

CSE 677: Homework 3

Due Date: Nov 16 (Mon), Total: 40 points

1. (4 points)

a).

Router A.

Incoming interface	Incoming VC#	Outgoing Interface	Outgoing VC#
3	12	1	22
2	63	1	18

Note, those two flows (from H1 and H2) must have different VC#s, true for both incoming and outgoing VC#s.

b).

Router B.

Incoming interface	Incoming VC#	Outgoing Interface	Outgoing VC#
2	22	3	32
2	18	1	28

2. (4 points)

As instructed in the question, you have to create a table with five entries.

Prefix Match	Link Interface
11100000 01000000 0	0
11100000 01000000 10000000	1
11100000	2
11100000 00	3
otherwise	3

Another solution:

Prefix Match	Link Interface
11100000 01000000 0	0
11100000 01000000 10000000	1
11100000 01	2
11100000 1	2
otherwise	3

Note:

A packet with an IP address 00000000 00000000 00000000 00000000 ~ 11100000 00111111 11111111 1111 goes to 3.

A packet with an IP address 11100000 01000000 00000000 00000000 ~ 11100000 01000000 01111111 11111111 goes to 0.

A packet with an IP address 11100000 01000000 10000000 00000000 ~ 11100000 01000000 10000000 11111111 goes to 1.

A packet with an IP address 11100000 01000000 10000001 00000000 ~ 11100000 11111111 11111111 11111111 goes to 2.

A packet with an IP address 11100001 00000000 00000000 00000000 ~ 11111111 11111111 11111111 11111111 goes to 3.

3. (5 points)

Destination Address Range	Link Interface
01100000 through 01111111	0
00000000 through 01011111	1
10000000 through 10111111	2
11000000 through 11111111	3

The number of addresses for interface 0 = $2^5 = 32$

The number of addresses for interface 1 = $2^6 + 2^5 = 96$

The number of addresses for interface 2 = $2^6 = 64$

The number of addresses for interface 3 = $2^6 = 64$

4. (4 points) Problem P24, Edition 5, page 430

Step	N'	$D(t),p(t)$	$D(u),p(u)$	$D(w),p(w)$	$D(x),p(x)$	$D(y),p(y)$	$D(z),p(z)$
0	v	4,v	2,v	7,v	∞	5,v	∞
1	vu	4,v		4,v	∞	5,v	∞
2	vut			4,v	10,y	5,v	15,y
3	vuty			4,v	10,y		15,y
4	vutyw				10,y		15,y
5	vutywx						15,y
6	vutywxz						

5. (4 points)

Note that you need to show all steps until all the distance vectors remain the same as in the previous time step.

Node t

		cost to							cost to							cost to				
		t	v	w	x	y			t	v	w	x	y			t	v	w	x	y
t	t	0	5	∞	∞	3	t	t	0	5	10	9	3	t	t	0	5	10	9	3

Node v

		cost to							cost to											
		t	v	w	x	y			t	v	w	x	y			t	v	w	x	y
v	v	5	0	5	∞	8	v	v	5	0	5	12	8	v	v	5	0	5	12	8

Node w

		cost to							cost to											
		t	v	w	x	y			T	v	w	x	y			T	v	w	x	y
w	w	∞	5	0	7	∞	w	w	10	5	0	7	13	w	w	10	5	0	7	13

Node x

t	v	w	x	y	t	v	w	x	y	t	v	w	x	y			
x	∞	∞	7	0	6	X	9	12	7	0	6	x	9	12	7	0	6

Node y

t	v	w	x	y	t	v	w	x	y	t	V	w	x	y			
y	3	8	∞	6	0	Y	3	8	13	6	0	y	3	8	13	6	0

6. (4 points)

The worst router was cisco-gnarly.n-connect.net (location is Iowa, the current index is 11, response time is 73 ms, and the packet loss rate is 87%) at 2:46pm, Nov.4, 2011.

The current index is a score from 0 to 100 where 0 is "slow" and 100 is "fast". It is determined by comparing the current response of a ping echo to all previous responses from the same router over the past 7 days. A score of 0 to 100 is then assigned to the current response depending on if this response is better or worse than all previous responses from that router. The ping is performed from test servers deployed in different area of the globe perform the ping at the same time.

7. (4 points)

Anycast is network addressing and routing methodology in which datagrams from a single sender are routed to the topologically nearest node in a group of potential receivers all identified by the same destination address. One of the applications of anycasting is load balancing. For example, when the servers in the same anycast group have the same content, then a user needs to access one of them.

8. (6points)

(a) (2points)

The command "netstat -r" returns a routing table.

Example:

Routing Table: IPv4

Destination	Gateway	Flags	Ref	Use	Interface
gige-net.cse.ohio-state.edu	kappa.cse.ohio-state.edu	U	1	9459	ce1
base-address.mcast.net	kappa.cse.ohio-state.edu	U	1	0	ce1
default	hsrp112.cse.ohio-state.edu	UG	1	50792	
localhost	localhost	UH	674128755645		lo0

A packet is forwarded to an appropriate gateway corresponding to the destination from the interface. If there is no entry in the table that corresponds to the destination, a packet is forwarded to the default gateway (hence, the destination entry is “default”, and in this example the default gateway is hsrp112.cse.ohio-state.edu). Flags U means that the interface is up (or running, active), G means that the route entry specifies indirect route, and H means that the destination field in this route entry specifies a host route. Ref shows how many times that particular MAC address is referenced in the routing table, and Use shows how many packets have been delivered through that interface.

(b) (2 points)

The command “netstat -r -n” returns a routing table with IP addresses.

Example:

Routing Table: IPv4

Destination	Gateway	Flags	Ref	Use	Interface
164.107.112.0	164.107.112.23	U	1	9463	ce1
224.0.0.0	164.107.112.23	U	1	0	ce1
default	164.107.112.1	UG	1	50817	
127.0.0.1	127.0.0.1	UH	663128875558		lo0

With the option -n, IP addresses are shown instead of names.

8. (c) (2 points)

-i : Shows the state of the interfaces that are used for IP traffic.

-s : Displays the statistics for the various protocol layers.

9. (5 points)

9. (a) (3 points)

Example:

- The computer in OSU with the IP address 164.107.112.103 is in Columbus, OH.
- The computer with the IP address 74.125.225.81 (www.google.com) is in Atlanta, GA.
- The computer with the IP address 203.216.243.240 (www.yahoo.co.jp) is in Tokyo, Japan.
- The computer with the IP address 78.236.5.39 (www.amazon.co.uk) is in Warsaw, Poland.
- And so on.

9. (b) (2 points)

- Commercial purpose: web masters know where visitors come from and optimize advertisements on their web site.
- Security purpose: some system administrators might want to block accesses from the users in particular countries.
- Localization purpose: the geographic location can be used for a geographic information service such as Google map.
- And so on. Any answers are good as long as you come up with an idea how to use the locations of the internet users or servers.