**SUBNETTING USING NUMBER OF HOSTS**

* Create 50 Hosts per Network
* Network Address – **200.1.0.0**
* Subnet Mask is **255.255.0.0**

**Step 1**

Convert the required number of Hosts - 50 to binary to determine the number of bits required to create the network.

5010 - Binary = 1100102 = 6 bits

**Step 2**

We save bits in the subnet mask and find our increment.

The subnet mask is 255.255.0.0. We convert it to binary

255.255.0.0 = 11111111.11111111.00000000.00000000

The number of bits needed to create subnets for 50 hosts is 6 so we save 6 bits on the 4th octet from right – left and change the remaining zeros (0s) to ones (1s)

11111111.11111111.00000000.00**000000** it then becomes

11111111.11111111.11111111.11000000

The 4th octet – 11000000 now becomes 192

128 + 64 = 192

64 = Lowest network bit converted to decimal

Converting back to decimal it becomes 255.255.255.192

Increment = **4** = Lowest network bit converted to decimal.

**Step 3**

Determine the total number of networks that can be created using the formula –

Number of Networks = 2n (where n = number of bits)

Number of bits = 6, so No. of networks = 26 = **64**

**Step 4**

Use your increment to find your network range.

Increment is 64, and we can create a total of 64 networks, so our new subnetwork addresses will be:

1. 200.1.0.0 – 200.1.0.63
2. 200.1.0.64 – 200.1.0.127
3. 200.1.0.128 – 200.1.0.191
4. 200.1.0.192 – 200.1.0.255
5. 200.1.1.0 – 200.1.1.63
6. 200.1.1.64 – 200.1.1.127
7. 200.1.1.128 – 200.1.1.191
8. 200.1.1.192 – 200.1.1.255

* Create 12 Hosts per Network
* Network Address – **192.168.3.0**
* Subnet Mask – Class C Network = **255.255.255.0**

**Step 1**

Convert the required number of Hosts - 12 to binary to determine the number of bits required to create the network.

1210 - Binary = 11002 = 4 bits

**Step 2**

Now that we know the number of bits we save bits in the subnet mask and find our increment.

The subnet mask is 255.255.255.0. We convert it to binary

255.255.255.0 = 11111111.11111111.11111111.00000000

We save 4 bits on the 4th octet from right to left and change the remaining zeros (0s) to ones (1s)

11111111.11111111.11111111.0000**0000** it then becomes

11111111.11111111.11111111.11110000

The 4th octet – 11110000 now becomes 240

128 + 64 + 32 + 16 = 240

16 = Lowest network bit converted to decimal

Converting back to decimal it becomes 255.255.255.240

Increment = **16** = Lowest network bit converted to decimal.

**Step 3**

Determine the total number of networks that can be created using our formula –

Number of Networks = 2n (where n = number of bits)

Number of bits = 4, so No. of networks = 24 = **16**

**Step 4**

Use your increment to find your network range.

Increment is 16, and we can create a total of 16 networks, so our new subnetwork addresses will be:

1. 192.168.3.0 – 192.168.3.15
2. 192.168.3.16 – 192.168.3.31
3. 192.168.3.32 – 192.168.3.47
4. 192.168.3.48 – 192.168.3.65
5. 192.168.3.64– 192.168.3.79
6. 192.168.3.80– 192.168.3.95
7. 192.168.3.96– 192.168.3.111
8. 192.168.3.112– 192.168.3.127
9. 192.168.3.128 – 192.168.3.143
10. 192.168.3.144– 192.168.3.159
11. 192.168.3.160– 192.168.3.175

* Create 200 Hosts per Network
* Network Address – **172.20.10.0**
* Subnet Mask – **255.255.255.0**

**Step 1**

Convert the required number of Hosts - 200 to binary to determine the number of bits required to create the network.

20010 - Binary = 110010002 = 8 bits

**Step 2**

We save bits in the subnet mask and find our increment.

The subnet mask is 255.255.255.0. We convert it to binary

255.255.255.0 = 11111111.11111111.11111111.00000000

The number of bits needed to create subnets for 200 hosts is 8 so we save 8 bits on the 4th octet from right to left) and change the remaining zeros (0s) to ones (1s)

11111111.11111111.11111111.**00000000** it then becomes

11111111.11111111.11111111.00000000

The 4th octet – 00000000 now becomes 0, so we move to the next (3rd octet) 11111111

128 + 64 + 32 + 16 + 8 + 4 + 2 + 1= 255

1 = Lowest network bit converted to decimal

Converting back to decimal it becomes 255.255.255.0

Increment = **1** = Lowest network bit converted to decimal.

**Step 3**

Determine the total number of networks that can be created using our formula –

Number of Networks = 2n (where n = number of bits)

Number of bits = 8, so No. of networks = 28 = **256**

**Step 4**

Use your increment to find your network range.

Increment is 1, and we can create a total of 256 networks, so our new subnetwork addresses will be:

1. 172.20.10.0 – 172.20.10.255
2. 172.20.11.0– 172.20.11.255
3. 172.20.12.0– 172.20.12.255
4. 172.20.13.0– 172.20.13.255
5. 172.20.14.0– 172.20.14.255
6. 172.20.15.0– 172.20.15.255
7. 172.20.16.0– 172.20.16.255
8. 172.20.17.0– 172.20.17.255
9. 172.20.18.0– 172.20.18.255
10. 172.20.19.0– 172.20.19.255

* Create 600 Hosts per Network
* Network Address – **12.0.0.0**
* Subnet Mask is **255.0.0.0**

**Step 1**

Convert the required number of Hosts - 600 to binary to determine the number of bits required to create the network.

60010 - Binary = 10010110002 = 10 bits

**Step 2**

We save bits in the subnet mask and find our increment.

The subnet mask is 255.0.0.0. We convert it to binary

255.0.0.0 = 11111111.00000000.00000000.00000000

The number of bits needed to create subnets for 600 hosts is 10 so we save 10 bits (from the 4th octet – Right – Left) and change the remaining zeros (0s) to ones (1s)

11111111.00000000.000000**00.00000000** it then becomes

11111111.11111111.11111100.00000000

The 3rd octet – 11111100 now becomes 252

128 + 64 + 32 + 16 + 8 + 4 = 252

4 = Lowest network bit converted to decimal

Converting back to decimal it becomes 255.255.252.0

Increment = **4** = Lowest network bit converted to decimal.

**Step 3**

Determine the total number of networks that can be created using our formula –

Number of Networks = 2n (where n = number of bits)

Number of bits = 10, so No. of networks = 210 =**1024**

**Step 4**

Use your increment to find your network range.

Increment is 4, and we can create a total of 1024 networks, so our new subnetwork addresses will be:

1. 12.0.0.0 – 12.0.3.255
2. 12.0.4.0 – 12.0.7.255
3. 12.0.8.0 – 12.0.11.255
4. 12.0.12.0 – 12.0.15.255
5. 12.0.16.0 – 12.0.19.255
6. 12.0.20.0 – 12.0.23.255
7. 12.0.24.0 – 12.0.27.255
8. 12.0.28.0 – 12.0.31.255
9. 12.0.32.0 – 12.0.35.255