

Chapter 7

Student Version

Chapter 7 Objectives:

- Describe the purpose of the transport layer in managing the transportation of data in end-to-end communication.
- Describe characteristics of the TCP and UDP protocols, including port numbers and their uses.
- Explain how TCP session establishment and termination processes facilitate reliable communication.
- Explain how TCP protocol data units are transmitted and acknowledged to guarantee delivery.
- Explain the UDP client processes to establish communication with a server.
- Determine whether high-reliability TCP transmissions, or non-guaranteed UDP transmissions, are best suited for common applications.

Required Materials:

Reading Organizer

Packet Tracer Activities: 7.3.1.2 Packet Tracer Simulation - Exploration of TCP and UDP

Labs: 7.0.1.2 Class Activity - We Need to Talk Instructions

7.2.1.8 Lab - Using Wireshark to Observe the TCP 3-Way Handshake

7.2.3.5 Lab - Using Wireshark to Examine a UDP DNS Capture

7.2.4.3 Lab - Using Wireshark to Examine FTP and TFTP Captures

7.3.1.1 Class Activity - We Need to Talk, Again Instructions

Chapter Test

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Name _____ Date _____

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Reading Organizer

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Note: the Reading Organizer has weighted scoring. Any question with the word **explain** or **define** in it is expected to have a longer answer and is worth two points each.

After completion of this chapter, you should be able to:

- Describe the purpose of the transport layer in managing the transportation of data in end-to-end communication.
- Describe characteristics of the TCP and UDP protocols, including port numbers and their uses.
- Explain how TCP session establishment and termination processes facilitate reliable communication.
- Explain how TCP protocol data units are transmitted and acknowledged to guarantee delivery.
- Explain the UDP client processes to establish communication with a server.
- Determine whether high-reliability TCP transmissions, or non-guaranteed UDP transmissions, are best suited for common applications.

7.1 Transport Layer Protocols

1. Explain the purpose of the transport layer.

2. What are the primary responsibilities of transport layer protocols?

a.

b.

c.

3. At the transport layer, each particular set of data flowing between a source application and a destination application is known as a _____.

4. TCP/IP provides two transport layer protocols. These are:

a.

b.

5. Explain how TCP and UDP differ from each other.

6. TCP's reliability functions provide more robust communication between applications. What are two possible issues that can be incurred by this reliability?

a.

b.

7. With UDP, there are no _____ layer processes that inform the sender if successful delivery has occurred.

8. Application developers must choose which transport protocol type is appropriate based on the requirements of the applications. What are two examples of where a TCP is more appropriate.

a.

b.

9. List the applications where UDP is the preferred transfer protocol?

- a.
- b.
- c.

10. Label the following application protocols with its correct transport layer delivery method. Either **TCP**, **UDP**, or **Both**.

_____ HTTP	_____ DNS	_____ TFTP
_____ Telnet	_____ IPTV	_____ FTP
_____ DHCP	_____ SNMP	_____ VoIP
_____ SMTP		

11. TCP was initially described in RFC 793. In addition to supporting the basic functions of data segmentation and reassembly, TCP also provides:

- a.
- b.
- c.
- d.

12. TCP is a connection-oriented protocol. Explain what a connection-oriented protocol is.

13. How does TCP ensure that its segments are reassembled into the proper order?

14. What is a stateful protocol?

15. What are some examples of applications that use TCP?

- a.
- b.
- c.

16. List the features used to describe UDP.

- a.
- b.
- c.
- d.

17. What are the pieces of communication in UDP called?

18. UDP is a stateless protocol. Explain what this means.

19. Why does a client place a destination port number in a segment?

20. What is the purpose of the source port number?

21. The combination of the source and destination IP addresses and the source and destination port numbers is known as a socket. What is a socket used for?

22. Label the following port number ranges.

_____ 0 to 1023

_____ 1024 to 49151

_____ 49152 to 65535

23. What are the well-known port numbers associated with the following protocols?

_____ FTP _____ Telnet _____ SMTP

_____ HTTP _____ IMAP _____ TFTP

_____ RIP _____ DNS _____ SNMP

24. What DOS command can be used to see which active TCP connections are open and running on a networked host?

25. Why is dividing application data into segments necessary?

26. The transport layer divides the data into pieces and adds a header for delivery over the network. List what information is included with the TCP and UDP headers.

TCP Header –

- a.
- b.
- c.
- d.

UDP Header –

- a.

27. Label each of the following delivery method characteristics as either TCP or UDP.

- _____ Less Overhead
- _____ Fast Transmission Requirements
- _____ No Acknowledgment of Receipt
- _____ Guaranteed Delivery
- _____ Ordered Delivery
- _____ Connectionless
- _____ Sequenced Message Segments
- _____ No ordered Delivery
- _____ Flow Control
- _____ Session Establishment

7.2 TCP and UDP

28. The key distinction between TCP and UDP is reliability. The reliability of TCP communication is obtained through the use of _____ sessions.

29. Explain what occurs during a three-way handshake.

- a.
- b.
- c.

30. Explain the three steps in TCP connection establishment.

a.

b.

c.

31. How can security be added to the data network?

a.

b.

c.

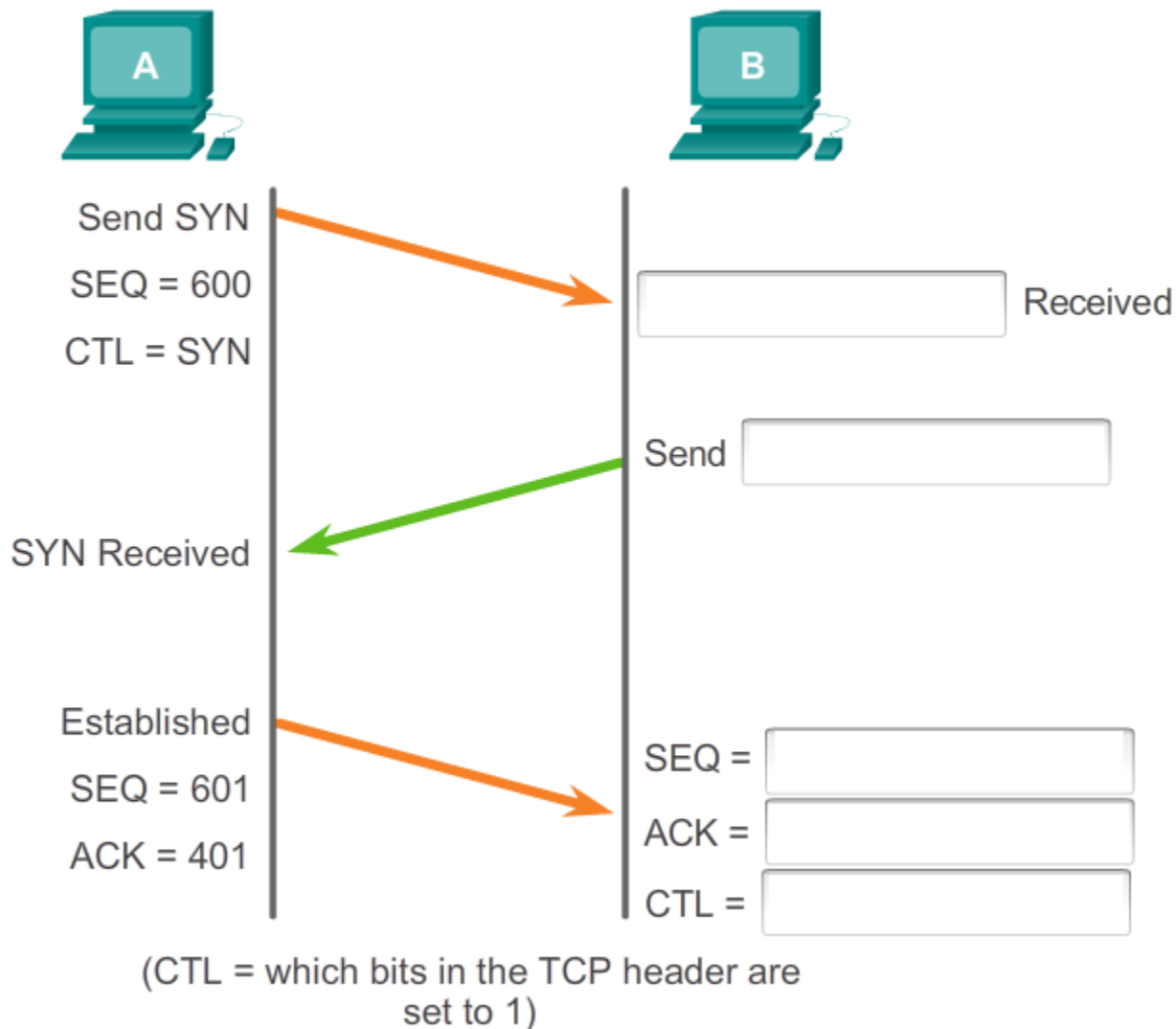
32. To end each one-way TCP session, a two-way handshake is used which consists of...

a.

b.

33. Add the correct descriptor to its appropriate place in the graphic.

3-Way Handshake of TCP Establishment Session



34. What information is assigned to each header to ensure that it is reassembled in the correct order?

35. What are the sequence (SEQ) number and acknowledgement (ACK) numbers used together for?

36. What advantage does selective acknowledgements (SACKs) offer?

37. Explain the purpose of flow control?

38. Explain how flow control is accomplished.

39. TCP uses _____ to attempt to manage the rate of transmission to the maximum flow that the network and destination device can support, while minimizing loss and retransmissions.

40. Explain how dynamic window sizes work.

41. Application layer protocols that use UDP include:

- a.
- b.
- c.
- d.
- e.
- f.
- g.

42. UDP is said to be transaction-based. What does this mean?

43. Which applications use TCP?

- a.
- b.
- c.
- d.

44. There are three types of applications that are best suited for UDP. Explain each.

- a.
- b.
- c.