

- 1) What is a subnet?

Most generally, a subnet is a part of a network which shares a common address prefix component. More specifically, it is often a discrete portion of a network, separated by a router from all other portions of the network.

- 2) What are the two addresses in a subnet which are reserved, and what are they reserved for?

The network address cannot be assigned to a host. To find the network address, set the *host part* of the IP address to all zeros. (mask it with the netmask)

The broadcast address is also reserved. To find the broadcast address, set the *host part* of the IP address to all ones.

- 3) Fill in the following table.

IPv4 CIDR Address	Netmask (dotted decimal)	Network Address	Broadcast Address	Host Number	Total count of host addresses in network
128.193.43.35 /16	255.255.0.0	128.193.0.0	128.193.255.255	11043	$65536-2 = 65534$
128.193.225.244 /20	255.255.240.0	128.193.224.0	128.193.239.255	500	$4096-2 = 4094$
128.193.43.35 /23	255.255.254.0	128.193.42.0	128.193.43.255	291	$512-2 = 510$
128.193.43.35 /26	255.255.255.192	128.193.43.0	128.193.43.63	35	$64-2 = 62$

- 4) Given the network address “block” 128.193.0.0 /16. Suppose that we want to split all of the addresses into 4 equal-sized subnets.

- a. What are the network addresses of each subnet

We can get 4 networks by using two additional bits of the network address:

The network address is 10000000 11000001 00000000 00000000

Subnet #0: 10000000 11000001 00000000 00000000

It's network address is 128.193.0.0 /18

Subnet #1: 10000000 11000001 01000000 00000000

It's network address is 128.193.64.0 /18

Subnet #2: 10000000 11000001 10000000 00000000

It's network address is 128.193.128.0 /18

Subnet #3: 10000000 11000001 11000000 00000000

It's network address is 128.193.192.0 /18

b. What are the netmasks for each subnet?

All four subnets have an 18-bit netmask: 255.255.192.0

c. How many host addresses can be assigned in each subnet?

16,382 host addresses in each subnet.

Each of the four subnets has an 18-bit netmask, which leaves 14 bits for host numbers.  $2^{14} = 16,384$  so  $16,384 - 2 = 16,382$

5) What is a *next-hop* router?

Once a prefix match is made within a routing table, a packet is forwarded to its appropriate output link. The router at the other end of that link is the next-hop router.