

Computer Networking Homework 5

Due date: 2018/12/30 13:00 PM

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1. (5%) What is the fundamental difference between a router and link-layer switch?
2. (a) (5%) What are the main functions of the data plane?
(b) (5%) What are the main functions of the control plane?
3. (10%) What is an essential different between RR and WFQ packet scheduling? Is there a case where RR and WFQ will behave exactly the same? (Hint: Consider the WFQ weights)
4. (20%) Consider a datagram network using 32-bit host addresses. Suppose a router has four links, numbered 0 through 3, and packets are to be forwarded to the link interfaces as follows:

Destination Address Range	Link Interface
11100000 00000000 00000000 00000000 through 11100000 00111111 11111111 11111111	0
11100000 01000000 00000000 00000000 through 11100000 01000000 11111111 11111111	1
11100000 01000001 00000000 00000000 through 11100001 01111111 11111111 11111111	2
otherwise	3

- a. (10%) Provide a forwarding table that has five entries, uses longest prefix matching, and forwards packets to the correct link interfaces.
- b. (10%) Describe how your forwarding table determines the appropriate link interface for datagrams with destination addresses:

11001000 10010001 01010001 01010101
11100001 01000000 11000011 00111100
11100001 10000000 00010001 01110111

5. (10%) Consider a subnet with prefix 128.119.40.128/26.
 - a. (5%) Give an example of one IP address (of form xxx.xxx.xxx.xxx) that can be assigned to this network.
 - b. (5%) Suppose an ISP owns the block of addresses of the form 128.119.40.64/26. Suppose it wants to create four subnets from this block, with each block having the same number of IP addresses. What are the prefixes (of form a.b.c.d/x) for the four subnets?
6. (10%) Consider sending a 2400-byte datagram into a link that has an MTU of 700 bytes. Suppose the original datagram is stamped with the identification number 422. How many fragments are generated? What are the values in the various fields in the IP datagram(s) generated related to fragmentation?
7. (10%) Suppose datagrams are limited to 1500 bytes (including header) between source Host A and destination Host B. Assuming a 20-byte IP header, how many datagrams would be required to send an MP3 consisting of 5 million bytes? Explain how you computed the answer.
8. (15%) Consider the network setup in figure. Suppose that the ISP instead assigns the router the address 24.34.112.235 and that the network address of the home network is 192.168.1/24.
 - (a) (5%) Assign addresses to all interfaces in the home network.
 - (b) (10%) Suppose each host has two ongoing TCP connections, all to port 80 at host 128.119.40.86. Provide the six corresponding entries in the NAT translation table.

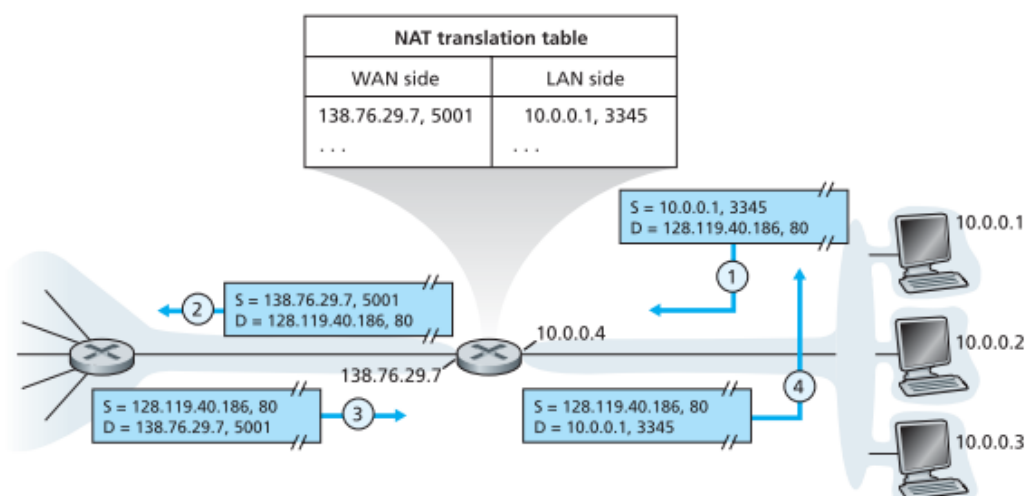


Figure 4.22 ♦ Network address translation

9. (10%) Consider the SDN OpenFlow network shown in Figure. Suppose that the desired forwarding behavior for datagrams arriving from host h3 or h4 as s2 is as follows:

- any datagrams arriving from host h3 and destined for h1, h2, h5 or h6 should be forwarded in a clockwise direction in the network;
- any datagrams arriving from host h4 and destined for h1, h2, h5 or h6 should be forwarded in a counter-clockwise direction in the network.

Specify the flow table entries in s2 that implement this forwarding behavior.

