Computer Networks HW 5

Shane Cincotta

May 11, 2020

Chapter 4 Problem 1

a

Destination Address	The Interface
H3	Link Interface 3

b

Implementing a forwarding table which has more than 1 route which leads to the same destination is impossible. The reason is because router A can either have an entry to H3 through link interface 3 or 4.

Chapter 4, Problem 5

a

Prefix Match	Link Interface
1110000000	0
1110000001000000	1
1110000	2
111000011	3
Otherwise	4

b

According to my table, the prefix match for the first address is the 5th entry which maps to link interface 3. The prefix match for the second address is the 3rd entry which maps to link interface 2. The prefix match for the 3rd address is the 4th entry, which maps to link interface 3.

Chapter 4, Problem 6

Destination Address Range	Link Interface
00000000 through 00111111	0
01000000 through 01011111	1
01100000 through 01111111	2
10000000 through 10111111	2
11000000 through 11111111	3

Number of Addresses	Link Interface
2^6	0
2^5	1
$2^5 + 2^6$	2
2^6	3

Chapter 4, Problem 8

Subnet 2

Subnet 2 has at least 90 interfaces, which corresponds to 7 bits. Thus the prefix range is 32-7=25. Therefore subnet 2 consists of the address which ranges from 223.1.17.0/25 to223.1.17.127/25

Subnet 1

Subnet 1 has at least 60 interfaces, which corresponds to 6 bits. Thus the prefix range is 32-6=26. Therefore subnet 1 consists of the address which ranges from 223.1.17.128/26 to223.1.17.191/26

Subnet 3

Subnet 3 has at least 12 interfaces, which corresponds to 4 bits. Thus the prefix range is 32-4=28. Therefore subnet 3 consists of the address which ranges from 223.1.17.192/28 to223.1.17.207/28.

Chapter 4, Problem 10

Destination Address	a.b.c.d/x notation	Link Interface
1110000000	224.0.0.0/10	0
1110000001000000	224.64.0.0/16	1
1110000	224.0.0.0/7	2
111000011	226.128.0.0/9	3
Otherwise	0.0.0.0/0	3

Chapter 4, Problem 12

a

Subnet	IP Address	Available UP Addresses
Subnet A	214.97.254.0/24	254
Subnet B	214.97.254.0/25 - 214.97.255.0/29	120
Subnet C	214.97.254.128/25	128
Subnet D	214.97.254.0/30	2
Subnet E	213.97.254.2/31	2
Subnet E	213.97.254.3/31	4

b

Forwarding table for router 1:

Longest Prefix	Link Interface	Action
11010110.01100001.1111111	A	Forwards to subnet A
11010110.01100001.11111110.0000010	F	Forwards to router 2
11010110.01100001.11111110.0000000	D	Forwards to router 3

Forwarding table for router 2:

Longest Prefix	Link Interface	Action
11010110.01100001.11111110.1	C	Forwards to subnet C
11010110.01100001.11111110.0000001	E	Forwards to router 3
11010110.01100001.11111110.0000010	F	Forwards to router 1

Forwarding table for router 3:

Longest Prefix	Link Interface	Action
11010110.01100001.11111110.0	B	Forwards to subnet B
11010110.01100001.11111110.0000000	D	Forwards to router 1
11010110.01100001.11111110.0000001	E	Forwards to router 2

Chapter 4, Problem 14

In each fragment, the max size of the data field is MTU - IP Header = 700 - 20 = 680.

The number of fragments $= \frac{Datagram - Header}{MTU - Header} = \frac{2400 - 20}{680} = 4$.

Fragment Number	Data Size	IP Header Size	Fragment Size	ID	Offset	Flag Value
1	680	20	700	422	0	1
2	680	20	700	422	85	1
3	680	20	700	422	170	1
4	340	20	360	422	255	0

Chapter 4, Problem 16

a

Interface Number	IP Address
1	192.168.1.1
2	192.168.1.3
3	192.168.1.2

The network router interface hs 192.168.1.4

b

WAN Side	LAN Side
23.34.112.235,4000	192.168.1.1,3345
23.34.112.235,4001	192.168.1.1,3346
23.34.112.235,4002	192.168.1.2,3445
23.34.112.235,4003	192.168.1.2,3446
23.34.112.235,4004	192.168.1.3,3545
23.34.112.235,4005	192.168.1.3,3546

Chapter 4, Problem 19

Match	Action
Port = 1; IP Source = 10.3.x.x ; IP Destination = 10.1.x.x	Forward to 2
Port = 2; IP Source = 10.1.x.x ; IP Destination = 10.3.x.x	Forward to 1
Port = 1; IP Destination = 10.2.0.3	Forward to 3
Port = 2; IP Destination = 10.2.0.3	Forward to 3
Port = 1; IP Destination = 10.2.0.4	Forward to 4
Port = 2; IP Destination = 10.2.0.4	Forward to 4
Port = 4	Forward to 3
Port = 3	Forward to 4

Chapter 4, Problem 20

Source Host	Destination Host	Source IP	Destination IP	Port Number	Interface Number	Action
H3	H1	10.2.0.3	10.1.0.1	3	2	Forward
H3	H2	10.2.0.3	10.1.0.2	3	2	Forward
H3	H5	10.2.0.3	10.3.0.5	3	2	Forward
H3	H6	10.2.0.3	10.3.0.6	3	2	Forward
Source Host	Destination Host	Source IP	Destination IP	Port Number	Interface Number	Action
H4	H1	10.2.0.4	10.1.0.1	4	1	Forward
H4	H2	10.2.0.4	10.1.0.2	4	1	Forward
H4	H5	10.2.0.4	10.3.0.5	4	1	Forward
H4	H6	10.2.0.4	10.3.0.6	4	1	Forward