Name – PRANJAL TRIPATHI
Batch- 01
Branch- BTECH CSE (BAO)
Roll No. R2142210964

University of Petroleum and Energy Studies, Dehradun

DATA COMMUNICATION AND COMPUTER NETWORKS

Lab File

(Semester IV)

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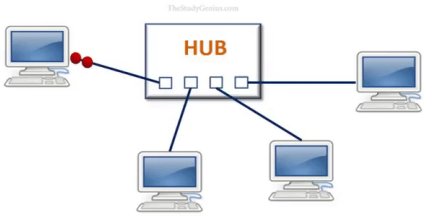
Network components

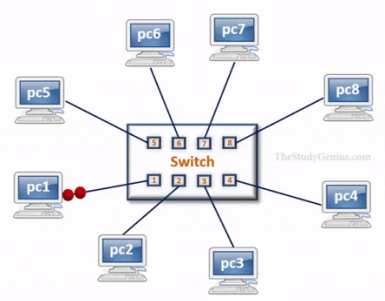
Computers- A computer is a piece of electrical equipment used to manipulate data or information. Data can be stored, retrieved, and processed by it. You may already be aware of the fact that you can use a computer to surf the Internet, send emails, type documents, and play games. It may also be used to edit or make presentations, films, and spreadsheets.
The computer is an electrical device that receives user input, processes that information under the direction of a set of instructions (referred to as a programmed), outputs the finished product and stores it for later use. Both numerical and non-numerical (arithmetic and logical) calculations can be processed by it.

Hub- A hub, also known as a network hub, is a point of connection that several devices utilize to connect to a network. For all the devices linked through a hub, it serves as a centralized connection. There are several ports on the hub. Due to a packet being replicated to the other ports, if a packet reaches one port, it may see by all network segments. A network hub broadcasts all network data across all connections and does not have routing tables or intelligence (unlike a network switch or router).

Even though the majority of hubs are capable of detecting network issues or mistakes like collisions, broadcasting all information to all ports poses a security risk and can slow down traffic. In the past, network hubs were preferred over switches and routers because they were less expensive. These days, switches are far less expensive than hubs and offer superior network solutions. A hub is also a dumb device; it has no IP address.



Switch-A switch is a component in a computer network that forwards data packets between network segments. It is regarded as a more sophisticated version of a hub and is used to connect devices together on a network. A switch enhances network efficiency and decreases congestion by forwarding data packets solely to the exact device they are meant for, as opposed to a hub, which broadcasts all incoming data packets to all connected devices.
There are several ports on a switch where computers may be connected. A network switch evaluates the destination address of each data frame that enters one of its ports, runs any necessary checks, and then transmits the frame to the appropriate device (s). It enables broadcast, multicast, and unicast communications.



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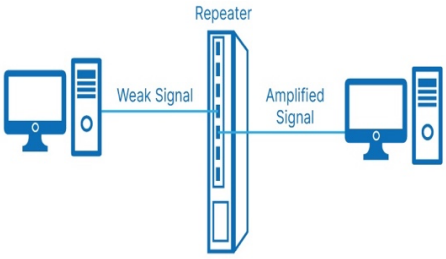
Routers- Routers are networking devices that operate at the OSI model's layer 3 or network layer. Receiving, analysing, and transmitting data packets between the connected computer networks is their responsibility. When a data packet arrives, the router first examines the destination address, then uses its routing tables to determine the best path, before sending the packet along it.
A router determines the optimal path to send packets by looking at the headers and forwarding tables, as well as the destination IP address of a specific data packet. The well-known manufacturers of routers include Cisco, 3Com, HP, Juniper, D-Link, Nortel, and others. The following list of router-related points is important:

Both LAN (Local Area Network) and WAN (Wide Area Network) scenarios make use of routers. For instance, it is utilized in workplaces for connectivity, and you may link distant networks like those from Bhopal to
In networking, it exchanges data with other routers.
To move the data over a network, it makes use of the routing protocol.

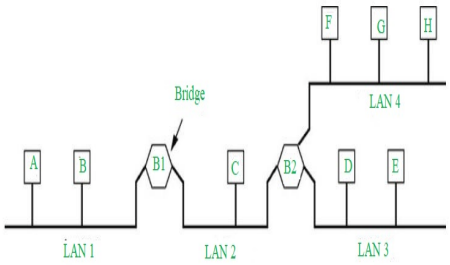
Repeaters- The fact that signal strength decreases as it moves across a network is generally known. This unavoidable phenomenon can happen with any kind of transmission, including network data or electrical power. Additionally, there may be circumstances in which you need to expand a network's routing domain for a variety of factors, such as to make room for a new host or to raise the service level in a particular topological area. Then, a repeater must be utilised in order to do this.

Therefore, a repeater is a strong network device that is used in computer networks to regenerate signals as they travel across a greater distance, guaranteeing that the signal intensity stays constant. A repeater is a device that is frequently used in networks to assist network lines in reaching farther destinations.



Bridges- A bridge in a computer network links various Local Area Networks (LANs) to a larger Local Area Network (LAN). Bridging is the term for the network aggregation process. The bridge, sometimes referred to as a layer of two switches, is a physical or hardware device that functions at the data connection layer of the OSI model.

A switch's main duty is to assess incoming traffic and decide whether to filter it or forward it. In computer networks, a bridge is essentially used to divide network connections into portions, with each segment having its own bandwidth and collision domain. In this case, a bridge is employed to boost network efficiency.



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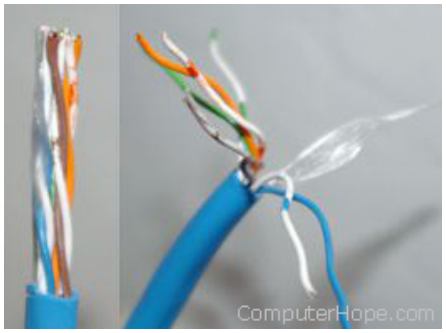
WIRE- A wire is a single metal strand that may transfer data or electricity from one location to another. With order to make them easier to identify, wires are frequently covered in a plastic coating. The image displays an illustration of a Cat 5 cable that has been removed to reveal the wires. A cable is made up of several wires, as seen in the picture.
When a computer is described as being "wired," it is being connected to the Internet via a Cat 5 Ethernet connection. A magazine by the name of Wired is similarly devoted to technology and information about computers.

Wi-Fi technology is used to provide a wireless connection to the Internet. Radio waves and microwaves are used to transfer the network signal to the computer, providing user access to the Internet.

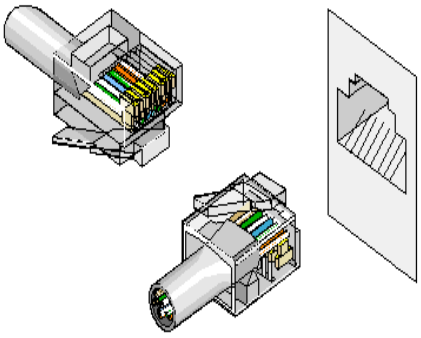


RJ- abbreviated for the Registered Jack. It used as a medium in telecommunications or network interface. It enables network devices to connect voice and data equipment. It is mainly used to connect different types of data equipment and telecommunication media to take services offered by the local services provider to exchange data for longer distances and shorter exchange carriers. These RJ cables are categorised on the basis of structure and functions, such as size, PIN number, and their reliability on different devices.

Types of RJ

There are following types of RJ cable used in telephone line and to connect and share data among the connected systems.

- RJ11
- RJ11-W
- RJ14
- RJ21RJ25
- RJ45
- RJ48
- RJ61



RJ11- The Registered Jack-11 (RJ-11) is a four or six wire connection for telephone and modem connections in the US. It is also more generally referred to as a modem port, phone connector, phone jack, or phone line. The graphic serves as an illustration of how the RJ-11 phone cable connects.
This cable can connect your modem to the Internet, but should not be confused with the RJ-45 connector, which is used with your network card.