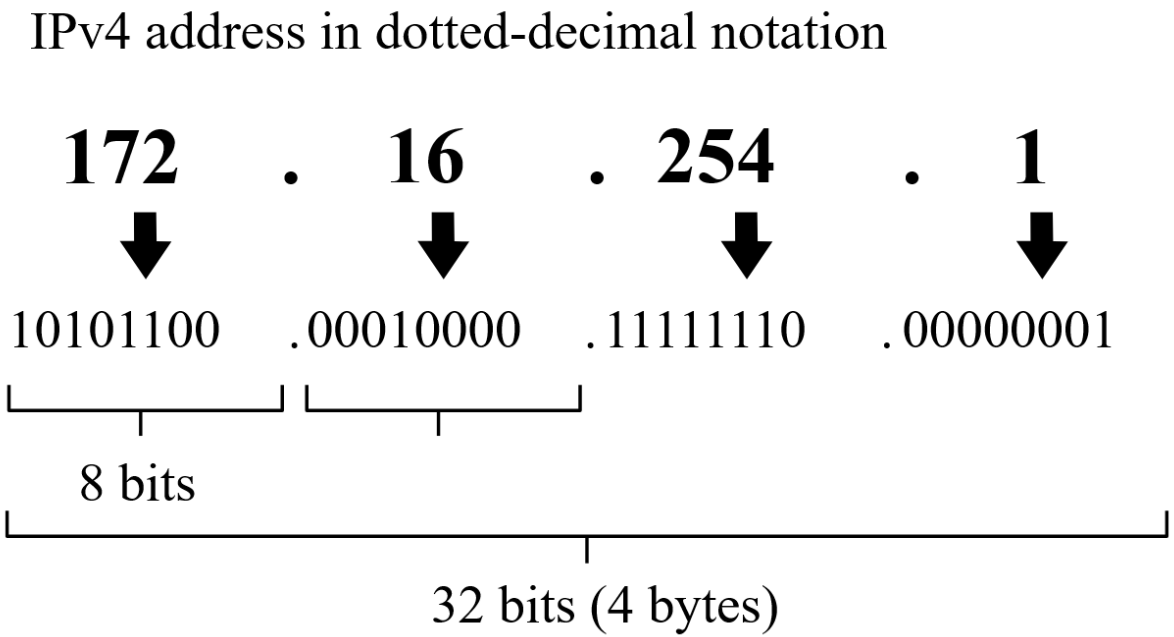
Network

IP subnetting

IP Address


IPv4 address in dotted-decimal notation
172 . 16 . 254 . 1
10101100 .00010000 .11111110 .00000001
8 bits
32 bits (4 bytes)

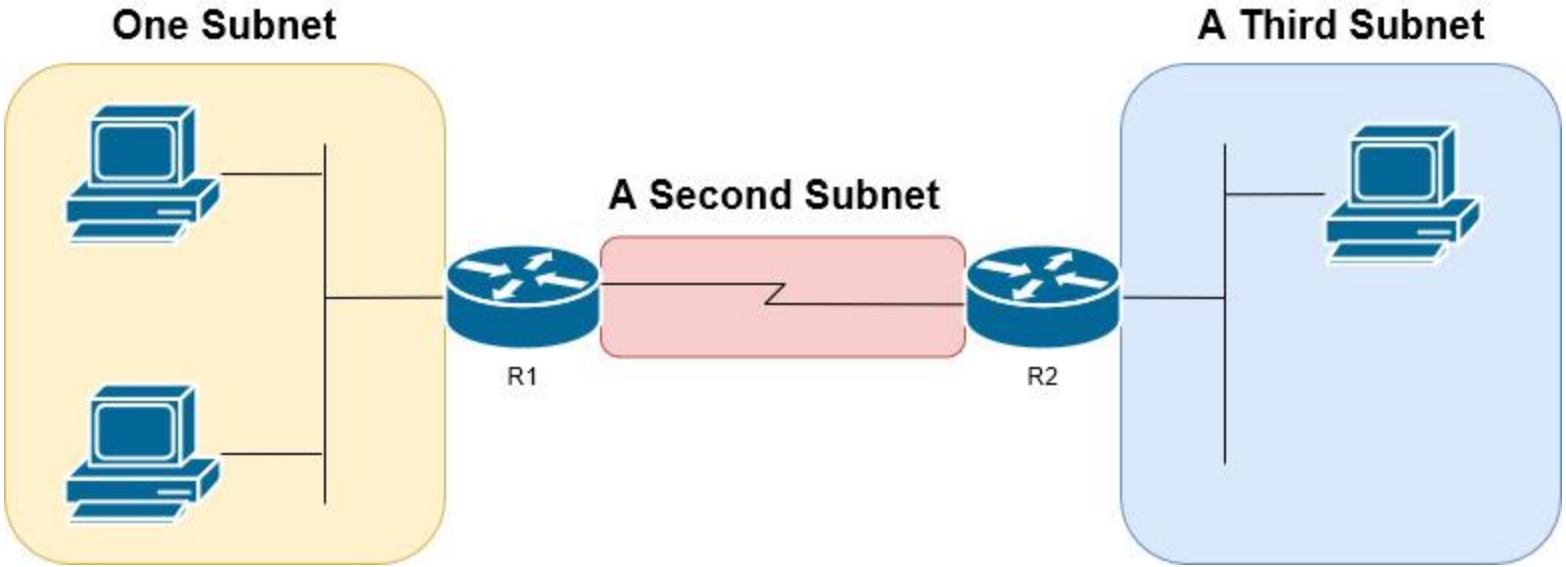
Analyze Subnetting and Addressing Needs

- Determining the Number of Subnets
- Determining the Number of Hosts per Subnet
- One Size Subnet Fits All—Or Not

Subnetting rules

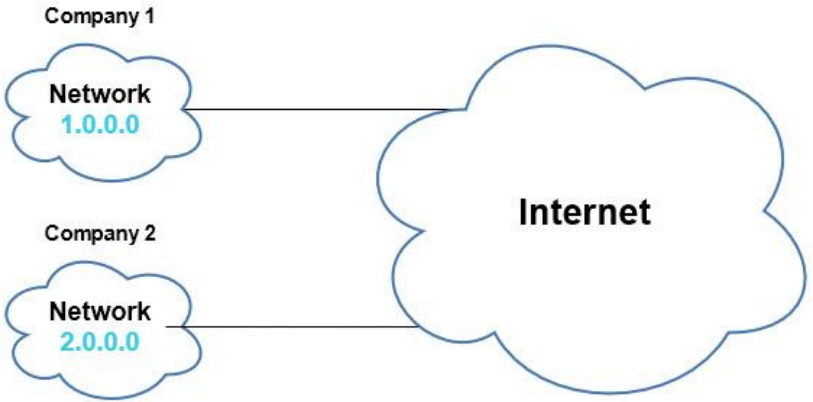
IP addressing rules group addresses into groups called subnets. The rules are as follows:

- Addresses in the same subnet are not separated by a router.
- Addresses in different subnets are separated by at least one router.

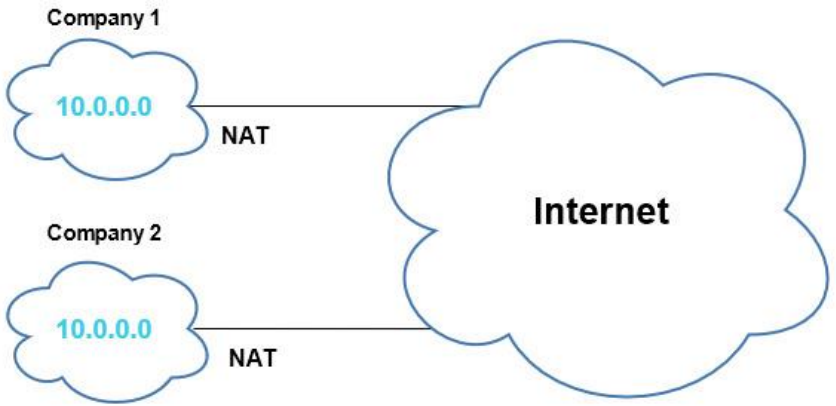


Public and Private Networks

PUBLIC NETWORKS



PRIVATE NETWORKS



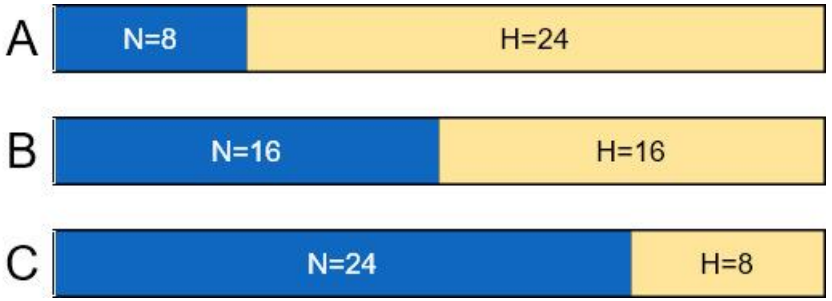
Private Networks (RFC 1918)

- Will never be assigned to an organization as a public IP network
- Can be used by organizations that will use NAT when sending packets into the Internet
- Can also be used by organizations that never need to send packets into the Internet

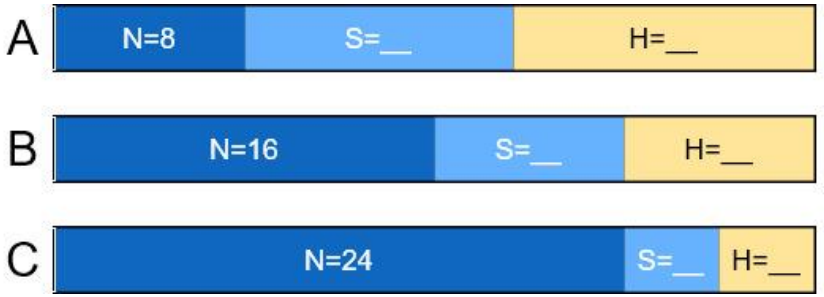
Class of Networks	Private IP Networks	Number of Networks
A	10.0.0.0	1
B	172.16.0.0 through 172.31.0.0	16
C	192.168.0.0 through 192.168.255.0	256

Choose the Mask

CLASSFUL IP NETWORKS BEFORE SUBNETTING



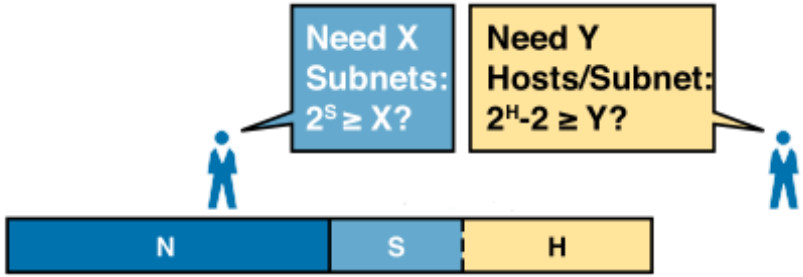
BORROWING HOST BITS TO CREATE SUBNET BITS



For example, we need to create 200 subnets with 200 hosts per subnet

Choose the Mask

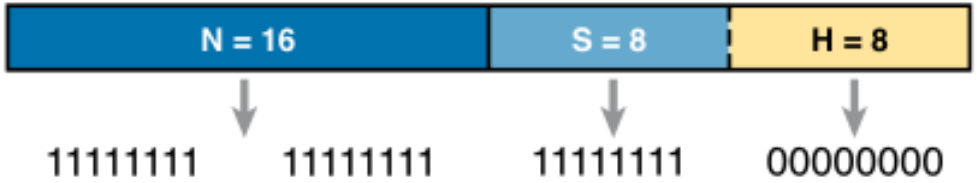
BORROWING ENOUGH SUBNET AND HOST BITS



POWERS OF 2 REFERENCE FOR DESIGNING MASKS

Number of Bits	2^X	$2^X - 2$
1	2	0
2	4	2
3	8	6
4	16	14
5	32	30
6	64	62
7	128	126
8	256	254
9	512	510
10	1024	1022
11	2048	2046
12	4096	4094

Masks and Mask Formats



11111111.11111111.11111111.0000000
255.255.255.0
/24

Quiz

1.Host A is a PC, connected to switch SW1 and assigned to VLAN 1. Which of the following are typically assigned an IP address in the same subnet as host A? (Select two answers)

A. The local router's WAN interface
B. The local router's LAN interface
C. All other hosts attached to the same switch
D. Other hosts attached to the same switch and also in VLAN 1

2. Which of the following are private IP networks? (Select two answers.)

A. 172.31.0.0
B. 172.32.0.0
C. 192.168.255.0
D. 192.1.168.0
E. 11.0.0.0

3. Which of the following are public IP networks? (Select three answers.)

A. 9.0.0.0
B. 172.30.0.0
C. 192.168.255.0
D. 192.1.168.0
E. 1.0.0.0

THANK YOU