MIDTERM STUDY FOCUS

Midterm2 Information

When: Week 10 during the 1hr lecture period.
Duration: 50 minutes
Content: Weeks 5 - 8 inclusive
Review These slides, Course slides, Review Slides, Quizzes, Net Acad supporting info
Policy: Closed-book exam on paper

Broadcast addresses always mean directed broadcast.

Calculators, including laptop calculators are not permitted.

Bring pencil/pen.

1. Routing table
2. Convert between decimal, hexadecimal, binary
3. For a given host address and mask, determine the network address
4. Configure the static route
5. IP Header fields
6. Compress and uncompress IPv6 addresses
7. IPv6 address types: global unicast and link local
8. Subnets in IPv6
9. Convert mask notations between dotted decimal and slash
10. How many bits are borrowed for n subnets
11. Partition the network into s subnets. What is the nth subnet ID?
12. Partition the network into subnets of n hosts. What is the nth subnet ID?
13. How many bits are borrowed to partition a classful network.
14. For a given subnet, identify first, last and broadcast addresses.
15. Router interfaces and subnets. Each Router Interface is a subnet.
16. Identify the default gateway and DNS server based on nth host in a subnet.
17. Private addresses
18. Reasons for subnetting
19. Valid masks

2. What is the Subnet ID of host 82.35.67.102/15

	82.	35.	67.	102

		128 64 32 16 8 4 2 1		
host	82	.00100011.	67.	102
mask	<u>11111111.1111111</u>0.00000000.00000000			
	15 bits			
host AND mask	82.	00100010.	0.	0

82.34.0.0/15

3.

10.10.1.0/24 — R1 .2 | .1 R2 .2 | .1 R3 — 10.10.2.0/24

R1 .254 — S1 Switch — 192.168.1.0/24
- .10 A PC
- B PC

R3 .254 — S2 Switch — 192.168.2.0/24
- .10 C PC
- D PC
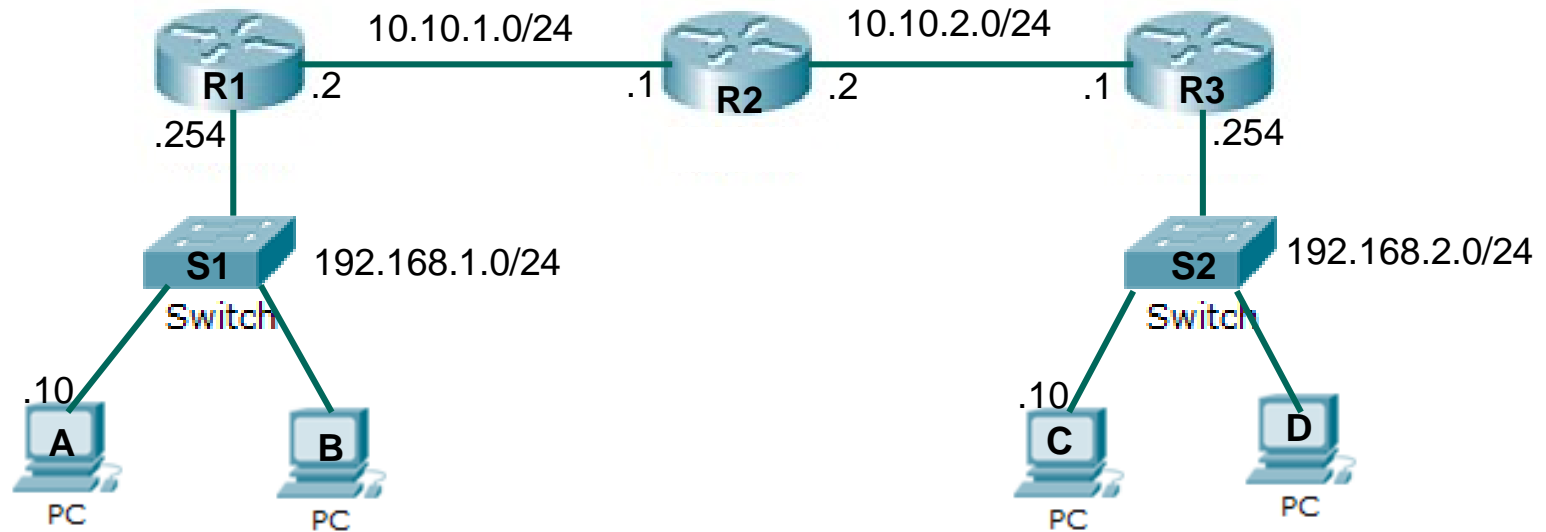
7. A packet needs to be sent from PC-A to PC-C.   Which static route needs to be configured at R1?

A) 192.168.2.0/24; 10.10.1.2

B) 192.168.1.0/24; 10.10.1.1

C) 192.168.2.0/24; 10.10.1.1

D) 192.168.2.0/24; 10.10.2.2

Static Route = Dest Network;   Next Hop Address

Answer in last slide

5. Which is the most efficient IPv6 compression?

2001:0000:0000:aa20:0000:0000:0000:0001

A) **2001::aa20::1**
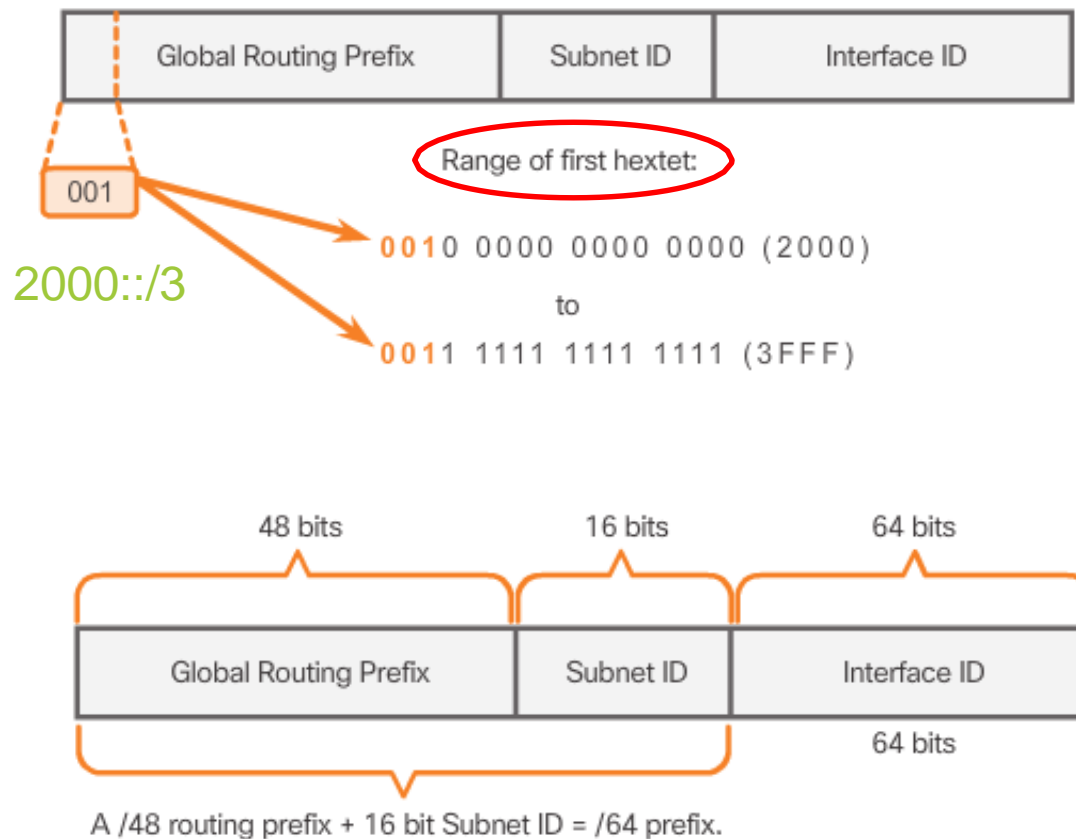
B) **2001:0:0:aa20::1**

C) **2001::aa20:0:0:0:1**

D) **2001:0:0:aa20:0:0:0:1**

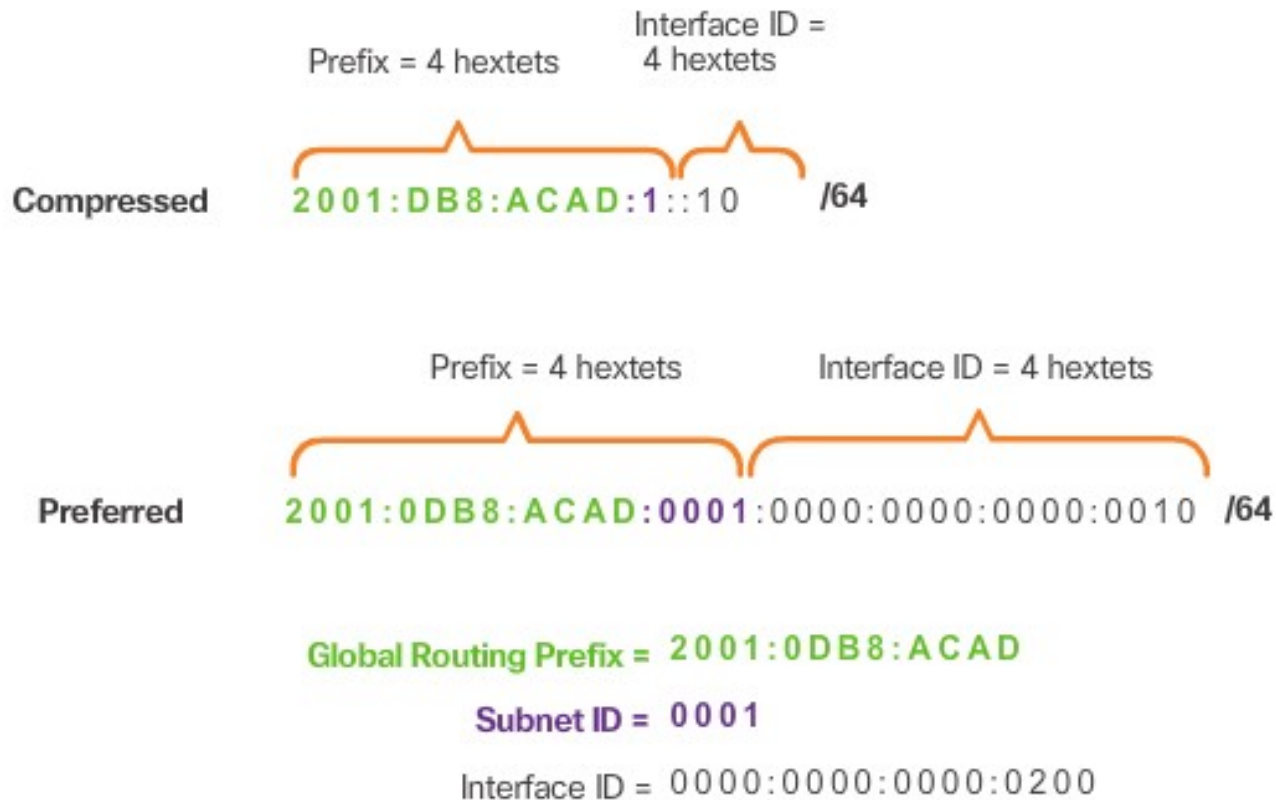You also need to uncompress IPv6 addresses.

Structure of an IPv6 Global Unicast Address

Global Routing Prefix	Subnet ID	Interface ID

Range of first hextet:

001

2000::/3

0010 0000 0000 0000 (2000)

to

0011 1111 1111 1111 (3FFF)

48 bits	16 bits	64 bits
Global Routing Prefix	Subnet ID	Interface ID

64 bits

A /48 routing prefix + 16 bit Subnet ID = /64 prefix.

Structure of an IPv6 Global Unicast Address (cont.)
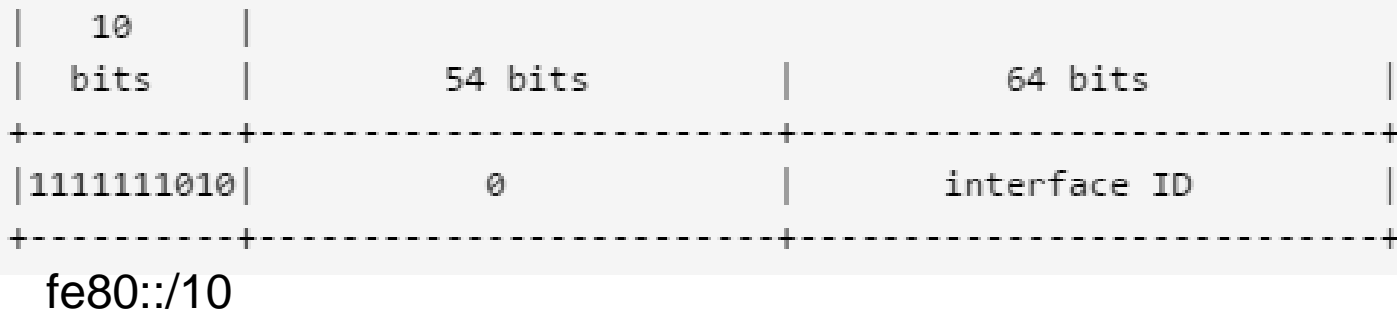
Reading a Global Unicast Address

Structure of an IPv6 Link Local Address

Similar to 169.254.0.0 Address in IPv4
Only used in a network segment – it is non routable
Example: used between two connected routers

```
|    10     |
|  bits     |           54 bits           |            64 bits            |
+-----------+-----------------------------+-------------------------------+
|1111111010 |             0               |          interface ID         |
+-----------+-----------------------------+-------------------------------+
```
fe80::/10

Example

fe80:0000:0000:0000:c001:37ff:fe6c:001

fe80::c001:37ff:fe6c:1

7. What is the subnet ID of the following IPv6 global unicast address?

2001:db8:1f23:aa20:5b6e:0000:0000:0001/64

A) 2001:db8:1f23:aa20::/64

B) db8

C) aa20

D) 5b6e

8. Convert /17 to dotted decimal notation.

<u>11111111.11111111.1</u>0000000.00000000

17 bits

11111111.11111111.10000000.00000000

(bit values over the third octet: 128 64 32 16 8 4 2 1)

255.   255.   128.   0

8. Convert 255.255.255.192 to slash notation.

255.   255.   255.   192

11111111.11111111.11111111.11000000
128 64 32 16 8 4 2 1

<u>11111111.11111111.11111111.11</u>000000
26bits

/26

10. Partition the network address 192.168.24.0/23 into 16 subnets. What are the subnet 0 and 3 IDs?

192   .168   .24   .0

192   .168   .00011000   .0

23 bits

16 subnets requires that we borrow 4 bits

192   .168   .0001100s.sss00000

27 bits

Subnet 0;
ssss=0000
mask= /27

192   .168   .24   .0 /27

Subnet 3;
ssss=0011;
mask = /27

192   .168   .24   .96 /27

Partition the network address 172.16.128.0/17 into subnets of 30 hosts each. What are subnet ID 0 and 5?

	172	.16	.128	.0

30 hosts requires 5 host bits

8 subnets requires that we borrow 3 bits

	172	.16	.1sssssss.sss00000

27-17=10 bits are available for subnets   5 host bits

Subnet 0; ssssssssss= 0000000000 mask= /27

	172	.16	.10000000.00000000
	172	.16	.128	.0 /27

Subnet 5; ssssssssss= 0000000101 mask= /27

	172	.16	.10000000.10100000
	172	.16	.128	.160 /27

13a. Example

Network Address: 192.168.125.128/25

Network Address in Dotted Binary Notation:
11000000.10101000.01111101.10000000
192.168.125.128/25

Network Address: Host portion are all 0s

First Host Address:
11000000.10101000.01111101.10000001
192.168.125.129

First Host Address: Host portion is 1 binary

13b. Example

Network Address: 192.168.125.128/25

Last Host Address:
11000000.10101000.01111101.11111110
192.168.125.254

Last Host Address: one less than broadcast in host portion

Broadcast Address:
11000000.10101000.01111101.11111111
192.168.125.255

Broadcast Address: host portion are all 1s

13. For the 10ᵗʰ subnet, what are the first, last, broadcast addresses and number of hosts?

192	.169	.64	.0 /19

$$\overset{\substack{128\ 64\ 32\ 16\ 8\ 4\ 2\ 1}}{}$$

192	.169 .	010<u>00000</u> .<u>00000000</u>

Host = 13 bits

$$\overset{\substack{128\ 64\ 32\ 16\ 8\ 4\ 2\ 1}}{}$$

directed broadcast

192	.169 .	010<u>11111</u> .<u>11111111</u>
192	.169	.95	.255

First = Net ID + 1

192	.169	.64	.1

Last = Broadcast - 1

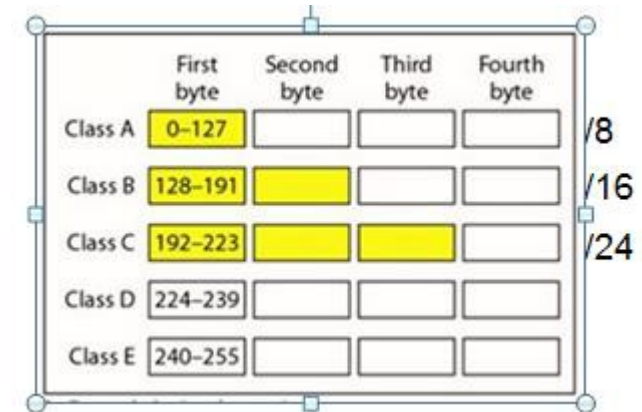| 192	.169	.95	.254

Number of hosts = $2^{13} - 2 = 8{,}190$
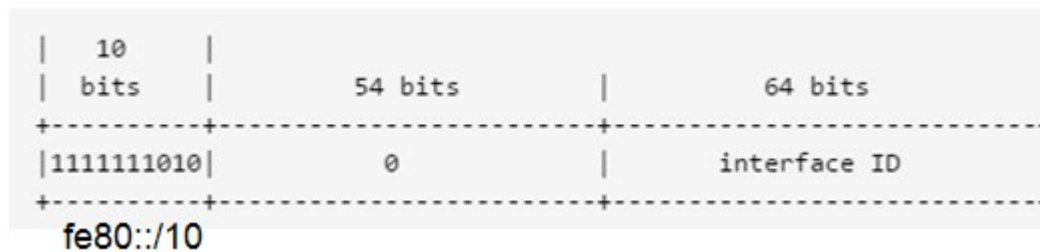
Information Sheet
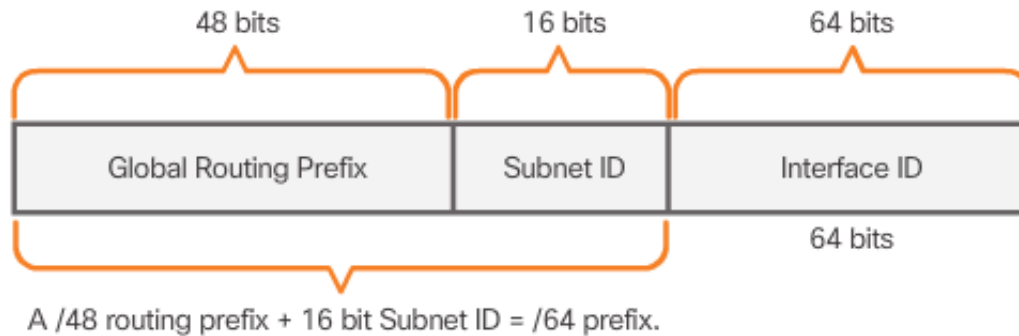
IPv6 Global Unicast Format

Address Classes

IPv6 Link Local Format

Class	Starting IP Address	Ending IP Address	# of Hosts
A	10.0.0.0	10.255.255.255	16,777,216
B	172.16.0.0	172.31.255.255	1,048,576
C	192.168.0.0	192.168.255.255	65,536

Private Addresses