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CS 176A: Homework 4

Part 1

1. Datagram Network

   a.

Prefix	Link Interface
11010000	0
11010001 00000000	1
11010001 1000001	2
Other	3

   b.

Address	Corresponding Link Interface
10011000 10010001 01010001 01010101	3
11010001 00000000 11000011 00111100	1
11010001 10000000 00010001 01110111	3

   c.

Prefix	Link Interface
208.0.0.0/8	0
209.0.0.0/16	1
209.130.0.0/15	2
Other	3

2. Network Figure
    a. Assigning Addresses
        i.   Host 1 - 192.168.110.1
        ii. Host 2 - 192.168.110.2
        iii. Host 3 - 192.168.110.3
        iv. Router - 192.168.110.4
    b.

WAN Side	LAN Side
91.81.100.233,5001	192.168.110.1, 3345
91.81.100.233,5002	192.168.110.1, 3346
91.81.100.233,5003	192.168.110.2, 3345
91.81.100.233,5004	192.168.110.2, 3346
91.81.100.233,5005	192.168.110.3, 3345
91.81.100.233,5006	192.168.110.3, 3346

3. Dijkstra's

3.

Step	N'	d(u)	d(v)	d(w)	d(y)	d(z)	d(t)
0	x	∞	4,x	1,x	5,x	∞	∞
1	xw	4,w	2,w	–	5,x	∞	∞
2	xwv	3,v	–	–	3,v	∞	10,v
3	xwvu	–	–	–	3,v	∞	7,u
4	xwvuy	–	–	–	–	13,y	7,u
5	xwvuyt	–	–	–	–	9,t	–
6	xwvuytz	–	–	–	–	–	–

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4.

X':

	x	y	z
x	0	10	3
y	∞	∞	∞
z	∞	∞	∞

	x	y	z
x	0	8	3
y	10	0	5
z	3	5	0

	x	y	z
x	0	8	3
y	8	0	5
z	3	5	0

Y':

	x	y	z
x	∞	∞	∞
y	10	0	5
z	∞	∞	∞

	x	y	z
x	0	10	3
y	8	0	5
z	3	5	0

	x	y	z
x	0	2	3
y	8	0	5
z	3	5	0

Z':

	x	y	z
x	∞	∞	∞
y	∞	∞	∞
z	3	5	0

	x	y	z
x	0	10	3
y	10	0	5
z	3	5	0

	x	y	z
x	0	8	3
y	8	0	5
z	3	5	0

4.

5.

Match	Action
Ingress Port = 2 Source IP = 10.1.0.2 Destination IP = 10.3.0.*	Forward - Port 1
Ingress Port = 4 Source IP = 10.2.0.4 Destination IP = 10.1.0.*	Forward - Port 2
Ingress Port = 4 Source IP = 10.2.0.4 Destination IP = 10.3.0.5	forward(2)

6. A sequence that would lead to a routing loop would be:
    a. Initially, A and B can reach each other and A and E can reach each other all with a cost 1
    b. When A and E fail to link, A will update its routing table to say that E is no longer directly reachable
    c. Before B is aware of this update, it may advertise to A that it can reach E with a cost of 2 (that is B to A to E)
    d. A may update its own table with this information and now try to reach E through B
    e. Now that B learns of this, it updates its routing table to make the cost equal to 3 (B to A to B to E)
    f. This loop can continue perpetually

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Part 2: Wireshark

1. What is the IP address of the client that sends the HTTP GET request in the nat-inside-wireshark-trace1-1.pcapng trace? What is the source port number of the TCP segment in this datagram containing the HTTP GET request? What is the destination IP address of this HTTP GET request? What is the destination port number of the TCP segment in this datagram containing the HTTP GET request?

    1. Source Port - 53924
    2. Source IP Address - 192.168.10.11
    3. Destination Port - 80
    4. Destination IP Address - 138.76.29.8

2. At what time1 is the corresponding HTTP 200 OK message from the webserver forwarded by the NAT router to the client on the router's LAN side?

   0.030672101 s

3. At what time does this HTTP GET message appear in the nat-outside-wireshark-trace1-1.pcapng trace file?

   0.027356291 s

4. What are the source and destination IP addresses and TCP source and destination port numbers on the IP datagram carrying this HTTP GET (as recorded in the nat-outside-wireshark-trace1-1.pcapng trace file)?

    1. Source Port - 53924
    2. Source IP Address - 10.0.1.254
    3. Destination Port - 80
    4. Destination IP Address - 138.76.29.8

5. Which of these four fields are different than in your answer to question 1 above?

   Source IP Address

6. Are any fields in the HTTP GET message changed?

   No fields changed

7. Which of the following fields in the IP datagram carrying the HTTP GET are changed from the datagram received on the local area network (inside) to the corresponding datagram forwarded on the Internet side (outside) of the NAT router: Version, Header Length, Flags, Checksum?

Checksum

8. At what time does this message appear in the nat-outside-wireshark-trace1-1.pcapng trace file?

    0.030625966 s

9. What are the source and destination IP addresses and TCP source and destination port numbers on the IP datagram carrying this HTTP reply ("200 OK") message (as recorded in the nat-outside-wireshark-trace1-1.pcapng trace file)?

    1. Source Port - 80
    2. Source IP Address - 138.76.29.8
    3. Destination Port - 53924
    4. Destination IP Address - 10.0.1.254

10. What are the source and destination IP addresses and TCP source and destination port numbers on the IP datagram carrying the HTTP reply ("200 OK") that is forwarded from the router to the destination host in the right of Figure 1?
    1. Source Port - 80
    2. Source IP Address - 138.76.29.8
    3. Destination Port - 53924
    4. Destination IP Address - 192.168.10.11