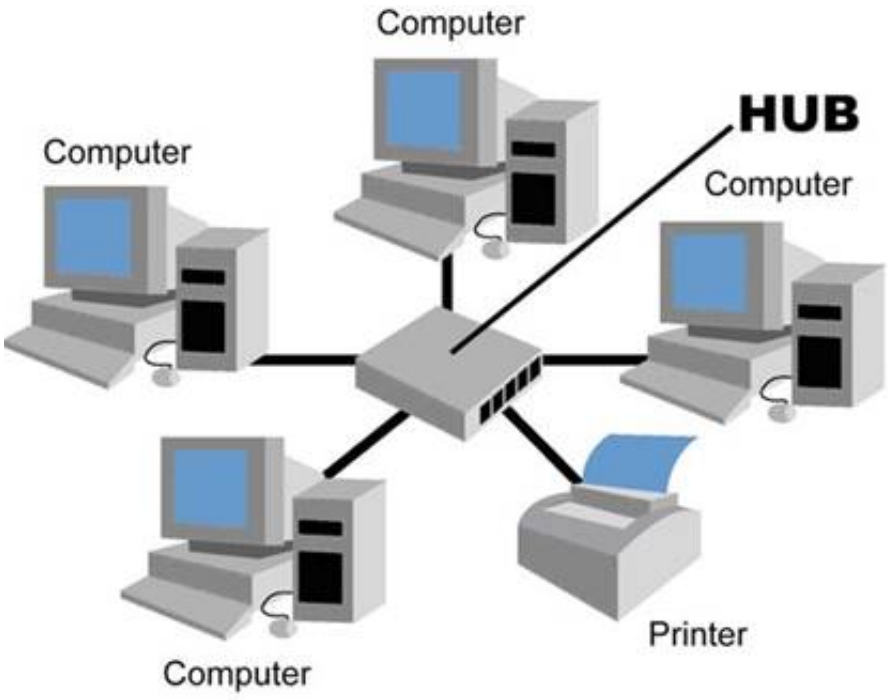
Components of a Computer Network

What is a computer Network?

A network is any collection of independent computers that communicate with one another over a shared network medium. When two or more than two computers are connected with each other over a shared network medium to exchange data, share files and peripherals such as modems, printers, tape backup drives, or CD-ROM drives or to communicate is called as a Computer Network. When networks at multiple locations are connected using services available from phone companies, people can send e-mail, share links to the global Internet, or conduct video conferences in real time with other remote users. Networks are used to provide easy access to information, thus increasing productivity for users.



Components of a Computer Network:

Servers: To manage a large number of users it becomes necessary to implement a server. A server is a high-powered computer connected to the network that serves a special function for the network. A server is just like any other computer of the network however it can be distinguished with its large storage capacity and the role that is assigned to it. This is the administrator that controls functioning of

other computers and responsible for the division of labor among computers in a shared network.

Client: Any computer that is the part of a network other than the Server is called as client. The division is based on the storage capacity and responsibility of the computer.

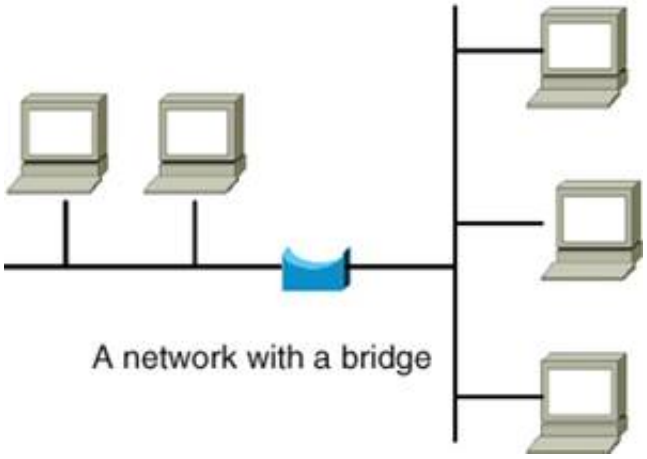
Hubs: A hub is used to connect basic networks together. Hubs are used to connect together two or more Ethernet segments of any media type. They are good for very small networks and for shortening up distances packets have to travel. Hubs can be wireless and allow wireless users to connect to the network. Hubs share the bandwidth with all the devices connected to it. If too many hubs are connected to together then this will cause problems for the network when large files are being transferred.

Routers: Routers filter out network traffic by specific protocol rather than by packet address. Routers also divide networks logically instead of physically. An IP router can divide a network into various subnets so that only traffic destined for particular IP addresses can pass between segments. Network speed often decreases due to this type of intelligent forwarding. Such filtering takes more time than that exercised in a switch or bridge, which only looks at the Ethernet address. However, in more complex networks, overall efficiency is improved by using routers. Routers mainly deal with Layer 3 of the OSI protocol.

Bridges: The function of a bridge is to connect separate networks together. Bridges connect different networks types (such as Ethernet and Fast Ethernet) or networks of the same type. Bridges map the Ethernet addresses of the nodes residing on each network segment and allow only necessary traffic to pass through the bridge.

Bridges are also called "store-and-forward" devices because they look at the whole Ethernet packet before making filtering or forwarding decisions. Filtering is done based on the destination address of the packet. If the segments are the same, the packet is dropped ("filtered"); if the segments are different, then the packet is "forwarded" to the correct segment. Additionally, bridges do not forward bad or misaligned packets. Filtering packets and regenerating forwarded packets enable bridging technology to split a network into separate collision domains. This allows for greater distances and

more repeaters to be used in the total network design. A network bridge connects multiple network segments at the Data Link layer (layer 2) of the OSI model.



Switches: Switches are the connectivity points of an Ethernet network. Switches connect the network and give the device connected to the switch port the full bandwidth. Devices connect to switches via twisted-pair cabling, one cable for each device.

The difference between hubs and switches is in how the devices deal with the data that they receive. A fully switched network completely replaces all the hubs and allows the network to maintain full duplex. There are not too many people who use fully switched networks because switches are much more expensive then hubs. Whereas a hub forwards the data it receives to all of the ports on the device, a switch forwards it only to the port that connects to the destination device. It does this by learning the MAC address of the devices attached to it, and then by matching the destination MAC address in the data it receives. Three widely used configurations of LAN switches are shared memory, matrix, and bus architecture. Switches are focus on layer 2 of the OSI standard.

Modems: A modem, short for modulator/demodulator, is a device that converts the digital signals generated by a computer into signals that can travel over conventional phone lines. The modem at the

receiving end converts the signal back into a format the computer can understand. Modems can use as means to connect to an ISP or as a mechanism for dialing up to a LAN.

Network interface cards (NICs): A Network Interface Controller (NIC) or network card is a hardware device that handles an interface to a computer network and allows a network-capable device to access that network. Network interface cards, also known as Network Adaptor and referred to as NICs.

The NIC provides a physical connection between the networking cable and the computer's internal bus. Each NIC can be identified by a unique number, its MAC (Media Access Control) address (identifier) which is burned into its ROM (Read Only Memory). This address is globally unique, no two NICs may have the same address (identifier).

NICs come in three basic varieties: 8-bit, 16-bit, and 32-bit. The larger the number of bits that can be transferred to the NIC, the faster the NIC can transfer data to the network cable.

The Network Interface Card (NIC) is a circuit board that regulates exchange of data between the network and computers or in other words we can say that it is necessary for receiving and sending data between the network and the computers. Each PC comes up with an inbuilt slot where NIC is plugged in which itself remain connected with a cable or wire.

The actual connector to a NIC may vary from RJ45 (by far, the most widespread) to BNC (coaxial cable) or no physical connector at all, in the case of a wireless NIC. The NIC exists on both the Physical and the Data Link layers of the OSI model. At layer 3 (Network) level NICs are identified by their IP (version 4 or

6) addresses.