange		1	Rx+	White/Green	
2	Tx-	Orange		2	Rx+	Green	
3	Rx+	White/Green		3	Tx+	White/Orange	
4	X	Blue		4	X	White/Brown	
5	X	White/Blue		5	X	Brown	
6	Rx-	Green		6	Tx-	Orange	
7	X	White/Brown		7	X	Blue	
8	X	Brown		8	X	White/Blue	

Diagram showing both T568A and T568B cabling wire colors
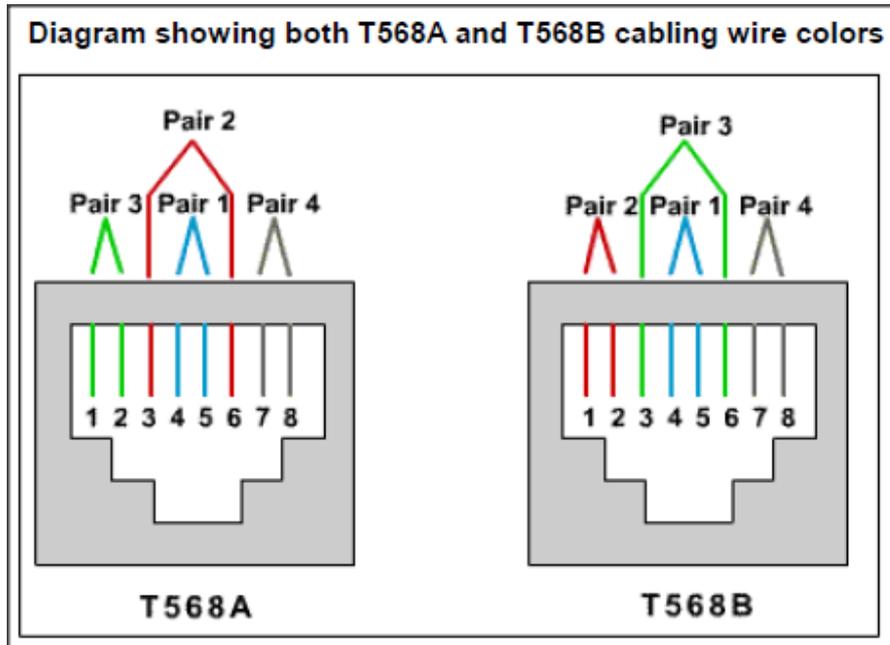
Use the preceding table and diagram to create a T568B patch panel cable. Both cable ends should be wired the same when looking at the conductors.

Tools and components

Components

1. Cable - Be sure the cable(s) you are using is properly rated for CAT 5.

2. Connectors – Ethernet cables are terminated with CAT 5 RJ-45 (RJ stands for "Registered Jack") modular plugs.

RJ-45 plugs are similar to those you'll see on the end of your telephone cable except they have eight versus four contacts on the end of the plug.

3. RJ-45 Crimping tool

Used to connect RJ45 connectors to Cat5 cables.
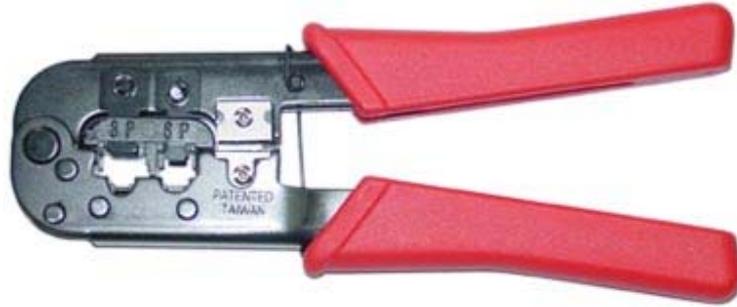
Steps

1. Step 1, Build Cross over cable

Step 1

Determine the distance between devices or device and plug. Add at least 30.48 cm (12 in.) to the distance.

Step 2

Cut a piece of stranded Category UTP cable to the desired length. Use stranded cable for patch cables because it is more durable when bent repeatedly. Solid wire is used for cable runs that are punched down into jacks.

Step 3

Strip 5.08 cm (2 in.) of jacket off of one end of the cable.

Step 4

Hold the four pairs of twisted cables tightly where jacket was cut away. Reorganize the cable pairs into the order of the T568B wiring standard. Take care to maintain as much of the twists as possible since this provides noise cancellation.

Step 5

Hold the jacket and cable in one hand and untwist a short length of the green and blue pairs.
Reorder the pairs to reflect the T568B wiring color scheme. Untwist and order the rest of the wire pairs according to the color scheme.

Step 6

Flatten, straighten, and line up the wires. Trim them in a straight line to within 1.25 to 1.9 cm (1/2 to ¾ in.) from the edge of the jacket. Be sure not to let go of the jacket and the wires, which are now in the proper order. Minimize the length of untwisted wires because sections that are too long and near connectors are a primary source of electrical noise.
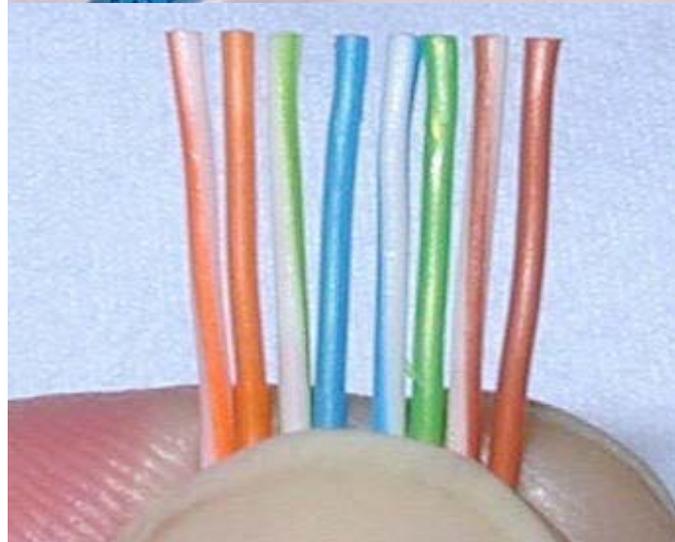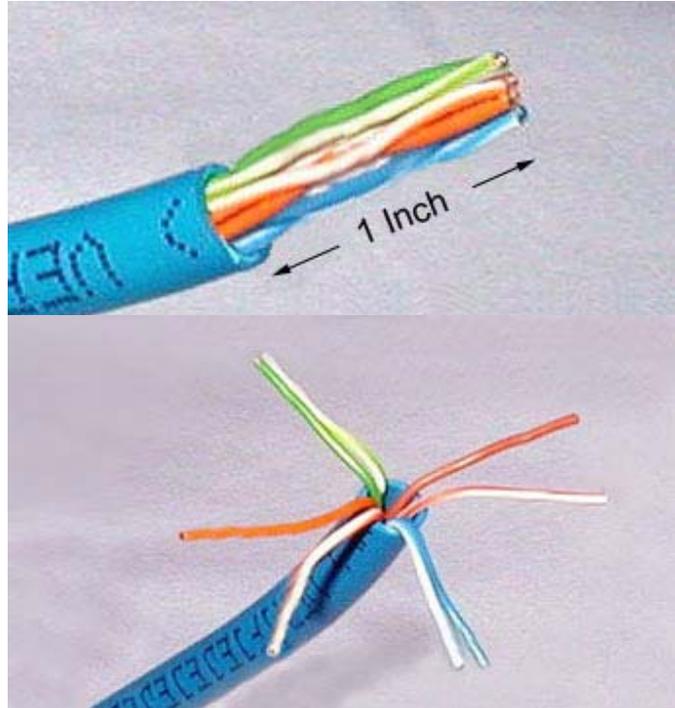
Step 7

Place an RJ-45 plug on the end of the cable, with the prong on the underside and the orange pair to the left side of the connector.

Step 8

Gently push the plug onto wires until the copper ends of the wires can be seen through the end of the plug. Make sure the end of the jacket is inside the plug. This provides for stress relief and to ensure that all wires are in the correct order.

If the jacket is not inside the plug, the plug will not be properly gripped and will eventually cause problems. If everything is correct, crimp the plug hard enough to force the contacts through the insulation on the wires, completing the conducting path.

Step 9

Repeat Steps 3 through 8 to terminate the other end of the cable. Use the same scheme to finish the straight through cable.

Step 10

Test the finished cable. Have the instructor check the finished cable. How is it possible to tell if the cable is functioning properly?

REPEAT STEPS OTHER END
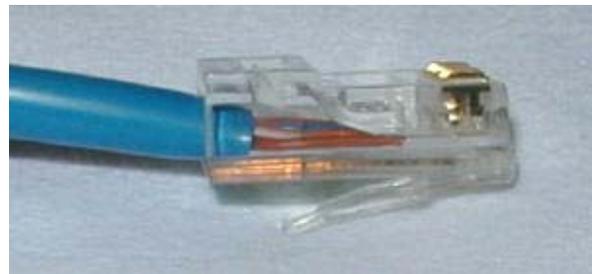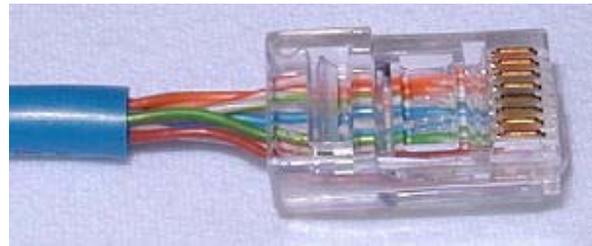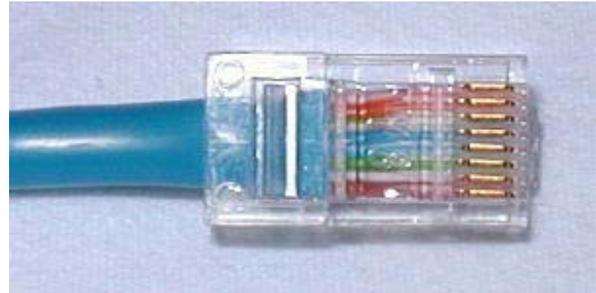
Step 2, establish the physical connection

Plug in and turn on the computers. To verify the computer connections, insure that the link lights on both NICs are lit. Are both link lights lit?

Step 3, configure windows network settings

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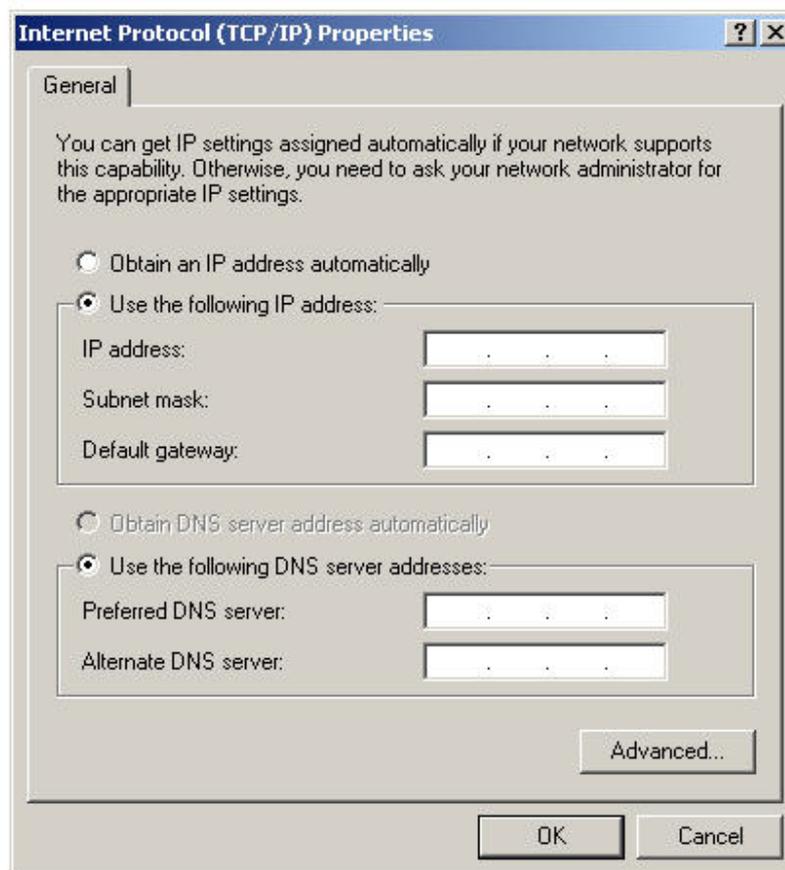
• Click on **Start** > **Settings** > **Control Panel** and then click the **Network Connection** icon.
• Select the **Local Area Network Connection** and click on **Change settings of this connection**.
• Select the **TCP/IP protocol** icon that is associated with the NIC in this PC.
• Click on **Properties**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

PC	IP	Sub net mask	Gateway
Pc01	192.168.1.1	255.255.255.0	Not required
Pc02	192.168.1.2	255.255.255.0	Not required

Step 5 Access the Command or MS-DOS prompt
Windows XP users should do the following:
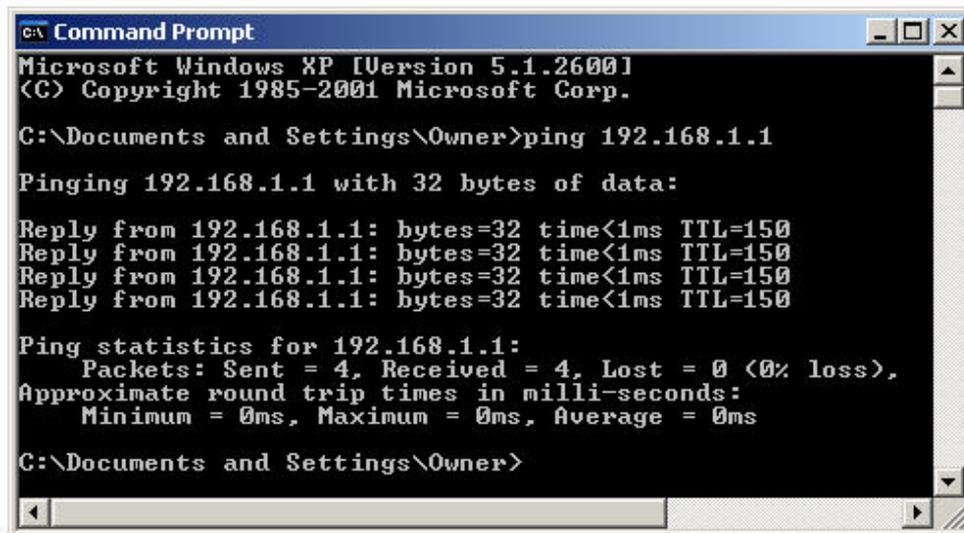**Start** > **Programs** > **Accessories** > **Command Prompt**

Step 4, Verify that the PCs can communicate

a. Test connectivity from one PC to the other 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

Step 5, Confirm the TCP/IP network settings

Windows NT / 2000 / XP users should do the following:
Type the **ipconfig** command from the Command Prompt.