Chapter 8

TCP/IP Networking I: Homework

Last Name:

First Name:

Due Date: Wednesday, April 6, 2016.

# Directions

For questions, I have shown the parts of each question you must answer below the question instead of making them boldface.

When you save the file, add your last name to the file name.

# Test Your Understanding Questions

1. a) What are interfaces? b) What is routing?

a)

b)

2. a) What are the three parts of an IP address? b) How long is each part? c) What is the total length of an IP address? d) In the IP address, 10.11.13.13, what is the network part?

b)

d)

3. a) Connecting different networks is the main job of what type of router? b) What type of router only connects different subnets?

a)

b)

4. a) How many bits are there in a mask? b) What do the 1s in a network mask correspond to in IP addresses? c) What do the 1s in a subnet mask correspond to in IP addresses? d) When a network mask is applied to any IP address on the network, what is the result? e) What is wrong with this mask (spaces added) between octets): 11111111 00000000 11111111 00000000?

a)

b)

c)

d)

e)

5. a) A mask has eight 1s, followed by 0s. Express this mask in dotted decimal notation. b) Express this mask in prefix notation. c) In prefix notation, a mask is /16. Express this mask in dotted decimal notation. d) Express the mask /18 in dotted decimal notation. (You will need a calculator for this.)

a)

b)

c)

d)

~~6. Why are routing tables more complex than Ethernet switching tables? Give a detailed answer.~~

7. a) In a routing table, what does a row represent? b) Do Ethernet switches have a row for each individual Ethernet address? c) Do routers have a row for each individual IP address? d) What is the advantage of the answer to the previous subparts of this question?

a)

d)

8. a) In Row 3 of Figure 8-7, how will a router test if the row matches the IP address 60.168.6.7? Show the calculations in the format given in the text. b) Is the row match? c) Why is the last row called the default row? d) Why must a router look at all rows in a routing table? e) Which rows in Figure 8-7 match 172.30.17.6? (Don’t forget the default row.) Show your calculations for rows that match. f) Which rows match 60.168.7.32? Show your calculations for rows that match. g) Which rows in Figure 8-7 match 128.171.17.13? (Show your calculations for rows that match.)

a)

b)

c)

d)

e)

f)

g)

9. a) Distinguish between Step 1 and Step 2 in the routing process. b) If any row other than the default row matches an IP address, why will the router never choose the default row? c) Which rows in Figure 8-7 match 128.171.17.13? (Don’t forget the default row.) Show your calculations for rows that match. d) Which of these is the best-match row? Justify your answer. e) What rows match 172.40.17.6? Show your calculations for rows that match. f) Which of these is the best-match row? Justify your answer. g) Which rows match 172.30.12.47? Show your calculations for rows that match. h) Which of these is the best-match row? Justify your answer. i) How would your previous answer change if the metric had been reliability?

a)

b)

c)

d)

e)

f)

g)

h)

i)

10. a) Distinguish between Step 2 and Step 3 in routing. b) What are router ports called? c) If the router selects Row 13 as the best-match row, what interface will the router send the packet out? d) To what device? e) Why is this router called the default router? (The answer is not in the text.) f) If the router selects Row 2 as the best-match row for packet 172.30.33.6, what interface will the router send the packet out? g) To what device? (Don’t say, “the local device.”)

a)

b)

c)

d)

e)

f)

g)

11. An arriving packet has the destination IP address 128.171.180.13. Row 86 has the value 128.171.160.0. The mask is 255.255.224.0. Does this row match the destination address? Show your work. You can use the Windows Calculator if you have a Windows PC. Choose programmer mode.

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12. a) What should a router do if it receives several packets going to the same destination IP address? ~~b) How would decision caching speed the routing decision for packets after the first one? c) Why is decision caching dangerous?~~

a)

13~~. A router wishes to send an IP packet to a host on its subnet. It knows the host’s IP address. a) What else must it know? b) Why must it know it? c) What message will it broadcast? d) Which device will respond to this broadcast message? e) Does a router have to go through the ARP process each time it needs to send a packet to a destination host or to a next-hop router? Explain. f) Is ARP used to find the DLL destination addresses of destination hosts, routers, or both? g) At what layer does the ARP protocol operate? h) Why must client PCs use ARP to transmit packets? The answer is not in the text.~~

14. a) What is the main version of the Internet Protocol in use today? b) Which field can be used to specify quality of service? c) How can the ECN field be used?

a)

b)

c)

~~15. a) Distinguish between application message fragmentation and packet fragmentation. b) Under what circumstances would the identification, flags, and fragment offset fields be used in IP? c) Why did we not study them in detail? d) Does IPv6 allow packet fragmentation?~~

16. a) What does a router do if it receives a packet with a TTL value of 2? b) What does the next router do? c) What does the protocol field value tell the destination host?

a)

b)

c)

~~17. What problem is caused by the way that IPv4 handles options?~~

18. a) What is the main problem with IPv4 that IPv6 was created to solve? b) How does IPv6 solve this problem?

a)

b)

19. a) What has been holding back the adoption of IPv6? b) What is pushing IPv6 adoption now?

a)

b)

20. a) Are IPv6 addresses written in uppercase or lowercase letters? b) Are IPv6 addresses written with decimal or hexadecimal symbols? c) How many symbols are there in a field? d) How are fields separated? e) How many fields are there in an IPv6 address?

a)

b)

c)

d)

e)

21. a) List the rules for simplifying IPv6 addresses. b) Simplify the following IP address: 2001:0ed2:056b:00d3:000c:abcd:0bcd:0fe0. c) Simplify the following IP address: 2001:0002:0000:0000:0000:abcd:0bcd:0fe0. d) Simplify the following IP address: 2001:0000:0000:00fe:0000:0000:0000:cdef. e) What is the advantage of simplifying IPv6 addresses according to strict rules?

a)

b)

c)

d)

e)

22. a) How do the version number fields in IPv4 and IPv6 differ? b) What is the general purpose of the diffserv subfield? c) Of the flow label field? d) In IPv6, how can the receiver tell the length of packet? e) Does the payload length field include the lengths of any extension headers in the packet? f) How is the hop limit field used? g) Does IPv6 have a header checksum field? h) What are the implications of this?

a)

b)

c)

d)

e)

f)

g)

h)

23. ~~a) Why is handling options the way that IPv4 does undesirable? b) Why is the approach of using optional extension headers desirable?~~ c) Which header is used by IPsec (IP security)? ~~d) What is usually the only extension header that routers have to consider?~~ e) How does the last extension header before a UDP datagram indicate that the UDP datagram comes next? (You must infer the answer from the text.) f) If you see 59 in the next header field of a header, what will follow this header?

c)

e)

f)

24. ~~a) For what reason is TCP complex? b) Why is it important for networking professionals to understand TCP?~~ c) What are TCP messages called?

25. ~~a) Why are sequence numbers good? b) What are 1-bit fields called? c) If someone says that a flag field is set, what does this mean? d) If the ACK bit is set, what other field must have a value? e) What is a FIN segment?~~ f) Distinguish between four-way closes and abrupt resets. g) Why is a reset segment not acknowledged?

f)

g)

## End-of-Chapter Questions

8-1. a) How does the postal service use hierarchical sorting? b) How does this simplify delivery decisions?

a)

b)

8-2. Give a non-network example of hierarchical addressing, and discuss how it reduces the amount of work needed in physical delivery. Do not use any example in the book, the postal service, or the telephone network.

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~~8-3. A client PC has two simultaneous connections to the same webserver application program on a webserver. (Yes, this is possible, and in fact, it is rather common.) What will be different between the TCP segments that the client sends on the two connections? (Hint: Consider all the fields in a TCP segment.)~~

8-4. A router that has the routing table in Figure 8-7 receives an incoming IPv4 packet. The source IP address in the arriving packet is 10.55.72.234. The destination IP address is 10.4.6.7. The TTL value is 1. The Protocol field value is 6. What will the router do with this packet? (Hint: Consider all the fields in the IP and TCP headers.)

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8-5. What was the most surprising thing you learned in this chapter?

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8-6. What was the most difficult material for you in learned in this chapter? this chapter?

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