DALHOUSIE UNIVERSITY

Faculty of Computer Science

CSCI 6704 – Advanced Topics in Networks

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Assignment: 05

Task 1

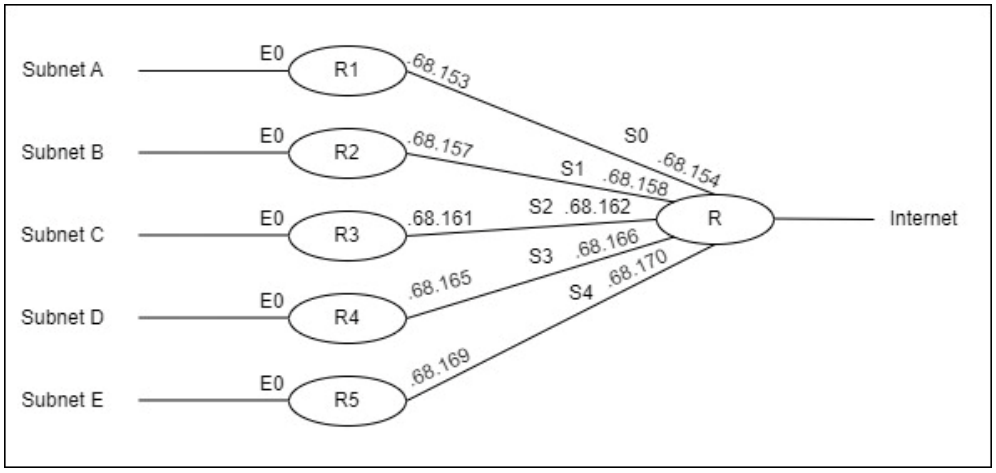

Figure: Internetwork Topology with given network address 201.45.68.0

Subnet	Total Addresses Required
Subnet A	14 + 2 + 1
Subnet B	28 + 2 + 1
Subnet C	2 + 2 + 1
Subnet D	10 + 2 + 1
Subnet E	45 + 2 + 1
R1 - R	2 + 2
R2 - R	2 + 2
R3 - R	2 + 2
R4 - R	2 + 2
R5 - R	2 + 2
Total	**135**

There's one additional address is added to show the subnet to router interface.

As the total addresses required is less than 256, we can proceed to the next step which is allocating subnet and host ID bits, and create the subnet address pattern.

Subnet	# host id bits/ # of subnet id bits	Subnet ID Assign	Subnet Address Pattern
Subnet E	6/2	SS = 00	201.45.68.0
Subnet B	5/3	SSS = 010	201.45.68.64
Subnet A	5/3	SSS = 011	201.45.68.96
Subnet D	4/4	SSSS = 1000	201.45.68.128
Subnet C	3/5	SSSSS = 10010	201.45.68.144
R1-R	2/6	SSSSSS = 100110	201.45.68.152
R2-R	2/6	SSSSSS = 100111	201.45.68.156
R3-R	2/6	SSSSSS = 101000	201.45.68.160
R4-R	2/6	SSSSSS = 101001	201.45.68.164
R5-R	2/6	SSSSSS = 101010	201.45.68.168

The final table with the subnet number, host ranges, broadcast address and mask for each subnet has been provided in the following table:

Subnet	Subnet Address	Range of Hosts	Broadcast Address	Subnet Mask
Subnet E	201.45.68.0	201.45.68.1 - 201.45.68.62	201.45.68.63	/26
Subnet B	201.45.68.64	201.45.68.65 - 201.45.68.94	201.45.68.95	/27
Subnet A	201.45.68.96	201.45.68.97 - 201.45.68.126	201.45.68.127	/27
Subnet D	201.45.68.128	201.45.68.129 - 201.45.68.142	201.45.68.143	/28
Subnet C	201.45.68.144	201.45.68.145 - 201.45.68.150	201.45.68.151	/29
R1-R	201.45.68.152	201.45.68.153 - 201.45.68.154	201.45.68.155	/30
R2-R	201.45.68.156	201.45.68.157 - 201.45.68.158	201.45.68.159	/30
R3-R	201.45.68.160	201.45.68.161 - 201.45.68.162	201.45.68.163	/30
R4-R	201.45.68.164	201.45.68.165 - 201.45.68.166	201.45.68.167	/30
R5-R	201.45.68.168	201.45.68.169 - 201.45.68.170	201.45.68.171	/30

As the last address is 201.45.68. 171, the free addresses remaining are 201.45.68.172 – 201.45.68.255. So, the total number of free addresses are 84.

Task 2

Subnet	Total Addresses Required
Subnet A	29 + 2 + 1
Subnet B	10 + 2 + 1
Subnet C	45 + 2 + 1
Subnet D	7 + 2 + 1
Subnet E	2 + 2
Total	**107**

There's one additional address is added to show the subnet to router interface.

As the total addresses required is less than 256, we can proceed to the next step, which is allocating subnet and host ID bits, and create the subnet address pattern.

Subnet	# host id bits/ # of subnet id bits	Subnet ID Assign	Subnet Address Pattern
Subnet C	6/2	SS = 00	209.78.32.0
Subnet A	5/3	SSS = 010	209.78.32.64
Subnet B	4/4	SSSS = 0110	209.78.32.96
Subnet D	4/4	SSSS = 0111	209.78.32.112
Subnet E	2/6	SSSSSS = 100000	209.78.32.128

The final table with the subnet number, host ranges, broadcast address and mask for each subnet has been provided in the following table:

Subnet	Subnet Address	Range of Hosts	Broadcast Address	Subnet Mask
Subnet B	209.78.32.0	209.78.32.1 - 209.78.32.62	209.78.32.63	/26
Subnet A	209.78.32.64	209.78.32.65 - 209.78.32.94	209.78.32.95	/27
Subnet C	209.78.32.96	209.78.32.97 - 209.78.32.110	209.78.32.111	/28
Subnet D	209.78.32.112	209.78.32.113 - 209.78.32.126	209.78.32.127	/28
Subnet E	209.78.32.128	209.78.32.129 - 209.78.32.130	209.78.32.131	/30

As the last address is 209.78.32.131, the free addresses remaining are 201.45.68.132 – 201.45.68.255. So, the total number of free addresses are 124.

Task 3

(a) The DV table in router B after stabilization is shown in the following table:

Network	Cost	Direction
N1	3	A
N2	0	direct
N3	2	C
N4	4	E
N5	1	E
N6	2	E

(b) After the failure of BE, the DV table in router B after re-stabilization is shown in the following table:

Network	Cost	Direction
N1	3	A
N2	0	direct
N3	2	C
N4	5	A
N5	4	F
N6	3	F

(c) After the failure of link BE and EF, the DV table in router B after re-stabilization is shown in the following table:

Network	Cost	Direction
N1	3	A
N2	0	direct
N3	2	C
N4	5	A
N5	8	A
N6	3	F

Task 4

The link state database that will be stored in each router after the flooding has been shown in the following table:

R1	R2	R3	R4	R5	R6
N1 0 R2 1 R5 3	N2 0 R1 1 R3 4 R5 2	N3 0 R2 4 R6 5	N4 0 R5 6 R6 7	N5 0 R1 3 R2 2 R4 6 R6 8	N6 0 R3 5 R4 7 R5 8