

Network Subnets and Calculation

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(<https://github.com/Emre0vunc/Subnetting>)

IP Address: 192.168.168.188

$$1 \quad 1 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \\ 2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0 = 192$$

$$1 \quad 0 \quad 1 \quad 0 \quad 1 \quad 0 \quad 0 \quad 0 \\ 2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0 = 168$$

$$1 \quad 0 \quad 1 \quad 1 \quad 1 \quad 1 \quad 0 \quad 0 \\ 2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0 = 188$$

192 = 1 1 0 0 0 0 0 0
168 = 1 0 1 0 1 0 0 0
188 = 1 0 1 1 1 1 0 0

$$192.168.168.188 = \underbrace{11000000}_{192} . \underbrace{10101000}_{168} . \underbrace{10101000}_{168} . \underbrace{10111100}_{188}$$

Subnet Mask: 255.255.255.192

$$1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \quad 1 \\ 2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0 = 255$$

$$1 \quad 1 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \\ 2^7 + 2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1 + 2^0 = 192$$

255 = 1 1 1 1 1 1 1 1
192 = 1 1 0 0 0 0 0 0

$$255.255.255.192 = \underbrace{11111111}_{255} . \underbrace{11111111}_{255} . \underbrace{11111111}_{255} . \underbrace{11000000}_{192}$$

Wildcard: ?

Wildcard = (Subnet Mask)

$$\text{Subnet Mask} = \underbrace{11111111}_{255} . \underbrace{11111111}_{255} . \underbrace{11111111}_{255} . \underbrace{11000000}_{192}$$

$$\overline{\text{Subnet Mask}} = \underbrace{00000000}_0 . \underbrace{00000000}_0 . \underbrace{00000000}_0 . \underbrace{00111111}_{63}$$

Wildcard = 0.0.0.63

Network ID: ?

Network ID = $IP\ Address \wedge Subnet\ Mask$

IP Address = 11000000 . 10101000 . 10101000 . 10111100
Subnet Mask = 11111111 . 11111111 . 11111111 . 11000000
----- AND
Network ID = 11000000 . 10101000 . 10101000 . 10000000
Network ID = $\underbrace{11000000}_{192}$. $\underbrace{10101000}_{168}$. $\underbrace{10101000}_{168}$. $\underbrace{10000000}_{128}$
Network ID = 192.168.168.128

Broadcast IP: ?

Broadcast IP = $Network\ ID \vee Wildcard$

Network ID = 11000000 . 10101000 . 10101000 . 10000000
Wildcard = 00000000 . 00000000 . 00000000 . 00111111
----- OR
Broadcast IP = 11000000 . 10101000 . 10101000 . 10111111
Broadcast IP = $\underbrace{11000000}_{192}$. $\underbrace{10101000}_{168}$. $\underbrace{10101000}_{168}$. $\underbrace{10111111}_{191}$
Broadcast IP = 192.168.168.191

Max. IP: ?

Max. IP = Broadcast IP - 1
Max. IP = 192.168.168.191 - 1
Max. IP = 192.168.168.190

Min. IP: ?

Min. IP = Network ID + 1
Min. IP = 192.168.168.128 + 1
Min. IP = 192.168.168.129