

Name _____ Date _____

Module 14 – Transport Layer

Introduction to Networks – Semester 1

Student Version

Module 14 Sections:

- 14.0 Introduction
- 14.1 Transportation of Data
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- 14.4 Port Numbers
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Required Materials:

Reading Organizer

Packet Tracer Activities: 14.8.1 - TCP and UDP Communications

Labs: None

Module's 14 – 15 Exam

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Note: The Reading Organizer has weighted scoring. Any question with the word **explain, define, or describe** 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:

- Explain the purpose of the transport layer in managing the transportation of data in end-to-end communication.
- Explain characteristics of TCP.
- Explain characteristics of UDP.
- Explain how TCP and UDP use port numbers.
- Explain how TCP session establishment and termination processes facilitate reliable communication.
- Explain how TCP protocol data units are transmitted and acknowledged to guarantee delivery.
- Compare the operations of transport layer protocols in supporting end-to-end communication.

14.1 Transportation of Data

1. _____ layer programs generate data that must be exchanged between source and destination hosts.
2. The _____ layer is responsible for logical communications between applications running on different hosts.
3. List what the transport layer has no knowledge of.
 - a.
 - b.
 - c.
 - d.
 - d.

4. The transport layer includes two protocols. These are:

a.

b.

5. List and describe the responsibilities of the transport layer.

a. _____ -

b. _____ -

c. _____ -

d. _____ -

e. _____ -

6. What is the IP protocol concerned with?

7. What does the transport layer protocols specify?
8. TCP is considered a _____, _____ transport layer protocol, which ensures that all of the data arrives at the _____.
9. TCP divides data into _____.
10. List the basic operations TCP uses to provide reliability and flow control.
- a.
 - b.
 - c.
 - d.
 - e.
11. Explain why TCP is known as a connection-oriented protocol.
12. **Explain in detail** why UDP is a simpler transport layer protocol than TCP.
14. Explain why UDP is referred to as a connectionless protocol.
15. UDP is also known as a _____ protocol.

16. UDP is also known as a _____ delivery protocol because there is no acknowledgment that the data is received at the destination.

17. Name an application that UDP is preferred for.

18. UDP is also used by request-and-reply applications where the data is minimal, and retransmission can be done quickly. List an example of this type of application.

19. TCP is used as the transport protocol. List some examples of this type of applications.

a.

b.

c.

20. Video may be sent over TCP or UDP. Applications that stream stored audio and video typically use TCP. List the reasons why these applications use TCP.

a.

b.

c.

d.

21. Real-time video and voice usually use _____.

22. Applications that stream stored audio and video use TCP. Explain what is happening if your network suddenly cannot support the bandwidth needed to watch an on-demand movie.

23. List the required protocol properties for UDP.

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

24. List the required protocol properties for TCP.

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

14.2 TCP Overview

25. In addition to supporting the basic functions of data segmentation and reassembly, what other services does TCP provides?

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

26. TCP is a stateful protocol. What does that mean?

27. The stateful session begins with the session _____ and ends with the session _____.

28. Label the TCP header.

Options (0 or 32 if any)			
Application Layer Data (Size varies)			

29. TCP is a good example of how the different layers of the TCP/IP protocol suite have specific roles. What tasks does TCP handle?

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

14.3 UDP Overview

30. UDP is a lightweight transport protocol that offers the same data segmentation and reassembly as TCP, but without TCP _____ and _____.

31. What features does UDP include?

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

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

33. If reliability is required when using UDP as the transport protocol, how is it handled?

34. The blocks of communication in UDP are called _____, or _____.

35. Label the UDP header.

Application Layer Data (Size varies)	

36. List the three types of applications that are best suited for UDP.

- a.
- b.
- c.

37. Which two protocols are able to use both UDP or TCP?

- a.
- b.

14.4 Port Numbers

38. Why do TCP and UDP use port numbers?

39. The source port number is associated with the _____ application on the local host whereas the destination port number is associated with the _____ application on the remote host.

40. A server can offer more than one service simultaneously such as web services on port _____ while it offers File Transfer Protocol (FTP) connection establishment on port _____.

41. What is the combination of the source IP address and source port number, or the destination IP address and destination port number is known as?

42. What is it called when you combination of the source IP address and source port number, and the destination IP address and destination port number?

43. The IANA has divided the range of port numbers into the three port groups. List the port group name, and the number range for each one.

Port Group	Number range

44. Identify the following well-known ports.

a. 20

b. 21

c. 23

d. 25

e. 53

f. 69

g. 80

h. 443

45. If you enter the command netstat command in DOS, what information will it show you?

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

14.5 TCP Communication Process

46. Each application process running on a server is configured to use a port number. The port number is either _____ assigned or configured _____ by a system administrator.

47. In TCP connections, the host client establishes the connection with the server using the _____ process.

48. List and describe the three steps in a TCP three-way handshake.

Step 1. _____ -

Step 2. _____ -

Step 3. _____ -

49. What does a three-way handshake validate?

50. How do you terminate a TCP connection?

51. Describe the functions of the three-way handshake:

a.

b.

c.

14.6 Reliability and Flow Control

52. Why is TCP the better protocol for some applications?

53. There may be times when TCP segments do not arrive at their destination. Other times, the TCP segments might arrive out of order. For the original message to be understood by the recipient, all the data must be received and the data in these segments must be reassembled into the original order. How does TCP achieve this goal?

54. The ISN does not begin at one but is effectively a _____ number.

55. TCP uses _____ to know how long to wait before resending a segment.

56. Describe flow control.

57. How does flow control help maintain the reliability of TCP transmissions?

58. What is the window size?

59. The initial window size is agreed upon when the TCP session is established during the _____.

60. What is the destination sending acknowledgments as it processes bytes received, and the continual adjustment of the source send window known as?

61. Describe the advantage of sliding windows?

62. What is the MSS part of the options field in the TCP header?

63. A common MSS is _____ bytes when using IPv4.

64. What happens when congestion occurs on a network?

65. If the retransmission of packets is not properly controlled, the additional retransmission of the TCP segments can make the _____ even worse.

14.7 UDP Communication

66. UDP does not track _____ numbers the way TCP does.

67. UDP reassembles data in the order that it was received and forwards it to the application. What happens if the data sequence is important to the application?

68. After a client has selected the source and destination ports, the same pair of ports are used in the header of all datagrams in the transaction. For the data returning to the client from the server, the source and destination port numbers in the datagram header are _____.