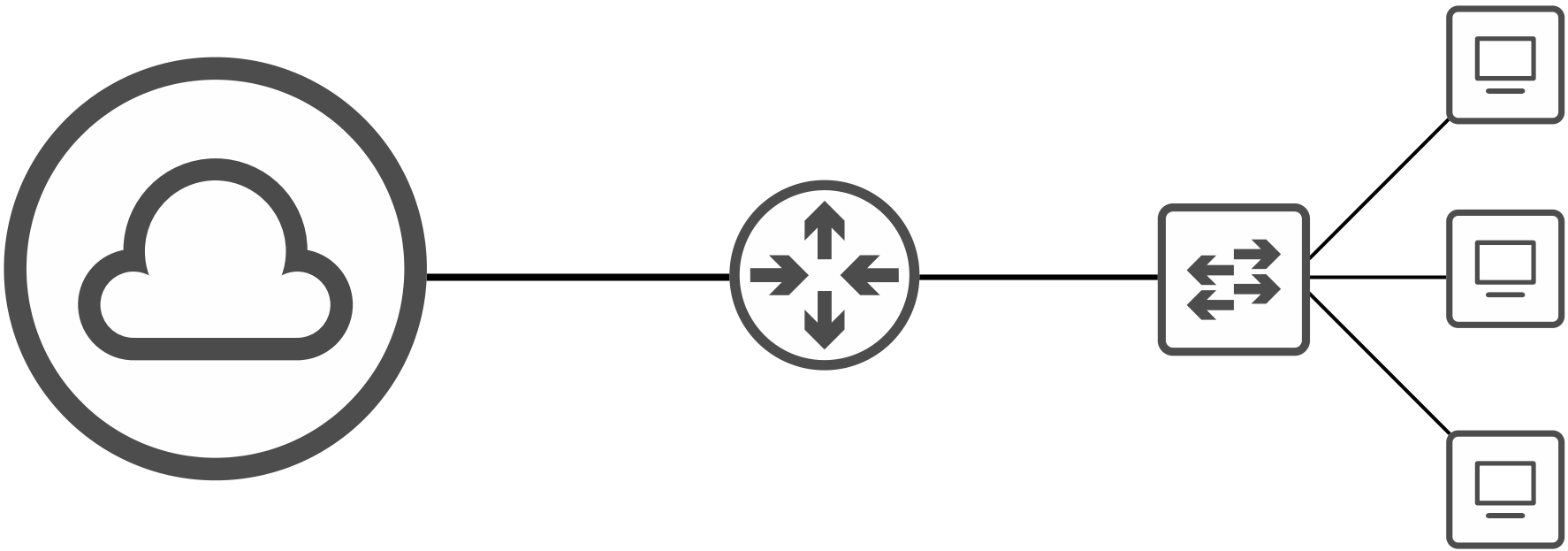
Jeremy's IT Lab

CCNA 200-301 Day 14

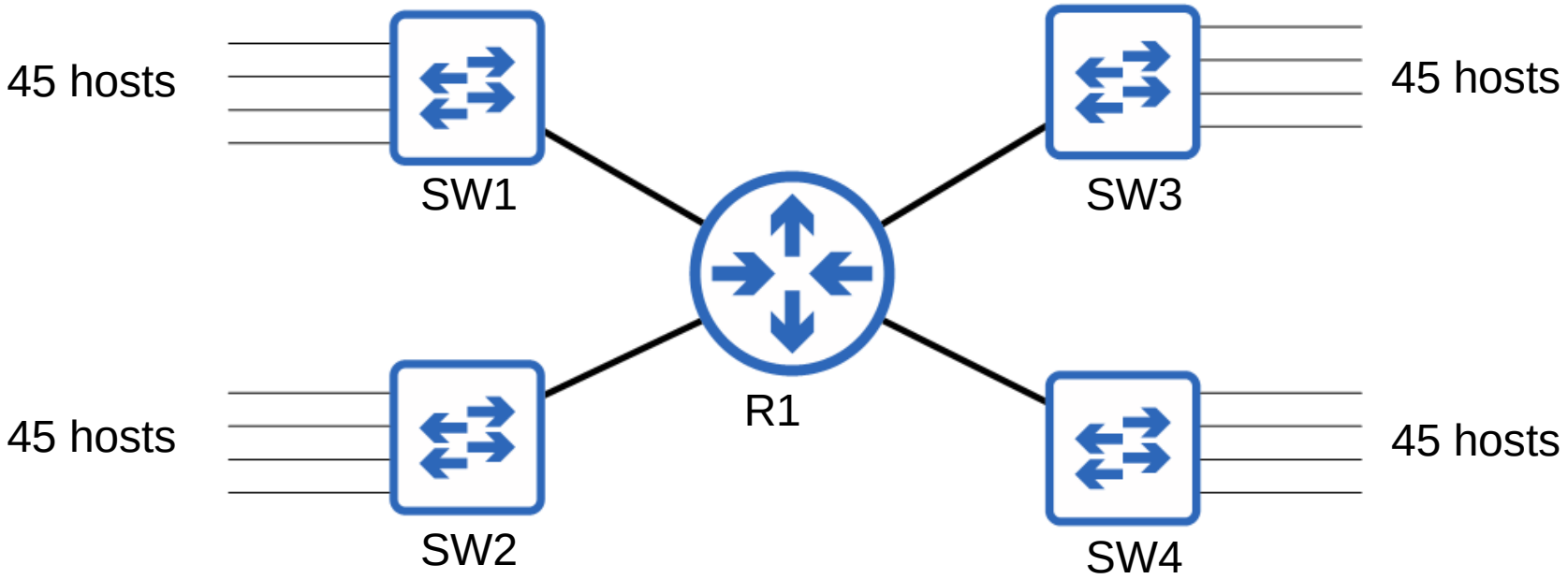
Subnetting (Part 2)



Things we'll cover

- Subnetting practice questions (Class C networks)
- Subnetting Class B networks

Subnetting



192.168.1.0/24

Divide the **192.168.1.0/24** network into four subnets that can accommodate the number of hosts required.

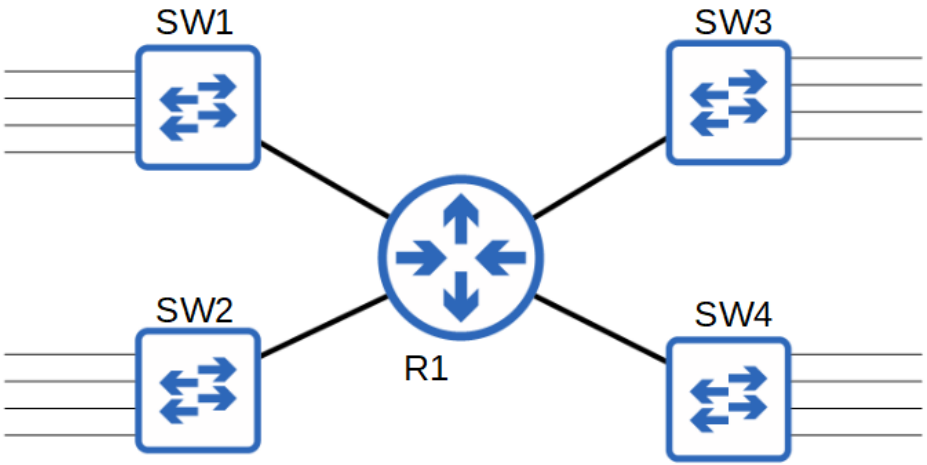
QUIZ

The first subnet (Subnet 1) is 192.168.1.0/26. What are the remaining subnets?

HINT: Find the broadcast address of Subnet 1. The next address is the network address of Subnet 2. Repeat the process for Subnets 3 and 4.

Subnet 1:
192.168.1.0/26

Subnet 2:
( )/26



Subnet 3:
( )/26

Subnet 4:
( )/26

192.168.1.0/24

Subnet 1

Subnet 1: 192.168.1.0/26

1 1 0 0 0.0.0.0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 0 0 0 0 0 0 0 0

192 . 168 . 1 . 0

1 1 0 0 0.0.0.0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 0 0 1 1 1 1 1 1

192 . 168 . 1 . 63

192.168.1.0 – 192.168.1.63

Subnet 2

Subnet 2: 192.168.1.64/26

1 1 0 0 0.0.0.0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 0 1 0 0 0 0 0 0

192 . 168 . 1 . 64

1 1 0 0 0.0.0.0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 0 1 1 1 1 1 1 1

192 . 168 . 1 . 127

192.168.1.64 – 192.168.1.127

Subnet 3

Subnet 3: 192.168.1.128/26

1 1 0 0 0.0.0.0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 1 0 0 0 0 0 0 0

192 . 168 . 1 . 128

1 1 0 0 0.0.0.0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 1 0 1 1 1 1 1 1

192 . 168 . 1 . 191

192.168.1.128 – 192.168.1.191

Subnet 4

Subnet 4: 192.168.1.192/26

1 1 0 0 0.0.0.0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 1 1 0 0 0 0 0 0

192 . 168 . 1 . 192

1 1 0 0 0.0.0.0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 1 1 1 1 1 1 1 1

192 . 168 . 1 . 255

192.168.1.192 – 192.168.1.255

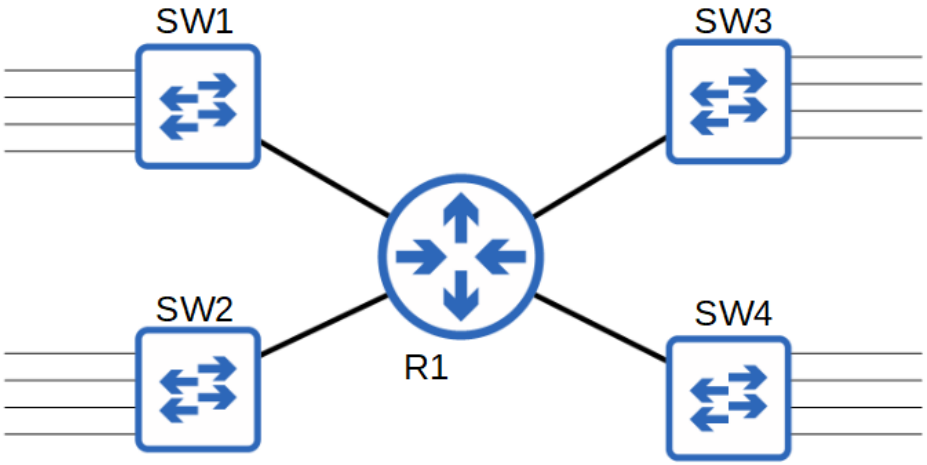
QUIZ

The first subnet (Subnet 1) is 192.168.1.0/26. What are the remaining subnets?

HINT: Find the broadcast address of Subnet 1. The next address is the network address of Subnet 2. Repeat the process for Subnets 3 and 4.

Subnet 1:
192.168.1.0/26

Subnet 2:
192.168.1.64/26



Subnet 3:
192.168.1.128/26

Subnet 4:
192.168.1.192/26

192.168.1.0/24

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Subnetting Trick

192.168.1.0/26

NETWORK PORTION | HOST PORTION

1 1 0 0 0.0.0.0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 0 0 1 . 0 0 | 0 0 0 0 0 0

192 . 168 . 1 . 0

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Subnetting Trick

192.168.1.0/26

192 . 168 . 1 . 0

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

NETWORK PORTION

HOST PORTION

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Subnetting Trick

192.168.1.64/26

192 . 168 . 1 . 64

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

NETWORK PORTION

HOST PORTION

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Subnetting Trick

192.168.1.128/26

192 . 168 . 1 . 128

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

NETWORK PORTION | HOST PORTION

Jeremy's IT Lab

Subnetting Trick

192.168.1.192/26

192 . 168 . 1 . 192

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

NETWORK PORTION

HOST PORTION

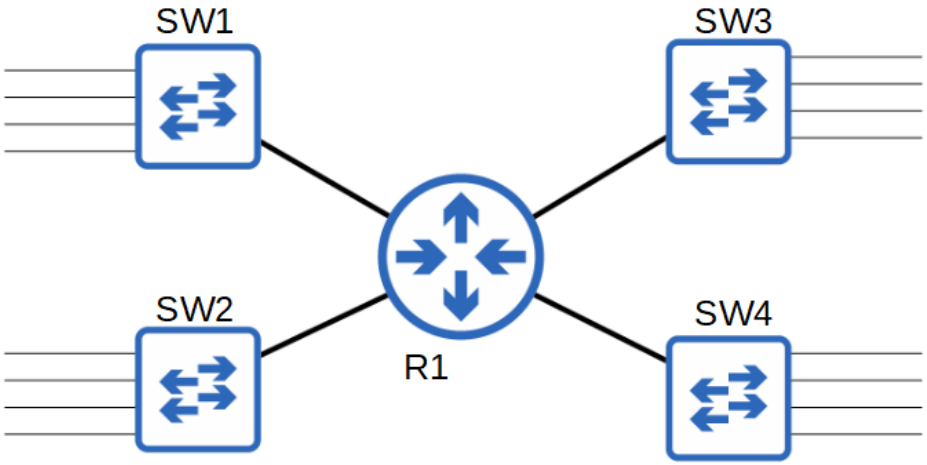
QUIZ

The first subnet (Subnet 1) is 192.168.1.0/26. What are the remaining subnets?

HINT: Find the broadcast address of Subnet 1. The next address is the network address of Subnet 2. Repeat the process for Subnets 3 and 4.

Subnet 1:
192.168.1.0/26

Subnet 2:
192.168.1.64/26



Subnet 3:
192.168.1.128/26

Subnet 4:
192.168.1.192/26

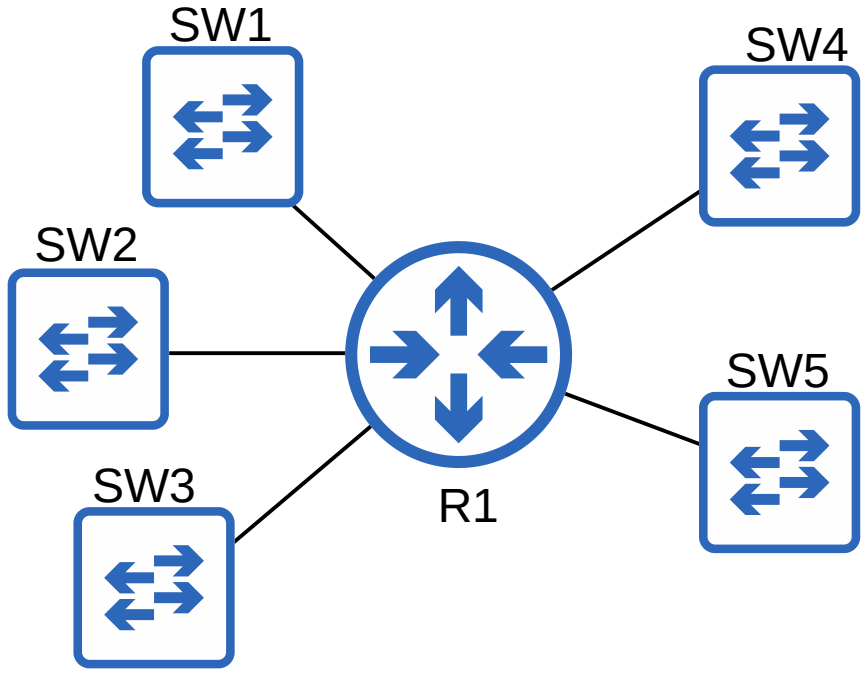
192.168.1.0/24

Subnetting

Subnet 1:

Subnet 2:

Subnet 3:



Subnet 4:

Subnet 5:

192.168.255.0/24

Divide the **192.168.255.0/24** network into five subnets of equal size. Identify the five subnets.

Subnetting

/24

1 1 0 0 0.0.0.0 . 1 0 1 0 1 0 0 0 . 1 1 1 1 1 1 1 1 . 0 0 0 0 0 0 0 0

192 . 168 . 255 . 0

Borrowing 0 bits = can’t make any subnets

Subnetting


```
1 1 0 0 0.0.0.0 . 1 0 1 0 1 0 0 0 . 1 1 1 1 1 1 1 1 . 0 0 0 0 0 0 0 0
   192          .    168          .    255          .    0
1 1 0 0 0.0.0.0 . 1 0 1 0 1 0 0 0 . 1 1 1 1 1 1 1 1 . 1 0 0 0 0 0 0 0
   192          .    168          .    255          .    128
```

Borrowing 1 bit = can make 2 subnets

2^x = number of subnets
(x = number of 'borrowed' bits)

$2^n - 2$ = number of hosts
(n = number of host bits)

Subnetting

1 1 0 0 0.0.0.0	.	1 0 1 0 1 0 0 0	.	1 1 1 1 1 1 1 1	.	0 0 0 0 0 0 0 0
192	.	168	.	255	.	0

Borrowing 2 bits = can make 4 subnets

Subnetting

1 1 0 0 0.0.0.0 . 1 0 1 0 1 0 0 0 . 1 1 1 1 1 1 1 1 . 0 0 0 0 0 0 0 0

192 . 168 . 255 . 0

Borrowing 3 bits = can make 8 subnets

Subnetting Trick

192.168.255.0/27

NETWORK PORTION | HOST PORTION

1 1 0 0 0.0.0.0 . 1 0 1 0 1 0 0 0 . 1 1 1 1 1 1 1 1 . 0 0 0 | 0 0 0 0 0

192 . 168 . 255 . 0

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Subnetting Trick

192.168.255.0/27

192 . 168 . 255 . 0

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

NETWORK PORTION

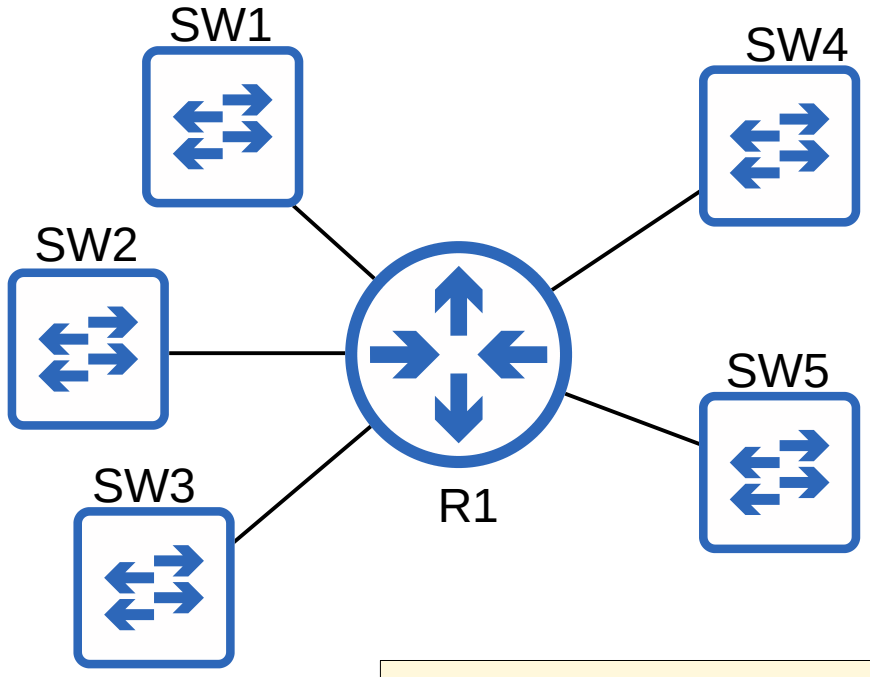
HOST PORTION

Subnetting

Subnet 1:
192.168.255.0/27

Subnet 2:
192.168.255.32/27

Subnet 3:
192.168.255.64/27



Subnet 4:
192.168.255.96/27

Subnet 5:
192.168.255.128/27

192.168

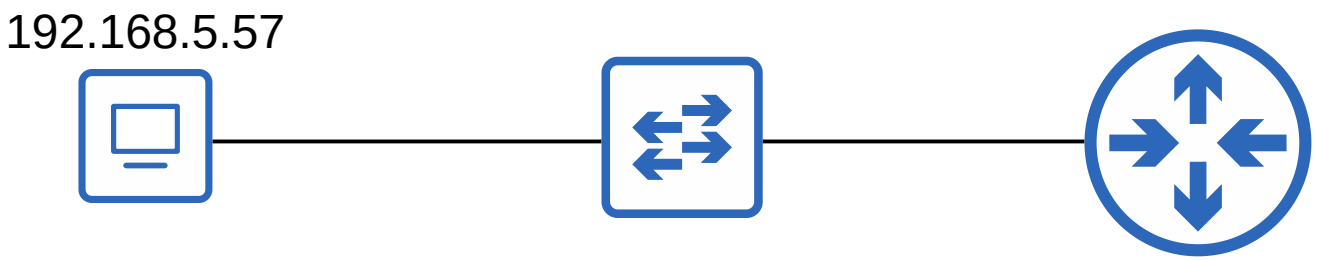
Subnet 6: 192.168.255.160/27
Subnet 7: 192.168.255.192/27
Subnet 8: 192.168.255.224/27

Divide the **192.168.255.0/** f
equal size. Identify the five subnets.

Identify the subnet

What subnet does host **192.168.5.57/27** belong to?

Subnet ID: _____/27



Identify the subnet

/27

1 1 0 0 0.0.0.0	.	1 0 1 0 1 0 0 0	.	0 0 0 0 0 1 0 1	.	0 0 1 1 1 0 0 1
192	.	168	.	5	.	57

Identify the subnet

/27

1 1 0 0 0.0.0.0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 1 0 1 . 0 0 1 1 1 0 0 1

192 . 168 . 5 . 57

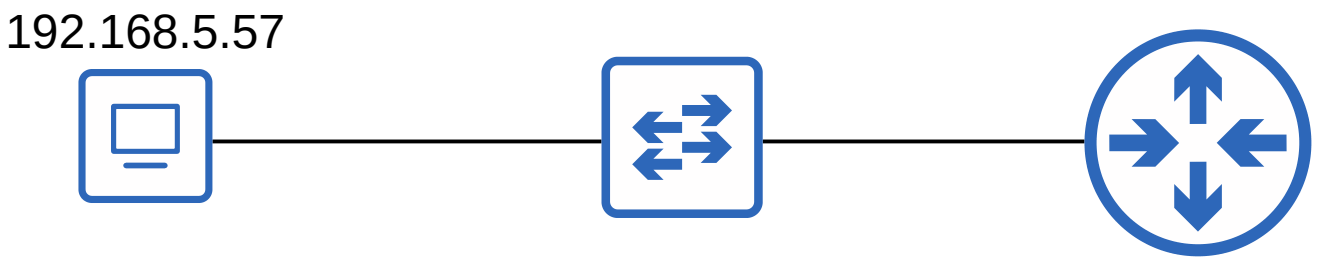
1 1 0 0 0.0.0.0 . 1 0 1 0 1 0 0 0 . 0 0 0 0 0 1 0 1 . 0 0 1 0 0 0 0 0

192 . 168 . 5 . 32

Identify the subnet

What subnet does host **192.168.5.57/27** belong to?

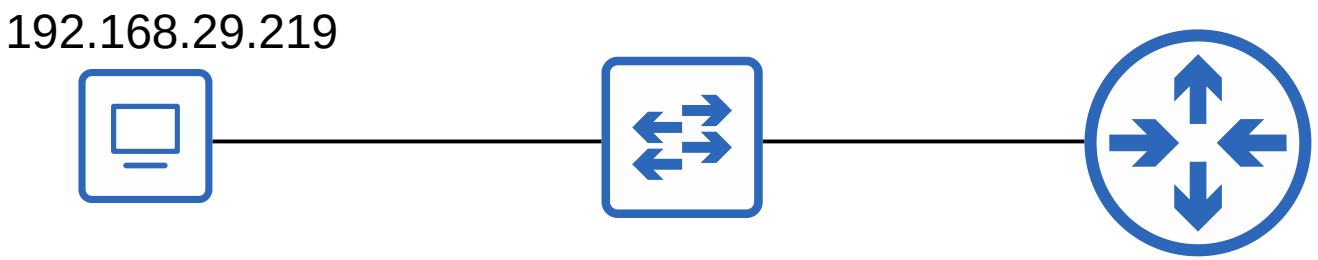
Subnet ID: 192.168.5.32 /27



Identify the subnet

What subnet does host **192.168.29.219/29** belong to?

Subnet ID: _____/29



Identify the subnet

/29

1 1 0 0 0 0 0 0 . 1 0 1 0 1 0 0 0 . 0 0 0 1 1 1 0 1 . 1 1 0 1 1 0 1 1

192 . 168 . 29 . 219

Identify the subnet

/29

1 1 0 0 0.0.0.0 . 1 0 1 0 1 0 0 0 . 0 0 0 1 1 1 0 1 . 1 1 0 1 1 0 1 1

192 . 168 . 29 . 219

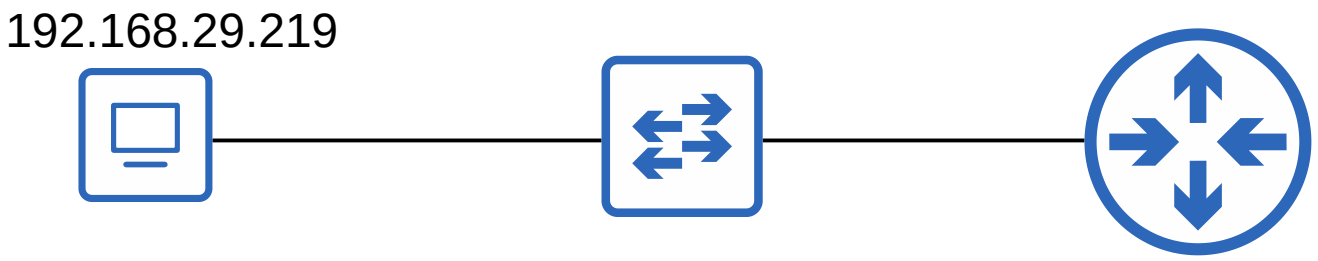
1 1 0 0 0.0.0.0 . 1 0 1 0 1 0 0 0 . 0 0 0 1 1 1 0 1 . 1 1 0 1 1 0 0 0

192 . 168 . 29 . 216

Identify the subnet

What subnet does host **192.168.29.219/29** belong to?

Subnet ID: 192.168.29.216/29



Subnets/Hosts (Class C)

Prefix Length	Number of Subnets	Number of Hosts
/25	2	126
/26	4	62
/27	8	30
/28	16	14
/29	32	6
/30	64	2
/31	128	0 (2)
/32	256	0 (1)

Subnetting Class B Networks

Class	Leading bits	Size of *network number* bit field	Size of *rest* bit field	Number of networks	Addresses per network
Class A	0	8	24	128 (2^7)	16,777,216 (2^{24})
Class B	10	16	16	16,384 (2^{14})	65,536 (2^{16})
Class C	110	24	8	2,097,152 (2^{21})	256 (2^8)

The process of subnetting Class A, Class B, and Class C networks is EXACTLY THE SAME!

Subnetting Class B Networks

You have been given the 172.16.0.0/16 network. You are asked to create 80 subnets for your company's various LANs. What prefix length should you use?

172.16.0.0/16

Subnetting Class B Networks

1 0 1 0 1 1 0 0	.	0 0 0 1 0 0 0 0	.	0 0 0 0 0 0 0 0	.	0 0 0 0 0 0 0 0
172	.	16	.	0	.	0

Borrowing 0 bits = can't make any subnets

2^x = number of subnets
(x = number of 'borrowed' bits)

Subnetting Class B Networks

1 0 1 0 1 1 0 0 . 0 0 0 1 0 0 0 0 . 0 0 0 0 0 0 0 0 . 0 0 0 0 0 0 0 0

172 . 16 . 0 . 0

Borrowing 1 bit = 2 subnets

Subnet mask:

1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 0 0 0 0 0 0 0 . 0 0 0 0 0 0 0 0

255 . 255 . 128 . 0

Subnetting Class B Networks

1 0 1 0 1 1 0 0 . 0 0 0 1 0 0 0 0 . 0 0 0 0 0 0 0 0 . 0 0 0 0 0 0 0 0

172 . 16 . 0 . 0

Borrowing 2 bits = 4 subnets

Subnet mask:

1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 0 0 0 0 0 0 . 0 0 0 0 0 0 0 0

255 . 255 . 192 . 0

Subnetting Class B Networks

1 0 1 0 1 1 0 0 . 0 0 0 1 0 0 0 0 . 0 0 0 0 0 0 0 0 . 0 0 0 0 0 0 0 0

172 . 16 . 0 . 0

Borrowing 3 bits = 8 subnets

Subnet mask:

1 1 1 1 1 1 1 1 . 1 1 1 1 1 1 1 1 . 1 1 1 0 0 0 0 0 . 0 0 0 0 0 0 0 0

255 . 255 . 224 . 0

Subnetting Class B Networks

1 0 1 0 1 1 0 0 . 0 0 0 1 0 0 0 0 . 0 0 0 0 0 0 0 0 . 0 0 0 0 0 0 0 0

172 . 16 . 0 . 0

Borrowing 4 bits = 16 subnets

Subnet mask:

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 0 0 0 0 0 0 0

255 . 255 . 240 . 0

Subnetting Class B Networks

1 0 1 0 1 1 0 0 . 0 0 0 1 0 0 0 0 . 0 0 0 0 0 0 0 0 . 0 0 0 0 0 0 0 0

172 . 16 . 0 . 0

Borrowing 5 bits = 32 subnets

Subnet mask:

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 0 0 0 0 0 0

255 . 255 . 248 . 0

Subnetting Class B Networks

1 0 1 0 1 1 0 0 . 0 0 0 1 0 0 0 0 . 0 0 0 0 0 0 0 0 . 0 0 0 0 0 0 0 0

172 . 16 . 0 . 0

Borrowing 6 bits = 64 subnets

Subnet mask:

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 0 0 0 0 0

255 . 255 . 252 . 0

Subnetting Class B Networks

1 0 1 0 1 1 0 0 . 0 0 0 1 0 0 0 0 . 0 0 0 0 0 0 0 0 . 0 0 0 0 0 0 0 0

172 . 16 . 0 . 0

Borrowing 7 bits = 128 subnets

Subnet mask:

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 0 0 0 0

255 . 255 . 254 . 0

Subnetting Class B Networks

1 0 1 0 1 1 0 0 . 0 0 0 1 0 0 0 0 . 0 0 0 0 0 0 0 0 . 0 0 0 0 0 0 0 0

172 . 16 . 0 . 0

1 0 1 0 1 1 0 0 . 0 0 0 1 0 0 0 0 . 0 0 0 0 0 0 1 0 . 0 0 0 0 0 0 0 0

172 . 16 . 2 . 0

1 0 1 0 1 1 0 0 . 0 0 0 1 0 0 0 0 . 0 0 0 0 0 1 0 0 . 0 0 0 0 0 0 0 0

172 . 16 . 4 . 0

1 0 1 0 1 1 0 0 . 0 0 0 1 0 0 0 0 . 0 0 0 0 0 1 1 0 . 0 0 0 0 0 0 0 0

172 . 16 . 6 . 0

1 0 1 0 1 1 0 0 . 0 0 0 1 0 0 0 0 . 0 0 0 0 1 0 0 0 . 0 0 0 0 0 0 0 0

172 . 16 . 8 . 0

Subnetting Class B Networks

You have been given the 172.22.0.0/16 network. You are required to divide the network into 500 separate subnets. What prefix length should you use?

172.22.0.0/16

Subnetting Class B Networks

1 0 1 0 1 1 0 0	.	0 0 0 1 0 1 1 0	.	0 0 0 0 0 0 0 0	.	0 0 0 0 0 0 0 0
172	.	22	.	0	.	0

Borrowing 9 bits = 512 subnets

Subnetting Class B Networks

You have been given the 172.18.0.0/16 network. Your company requires 250 subnets with the same number of hosts per subnet. What prefix length should you use?

172.18.0.0/16

Subnetting Class B Networks

1 0 1 0 1 1 0 0	. 0 0 0 1 0 0 1 0	. 0 0 0 0 0 0 0 0	. 0 0 0 0 0 0 0 0
172	. 18	. 0	. 0

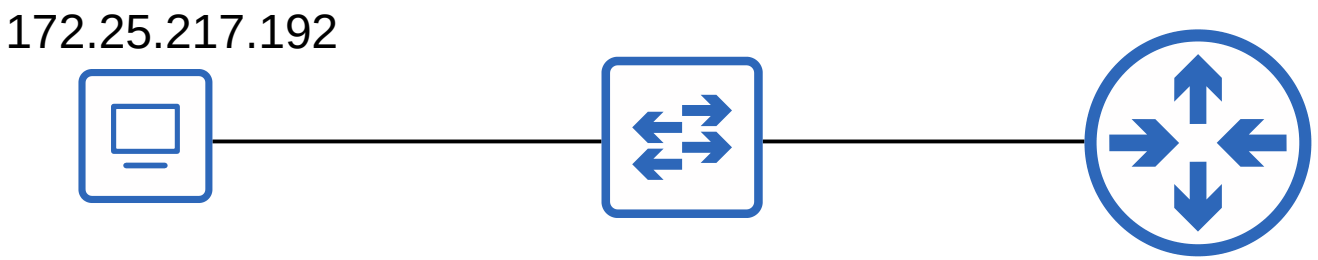
Borrowing 8 bits = 256 subnets

8 host bits = 254 hosts per subnet

Identify the subnet

What subnet does host **172.25.217.192/21** belong to?

Subnet ID: _____/21



Identify the subnet

/21

1 0 1 0 1 1 0 0 . 0 0 0 1 1 0 0 1 . 1 1 0 1 1 0 0 1 . 1 1 0 0 0 0 0 0

172 . 25 . 217 . 192

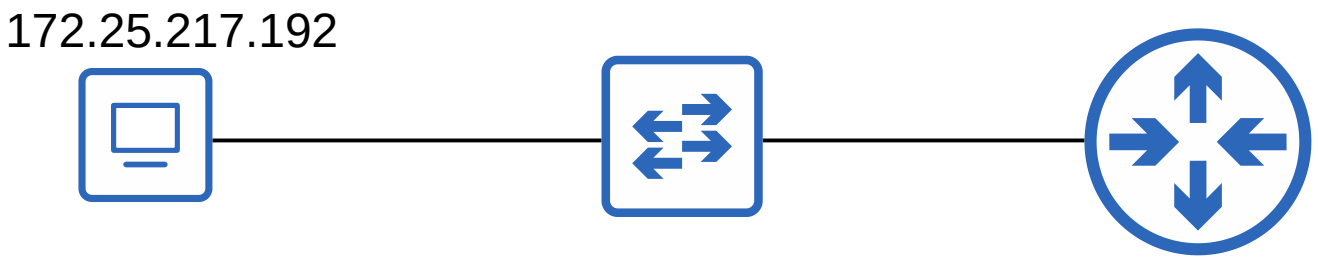
1 0 1 0 1 1 0 0 . 0 0 0 1 1 0 0 1 . 1 1 0 1 1 0 0 0 . 0 0 0 0 0 0 0 0

172 . 25 . 216 . 0

Identify the subnet

What subnet does host **172.25.217.192/21** belong to?

Subnet ID: 172.25.216.0 /21



Subnets/Hosts (Class B)

Prefix Length	Number of Subnets	Number of Hosts
/17	2	32766
/18	4	16382
/19	8	8190
/20	16	4094
/21	32	2046
/22	64	1022
/23	128	510
/24	256	254

Prefix Length	Number of Subnets	Number of Hosts
/25	512	126
/26	1024	62
/27	2048	30
/28	4096	14
/29	8192	6
/30	16384	2
/31	32768	0 (2)
/32	65536	0 (1)

QUIZ

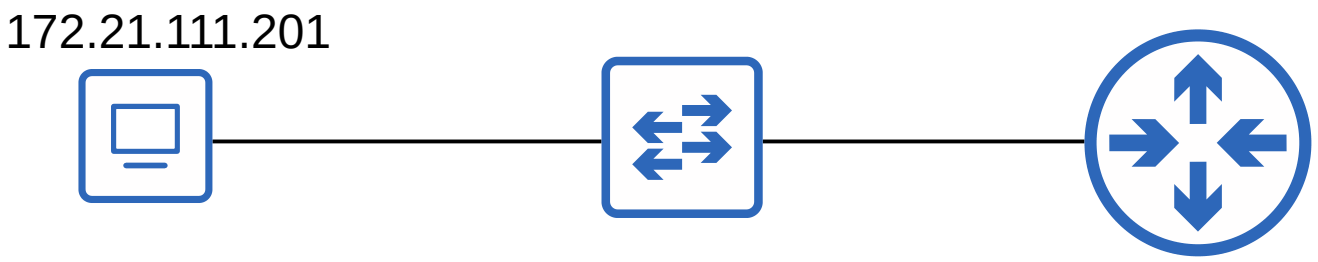
QUIZ QUESTION 1

You have been given the 172.30.0.0/16 network. Your company requires 100 subnets with at least 500 hosts per subnet. What prefix length should you use?

QUIZ QUESTION 2

What subnet does host **172.21.111.201/20** belong to?

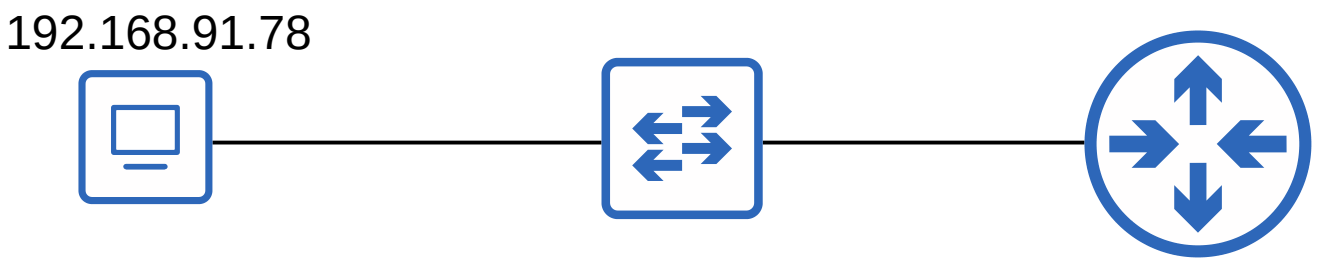
Subnet ID: _____/20



QUIZ QUESTION 3

What is the **broadcast address** of the network **192.168.91.78/26** belongs to?

Broadcast address: _____/26



QUIZ QUESTION 4

You divide the 172.16.0.0/16 network into 4 subnets of equal size. Identify the **network** and **broadcast** addresses of the second subnet.

QUIZ QUESTION 5

You divide the 172.30.0.0/16 network into subnets of 1000 hosts each. How many subnets are you able to make?

QUIZ

Write your answers in the comment section of this video!

Jeremy's IT Lab

JCNP-Level Channel Members

Vance Simmons

M

Mike Achee

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Yonatan Makara

L

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