# Experiment No. 3

Internet Protocol (IPv4)

OBJECTIVE

Ipv4 classes, Private and Public IP adresses.

Internet Protocol hierarchy contains several classes of IP Addresses to be used efficiently in various situations as per the requirement of hosts per network. Broadly, the IPv4 Addressing system is divided into five classes of IP Addresses. All the five classes are identified by the first octet of IP Address.

The first octet referred here is the left most of all. The octets numbered as follows depicting dotted decimal notation of IP Address:
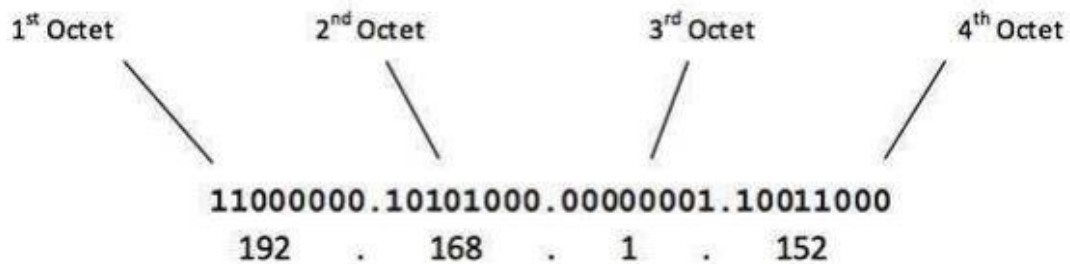
The number of networks and the number of hosts per class can be derived by this formula:

$$\text{Number of networks} = 2\text{^network\_bits}$$

$$\text{Number of Hosts/Network} = 2\text{^host\_bits} - 2$$

When calculating hosts' IP addresses, 2 IP addresses are decreased because they cannot be assigned to hosts, i.e. the first IP of a network is network number and the last IP is reserved for Broadcast IP.

The default subnet mask for Class A IP address is 255.0.0.0 which implies that Class A addressing can have 126 networks (2 7-2) and 16777214 hosts (2 24-2).

Class A IP address format is thus: **0NNNNNNN.HHHHHHHH.HHHHHHHH.HHHHHHHH**

Class B Address:

An IP address which belongs to class B has the first two bits in the first octet set to 10, i.e.

```
10000000 - 10111111
   128 - 191
```

Class B IP Addresses range from 128.0.x.x to 191.255.x.x. The default subnet mask for Class B is 255.255.x.x.

Class B has 16384 (2 14) Network addresses and 65534 (2 16-2) Host addresses.

Class B IP address format is: **10NNNNNN.NNNNNNNN.HHHHHHHH.HHHHHHHH**

Class C Address:

The first octet of Class C IP address has its first 3 bits set to 110, that is:

```
11000000 - 11011111
   192 - 223
```

Class C IP addresses range from 192.0.0.x to 223.255.255.x. The default subnet mask for Class C is 255.255.255.x. Class C gives 2097152 (2 21) Network addresses and 254 (2 8-2) Host addresses.

Class C IP address format is: **110NNNNN.NNNNNNNN.NNNNNNNN.HHHHHHHH**

Class D Address:

Very first four bits of the first octet in Class D IP addresses are set to 1110, giving a range of:

```
11100000 - 11101111
   224 - 239
```

Class D has IP address rage from 224.0.0.0 to 239.255.255.255. Class D is reserved for Multicasting. In multicasting data is not destined for a particular host, that is why there is no need to extract host address from the IP address, and Class D does not have any subnet mask.

Class E Address

This IP Class is reserved for experimental purposes only for R&D or Study. IP addresses in this class ranges from 240.0.0.0 to 255.255.255.254. Like Class D, this class too is not equipped with any subnet mask.

Private IP address:

A private IP address is an IP address that's reserved for internal use behind a router or other Network Address Translation (NAT) device, apart from the public.

Private IP addresses are in contrast to public IP addresses, which are public and can not be used within a home or business network.

Sometimes a private IP address is also referred to as a local IP address.

Public IP address:

An Internet Protocol (IP) address that is designated for use in a public domain, such as the Internet. A public IP address is in contrast to a private IP address, which is in an address range designated for use only in a private domain, such as a local area network (LAN). See also domain, Internet, IP, IP address, LAN, and private IP address.

Summary   of   Ipv4   Classes   range   and   Public   &   Private   IP   adress:

IP address classes

Class	1st Octet Decimal Range	1st Octet High Order Bits	Network/Host ID (N=Network, H=Host)	Default Subnet Mask	Number of Networks	Hosts per Network (Usable Addresses)
A	1 – 126*	0	N.H.H.H	255.0.0.0	$126\ (2^7 - 2)$	$16,777,214\ (2^{24} - 2)$
B	128 – 191	10	N.N.H.H	255.255.0.0	$16,382\ (2^{14} - 2)$	$65,534\ (2^{16} - 2)$
C	192 – 223	110	N.N.N.H	255.255.255.0	$2,097,150\ (2^{21} - 2)$	$254\ (2^8 - 2)$
D	224 – 239	1110	Reserved for Multicasting			
E	240 – 254	1111	Experimental; used for research			

Note: Class A addresses 127.0.0.0 to 127.255.255.255 cannot be used and is reserved for loopback and diagnostic functions.

Private IP Addresses

Class	Private Networks	Subnet Mask	Address Range
A	10.0.0.0	255.0.0.0	10.0.0.0 - 10.255.255.255
B	172.16.0.0 - 172.31.0.0	255.240.0.0	172.16.0.0 - 172.31.255.255
C	192.168.0.0	255.255.0.0	192.168.0.0 - 192.168.255.255

Lab Report 02

1. **What is Network Id in IP address?**
2. **What is Broadcasr Id in IP address?**
3. **What are the uses of Ipv4 Class A, Class B, Class C and Class D?**
4. **State the difference b/w Switch and Hub.**