SYSTECH

MAKES HARD THINGS EASY

HARDWARE & NETWORKING ACADEMY

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CCNA V3

200-125

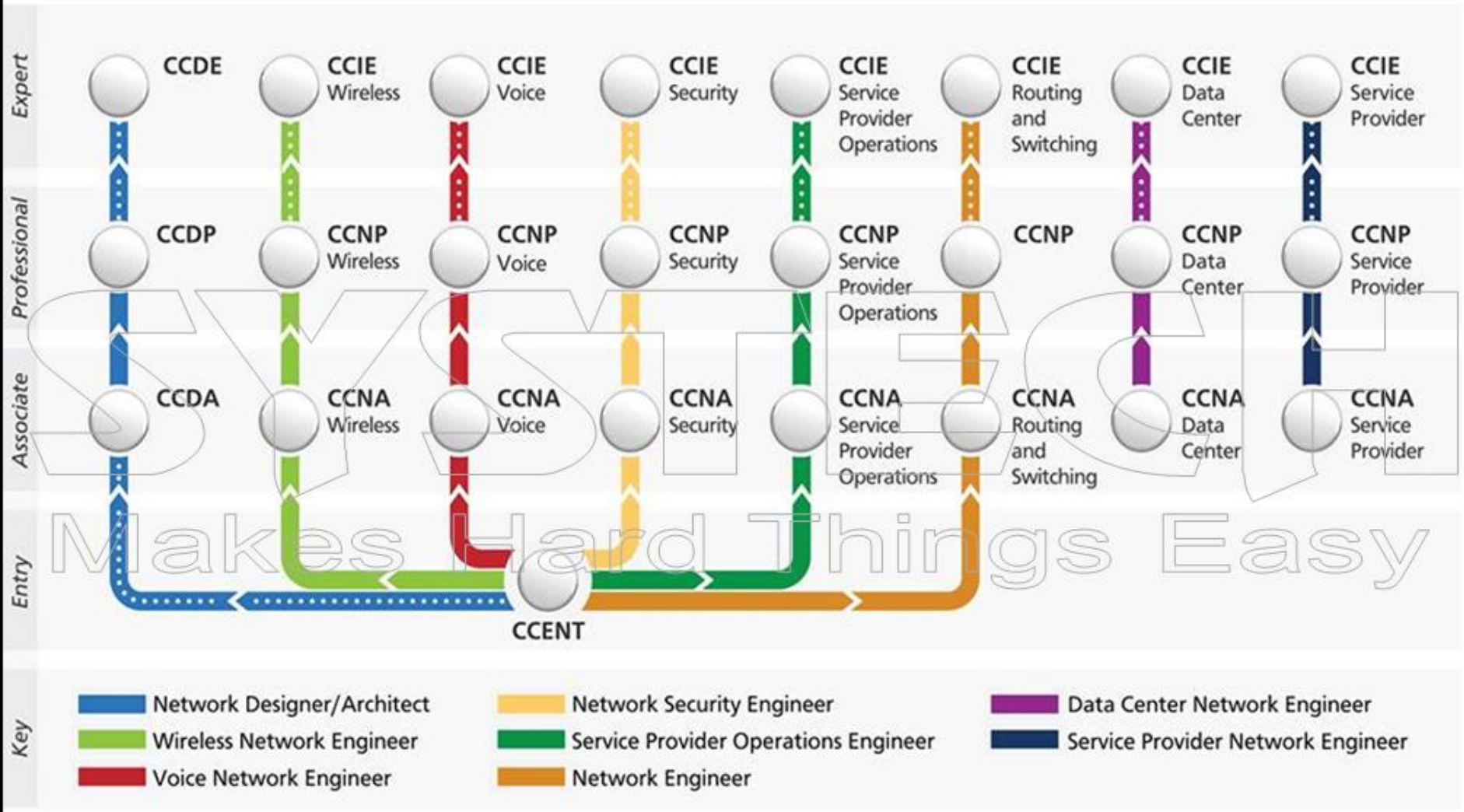
ROUTING & SWITCHING

Exam Duration :150

Min passing mark 825/1000

Exam Questions 50-60 (Multiple choice, Drag-and-Drop,Simulations,Scenario Based)

Cisco carrier certification tracks



Solid-colored tracks indicate required steps; dotted tracks indicate recommended steps

SUBNETTING

Allows you to take one larger network and break it into a bunch of smaller networks.

- ✓ Reduced network traffic.
- ✓ Optimized network performance.
- ✓ Simplified management.
- ✓ Facilitated spanning of large geographical distance.

SUBNETMASK

- ✓ A subnet mask is a 32 bit values that allows the recipient of IP packets to distinguish the network id portion of the IP address from the host id portion of the IP address.

SUBNETTING: (Increases the network right sides borrow)

128	64	32	16	8	4	2	1	
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	
1	0	0	0	0	0	0	0	- 128
1	1	0	0	0	0	0	0	- 192
1	1	1	0	0	0	0	0	- 224
1	1	1	1	0	0	0	0	- 240
1	1	1	1	1	0	0	0	- 248
1	1	1	1	1	1	0	0	- 252
1	1	1	1	1	1	1	0	- 254
1	1	1	1	1	1	1	1	- 255

IP ADDRESSING

An IP address is a numeric identifier assigned to each machine on IP network.

BIT : one digit, either 0 or 1.
BYTE : 7 or 8 bits.
OCTET : always 8 bits.

IP address is classified into 5 classes in first octet (or) byte

Class A: 0.0.0.0 to 126.255.255.255

Class B: 128.0.0.0 to 191.255.255.255

Class C: 192.0.0.0 to 223.255.255.255

Class D: 224.0.0.0 to 239.255.255.255 (multicast)

Class E: 240.0.0.0 to 255.255.255.255 (Research)

Private IP Address : (Non Routable N/W)

✓used in LAN.

Private IP Address Range : (from IANA – Internet assigned Numbers in Authority)

Class A	Class B	Class C
10.0.0.0 10.255.255.255.	172.16.0.0 172.31.255.255	192.168.0.0 192.168.255.255

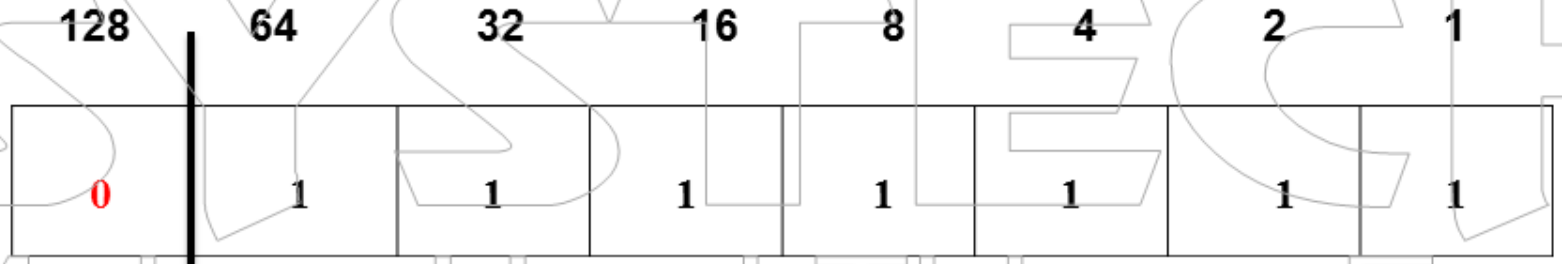
✓Also, IP addresses in the range of 169.254.0.0 -169.254.255.255 are reserved for Automatic Private IP Addressing.

Public IP Address : (Routable N/W)

✓ used in Internet

HIGHER ORDER BIT

Class A: Higher order bit - 0



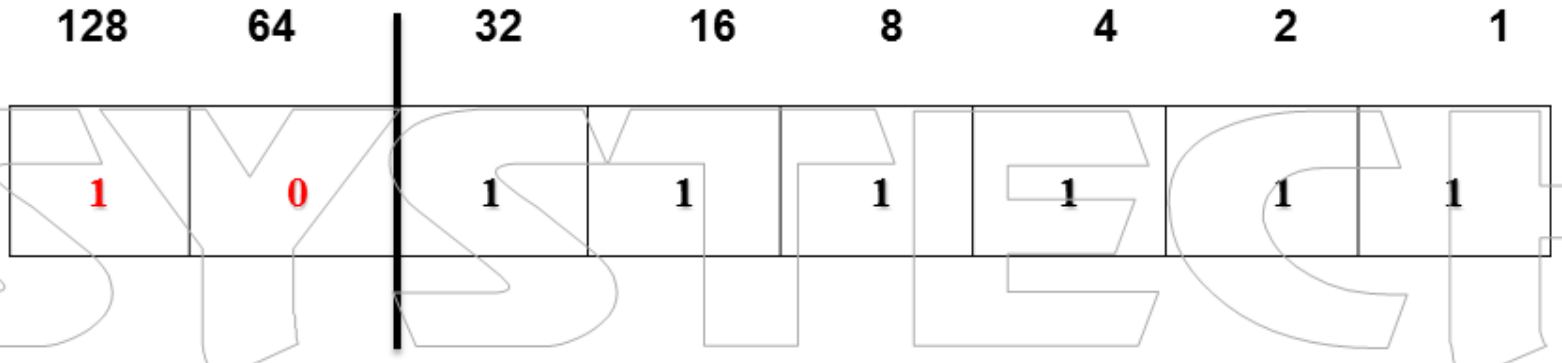
64 + 32 + 16 + 8 + 4 + 2 + 1 = 127

0 ^ 127

(not in use) (loop back address)

RANGE: 1 ^ 126

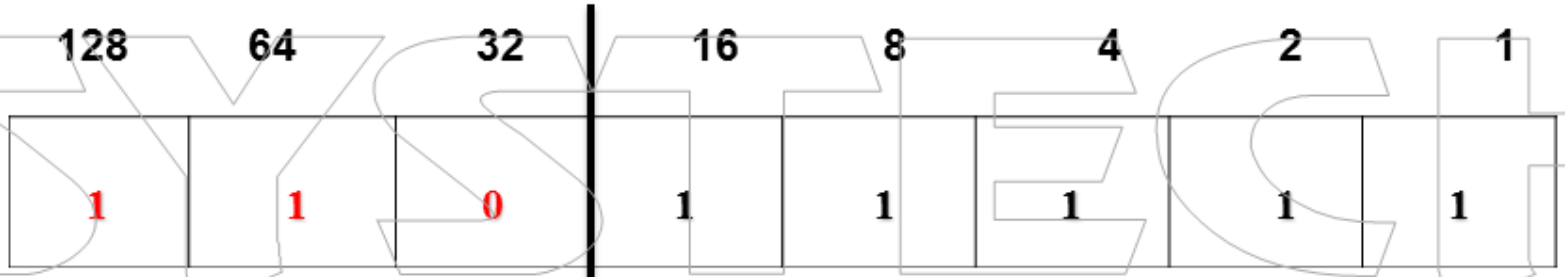
Class B: Higher order bit - 1 0



128 128 + 32 + 16 + 8 + 4 + 2 + 1 = 191

RANGE: 128 ^ 191

Class C: Higher order bit - 1 1 0

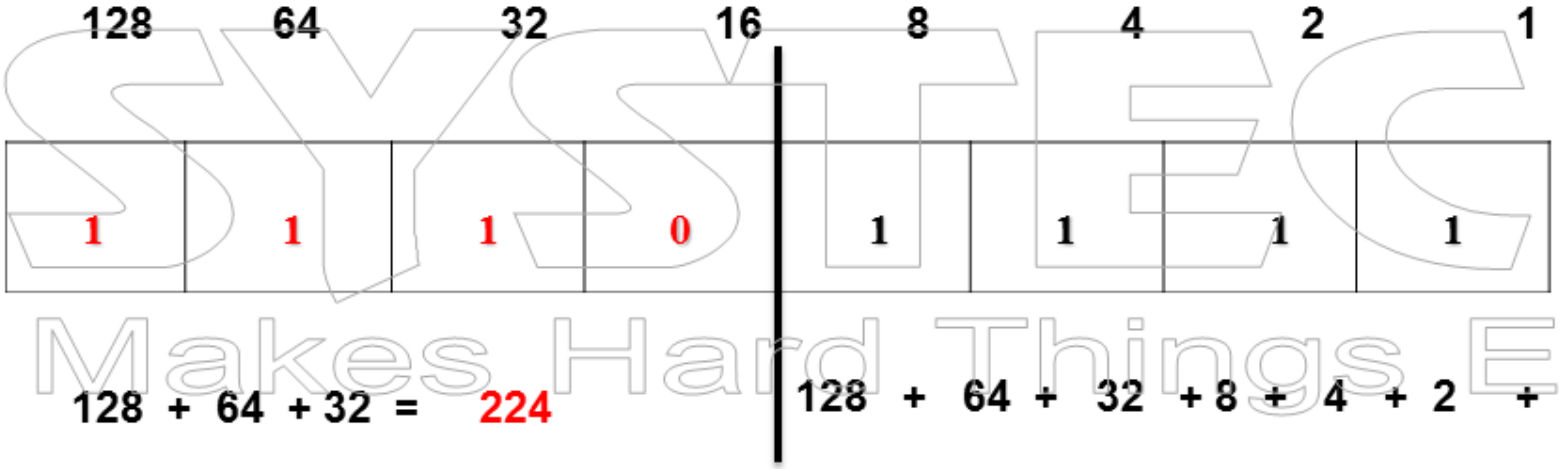


128 + 64 =192

128 + 64 + 16 + 8 + 4 + 2 + 1 = 223

RANGE: 192 ^ 223

Class D: Higher order bit- 1 1 1 0



RANGE: 224 ^ 239

SUBNETMASK

- ✓All network bits are 1
- ✓All host bits are 0

Class A: Default subnet mask - 255.0.0.0

N/W	.	HOST	.	HOST	.	HOST
255	.	0	.	0	.	0

(128+64+32+16+8+4+2+1)

Class B: Default subnet mask - 255.255.0.0

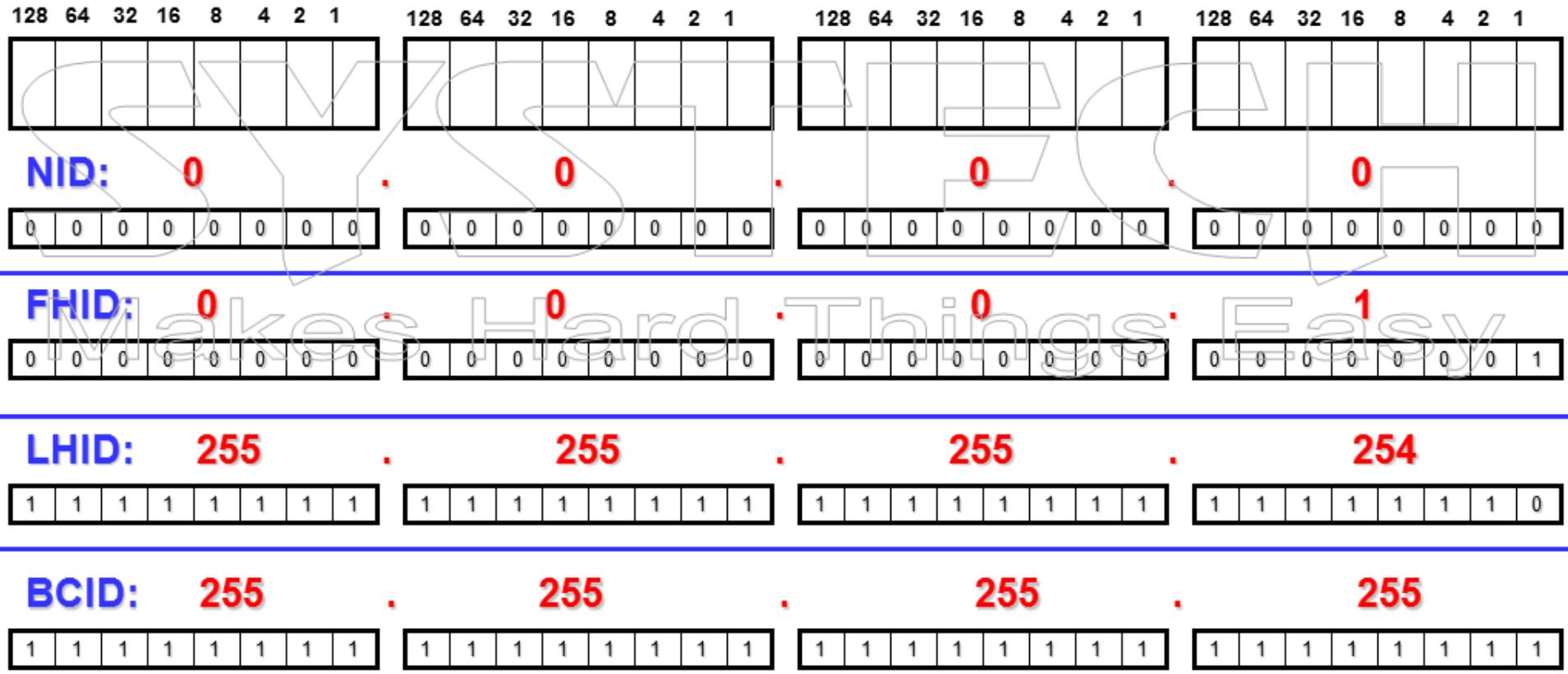
N/W	.	N/W	.	HOST	.	HOST
255	.	255	.	0	.	0

Class C: Default subnet mask - 255.255.255.0

N/W	.	N/W	.	N/W	.	HOST
255	.	255	.	255	.	0

SUBNETTING

Network ID (NID) – All are 0 (0.0.0.0)
First host ID (FHID) – All 0 but 1 (0.0.0.1)
Last Host ID (LHID) – All 1 but 0 (255.255.255.254)
Broadcast ID (BCID) – All 1 (255.255.255.255)



MAJOR NETWORK ID (MNID)

E.g.:

Class A: 10.0.0.0 (MNID)

Host are 0

Class B: 175.50.0.0 (MNID)

Host are 0

Class C: 200.200.200.0 (MNID)

Host are 0

2 POWER CHART

$2^{2} - 2$	= 2
$2^{3} - 2$	= 6
$2^{4} - 2$	= 14
$2^{5} - 2$	= 30
$2^{6} - 2$	= 62
$2^{7} - 2$	= 126
$2^{8} - 2$	= 254
$2^{9} - 2$	= 510
$2^{10} - 2$	= 1022
$2^{11} - 2$	= 2046
$2^{12} - 2$	= 4094
$2^{13} - 2$	= 8190
$2^{14} - 2$	= 16382
$2^{15} - 2$	= 32766

NUMBERING SYSTEM:

✓Binary Numbering System

Base 2,Digits: 0 1

✓Octal Numbering System

Base 8, Digits: 0 1 2 3 4 5 6 7

✓Decimal Numbering System

Base 10, Digits: 0 1 2 3 4 5 6 7 8 9

✓Hexadecimal Numbering System

Base 16, Digits: 0 1 2 3 4 5 6 7 8 9 A B C D E F

CONVERSIONS:

Decimal to Binary:

2	78	
2	39	0
2	19	1
2	9	1
2	4	1
2	2	0
	1	

78=1001110

Binary to Decimal:

$2^6\ 2^5\ 2^4\ 2^3\ 2^2\ 2^1\ 2^0$

= 1 1 0 1 0 1 1

= 64+32+8+2+1

= 107

2 power chart

2^0	1	2^8	256
2^1	2	2^9	512
2^2	4	2^{10}	1,024
2^3	8	2^{11}	2,048
2^4	16	2^{12}	4,096
2^5	32	2^{13}	8,192
2^6	64	2^{14}	16,384
2^7	128	2^{15}	32,768

Hexadecimal-Decimal-Binary equivalents

HEXADECIMAL	DECIMAL	BINARY
0	0	0000
1	1	0001
2	2	0010
3	3	0011
4	4	0100
5	5	0101
6	6	0110
7	7	0111
8	8	1000
9	9	1001
A	10	1010
B	11	1011
C	12	1100
D	13	1101
E	14	1110
F	15	1111

Binary-Decimal equivalents

10000000	128
11000000	192
11100000	224
11110000	240
11111000	248
11111100	252
11111110	254
11111111	255

SUBNET MASK VALUE

- ✓Defines properties of IP Address to which it can communicate and to which it can not
- ✓IP address uses subnet mask to find out boundary of network
- ✓Subnet mask value is driver of IP address
- ✓Network bits are 1 and host bits are 0

NETWORK ADDRESS

- ✓Identification address for all the systems in the network
- ✓The system with same network address will communicate with each other

BROADCAST ADDRESS

- ✓Used to deliver broadcast messages to all computer in the network
- ✓All the system in between network address and broadcast address form logical network for communication

Network address & broadcast address are boundaries of a network and they can't be assigned to computers

VLSM (Variable Length subnet Mask)

- ✓Subnetting of subnetting
- ✓IP address schema is used more efficiently without wastage