

## SUBNET MASK

A subnet mask in networking is a 32-bit number that divides an IP address into network and host portions. It acts as a guide, helping routers determine whether a destination IP address is on the same local network or requires routing through other networks.

### 1. Dividing IP Addresses:

- A subnet mask, when combined with an IP address, identifies the network portion and the host portion of that IP address.
- The network portion specifies the network to which the device belongs, while the host portion identifies the specific device within that network.

### 2. Facilitating Routing:

- Routers use subnet masks to determine the appropriate path for data packets.
- By examining the subnet mask, a router can quickly identify if the destination IP address is on the same network or if it needs to forward the packet to another router.
- This process prevents the router from having to track every individual device and significantly improves network efficiency.

## WILDCARD MASK

### 1. Bitwise Comparison:

When a wildcard mask is applied to an IP address, each bit in the mask is compared with the corresponding bit in the IP address.

### 2. Matching:

A "0" in the wildcard mask means the IP address bit must be identical to the bit in the rule or policy. A "1" in the wildcard mask means the IP address bit can be either a 0 or a 1.

### 3. Range Definition:

By using a combination of "0"s and "1"s, wildcard masks can specify a range of IP addresses instead of just a single network address.

Example:

- Consider the IP address 192.168.1.0 with a wildcard mask of 0.0.0.255.
- The wildcard mask "0.0.0.255" indicates that the first three octets (192.168.1) must match exactly, while the last octet (0) can be any value.
- This means the rule or policy will apply to the entire subnet 192.168.1.0/24 (192.168.1.0 to 192.168.1.255)

**Common Uses:**

- Access Control Lists (ACLs):

ACLs use wildcard masks to filter network traffic based on IP address ranges, allowing for efficient and concise rule creation.

- Routing Protocols (EIGRP, OSPF):

Wildcard masks are used in routing protocols to define which networks a router should advertise or accept routing updates for.

- Network Segmentation:

Wildcard masks can be used to define network boundaries for management and security purposes