

Chapter 3: Transport Layer

1. Explain the services provided by the transport layer.
2. What are the two standardized protocols in the transport layer?
3. Briefly explain the UDP protocol.
4. Briefly explain the TCP protocol.
5. Compare the UDP and the TCP protocols.
6. Explain the idea of “ports.” Why are some ports reserved?
7. What is meant by “reliable communication” between two application entities?
8. The UDP protocol does not provide any kind of reliability in communication between two app entities. Why is UDP still used?
9. Explain the segment header in the UDP protocol.
10. Explain the meaning of a TCP connection between two application entities.
11. How are the end points of a TCP connection uniquely identified?
12. Why is the TCP protocol called a “byte stream” protocol?
13. What are the six flags in the segment header of the TCP protocol? Explain all those flags (except U and P).
14. The “Receive Window Size” field carries what information?
15. While setting up a TCP connection, the sender and the receiver exchange their own ISN (Initial Sequence Number) values. What field(s) in the TCP segment header carry and/or indicate the ISN value?
16. Why are new ISN values used in successively opened TCP connections between the same two end points?

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17. Identify and explain three kinds of information carried in the Options field of a segment header.
18. How does the TCP protocol know how many bytes of data have been received in a segment? (No field in the TCP segment header gives you the total length of a segment.)
19. What is piggybacking?
20. Explain the 3-way handshake mechanism to open a TCP connection between two app entities.
21. Explain how flow control is performed in the TCP protocol.
22. Explain four ACK generation rules in the TCP protocol.
23. What ACK generation rule supports piggybacking in TCP?
24. What is congestion control in TCP? Why do you need a congestion control mechanism in TCP?
25. Explain the difference between flow control and congestion control.
26. Explain a general principle of congestion control, with no specific reference to the actual congestion control in TCP.
27. How is congestion detected by the TCP protocol?
28. Explain the congestion control mechanism used in the TCP protocol.
29. Compare Congestion Window (CW) and Receive Window (RWND).
30. Why do routers run the UDP and/or the TCP protocols?
31. Briefly explain how the TCP protocol supports reliable communication between two app entities.
32. Why does hop-by-hop flow control does not imply end-to-end flow control?

33. What is meant by “end-to-end” semantics of the TCP protocol?
34. If two app entities are communicating by means of TCP/IPv4, give a simple expression for the length of the IP packets moving between them, assuming that those packets do not carry option fields.