

Computer Network

IP address

- An IP (Internet Protocol) address is a numerical label assigned to the devices connected to a computer network that uses the IP for communication.
- IP address act as an identifier for a specific machine on a particular network. It also helps you to develop a virtual connection between a destination and a source. The IP address is also called IP number or internet address. It helps you to specify the technical format of the addressing and packets scheme. Most networks combine TCP with IP.

IP address

- An IP address consists of four numbers, each number contains one to three digits, with a single dot (.) separates each number or set of digits.
- First 16 bit: network part. Last 16 bits: Host part

IP address

IP Address is divided into two parts:

- Prefix: The prefix part of IP address identifies the physical network to which the computer is attached. . Prefix is also known as a network address.
- Suffix: The suffix part identifies the individual computer on the network. The suffix is also called the host address.

How does IP address work?

IP address works in an IP network like a postal address. For example, a postal address combines two addresses, address, or your area your house address.

The address or your area is a group address of all houses that belong to a specific area. The house address is the unique address of your homes in that area. Here, your area is represented by a PIN code number.

In this example, the network address comprises all hosts which belong to a specific network. The host address is the unique address of a particular host in that network.

What is Classful Addressing?

Classful addressing is a network addressing the Internet's architecture from 1981 till Classless Inter-Domain Routing was introduced in 1993.

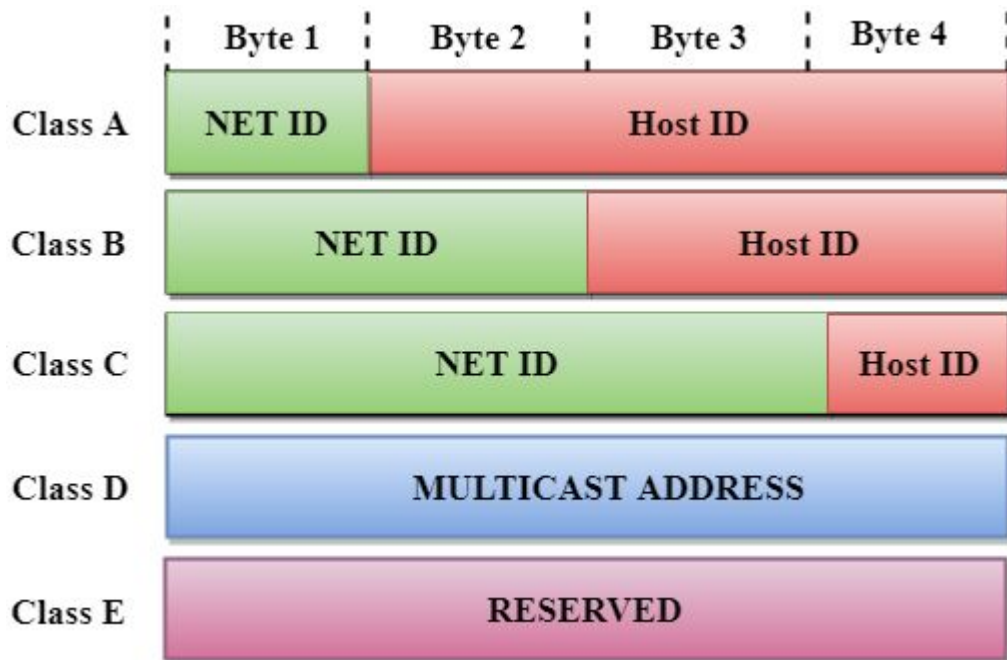
This addressing method divides the IP address into five separate classes based on four address bits.

Here, classes A, B, C offers addresses for networks of three distinct network sizes. Class D is only used for multicast, and class E reserved exclusively for experimental purposes.

Limitations of classful IP addressing

Here are the drawbacks/ cons of the classful IP addressing method:

1. Risk of running out of address space soon
2. Class boundaries did not encourage efficient allocation of address space



Class A Network

In Class A, the first bit in higher order bits of the first octet is always set to 0 and the remaining 7 bits determine the network ID. The 24 bits determine the host ID in any network.

The total number of networks in Class A = $2^7 = 128$ network address

The total number of hosts in Class A = $2^{24} - 2 = 16,777,214$ host address

Class B Network

In Class B, an IP address is assigned to those networks that range from small-sized to large-sized networks.

The Network ID is 16 bits long.

The Host ID is 16 bits long.

In Class B, the higher order bits of the first octet is always set to 10, and the remaining 14 bits determine the network ID. The other 16 bits determine the Host ID.

The total number of networks in Class B = $2^{14} = 16384$ network address

The total number of hosts in Class B = $2^{16} - 2 = 65534$ host address

Class C Network

In Class C, the higher order bits of the first octet is always set to 110, and the remaining 21 bits determine the network ID. The 8 bits of the host ID determine the host in a network.

The total number of networks = $2^{21} = 2097152$ network address

The total number of hosts = $2^8 - 2 = 254$ host address

Class D Network

Class D addresses are only used for multicasting applications. Class D is never used for regular networking operations. This class addresses the first three bits set to “1” and their fourth bit set to use for “0”. Class D addresses are 32-bit network addresses. All the values within the range are used to identify multicast groups uniquely.

Therefore, there is no requirement to extract the host address from the IP address, so Class D does not have any subnet mask.

Example for a Class D IP address:

227.21.6.173

Class E Network

Class E IP address is defined by including the starting four network address bits as 1, which allows you to incorporate addresses from 240.0.0.0 to 255.255.255.255. However, E class is reserved, and its usage is never defined. Therefore, many network implementations discard these addresses as undefined or illegal.

Example for a Class E IP address:

243.164.89.28