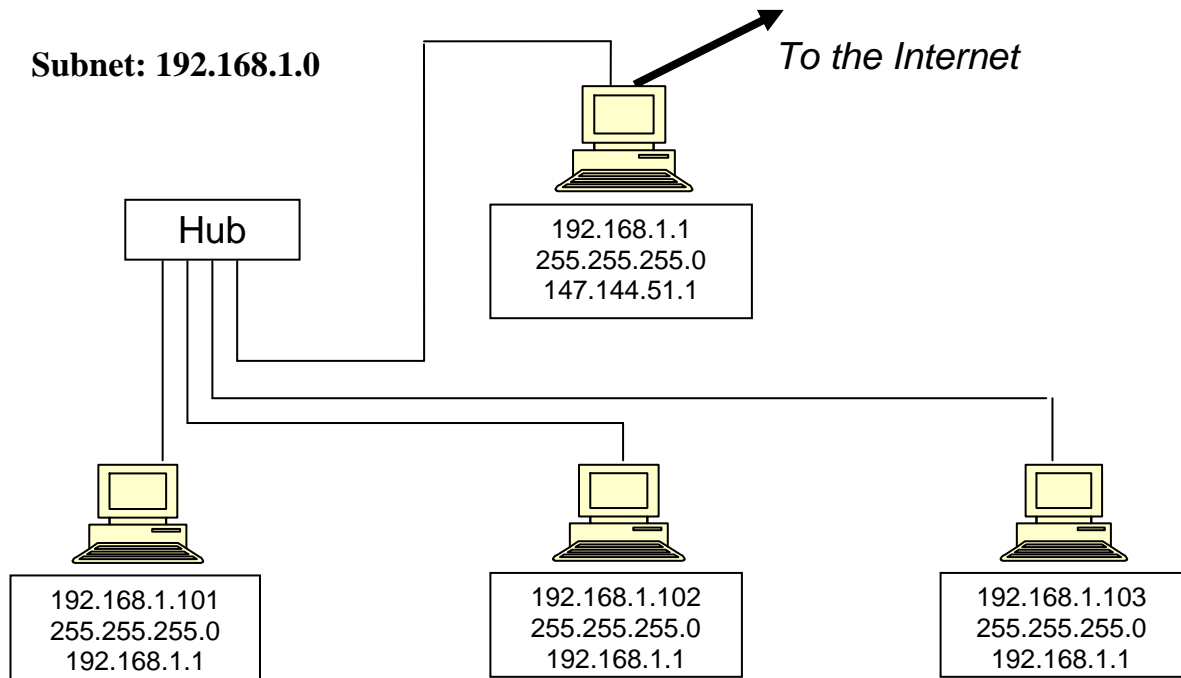# Understanding TCP/IP Properties

1. Objectives

- ➢ Use of **IP address, Subnet mask, Default gateway, MAC address**.
- ➢ Identify tools used to discover a **computer network configuration** in Windows.
- ➢ Gather information including **connection**, **host name**, **MAC address** and **IP address** information.
- ➢ **Compare** network information to other PCs on the network.
- ➢ Learn to use the **TCP/IP Packet Internet Groper (ping) command** from a workstation/PC.

2a. IP address, Subnet mask, Default gateway, MAC address

Consider the following diagram:

Subnet: 192.168.1.0

To the Internet

Hub

```
192.168.1.1
255.255.255.0
147.144.51.1
```

```
192.168.1.101        192.168.1.102        192.168.1.103
255.255.255.0        255.255.255.0        255.255.255.0
192.168.1.1          192.168.1.1          192.168.1.1
```

- **i.** Write down the **subnet mask**: …………………………………………………………………………..
- **ii.** Find the **network portion** of the IP address of the Gateway Machine:…………………………………………..
- **iii.** Is the **default gateway** (Gateway Machine's IP address) same for all the Workstations (PCs)?…………………
- **iv.** Find the **default gateway** for the Workstations (PCs):…………………………………………………………..

2b. Crossover and Straight-through Cables

Common Ethernet network cables are straight and crossover cable. This Ethernet network cable is made of **4 pair high performance cable** that consists of **twisted pair conductors** that used for data transmission. Both end of cable is called **RJ45 connector**. Straight and crossover cable can be Cat3, Cat 5, Cat 5e or Cat 6 UTP cable, the only difference is each type will have different wire arrangement in the cable for serving different purposes.

Side A

Side B

Category 1 (Layer 2 or below)	**Category 2 (Layer 3 or above)**
Hub Switch	PC/Laptop/Server Router

You usually use **straight cable** to connect **different type of devices (different category)**. For example:

- ✓ Connect a computer to a switch/hub's normal port.
- ✓ Connect a router's LAN port to a switch/hub's uplink port. (normally used for expanding network)

Use **crossover cable** to **connect same type of devices (same category)**. For example:

- ✓ Connect 2 computers directly.
- ✓ Connect a router's LAN port to a switch/hub's normal port. (normally used for expanding network)
- ✓ Connect 2 switches/hubs by using normal port in both switches/hubs.

3a. Instructions: Experiment 1

Step 1: Connect into the Network
Establish and verify connectivity to the Network. This ensures the computer has an IP address.

Step 2: Gather TCP/IP configuration information
Use the **Start menu** to open the **Command Prompt**, an MS-DOS-like window. Type **ipconfig**and press the **Enter** key. The **ipconfig**is used for gathering the IP Configuration information.

Step 3: Record the following TCP/IP information for your computer
IP address: _____, Subnet Mask:_____, Default Gateway: _____

Step 4: Compare the TCP/IP configuration of your computer to another computer on the LAN
Select another **computer B**. Perform **step 3** for the computer B.**Fill up** the following table.

	Your Computer (A)	Another Computer (B)	Are there any similarities? (yes/no)
IP Address:			
Subnet Mask:			
Default Gateway			

Step 5: Check additional TCP/IP configuration information
To see detailed information, type **ipconfig /all** and press **Enter**.

    i. Does the output screen show **any Servers?** …………………………

    ii. If yes, write down the IP addresses of the Servers listerd:……………….…………………………………………………..

    iii. Write down the**HostName**of your computer:……………………..

    iv. Write down the **HostName of another computer**:……………………………

    v. Do all of the servers and workstations **share the same network portion** of the IP address as your pc?…………..

    vi. If the servers and workstations are in another network, how to communicate with them?…………………………

    vii. Write down the**Physical (MAC) Address** of your computer:……………………………………...…………………..

    viii. Write down the **Physical (MAC) Address of another computer**:……………………………………………………

    ix. Are there **any similarities** between them? If yes, **describe** the similarity in **1 sentence**…………………………….

Step 6: Close the screen
Close the screen when finished examining network settings. Repeat the previous steps as necessary. Make sure that it is possible to return to and interpret this screen.

3b. Instructions: Experiment 2
You need the **IP addresses** that were recorded in **experiment 1**.

Step 1: Access the command prompt
Use the Start menu to open the Command Prompt window.

Step 2: ping the IP address of another computer
In the window, type **ping**, a space, and the **IP address of another computer B**. Is the **ping** successful? **(yes/no)_____**. Note the results from the output screen:**Packets: sent =__, Received = __, Lost = _____**

Step 3: ping the IP address of the default gateway
Try to **ping** the **IP address of the default gateway**listed in the last exercise. Is the **ping** successful? **(yes/no)_____**. Note the results from the output screen: **Packets: sent =__, Received = __, Lost = _____**

Step 4: ping the Loopback IP address of this computer
Type the following command**: ping 127.0.0.1** Is the **ping** successful? **(yes/no)_____**. Note the results from the output screen: **Packets: sent =__, Received = __, Lost = _____**

Step 5: ping the hostname of another computer
Try to **ping** the **hostname** of the **computer B**.Is the **ping** successful? **(yes/no)_____**. Note the results from the output screen: **Packets: sent =__, Received = __, Lost = _____**

Demonstrate your work to the instructors.   **Signature of the Instructor**