

Department of  
**Computer Science & Engineering**

**LAB MANUAL**  
**COMPUTER NETWORKS-1**

**B.Tech–IV Semester**



**KCT College OF ENGG AND TECH.**

**VILLAGE FATEHGARH**

**DISTT.SANGRUR**

## **BTCS 407 Computer Networks-1 Lab**

1. Write specifications of latest desktops and laptops.
2. Familiarization with Networking Components and devices: LAN Adapters, Hubs, Switches, Routers etc.
3. Familiarization with Transmission media and Tools: Co-axial cable, UTP Cable, Crimping Tool, Connectors etc.
4. Preparing straight and cross cables.
5. Study of various LAN topologies and their creation using network devices, cables and computers.
6. Configuration of TCP/IP Protocols in Windows and Linux.
7. Implementation of file and printer sharing.
8. Designing and implementing Class A, B, C Networks
9. Subnet planning and its implementation
10. Installation of ftp server and client

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## **EXPERIMENT NO:- 1**

**AIM:- Write specifications of latest desktops and laptops. APPARATUS:-**

### **THEORY:-**

Apple MacBook Pro: provides an easily operation, stability, and system security, but this requires an additional power for a higher performance level.

### **Specifications includes:**

- A 17" Widescreen TFT display;
- An Intel 2.33Ghz Core 2 Duo Processor;
- An Apple Mac operating system X 10.4 Operating System;
- An integrated 10/100/1000 LAN, also with an integrated Wireless LAN: 802.11b/g;
- An integrated bluetooth; - A built-in webcam;
- 2 USB 2.0 Ports for interfaces;
- A built-in stereo speakers for sounds;
- A built-in microphone; - And a 3.1kg weight.

Apple iMac Intel Core i3

Apple iMac Intel Core i3 3.06GHz / 4GB / 500GB / TFT21.5 / DVDRW / Mac OS X 10.6 Snow Leopard

Product name iMac Intel Core i3 3.06GHz / 4GB / 500GB / TFT21.5 / DVDRW / Mac OS X 10.6 Snow Leopard

CPU Type: Intel Core i3

Processor Speed: 3.06 GHz

Sound Card Integrated

Hard Drive Size 500 GB

Monitor TFTJLCD

Operating System Mac OS X 10.6

Screen Size 21.5

Optical Drive 21.5

Internal Memory 4096 MB

Graphics Card Radeon HD 4670

Memory Size Extra Hardware Bluetooth 2.1 + EDR, Camera ManufacturerApple

WLAN 802.11a/b/g

## **EXPERIMENT NO: - 2**

**AIM: - Familiarization with Networking components and devices: LAN Adapters, Hub,**

**Switches,Routers.**

**EQUIPMENT REQUIRED: - PC's for connection, wires, adapter, hub, switch, router**

### **THEORY:-**

**LAN ADAPTERS: -** A LAN adapter is a device used to allow a computer to interface with a network. Many computers may have some sort of LAN adapter already installed, but others may require a special installation, which is accomplished by adding a network interface card to the system or possibly connecting the adapter to a USB port. Most networks that are used in an office or home environment are known as local area

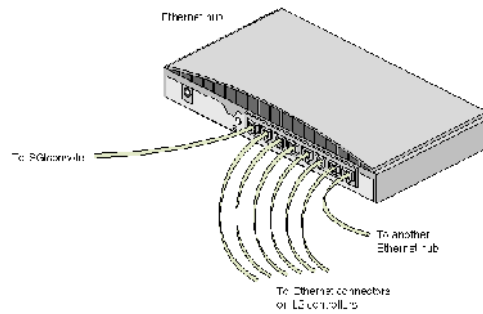
**Networks (LANs).** This type of network is one used over a limited geographic area. Most of the time, the network goes no further than the building which houses its main components, though that is not always the case. A LAN adapter is simply one that is able to access this type of network.

A LAN adapter can be used with a wireless or wired network, though when purchasing one, it is important to understand what type of network and connection is needed. In most cases, a wireless LAN adapter cannot be used for a wired network and vice versa. Those needing an adapter but unsure of the type should consult their network administrators for more information.

In many cases, a wired LAN adapter is used for Ethernet connections, one of the fastest and most reliable forms of wired networks. Because of their performance and security, they are often used in office or business environments.

### **TYPES OF LAN ADAPTER:-**

**Wireless LAN adapter:-** wireless LAN provides instant connectivity to mobile personnel. It also avoids the costly expense of running Ethernet cable throughout a building, providing easy, effortless desktop connectivity between clients.



On this network segment, all computers can communicate directly with each other. A hub includes a series of ports that each accept a network cable. Small hubs network four computers. Three different types of hubs exist:

- Passive
- Active
- Intelligent

Passive hubs do not amplify the electrical signal of incoming packets before broadcasting them out to the network. Active hubs, on the other hand, do perform this amplification, as does a different type of dedicated network device called a repeater. Some people use the term concentrator when referring to a passive hub and multiport repeater when referring to an active hub.

Intelligent hubs add extra features to an active hub that are of particular importance to businesses. It also typically includes remote management capabilities via SNMP and virtual LAN (VLAN) support.

**SWITCHES:** - A network switch is a computer networking device that links network segments or network devices. The term commonly refers to a multi-port network bridge that processes and routes data at the data link layer (layer 2) of the OSI model.

Switches that additionally process data at the network layer (layer 3) and above are often called layer-3 switches or multilayer switches. A switch is a telecommunication device which receives a message from any device connected to it and then transmits the message only to the device for which the message was meant. This makes the switch a more intelligent device than a hub (which receives a message and then transmits it to all the other devices on its network). The network switch plays an integral part in most modern Ethernet local area networks (LANs).

**Wi-Fi LAN Adapter:** - It normally requires opening the case and plugging the card into an expansion slot. A local area network (LAN) adapter is a small piece of hardware that allows a



Computer to join a LAN. It can be internally installed in the computer as a network interface card (NIC), or it can take the form of an external adapter.

**USB LAN adapter:-** The USB router adapter simply connects to the computer through a USBport, and then will find wireless networks in the area and allow the user to connect to one.



**Virtual LAN adapter:** - Such adapters may function as an external network adapter and thus remain outside the primary electronic device or they may be installed into the device's main physical body. The virtual network adapter differs from the traditional adapter due to its non-physicality.

**Wireless LAN USB adapter:** - A keyboard, mouse, or headset can be connected to your computer using a dongle that plugs into a USB port on the computer but doesn't need to connect to anything on the other side.

**HUB:** - A special type of network device called the hub can be found in many home and small business networks. Hub is a small rectangular box, often made of plastic that receives its power from an ordinary wall outlet. A hub joins multiple computers (or other network devices) together to form a single network seg





**ROLE OF SWITCH:** - Switches may operate at one or more layers of the OSI model, including data link and network. A device that operates simultaneously at more than one of these layers is known as a multilayer switch.

**ROUTERS:** - A router is a device that forwards data packets between computer networks, creating an overlay internetwork. A router is connected to two or more data lines from different networks. When a data packet comes in one of the lines, the router reads the address information in the packet to determine its ultimate destination. When multiple routers are used in interconnected networks, the routers exchange information about destination addresses, using a dynamic routing protocol. Each router builds up a table listing the preferred routes between any two systems on the interconnected networks. A router has interfaces for different physical types of network connections, (such as copper cables, fiber optic, or wireless transmission)



## EXPERIMENT NO: - 3

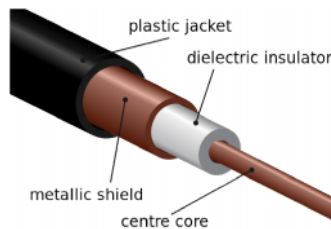
**AIM: - Familiarization with Transmission Media and Tools: Co-axial cable, UTP cable, Crimping Tool, connectors.**

**EQUIPMENT REQUIRED: - Cables, Devices. Crimping tools, RJ-45 Connectors.**

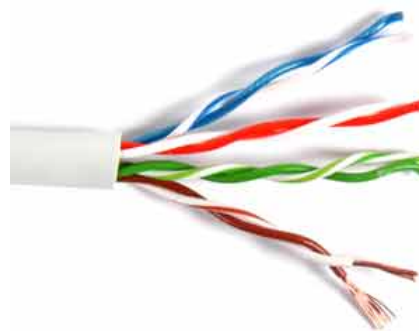
**THEORY:-**

**Transmission media:** - The medium through which communication takes place b/w the PCs. At the lowest level, all computer communication involves encoding data in the form of energy and sending the energy across a transmission medium. Hardware devices attached to the computer perform encoding and decoding of data.

**Coaxial Cable:** - The copper wiring used in now is co-axial cable (coax) the same type of wiring used for cable TV. It provides even more protection from interference than twisted pair. Instead of twisting the wires around one another to limit interference, a coaxial cable consists of a single wire surrounded by a heavier metal shield. In coaxial cable it forms a flexible cylinder around the inner wire that provides a barrier to electromagnetic radiation.



**UTP CABLE:** - It stands for Unshielded Twisted Pair. It consists of two insulated copper wires of thickness 1mm each. They are twisted to each other to reduce the electrical inference from the similar pair.



**CRIMPING TOOL:** - Crimping is joining two pieces of metal or other malleable material by deforming one

Or both of them to hold the other. The bend or deformity is called the crimp. Crimping is most Extensively used in metalworking. Crimping is commonly used to join bullets to their cartridge cases, for

Rapid but lasting electrical connectors, securing lids on metal food cans, and myriad other applications.



**CONNECTOR:** - Connector may refer to a device for joining electrical circuits together. Implementation of

Cables using Connectors and crimping Tools

**To do these practical following steps should he done:-**

1. Start by stripping off about 2 inches of the plastic jacket off the end of the cable. Be very careful at this point, as to not nick or cut into the wires, which are inside. Doing so could alter the characteristics of your cable, or even worse render is useless. Check the wires, one more time for nicks or cuts. If there are any, just whack the whole end off, and start over.
2. Spread the wires apart, but be sure to hold onto the base of the jacket with your other hand. You do not want the wires to become untwisted down inside the jacket. Category 5 cable must only have 1/2 of an inch of 'untwisted' wire at the end; otherwise it will be 'out of spec'. At this point, you obviously have ALOT more than 1/2 of an inch of un-twisted wire. -
3. You have 2 end jacks, which must be installed on your cable. If you are using a pre-made cable, with one of the ends whacked off, you only have one end to install - the crossed over end. Below are two diagrams, which show how you need to arrange the cables for each type of cable end.

## **EXPERIMENT NO: - 4**

**AIM: - Preparing straight and cross cables. APPARATUS REQUIRED: - Cables**

### **THEORY:-**

Straight through cable:-Here, the connections are same on both the ends the cable. This type of cable is used when we connect dissimilar devices [switch and router, router and hub, switch and PC, etc]. The colors of the wires and their respective pin numbers are mentioned below:

Green [Pin 1].....Green [Pin 1]

White Green [Pin 2].....White Green [Pin 2]

White Orange [Pin 3].....White Orange [Pin 3]

Blue [Pin 4]..... 0 Blue [Pin 4]

White Blue [Pin 5].....White Blue [Pin 5]

Orange [Pin 6].....Orange [Pin 6]

White Brown [Pin 7].....White Brown [Pin 7]

Brown [Pin 8].....Brown [Pin 8]

### **Cross cable:-**

Here, the connections are different with a specific pattern. This type of cable is used when we connect similar devices [router and router, switch and switch, PC and PC, etc] and with some exceptions [switch and hub, Router and PC]. The colors of the wires and their respective pin numbers are mentioned below:

White orange [Pin 1] ..... White Green [Pin 1]

Orange [Pin 2].....Green [Pin 2]

White Green [Pin 3].....White Orange [Pin 3]

Blue [Pin 4] ..... [White Brown [Pin 4]

White Blue [Pin 5] ..... LiBrown [Pin 5]

Green [Pin 6].....Orange [Pin 6]

White Brown [Pin 7].....Blue [Pin 7]

Brown [Pin 8].....White Blue [Pin 8]

## EXPERIMENT NO:- 5

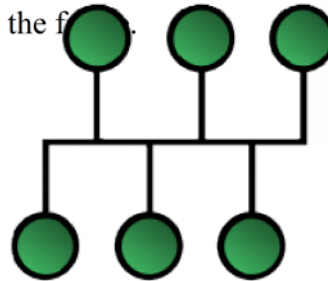
**AIM:-** Study of various LAN topologies and their creation using network devices, cables and computers.

**APPARATUS REQUIRED:-** cables, computers.

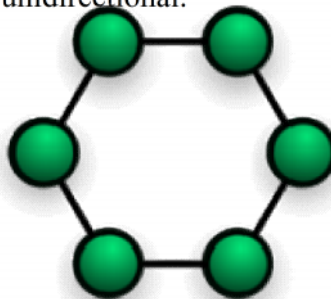
**THEORY:-**

**LAN TOPOLOGY:-** The way how the pcs are connected with each other is called physical or network topology.

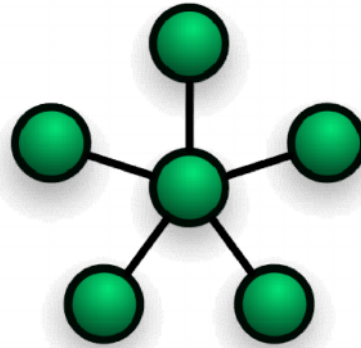
**Bus Topology:-** It comprises of stations that are connected to a single communication line. This single communication line is referred to as bus. If destination field does not match the station address, the station discards the information frame back on to the bus. If it matches the station address, it accepts the information frame and processes the frame.



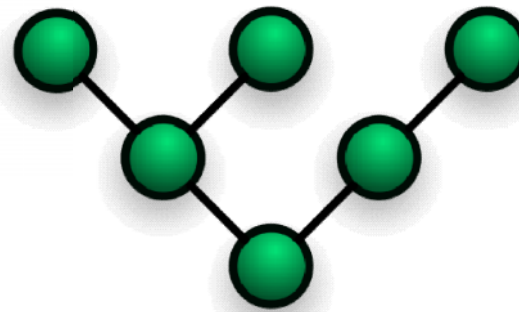
**Ring Topology:-** LAN that have each station attached to an adjacent station using point-to-point links from physical ring. Each station attached and active to the ring regenerates the information frame, then the re-transmit information frame on the ring. The ring itself is logically circular and flow of information is unidirectional.



**Star Topology:-** It comprises no. of stations connected directly to central station communications on the connecting links b/w the stations and the central station of star topography can be bidirectional and are point-to-point. The central controller manages and controls all communications b/w stations on the n/w.



**Tree topology:-** The corollary to the topology is tree topology. It extends the branches of the bus topology allowing more stations to access the bus. On bus or tree nlw, there is no central management and control functions are distributed to each station of the bus.



- 1) Switch on the three systems
- 2) Using the bus cable connect the three system
- 3) After connect the systems in bus cable. Double click the my network place icon on the desktop for the first system
- 4) Then click view network connection.
- 5) Now right click local area connection and click properties.
- 6) Click the internet protocol (TCP/IP) and set the IP address for the First system Example IP address: 192.168.0.1 Subnet mask: 255.255.255.0
- 7) Then click ok
- 8) Repeat the steps 2-6 for the remaining two systems.

## **EXPERIMENT NO:- 6**

**AIM:- Configuration of TCP/IP protocols in Windows.**

**APPARATUS REQUIRED:-Pentium IV Computer**

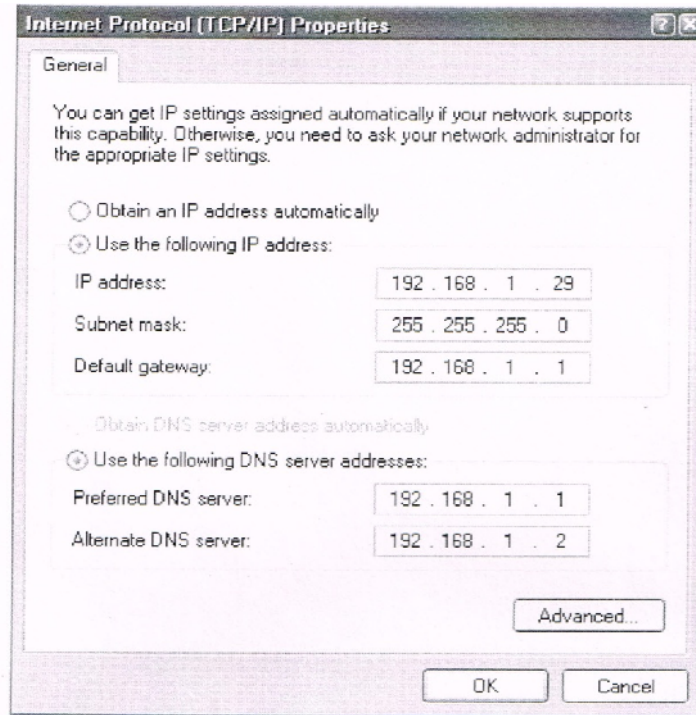
Windows XP Professional Edition TCP/IP Protocol

**THEORY:-**

- 1). Start -> Settings -> Control Panel -> Network Connections.
- 2). Network Connection Window will appear. Choose Local Area Connection Icon in the window.
- 3). Right Click the mouse and choose properties option under shortcut Menu.
- 4). Choose Internet Protocol (TCP/IP) check box and click Properties Button.

You can assign IP address in 2 ways

- (a). Obtain an IP address automatically,
  - (b). Use the following IP address. IP address must be unique for each and every machine in the network. If 2 machines have same IP address in the network it will lead to network error.
- 5). Choose the option 'Use the following IF Address radio button' And type IP address, subnet mask as per rules and regulations.
  - 6) Click OK button.

**Result:**

By following the above procedure, we can configure TCP/IP protocol in a windows XP machine successfully.



## **EXPERIMENT NO:- 7**

**AIM:- Implementation of file and printer sharing.**

**APPARATUS REQUIRED:- files, router, cables, pc's THEORY:-**

### **Sharing a Printer:-**

1. Open the Windows Control Panel
2. Double-click Network
3. In the Network window under the Configuration tab click the File and Print Sharing button.
4. In the File and Print Sharing Window check the "I want to be able to allow others to print to my printer(s)" option. Note: If the computer asks to restart the computer after selecting this option make sure to restart.
5. Click Ok and then Ok again to close out of the Network Window.
6. Once back in the Control Panel double-click printers
7. If you currently have a printer already installed on the computer right-click the printer icon and click Properties. In the Properties window click the sharing tab and make sure the printer is shared.

### **Share a file:-**

1. Open the my computer
2. Select the Drive (C,D,E,F)
3. Right click the selected drive 4.. Click the property Button. From that menu choose the sharing option.
5. Click the Share this Folder
6. Click the new share. Enter share name and click ok

### **Result:**

By following the above procedure, we can Share a file and printer.

## EXPERIMENT NO:- 8

**AIM:- Subnet planning and its implementation.**

**APPARATUS (Software): NA**

**THEORY:** Following is required to be study under this practical.

Classification of IP address

As below we teach how the ip addresses are classified and when they are used.

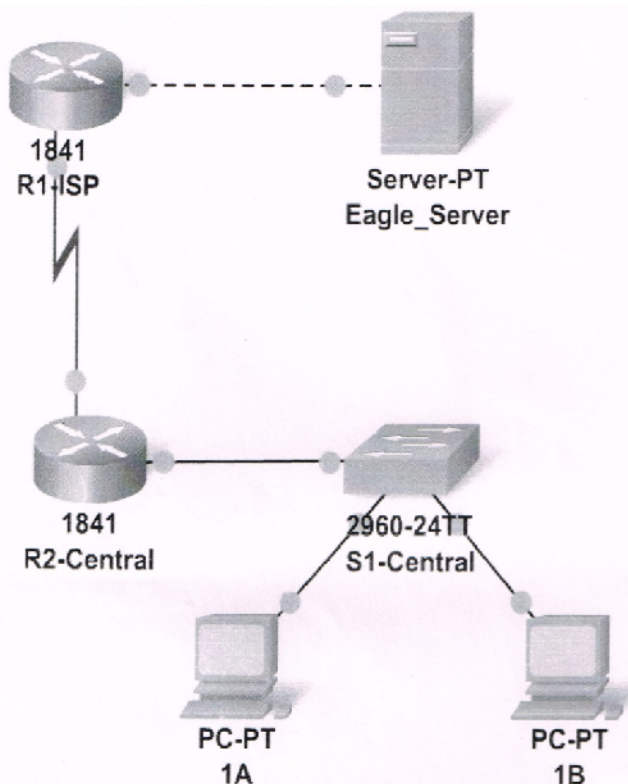
Class A 1.0.0.1 to 126.255.255.254 Supports 16 million hosts on each of 127 networks.

Class B 128.1.0.1 to 191.255.255.254 Supports 65,000 hosts on each of 16,000 networks.

Class C 192.0.1.1 to 223.255.254.254 Supports 254 hosts on each of 2 million networks.

Class D 224.0.0.0 to 239.255.255.255 Reserved for multicast groups.

Class E 240.0.0.0 to 255.255.255.254 Reserved



You have been given an IP address block of 192.168.23.0 /24. You must provide for existing networks as well as future growth.

**Subnet assignments are:**

- 1st subnet, existing student LAN (off of router R2-Central), up to 60 hosts;
- 2nd subnet, future student LAN, up to 28 hosts;
- 3rd subnet, existing ISP LAN, up to 12 hosts;
- 4th subnet, future ISP LAN, up to 6 hosts;

- 5th subnet, existing WAN, point-to-point link;
- 6th subnet, future WAN, point-to-point link;
- 7th subnet, future WAN, point-to-point link.

**Interface IP addresses:**

- For the server, configure the second highest usable IP address on the existing ISP LAN subnet.
- For Ri-ISP's FaO/O interface, configure the highest usable IP address on the existing ISP LAN subnet.
- For Ri -ISP's SO/0/0 interface, configure the highest usable address on the existing WAN subnet.
- For R2-Central's S0/0/10 interface, use the lowest usable address on the existing WAN subnet.
- For R2-Central's FaO/O interface, use the highest usable address on the existing student LAN subnet.
- For hosts 1A and 1B, use the first 2 IP addresses (two lowest usable addresses) on the existing student LAN subnet.

**Additional configurations:**

- For PCs 1A and 1B. in addition to IP configuration, configure them to use DNS services. • For the server, enable DNS services, use the domain name eagle-server.example.com, and enable HTTP services.
- For Ri-ISP router serial interface, you will need to set the clock rate (a timing mechanism required on the DCE end of serial links) to 64000.
- No clock rate is needed on the DTE side, in this case R2-Central's serial interface.