### ECE-C-432 Solutions to HW # 0

### Problem 11

Destination Address Range Link Interface

00000000

through 0

00111111

01000000

through 1

01011111

01100000

through 2

01111111

10000000

through 2

10111111

11000000

through 3

11111111

number of addresses for interface 0 = 

number of addresses for interface 1 = 

number of addresses for interface 2 = 

number of addresses for interface 3 = 

### Problem 12

Destination Address Range Link Interface

11000000

through (32 addresses) 0

11011111

10000000

through(64 addresses) 1

10111111

11100000

through (32 addresses) 2

11111111

00000000

through (128 addresses) 3

01111111

### Problem 13

223.1.17.0/26

223.1.17.128/25

223.1.17.192/28

**Problem 14**

Destination Address Link Interface

200.23.16/21 0

200.23.24/24 1

200.23.24/21 2

otherwise 3

### Problem 15

Destination Address Link Interface

11100000 00 (224.0/10) 0

11100000 01000000 (224.64/16) 1

1110000 (224/8) 2

11100001 1 (225.128/9) 3

otherwise 3

### Problem 16

Any IP address in range 128.119.40.128 to 128.119.40.191

Four equal size subnets: 128.119.40.64/28, 128.119.40.80/28, 128.119.40.96/28, 128.119.40.112/28

### Problem 17

From 214.97.254/23, possible assignments are

a) Subnet A: 214.97.255.0/24 (256 addresses)

Subnet B: 214.97.254.0/25 - 214.97.254.0/29 (128-8 = 120 addresses)

Subnet C: 214.97.254.128/25 (128 addresses)

Assume D is the network connecting R1 andR2

E is the network connecting R3 andR2

F is the network connecting R2 and R1

Each of these networks need 2 IP addresses; all these 6 are allotted out of 214.97.254.0/29

Subnet D: 214.97.254.0/31 (2 addresses) - 214.97.254.0 for the R1-R3 interface and

214.97.254.1 for the R3-R1 interface

Subnet E: 214.97.254.2/31 (2 addresses) - 214.97.254.2 for the R3-R2 interface and

214.97.254.3 for the R2-R3 interface

Subnet F: 214.97.254.4/31 (2 addresses) - - 214.97.254.4 for the R2-R1 interface and

214.97.254.5 for the R1-R2 interface

Two more addresses are 214.97.254.6 and 214.97.254.7 unallotted

b) Assume that the interface of R1 connected to A is 214.97.255.0

Forwarding table at R1 is as follows:

( It can be assumed that no datagrams will arrive addressed to D,E or F which have no

hosts in them)

Incoming IP address Interface

214.97.255.0/24 214.97.255.0 (Datagrams destined to hosts in A)

214.97.254.0/25 214.97.254.0 (Datagrams destined to hosts in B)

214.97.254.128/25 214.97.254.5 (Datagrams destined to hosts in C)

Similarly forwarding tables at R2 and R3 can be derived.

### Problem 19

The maximum size of data field in each fragment = 680 (because there are 20 bytes IP header). Thus the number of required fragments 

Each fragment will have Identification number 422. Each fragment except the last one will be of size 700 bytes (including IP header). The last datagram will be of size 360 bytes (including IP header). The offsets of the 4 fragments will be 0, 85, 170, 255. Each of the first 3 fragments will have flag=1; the last fragment will have flag=0.

### Problem 20

MP3 file size = 5 million bytes. Assume the data is carried in TCP segments, with each TCP segment also having 20 bytes of header. Then each datagram can carry 1500-40=1460 bytes of the MP3 file

Number of datagrams required. All but the last datagram will be 1,500 bytes; the last datagram will be 960+40 = 1000 bytes. Note that here there is no fragmentation – the source host does not create datagrams larger than 1500 bytes, and these datagrams are smaller than the MTUs of the links.