# Classless Inter-Domain Routing (CIDR)

Classless Inter-Domain Routing (CIDR) blocks are for specifying a range to IP addresses in format of IPv4 or IPv6.

For the sake of simplicity, I will explain rest of this in format of IPv4 however it is applicable to IPv6.

*General format for CIDR Blocks:****x.y.z.t/p***

x, y, z and t are numbers from 0 to 255. Basically, each represents an 8-bit binary number. That's why it is range is up to 255. Combination of this numbers becomes an IPv4 IP address that must be unique to be able to identify a specific instance.

In case of AWS, p is a number from 16 to 28. It represents the number of bits that are inherited from given IP address.

For example: 10.0.0.0/16 represents an IP address in following format: 10.0.x.y where x and y are any number from 0 to 255. So, it represents a range of IP addresses, starting from 10.0.0.0 to 10.0.255.255.

However, for each CIDR block, AWS prohibits 5 possible IP addresses. Those are the first 4 available addresses and the last available address. In this case:

1. 10.0.0.0: Network address
2. 10.0.0.1: Reserved for VPC router
3. 10.0.0.2: DNS server
4. 10.0.0.3: Reserved for future use
5. 10.0.255.255: Network broadcast

This is one of the main reasons why AWS permits numeric value of p up to /28. Because for p=30, there will be 4 available values however AWS needs 5 IP address to use. In my opinion for p=29, they might find it inefficient to occupy 5 addresses to provide 3 possible IP address.

Number of possible IP addresses can be calculated by using this formula:

NumberOfPossibleIPs = **2^(32-p) - 5**

Eg-

10.0.0.0/24

= 24/8 = 3

= min 10.0.0.0 | max 10.0.0.255

10.0.0.0/32 10.0.0.0/0

= 32/8 = 4 = 0/8 = 0

= min = max 10.0.0.0 = min 0.0.0.0 | max 255.255.255.255