Evolution of networking

Internet (INTERconnection NETwork): The Internet is a worldwide network of computer networks. It is not owned by anybody.
The internet has evolved from ARPANET. The internet is a globally connected network system that utilizes TCP/IP to transmit information.

following services are instantly available through internet :

- Email,
- Web-enabled audio/video conferencing services,
- Online movies and gaming ,
- Data transfer/file-sharing, Instant messaging ,
- Internet forums ,
- Social networking ,
- Online shopping ,
- Financial services

Interspace: is a client/server software program that allows multiple users to communicate online with real –time audio, video and text chat in dynamic 3D environments.

Switching techniques

Switching Techniques: Switching techniques are used for transmitting data across networks. Different ways of sending data across the network are:

Circuit Switching: telephone call

- Circuit switching is a methodology of implementing a telecommunications network in which two network nodes establish a dedicated communications channel (circuit) through the network before the nodes may communicate.
- The circuit guarantees the full bandwidth of the channel and remains connected for the duration of the communication session.
- The circuit functions as if the nodes were physically connected as with an electrical circuit.

Switching techniques

Packet Switching:-e.g email . Store(RAM) and forward technique

- In packet switching the data to be transmitted is divided into packets transmitted through the network independently.

- In packet switching, instead of being dedicated to one communication session at a time, network links are shared by packets from multiple competing communication sessions.

- Packet switching results in variable delay and throughput depending on the traffic load in the network.

Message Switching: e.g digital data(voice data) ,sms,

- In message switching messages are routed in their entirety, one hop at a time. Message switching systems are nowadays mostly implemented over packet-switched or circuit-switched data networks.

- Each message is treated as a separate entity. Each message is stored (usually on hard drive due to RAM limitations) before being transmitted to the next switch.

- Because of this it is also known as a store-and-forward network. Internet call is a common application for Message Switching.

- A delay in delivering email is allowed unlike real time data transfer between two computers.

Difference between circuit and packet switching

Circuit	Packet
It is a connection oriented network switching technique.	It is a connectionless network switching technique.
A dedicated path has to be established between the source and the destination before transfer of data commences.	There is no need to establish a dedicated path from the source to the destination.
It is inflexible in nature since data packets are routed along the same dedicated path.	Each packet is routed separately. Consequently, it is flexible in nature where the different data packets follow different paths.
It was initially designed for voice transfer.	It was initially designed for data transfer.
The entire message is received in the order sent by the source.	The individual packets of the message are received out of order and so need to be reassembled at the destination.
It is not a store and forward transmission.	It is store and forward transmission.
Data is processed and transmitted at the source only.	Data is processed and transmitted, not only at the source but at each switching station.
It is more reliable.	It is less reliable.
The protocols for delivery are relatively simpler.	They require complex protocols for delivery.

Difference between circuit and message switching

Circuit	Message
In circuit switching, data is not stored.	In message Switching, data is first stored, then forwarded to the next node.
A dedicated path has to be established between the source and the destination before transfer of data commences.	There is no need to establish a dedicated path from the source to the destination.
Circuit Switching is costlier than message Switching.	The cost of message switching is less than circuit switching.
Circuit switching reserves the full bandwidth in advance.	Message Switching does not reserve the entire bandwidth in advance.
In circuit switching, charge depend on time and distance.	In message switching, charge is based on the number of bytes and distance.
Congestion occurs for per minute in circuit switching.	In message switching, no congestion or very less congestion occurs.
Circuit Switching is done by setting a physical path between two systems.	In message Switching, data is first stored by one node then forward to another node to transfer the data to another system.

● Data Communication terminologies

Communication Channel (Transmission media): A communication channel is either a physical transmission medium such as a wire, or to a logical connection over a multiplexed medium such as a radio channel in telecommunications and computer networking.

Bandwidth: The amount of data that can be transferred from one point to another.

- it is a measure of the range of frequencies a transmitted signal occupies.

- In digital systems, bandwidth is the data speed in bits per second.

- In analog systems, bandwidth is measured in terms of the difference between the highest-frequency signal component and the lowest- frequency signal component.

- Bandwidth is expressed in Hz, KHz, and MHz.

The hertz (symbol: Hz) is the derived unit of frequency in the International System of Units (SI) and is defined as one cycle per second.

It is named after Heinrich Rudolf Hertz. Hertz are commonly expressed in multiples: kilohertz (103 Hz, kHz), megahertz (106 Hz, MHz), gigahertz (109 Hz, GHz)

● Data Communication terminologies

Data transfer rate: DTR is the amount of data in digital form that is moved from one place to another in a given time on a network. Data rates are often measured in megabits (million bits) or megabytes (millionbytes) per second.

bps bits per second
Kbps kilobits per second
Mbps megabits per second
Gbps giga bits per second
Tbps tera bits per second

Bps bytes per second
KBps kilo bytes per second
MBps megabytes per second
GBps giga bytes per second
TBps tera bytes per second

Protocols for Chat and Video Conferencing

- UDP –User Datagram Protocol.

- RTP –Real-time Transport Protocol.

- VoIP – Voice Over Internet Protocol.