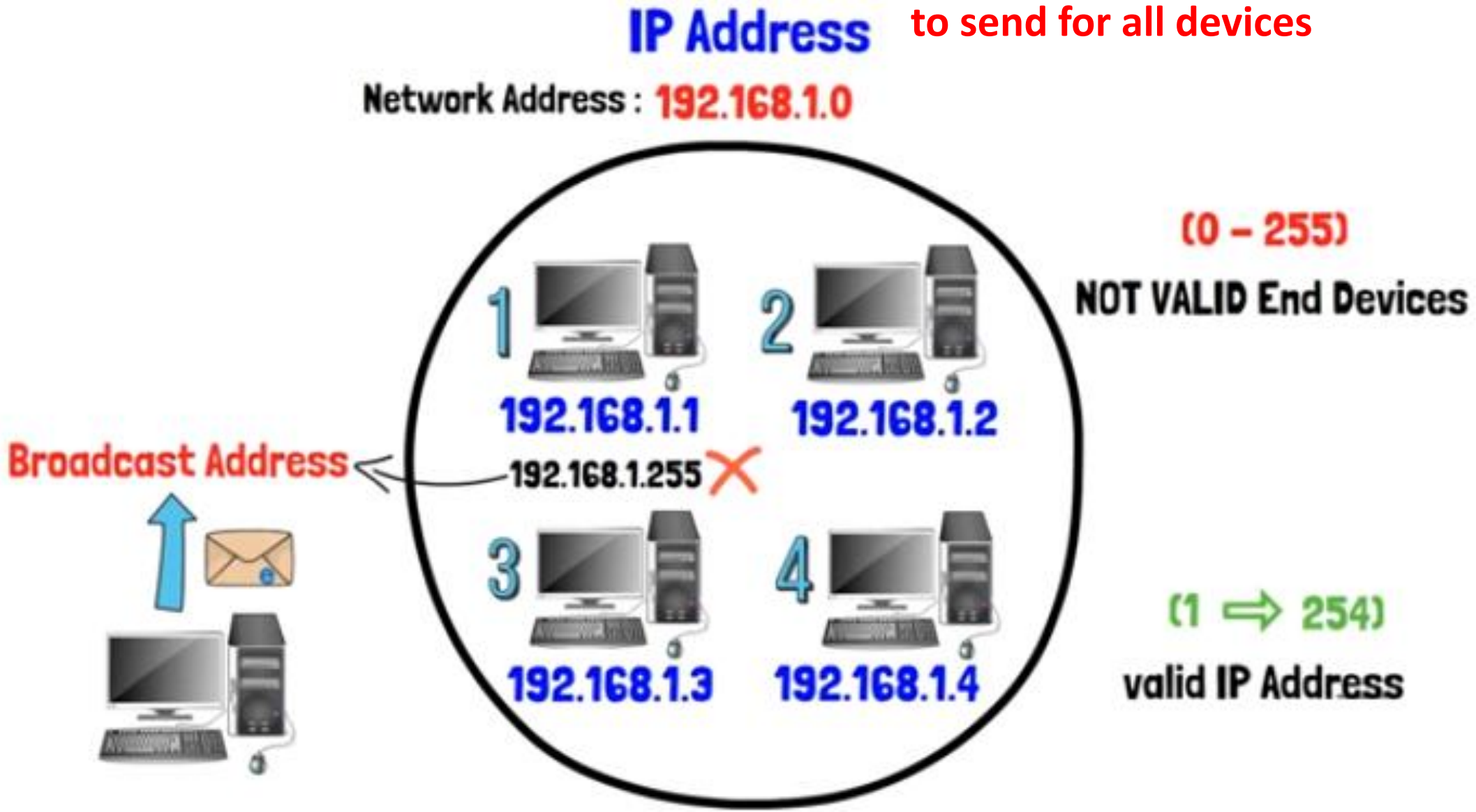
Lecture 2
Subnetting and distribute the Ips
Range of hosts and prefix length

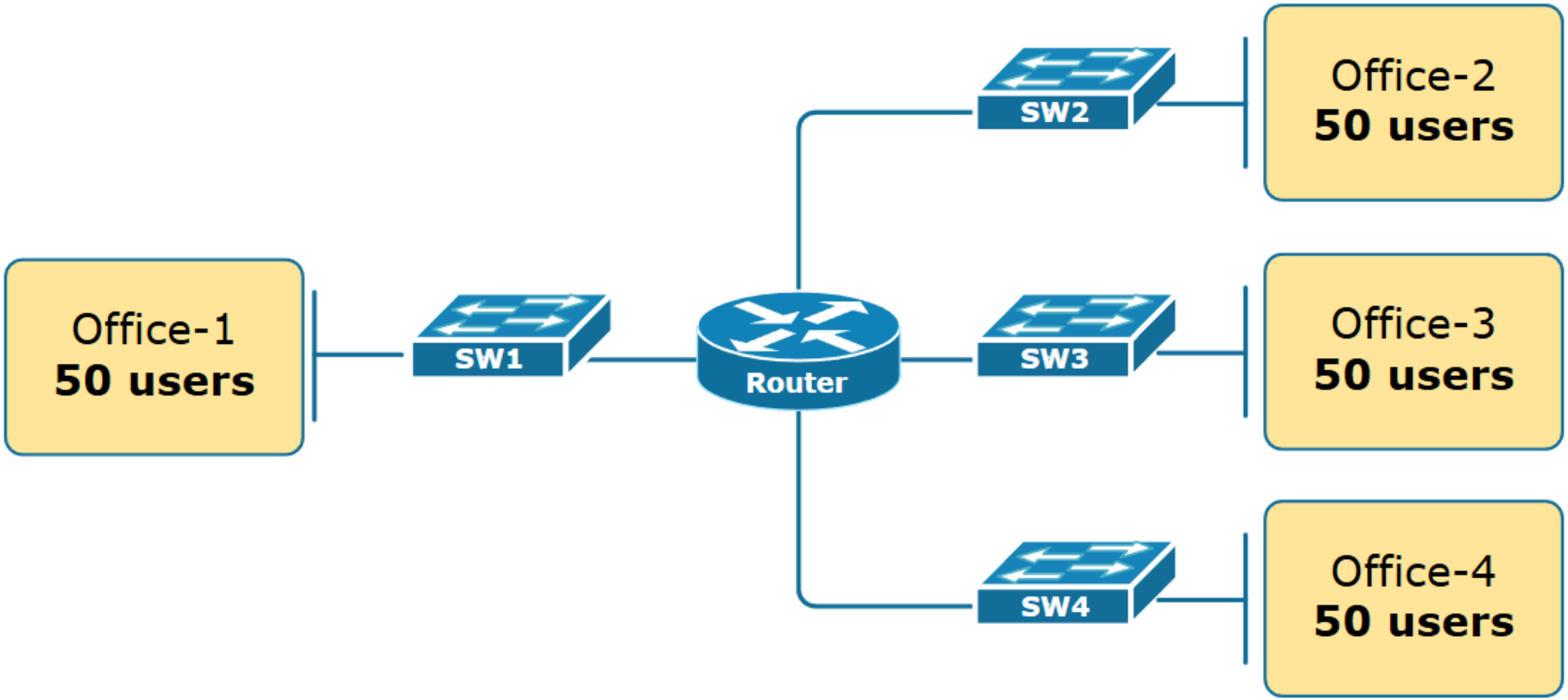
Subnetting Definition

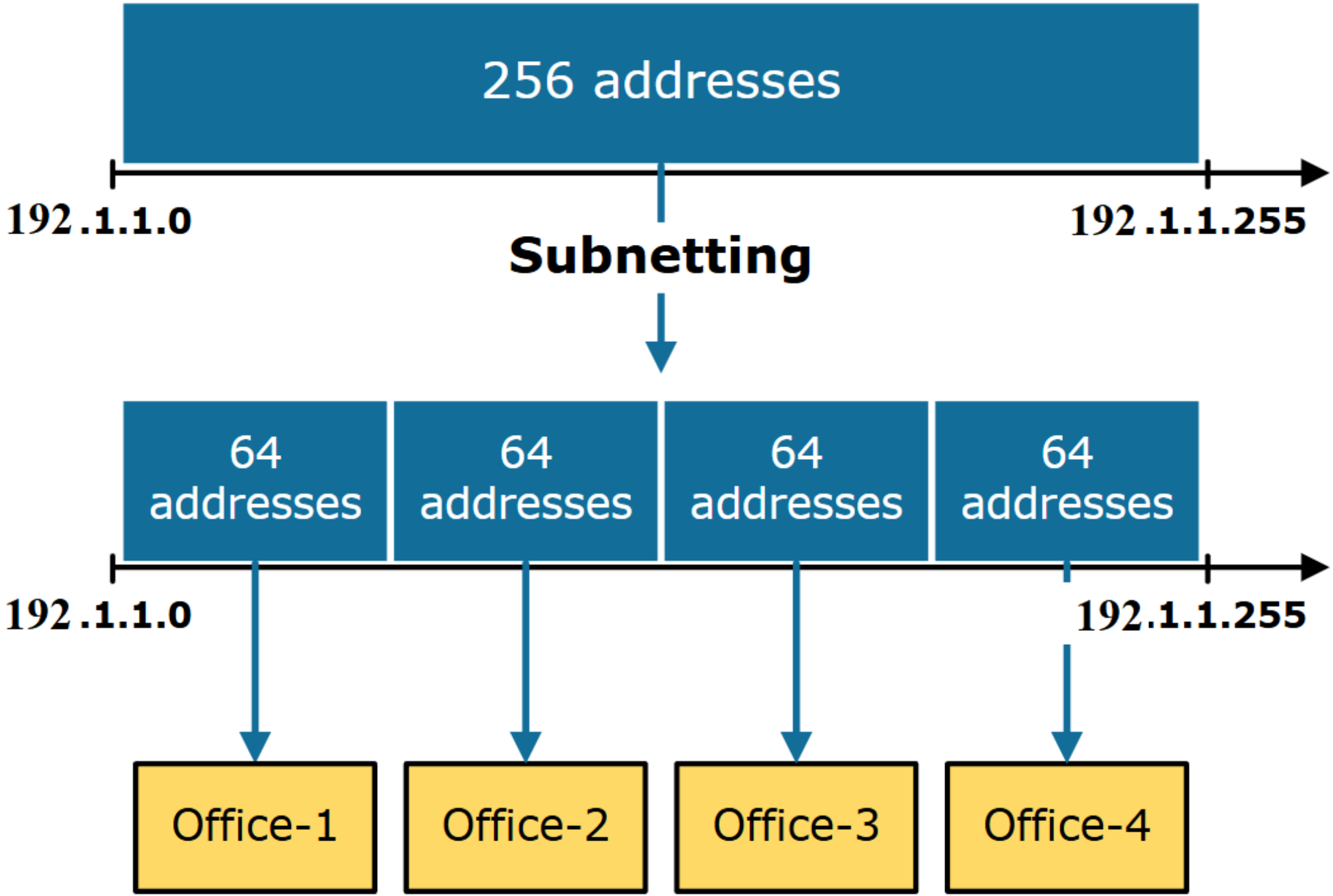
- Subnetting is the process of creating a subnetwork (also known as a subnet) within a network.
- Network interfaces and devices within a subnet can communicate with each other directly.
- Routers facilitate communication between different subnets.

To distribute the IPs for the devices

192.168.1.0 → network address
192.168.1.255 → broadcast address
to send for all devices




Office-1
50 users
SW1
Router
SW2
SW3
SW4
Office-2
50 users
Office-3
50 users
Office-4
50 users


256 addresses
192.1.1.0
192.1.1.255
Subnetting
64 addresses
64 addresses
64 addresses
64 addresses
192.1.1.0
192.1.1.255
Office-1
Office-2
Office-3
Office-4

Example: Subnet table

192.168.0.0
192.168.0.32
192.168.0.64
192.168.0.96
192.168.0.128
192.168.0.160
192.168.0.192
192.168.0.224

Subnet	Network ID	Start IP Address	End IP Address	Broadcast
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
4	192.168.0.96	192.168.0.97	192.168.0.126	192.168.0.127
5	192.168.0.128	192.168.0.129	192.168.0.158	192.168.0.159

Subnetting

- ***Find the subnet mask from given prefix length***

192.168.0.0/27



IP Network Address
Prefix
Class C

Prefix length
CIRD

Class A: 1- 126
127 ping to check error
Class B: 128- 191
Class C: 192- 223

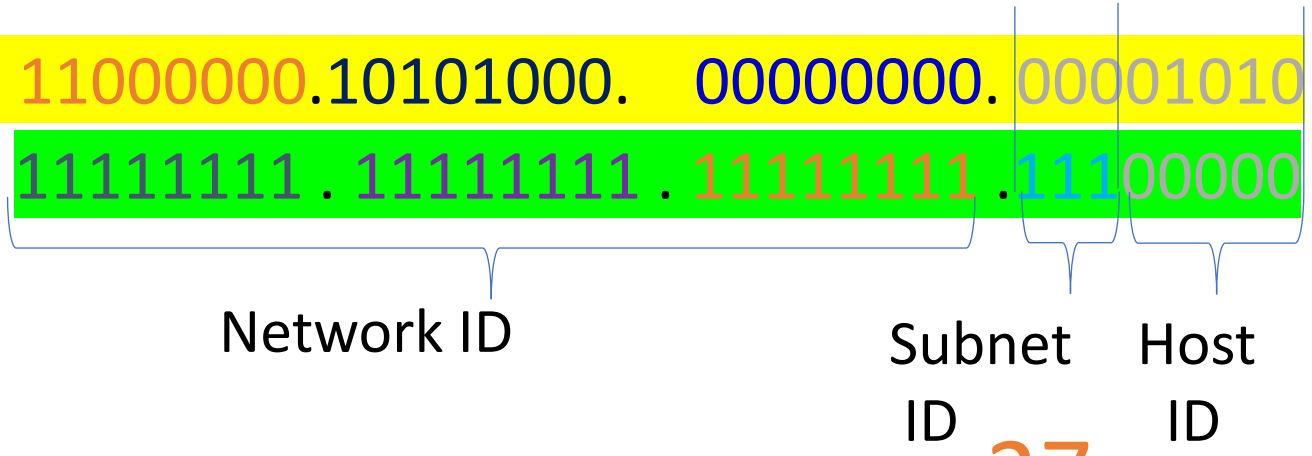
Best path means longest prefix

Example: find the IP and subnet mask in ***binary system***

- Given: class C
- IP address: 192.168.0.226
- Subnet mask: 255.255.255.224

Example: find the IP and subnet mask in binary system

- Given: class C
- IP address: 192.168.0.10
- Subnet mask: 255.255.255.224
- Solution:
- IP address : 11000000.10101000. 00000000. 00001010
- Subnet mask: 11111111 . 11111111 . 11111111 . 11100000

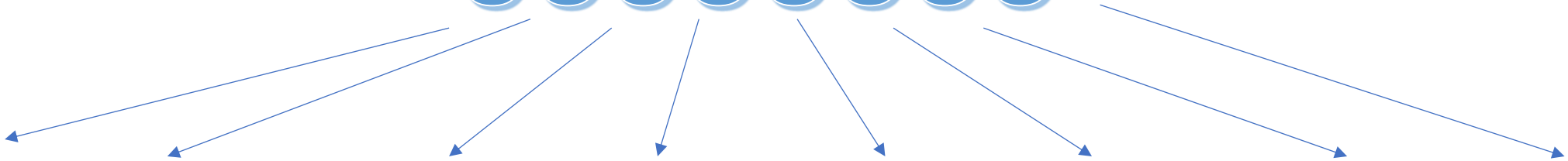


- Prefix length is number of ones in subnet mask = 27

192.168.0.10/27
3 bits

Subnetting for class C (last octet 8 bits)

00000000



128	64	32	16	8	4	2	1
128	192	224	240	248	252	254	255

1000-0000	128
1100-0000	192
1110-0000	224
1111-0000	240
1111-1000	248
1111-1100	252
1111-1110	254
1111-1111	255

Fill the subnet table for IP 192.168.0.10/27 – 3 bits

IP = 11000000. 10101000. 00000000. 00001010

Subnet Mask= 11111111 . 11111111 . 11111111 . 11100000

1	1	1	0	0	0	0	0
128	64	32	16	8	4	2	1
128	192	224	240	248	252	254	255

Bit 3 = 32 thus

First network start at 0 and add 32 for each time and end at 224

START → 192.168.0.0

+32 192.168.0.32

+32 192.168.0.64

+32 192.168.0.96

+32 192.168.0.128

+32 192.168.0.160

+32 192.168.0.192

End → 192.168.0.224

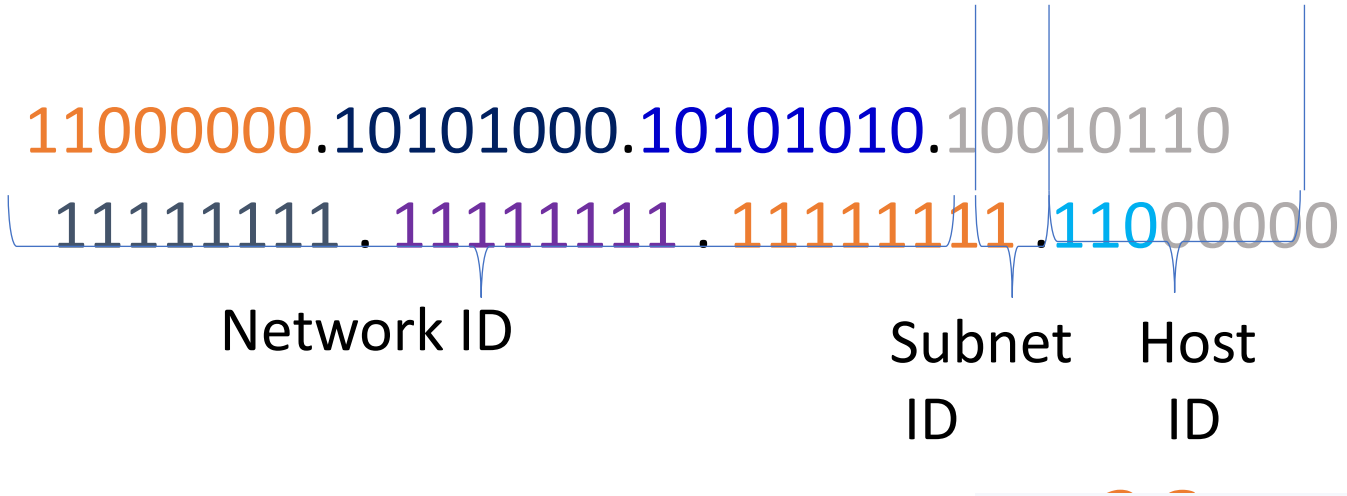
Subnet table

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192.168.0.64
192.168.0.96
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4	192.168.0.96	192.168.0.97	192.168.0.126	192.168.0.127
5	192.168.0.128	192.168.0.129	192.168.0.158	192.168.0.159
6	192.168.0.160	192.168.0.161	192.168.0.190	192.168.0.191
7	192.168.0.192	192.168.0.193	192.168.0.222	192.168.0.223
8	192.168.0.224	192.168.0.225	192.168.0.254	192.168.0.255

Example: find prefix length, the IP and subnet mask in binary system

- Given: class C
- IP address: 192.168.170.200
- Subnet mask: 255.255.255.192
- Solution:
- IP address : 11000000.10101000.10101010.10010110
- Subnet mask: 11111111 . 11111111 . 11111111 . 11000000



- Prefix length is number of ones in subnet mask

192.168.170.150/26
2 bits

Subnetting for class C

128	64	32	16	8	4	2	1
128	192	224	240	248	252	254	255

Fill the subnet table for IP 192.168.170.150/26 – 2 bits

128	64	32	16	8	4	2	1
128	192	224	240	248	252	254	255

Bit 2= 192 thus

First network start at 0 and add 64 for each time and end at 192

192.168.170.0

192.168.170.64

192.168.170.128

192.168.170.192

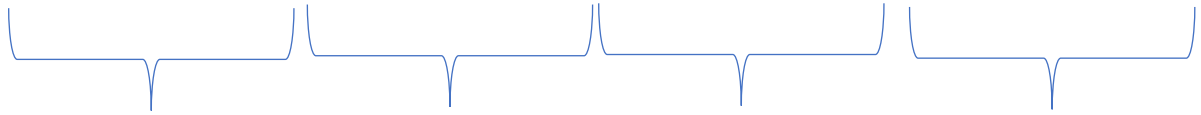
Subnet t

192.168.170.0
192.168.170.64
192.168.170.128
192.168.170.192

Subnet	Network ID	Start IP Address	End IP Address	Broadcast
1	192.168.170.0	192.168.170.1	192.168.170.62	192.168.170.63
2	192.168.170.64	192.168.170.65	192.168.170.126	192.168.170.127
3	192.168.170.128	192.168.170.129	192.168.170.190	192.168.170.191
4	192.168.170.192	192.168.170.193	192.168.170.254	192.168.170.255

Example: find the subnet mask for IP = 192.231.32.1/ 26

- In the first IP has 32 bits
  - 11111111.11111111.11111111.11111111



- If IP/ 24 that mean
- 11111111.11111111.11111111.00000000
- Subnet = 255.255.255.0

128	64	32	16	8	4	2	1
0	0	0	0	0	0	0	0

Example: find the subnet mask for IP = 192.231.32.1/ 26

- In the first IP has 26 bits
  - 11111111.11111111.11111111.11000000
- If IP/ 26 that mean
- 11111111.11111111.11111111.11000000 → 11000000= 128 + 64 = 92
- Subnet = 255.255.255.92

128	64	32	16	8	4	2	1
0	0	0	0	0	0	0	0