

IP SUBNETTING AND ADDRESSING

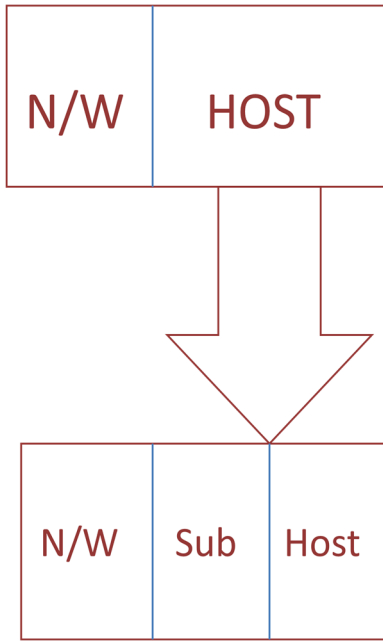
Classes and Blocks:

- Problem with classful addressing is that
 - Each class is divided into a fixed number of blocks with

<i>Class</i>	<i>Number of Blocks</i>	<i>Block Size</i>	<i>Application</i>
A	128	16,777,216	Unicast
B	16,384	65,536	Unicast
C	2,097,152	256	Unicast
D	1	268,435,456	Multicast
E	1	268,435,456	Reserved

IP Subnet: -

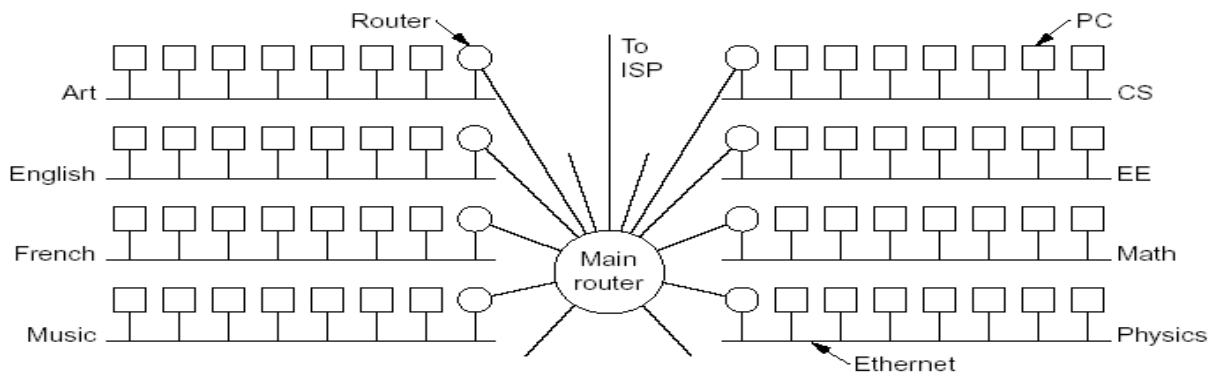
- Basic Concept:
 - ❖ A subset of a class A, B or C network.
- IP addresses that do not use subsets consists of 1- a network portion and 2- a host portion.
 - ❖ Represents a static two level hierarchical addressing model.
- IP subnet introduces a third level of hierarchy.
 - ❖ A network portion
 - ❖ A subnet portion
 - ❖ A host portion.



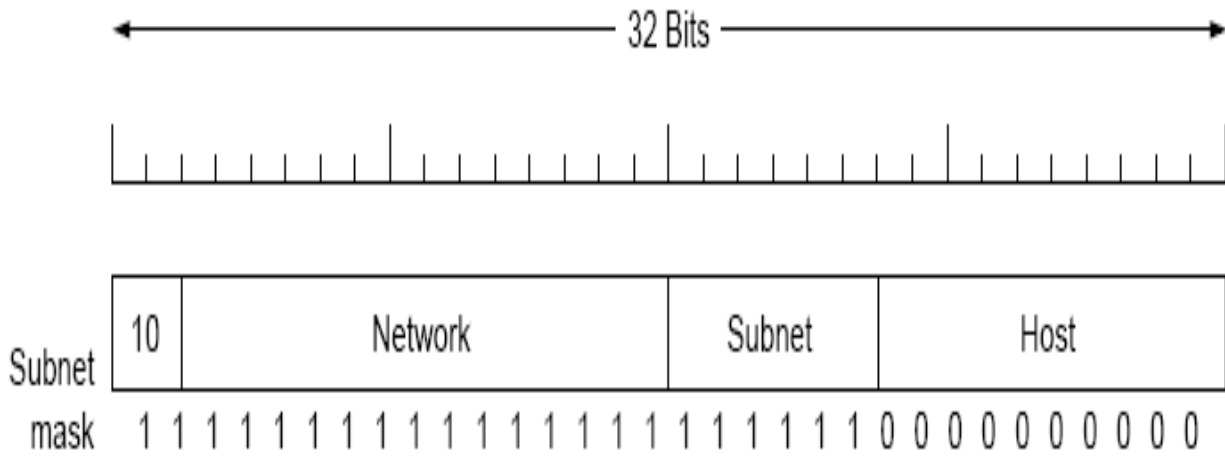
SUBNETTING:

- Breaking of a large network into smaller interconnected networks
- Efficient data transfer

Easier management of network



SUNETTING A CLASS B NETWORK:



IP Subnet: -

- ❖ Allow more efficient (and structured) utilization of the addresses.
- ❖ Uses network masks.
 - Natural/default network marks.
 - Custom/Subset network masks.

Natural Mask: -

- Network mask 255.0.0.0 is applied to a class A network 10.0.0.0.
 - ❖ In binary, the mask is a series of contiguous 1's followed by a series of contiguous 0's.

11111111.00000000.00000000.00000000

N/W portion Host portion

- Provide a mechanism to split the IP address 10.0.0.20 into.
 - ❖ A network portion of 10, and
 - ❖ A host portion 20

Decimal binary

IP address 10.0.0.20 00001010.00000000.00000000.00000000

Mask 255.0.0.0 11111111.00000000.00000000.00000000

N/W Host

(Both are added together to know the N/W address.)

- Class A, B and C addresses
 - ❖ Have fixed division of network and host portions.
 - ❖ Can be expressed as masks.
 - ☐ Called natural masks.
- Natural Masks
 - ❖ Class A:: 255.0.0.0
 - ❖ Class B:: 255.255.0.0
 - ❖ Class C:: 255.255.255.0

Creating Subnets using Masks:

- Masks are very flexible.
 - ❖ Using masks, network can be divided into smaller subnets.
- How?
 - ❖ By extending the network portion of the address into host portion.
- Advantage gained:
 - ❖ We can create a large number of subnets from one network.
 - ❖ Can have less number of hosts per network.

Example: - Subnets

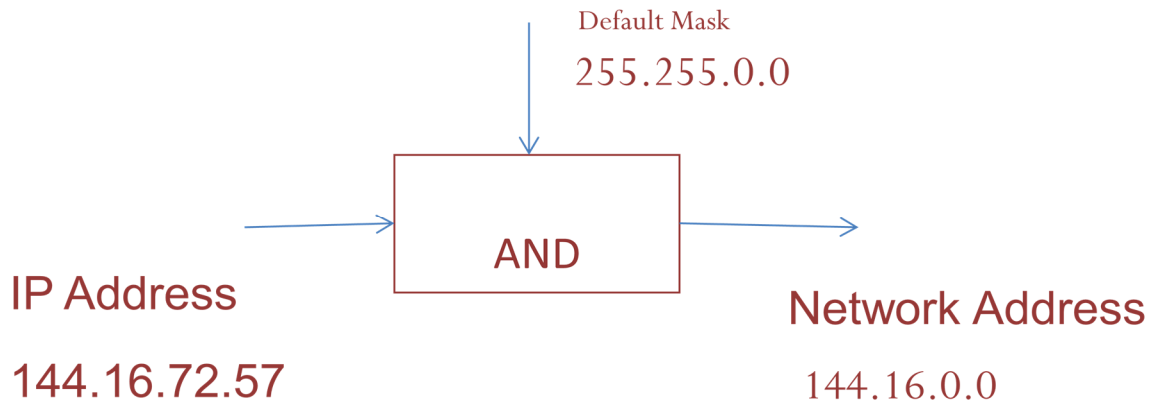
- Network mask 255.255.0.0 is applied to a class A network 10.0.0.0.
 - ❖ This divide the IP address 10.5.0.20 into
 - ❖ .a network portion of 10
 - ❖ .a subnet portion of 5

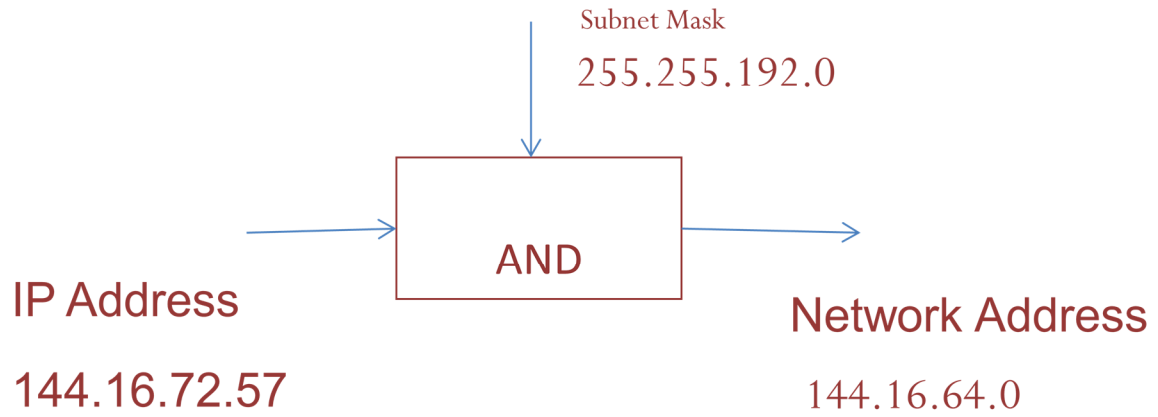
- ❖ .a host portion of 20
- ❖ The 255.255.0.0 mask borrows a portion of the host space and applies it to network space.
- What happens?
 - ❖ We have now split the network into 256 subnets.
 - ❖ Initially it was a single large Class A network (hosts).
 - From 10.0.0.0 to 10.255.0.0
 - The host per subnet decreases to 65,634

	Decimal	Binary
IP Address	10.5.0.20	00001010.00000101.00000000.00010106
Mask	255.255.0.0	11111111.11111111.00000000.00000000

N/W	Subnet	host
-----	--------	------

Default Mask and Subnet mask:





192 = 11000000

72 = 01001000

AND 01000000=64