

## Custom Subnet Masks

### Problem 7

Number of needed subnets **2000**

Number of needed usable hosts **15**

Network Address **178.100.0.0**

Address class **B**

Default subnet mask 255.255.0.0

Custom subnet mask 255.255.255.224

Total number of subnets 2048

Total number of host addresses 32

Number of usable addresses 30

Number of bits borrowed 11

Show your work for Problem 7 in the space below.

Number of Hosts	65,536	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2
Number of Subnets	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192	16384	32768	65536
Binary values	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1

178 . 100 . 0 0 0 0 0 0 0 0 . 0 0 0 0 0 0 0 0

128  
64  
32  
16  
8  
4  
2  
+ 1  

---

18 255

128  
64  
+ 32  

---

224

- Number of usable hosts

30

# Custom Subnet Masks

## Problem 15

Number of needed usable hosts **50**

Network Address **172.59.0.0**

Address class **B**

Default subnet mask **255.255.0.0**

Custom subnet mask **255.255.255.192**

Total number of subnets **1024**

Total number of host addresses **64**

Number of usable addresses **62**

Number of bits borrowed **10**

Show your work for **Problem 15** in the space below.

Number of Hosts	65,536	32,768	16,384	8,192	4,096	2,048	1,024	512	256	128	64	32	16	8	4	2
Number of Subnets	2	4	8	16	32	64	128	256	512	1024	2048	4096	8192	16384	32768	65536
Binary values	128	64	32	16	8	4	2	1	128	64	32	16	8	4	2	1
172 . 59 .	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

128

64

32

16

8

4

2

1

255

128  
+ 64  
-----  
192

64  
- 2  
-----  
62

- Number of usable hosts

## Subnetting

### Problem 11

Number of needed usable hosts **8,000**

Network Address **135.70.0.0**

Address class **B**

Default subnet mask **255.255.0.0**

Custom subnet mask **255.255.224.0**

Total number of subnets **8**

Total number of host addresses **8192**

Number of usable addresses **8190**

Number of bits borrowed **3**

What is the 6th subnet range? **135.70.160.0 to 135.70.191.255**

What is the subnet number for the 7th subnet? **135.70.192.0**

What is the subnet broadcast address for the 3rd subnet? **135.70.63.255**

What are the assignable addresses for the 5th subnet? **135.70.128.1 to 135.70.159.254**



## Subnetting

### Problem 12

Number of needed usable hosts **45**

Network Address **198.125.50.0**

Address class **C**

Default subnet mask **255.255.255.0**

Custom subnet mask **255.255.255.192**

Total number of subnets **4**

Total number of host addresses **64**

Number of usable addresses **62**

Number of bits borrowed **2**

What is the 2nd subnet range? **198.125.50.64 to 198.125.50.127**

What is the subnet number for the 2nd subnet? **198.125.50.64**

What is the subnet broadcast address for the 4th subnet? **198.125.50.255**

What are the assignable addresses for the 3rd subnet? **198.125.50.129 to 198.125.50.190**

Show your work for Problem 12 in the space below.

Number of Subnets	256	128	64	32	16	8	4	2	1	Number of Hosts
-	2	4	8	16	32	64	128	256		
	128	64	32	16	8	4	2	1	-	Binary values
198.125.50.	0	0	0	0	0	0	0	0	0	

128  
 + 64  
 ---  
 192  
 Custom  
 Subnet

(0) 0  
 (1) 1  
 (2) 0  
 (3) 1

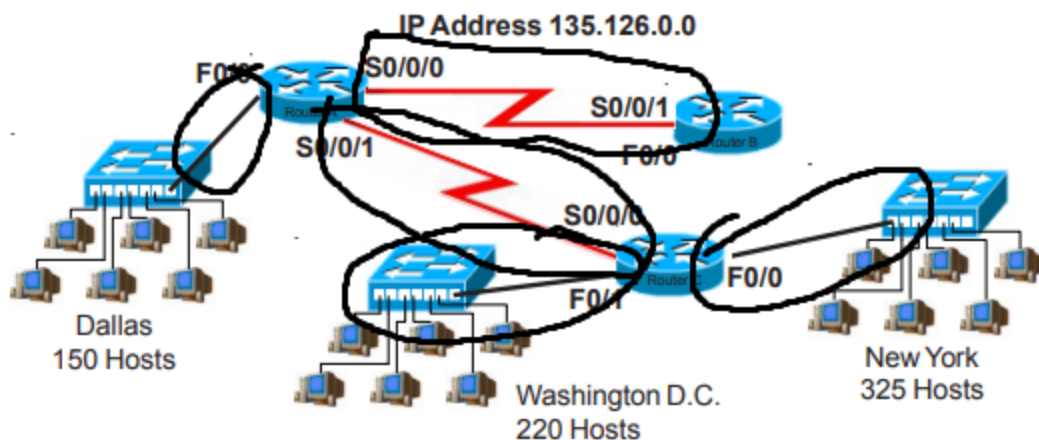
198.125.50.0 to 198.125.50.63  
 198.125.50.64 to 198.125.50.127  
 198.125.50.128 to 198.125.50.191  
 198.125.50.192 to 198.125.50.255

$$\begin{array}{r}
 64 \\
 - 2 \\
 \hline
 62
 \end{array}
 \qquad
 \begin{array}{r}
 4 \\
 - 2 \\
 \hline
 2
 \end{array}$$

Usable Host      Usable Subnet

## Practical Subnetting 4

Based on the information in the graphic shown, design a network addressing scheme that will supply the minimum number of subnets, and allow enough extra subnets and hosts for 70% growth in all areas. Circle each subnet on the graphic and answer the questions below.



Address class	<b>B</b>
Custom subnet mask	<b>255.255.240.0</b>
Minimum number of subnets needed	<b>5</b>
Extra subnets required for 70% growth (Round up to the next whole number)	<b>+ 4</b>
Total number of subnets needed	<b>= 9</b>
Number of host addresses in the largest subnet group	<b>325</b>
Number of addresses needed for 70% growth in the largest subnet (Round up to the next whole number)	<b>+ 228</b>
Total number of address needed for the largest subnet	<b>= 553</b>

Start with the first subnet and arrange your sub-networks from the largest group to the smallest.

IP address range for New York	<b><u>135.126.0.0 to 135.126.15.255</u></b>
IP address range for Washington D. C.	<b><u>135.126.16.0 to 135.126.31.255</u></b>
IP address range for Dallas	<b><u>135.126.32.0 to 135.126.47.255</u></b>
IP address range for Router A to Router B serial connection	<b><u>135.126.48.0 to 135.126.63.255</u></b>
IP address range for Router A to Router C serial connection	<b><u>135.126.64.0 to 135.126.79.255</u></b>

Show your work for Problem 4 in the space below.

$$\begin{array}{r}
 128 \\
 64 \\
 32 \\
 + 16 \\
 \hline
 240
 \end{array}$$

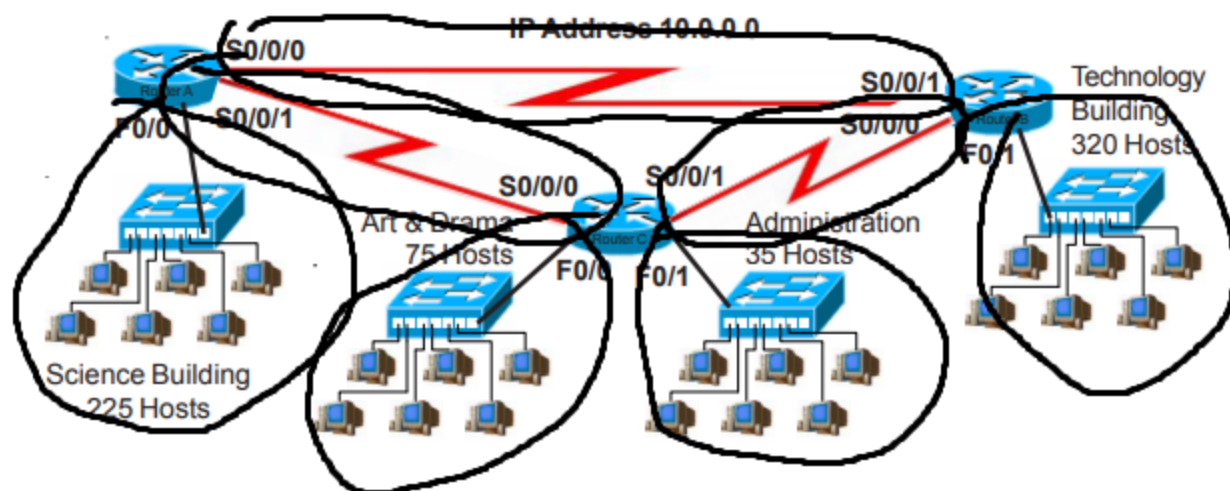
Number of Hosts -	Number of Subnets -	Binary values -	
65,536	2	128 64 32 16	135.126.0.0 to 135.126.15.255
32,768	4	128 64 32 16	135.126.16.0 to 135.126.31.255
16,384	8	128 64 32 16	135.126.32.0 to 135.126.47.255
8,192	16	128 64 32 16	135.126.48.0 to 135.126.63.255
4,096	32	128 64 32 16	135.126.64.0 to 135.126.79.255
2,048	64	128 64 32 16	135.126.80.0 to 135.126.95.255
1,024	128	128 64 32 16	
512	256	128 64 32 16	
	512	128 64 32 16	
	1,024	128 64 32 16	
	2,048	128 64 32 16	
	4,096	128 64 32 16	
	8,192	128 64 32 16	
	16,384	128 64 32 16	
	32,768	128 64 32 16	
	65,536	128 64 32 16	
		135.126.0.0 to 135.126.95.255	

(0) 0  
(1) 1  
(2) 1 0  
(3) 1 1  
(4) 1 0 0  
(5) 1 0 1



## Practical Subnetting 6

Based on the information in the graphic shown, design a network addressing scheme that will supply the **minimum number of subnets**, and allow enough extra subnets and hosts for 20% growth in all areas. Circle each subnet on the graphic and answer the questions below.



Address class	<b>A</b>
Custom subnet mask	<b>255.240.0.0</b>
Minimum number of subnets needed	<b>7</b>
Extra subnets required for 20% growth (Round up to the next whole number)	<b>+ 2</b>
Total number of subnets needed	<b>= 9</b>

Start with the first subnet and arrange your sub-networks from the largest group to the smallest.

IP address range for Technology	<b>10.0.0.0 to 10.15.255.255</b>
IP address range for Science	<b>10.16.0.0 to 10.31.255.255</b>
IP address range for Arts & Drama	<b>10.32.0.0 to 10.47.255.255</b>
IP Address range Administration	<b>10.48.0.0 to 10.63.255.255</b>
IP address range for Router A to Router B serial connection	<b>10.64.0.0 to 10.79.255.255</b>
IP address range for Router A to Router C serial connection	<b>10.80.0.0 to 10.95.255.255</b>
IP address range for Router B to Router C serial connection	<b>10.96.0.0 to 10.111.255.255</b>

Number of Subnets - 2 4 8 16 32 64 128 256.  
 Binary values - 128 64 32 16 8 4 2 1 . 128 64 32 16 8 4 2 1  
 10 . 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

Show your work for Problem 6 in the space below.

- (0) 0 10.0.0.0 to 10.15.255.255
- (1) 1 10.16.0.0 to 10.31.255.255
- (2) 1 0 10.32.0.0 to 10.47.255.255
- (3) 1 1 10.48.0.0 to 10.63.255.255
- (4) 1 0 0 10.64.0.0 to 10.79.255.255
- (5) 1 0 1 10.80.0.0 to 10.95.255.255
- (6) 1 1 0 10.96.0.0 to 10.111.255.255
- (7) 1 1 1 10.112.0.0 to 10.127.255.255