

Subnetting

A = 10.0.0.0/8:

CIDR - Classless Inter-domain Routing

Subnet Range/Subnet Mask

A = 8-15

B = 16-23

C = 24-31

Classfull

Ex. 10.0.0.0/8

Subnet mask = 255.0.0.0

bit value
1 = 128

Ex. 10.0.0.0/9

mask = 255.128.0.0

1 more from 8 bit value

Ex. 10.0.0.0/13

255.248.0.0

2 = 192

3 = 224

4 = 240

5 = 248

Ex. 10.0.0.0/10

255.192.0.0

Ex. 10.0.0.0/16

255.255.0.0

6 = 252

7 = 254

8 = 255

Ex. 10.0.0.0/11

255.224.0.0

Ex. 10.0.0.0/17

255.255.128.0

Ex. 10.0.0.0/27

255.255.255.224

SubnettingBlock size

10.0.0.0/10

1 = 128

255.192.0.0 = Subnet Mask

2 = 192

3 = 224

Block size is used to identify the next network.

4 = 240

5 = 248

6 = 252

IP address Range \Rightarrow 0 - 255

7 = 254

∴ Total = 256

8 = 255

$$\text{Block size} = 256 - \text{extra bit size}$$

$$\text{Class A} = \frac{8}{\overbrace{\text{N.N.H.H}}^{24}}$$

$$\text{Class B} = \text{N.N.H.H}$$

$$\text{Class C} = \frac{\text{N.N.N.H}}{24 \quad 8}$$

Ex. 10.0.0.0/10

$$\text{Block size} \Rightarrow 256 - 192 = 64$$

255.192.0.0

Ex. 10.0.0.0/14

$$\text{subnet mask} = 255.252.0.0$$

$$\text{Block size} \Rightarrow 256 - 252 = 4$$

Q. $10 \cdot 0 \cdot 0 \cdot 0 / 19$

Subnet mask = $255 \cdot 255 \cdot 255 \cdot 224 \cdot 0$

$$\begin{aligned} \text{Block size} &= 256 - 224 \\ &= 32 \end{aligned}$$

Q. $10 \cdot 0 \cdot 0 \cdot 0 / 27$

Mask = $255 \cdot 255 \cdot 255 \cdot 255 \cdot 224$

$$\begin{aligned} \text{Block size} &= 256 - 224 \\ &= 32 \end{aligned}$$

Q. Given block size = 16

Class A IP

CIDR?

A₁: Block size = 16

$$= 256 - 16 \Rightarrow \frac{240}{\downarrow}$$

4 bit extra

$\therefore 10 \cdot 0 \cdot 0 \cdot 0 / 12$

Subnet Range
Class A = 8 - 15

B = 16 - 23

C = 24 - 31

Q. $10 \cdot 0 \cdot 0 \cdot 0 / ?$

Block size = 8

1 = 128

2 = 192

3 = 224

4 = 240

5 = 248

6 = 252

7 = 254

8 = 255

A₂: Block size = $256 - 8$

$$\frac{248}{\downarrow}$$

5 bit extra

$\therefore 10 \cdot 0 \cdot 0 \cdot 0 / 13$

\downarrow
 $8+5$

by default in class A

Q. 170. 0. 0. 0 / ?

Block size = 8

A. Block size = 8

$$= 256 - 8$$

$$= 248 \rightarrow 5 \text{ bit extra}$$

Class B

$\therefore 170. 0. 0. 0 / 21$

subnet mask = 255. 255. 248. 0

Network ID & No. of Host Addresses

Q. 192.168.0.0/26

subnet mask = 255.255.255.192

$$\begin{aligned} \text{Block size} &= 256 - 192 \\ &= 64 \end{aligned}$$

$$\text{Network ID} = 2^h$$

$$\text{Host address} = (2^h - 2)$$

$$A = N.H.H.H$$

$$B = N.N.H.H$$

$$C = N.N.N.H$$

$$1 = 128$$

$$2 = 192$$

$$3 = 224$$

$$4 = 240$$

$$5 = 248$$

$$6 = 252$$

$$7 = 254$$

$$8 = 255$$

$$\begin{aligned} \bullet \text{ Host address} &= (2^h - 2) \\ &= (2^6 - 2) \\ &= 62 \end{aligned}$$

$$A = 8-15$$

$$B = 16-23$$

$$C = 24-31$$

Q. 192.168.0.0/28

subnet mask = 255.255.255.240

$$\text{Block size} = 256 - 240 = 16$$

$$\text{Network ID} = 2^h = 2^4 = 16$$

$$\text{Host Address} = 2^h - 2$$

$$= 2^4 - 2$$

$$= 14$$

$$A = 1-126$$

$$B = 128-191$$

$$C = 192-223$$

in 2-58 ip with 8 available address

first 28 is data draft

3-

Q. 192.168.0.0

Host Address = 126

CIDR=?

Aw. $2^h - 2 = 126$

$$2^h = 128$$

$$2^h = 2^7$$

$$h = 7$$

$\therefore 192.168.0.0/25$

Q. 192.168.0.0/27

Aw. Subnet Mask = 255.255.255.224

$$\text{Block size} = 256 - 2^{24} = 32$$

$$\text{Network ID} = 2^h = 2^3 = 8$$

$$\text{Host Addresses} = 2^h - 2$$

$$= 2^5 - 2$$

$$= 30$$

Q. 192.168.0.0/?

$$\text{Network ID} = 32$$

Aw. Network ID $\geq 2^h = 32$

$$h = 5$$

$$\therefore \text{extra 5 bit} \therefore 2^4 + 5 = 29$$

mask = 192.168.0.0/29

$$\text{Host Address} \geq 2^h - 2 \Rightarrow 2^3 - 2 = 6$$

$$\text{Block size} = 256 - 2^{48}$$

$$= 8$$

Q. Class C : 192.168.0.0/26

Ans. Subnet Mask = 255.255.255.192

$$\text{Block size} = 2^6 - 192 \\ = 64$$

$$\begin{aligned}\text{Network ID} &= 2^h = 2^2 = 4 \\ \text{Host ID} &= 2^h - 2 \\ &= 2^6 - 2 \\ &= 62\end{aligned}$$

Network ID	Host Address Range	Broadcast Address
1. 192.168.0.0	192.168.0.1 - 192.168.0.62	192.168.0.63
2. 192.168.0.64	192.168.0.65 - 192.168.0.126	192.168.0.127
3. 192.168.0.128	192.168.0.129 - 192.168.0.190	192.168.0.191
4. 192.168.0.192	192.168.0.193 - 192.168.0.254	192.168.0.255

1. 192.168.0.0	192.168.0.1 - 192.168.0.62	192.168.0.63
2. 192.168.0.64	192.168.0.65 - 192.168.0.126	192.168.0.127
3. 192.168.0.128	192.168.0.129 - 192.168.0.190	192.168.0.191
4. 192.168.0.192	192.168.0.193 - 192.168.0.254	192.168.0.255

Q. 192.168.0.0/27

Ans. Subnet mask = 255.255.255.224

$$\text{Block size} = 256 - 224 = 32$$

$$\text{Network ID} = 2^h = 2^3 = 8$$

$$\text{Host ID} = 2^h - 2 \Rightarrow 2^5 - 2 \Rightarrow 30$$

Network ID	Host Address Range	Broadcast Address
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1. 192.168.0.0	192.168.0.1 - 192.168.0.30	192.168.0.31
2. 192.168.0.32	192.168.0.33 - 192.168.0.62	192.168.0.63
3. 192.168.0.64	192.168.0.65 - 192.168.0.94	192.168.0.95

Q. C6x3 : 172.16.0.0/18

A : 8-15

B : 16-23

C : 24-31

Ans: Subnet Mask = 255.255.192.0

$$\begin{aligned} \text{Block size} &= 256 - 192 \\ &= 64 \end{aligned}$$

$$\text{Network ID} = 2^h = 2^2 = 4$$

N. N. H. H
18 14

$$\begin{aligned} \text{Host Address} &= 2^h - 2 \\ &= 2^4 - 2 \\ &= 16382 \end{aligned}$$

Q. 172.16.0.0/20

Ans: Subnet Mask = 255.255.240.0

$$\begin{aligned} \text{Block size} &= 256 - 240 \\ &= 16 \end{aligned}$$

$$\text{Network ID} = 2^h = 2^4 = 16$$

$$\text{Host Address} \Rightarrow 2^h - 2 \Rightarrow 2^{12} - 2 \Rightarrow 4094$$

	Network ID	Host Addresses	Broadcast Address
1.	172.16.0.0	172.16.0.1 - 172.16.15.254	172.16.15.255
2.	172.16.16.0	172.16.16.1 - 172.16.31.254	172.16.31.255
3.	172.16.32.0	172.16.32.01 - 172.16.47.254	172.16.47.255
4.	172.16.48.0		

Q. Class A: 10.0.0.0/10

A. Subnet Mask = 255.192.0.0

Block size = $256 - 192$
= 64

Network ID = $2^m \Rightarrow 2^2 = 4$

Host ID = $2^H - 2$
= $2^{22} - 2$
= 4194302

Network ID Host Addresses Broadcast IP

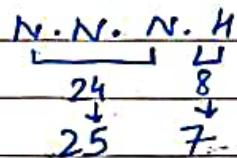
1.	10.0.0.0	10.0.0.1 - 10.63.255.254	10.63.255.255
2.	10.64.0.0	10.64.0.1 - 10.127.255.254	10.127.255.255
3.	10.128.0.0	10.128.0.1 - 10.191.255.254	10.191.255.255
4.	10.192.0.0	10.192.0.1 - 10.255.255.254	10.255.255.255
5.	10.256.0.0		

Q. Class C : 192.168.0.0

Host required = 100

Ans. Host $\geq 2^4 - 2$

$$= 2^7 - 2 = \underline{126}$$



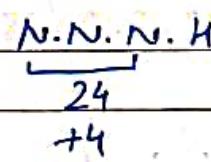
$\therefore 192.168.0.0/25$

Q. 192.168.0.0

Network ID = 16

Ans. Network ID $\geq 2^n = 16$

$$n = 4$$



$192.168.0.0/28$

Q. 192.168.0.0

2nd network Broadcast address = 192.168.0.15

Ans. Network ID Host Address Broadcast IP

1. 0.0

2. 0.8

3. 192.168.0.16

192.168.0.15

$$\text{Block size} = 8 \Rightarrow 256 - 8 = 248$$

↓

5 bit

$$\therefore CIDR = 24 + 5$$

$\therefore 192.168.0.0/29$

$$\text{Network ID} = 2^n = 2^5 = 32$$

$$\text{Host Addresses} \Rightarrow 2^n - 2 \Rightarrow 2^3 - 2 \Rightarrow 6$$