

You are tasked by your supervisor with assigning IP addresses for your new MAN (Metropolitan Area Network), which consists of 8 different buildings, each building will have **255** workstations. Your supervisor tells you to only use as much of the 164.10.0.0 network as you need. Your supervisor will assign the IP addresses to the serial interfaces using a different network. You will need to determine the following four items for each of the eight buildings:

- A) Subnet masks
- B) Network addresses
- C) Broadcast address for each subnet
- D) Valid host ranges on each subnet

NNNNNNNN.NNNNNNNN.SSSSSSSS.HHHHHHHH
11111111.11111111.11111111.00000000
255.255.255.0
/24

You are tasked by your supervisor with assigning IP addresses for your new MAN (Metropolitan Area Network), which consists of 8 different buildings, each building will have **255** workstations. Your supervisor tells you to only use as much of the 164.10.0.0 network as you need. Your supervisor will assign the IP addresses to the serial interfaces using a different network. You will need to determine the following four items for each of the eight buildings:

NNNNNNNN.NNNNNNNN.SSSSSSSS.HHHH
11111111.11111111.11111111.00000000
255.255.255.0
/24

- A) Subnet masks
- B) Network addresses
- C) Broadcast address for each subnet
- D) Valid host ranges on each subnet

/16 - 65,535 (64K) IPs, 64K-2 Hosts

/17 - 32K

/18 - 16K

/19 - 8192 (8K)

/20 - 4096 (4K)

/21 - 2048 (2K)

/22 - 1024 (1K)

/23 - 512 IPs, 510 Hosts

/24 - 256 IPs, 254 Hosts

/25 - 128

/26 - 64

/27 - 32

/28 - 16

/29 - 8

/30 - 4

/31 - 2

/32 - 1

164.10.0.0

11111111.11111111.11111110.00000000

255.255.254.0

/23

/16 - 65,535 (64K) IPs, 64K-2 Hosts

/17 - 32K

/18 - 16K

/19 - 8192 (8K)

/20 - 4096 (4K)

/21 - 2048 (2K)

/22 - 1024 (1K)

/23 - 512

/24 - 256 IPs, 254 Hosts

/25 - 128

/26 - 64

/27 - 32

/28 - 16

/29 - 8

/30 - 4

/31 - 2

/32 - 1

164.10.0.0/23
164.10.2.0/23
164.10.4.0/23
164.10.6.0/23
164.10.8.0/23
164.10.10.0/23
164.10.12.0/23
164.10.14.0/23

164.10.1.255
164.10.3.255
164.10.5.255
164.10.7.255
164.10.9.255
164.10.11.255
164.10.13.255
164.10.15.255

164.10.0.0
11111111.11111111.1 1 1 1 1 1 0.00000000
00000000.00000000.00000000.00000000
00000000.00000000.00000010.00000000 = 2
00000000.00000000.00000100.00000000 = 4
00000000.00000000.00000110.00000000 = 6
00000000.00000000.00001000.00000000 = 8
00000000.00000000.00001100.00000000
00000000.00000000.00001110.00000000
00000000.00000000.0000XXX0.00000000
00000000.00000000.0000XXX0.00000000
255.255.254.0
/23

00000000.00000000.00000000.00000000 = 0
00000000.00000000.00000010.00000000 = 2
00000000.00000000.00000100.00000000 = 4
00000000.00000000.00000110.00000000 = 6

00000000.00000000.00000000.00000000 = 0
00000000.00000000.00000100.00000000 = 4
00000000.00000000.00001000.00000000 = 8
00000000.00000000.00001100.00000000 = 12

IPs

You are asked to figure out how many host addresses you need for your network. Which item(s) do you need to take into account?

- A) The subnet broadcast address
- B) The subnet network address
- ~~C) Each computer in the building~~
- ~~D) Each WAN connection~~
- E) Each network interface connection

You are told that your client has a subnet mask of 255.255.255.248. How many hosts and subnets does this client have available?

- A) 16 subnets and 14 hosts
- B) 30 subnets and 16 hosts
- C) 8190 subnets and 8 hosts
- D) 8190 subnets and 6 hosts

11111111.11111111.11111111.11111000

/29=8 -2 = 6

/24=256,/25,26,27,28

$2^3=8 - 2 = 6$

On a Class B network with a 10 bit subnet mask, how would you write the subnet mask?

- A) 255.255.255.192
- B) 255.192.0.0
- C) 255.255.192.0
- D) 255.255.255.255

0NNNNNNN.HHHHHHHH.HHHHHHHH.HHHHHHHH

10NNNNNNN.HHHHHHHH.HHHHHHHH.HHHHHHHH

110NNNNNN.HHHHHHHH.HHHHHHHH.HHHHHHHH

Class A: /8
Class B: /16
Class C: /24

11111111.11111111.11111111.11000000
255.255.255.192

How many hosts/networks are available in using a netmask of 255.255.254.0?

- A. 255
- B. 254
- C. 510
- D. 2048
- E. 512

11111111.11111111.11111110.00000000

255.255.254.0

$2^9 = 512 - 2 = 510$ Hosts (c)

$/23 = 512 - 2 = 510$ Hosts (c)

(24-256, 23-512)

What mask will allow at most 14 hosts?

- A. /30
- B. /24
- C. /20
- D. /28
- E. /29

14 hosts \Rightarrow 16 IPs

16 IPs \Rightarrow 2,3,4

11110000 \Rightarrow /28

(D)

Having been assigned 172.16.0.0/16 network block. You are asked to establish 12 subnets. What would be the mask that allows the creation of 12 subnets?

- A. /16
- B. /18
- C. /24
- D. /20

11111111.11111111.11110000.00000000

12 subnets \Rightarrow 1,2,3 \Leftarrow no 4 bits = 16 subnets, yes!

/20

$$2^{12} - 2 = 4094$$

4094

Firewall Rules:

Rule	Source	Destination	Action
R1	→ 111.11.0.0 / 16	222.22.22.0 / 24	permit
R2	→ 111.11.11.0 / 24	→ 222.22.0.0 / 16	deny
R3	0.0.0.0 / 0	0.0.0.0 / 0	deny

Datagram Flow:

Datagram Number	Source IP Address	Destination IP Address	Action
P1	111.11.11.1	222.22.6.6	DENY

111.11.11.1
AND
11111111.11111111.11111111.0
111.11.11.0

222.22.6.6
AND 11111111.11111111.0.0
222.22.0.0

Firewall Rules:

Rule	Source	Destination	Action
R1	→ 111.11.0.0 / 16	→ 222.22.22.0 / 24	permit
R2	111.11.11.0 / 24	222.22.0.0 / 16	deny
R3	0.0.0.0 / 0	0.0.0.0 / 0	deny

Datagram Flow:

Datagram Number	Source IP Address	Destination IP Address	Action
P1	111.11.11.1	222.22.6.6	DENY
P2	111.11.11.1	222.22.22.2	PERMIT

111.11.11.1
AND 11111111.11111111.0.0
111.11.11.0

222.22.22.2
AND
11111111.11111111.11111111.0
222.22.22.0

Firewall Rules:

Rule	Source	Destination	Action
R1	→ 111.11.0.0 / 16	→ 222.22.22.0 / 24	permit
R2	111.11.11.0 / 24	222.22.0.0 / 16	deny
R3	0.0.0.0 / 0	0.0.0.0 / 0	deny

Datagram Flow:

Datagram Number	Source IP Address	Destination IP Address	Action
P1	111.11.11.1	222.22.6.6	DENY
P2	111.11.11.1	222.22.22.2	PERMIT
P3	111.11.6.6	222.22.22.2	PERMIT

111.11.6.6
AND 11111111.11111111.0.0
111.11.0.0

222.22.22.2
AND
11111111.11111111.11111111.0
222.22.22.0

Firewall Rules:

Rule	Source	Destination	Action
R1	➔ 111.11.0.0 / 16	222.22.22.0 / 24	permit
R2	111.11.11.0 / 24	222.22.0.0 / 16	deny
R3	0.0.0.0 / 0	0.0.0.0 / 0	deny

Datagram Flow:

Datagram Number	Source IP Address	Destination IP Address	Action
P1	111.11.11.1	222.22.6.6	DENY
P2	111.11.11.1	222.22.22.2	PERMIT
P3	111.11.6.6	222.22.22.2	PERMIT
P4	111.11.6.6	222.22.6.6	DENY

111.11.6.6
AND
11111111.11111111.11111111.0
111.11.6.0

222.22.6.6
AND 11111111.11111111.0.0
222.22.0.0

What needs to be true to access an EC2 instance on port 22 from the Internet:

- 1) EC2 must have a public IP
- 2) EC2 must be in a public subnet. The subnet must have a route directly to the IGW for 0.0.0.0/0 traffic.
- 3) Inbound security group rule must allow for port 22