


Question 4

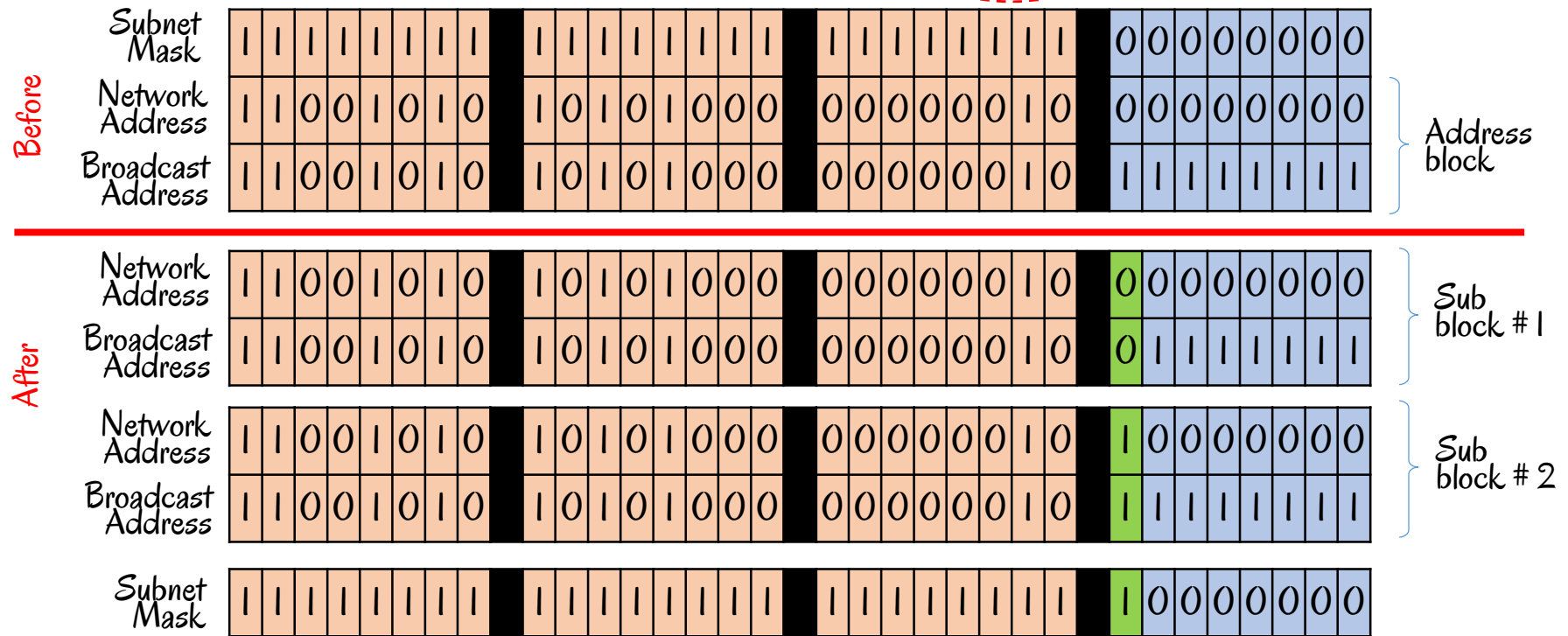
Create TWO (2) subnets from the address block
202.168.2.0/24.

- Find Network and Broadcast Address before subnetting.
- List all new subnetworks.
- Find new SubnetMask 

Solution

Given, Network address = 202.168.2.0 and SM = /24 = 255.255.255.0

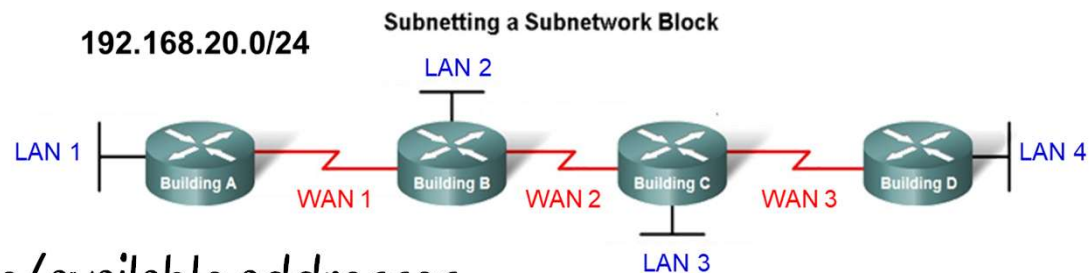
- Broadcast address = 202.168.2.255
- No. of Subnet = $2 = 2^n \rightarrow n = 1 =$ no of bit(s) required for subnetwork



- Subnetwork 1 = 202.168.2.0 \rightarrow 202.168.2.127 (128 addresses)
- Subnetwork 2 = 202.168.2.128 \rightarrow 202.168.2.255 (128 addresses)
- New SubnetMask = 255.255.255.128 = /25

Question 5

Given the address block 192.168.20.0/24. To make more efficient and avoid wastage, use VLSM to create a number of subnets as shown in figure below



- Required usable/available addresses
 - LAN – 20 addresses per subnet
 - WAN – 2 addresses per subnet

List all new subnetworks

Solution

Note:
Value 2 power of n :
1, 2, 4, 8, 16, 32, 64, 128

- No. of subnetworks
= 4 LANs and 3 WANs
- Start with LAN – highest no. of required addresses
- Required usable addresses for LAN is 20 addresses per subnet
- Must add 2 more addresses for network & broadcast addresses.
 - $20 + 2 = 22$ addresses
- Nearest value 2 power of n $\rightarrow 22 = 32$
- $2^n = 32$,
 - $n=5$ = no of bits required for host

Solution

Given, Network address = 192.168.2.0 and SM = /24 = 255.255.255.0

- Broadcast address = 192.168.2.255

- Bit required for host = 5 bits

Network bits

Host bits

SubNetwork
bits = 3

Host bits
= 5

Before

NA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
BA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1	1	1
SM	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Host bits
=5

After

NA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
BA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	1	1	1	1	1	1	1	1
NA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
BA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1
NA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
BA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1
NA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
BA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1
NA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
BA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1
NA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
BA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1
NA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
BA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1
NA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
BA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1
NA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
BA	1	1	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	1	1	1	1
New SM	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

0
31

Sub block #1
LAN A

32
63

Sub block #2
LAN B

64
95

Sub block #3
LAN C

96
127

Sub block #4
LAN D

128
159

Sub block #5
WAN

160
191

Sub block #6
Free

192
223

Sub block #7
Free

224
255

Sub block #8
Free

255.255.255.224 = /27

- Need 4 LANs

NA	192	168	2	0 0 0 0 0 0 0 0	0	Sub block # 1
BA				0 0 0 1 1 1 1 1	31	LAN A
NA	192	168	2	0 0 1 0 0 0 0 0	32	Sub block # 2
BA				0 0 1 1 1 1 1 1	63	LAN B
NA	192	168	2	0 1 0 0 0 0 0 0	64	Sub block # 3
BA				0 1 0 1 1 1 1 1	95	LAN C
NA	192	168	2	0 1 1 0 0 0 0 0	96	Sub block # 4
BA				0 1 1 1 1 1 1 1	127	LAN D

LAN A : 192.168.2.0 → 192.168.2.31
 LAN B : 192.168.2.32 → 192.168.2.63
 LAN C : 192.168.2.64 → 192.168.2.95
 LAN D : 192.168.2.96 → 192.168.2.127

Subnet Mask = total Network bits
 = 24 + 3
 = 27

Slash notation = /27
 Dotted notation = 255.255.255.224

32 addresses per subnetwork

30 usable address,

2 unusable addresses

→ 1 network address (1st address)

→ 1 broadcast address (last address)

Required usable/available addresses

= 20 < 30

Solution

WAN

- Required usable addresses for WAN is 2 addresses per subnet
- Must add 2 more addresses for network & broadcast addresses.

$2 + 2 = 4$ addresses

- Nearest value 2 power of $n \rightarrow 4 = 4$

- $2^n = 4,$

$n=2$ = no of bits required for host

- Sub Block / Sub Network available

- #5 \rightarrow #8 (#1 \rightarrow #4 already used by LAN)
- Let say we choose #5

[illegible]

- Host bits
= 2

Before

NA	1	1	0	0	0	0	0	0	0		1	0	1	0	1	0	0	0		0	0	0	0	0	0	1	0		1	0	0	0	0	0	0	0	0	128	Sub block # 5 WAN 255.255.255.224 = /27
BA	1	1	0	0	0	0	0	0	0		1	0	1	0	1	0	0	0		0	0	0	0	0	0	1	0		1	0	0	1	1	1	1	1	159		
SM	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1		1	1	1	0	0	0	0	0			

After

NA	1	1	0	0	0	0	0	0	0		1	0	1	0	1	0	0	0		0	0	0	0	0	0	1	0		1	0	0	0	0	0	0	0	0	128	Sub block # 1 WAN A
BA	1	1	0	0	0	0	0	0	0		1	0	1	0	1	0	0	0		0	0	0	0	0	0	1	0		1	0	0	0	0	0	1	1	131		
NA	1	1	0	0	0	0	0	0	0		1	0	1	0	1	0	0	0		0	0	0	0	0	0	1	0		1	0	0	0	0	1	0	0	132	Sub block # 2 WAN B	
BA	1	1	0	0	0	0	0	0	0		1	0	1	0	1	0	0	0		0	0	0	0	0	0	1	0		1	0	0	0	0	1	1	1	135		
NA	1	1	0	0	0	0	0	0	0		1	0	1	0	1	0	0	0		0	0	0	0	0	0	1	0		1	0	0	0	1	0	0	0	136	Sub block # 3 WAN C	
BA	1	1	0	0	0	0	0	0	0		1	0	1	0	1	0	0	0		0	0	0	0	0	0	1	0		1	0	0	0	1	0	1	1	139		
NA	1	1	0	0	0	0	0	0	0		1	0	1	0	1	0	0	0		0	0	0	0	0	0	1	0		1	0	0	0	1	1	0	0	140	Sub block # 4 Free	
BA	1	1	0	0	0	0	0	0	0		1	0	1	0	1	0	0	0		0	0	0	0	0	0	1	0		1	0	0	0	1	1	1	1	143		
NA	1	1	0	0	0	0	0	0	0		1	0	1	0	1	0	0	0		0	0	0	0	0	0	1	0		1	0	0	1	0	0	0	0	144	Sub block # 5 Free	
BA	1	1	0	0	0	0	0	0	0		1	0	1	0	1	0	0	0		0	0	0	0	0	0	1	0		1	0	0	1	0	0	1	1	147		
NA	1	1	0	0	0	0	0	0	0		1	0	1	0	1	0	0	0		0	0	0	0	0	0	1	0		1	0	0	1	0	1	0	0	148	Sub block # 6 Free	
BA	1	1	0	0	0	0	0	0	0		1	0	1	0	1	0	0	0		0	0	0	0	0	0	1	0		1	0	0	1	0	1	1	1	151		
NA	1	1	0	0	0	0	0	0	0		1	0	1	0	1	0	0	0		0	0	0	0	0	0	1	0		1	0	0	1	1	0	0	0	152	Sub block # 7 Free	
BA	1	1	0	0	0	0	0	0	0		1	0	1	0	1	0	0	0		0	0	0	0	0	0	1	0		1	0	0	1	1	0	1	1	155		
NA	1	1	0	0	0	0	0	0	0		1	0	1	0	1	0	0	0		0	0	0	0	0	0	1	0		1	0	0	1	1	1	0	0	156	Sub block # 8 Free	
BA	1	1	0	0	0	0	0	0	0		1	0	1	0	1	0	0	0		0	0	0	0	0	0	1	0		1	0	0	1	1	1	1	1	159		
New SM	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1		1	1	1	1	1	0	0		255.255.255.252 = /30		

- Need 3 WANs

NA	192	168	2	0	0	0	0	0	0	0	0	128	Sub block #1 WAN A
BA				0	0	0	1	1	1	1	1	131	
NA	192	168	2	0	0	1	0	0	0	0	0	132	Sub block #2 WAN B
BA				0	0	1	1	1	1	1	1	135	
NA	192	168	2	0	1	0	0	0	0	0	0	136	Sub block #3 WAN C
BA				0	1	0	1	1	1	1	1	139	

LAN A : 192.168.2.128 → 192.168.2.131
 LAN B : 192.168.2.132 → 192.168.2.135
 LAN C : 192.168.2.136 → 192.168.2.139

Subnet Mask = total Network bits
 = 27 + 3
 = 30

Slash notation = /30

Dotted notation = 255.255.255.252

4 addresses per subnetwork

2 usable address,

2 unusable addresses

→ 1 network address (1st address)

→ 1 broadcast address (last address)

Required usable/available addresses
 = 2

Solution

- *Total allocated addresses*
 - = 4 LANs + 3 WANs
 - = 4(32) + 3(4)
 - = 128 + 12 = 140 address
- *Total saved addresses for future use*
 - = Total given addresses – Total allocated addresses
 - = 256 – 140
 - = 116 addresses

Solution

Subnetting a Subnetwork Block

