

# Subnet Mask & Subnetting



## What is a subnet?

- Is a segmented piece/subdivision of a larger network, the act of creating subnets is called subnetting.
- Subnetting aims to provide efficiency by creating smaller, interconnected networks that help minimize traffic.
- Each subnet allows its connected devices to communicate with each other, while routers are used to communicate between subnets (by sending packets to a gateway).
- A subnet itself also may be segmented into smaller subnets as long as sufficient address space is available.
- Subnetting allows network administrators to reduce network-wide threats by quarantining compromised sections of the network and by making it more difficult for trespassers to move around an organization's network.

## What is a subnet mask?

- All IP addresses are divided into portions, a subnet mask is what divides/splits an IP address into those portions: the client or host address and the server or network address/routing prefix.
- An IP address and its associated network mask may be expressed in Classless Inter-Domain Routing (CIDR) notation: The network address, followed by a slash character (/), and ending with the bit-length of the host address. For example, 198.51.100.0/24 is the prefix of the IPv4 network starting at the given address, having 24 bits allocated for the network address, and the remaining 8 bits reserved for host addressing.
- A subnet mask tells the data sending computer whether the destination IP address is local or remote and it can be seen as a string of ones followed by some number of zeroes, always totaling exactly 32 bits typed into every TCP/IP host.
- IPv6 doesn't have a subnet mask but instead calls it a Prefix Length, often shortened to "Prefix". Prefix length and CIDR masking work similarly; The prefix length denotes how many bits of the address define the network in which it exists.

## Class IDs

The internet is the most complex TCP/IP internetwork and one of its challenges is to make sure no two devices share the same public IP address.

To support the dispersion of IP addresses an organization called IANA was formed to track and disperse IP addresses to those who need them. IANA's RIRs (Regional Internet Registries) parcel out IP addresses to large ISPs and major corporations and does so in network blocks named Class A, Class B, Class C, Class D and Class E.

Each of the mentioned address classes has a different default subnet mask. You can identify the class of an IP address by looking at its first octet. Class D and Class E are dedicated to special purposes such as experimental tasks.

	First Decimal Value	Addresses	Hosts per Network ID
<b>Class A</b>	1-126	1.0.0.0 - 126.255.255.255	16,777,214
<b>Class B</b>	128-191	128.0.0.0 - 191.255.255.255	65,534
<b>Class C</b>	192-223	192.0.0.0 - 223.255.255.255	254
<b>Class D</b>	224-239	224.0.0.0 - 239.255.255.255	Multicast
<b>Class E</b>	240-254	240.0.0.0 - 254.255.255.255	Experimental