Additional Help for IP address

Subnet mask.

In classful addressing there are classes A, B, C, D and E. The number of addresses in a block needs to be power of 2. The address itself has a netId and hostId (prefix and suffix). Please see my lectures for explanation. All addresses in a block have the same prefix.

 When a network is subnetted, the first usable address in the subnet is the identifier of the subnet, usually assigned to the router. Suppose one of the address in a block is 141.14.120.77 and it is subnetted into four subnets. It is a class B address and should have a default mask of 255.255.0.0. However since it is subnetted further into four subnets we need use 2 more bits (22 is 4), 255.255.192.0. If we AND the subnet mask with one address we are given, we get: 141.14.64.0, which is the first address of this this subnet block. I am showing the calculation for the 3rd octet:

01111000 - 120 AND

11000000 – 192

01000000 – 64 This is the beginning address of the third octet in that block.

We can find the last address in the third octet of that block by setting all 1s to zeros and all zeros to ones in the mask and ORing with the address, giving us 127.

Network Address:141.14.64.0

First Host Address:141.14.64.1

Last Host Address:141.14.127.254

Supernetting:

Class C network addresses are still available, but one may not be enough for an organization like STC. In supernetting we can combine several class C blocks to create a larger range of addresses. If an organization needs 1000 addresses, we can join 4 class C blocks. For Supernetting we go backwards with the subnet mask. In this case we have 2 less 1s than the default subnet mask. The default subnet mask for class C is 255.255.255.0. In this case we go 2 bits to the left, or 255.255.252.0.

**In superneting, the number of blocks to combine needs to be a power of 2.**

Classless addressing (CIDR)

Changes the distribution of addresses to provide a fair share to each organization, variable length blocks that belong to no classes. The addresses needs to be a power of 2 and a slash notation is given to find the prefix length.

In the address 167.199.170.82/27 the network mask is 255.255.255.224 (27 ones and five zeros). The suffix length of 5, meaning there can be 32 host addresses.

We can find the first address by ANDING the IP with mask. We can find the last address by ORing the address with the complement of the mask.