

Example Question Set for Chapter 3-5

Short Answer Questions:

1. What is the difference between network layer and transport layer since they are both carrying logical communications?
2. What is the difference between network layer and data link layer?
3. Please give three differences between TCP and UDP.
4. What is multiplexing at sender? What is de-multiplexing at receiver?
5. What is the difference between UDP socket and TCP socket?
6. What is the usual size of UDP header?
7. What is the usual size of IPv4 header?
8. What is the purpose of UDP checksum?
9. What is the problem and solution in rdt 2.0, rdt 2.1, and rdt 3?
10. For non-pipelined protocols, why does sequence number surface (0, 1) suffice?
11. What is the difference between stop-and-wait protocols and pipelined protocols?
12. What is called cumulative ACK?
13. Why does Selective Repeat have the dilemma when seq #'s: 0, 1, 2, 3 and window size=3?
14. For k-bit sequence number, what is the window size for GBN and Selective Repeat respectively?
15. Give at least five features of TCP which UDP doesn't have.
16. What is called TCP fast retransmit?
17. Give me two indicators of a data loss.
18. What is the definition for sequence number and acknowledgement number respectively in TCP?
19. Among the packet headers, which layer header contains port number? Which layer header contains IP address? Which layer header contains physical address?
20. What is the major difference between TCP flow control and congestion control?
21. How does the receiver "advertises" free buffer space (amount recorded by *rwnd*) in TCP header?
22. Why do we need preamble in packet format?
23. Give me three costs of congestions.
24. Why does TCP have fairness?
25. What is called "longest prefix matching"?
26. IP address: What is subset part and host part?
27. CIDR: What does "x" mean in "a.b.c.d/x"?
28. NAT: why can the internal computers use private addresses like "10.0.0.1"?
29. In distance vector algorithm, give me two conditions that may cause the router to re-compute the distance vector estimates?
30. What is the difference between inter-AS and intra-As protocols?
31. What is the functionality of inter-AS protocol?
32. What is called "hot potato routing"?
33. What is the difference between eBGP and iBGP?
34. What is the difference between TDMA and FDMA?
35. List two common drawbacks for "taking turns" MAC protocols.

True or False Questions:

1. Multiplexing occurs at receiver and de-multiplexing occurs at sender.
2. UDP socket is identified by 4-tuple: source IP, source port number, destination IP and destination port number.
3. Checksum can be used to detect transmission error 100% correct.
4. rdt 3.0 is a pipelined protocol as it is much better than rdt 2.0.
5. Stop-and-wait protocols are better than pipelined protocols regarding performance and network utilization.
6. Selective Repeat utilizes cumulative ACK.
7. GBN has buffers at the receiver's side.
8. Network layer protocols are only for routers.
9. Forwarding and routing are totally independent.
10. Forwarding table uses individual IP addresses as indexes for each entry.
11. Internet is based on datagram network, which is reliable.
12. IP address is flat.
13. Like TCP and UDP, ICMP is a transport layer protocol.
14. In tunneling technique, IPv4 is carried as payload of IPv6 packet.
15. Link state algorithm is appropriate for use in large-scale networks.
16. For broadcasting, in-network duplication is better than source duplication.
17. What is called reverse path forwarding (RPF)-based controlled flooding?
18. Data link layer studies logical communication between remote hosts or processes.
19. With CSMA, there is no possibility to have collisions.
20. MAC address is hierarchical.
21. MAC address is portable.
22. What is the difference between switch and router?

Multiple Choice Questions:

1. Which layer's header contains port numbers:

(a) Application layer;
(b) Transport layer;
(c) Network layer;
(d) Data link layer;
(e) All the above.

Long Answer Questions:

1. Show the problem and solution respectively for all the non-pipelined protocols (rdt 1.0, 2.0, 2.1, 2.2 and 3.0)?
2. The TCP 3-way handshake details, especially the values of SYN, ACK bits.
3. How does the TCP close connections, especially the values of ACK and FIN bits.
4. TCP slow start, congestion avoidance and fast recovery? Pay attention to the values of *cwnd*, and *ssthresh*.

5. Router input port functions, output port functions.
6. IP fragmentation: why and how to calculate given a large-size packet.
7. DHCP: why and how it works (the example).
8. Traceroute: how it works.
9. Link state algorithm example-based mechanism.
10. Distance vector algorithm example-based mechanism.
11. How to build spanning tree?
12. How to calculate single bit parity, and CRC?
13. How does slotted ALOHA work?
14. How does binary back-off algorithm work?
15. Addressing: routing between different LANs. Pay attention to the src IP, dest IP, src MAC, and dest MAC for each protocol.
16. The layout of Ethernet frame structure.
17. How are switches configured?
18. How does ARP work?
19. Example: a day in the life of a web request.