

## Vocabulary Exercise: Matching

Match the definition on the left with a term on the right. Each term will match with one definition only.

Definitions	Terms
A. Media-access mechanism wherein devices ready to transmit data first check the channel for a carrier.	<u>  A  </u> CSMA/CD
B. The network area within which frames that have collided are propagated.	<u>  J  </u> MAC
C. The wrapping of data in a particular protocol header.	<u>  D  </u> Unicast
D. This message is sent to a single network destination.	<u>  F  </u> Broadcast
E. A request sent to the sending station requesting that a frame be sent again because it was not received or received with errors.	<u>  H  </u> Multicast
F. Data packet that will be sent to all nodes on a network. Broadcasts are identified by a broadcast address.	
G. A notification sent from one network device to another to acknowledge that some event has occurred.	
H. These are single packets copied by the network and sent to a specific subset of network addresses.	
I. The control information appended to the end of data when that data is encapsulated for network transmission.	
J. The lower of the two sublayers of the data link layer defined by the Institute of Electrical and Electronics Engineers (IEEE 802.3 standards).	
K. Higher of the two data link layer sublayers defined by the IEEE. This sublayer handles error control, flow control, framing, and MAC sublayer addressing	

## Lab 1.1 PC Network TCP/IP Configuration

### Objective

- Identify tools used to discover a computer network configuration with various operating systems.
- Gather information including connection, host name, Layer 2 MAC address and Layer 3 TCP/IP network address information.
- Compare network information to other PCs on the network.

### Background

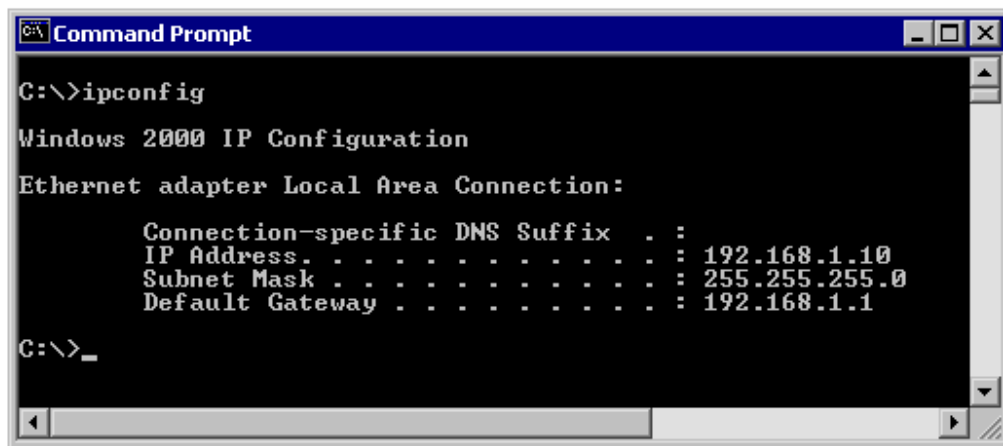
This lab assumes the use of any version of Windows. This is a non-destructive lab and can be done on any machine without concern of changing the system configuration.

Ideally, this lab is performed in a classroom or other LAN environment that connects to the Internet. This lab can be done from a single remote connection using a modem or DSL-type connection. The instructor will furnish IP addresses.

### Step 1 Gather TCP/IP configuration information

Use the Start menu to open the Command Prompt, an MS-DOS-like window. Press **Start > All Programs > Accessories > Command Prompt**

The following figure shows the Command screen. Type **ipconfig** and press the **Enter** key. The spelling of **ipconfig** is critical while case is not. It is short for IP Configuration.



```
Command Prompt
C:\>ipconfig

Windows 2000 IP Configuration

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . : 
    IP Address . . . . . : 192.168.1.10
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1

C:\>_
```

This first screen shows the IP address, subnet mask, and default gateway. The IP address and the default gateway should be in the same network or subnet, otherwise this host would not be able to communicate outside the network. In the figure the subnet mask tells us that the first three octets must be the same to be in the same network.

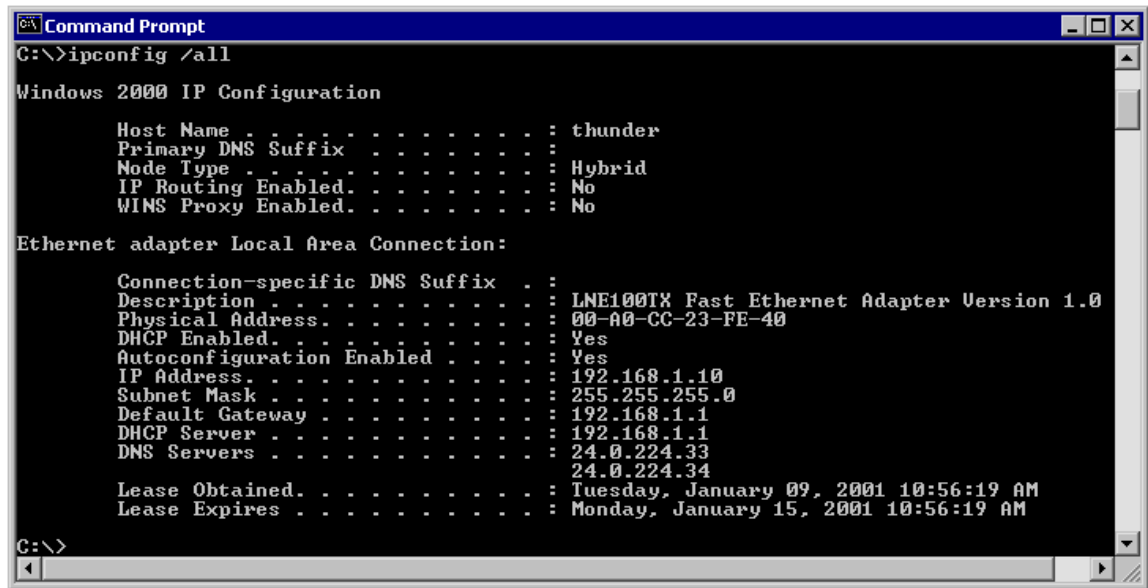
**Note:** If this computer is on a LAN, the default gateway might not be seen if it is running behind a Proxy Server. Record the following information for this computer.

**Step 2 Record the following TCP/IP information for this computer**

- 2.1 IP address: 68.91.33.28
- 2.2 Subnet Mask: 255.255.255.0
- 2.3 Default Gateway: 68.91.33.29

**Step 3 Check additional TCP/IP configuration information**

To see detailed information, type **ipconfig /all** and press **Enter**. The figure shows the detailed IP configuration screen.



**Step 4 Record the additional TCP/IP information for this computer**

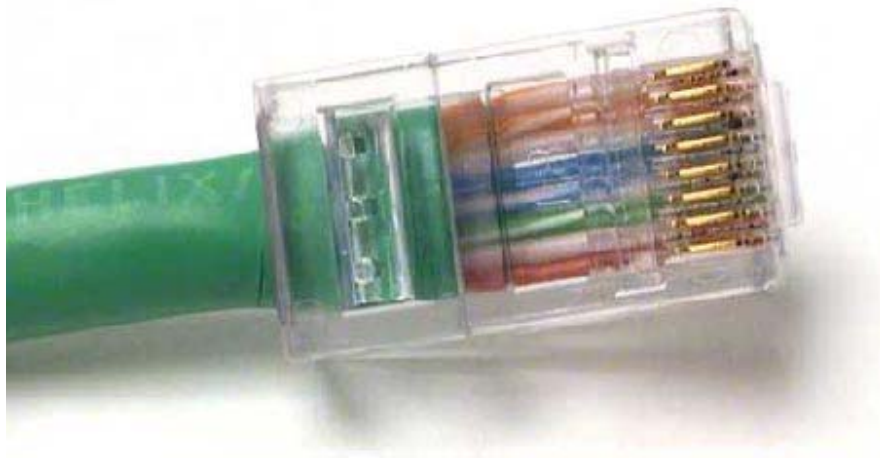
- 4.1 MAC address: 00-13-72-B6-47-63
- 4.2 DHCP Server: 192.168.0.1
- 4.3 DNS Server: 192.168.0.1

The host name, including the computer name and NetBIOS name should be displayed. Also, the DHCP server address, if used, and the date the IP lease starts and ends should be displayed. Look over the information. Entries for the DNS, used in name resolution servers, may also be present.

The previous figure reveals that the router is performing DHCP service for this network. This would likely be a small office or home office (SOHO) or small branch office implementation.

Notice the Physical Address (MAC) and the NIC model (Description).

## Lab 1.2 Straight-Through Cable Construction



### Objective

- Learn how to build a Category 5 or Category 5e Unshielded Twisted Pair (UTP) Ethernet network patch cable or patch cord.

### 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

Four RJ-45 connectors, two are extra for spares

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

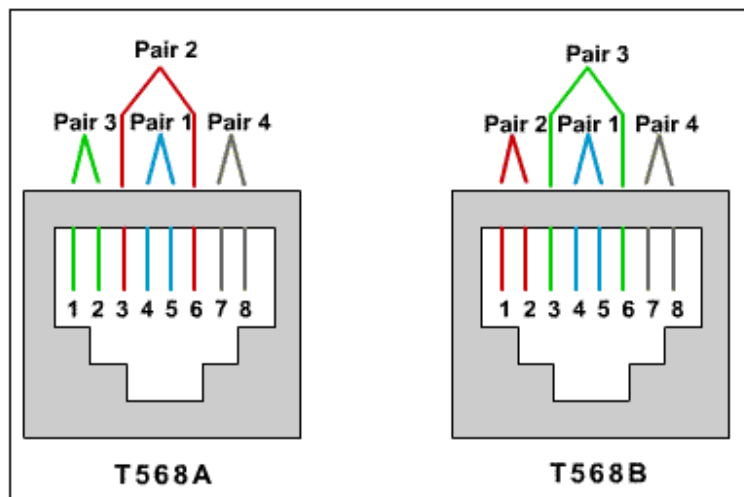
Ethernet cabling continuity tester (if available) which can test straight-through or crossover type cables, T568A or T568B

Wire cutters

### Cabling Pin-out Information for T568B

Pin #	Pair #	Function	Wire Color	Used with 10/100BASE-T Ethernet?	Used with 100BASE-T4 and 1000BASE-T Ethernet?
1	2	Transmit	White/Orange	Yes	Yes
2	2	Transmit	Orange	Yes	Yes
3	3	Receive	White/Green	Yes	Yes
4	1	Not used	Blue	No	Yes
5	1	Not used	White/Blue	No	Yes
6	3	Receive	Green	Yes	Yes
7	4	Not used	White/Brown	No	Yes
8	4	Not used	Brown	No	Yes

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.

#### Step 1

Determine the distance between devices or device and plug. Add at least 30.48 cm (12 in.) to the distance. The maximum length for this cable, according to TIA/EIA structured wiring standards is 3 m (9.84 ft), although this can vary. Standard lengths are 1.83 m (6ft) and 3.05 m (10 ft).

#### 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 3/4 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.

## Tutorial Videos

The following videos will demonstrate major functions of crimping tool and how to make a ethernet cable.

RJ-45 Crimping Tool:

<http://www.youtube.com/watch?v=HBNtMp7mcAA&feature=related>

How to Make Ethernet Cable

<http://www.youtube.com/watch?v=HNu2NDTiZ44>

## Step 10

In the tutorial video, what kind of cable did they make (T568A or T568B)?

T568B was the kind of cable that was made in the tutorial video.

## Lab 1.3 UTP Cable Purchase

### Objective

- Introduce the variety and prices of network cabling and components in the market.
- Gather pricing information for UTP patch cables and bulk cable.

### Background

Put together a price list for an upcoming cabling project. Gather pricing information for the horizontal (UTP) cabling. If UTP is not used in the immediate area, substitute shielded products. The items include the following:

- 24 – 1 m (3 ft) Category 5 or higher UTP patch cables
- 24 – 3 m (10 ft) Category 5 or higher UTP patch cables
- 2 – 15 m (50 ft) Category 5 or higher UTP patch cables
- 152.4 m (500 ft) UTP compare the price to shielded twisted pair
- 152.4 m (500 ft) UTP plenum

### Step 1 Research cable pricing

Use at least three sources for pricing. On the Web try <http://www.cdw.com> and <http://www.google.com>. Perform searches from those sites looking for Category 5 jumpers, Category 5 patch, and Category 5 bulk. While the CDW site will give prices quickly, the Google search will turn up many interesting things from custom cable building firms to instructions for building cables. Also refer to networking equipment and supplies catalogs.

### Step 2 Compile a table of the results

Site, Catalog or Store	Pacific Custom Cable	Belkin	Tiger Direct
24 - 1 m (3 ft) Category 5 or	2.10 each = \$50.40	3.99 each = 95.76	3.99 each = 95.76
24 - 3 m (10 ft) Category 5 or	3.15 each = \$75.60	2.99 each = 71.76	7.99 each = 191.76
2 - 15 m (50 ft) Category 5 or	14.00 each = \$28.00	17.99 each = 35.99	19.99 each = 39.98
152.4 m (500 ft) UTP	95.00 (1000 feet)	79.99	54.99 bulk
152.4 m (500 ft) shielded twisted	X	354.99	X
152.4 m (500 ft) UTP plenum	195.00 (1000 feet)	175.99	X

### Reflection

What do you find from search results?

#### Extra Pricing Results

	Directron	CompUSA	CDW.COM
24- (3 ft) Cat. 5	2.25 each = 54.00	4.99 each = 119.76	1.99 each = 47.76
24- (10 ft) Cat. 5	3.50 each = 84.00	4.99 each = 119.76	2.99 each = 71.76
2- (50 ft) Cat. 5	7.99 each = 15.98	24.99 each = 49.98	18.99 each = 37.98
500 ft. UTP	82.99	54.99	79.99
500 ft. shielded	x	X	199.99
500 ft. plenum	149.99	159.99	175.99

This was a search that I had never thought about before. I always felt that if I needed a cable that I would just go down to Best Buy or the now defunct Circuit City and purchase what looked like it would work for my need. After watching the tutorial I felt much more confident in knowing that down the road I could custom-build my own cables. From the results it is clear that if you buy your cabling in the bulk you could save yourself or your company a lot of money. When you are in charge of a network it would seem logical to purchase the 500 or even 1000 feet of cabling and then cut your cables to the specific sizes that you need.

I also found most companies are close to each other in price, but there is some degree of variations. It goes to show that if you shop around and find a good vendor, your budget can stretch and your boss should be pleased.