

IS 370 Computer Networking

Review Sheet #3

Put T in front of the true statement and F in front of the false statement in each of the following:

1. Transport layer provide logical communication between processes running on different hosts. **T**
2. The packets formed in the transport layer are called datagrams. **F**
3. Transport layers protocols run within network core. **F**
4. TCP transfers messages from transport layer to network layer and vise versa. **T**
5. UDP provides congestion control service. **F**
6. TCP provides delay guarantees. **F**
7. UDP is a best effort protocol. **T**
8. TCP segment has 8-byte header. **F**
9. ACKs are used to detect bit errors in reliable data transfer. **F**
10. Sequence number is used to handle duplication in data transmission. **T**
11. Timeout is used to confirm that data has been received correctly. **F**
12. Stop and wait protocol limits the use of physical resources. **T**
13. Pipeline protocols reduce network resources utilization. **F**
14. In pipelining, sender sends multiple packets w/o waiting for ACK. **T**
15. In selective repeat pipelining, receiver individually acknowledges all correctly received pkts. **T**
16. In go-back-n pipelining, receiver buffers out-of-order packets. **F**
17. Host A is sending a large file to host B over a TCP connection. If the sequent number for a segment of this connection is ***m***, then the sequence number for the subsequent connection will necessarily be ***m+1***. **F it might be lost or the ACK lost**
18. The last SampleRTT in a TCP connection is equal to 1 sec. The current value of Timeout Interval for the connection will necessarily be greater than or equal 1 sec. **F**
19. Host A sends one segment with sequence number 38 and 4 bytes of data over a TCP connection to Host B, in this segment the acknowledgment number is necessarily 42. **F**
20. Duplicate acks retransmits slower than timeout. **F**
21. Host A is sending a large file to Host B over TCP connection. The size number of unacked bytes that A sends to B cannot exceed the size of the receiver buffer. **T**

Sentence	T or F
1. 3 Duplicate acks retransmits faster than timeout	T
2. Transport layer provide logical communication between processes running on different hosts	T
3. TCP segment has 20-byte header	T
4. TCP is a best effort protocol	F
5. Pipeline protocols reduce network resources utilization	F
6. In GBN pipelining, receiver individually acknowledges all correctly received pkts	F
7. In SR, receiver buffers out-of-order packets	T

8. Timeout is used to confirm that data has been received correctly	F
9. Sequence number is used to handle duplication in data transmission	T
10. TCP provides delay guarantees	F

Fill in the space in the following sentences:

1. A transport layer segment consists of **Header & Data**
2. Transport layer uses **TCP and UDP** protocols
3. In the network layer segments are encapsulated to form **IP datagrams**
4. **src port number and dest port number** fields in transport layer segment are used for mux and demux
5. Checksum field in transport layer segment is used for **detecting "errors"**
6. Network layer uses **IP (Internet protocol)** protocol
7. At the receiver, transport layer extracts **Messages OR Data (وحده منهم)** from segments
8. At the receiver, network layer extracts segments from **datagrams**
9. A segment is a chunk of data with **Header**.
10. Network layer provides logical communication between **hosts**
11. TCP provides connection oriented, **Reliability, Flow control** and **congestion control** services
12. Reliability means **Error Free, Receiver data is not lost, and Data is received in order**
13. Services that are not available in TCP and UDP are **delay guarantees** and **bandwidth guarantees**
14. A UDP socket is identified by **dest IP address, dest port number**
15. A TCP socket is identified by **src IP address, src port number, dest IP address, dest port number**
16. At the sender, TCP protocol stores app data in **TCP send buffer**
17. **speed-matching service** means matching send rate to receiving application's drain rate
18. Timeout interval for the oldest unacked segment is 2 sec. When this timer first expires, TCP will retransmit the segment and set the timer to **4** sec
19. Host A sends segment of seq # 20 and data length 50 bytes to host B using TCP. When segment received host B will send ACK number equals **70**
20. Host A sends back-to-back segments that have seq. numbers 100,110,120,130,140,150 to host B using TCP. Suppose that segment of seq. # 120 is lost. The ACK number sent by host B will be **120**
21. In 20 when the timer of segment of seq. # 120 expires, the sender will send **120**

Choose the correct answer in each of the following:

1. The transport layer has two protocols
 - a. IP & TCP
 - b. HTTP & TCP
 - c. **TCP & UDP**
 - d. HTTP & UDP
 - e. None of the above
2. Which is not true about TCP
 - a. **Best effort transfer**
 - b. Flow control
 - c. Congestion control
 - d. Connection oriented

- e. None of the above
- 3. TCP uses the following only for mux, demux purposes
 - a. Destination Port number
 - b. Destination IP and destination Port number
 - c. Source IP and destination IP
 - d. Destination IP & port and Source IP & port**
 - e. Only IP source and destination and destination port
- 4. UDP is used because
 - a. It is has no connection delay
 - b. It has no congestion control
 - c. It has small header
 - d. Easy no state maintenance
 - e. All of the above**

Problems:

1. Consider a 2GB channel that transfers packets of length 10B/packet. The propagation delay is 20 msec. what will be the sender utilization in the following cases:

فيه شك اللي يعرف يحله يعطيني خبر عشان اعدله للشباب فيصل

- a) Using stop and wait protocol

$$U_{\text{sender}} = \frac{L / R}{RTT + L / R}$$

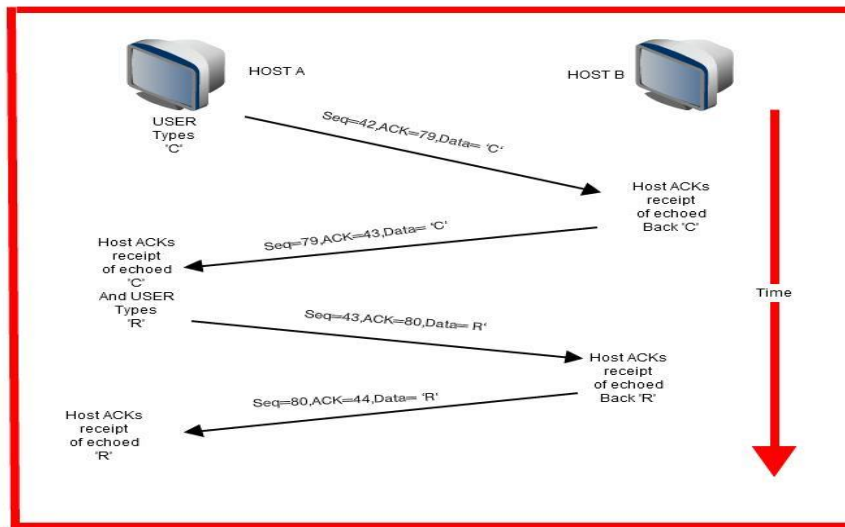
$$U = (L/R) / (RTT + (L/R)) = (10/2 * 10^9) / ((2 * 20) + (10/2 * 10^9)) = 0.000125$$

- b) Using pipelined protocol that allows for 5 packets to be sent without acknowledgement

$$U_{\text{sender}} = \frac{5 * (L / R)}{RTT + L / R}$$

$$U = (5 * (L/R)) / (RTT + (L/R)) = (5 * (L/R)) / (RTT + (L/R)) = 0.000624$$

2. Consider host A and host B communicates through Telnet. The user at host A typed 'C' with Seq=42 and AKC=79 and after few seconds he typed 'R'. Draw a diagram that shows segments exchange between host A and host B.



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3. Suppose that host A sends two TCP segments back-to-back to host B over a TCP connection. The first segment has a sequence number 90; the second has a sequence number 110.
 - a) Suppose that the first segment is lost but the second segment arrives at B. in the acknowledgment that host B send s to host A, what will be the acknowledgment number? **90**
 - b) How much data is in the first segment? **110-90=20 bytes**
4. Suppose a process in host C has a UDP socket with port number 6789. Suppose both host A and host B each send a UDP segment to host C with destination port number 6789.
 - a) Will both segments be directed to the same socket at host C? **yes**
 - b) If the answer for a is "yes", how will the process at host C know that these two-segment originated from two different hosts? **Using the source port#**
5. Suppose that a Web server runs in Host C on port 80. Suppose this web server uses persistent connections, and is currently receiving requests from two different Hosts, A and B.
 - a) Are all the requests being sent through the same socket at Host C? **no**
 - b) If the answer for a is "no", do both sockets have port 80? **Yes, Web servers have different sockets for each connecting client**
6. If the current EstimatedRTT is 20 msec, and the current DevRTT is 5. Suppose a new SampleRTT of 30 msec has been obtained. Compute the TimeoutInterval.

$$\text{EstimatedRTT} = 0.875 * \text{EstimatedRTT} + 0.125 * \text{SampleRTT} \rightarrow \text{EstimatedRTT} = 0.875 * 20 + 0.125 * 30 = 21.25$$

$$\text{DevRTT} = (1 - \beta) * \text{DevRTT} + \beta * |\text{SampleRTT} - \text{EstimatedRTT}| \rightarrow \text{DevRTT} = (1 - 0.25) * 5 + (0.25 * |30 - 20|) = 3.75 + 2.5 = 6.25$$

$$\text{TimeoutInterval} = \text{EstimatedRTT} + 4 * \text{DevRTT} = 21.25 + (4 * 6.25) = 46.25$$

7. If the window size for TCP before loss occurs is 100KB and the round-trip time is 200 msec. what will be the average throughput?

$$\text{average throughput} = .75 W / \text{RTT} = (0.75 * 100) / 0.2 \text{ sec} = 375 \text{ KB/sec}$$