IP (Classful) Addresses

Class	First Byte	Decimal Range	Networks	Hosts	Mask	Private Addresses
A	0bbbbbbb	0 - 127	2^7	2^24	255.0.0.0	10.0.0.0 - 10.0.0.255
B	10bbbbbb	128-191	2^14	2^16	255.255.0.0.	172.16.0.0 - 172.31.255.255
C	110bbbbb	192-223	2^21	2^8	255.255.255.0	192.168.0.0 - 192.168.255.255
D	1110bbbb	224-239	1			
E	1111bbbb	240-255	1			

Special Addresses	Address	
Direct Broadcast	NetID.All 1's	
Limited Broadcast	All 1's	(255.255.255.255)
This Host	All 0's	(0.0.0.0)
Specific Host	All 0's.HostID	
Loopback	127.x.x.x	(127.0.0.1)
Multicast	224.0.	

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

Classless IP Addresses (CIDR - Classless Interdomain Routing)

Format: d.d.d.d/n where the d's are decimal integers between 0 and 255, and the n is a decimal integer between 1 and 254.

n specifies how many leftmost bits of the 32 IP address bits designate the network address.

e.g. if n = 16, this is equivalent to a network address mask of 255.255.0.0

if n = 25, this is equivalent to a network address mask of 255.255.255.128

For any n, the number of host address bits is 32-n

Special and private addresses are the same as for Classful IP addressing

Subnetting

Subnetworks are created by allocating some of the (rightmost) host address bits to the network address.
The number of bits so allocated (m, say) determines the number of subnetworks created
The remaining number of host address bits (32 -n - m) are the host IDs available on each subnetwork

Examples

Classful adressing: Given the Class B IP address 130.10.254.1 and mask is 255.255.0.0

The network address is 130.10.0.0 and there are 2^16 host addresses
If 8 subnetworks are created, 3 of the host address bits become subnetwork address bits
The subnetwork addresses are 130.10.0.0, 130.10.32.0, 130.10.64.0, 130.10.96,
130.10.128.0, 130.10.160, 130.10.192.0, and 130.10.224.0
The subnetwork address mask is 255.255.224.0
Each subnetwork has 2^13 available host addresses

Classless addressing: Given the IP address 130.10.254.1/18

The network address is 130.10.192.0 with address mask 255.255.192.0 and 2^14 host addresses
If 4 subnetworks are created, 2 of the host address bits become subnetwork address bits
The subnetwork addresses are 130.10.192.0, 130.10.208.0, 130.10.224.0, and 130.10.240.0
Each subnetwork has 2^12 available host addresses