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Internal Assesment Test - III

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|-------|--------------------------|------------|----------------|
| Sub: | Multimedia Communication | Code: | 10EC841 |
| Date: | 23/05/2017 | Duration: | 90 mins |
| | | Max Marks: | 50 |
| | | Sem: | VIII |
| | | Branch: | ECE-A, B, C, D |

Answer Any FIVE FULL Questions

| | | Marks | OBE | |
|------|---|-------|-----|-----|
| | | | CO | RBT |
| 1. | Explain datagram format of IPV6. | [10] | CO1 | L1 |
| 2. | Explain briefly about ARP and RARP Protocol. | [5+5] | CO2 | L1 |
| 3. | Explain the ATM cell formats. | [10] | CO2 | L1 |
| 4. | Explain classical IP over ATM LAN. | [10] | CO3 | L1 |
| 5. | Explain with the help of neat diagram that how TCP socket primitives are used to carry out active open and passive open connections. | [10] | CO4 | L1 |
| 6. | Explain RTP and RTCP with necessary figures. | [10] | CO5 | L1 |
| 7a). | List different types of multimedia networks. Explain any two networks in detail. | [07] | CO2 | L3 |
| b) | Determine the propagation delay associated with the following communication channels (i) A connection through a private telephone network of 1 km (ii) A connection through a PSTN of 200 km (iii) A connection over a satellite channel of 50,000km. Assume that the velocity of propagation of a signal in the case of (i) and (ii) is 2×10^8 m/s and in the case of (iii) is 3×10^8 m/s. | [03] | CO1 | L2 |

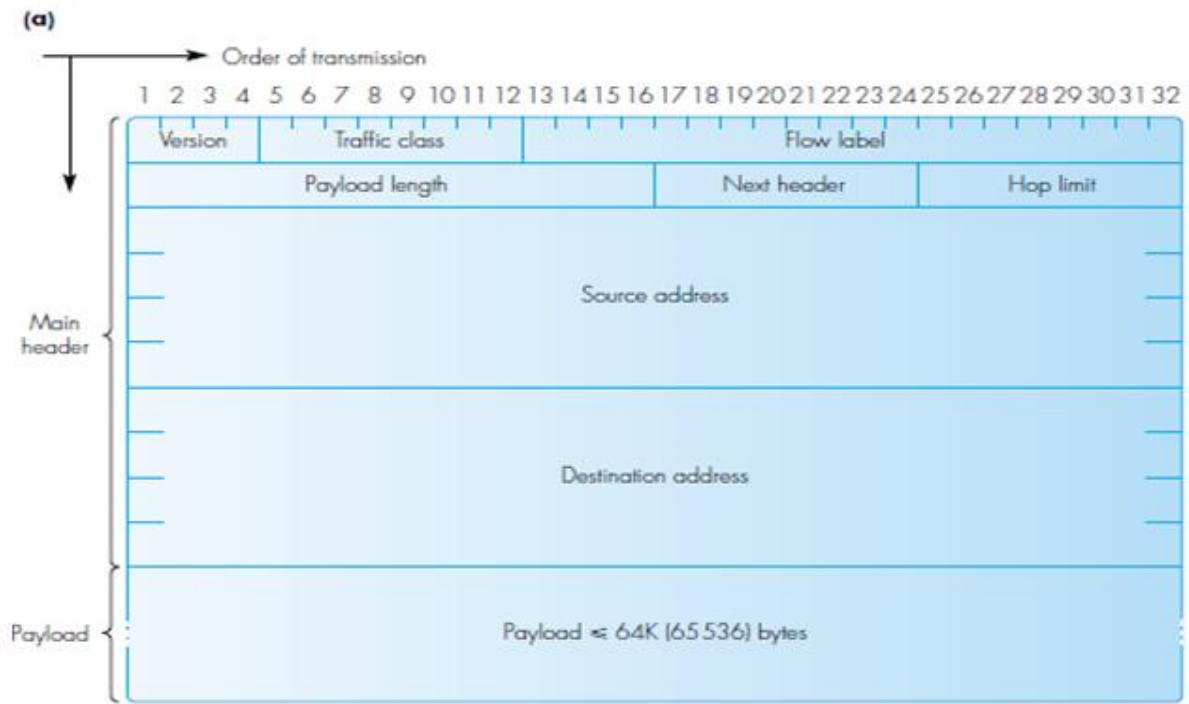
1.

- A much increased address space from 32 bits to 128 bits
- Hierarchical address to reduce the size of the routing tables associated with the routers in the core backbone network
- A simplified header to enable routers and gateways to process and route packets faster
- The introduction of improved security and data integrity features including authentication and encryption
- An autoconfiguration facility that enables a host to obtain an IP address via the network without human intervention
- Header quality of service guarantees by means of the preferential treatment by routers of the packets associated with interactive and multimedia application relative to those relating to traditional applications such as email and file transfers
- Support for mobile computing by the use of autoconfiguration to obtain an IP address dynamically via network for the duration of a call

Datagram Format

- Version – set to 6
- Traffic Class – Source IP allocates different priority in multimedia applications
- Flow Label- set to 0, in best effort packets and in the second category use to enable a router to identify individual packets relating to same call / session
- Payload Length – No of bytes that follow the basic 40 byte header in the datagram
- Next Header – IPv6 datagram contains name header followed by the header of transport layer protocol
- Hop limit – similar to IPv4, value is hop count instead of time
- Source and destination address – 128 bit address

Figure 9.30 IPv6: (a) main header fields and format; (b) position and order of extension headers.

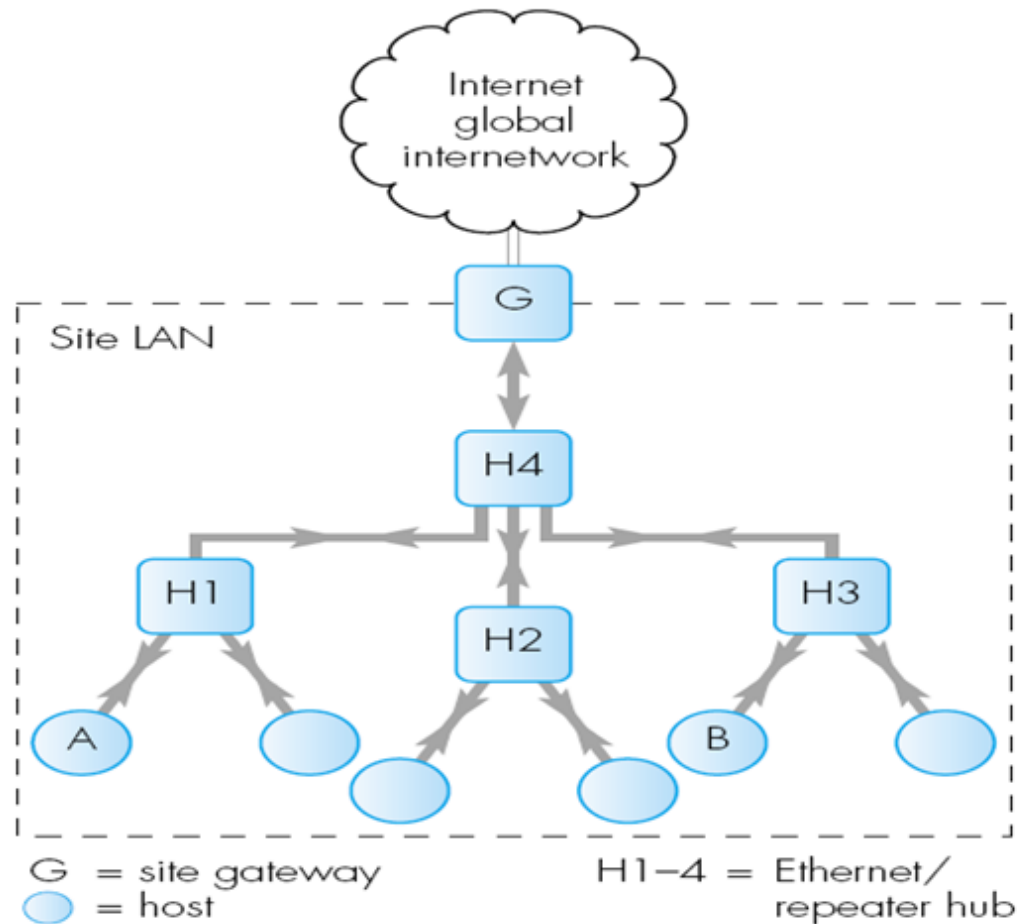


2.

ARP(Address Resolution Protocol)

- The Address Resolution Protocol (ARP) is used to associate an IP address with a MAC physical address.
- On a typical physical network, such as a LAN, each device on a link is identified by a physical or station address, usually imprinted on the network interface card (NIC).
- ARP is used to find the physical address of the node when its Internet address is known.
- Normally both addresses are stored in the configuration file of the host on the hard disk.

Figure 9.7 Example topology for describing the operation of the ARP.



- Three Ethernet hubs (H1,H2,H3) are interconnected by means of fourth hub H4.
- Also there is a connection between H4 and Gateway(G).
- Each ARP as a routing table known as

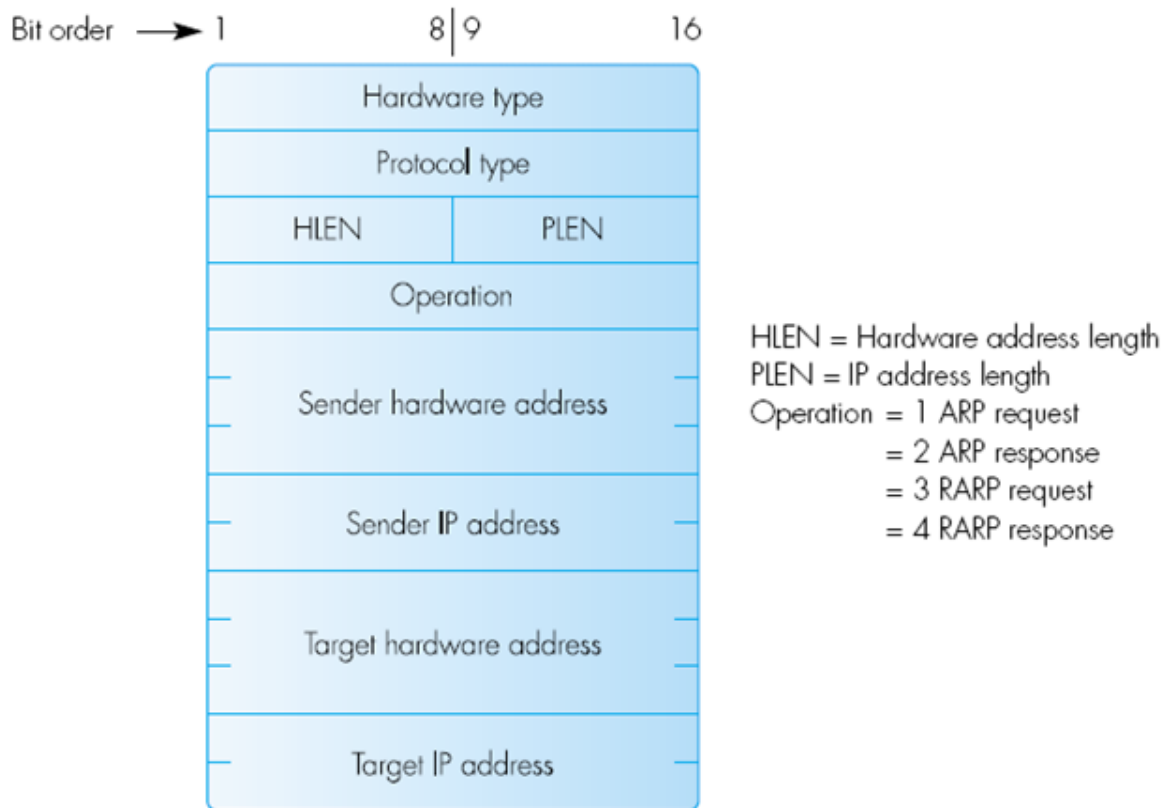
ARP Cache.

- The Reverse Address Resolution Protocol (RARP) allows a host to discover its

Internet address when it knows only its physical address.

- It is used when a computer is connected to a network for the first time or when a diskless computer is booted.

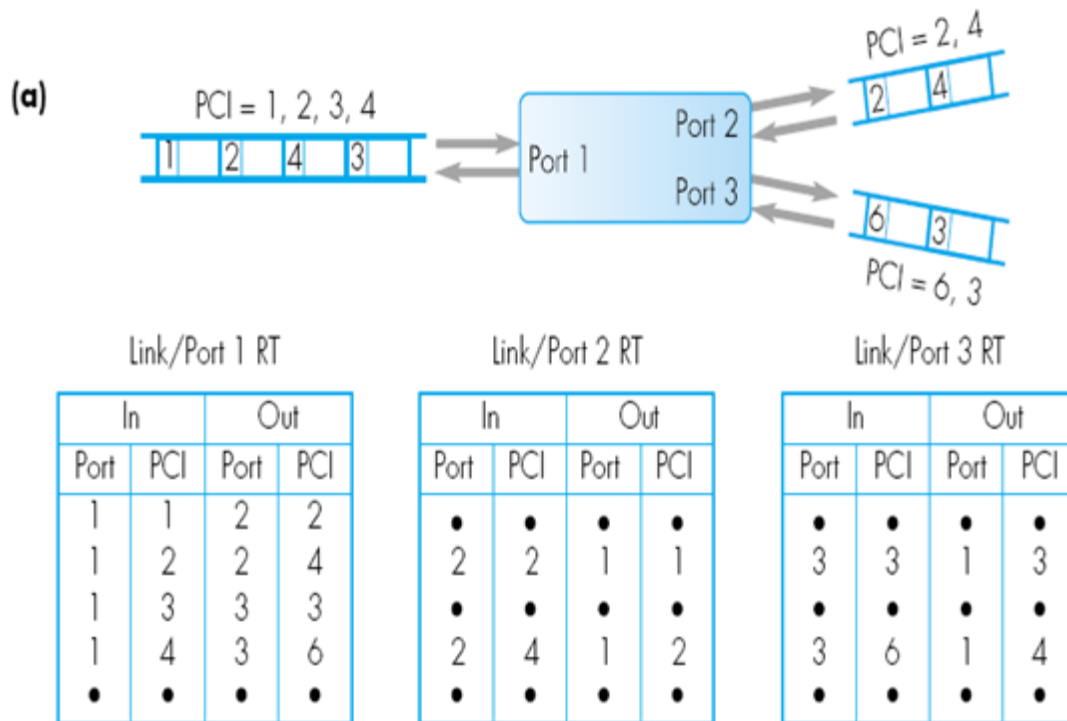
**Figure 9.8 ARP and RARP message formats and transmission:
(a) ARP and RARP message formats;**



3.

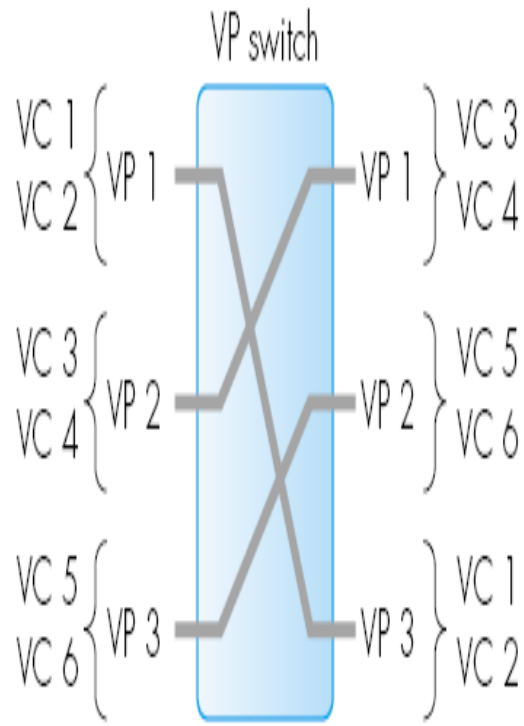
- If any information cells being sent, a virtual circuit is first established.
- In an ATM network, the VCI used on each link is known as protocol connection identifier (PCI).
- The principle of routing scheme used is shown in diagram (1)
- Associated with each incoming link/port is a routing table that contains for each incoming PCI, the corresponding outgoing link/port and the new PCI to be used.
- As a result cells from each link can be switched independently and at very high rates.
- This allows parallel switch architectures to be used and high speed transmission lines in the gigabit range, each operate at its maximum rate.

Figure 10.1 Cell switching principles: (a) routing schematic;



- In practice PCI is made up of two subfields.
- Virtual path identifier (VPI)
- Virtual circuit identifier (VCI)
- Routing can be performed using either one or the combination of the two.
- In part (b) switching is performed on virtual paths and the VCIs within each virtual path remain unchanged.
- In part (c) switching is performed on the virtual channels within each virtual path independently and the virtual paths simply terminate at each switch port.

(b)

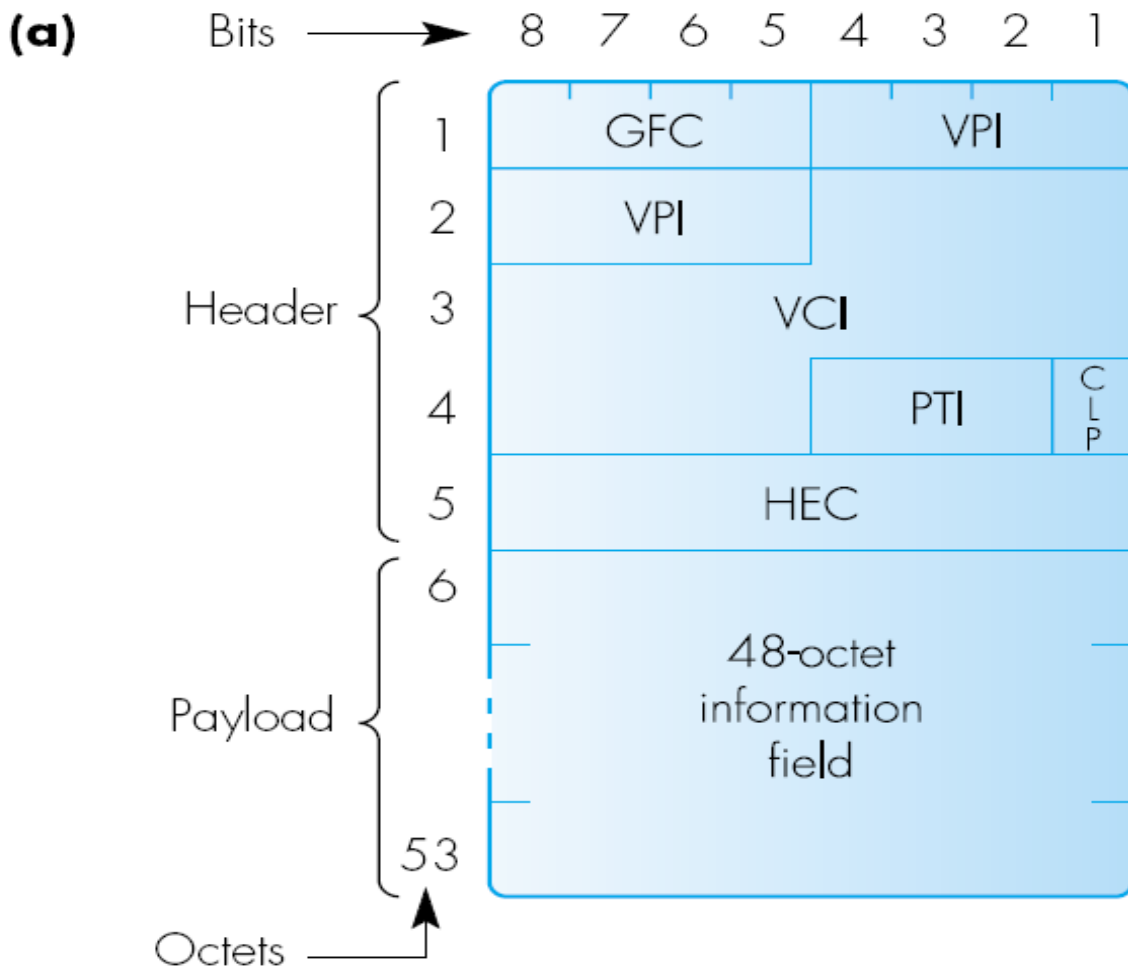
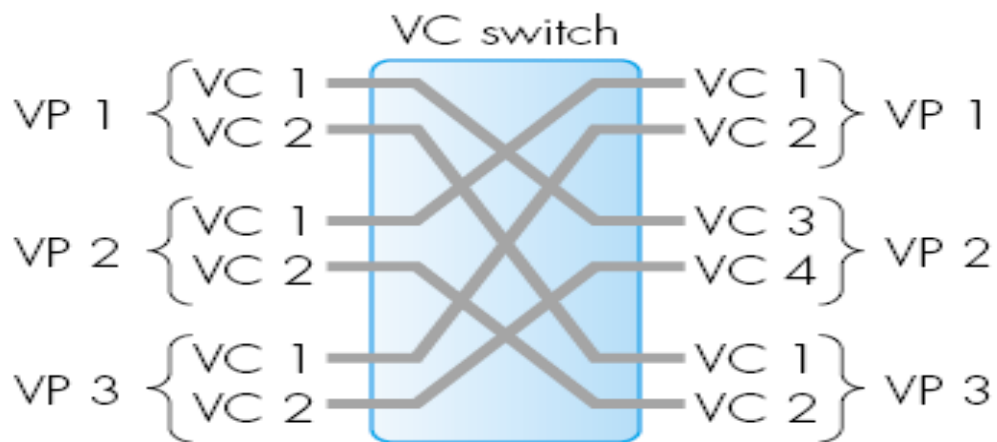


PCI = protocol connection identifier

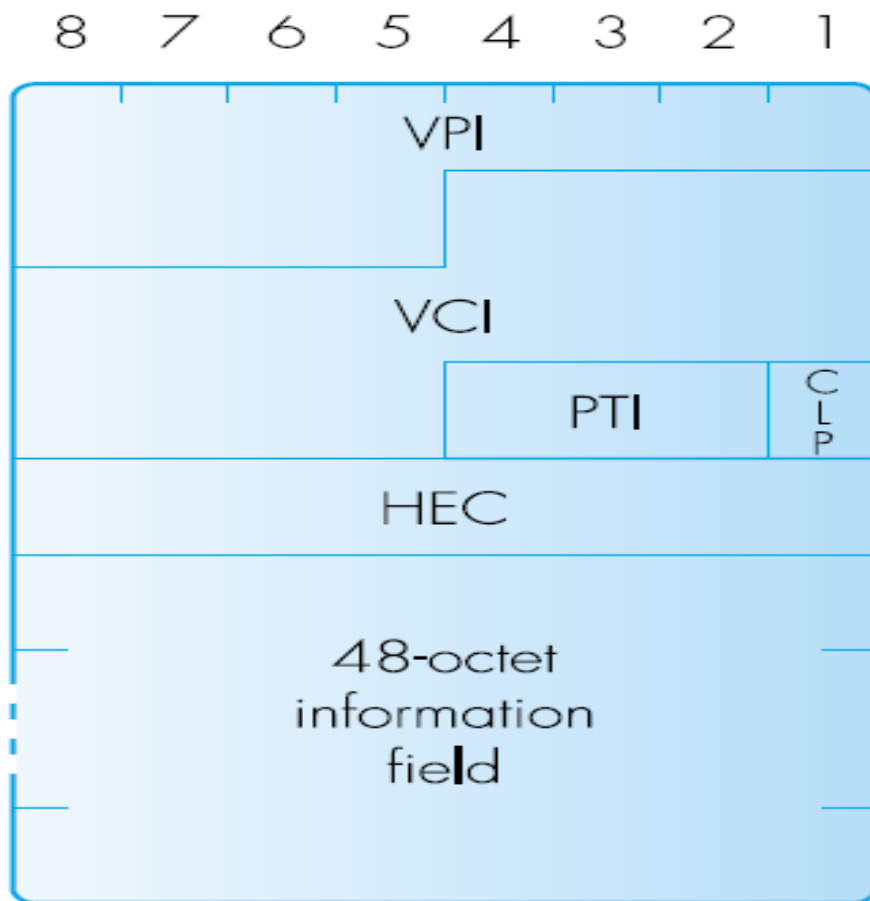
RT = routing table

VP = virtual path

VC = virtual channel



(b)

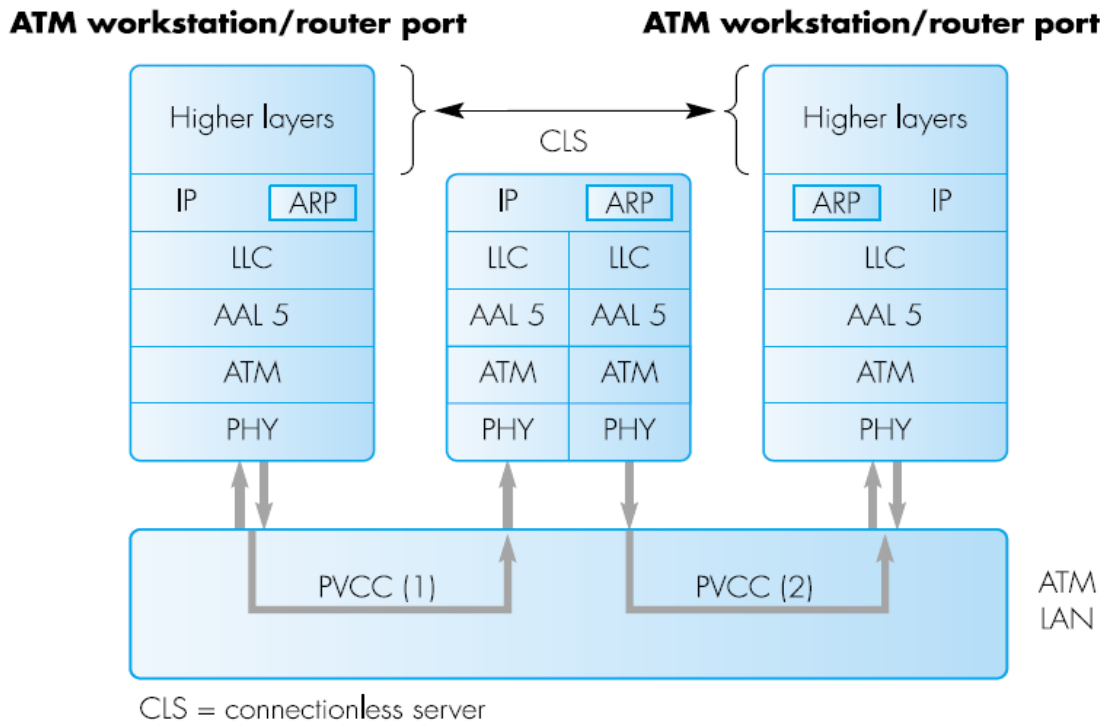


PTI: 000 – user data, no congestion, SDU type 0
001 – user data, no congestion, SDU type 1
010 – user data, congestion, SDU type 0
011 – user data, congestion, SDU type 1
100 – }
101 – } Network control
110 – }
111 – }

GFC = generic flow control
VPI = virtual path identifier
VCI = virtual channel identifier

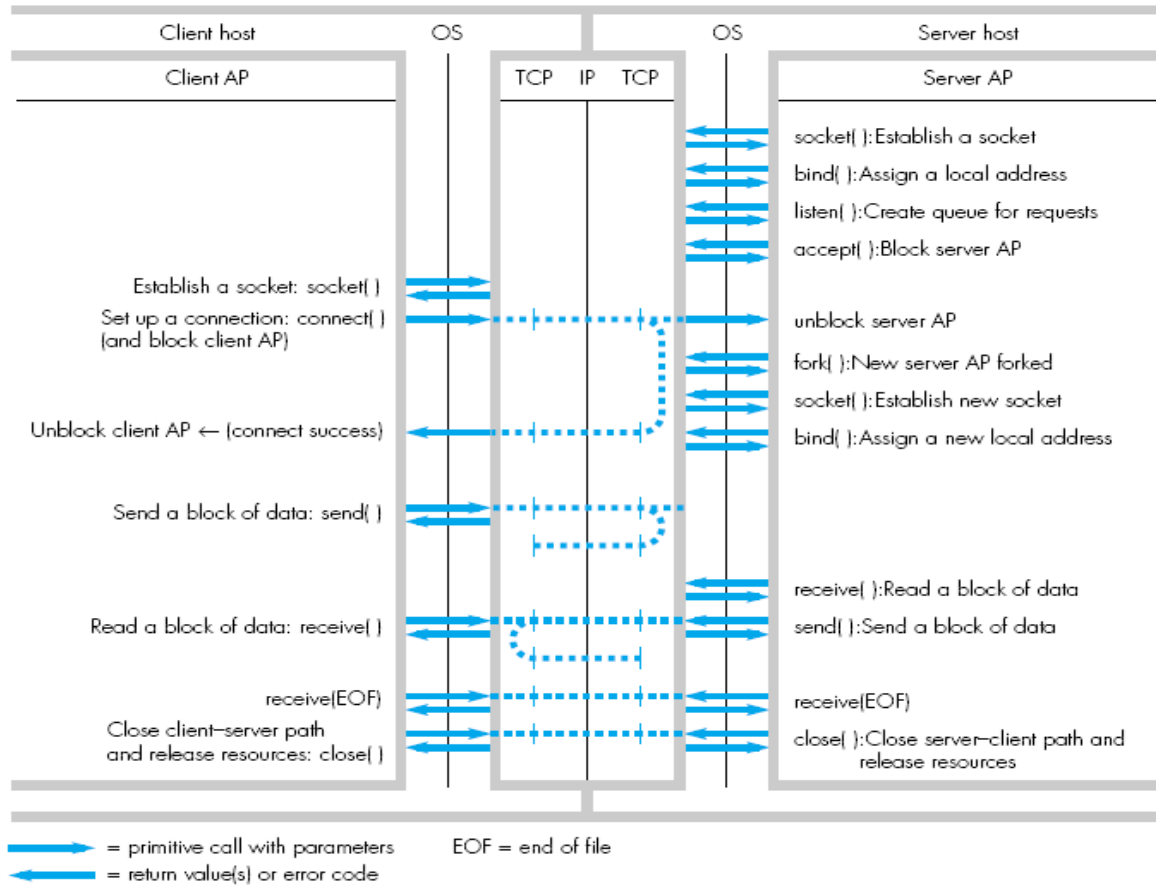
PTI = payload type identifier
CLP = cell loss priority
HEC = header error checksum

4.



5.

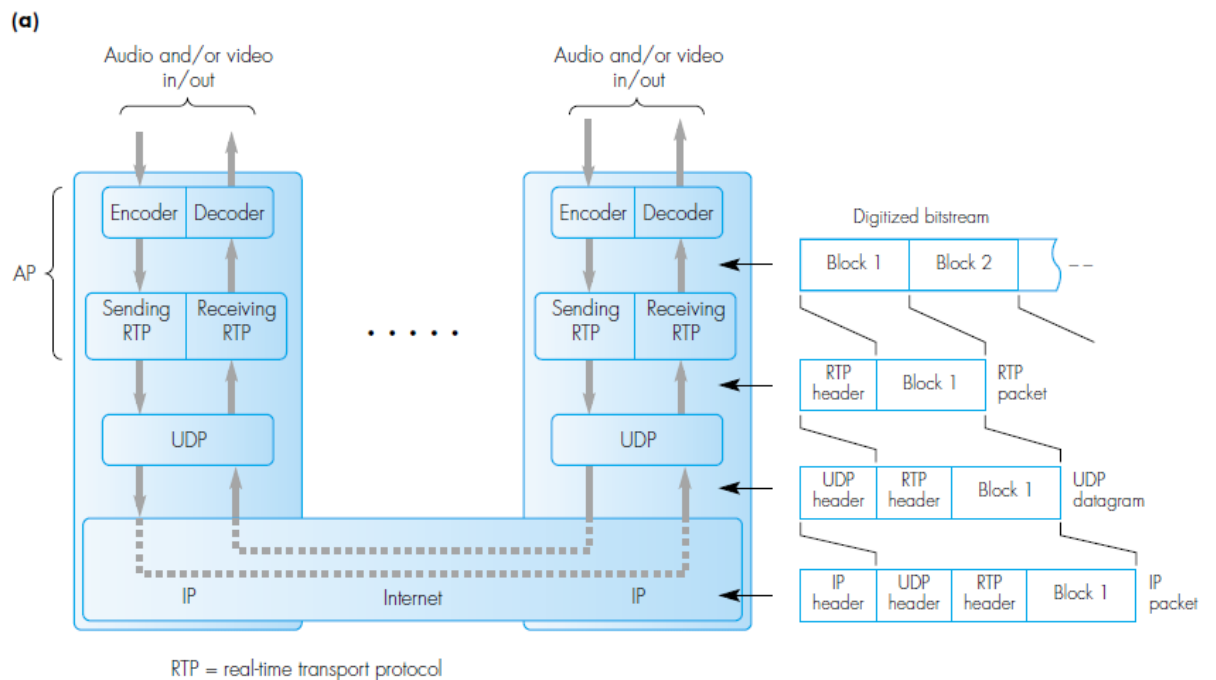
(b)



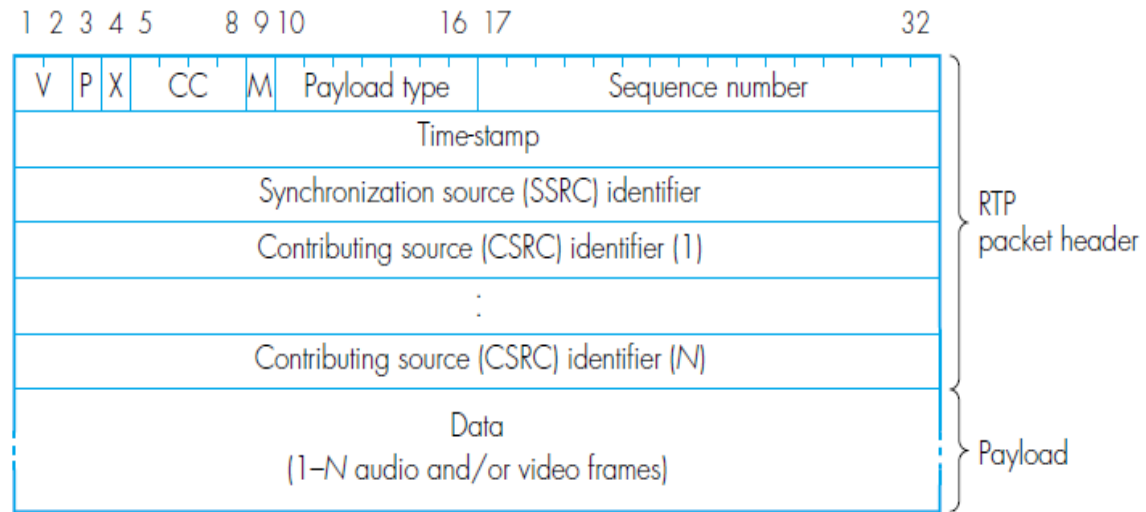
• TCP Connections

- Everything in TCP happens in the context of a connection. TCP sends and receives data through a connection, which must be requested, opened, and closed according to the rules of TCP.
- TCP supports two open states:
- Passive open : A given application process notifies TCP that it is prepared to receive incoming connections through a TCP port. Thus, the pathway from TCP to the application is opened in anticipation of an incoming connection request.
- Active open : An application requests that TCP initiate a connection with another computer that is in the passive open state. (Actually, TCP can also initiate a connection to a computer that is in the active open state, in case both computers are attempting to open a connection at once.)

6. Used in transfer of real time stream of audio and video.
- Speech in internet phone call – timing information required by the receiver - **RTP- Real-time transport protocol**.
 - For both audio and video signal – video phone call – **RTCP – Real-time transport control protocol** is used for synchronization.
 - **RTP** – real-time audio signal are digitized and transmitted in the form of bitstreams.
 - At receiver this bitstream is received and signal is reconstructed.
 - During transfer over internet – some packets maybe lost, some delayed and some take different path so arrive in different order.
 - RTP performs compensation and detection of lost/ delayed packets.



(b)

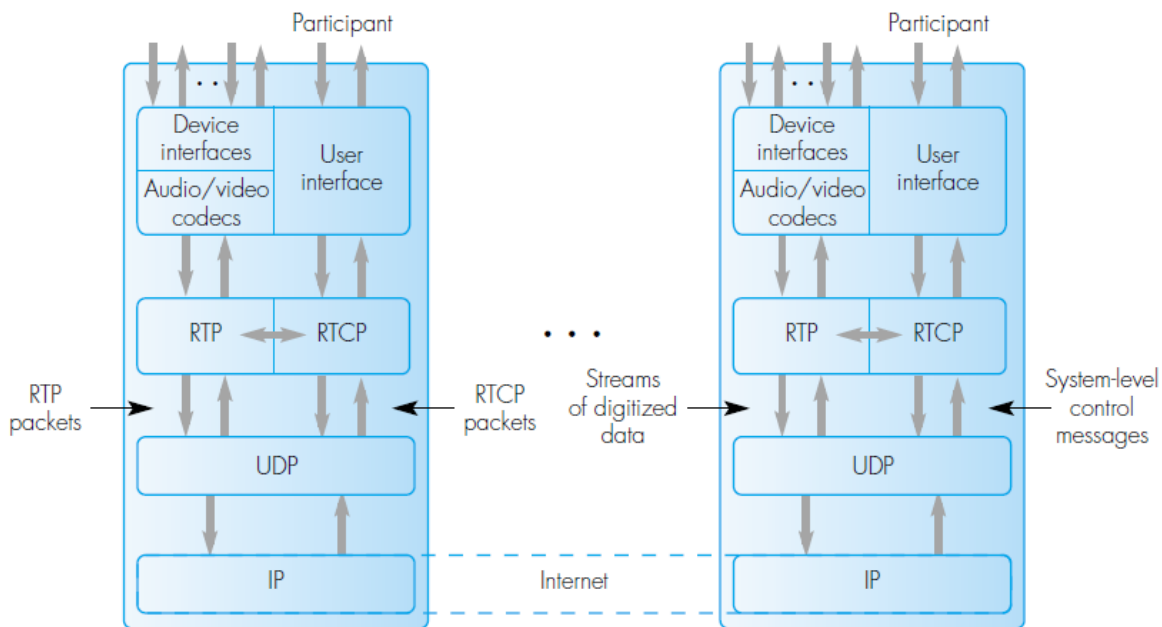


V = version P = pad X = extension flag CC = CSRC count ($N \leq 15$) M = marker bit

- **Version** – RTP version
- **P – pad bit & X-** extension of basic header defined and added in future.
- **CSRC** – contributing source – 32bit identifier - In a multicast call, each participants is called a contributing source(CSRC).
- **CSRC count** – **CC** – 4bit – no. of CSRC identifiers present.
- **M – marker** – helps receiver to interret the packets to the correct block boundaries.
- **Payload type** – type of encoder used to encode the data.
- **Sequence no.** – used to detect lost/out of sequence packets.
- **Time-stamp** – time when the packet was created. Used to determine current mean transmission delay & level of jitter.
- **SSRC** – synchronization source identifier – identifies the source device that has produced the packet content. – e.g. – microphone, camera, etc.
- **MIXER** – device which multiplexes the packets from multiple sessions.

RTCP Messages Exchanged

- **Integrated Media Synchronization** – common system clock is used for synchronization of separate audio and video streams. System initiating a call provides this function or a real time server.
- **QoS Report** – each RTCP collects details – no. of lost packets, jitter level, mean transmission delay from RTP and shares with all other RTCP periodically.
- **Participation Report** – during a conference call, when a participant wishes to leave the call, can intimate others in the call.
- **Participation Details** - name, email address, phone no., etc. of each participants are sent to all other participants – each participants knows identity and contact information of each other.



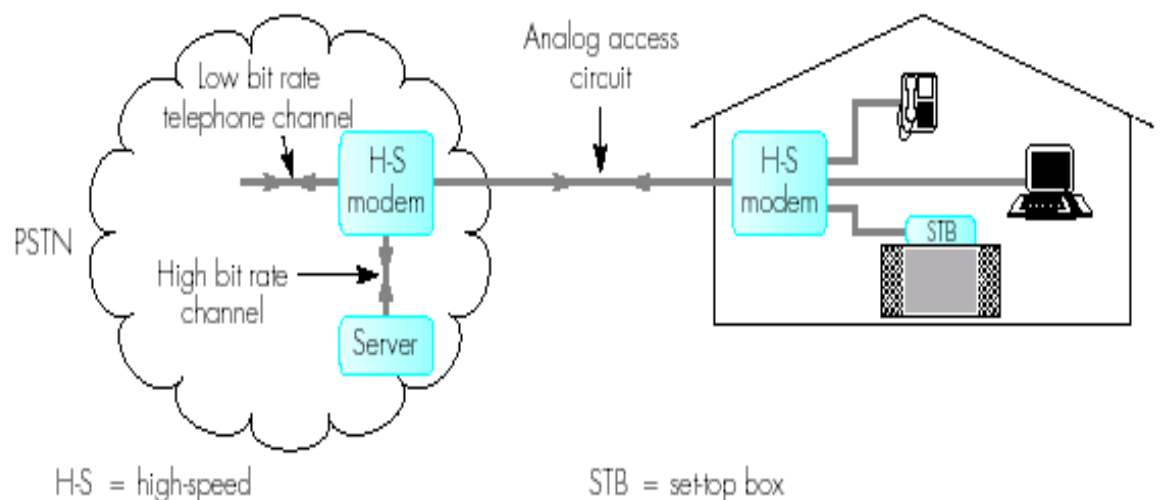
7. Multimedia Networks

- Telephone Networks - Telephony
- Data Networks – Data Communications
- Broadcast Television Networks – Broadcast TV)

- Integrated Services Digital Networks (ISDN) – Multi service
- Broadband Multiservice Networks – Multi service

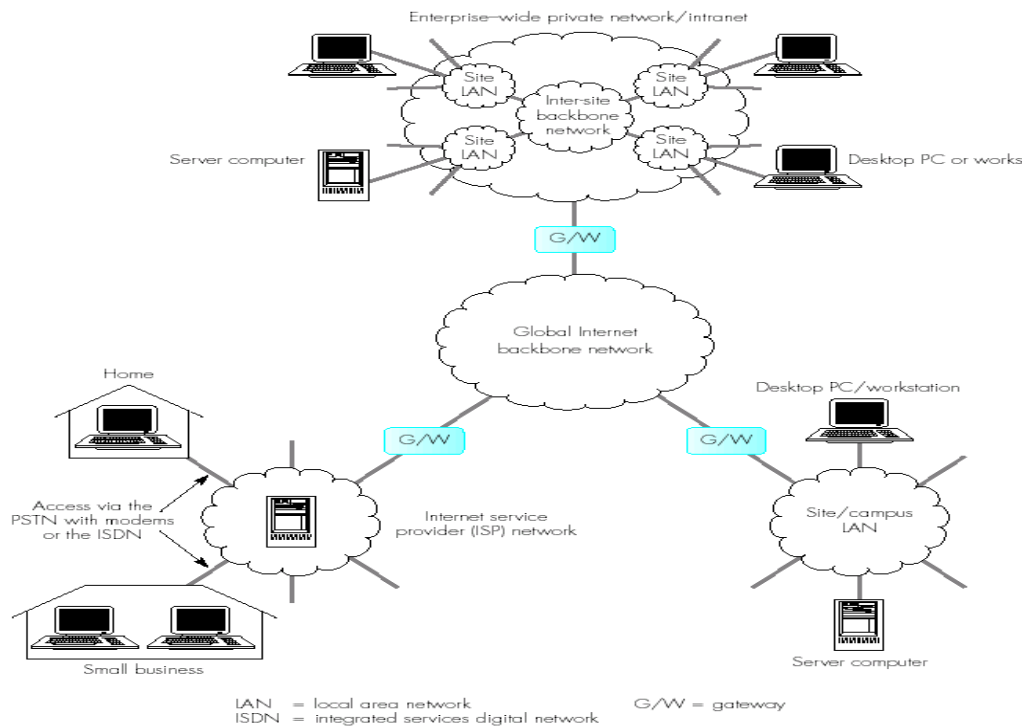
Telephone Networks

- Telephones in the home or in a small business are connected directly to their nearest **local exchange/end office**
- Telephones in a large office are connected to a private switching office known as **private branch exchange (PBX)**
- PBX provides free service between two telephones that are connected to it
- A PBX is a telephone system within an *enterprise* that switches calls between enterprise users on local lines while allowing all users to share a certain number of external phone lines. The main purpose of a PBX is to save the cost of requiring a line for each user to the telephone company's central office.
- PBX is connected to the *local exchange* and this enables phones connected to the PBX to make calls through PSTN too.
- **Cellular phone networks** – Provides service to mobile subscribers
- The switches used in a cellular phone network are known as **Mobile Switching Centers (MSCs)**
- International calls are routed to and switched by **international gateway exchanges (IGEs)**



Data Networks

- Designed to provide basic data communication services such as email and general file transfer
- Most widely deployed networks: **X.25 network** (low bit rate data) not suitable for multimedia and the **Internet** (Interconnected Networks)
- **Communication protocol**: set of rules (defines the sequence and syntax of the messages) that are adhered to by all communicating parties for the exchange of information/data
- **Packet**: Container for a block of data, at its head, is the address of the intended recipient computer which is used to route the packet through the network



- **Open systems interconnections (OSI)**- is a standard description or "reference model" for how messages should be transmitted between any two points in a telecommunication network
- Access to homes is through an Internet Service provider (ISP)
- Access through PSTN or ISDN (high-bit rate)
- Business users obtain access either through site network or through an enterprise-wide private network (multiple sites)

- Universities with single campus use a network known as the Local Area Network (LAN). However bigger universities with more than one campus use enterprise wide network
- If the communication protocols of the computers on the network are the same as the internet protocols then the network is known as an **intranet** (e.g large companies and universities)