

Subnetting on the 4th Octet – Written Example

“For the IP address 172.19.216.50 255.255.255.240, what is the network address, broadcast address and range of valid hosts?”

The first thing to figure out is which octet we are subnetting on.

The subnet mask is 255.255.255.240

We can see we are not subnetting on the first 3 octets as the value is 255.

We are subnetting on the 4th octet with a value of 240.

I like to underline the octet I’m working on at this point so that I don’t accidentally confuse the octets later:

172.19.216.50/28

The 172.19.216 part of the address (the first 3 octets) is never going to change in our example.

Next up let’s figure out the network address.

Write down the 4th octet in binary then add the digits together from the left until they add up to the ‘240’ used in the subnet mask.

4th octet

128	64	32	16	8	4	2	1
x	x	x	x				

$$128 + 64 = 192$$

$$192 + 32 = 224$$

$$224 + 16 = 240$$

The first 4 bits in the 4th octet are being borrowed for the network portion of the address and the remaining 4 bits are used for the host portion.

4th octet

128	64	32	16	8	4	2	1
x	x	x	x				

We can see that the network portion of the address falls on a '16', so the subnets will go up in multiples (a block size) of 16 on the 4th octet:

172.19.216.0/28

172.19.216.16/28

172.19.216.32/28

172.19.216.48/28

172.19.216.64/28

Etc...

At this point we can see which subnet the IP address in our example is in. 172.19.216.**50** falls in the range between 172.19.216.**48** and 172.19.216.**64**, so it is in the 172.19.216.48 subnet.

('50' is between '48' and '64'.)

172.19.216.48/28 is the network address we are working on.

172.19.216.64/28 is the next network address.

Next we figure out the broadcast address. This is one less than the next network address:

172.19.216.63 is the broadcast address.

('63' is one less than '64'.)

The last thing to figure out is the range of valid host addresses. This is everything between the network address and broadcast address.

172.19.216.49 to 172.19.216.62 is the range of valid host addresses.

('49' is one more than the network address of '48', '62' is one less than the broadcast address of '63'.)