**Subnetting**

Generally IP address is in two parts:

**network number portion and host number portion**.

The highest order octet (most significant bits) in an address was designated as the ***network number****.*

and the remaining bits were called the *rest field* or ***host identifier***, and were used for host numbering within a network.

The **first three bits** of the most significant octet of an IP address were defined as the *class* of the address.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Historical classful network architecture** | | | | | | | |
| **Class** | **Leading bits** | **Size of *network number* bit field** | **Size of *rest* bit field** | **Number of networks** | **Addresses per network** | **Start address** | **End address** |
| **A** | 0 | 8 | 24 | 128 (27) | 16,777,216 (224) | 0.0.0.0 | 127.255.255.255 |
| **B** | 10 | 16 | 16 | 16,384 (214) | 65,536 (216) | 128.0.0.0 | 191.255.255.255 |
| **C** | 110 | 24 | 8 | 2,097,152 (221) | 256 (28) | 192.0.0.0 | 223.255.255.255 |

**Private addresses**

Computers not connected to the Internet, such as factory machines that communicate only with each other via TCP/IP, need not have globally unique IP addresses.

Three non-overlapping ranges of IPv4 addresses for private networks were reserved in [RFC 1918](https://tools.ietf.org/html/rfc1918). These addresses are not routed on the Internet and thus their use need not be coordinated with an IP address registry.

Today, when needed, such private networks typically connect to the Internet through [network address translation](https://en.wikipedia.org/wiki/Network_address_translation) (NAT).

|  |  |  |
| --- | --- | --- |
| **Reserved private IPv4 network ranges**[[8]](https://en.wikipedia.org/wiki/IP_address#cite_note-8) | | |
| **Start** | **End** | **Number of addresses** |
| 10.0.0.0 | 10.255.255.255 | 16777216 |
| 172.16.0.0 | 172.31.255.255 | 1048576 |
| 192.168.0.0 | 192.168.255.255 | 65536 |

Any user may use any of the reserved blocks. Typically, a network administrator will divide a block into [subnets](https://en.wikipedia.org/wiki/Subnetwork); for example, many [home routers](https://en.wikipedia.org/wiki/Residential_gateway) automatically use a default address range of 192.168.0.0 through 192.168.0.255 (192.168.0.0/24).