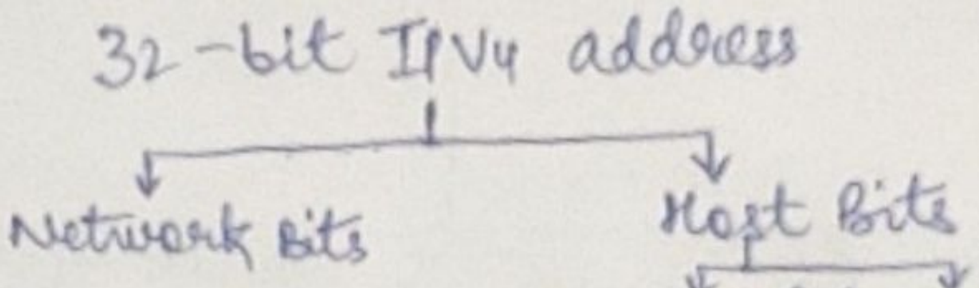
DATE 01-12-22 EXP. No. 10

Aim:- Familiarization with different subnetting Techniques.

Theory:- IP Subnetting:-

There are two parts in an IP address. One of them is Network Part & the another is Host part. We are adding one more part. This is "Subnet part". From the Host Part, we borrow some bits and we will use this part for subnet.



Subnetting is dividing the network into smaller n/w groups & by using this, using the IP Address Block more efficient. For Subnetting, Subnet Masks are used. Subnets masks are 32 bit addresses like IP Addresses. Subnet Masks are used with IP Addresses. The 1s represents the network parts, and 0s represents the host parts.

We can show Subnet Masks with four octets like IP Addresses (255.255.255.0) or we can show it like /X. Here, for the 255.255.255.0 subnet mask, we can use /24. This means that the first 24 bit is full of 1s and it is n/w part.

CIDR versus VLSM

For Subnetting, there are two important terms. These are:

- CIDR (classless Inter Domain Routing)
- VLSM (Variable length Subnet Mask)

CIDR (classless Inter Domain Routing) is the term that is used for using IP Addresses independent from their traditional IP classes. In other words, CIDR is using IP Addresses without classes.

DATE..... EXP. No.....

VLSM (Variable length Subnet Mask) is the term that is used for using different Subnet Mask for different lan networks. In another words, it is the mechanism that allows different Subnet Masks and provide division of a network into sub networks. It is like subnet of subnets.

CIDR is used on the addresses that will advertise to the internet. So, it is used in the Internet Service Provider part. VLSM is used in a company or in smaller networks to use IP addresses spaces ideally.

Special Subnets :-

In subnetting some subnet masks are used specifically sometimes. These are /24, /30, /31 & /32.

- /24 is the subnet mask is usually used in local n/w by default
- /32 is the subnet mask generally on loopback and system interfaces
- /31 is the subnet mask used on point-to-point links.
- /30 is also widely used in Service Provider N/W for point-to-point connections.

IP Subnetting Example :-

IP Address = 192.168.5.85

Subnet Mask = 255.255.255.0

Firstly, we will convert this decimal numbers to the binary equals. The 1s in the subnet Mask will show the no. of bits that n/w part has. And the 0s will show the host part bits.

IP Address = 11000000, 10101000, 00000101, 01010101

Subnet Mask = 11111111, 11111111, 11111111, 00000000

So, here, the first 24 bits (First 3 octets) are n/w bits & the last 8 bits (last octet) are the host bits.

For this IP and Subnet Mask, to determine the n/w address of this IP address, we will use 'AND' operation b/w IP Address & Subnet Mask in binary mode.

DATE.....

EXP. No.....

IP Add : 11000000 , 10101000 , 00000101 , 01010101

SubM : 11111111 , 11111111 , 11111111 , 00000000

AND : 11000000 , 10101000 , 00000101 , 00000000

When we use AND operation with this binary no, as you can see, the last octect will be multiple with zero (AND is Multiplication). So the result of this multiplication will be 192.168.5.0. Here, the first three octets will be same as IP address & the last octet will be full of 0s.

For this example our broadcast address will be 192.168.5.255. As you can see, all the host bits are full of 1s for broadcast address. The other addresses in the middle through 192.168.5.1 to 192.168.5.254 are host addresses.