IPv4 subnetting

Address counts, masks, private ranges and a worked example.

Core calculations

An IPv4 address has 32 bits. A /n prefix fixes n network bits and leaves 32-n host bits.

Total addresses = 2^(32-n)

For a conventional /30 or larger subnet, usable hosts are normally total minus two: network and broadcast addresses.

Common prefixes

Prefix	Mask	Total	Hosts
/16	255.255.0.0	65,536	65,534
/20	255.255.240.0	4,096	4,094
/22	255.255.252.0	1,024	1,022
/24	255.255.255.0	256	254
/25	255.255.255.128	128	126
/26	255.255.255.192	64	62
/27	255.255.255.224	32	30
/28	255.255.255.240	16	14
/29	255.255.255.248	8	6
/30	255.255.255.252	4	2

Special cases

/31: two endpoints on an IPv4 point-to-point link when both ends support RFC 3021; no network/broadcast subtraction.

/32: one exact address or host route.

/0: the complete IPv4 space.

Worked example: 192.168.10.77/26

The final mask octet is 192, so the block size is 256-192 = 64. Boundaries are 0, 64, 128 and 192.

Network: 192.168.10.64

Broadcast: 192.168.10.127

Host range: 192.168.10.65-126

Usable hosts: 62

Private IPv4 ranges

10.0.0.0/8

172.16.0.0/12 (172.16-172.31)

192.168.0.0/16

Private addressing does not provide encryption or replace firewall policy. Private addresses are not globally unique.

Plan beyond the address count

Allow space for gateways, infrastructure, reservations and growth. A subnet calculator does not know your DHCP exclusions or vendor-reserved addresses. Cloud networks can reserve additional addresses. Check the target platform before sizing.

Avoid common mistakes

A /24 is a prefix length, not a host count. Larger prefix numbers mean smaller networks. The gateway is a chosen usable address, not automatically the first host. Networks can overlap even when their written base addresses differ.

Simple Systems tools

Subnet calculator and IP range comparison.
simplesys.dev/subnet-calculator/

References (click to open): RFC 1918: private address space | RFC 3021: /31 point-to-point links