4132COMPUTER COMMUNICATION AND NETWORKS

Module III

PART A

Answer all questions in one word or one sentence.

1. The IPv4 header size _____
   20 to 60 bytes
2. UDP packets are called _____
   User datagrams
3. List any two services of network layer
   Packetizing, routing and forwarding, error control, flow control and congestion control
4. Data in network layer is transferred in the form of _____
   Packets
5. A port number is _____ bits long
   16 bits or 2 bytes
6. List any two routing algorithms
   Link state and distance vector
7. What is subnetting?
   Subnetting *is* the strategy used to partition a single physical network into more than one smaller logical sub-networks (subnets*).*
8. List two transport layer protocols
   TCP, UDP
9. UDP stands for _____
   User Datagram Protocol
10. TCP stands for_____
    Transmission Control Protocol

Question and Answers

11. List the advantages of IPv6 over IPv4
    - Larger address space
    - Header format is better
    - New options
    - Support for more security
12. Write notes on congestion control
    Congestion will occur if the number of packets sent to the network greater than the capacity of the network. There are two types of congestion control mechanisms:
    Open loop congestion control and closed loop congestion control
13. What are the fields of UDP Packet?
    The UDP packet format contains four fields:
    - Source Port and Destination Port fields (16 bits each): Endpoints of the connection.
    - Length field (16 bits): Length of the header and data.
    - Checksum field (16 bits): It allows packet integrity
    - Checking (optional).

Source port	Destination Port
Length	CheckSum

14. Explain services of network layer

The network layer provides the following services:

- Packetizing

Packetizing refers to the process of encapsulating data received from the payload, which is the upper layer of the network, in a Network layer at the source, and then decapsulating it at the destination. The host adds a header that includes the source and the destination addresses alongside other relevant information that is required in the process of packetizing. The receiver host receives the network layer packet from the Data Link layer, decapsulates it, and sends the payload to the upper layer protocol. The routers cannot change the header or the address.

- Routing

In the network layer, there are numerous routes available from the source to the destination, the Network layer follows some strategies to find the best route possible. The process of finding the best route is known as routing.
The following types of routing protocols are used for routing:

1. Unicast Routing Protocol
2. Multicast Routing Protocol

- Forwarding

Forwarding refers to the action applied by the router when a packet arrives at one of the interfaces. The router receives a packet from one network and forwards it to another attached network(s).

15. Explain distance vector routing

A distance-vector routing (DVR) protocol requires that a router inform its neighbours of topology changes periodically.
Each router has an ID

- Associated with each link connected to a router, there is a link cost (static or dynamic).
- Intermediate hops

Distance Vector Table Initialization -

- Distance to itself = 0
- Distance to ALL other routers = infinity number.

Distance Vector Algorithm –

1. A router transmits its distance vector to each of its neighbours in a routing packet.
2. Each router receives and saves the most recently received distance vector from each of its neighbours.
3. A router recalculates its distance vector when:
    - It receives a distance vector from a neighbour containing different information than before.
    - It discovers that a link to a neighbour has gone down.

   The DV calculation is based on minimizing the cost to each destination

16. Explain features and application of UDP

The User Datagram Protocol (UDP) is a Transport Layer communication protocol.

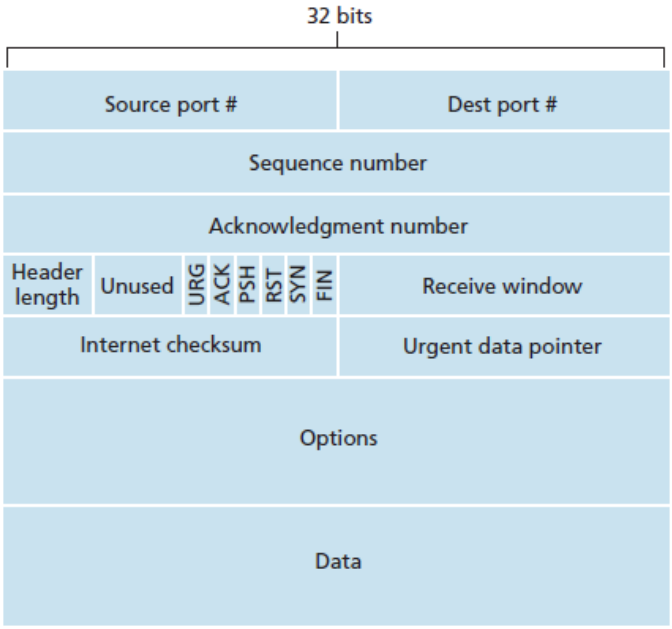
Features

- UDP is used when acknowledgement of data does not hold any significance.
- UDP is good protocol for data flowing in one direction.
- UDP is simple and suitable for query based communications.
- UDP is not connection oriented.
- UDP does not provide congestion control mechanism.
- UDP does not guarantee ordered delivery of data.
- UDP is stateless.
- UDP is suitable protocol for streaming applications such as VoIP, multimedia streaming.

UDP application

- Domain Name Services
- Simple Network Management Protocol
- Trivial File Transfer Protocol
- Routing Information Protocol
- Kerberos

17. Draw and explain TCP segment

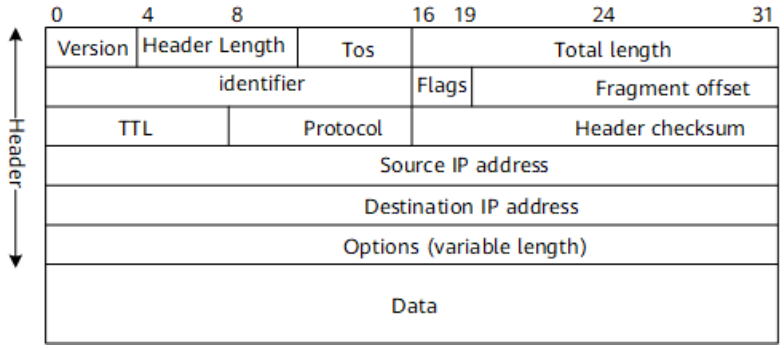


18. What is IP Address?

An IP address is a unique address that identifies a device on the internet or a local network. IP stands for Internet Protocol, which is the set of rules governing the format of data sent via the internet or local network. The internet needs a way to differentiate between different computers, routers, and websites. IP addresses provide a way of doing so and form an essential part of how the internet works.

IP addresses are expressed as a set of four numbers — an example address might be 192.158.1.38. Each number in the set can range from 0 to 255. So, the full IP addressing range goes from 0.0.0.0 to 255.255.255.255.

19. What are the features of TCP
    - TCP is reliable protocol, the sender always knows about whether the data packet is reached the destination or it needs to resend it.
    - TCP ensures that the data reaches intended destination in the same order it was sent.
    - TCP is connection oriented. TCP requires that connection between two remote points be established before sending actual data.
    - TCP provides error-checking and recovery mechanism.
    - TCP provides end-to-end communication.
    - TCP provides flow control and quality of service.
20. Draw and Explain packet format of IPv4



21. Explain link state routing

    Step 1: Neighbor discovery

    Step 2: Measuring link cost

    Step 3: Building and Distributing Link State Packets

    Step 4: Evaluating Shortest Paths

22. Explain services of transport layer

    The services provided by the transport layer protocols can be divided into five categories:

    - End-to-end delivery
    - Addressing
    - Reliable delivery
    - Flow control
    - Multiplexing

23. Compare TCP and UDP

Key	TCP	UDP
Definition	It is a communications protocol, using which the data is transmitted between systems over the network. In this, the data is transmitted in the form of packets. It includes error-checking,	It is same as the TCP protocol except this doesn't guarantee the error-checking and data recovery. If you use this protocol, the data will be sent continuously, irrespective of

	guarantees the delivery and preserves the order of the data packets.	the issues in the receiving end.
Design	TCP is a connection-oriented protocol.	UDP is a connectionless protocol.
Reliability	TCP is more reliable as it provides error checking support and also guarantees delivery of data to the destination router.	UDP, on the other hand, provides only basic error checking support using checksum. So, the delivery of data to the destination cannot be guaranteed in UDP as in case of TCP.
Data transmission	In TCP, the data is transmitted in a particular sequence which means that packets arrive in-order at the receiver.	There is no sequencing of data in UDP in order to implement ordering it has to be managed by the application layer.
Performance	TCP is slower and less efficient in performance as compared to UDP. Also TCP is heavy-weight as compared to UDP.	UDP is faster and more efficient than TCP.
Retransmission	Retransmission of data packets is possible in TCP in case packet get lost or need to resend.	Retransmission of packets is not possible in UDP.
Sequencing	The Transmission Control Protocol has a function that allows data to be sequenced (TCP). This implies that packets arrive at the recipient in the sequence they were sent.	In UDP, there is no data sequencing. The application layer must control the order if it is necessary.
Header size	TCP uses a variable-length (20-60) bytes header.	UDP has a fixed-length header of 8 bytes.
Handshake	Handshakes such as SYN, ACK, and SYNACK are used.	It's a connectionless protocol, which means it doesn't require

		a handshake.
Broadcasting	Broadcasting is not supported by TCP.	Broadcasting is supported by UDP.
Examples	HTTP, HTTPs, FTP, SMTP, and Telnet use TCP.	DNS, DHCP, TFTP, SNMP, RIP, and VoIP use UDP.