

## **Q: What Is ISDN (Integrated Services Digital Network)?**

SDN is the abbreviation of Integrated Services Digital Network which is a set of communications standard for instantaneous digital transmission of data, audio, video, and other services related to network, in excess of the conventional circuits of the community switched telephone network. The major feature of ISDN (Integrated Services Digital Network) is that it put together speech and information on the same line which were not presented in classic telephone system.

### **ISDN Advantages**

- The basic advantage of ISDN is to facilitate the user with multiple digital channels. These channels can operate concurrently through the same one copper wire pair.
- The digital signals broadcasting transversely the telephone lines.
- ISDN provides high data rate because of digital scheme which is 56kbps.
- ISDN takes only 2 seconds to launch a connection while other modems take 30 to 60 second for establishment.

### **ISDN Disadvantages**

- The disadvantage of ISDN lines is that it is very costly than the other typical telephone system.
- ISDN requires specialized digital devices just like Telephone Company.

## **Q :What are the advantage and disadvantage of AM and FM.**

### **Advantage of AM**

- 1- Coverage area of AM Receiver is wider than FM because atmospheric propagation
- 2- AM is long distance propagation because  $\lambda$
- 3- AM Circuit is cheaper and non complex than FM.
- 4- AM have bandwidth limited and FM unlimited.

### **- Disadvantage of AM**

- 1- The only one way to withance to noise happen is increasing power transmute
- 2- Signal of AM is not stronger than FM when it propagate to obstacle. (Urband)
- 3- Only one sideband of AM transmits Information Signal, So it loss power on other sideband and Carrier.
- 4- Noise mixes AM Signal in amplitude when it propagates in free space that it make difficulty to recover Original Signal at reciever.

### **Advantage of frequency modulation :**

- Amplitude of frequency modulation signal is remain constant.
- Less susceptible to noise.
- Provides good sound quality.
- More efficient use of power.
- Operate in very high frequency.

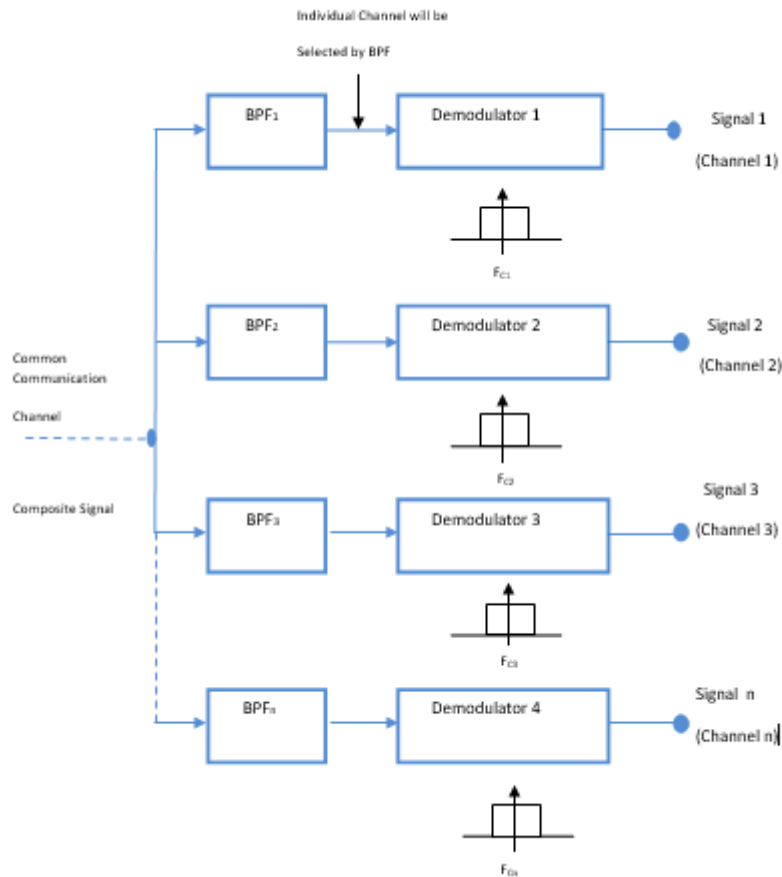
**Disadvantages of frequency modulation :**

- More complex and costly.
- Require higher bandwidth.
- Coverage area is limited.

**Write the application of FDM .**

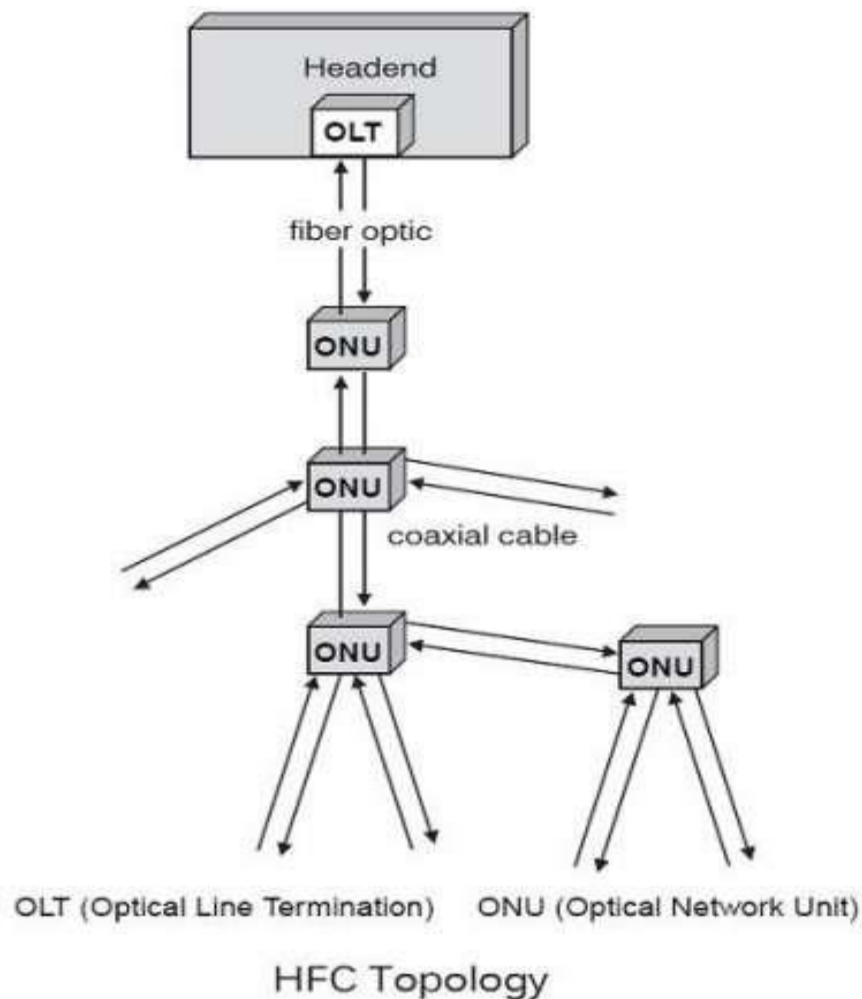
**Applications of FDM**

1. FDM is used for FM & AM radio broadcasting. Each AM and FM radio station uses a different carrier frequency. In AM broadcasting, these frequencies use a special band from 530 to 1700 KHz. All these signals/frequencies are multiplexed and are transmitted in air. A receiver receives all these signals but tunes only one which is required. Similarly FM broadcasting uses a bandwidth of 88 to 108 MHz
2. FDM is used in television broadcasting.
3. First generation cellular telephone also uses FDM.



**Q : Write short note on CABLE TV network .**

Another solution to obtain a broadband distribution network is to use the wiring of cable operators, when it exists. This wiring has long been made of CATV (cable TV), whose bandwidth exceeds 800MHz easily. Today, this infrastructure is slightly modified by the introduction of systems HFC (Hybrid Fiber/Coax), combining a fiber portion between the head end and the beginning of the service by the CATV. This topology is illustrated in Figure.



This solution has many advantages but also some major defects. Its main advantage is the ability to optimize what is transmitted in different channels, since each channel is independent of the other channels. Multimedia is easily supported by assigning a media per sub-band, each sub-band having the opportunity to be optimized. Simply keep the analog information or scanning.

Television channels pass through separate subbands. A specific sub-band can be dedicated to a telephone voice connection and one sub-band to the internet. This Internet access requires the use of a cable modem, which allows access to the sub-band connected to the Internet. This type of modem requires a determined frequency corresponding to the selected sub-band for the Internet connection. Its speed can reach through a high bandwidth several megabits per second. HFC is another solution, which is to use fiber optics to allow the network to carry up to a little distance away from the user broadband communications, being relayed by the coaxial cable to the user socket.

### **Q: Write the function of SMTP .**

SMTP functions for sending emails (electronic mail) by using SMTP (Simple Mail Transfer Protocol).

SMTP is an internet standard for email transmission across IP networks that are typically only used for sending messages to a mail server for relaying.

The SMTP functions support two ways of sending emails.

### **smtpSend, for simple short messages:**

Advantages:

- Only the smtpSend function is needed.
- The function waits for the mail transfer to complete.

### **Disadvantages:**

- The function waits for the mail transfer to complete.
- Only a short text message.
- No attachments.

### **smtpSendX, for advanced messages:**

Advantages:

- Large text messages.
- Message text can be built over time.
- File attachments.
- Asynchronous mail transfer (depending on the situation, this can also be a disadvantage).
- Mail transfer progress can be monitored.

Disadvantages:

- Several functions are required to build and send an email.

## **Q : Briefly explain Nyquist Theorem .**

### Nyquist Theorem

The Nyquist Theorem, also known as the sampling theorem, is a principle that engineers follow in the digitization of analog signals. For analog-to-digital conversion (ADC) to result in a faithful reproduction of the signal, slices, called *samples*, of the analog waveform must be taken frequently. The number of samples per second is called the sampling rate or sampling frequency.

Any analog signal consists of components at various frequencies. The simplest case is the sine wave, in which all the signal energy is concentrated at one frequency. In practice, analog signals usually have complex waveforms, with components at many frequencies. The highest frequency component in an analog signal determines the bandwidth of that signal. The higher the frequency, the greater the bandwidth, if all other factors are held constant.

Suppose the highest frequency component, in hertz, for a given analog signal is  $f_{\max}$ . According to the Nyquist Theorem, the sampling rate must be at least  $2f_{\max}$ , or twice the highest analog frequency component. The sampling in an analog-to-digital converter is actuated by a pulse generator (clock). If the sampling rate is less than  $2f_{\max}$ , some of the highest frequency

components in the analog input signal will not be correctly represented in the digitized output. When such a digital signal is converted back to analog form by a digital-to-analog converter, false frequency components appear that were not in the original analog signal. This undesirable condition is a form of distortion called aliasing.

## ***What is URL ?***

**URL** is the abbreviation of **Uniform Resource Locator** and is defined as the global address of documents and other resources on the World Wide Web.

We all use URLs to visit webpages and other resources on the web. The URL is an address that sends users to a specific resource online, such as a webpage, video or other document or resource. When you search Google, for example, the search results will display the URL of the resources that match your search query. The title in search results is simply a hyperlink to the URL of the resource.

A URL is one type of **Uniform Resource Identifier (URI)**; the generic term for all types of names and addresses that refer to objects on the World Wide Web.

## ***What Are the Parts of a URL?***

The first part of the URL is called a *protocol identifier* and it indicates what protocol to use, and the second part is called a *resource name* and it specifies the IP address or the domain name where the resource is located. The protocol identifier and the resource name are separated by a colon and two forward slashes.

## **What is leaky bucket algorithm.**

### **Leaky bucket algorithm:**

In the network layer, before the network can make Quality of service guarantees, it must know what traffic is being guaranteed. One of the main causes of congestion is that traffic is often bursty.

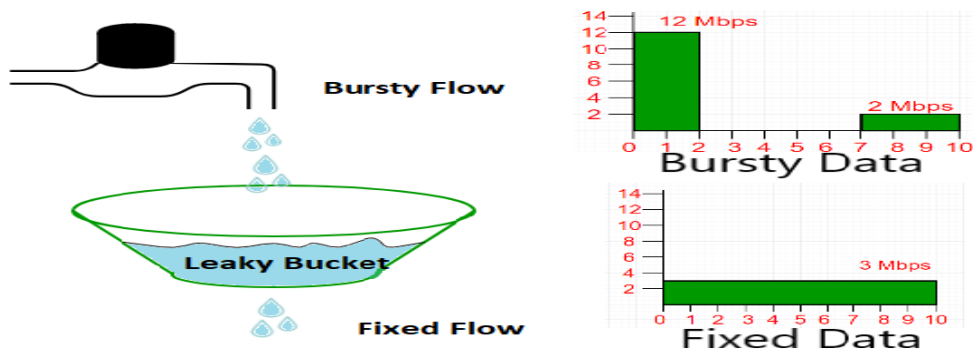
To understand this concept first we have to know little about traffic shaping. **Traffic Shaping** is a mechanism to control the amount and the rate of the traffic sent to the network. Approach of congestion management is called Traffic shaping. Traffic shaping helps to regulate rate of data transmission and reduces congestion.

There are 2 types of traffic shaping algorithms:

1. Leaky Bucket
2. Token Bucket

Suppose we have a bucket in which we are pouring water in a random order but we have to get water in a fixed rate, for this we will make a hole at the bottom of the bucket. It will ensure that water coming out is in a some fixed rate, and also if bucket will full we will stop pouring in it.

The input rate can vary, but the output rate remains constant. Similarly, in networking, a technique called leaky bucket can smooth out bursty traffic. Bursty chunks are stored in the bucket and sent out at an average rate.



In the figure, we assume that the network has committed a bandwidth of 3 Mbps for a host. The use of the leaky bucket shapes the input traffic to make it conform to this commitment. In Figure the host sends a burst of data at a rate of 12 Mbps for 2 s, for a total of 24 Mbits of data. The host is silent for 5 s and then sends data at a rate of 2 Mbps for 3 s, for a total of 6 Mbits of data. In all, the host has sent 30 Mbits of data in 10 s. The leaky bucket smooths the traffic by sending out data at a rate of 3 Mbps during the same 10 s.

Without the leaky bucket, the beginning burst may have hurt the network by consuming more bandwidth than is set aside for this host. We can also see that the leaky bucket may prevent congestion.

The following is an algorithm for variable-length packets:

1. Initialize a counter to  $n$  at the tick of the clock.
2. If  $n$  is greater than the size of the packet, send the packet and decrement the counter by the packet size. Repeat this step until  $n$  is smaller than the packet size.
3. Reset the counter and go to step 1.

**Example –** Let  $n=1000$

Packet= 

200	700	500	450	400	200
-----	-----	-----	-----	-----	-----

Since  $n >$  front of Queue i.e.  $n > 200$

Therefore,  $n = 1000 - 200 = 800$

Packet size of 200 is sent to the network.

200	700	500	450	400
-----	-----	-----	-----	-----

Now Again  $n >$  front of the queue i.e.  $n > 400$

Therefore,  $n = 800 - 400 = 400$

Packet size of 400 is sent to the network.

200	700	500	450
-----	-----	-----	-----

Since  $n <$  front of queue

Therefore, the procedure is stop.

Initialize  $n=1000$  on another tick of clock.

This procedure is repeated until all the packets are sent to the network.



**Q : What are the difference between HTTP and HTTPS.**

<b>BASIS FOR COMPARISON</b>	<b>HTTP</b>	<b>HTTPS</b>
Prefix Used	Url begins with "http://"	Url begins with "https://"
Security	Unsecured.	Secured.
Operated On	Application layer	Transport layer.
Encryption	No encryption is there	Encryption is used.
Certificate	Not required.	Necessary
Port Used	Port number 80 is used for communication.	Port number 443 is used for communication.
Characteristics	It is subject to man-in-the-middle and eavesdropping attacks.	It is designed to resist man-in-the-middle and eavesdropping attacks and is considered secure against such attacks.
Example	Websites like internet forums, educational sites.	Websites like Banking Websites, Payment gateway, Shopping Websites, etc.

**Q :What is HLAN.**

The combined effect of the growth in the number of users and increasing bandwidth requirement per user has led to the development of High Speed LANs with data transfer rate of 100 Mb/s or more.

The high speed LANs that have emerged can be broadly categorized into three types based on token passing, successors of Ethernet and based on switching technology. In the first category we have FDDI and its variations, and high-speed token ring. In the second category we have the fast Ethernet and Gigabit Ethernet. In the third category we have ATM, fiber channel and

the Ether switches. In this lesson we shall discuss details of FDDI – the token ring based high speed LAN.

Why High Speed LANs? • Office LANs used to provide basic connectivity

— Connecting PCs and terminals to mainframes and midrange systems that ran corporate applications

— Providing workgroup connectivity at departmental level

— Traffic patterns were light

- Emphasis on file transfer and electronic mail
- Speed and power of PCs has risen — Graphics-intensive applications and GUIs
- MIS organizations recognize LANs as essential
- Began with client/server computing
- Now dominant architecture in business environment
- Intranet works
- Frequent transfer of large volumes of data

BASIS FOR COMPARISON	MAC ( PHYSICAL ADDRESS )	IP
Full Form	Media Access Control Address.	Internet Protocol Address.
Purpose	It identifies the physical address of a computer on the internet.	It identifies connection of a computer on the internet.
Bits	It is 48 bits (6 bytes) hexadecimal address.	IPv4 is a 32-bit (4 bytes) address, and IPv6 is a 128-bits (16 bytes) address.
Address	MAC address is assigned by the manufacturer of NIC card.	IP address is assigned by the network administrator or Internet Service Provider.
Retrieve Address	ARP protocol can retrieve MAC address of a device.	RARP protocol can retrieve IP address of a device.

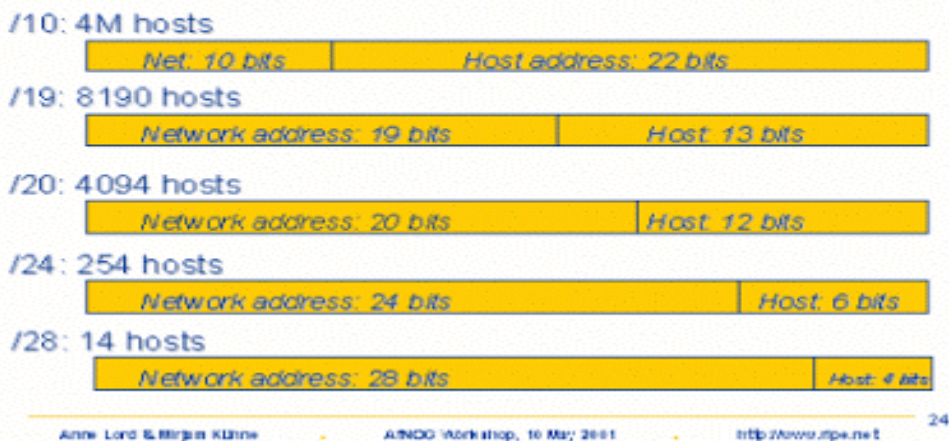
**Q: What is class ful and class less addressing ?**

**Classful addressing:**In the classful addressing system all the IP addresses that are available are divided into the five classes A,B,C,D and E, in which class A,B and C address are

frequently used because class D is for Multicast and is rarely used and class E is reserved and is not currently used. Each of the IP address belongs to a particular class that's why they are classful addresses. Earlier this addressing system did not have any name, but when classless addressing system came into existence then it is named as Classful addressing system. The main disadvantage of classful addressing is that it limited the flexibility and number of addresses that can be assigned to any device. One of the major disadvantage of classful addressing is that it does not send subnet information but it will send the complete network address. The router will supply its own subnet mask based on its locally configured subnets. As long as you have the same subnet mask and the network is contiguous, you can use subnets of a classful network address.



## Classless Addressing - Examples



**Classless Addressing:** Classless addressing system is also known as CIDR (Classless Inter-Domain Routing). Classless addressing is a way to allocate and specify the Internet addresses used in inter-domain routing more flexibly than with the original system of Internet Protocol (IP) address classes. What happened in classful addressing is that if any company needs more than 254 host machines but far fewer than the 65,533 host addresses then the only option for the company is to take the class B address. Now suppose company needs only 1000 IP addresses for its host computers then in this  $(65533 - 1000 = 64533)$  IP addresses get wasted. For this reason, the Internet was, until the arrival of CIDR, running out of address space much more quickly than necessary. CIDR effectively solved the problem by providing a new and more flexible way to specify network addresses in routers. A CIDR network address looks like this:

192.30.250.00/15

State the function of routing table . Describe briefly anyone of routing algorithm.

**Routing table** :A routing table is a set of rules, often viewed in table format, that is used to determine where data packets traveling over an Internet Protocol (IP) network will be directed. All IP-enabled devices, including routers and switches, use routing tables.

A routing table contains the information necessary to forward a packet along the best path toward its destination. A basic routing table includes the following information:

- Destination: The IP address of the packet's final destination
- Next hop: The IP address to which the packet is forwarded
- Interface: The outgoing network interface the device should use when forwarding the packet to the next hop or final destination
- Metric: Assigns a cost to each available route so that the most cost-effective path can be chosen.

### **Non-Adaptive Algorithms –**

These are the algorithms which do not change their routing decisions once they have been selected. This is also known as static routing as route to be taken is computed in advance and downloaded to routers when router is booted.

Further these are classified as follows:

- **(a) Flooding** – This adapts the technique in which every incoming packet is sent on every outgoing line except from which it arrived. One problem with this is that packets may go in loop and as a result of which a node may receive duplicate packets. These problems can be overcome with the help of sequence numbers, hop count and spanning tree.
- **(b) Random walk** – In this method, packets are sent host by host or node by node to one of its neighbors randomly. This is highly robust method which is usually implemented by sending packets onto the link which is least queued.

### **Q: write short note on FDDI LAN .**

Fiber distributed data interface (FDDI), which is an optical data communication standard used for long distance networks provides communication with fiber optic lines up to 200 kilometers at a speed of 100 megabit per second (Mbps). FDDI has dual primary and secondary communication rings. The primary ring works alongside the network, and the secondary ring remains idle and available for backup.

FDDI was later extended to FDDI-2 for long distance voice and multimedia communication.

Organizations use this medium for voice and video conferences, online lectures, news and other multimedia.

FDDI networks, which are designed for geographically large-scaled organizations that support thousands of end users, operates in the OSI model's physical and media access control (MAC layers).

The American National Standards Committee (ANSC) formally standardized FDDI as the best linking medium for local area networks (LAN), which use FDDI for long-distance communication.

FDDI also is used by single and multi-mode fiber optic, which have different communication mechanisms. Multi-mode fiber optic uses a lead generation device, whereas single-mode fiber optic uses laser for data transmission only.

### **Q: What is Network Security and why we need Network Security ?**

Network Security is a branch of computer science that involves in securing a computer network and network infrastructure devices to prevent unauthorized access, data theft, network misuse, device and data modification. Another function of Network Security is in preventing DoS (Denial of Service) attacks and assuring continuous service for legitimate network users. Network Security involves proactive defence methods and mechanisms to protect data, network and network devices from external and internal threats.

Data is the most precious factor of today's businesses. Top business organizations spend billions of dollars every year to secure their computer networks and to keep their business data safe. Imagine the loss of all important research data on which the company has invested millions of dollars and working for years !!!

We are dependent on computers today for controlling large money transfers between banks, insurance, markets, telecommunication, electrical power distribution, health and medical fields, nuclear power plants, space research and satellites. We cannot negotiate security in these critical areas.

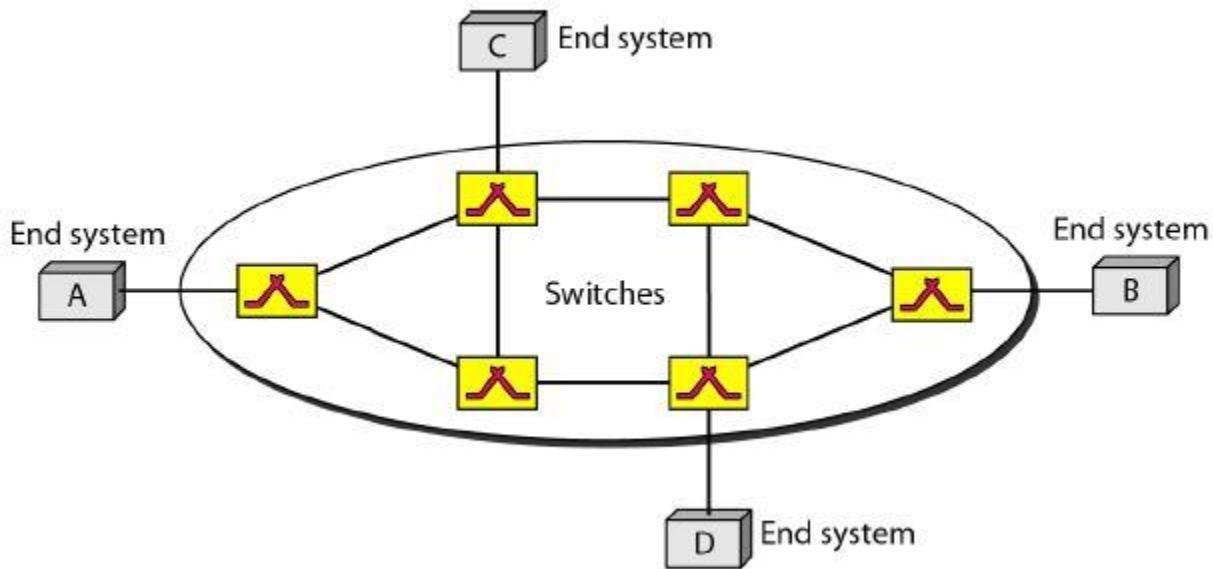
### **Q :Discuss any encryption and decryption technique .**

**RSA :RSA is a public-key encryption algorithm and the standard for encrypting data sent over the internet. It also happens to be one of the methods used in our PGP and GPG programs.**

Unlike Triple DES, RSA is considered an asymmetric algorithm due to its use of a pair of keys. You've got your public key, which is what we use to encrypt our message, and a private key to decrypt it.

### **Q: What is Virtual Circuit?**

Virtual Circuit is a logical path between nodes in a network, typically a telecommunications network. The path is made up of discrete segments of the network that are connected using switches. The nodes on the circuit communicate as if they were directly connected using physical wires, but the switches actually establish and tear down the virtual communication path.



**Q: What do you understand by access control and authentication. ?**

Authentication : Authentication is the process of determining whether someone or something is, in fact, who or what it declares itself to be. Authentication technology provides access control for systems by checking to see if a user's credentials match the credentials in a database of authorized users or in a data authentication server.

access control : Access control is a security technique that regulates who or what can view or use resources in a computing environment. It is a fundamental concept in security that minimizes risk to the business or organization. There are two types of access control: physical and logical. Physical access control limits access to campuses, buildings, rooms and physical IT assets. Logical access control limits connections to computer networks, system files and data.

### **Q: What is netid and host id ?**

The 32 bit IP address is divided into five sub-classes. These are:

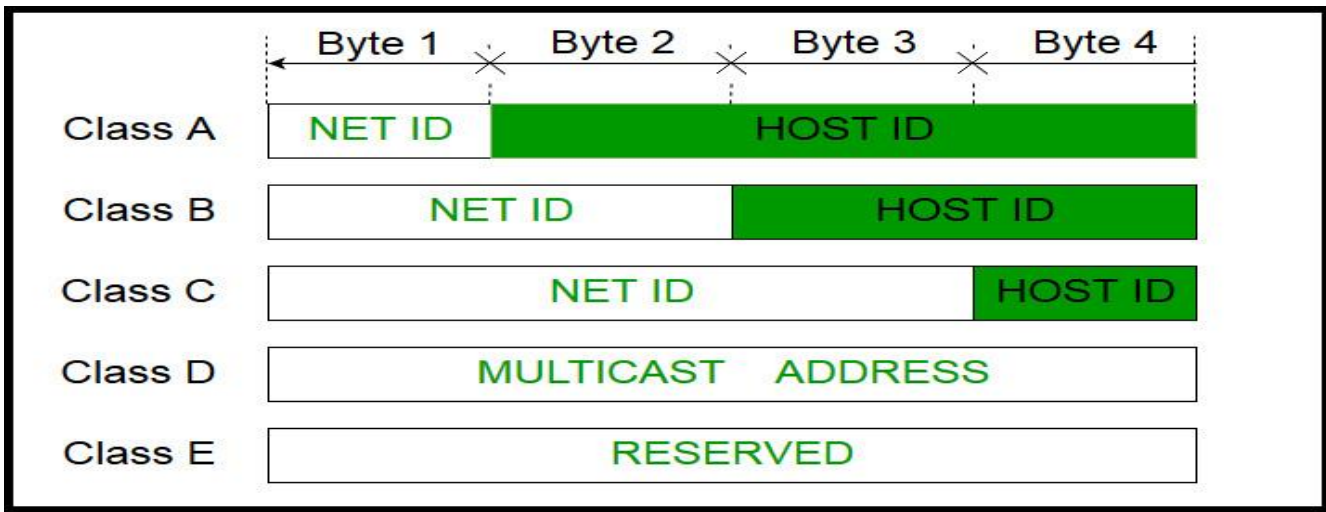
- Class A
- Class B
- Class C
- Class D
- Class E

Each of these classes has a valid range of IP addresses. Classes D and E are reserved for multicast and experimental purposes respectively. The order of bits in the first octet determine the classes of IP address.

IPv4 address is divided into two parts:

- **Network ID**
- **Host ID**

The class of IP address is used to determine the bits used for network ID and host ID and the number of total networks and hosts possible in that particular class. Each ISP or network administrator assigns IP address to each device that is connected to its network.



**Q: What do you mean by Flow control ?**

Flow control is the management of data flow between computers or devices or between nodes in a network so that the data can be handled at an efficient pace. Too much data arriving before a device can handle it causes data overflow, meaning the data is either lost or must be retransmitted.