Sri Lanka Institute of Information Technology

**Computer Networks 2nd Year, 1st Semester**



**2020**

**Tutorial 3 – VLSM and IPv6**

1. 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.
   1. What is the subnet mask that would be configured in each workstation ?

Case 1 : 255.255.255.240

Case 2 : 255.255.255.252

* 1. Identify the sub-network addresses.

Case 1 :

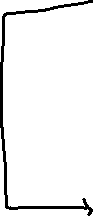
For 12 users all with broadcast and network would be 14. So we need host ID= 24 = 16 = 4bits

195.100.50.0000 0000/28



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Net ID | Subnet ID | Host ID | Subnet Mask | Subnet address |
| 195.100.50 | 0000 | 0000 | 255.255.255.240 | 195.100.50.0/28 |
| 195.100.50 | 0001 | 0000 | 255.255.255.240 | 195.100.50.16/28 |
| 195.100.50 | 0010 | 0000 | 255.255.255.240 | 195.100.50.32/28 |
| 195.100.50 | 0011 | 0000 | 255.255.255.240 | 195.100.50.48/28 |
| 195.100.50 | 0100 | 0000 | 255.255.255.240 | 195.100.50.64/28 |
| 195.100.50 | 0101 | 0000 | 255.255.255.240 | 195.100.50.80/28 |
| 195.100.50 | 0110 | 0000 | 255.255.255.240 | 195.100.50.96/28 |
| 195.100.50 | 0111 | 0000 | 255.255.255.240 | 195.100.50.112/28 |

Case 2 :



For 2 usable we need 4 addresses host bits = 22 = 4 = 2bits

195.100.50.0000 00 00 /30

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Net ID | Subnet ID | Host ID | Subnet Mask | Subnet Address |
| 195.100.50 | 0101 00 | 00 | 255.255.255.252 | 195.100.50.80/30 |
| 195.100.50 | 0101 01 | 00 | 255.255.255.252 | 195.100.50.84/30 |
| 195.100.50 | 0101 10 | 00 | 255.255.255.252 | 195.100.50.88/30 |
| 195.100.50 | 0101 11 | 00 | 255.255.255.252 | 195.100.50.92/30 |

* 1. Calculate the WAN Link addresses.

|  |  |
| --- | --- |
| Subnet address | Wan link address |
| 195.100.50.80/30 | 195.100.50.81/30  195.100.50.82/30 |
| 195.100.50.84/30 | 195.100.50.85/30  195.100.50.86/30 |
| 195.100.50.88/30 | 195.100.50.89/30  195.100.50.90/30 |
| 195.100.50.92/30 | 195.100.50.93/30  195.100.50.94/30 |

1. 132.16.128.0/17 main network need to be separated into subnetworks based on the following requirements.
   1. 3 subnets with 25 devices each.

Class B

All devices count = 25 + 2 = 27 (broadcast + network)

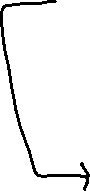
Host bits count that we need = 25 = 32 = 5 bits

132.16.100000000.000 00000



Subnet mask = 255.255.255.224

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Net Id | Sub id | Host id | Subnet mask | Subnet address |
| 132.16.1 | 0000000 000 | 00000 | 255.255.255.224 | 132.16.128.0/27 |
| 132.16.1 | 0000000 001 | 00000 | 255.255.255.224 | 132.16.128.32/27 |
| 132.16.1 | 0000000 010 | 00000 | 255.255.255.224 | 132.16.128.64/27 |
| 132.16.1 | 0000000 011 | 00000 | 255.255.255.224 | 132.16.128.96/27 |
| 132.16.1 | 0000000 100 | 00000 | 255.255.255.224 | 132.16.128.128/27 |
| 132.16.1 | 0000000 101 | 00000 | 255.255.255.224 | 132.16.128.160/27 |
| 132.16.1 | 0000000 110 | 00000 | 255.255.255.224 | 132.16.128.192/27 |
| 132.16.1 | 0000000 111 | 00000 | 255.255.255.224 | 132.16.128.224/27 |

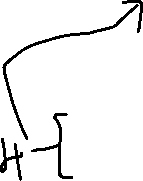


* 1. 4 WAN links to inter-connect the sub networks

Each wan link address needed = 4

Bits needed to have 4 addresses = 22 = 4 = 2 bits

132.16.10000000.000 000 00/30



|  |  |  |  |
| --- | --- | --- | --- |
| Net id | Subnet | Hosts | 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 |

1. 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 ?

Class B

136.210.0.0/16

Host 110. So, we need host bit count = 27 = 128 = 7-bits

136.210.00000000.0 0000000/25

.

Subnet mask = 11111111 11111111 11111111 10000000

255.255.255.128

Net ID = 136.210.0.0

Subnet ID = number of bits for subnet ID = 9

Number of subnets = 29 = 512

1. Calculate the EUI-64 interface ID for IPv6 address for the following device MAC addresses.
   1. 3463:adad:adad

3463:adFF:FEad:adad

0011 0110



3663:adff:fead:adad

* 1. 2C55:CAFE:ABCD

2C55:CAFF:FEFE:ABCD

0010 1110



2E55:CAFF:FEFE:ABCD

1. Write the simplified version of the following IPv6 addresses.
   1. 2001:0db8:85a3:0000:0000:8a2e:0370:7334

2001:db8:85a3::8a2e:370:7334

* 1. 2001:0000:85a3:0000:0000:8a2e:0370:7334

2001:0:85a3::8a2e:370:7334

1. Calculate the original IPv6 address of the following compressed IPv6 addresses.
   1. 52:8d30:0:2345::190

0052:8d30:0000:2345:0000:0000:0000:0190

* 1. a052:30::3567:0:0:cd9

a052:0030:0000:0000:3567:0000:0000:0cd9

* 1. a052:30:3:40:3567:5640::

a052:0030:0003:0040:3567:5640:0000:0000