What is a computer Network?

A network is any collection of independent computers that communicate with one another over a shared network medium. A computer network is a collection of two or more connected computers. When these computers are joined in a network, people can share files and peripherals such as modems, printers, tape backup drives, or CD-ROM drives. 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. When a network becomes open sourced it can be managed properly with online collaboration software. As companies rely on applications like electronic mail and database management for core business operations, computer networking becomes increasingly more important.

Every network includes:

- At least two computers Server or Client workstation.
- Networking Interface Card's (NIC)
- A connection medium, usually a wire or cable, although wireless communication between networked computers and peripherals is also possible.
- Network Operating system software, such as Microsoft Windows NT or 2000, Novell NetWare, Unix and Linux.

Types of Networks:

LANs (Local Area Networks)

A network is any collection of independent computers that communicate with one another over a shared network medium. LANs are networks usually confined to a geographic area, such as a single building or a college campus. LANs can be small, linking as few as three computers, but often link hundreds of computers used by thousands of people. The development of standard networking protocols and media has resulted in worldwide proliferation of LANs throughout business and educational organizations.

WANs (Wide Area Networks)

Wide area networking combines multiple LANs that are geographically separate. This is accomplished by connecting the different LANs using services such as dedicated leased phone lines, dial-up phone lines (both synchronous and asynchronous), satellite links, and data packet carrier services. Wide area networking can be as simple as a modem and remote access server for employees to dial into, or it can be as complex as hundreds of branch offices globally linked using special routing protocols and filters to minimize the expense of sending data sent over vast distances.

Internet

The Internet is a system of linked networks that are worldwide in scope and facilitate data communication services such as remote login, file transfer, electronic mail, the World Wide Web and newsgroups.

With the meteoric rise in demand for connectivity, the Internet has become a communications highway for millions of users. The Internet was initially restricted to military and academic institutions, but now it is a full-fledged conduit for any and all forms of information and commerce. Internet websites now provide personal, educational, political and economic resources to every corner of the planet.

Intranet

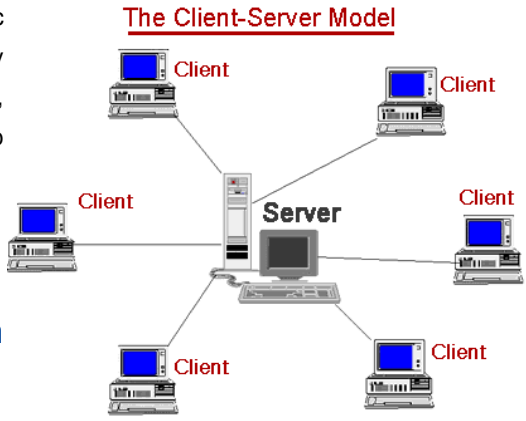
With the advancements made in browser-based software for the Internet, many private organizations are implementing intranets. An intranet is a private network utilizing Internet-type tools, but available only within that organization. For large organizations, an intranet provides an easy access mode to corporate information for employees.

MANs (Metropolitan area Networks)

The refers to a network of computers with in a City.

VPN (Virtual Private Network)

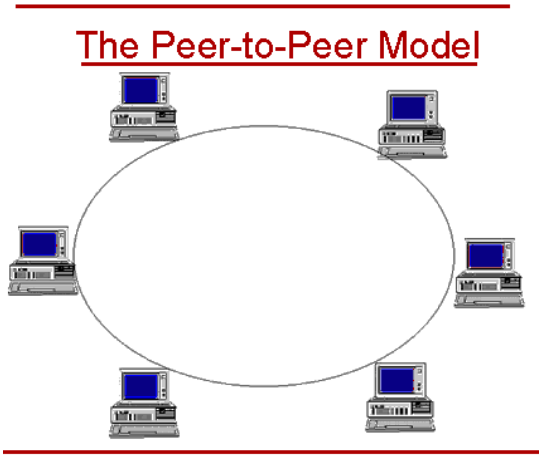
VPN uses a technique known as tunneling to transfer data securely on the Internet to a remote access server on your workplace network. Using a VPN helps you save money by using the public Internet instead of making long–distance phone calls to connect securely with your private network. There are two ways to create a VPN connection, by dialing an Internet service provider (ISP), or connecting directly to Internet.



Categories of Network:

Network can be divided in to two main categories:

- Peer-to-peer.
- Server – based.



In peer-to-peer networking there are no dedicated servers or hierarchy among the computers. All of the computers are equal and therefore known as peers. Normally each computer serves as Client/Server and there is no one assigned to be an administrator responsible for the entire network.

Peer-to-peer networks are good choices for needs of small organizations where the users are allocated in the same general area, security is not an issue and the organization and the network will have limited growth within the foreseeable future.

The term Client/server refers to the concept of sharing the work involved in processing data between the client computer and the most powerful server computer.

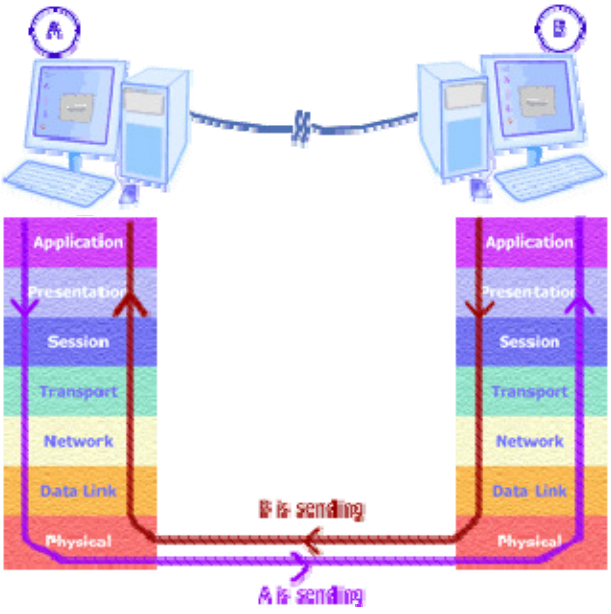
The client/server network is the most efficient way to provide:

- Databases and management of applications such as Spreadsheets, Accounting, Communications and Document management.
- Network management.
- Centralized file storage.

The client/server model is basically an implementation of distributed or cooperative processing. At the heart of the model is the concept of splitting application functions between a client and a server processor. The division of labor between the different processors enables the application designer to place an application function on the processor that is most appropriate for that function. This lets the software designer optimize the use of processors--providing the greatest possible return on investment for the hardware.

Client/server application design also lets the application provider mask the actual location of application function. The user often does not know where a specific operation is executing. The entire function may execute in either the PC or server, or the function may be split between them. This masking of application function locations enables system implementers to upgrade portions of a system over time with a minimum disruption of application operations, while protecting the investment in existing hardware and software.

The OSI Model:

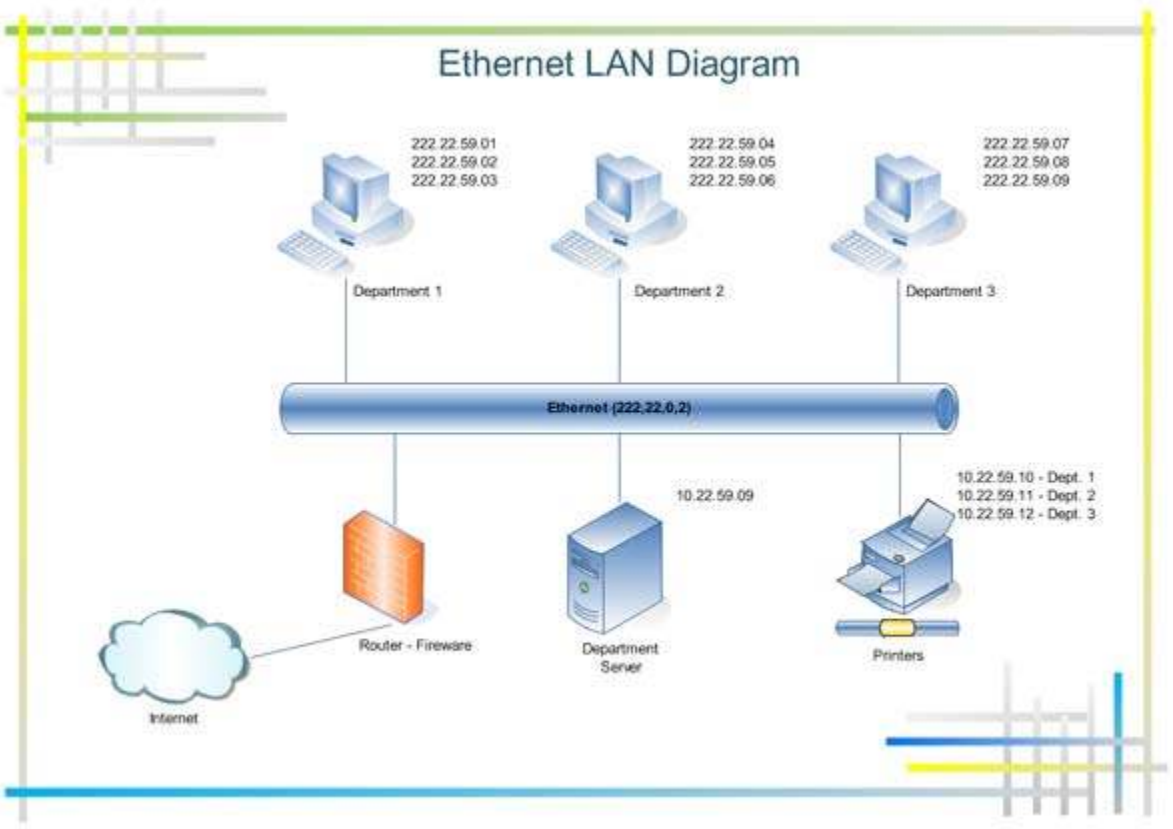


Open System Interconnection (OSI) reference model has become an International standard and serves as a guide for networking. This model is the best known and most widely used guide to describe networking environments. Vendors design network products based on the specifications of the OSI model. It provides a description of how network hardware and software work together in a layered fashion to make communications possible. It also helps with trouble shooting by providing a frame of reference that describes how components are supposed to function.

There are seven to get familiar with and these are the physical layer, data link layer, network layer, transport layer, session layer, presentation layer, and the application layer.

- Physical Layer, is just that the physical parts of the network such as wires, cables, and there media along with the length. Also this layer takes note of the electrical signals that transmit data throughout system.
- Data Link Layer, this layer is where we actually assign meaning to the electrical signals in the network. The layer also determines the size and format of data sent to printers, and other devices. Also I don't want to forget that these are also called nodes in the network. Another thing to consider in this layer is will also allow and define the error detection and correction schemes that insure data was sent and received.
- Network Layer, this layer provides the definition for the connection of two dissimilar networks.
- Transport Layer, this layer allows data to be broken into smaller packages for data to be distributed and addressed to other nodes (workstations).
- Session Layer, this layer helps out with the task to carry information from one node (workstation) to another node (workstation). A session has to be made before we can transport information to another computer.
- Presentation Layer, this layer is responsible to code and decode data sent to the node.
- Application Layer, this layer allows you to use an application that will communicate with say the operation system of a server. A good example would be using your web browser to interact with the operating system on a server such as Windows NT, which in turn gets the data you requested.

Network Architectures:



Ethernet

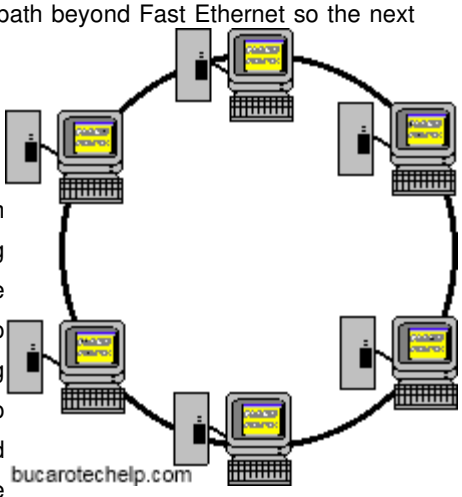
Ethernet is the most popular physical layer LAN technology in use today. Other LAN types include Token Ring, Fast Ethernet, Fiber Distributed Data Interface (FDDI), Asynchronous Transfer Mode (ATM) and LocalTalk. Ethernet is popular because it strikes a good balance between speed, cost and ease of installation. These benefits, combined with wide acceptance

in the computer marketplace and the ability to support virtually all popular network protocols, make Ethernet an ideal networking technology for most computer users today. The Institute for Electrical and Electronic Engineers (IEEE) defines the Ethernet standard as IEEE Standard 802.3. This standard defines rules for configuring an Ethernet network as well as specifying how elements in an Ethernet network interact with one another. By adhering to the IEEE standard, network equipment and network protocols can communicate efficiently.

Fast Ethernet

For Ethernet networks that need higher transmission speeds, the Fast Ethernet standard (IEEE 802.3u) has been established. This standard raises the Ethernet speed limit from 10 Megabits per second (Mbps) to 100 Mbps with only minimal changes to the existing cable structure. There are three types of Fast Ethernet: 100BASE-TX for use with level 5 UTP cable, 100BASE-FX for use with fiber-optic cable, and 100BASE-T4 which utilizes an extra two wires for use with level 3 UTP cable. The 100BASE-TX standard has become the most popular due to its close compatibility with the 10BASE-T Ethernet standard. For the network manager, the incorporation of Fast Ethernet into an existing configuration presents a host of decisions. Managers must determine the number of users in each site on the network that need the higher throughput, decide which segments of the backbone need to be reconfigured specifically for 100BASE-T and then choose the necessary hardware to connect the 100BASE-T segments with existing 10BASE-T segments. Gigabit Ethernet is a future technology that promises a migration path beyond Fast Ethernet so the next generation of networks will support even higher data transfer speeds.

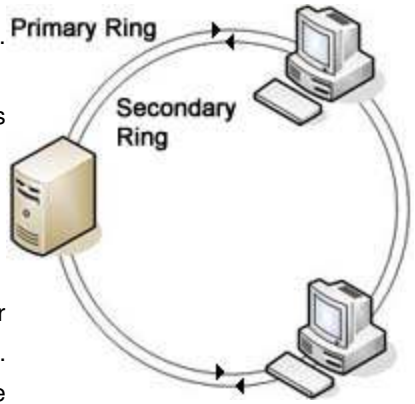
Token Ring



Token Ring is another form of network configuration which differs from Ethernet in that all messages are transferred in a unidirectional manner along the ring at all times. Data is transmitted in tokens, which are passed along the ring and viewed by each device. When a device sees a message addressed to it, that device copies the message and then marks that message as being read. As the message makes its way along the ring, it eventually gets back to the sender who now notes that the message was received by the intended device. The sender can then remove the message and free that token for use by others.

Various PC vendors have been proponents of Token Ring networks at different times and thus these types of networks have been implemented in many organizations.

FDDI



FDDI (Fiber-Distributed Data Interface) is a standard for data transmission on fiber optic lines in a local area network that can extend in range up to 200 km (124 miles). The FDDI protocol is based on the token ring protocol. In addition to being large geographically, an FDDI local area network can support thousands of users.

Protocols: