Internet Protocol (IP) Addressing

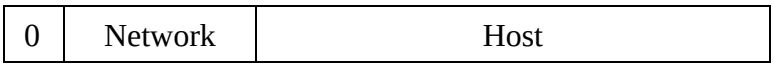
IP addresses are hierarchical and consist of two parts – a network part and a host part.

All hosts and routers connected in a network all have the same network part of their IP address.

Routers have an IP address for each interface connected into a network

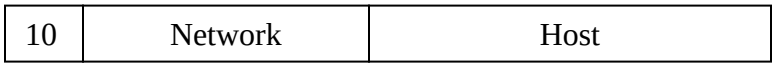
IP addresses are broken up into three address classes

Class A Networks: 8 bit network address with a first bit = 0 and 24 bit host address



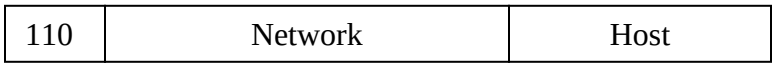
Addresses are of the form **NNN.HHH.HHH.HHH**, here NNN ranges from an all zero network address: 00000000 to 01111111 (or decimal 0 to 127) . Networks 0 and 127 are reserved, so there are **at most 126 class A networks each with 2^{24} – 2 hosts each.** Possible networks using the dotted decimal notation are: 1.xxx.xxx.xxx to 126.xxx.xxx.xxx

Class B Networks: 16 bit network address with the first two bits = 10 and 16 bit host address



Addresses are of the form **NNN.NNN.HHH.HHH**, here there are **2^{14} – 2= 16384 possible Class B** networks with **2^{16} – 2= 65534 hosts each**. The first 8 bits of the network address are 10xxxxxx which allows for networks represented by numbers 128 through 191. Therefore the possible networks are 128.0.xxx.xxx to 191.255.xxx.xxx

Class C Networks: 24 bit network address with the first three bits = 110 and 8 bit host address



Addresses are of the form **NNN.NNN.NNN.HHH**, here there are 2^{21} - 2 possible networks (minus the 2 reserved ones) and 254 hosts per network. The first 8 bits of the network address are 110xxxxx which allows for networks represented by numbers 11000000 (192) to 11011111 (223). Therefore possible network addresses are: 192.0.0.xxx to 223.255.255.xxx

Each network address set has 2 addresses that are reserved
Each host address set has 2 addresses that are reserved

The following table is from Wikipedia (http://en.wikipedia.org/wiki/Classful_network)

Class	Leading bits	Size of *network number* bit field	Size of *rest* bit field	Number of networks	Addresses per network	Start address	End address
Class A	0	8	24	128 (2^7)	16,777,216 (2^{24})	0.0.0.0	127.255.255.255
Class B	10	16	16	16,384 (2^{14})	65,536 (2^{16})	128.0.0.0	191.255.255.255
Class C	110	24	8	2,097,152 (2^{21})	256 (2^8)	192.0.0.0	223.255.255.255
Class D (multicast)	1110	not defined	not defined	not defined	not defined	224.0.0.0	239.255.255.255
Class E (reserved)	1111	not defined	not defined	not defined	not defined	240.0.0.0	255.255.255.255