

CSEN404 Introduction to Networks
Spring Term 2021
Practice Assignment 10

Problem 1

An organization is assigned 1 class B address 160.17. The organization has 5 departments that need to have each computer department be connected on the same subnet. The numbers of computers in the 5 departments are: 50, 90, 44, 120, and 35 respectively.

- How many host bits at least are needed in the subnet mask?
- Divide the bits of the IP between host, subnet and network.
- Write down the IP address and subnet mask for each department.

Answer

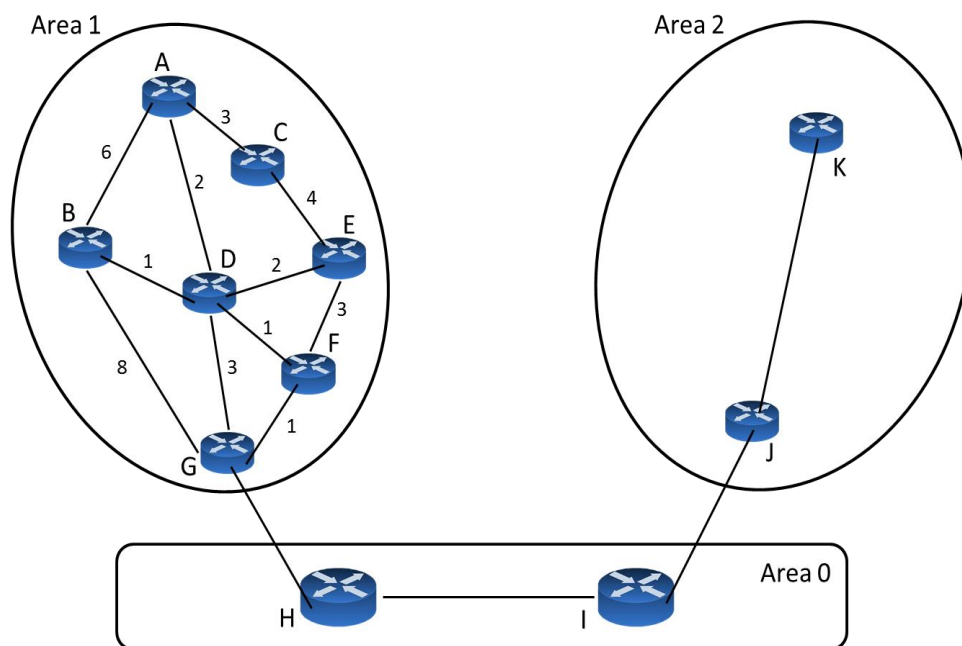
- At least 7 bits are needed to represent 120 PCs.
- In class B, Network part is 16 bits and the local part is 16 bits.
We need at least three bits for the subnet mask to represent the five departments and at least 7 bits to represent the maximum number of hosts in each department.
If we left 7 bits for the host ID then we will have 9 bits for the subnet ID, giving a larger number of departments and fewer range of hosts' IPs in each department.
If we left 3 bits for the subnet ID, this will give 13 bits for the host ID thus allowing for larger number of hosts to be accommodated in one networks but on the other side there will be fewer subnets.
Division can be 3 bits and 13 bits for example.
(No unique answer for this question, but you have to answer maintaining at least 3 bits for sub-netting and 7 bits for the host part)
- In case we choose to have 3 bits for the subnet ID and 13 bits for the host ID, we will have the following IP address and subnet mask for each department

Department	IP address/subnet mask
A	160.17.0.0/19
B	160.17.32.0/19
C	160.17.64.0/19
D	160.17.96.0/19
E	160.17.128.0/19

Problem 2

The following figure shows a network where the Open Shortest Path First (OSPF) routing algorithm is running. Nodes G and J are border routers.

1. Execute the Dijkstra algorithm at Node A to discover optimum paths to all routers in Area 1.
2. If Node A in Area 1 wishes to send a packet to node K in Area 2, what is the sequence of nodes that will be traversed?



Answer

Step	Path	B	C	D	E	F	G
0	A	6,A	3,A	2,A	∞	∞	∞
1	AD	3,D	3,A		4,D	3,D	5,D
2	ADF	3,D	3,A		4,D		4,F
3	ADFC	3,D			4,D		4,F
4	ADFCB				4,D		4,F
5	ADFCBE						4,F
6	ADFCBEG						

Nodes: A, D, F, G, H, I, J, K