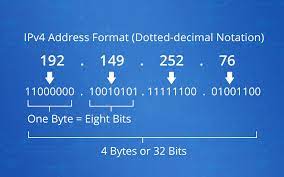
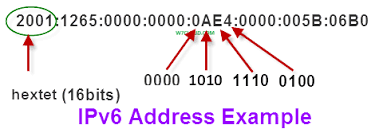
**ASSIGNMENT-1**

**IPv4**

IPv4 addresses are 32-bit integers that have to be expressed in Decimal Notation. It is represented by 4 numbers separated by dots in the range of 0-255, which have to be converted to 0 and 1, to be understood by Computers. IPv4 Address Format is a 32-bit Address that comprises binary digits separated by a dot (.).



**IPv6**

IPv6 is written as a group of 8 hexadecimal numbers separated by colon (:). It can be written as 128 bits of 0s and 1s.

**Advantages in IPv6:**

->It has built-in improved security features and offers security like data authentication and encryption.

->It has larger address space than IPv4 and hence can be used for connecting higher number of devices.

->IPv6 has increased and better support for Mobile Devices. It helps in making quick connections over other Mobile Devices and in a safer way than IPv4.

->As compared to IPv4, IPv6 has a simpler and more effective header Structure, which is more cost-effective.

**Following are the features of IPv4:**

* Connectionless Protocol
* Allow creating a simple virtual communication layer over diversified devices
* It requires less memory, and ease of remembering addresses
* Already supported protocol by millions of devices
* Offers video libraries and conferences

**Following are the features of IPv6:**

* Hierarchical addressing and routing infrastructure
* Stateful and Stateless configuration
* Support for quality of service (QoS)
* An ideal protocol for neighboring node interaction

**RESERVED PORTS**

Port numbers can run from 0 to 65353. Port numbers from 0 to 1023 are reserved for common TCP/IP applications and are called well-known ports. The use of well-known ports allows client applications to easily locate the corresponding server application processes on other hosts. For example, a client process wanting to contact a DNS process running on a server must send the datagram to some destination port. The well-known port number for DNS is 53, and that’s where the server process should be listening for client requests. These ports are sometimes called “privileged” ports, although a number of applications that formerly ran in “privileged” mode, such as HTTP servers, do not run this way anymore except when binding to the port. It should be noted that it is getting harder and harder to register new applications in the space below 1023 (these often use registered ports in the range 1024 to 49151).

Ports used on servers are persistent in the sense that they last for a long time, or at least as long as the application is running. Ports used on clients are ephemeral in the sense that they “come and go” as the user runs client applications.

Technically, UDP port numbers are independent from TCP port numbers. In practice, most of the applications indexed by port numbers are the same in UDP or TCP (although a few applications can use either protocol), excepting a handful that are maintained for historical reasons. This does not imply that applications can use TCP or UDP as they choose. It just means that it’s easier to maintain one list rather than two. But no matter what port numbers are used, UDP port 1000 is a different application than TCP port 1000, even though both applications might perform the same function.

## CLASS-A

In this class out of 32 bits only first 8 bits are assigned to the network part, hence it has default subnet mask of 255.0.0.0. In this class the first bit is reserved and is always kept off.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Bit’s Position** | **1** | 2 | 3 | 4 | 5 | 6 | 7 | 8 |  |
| **Decimal Value** | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Total=0 |

Lower range can be found out by keeping all the bits off (means the corresponding numerical value is not added)

Higher range can be calculated by turning all the bits on (except the 1st bit which is reserved as off)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Bit’s Position** | **1** | 2 | 3 | 4 | 5 | 6 | 7 | 8 |  |
| **Decimal Value** | **0** | 64 | 32 | 16 | 8 | 4 | 2 | 1 | Total=127 |

Hence the IP range of this class should be 0-127 but 0.0.0.0 doesn’t represent a valid network and 127.0.0.0 to 127.255.255.255 is reserved for local host loop back to verify TCP/IP services diagnostic functions.

So the Valid IP range for class A is **1-126**. Some examples are 10.x.x.x, 125.x.x.x, 79.x.x.x, 98.x.x.x etc.

## 

## CLASS-B

In this class first 16 bits are assigned to network part & so it has default subnet mask of 255.255.0.0. For range assignment first two bits are reserved, first bit always on and second bit always off.

Its lower range is 128 as last six bits are off

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Bit’s Position** | **1** | **2** | 3 | 4 | 5 | 6 | 7 | 8 |  |
| **Decimal Value** | **128** | **0** | 0 | 0 | 0 | 0 | 0 | 0 | Total=128 |

Its higher range is 191 as last six bits are on

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Bit’s Position** | **1** | **2** | 3 | 4 | 5 | 6 | 7 | 8 |  |
| **Decimal Value** | **128** | **0** | 32 | 16 | 8 | 4 | 2 | 1 | Total=191 |

So the range of class B is **128-191**. Some examples are 130.x.x.x, 156.x.x.x, 178.x.x.x, 190.x.x.x.

## CLASS-C

This class has 24 bits for network part and so its default subnet mask is 255.255.255.0. To assign the range first 3 bits are reserved, 1st & 2nd bits are always on and 3rd bit is always off.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Bit’s Position** | **1** | **2** | **3** | 4 | 5 | 6 | 7 | 8 |  |
| **Decimal Value** | **128** | **64** | **0** | 0 | 0 | 0 | 0 | 0 | Total=192 |

Its lower range is 192 as last five bits are off.

Its higher range is 223 by putting last five bits on.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Bit’s Position** | **1** | **2** | **3** | 4 | 5 | 6 | 7 | 8 |  |
| **Decimal Value** | **128** | **64** | **0** | 16 | 8 | 4 | 2 | 1 | Total=223 |

So the class C range is **192-223**. Some examples are 200.x.x.x, 215.x.x.x, 221.x.x.x, 195.x.x.x.

## CLASS-D

The range of this class is from 224-239 and can’t be allocated to hosts. This class is used for multicasting by various routing protocols. Some common examples are

224.0.0.5-Used by all OSPF routers

224.0.0.6-Used by OSPF DRs (Designated Routers)

224.0.0.9-Used by RIP-2

224.0.0.10-Used by EIGRP

224.0.0.12-Used by DHCP Server/Relay Agent

224.0.0.14-Used by RSVP encapsulation

224.0.0.18-Used by VRRP

224.0.0.22-Used by IGMP

## 

## CLASS-E

The range of this class is from 240-255 and is not meant for general use. These are typically used for experiments.