Computer networks 503442-3

Assignments-3

Chapter:3 Transport layer

Q1- Choose the correct answer.

1) …… protocol provides unreliable, unordered delivery of data

(TCP , UDP)

2) …….. segments may be lost or delivered out-of-order to application

(TCP , UDP)

3) streaming multimedia, and DNS use ……..

(TCP , UDP)

4) …….. is connection-oriented protocol

(TCP , UDP)

5) ……handle data from multiple sockets, add transport header

(multiplexing , demultiplexing)

6) …… use header info to deliver received segments to correct socket

(multiplexing , demultiplexing)

7) server host can support…… simultaneous TCP sockets:

(single , many)

8) Using …….., receiver explicitly tells sender that pkt received OK

(ACKs , NAKs)

9) Using …….., receiver explicitly tells sender that pkt had errors

(ACKs , NAKs)

10) Pipelining ……. Utilization

(increases , decreases)

11) In ……. , receiver only sends *cumulative ack*

(Go-back-N , Selective Repeat)

12) In …… , receiver sends individual ack for each packet

(Go-back-N , Selective Repeat)

13) In …… , sender has timer for oldest unacked packet

(Go-back-N , Selective Repeat)

14) In …… , sender maintains timer for each unacked packet

(Go-back-N , Selective Repeat)

15) In …… , sender may receive duplicate ACKs

(Go-back-N , Selective Repeat)

16) timeout value must be …… than RTT

(shorter , longer)

Q2- Complete the following sentences.

1) Transport layer provide *logical communication* between app processes running on different hosts.
2) Network layer provide logical communication between hosts
3) transport protocols run in send side: breaks app messages into segments
4) congestion control, flow control, and connection setup are functions of TCP protocol in transport layer
5) host uses IP addresses & port numbers to direct segment to appropriate socket
6) the size of UDP segment header is 8 bytes
7) the size of TCP segment header is 20 bytes
8) checksum is used to detect errors in transmitted segment

9) In NAK-free protocols, duplicate ACK at sender results in same action as NAK (i.e retransmit current pkt)

10) In pipelining sender allows multiple, "in-flight", yet-to-be-acknowledged packets

11) sequence numbers: is the byte stream "number" of first byte in TCP segment's data

12) acknowledgements numbers: is the sequence numbers of next byte of TCP segment expected from other side

Q3: Answer the following Questions

A- What are the 4-tuple by which the TCP socket is identified?

1. source IP address
2. source port number
3. destination IP address
4. destination port number

B- Why is there a UDP?

- No connection establishment (which can add delay)
- Simple: no connection state at sender, receiver
- Small header size
- No congestion control: UDP can blast away as fast as desired

C- What are the meaning of ACK(n) and timeout(n) for Go-back-N protocol

ACK(n): ACKs all pkts up to, including sequence number - *"cumulative ACK"*

timeout(n): retransmit packet n and all higher sequence pkts in window

D- Utilization at the sender U_s= fraction of time sender busy sending. Compute U_s at 100 Mbps link, 10 ms prop. delay, 9000 bit packet for:

- ***stop-and-wait operation***

$$D_{trans} = \frac{L}{B} \Rightarrow \frac{9000\ bits}{100\times10^6\ bits/sec} = 9\times 10^{-5}$$

$$RRT = 10 \times 2 = 20$$

$$U_{sender} = \frac{L/R}{RRT + L/R} \Rightarrow \frac{9\times10^{-5}}{20 + 9\times10^{-5}} = 4.49^{-6}$$

- ***pipelining operation: sender can have up to N=5 unacked packets in pipeline***

$$\frac{L/R}{RRT + L/R} \times N \Rightarrow \frac{9\times10^{-5}}{20 + 9\times10^{-5}} \times 5 = 2.24^{-5}$$