इरिसेट
नेटवर्क प्रयोगशाला
प्रयोग नं: एन डब्लू एल - 01

IRISET

NETWORK LABORATORY

EXPERIMENT No: NWL - 01

नाम Name	:	--		
अनुक्रमांक Roll No	:	--	प्राप्त अंक Marks Awarded	:
पाठ्यक्रम Course	:	--		
दिनांक Date	:	--	अनुदेशक का हस्ताक्षर Instructor Initial	:

Name of Experiment: **Establishing a LAN**

Object

Establishing a LAN by connecting the Desktop PCs as per the topology diagram.

Introduction

Local Area Networks (LANs): are networks that connect computers and resources in a building or buildings close together. The computers share resources such as hard-drives, printers, data, applications etc...

TCP/IP: Network protocols help your computers speak the same language so they can share data. Network protocols define the rules for communication. The TCP/IP protocol is used just about everywhere. After the Internet boom, it became the standard protocol for networks.

IP Address and Subnet Mask: The most important setting is the IP address. The IP address gives each computer a unique address where it can be accessed in the network. An IP address is 32 bits long and represented as four OCTETS in dotted decimal notation. The IP address has four numbers between 0 and 255 that are separated by periods. All the computers are numbered in a series.
The subnet mask determines the network in which the computer is located. This is especially important in large networks that are divided into several subnets. In your small network, all the computers are in the same subnet.

MAC Address: It is a unique hardware identification number provided to a node (desktop PC) at layer2 level. It consists of 6 Bytes of Hexadecimal numbers separated by a colon. First 3 bytes identify OUI (Organizational unique Identifier) assigned by IEEE and rest 3 bytes for product serial numbers. MAC assists in addressing packets/ frames through unicast, broadcast or multicast. The MAC address is permanently burnt into the ROM.

Switch: is a layer 2 (Data link Layer) switching device, that connects LAN segments. The switch is an intelligent device, based on the MAC address; the switch transfers the packets/ frames to the destination.

Apparatus Required

1. Desktop PC with NIC card
2. Patch card (straight cable, both ends terminated with RJ 45 connectors)
3. Switch

Procedure

1. Study the topology diagram & use the network cable / Patch chord   from NIC card of your Desktop PC to a free port on a switch

2. Assign IP address to your Desktop PC after choosing the protocols (TCP/IP) required.

3. Connect two or more Desktop PCs on the switch ports

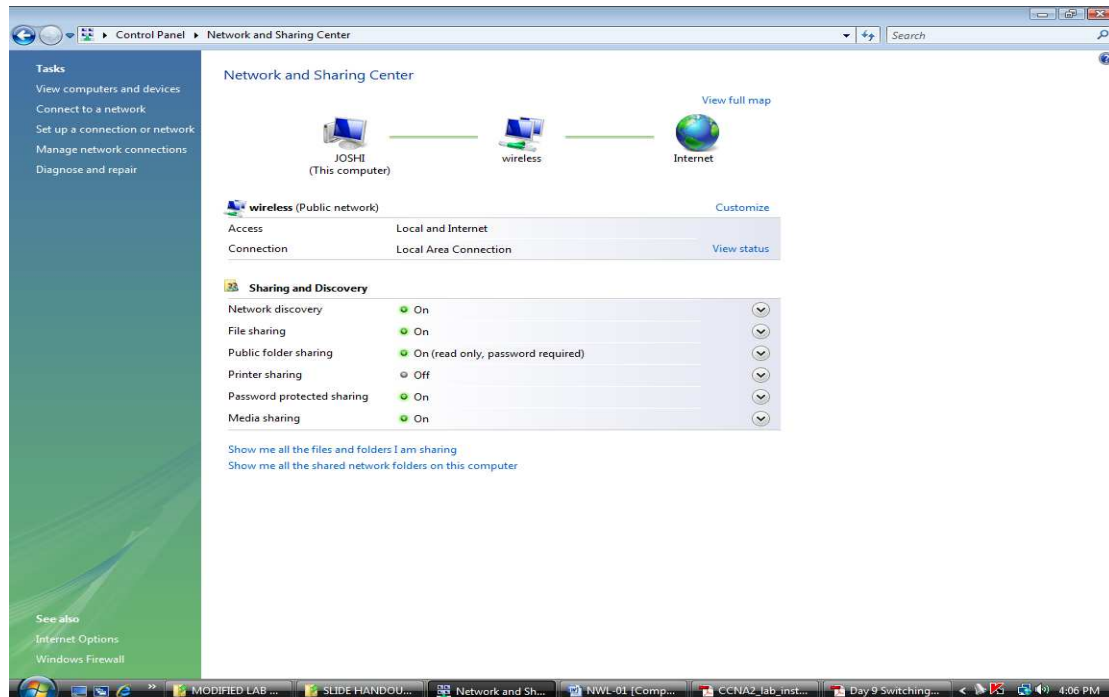4. Test the connectivity with OS commands

Topology Diagram
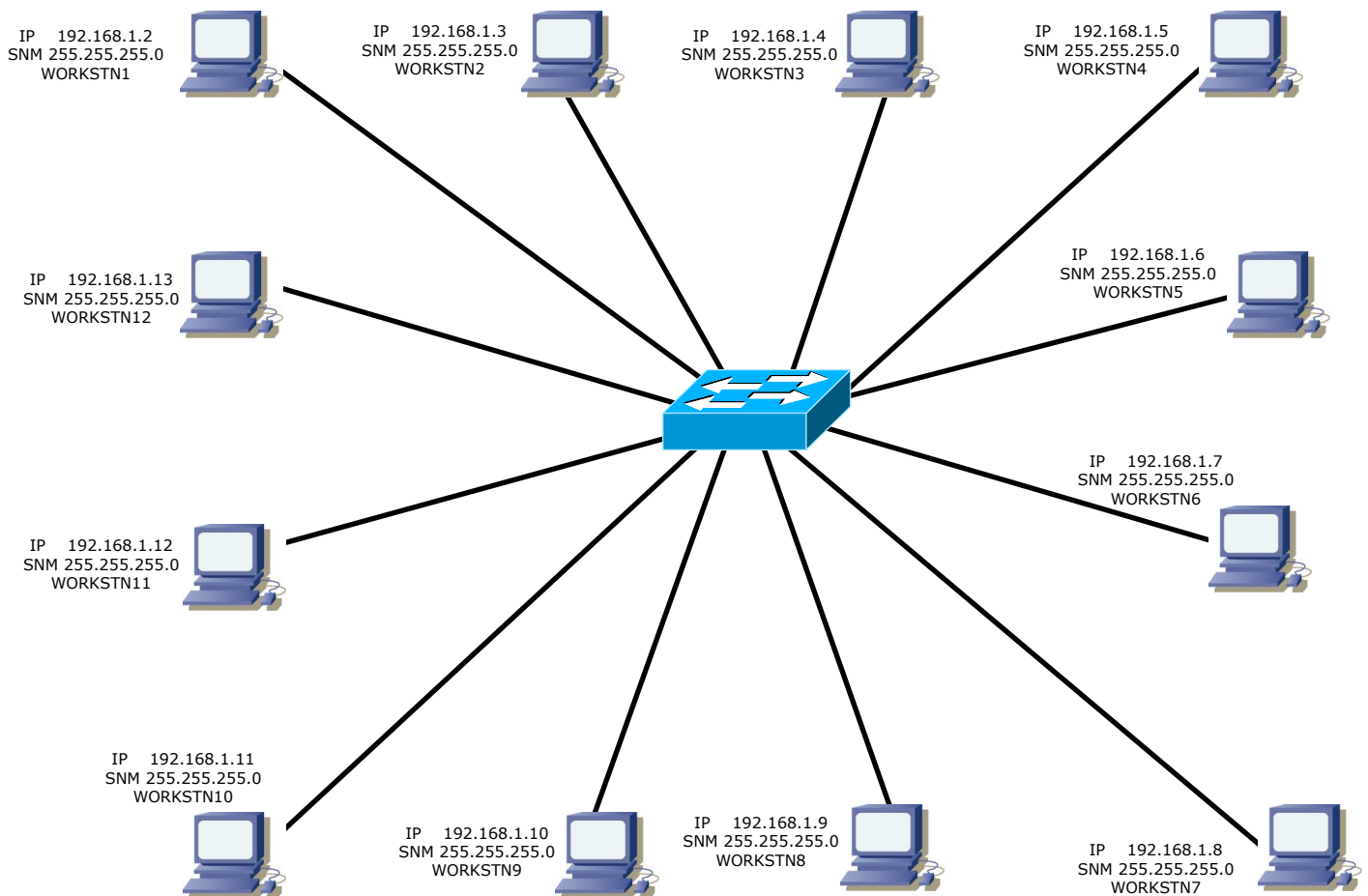
The topology diagram shows the WINDOWS (**Windows Vista**) Desktop PCs, which are to be configured with IP address.

Assigning IP address

1. Click **Start**,
2. Point to **Settings**,
3. Click **Control Panel**, and then
4. Double-click the **Network & Sharing Center** icon

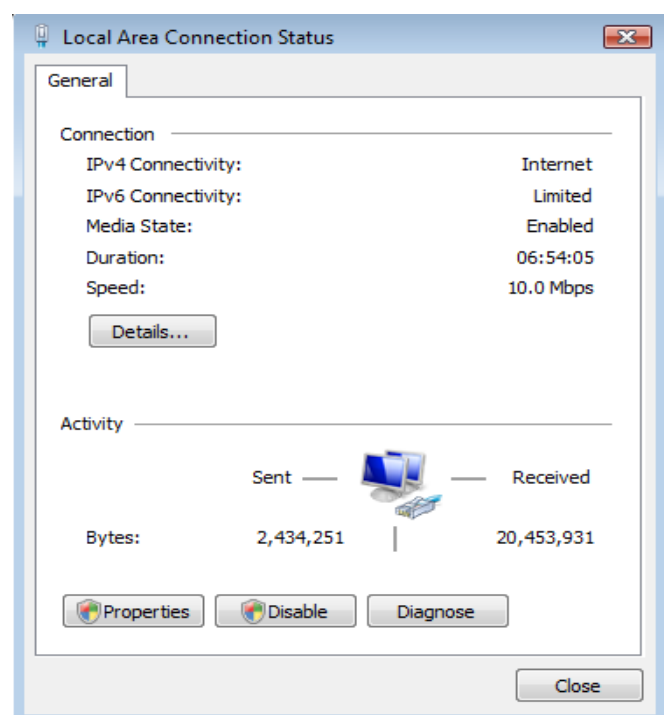Network sharing center window appears on the screen

*Click on **view status link***

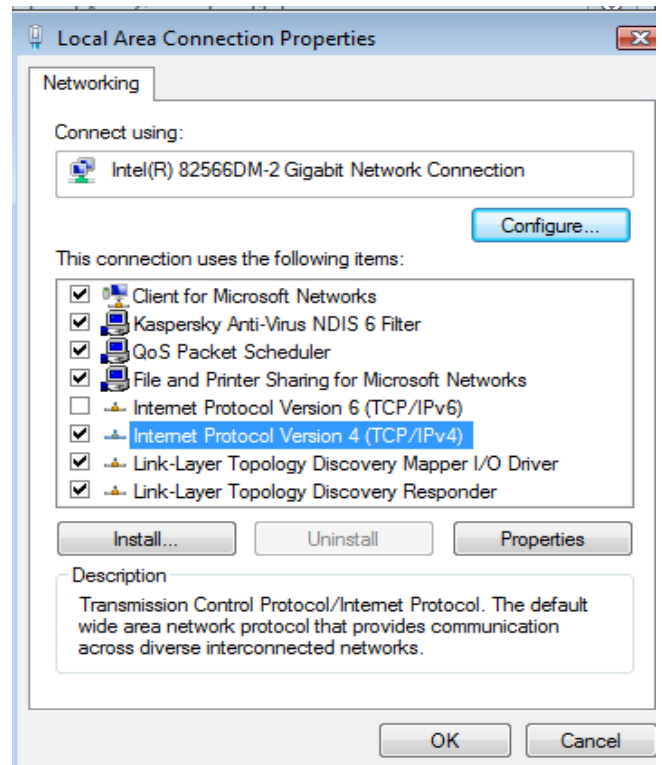*Local area Connection Status dialog box opens*

*Click on **properties***

User Account Control dialog box opens

*Then give user account control permission by clicking on **Continue***

*Select **Internet protocol version4 (TCP/IPV4)***
*& click on **properties***

Internet Protocol Version4 (TCP/IP4) properties dialog box opens

1. Click on, use the following IP address

2. Then type the IP address

e.g.   Use 192.168.1.2 for the first computer
Use 192.168.1.3 on the second computer
Use 192.168.1.4 for the third computer and so on.

3. Subnet mask stays the same for all the computers

   Type subnet mask as 255.255.255.0.

4. Default gateway
   *{**Default gateway is required to connect your network with other network**}*
   [Here no need of mentioning gateway as we are not connecting our network with any other Network]

5. DNS server addresses
   *{**DNS server address is required to convert URL address into IP address**}*
   [Here no need of converting IP address into URL]

6. Click on **OK**
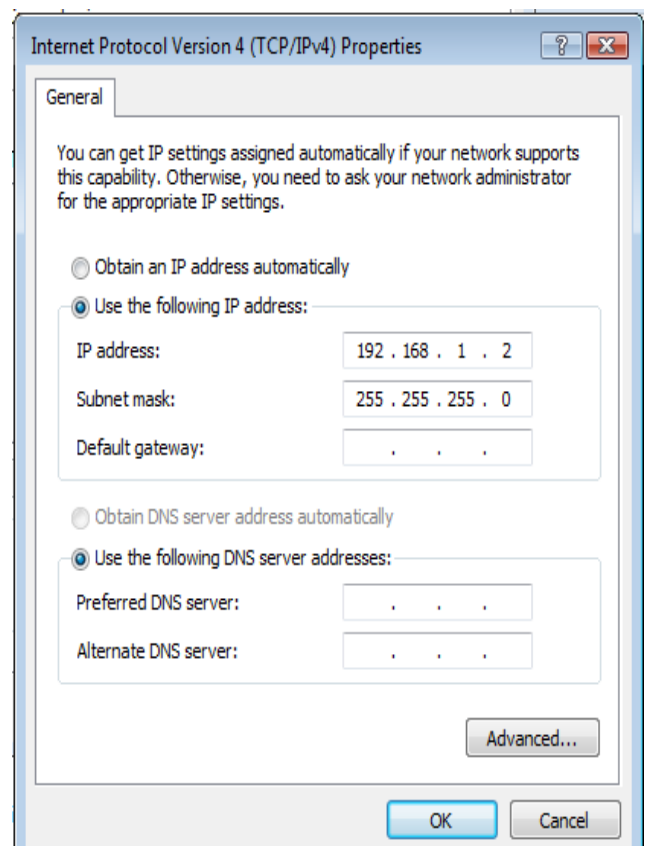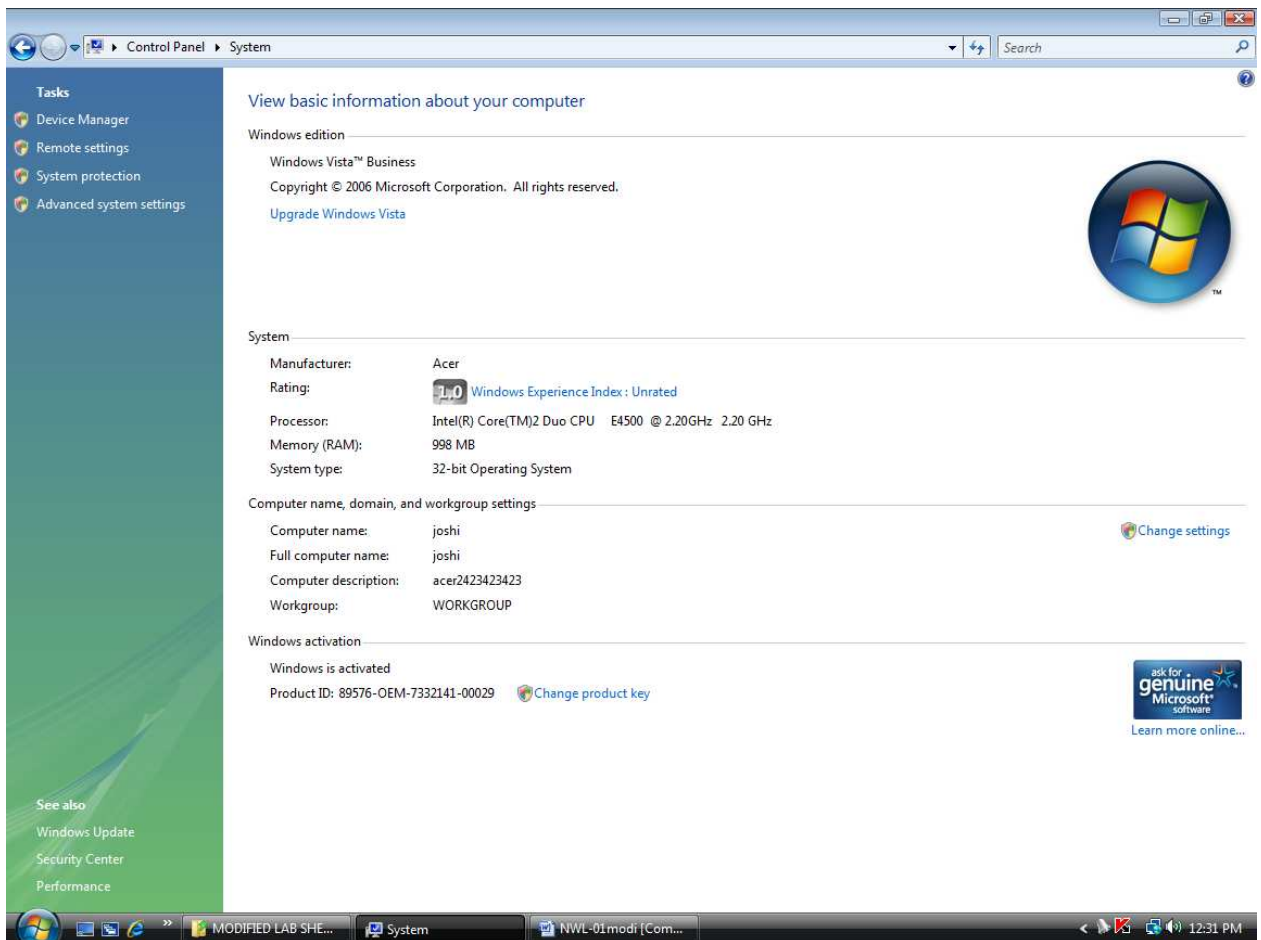
Setting the Computer Names and Workgroups

You must assign a unique name & workgroup to each and every Desktop PC / node. Like the IP address, the name of each and every Desktop PC / node in a workgroup should also be unique.

To assign your computers a name and a workgroup, follow these steps:

1. Click **Start**, point to **Settings**, and then click **Control Panel**.
2. Double-click the **System** icon.
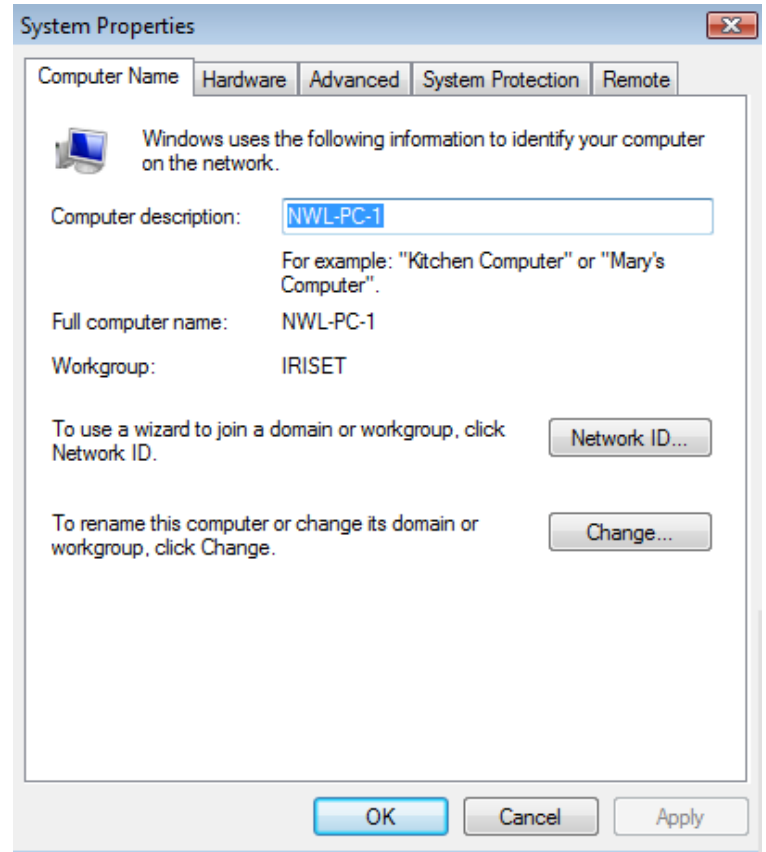
System window (as shown below) opens

Click on **Change Settings** icon for changing the computer name and workgroup

User Account Control dialog box opens
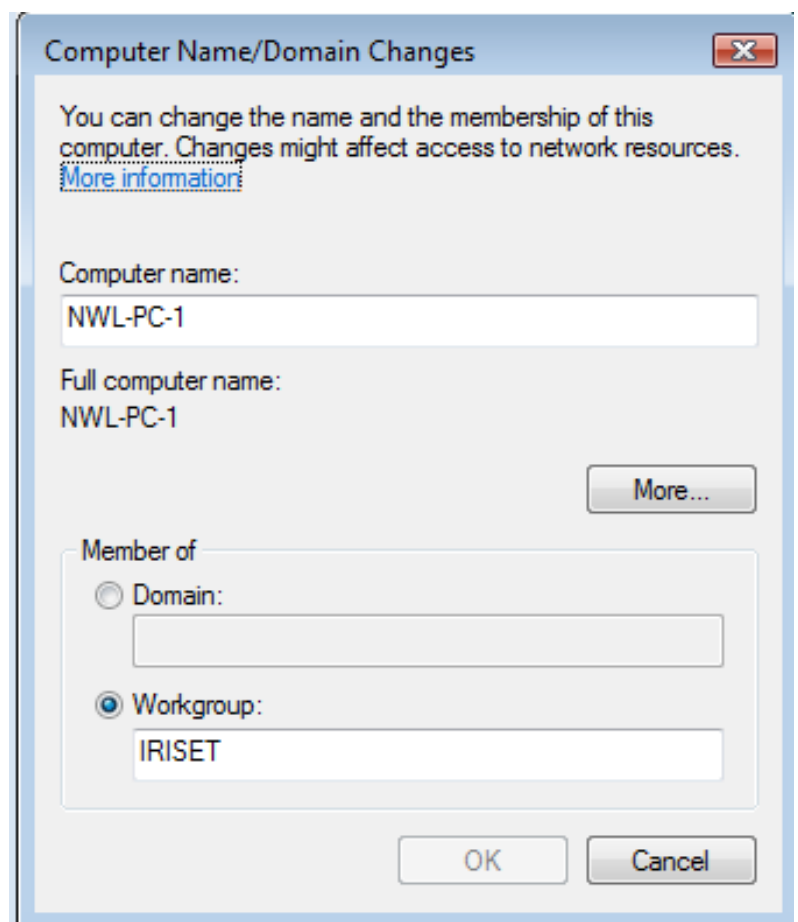*Then give user account control permission by clicking on **Continue***

System Properties dialog box opens

Click on **Change** icon & further click on **OK**

System Properties

Computer Name | Hardware | Advanced | System Protection | Remote

Windows uses the following information to identify your computer on the network.

Computer description: NWL-PC-1

For example: "Kitchen Computer" or "Mary's Computer".

Full computer name: NWL-PC-1

Workgroup: IRISET

To use a wizard to join a domain or workgroup, click Network ID. [Network ID...]

To rename this computer or change its domain or workgroup, click Change. [Change...]

[OK] [Cancel] [Apply]

Computer Name/Domain Changes window will opens

1. Assign each computer a meaningful name.

   E.g. **NWL-PC-1**

2. The name will appear in the Network
3. Assign every computer the same workgroup e.g. IRISET
4. You can type a description that specifies what this computer is used for or who works on it.
5. Click **OK**.
6. Restart your computer.

Computer Name/Domain Changes

You can change the name and the membership of this computer. Changes might affect access to network resources. More information

Computer name:

NWL-PC-1

Full computer name:
NWL-PC-1

[More...]

Member of
- ○ Domain:

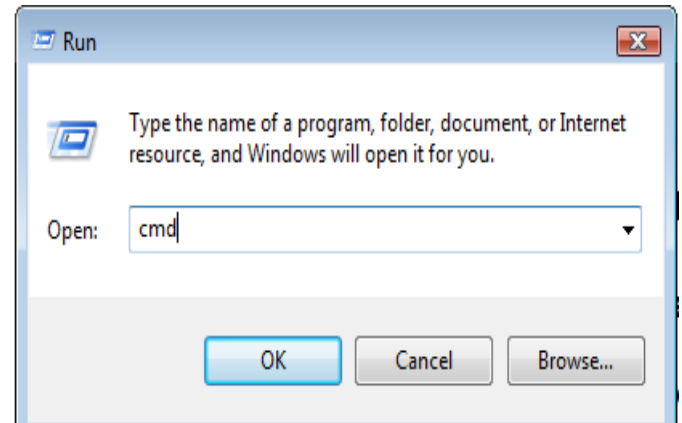- ● Workgroup:

  IRISET

[OK] [Cancel]

Verification of Established LAN

Step 1: To Check the Network Card and driver software

1. Click on **Start, Programs, Accessories, Command Prompt**

    (Or)

    Click on **Start, Run** and type **cmd** in the Run dialog box and click on **O.K**

2. A new "Command Prompt window" appears with DOS prompt like **C:\>_**
3. Type, "*Ping 127.0.0.1*" <Enter> to check the local configuration of TCP/IP i.e. A **local loop back** check, you will find the reply as shown below if TCP/IP configuration is OK
4. If you get a reply stating Reply from 127.0.0.1: bytes=32 time<10ms TTL=128

```
Reply from 127.0.0.1: bytes=32 time<10ms TTL=128
Reply from 127.0.0.1: bytes=32 time<10ms TTL=128
Reply from 127.0.0.1: bytes=32 time<10ms TTL=128
Reply from 127.0.0.1: bytes=32 time<10ms TTL=128

Ping statistics for 127.0.0.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

This test confirms that your network card and software drivers are installed correctly.

5. If you receive a message stating **Request Timed Out**, check that:

    - The network card is inserted properly in the PCI slot in the computer - it may have become loose.
    - Try re-installing the network card drivers.

6. Repeat **Step 1** again.
7. Now check response from your local system IP address

e.g. **Ping** <***IP address of your system***> Record the observations

Ping statistics for	Packets			
	Sent	Received	Lost	% loss

8. Then Check the response from the other PCs connected on SWITCH using ping command with its respective IP address. ex. **Ping** <*IP address of destination PC*> Record the observations

Ping statistics for	Packets			
	Sent	Received	Lost	% loss

9. If you receive a message stating **Request Timed Out**, the reason may be

- The Destination PC may not be switched on

(OR)

- The cable connectivity **(or)** media cable from your PC to the Destination PC may be having break.

10. If you receive a message stating **Destination host un-reachable**, the reason may be

- The other system may not be in the same network

11. On default ping will send 4 echo requests only. To increase no. of echo request C:/>Ping <neighbor PCs IP address> -n 50 (request to send 50 echo requests)

12. During the ping is in progress disconnect patch cable for a while and reconnect

Record the observations

Ping statistics for	Packets			
	Sent	Received	Lost	% loss

13. Try Ping <ip address> -t,
This will sends continuous echo requests to the specified host until stopped by pressing Ctrl-C
{This continuous echo requests will certainly help in tracing the failure}

Step 2: To Check the Desktop PC name, Ethernet (MAC Address) & IP Address

1. Click on **Start, Programs, Accessories, Command Prompt**

(Or)

2. Click on **Start, Run** and type **cmd** in the Run dialog box and click on **O.K**
3. In the Command Prompt window, type

C :/> *ipconfig /all*

The Command prompt window will be open as shown below.

```
C:\Windows\system32\cmd.exe                                              _ □ X

Microsoft Windows [Version 6.0.6000]
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C:\Users\JOSHI>ipconfig /all

Windows IP Configuration

    Host Name . . . . . . . . . . . . : DESKTOP-PC-1
    Primary Dns Suffix  . . . . . . . :
    Node Type . . . . . . . . . . . . : Hybrid
    IP Routing Enabled. . . . . . . . : No
    WINS Proxy Enabled. . . . . . . . : No

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . :
    Description . . . . . . . . . . . : Intel(R) 82566DM-2 Gigabit Network Connec
tion
    Physical Address. . . . . . . . . : 00-1E-90-1D-12-D1
    DHCP Enabled. . . . . . . . . . . : No
    Autoconfiguration Enabled . . . . : Yes
    IPv4 Address. . . . . . . . . . . : 192.168.1.2(Preferred)
    Subnet Mask . . . . . . . . . . . : 255.255.255.0
    Default Gateway . . . . . . . . . :
    NetBIOS over Tcpip. . . . . . . . : Enabled
```

Observations: Record the observations in the tabular form

	Configured information	
MAC address of the system		
IP address and subnet mask		
Default gateway configured		
Name of the computer		
Workgroup name		
DHCP Sever		
DNS Servers	1.	
	2.	

Exercise

1. What is PING, Why it is required?

2. Why Subnet mask is required with IP address?

3. Name the protocol used for establishing the LAN?

4. What is the function of NIC card?