

Computer Networks
2nd Year, 1st Semester

2022

Tutorial 3 – VLSM and IPv6

01. An ISP supplies a class C network of 195.100.50.0 to an enterprise that requires 5 networks each to support 12 users and 4 networks supports 2 usable ip addresses.

a. What is the subnet mask that would be configured in each workstation? /28

195.100.50.0/24

Case 1: 5 networks with 12 users

Case 2: 4 networks with 2 IPS

Case 1: num of addresses needed = 14

Bits needed to have 14 addresses in host portion = $2^4 = 16$ (4 bits)

Host ID

195.100.50.00000000

195.100.50.00000000 / 28

b. Identify the sub-network addresses.

195.100.50	0000 0000	195.100.50.0/28
195.100.50	0001 0000	195.100.50.16/28
195.100.50	0010 0000	195.100.50.32/28
195.100.50	0011 0000	195.100.50.48/28
195.100.50	0100 0000	195.100.50.64/28
195.100.50	0101 0000	195.100.50.80/28
195.100.50	0110 0000	195.100.50.96/28
195.100.50	0111 0000	195.100.50.112/28
195.100.50	1000 0000	195.100.50.128/28
195.100.50	1001 0000	195.100.50.144/28
195.100.50	1010 0000	195.100.50.160/28
195.100.50	1011 0000	195.100.50.176/28
195.100.50	1100 0000	195.100.50.192/28
195.100.50	1101 0000	195.100.50.208/28
195.100.50	1110 0000	195.100.50.224/28
195.100.50	1111 0000	195.100.50.240/28

Case 2: 4 networks with 2 IPS : 195.100.50.80/28

Bits needed to have 4 addresses in host portion = $2^2 = 4$ (4 bits)

Host ID

195.100.50.01010000

195.100.50. 01010000 / 30

Net id	Subnet host	Subnet address
195.100.50. 0101	00 00	195.100.50.80/30
195.100.50. 0101	01 00	195.100.50.84/30
195.100.50. 0101	10 00	195.100.50.88/30
195.100.50. 0101	11 00	195.100.50.92/30

c. Calculate the WAN Link addresses.

Net id	Subnet host	Subnet address	WAN Link Addresses
195.100.50. 0101	00 00	195.100.50.80/30	195.100.50.81/30 195.100.50.82/30
195.100.50. 0101	01 00	195.100.50.84/30	195.100.50.85/30 195.100.50.86/30
195.100.50. 0101	10 00	195.100.50.88/30	195.100.50.89/30 195.100.50.90/30
195.100.50. 0101	11 00	195.100.50.92/30	195.100.50.93/30 195.100.50.94/30

02. 132.16.128.0/17 main network needs to be separated into subnetworks based on the following requirements.

a. 3 subnets with 25 devices each.

132.16.128.0/17

Case 1-**3 subnets** with 25 devices each.

Case II-. 4 WAN links to inter-connect the sub networks

Case 1: num of addresses needed = 25+2

Bits needed to have 27 addresses in host portion = $2^5 = 32$ (4 bits)

Host ID

132.16.10000000.00000000

132.16.10000000.00000000 /27

Net Id	Subnet host	Subnet address
132.16.1	0000000.000 00000	132.16.128.0/27
132.16.1	0000000.001 00000	132.16.128.32/27
132.16.1	0000000.010 00000	132.16.128.64/27
132.16.1	0000000.011 00000	132.16.128.96/27
132.16.1	0000000.100 00000	132.16.128.128/27
132.16.1	0000000.101 00000	132.16.128.160/27
132.16.1	0000000.110 00000	132.16.128.192/27
132.16.1	0000000.111 00000	132.16.128.224/27
132.16.1		

b) 4 WAN links to inter-connect the sub networks

Each WAN link addresses needed = 4

Bits needed to have 4 addresses in host portion = $2^2 = 4$ (2 bits)

132.16.128.96/27

132.16.10000000.011 00000

132.16.10000000.011 00000 /30

Net id	Subnet host	Subnet address
132.16.128.011	000 00	132.16.128.96/30
132.16.128.011	001 00	132.16.128.100/30
132.16.128.011	010 00	132.16.128.104/30
132.16.128.011	011 00	132.16.128.108/30
132.16.128.011	100 00	132.16.128.112/30
132.16.128.011	101 00	132.16.128.116/30
132.16.128.011	110 00	132.16.128.120/30
132.16.128.011	111 00	132.16.128.124/30

03. An ISP supplies a class B network of 136.210.0.0 to an enterprise that requires ten networks each to support 110 users. What is the network mask that would be configured in each workstation and what would be the NetID, Subnet Number?

136.210.0.0 /16

Case 1 : 10 networks each to support 110 users

Required addresses $110+2 = 112$

Num of host bits needed = $2^7 = 128$ (7 bits)

136.210.00000000.00000000

136.210.0.0 /25

Mask = 255.255.255.128

Net ID = 136.210.00000000.0

Subnet number = subnet id num of bits = 9

Num of subnets = $2^9 = 512$