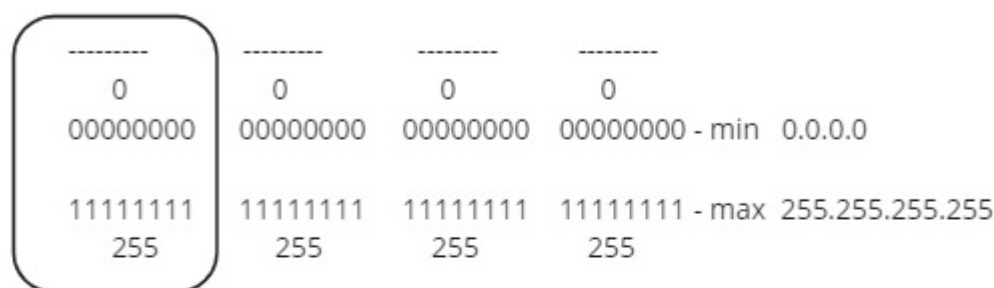


## IP Addressing

Unicast/ Unique IP - used for communication  
 Network IP - 1st IP of a group  
 Broadcast IP - last IP of the group  
 APIPA - System Autogenerated IP  
 Loopback IP - used for NIC testing  
 Multicast IP - reserved for research work

IPv4 - 32 bits - divided into 4 octets



There are 5 classes of IPs - A,B,C,D and E

Binary to decimal conversion

10010011	1	0	0	1	0	0	1	1
	128	64	32	16	8	4	2	1
	1	0	0	1	0	0	1	1
	1	1	1	1	1	1	1	1

= 128+0+0+16+0+0+2+1 = 147  
 = 128+64+32+16+8+4+2+1 = 255

Decimal to binary conversion

255.89.240.10 - valid  
 9.74.259.9 - invalid

$$147 - 128 = 19 - 16 = 3 - 2 = 1 - 1 = 0$$

192 - 11000000

194.56.0.10/24	CIDR - 24	11111111	11111111	11111111	00000000
10.0.0.0/24	no. of on bits out of 32 bits - 24	255.255.255.0	- subnet mask		
	no. of IPs - $2^{\text{off bits}} = 2^8 = 256$	194.56.0.0--194.56.0.1--194.56.0.2-----194.56.0.255			

class	Range	Default Subnet Mask	On bits nwkw bits	off bits host bits	Total no. of IPs
A	1-126	255.0.0.0	8	24	$2^{24} = 16777216$
B	128-191	255.255.0.0	16	16	$2^{16} = 65536$
C	192-223	255.255.255.0	24	8	$2^8 = 256$
D	224-239	255.255.255.255	32	0	$2^0 = 1$
E	240-255	255.255.255.255	32	0	$2^0 = 1$

193.78.10.127/24 find class, default subnet mask, subnet mask, extra on bits, no. of groups, total no. of IPs, total no. of IPs in a group  
 network IP, broadcast IP, valid IPs and which type of IP is given in the question

Class - C  
 D.S.M - 255.255.255.0  
 S.M - 255.255.255.0  
 Extra on bits = 0  
 total no. of groups =  $2^{\text{extra on bits}} = 2^0 = 1$   
 total no. of IPs =  $2^{\text{off bits (D.S.M)}} = 2^8 = 256$   
 Total no. of IPs in a group =  $2^{\text{off bits (S.M)}} = 2^8 = 256$   
 Valid IP ->  $256 - 2$  (1 nwkw & broadcast) = 254  
 IP in question is unicast  
 193.78.10.0---193.78.10.1--193.78.10.2-----193.78.10.255  
 network IP      unicast IP      broadcast IP

193.78.10.127/25  
 class - C  
 D.S.M - 255.255.255.0  
 S.M - 255.255.255.128  
 extra on bits = 1  
 groups =  $2^1 = 2$   
 total no of IPs =  $2^{\text{off bits (D.S.M)}} = 2^8 = 256$   
 total no of IPs in a group =  $2^7$  (S.M) = 128  
 valid IPs =  $256 - 4$  (2 nwkw & 2 broadcast)  
 type of IP given in question - broadcast  
 193.78.10.0--193.78.10.1-----193.78.10.127 -> grp1  
 193.78.10.128--193.78.10.129-----193.78.10.255 -> grp 2  
 network      unique      broadcast

11111111 11111111 11111111 00000000  
 11111111 11111111 11111111 10000000