



**ALGONQUIN**  
COLLEGE

# MIDTERM STUDY FOCUS

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# Midterm2 Information

When: Wednesday March 23 during the lecture period.

Duration: 50 minutes

Content: Weeks 5 - 8 inclusive

Review These slides, Course slides, Review Slides, Quizzes, Net Acad supporting info

When mask information is required in the answer, always use slash notation (i.e. 192.168.1.1/8) unless stated otherwise.

Always provide the mask with a network or subnetwork address.

Always provide the mask with an IPv6 network or host address.

Broadcast addresses always mean directed broadcast.

Calculators, including laptop calculators are not permitted.

Bring paper and pencil/pen.

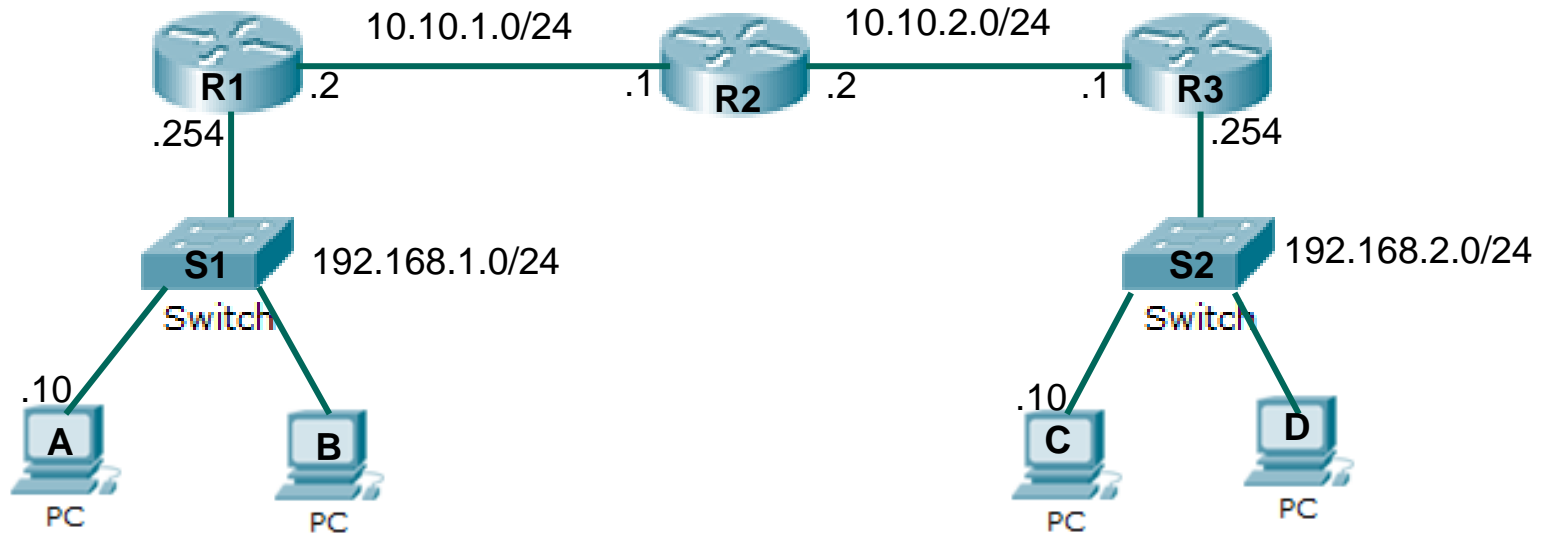


1. Convert between decimal, hexadecimal, binary
2. For a given host address and mask, determine the network address
3. Configure the static route
4. IP Header fields
5. Compress and uncompress IPv6 addresses
6. IPv6 address types: global unicast and link local
7. Subnets in IPv6
8. Convert mask notations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





3.



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**

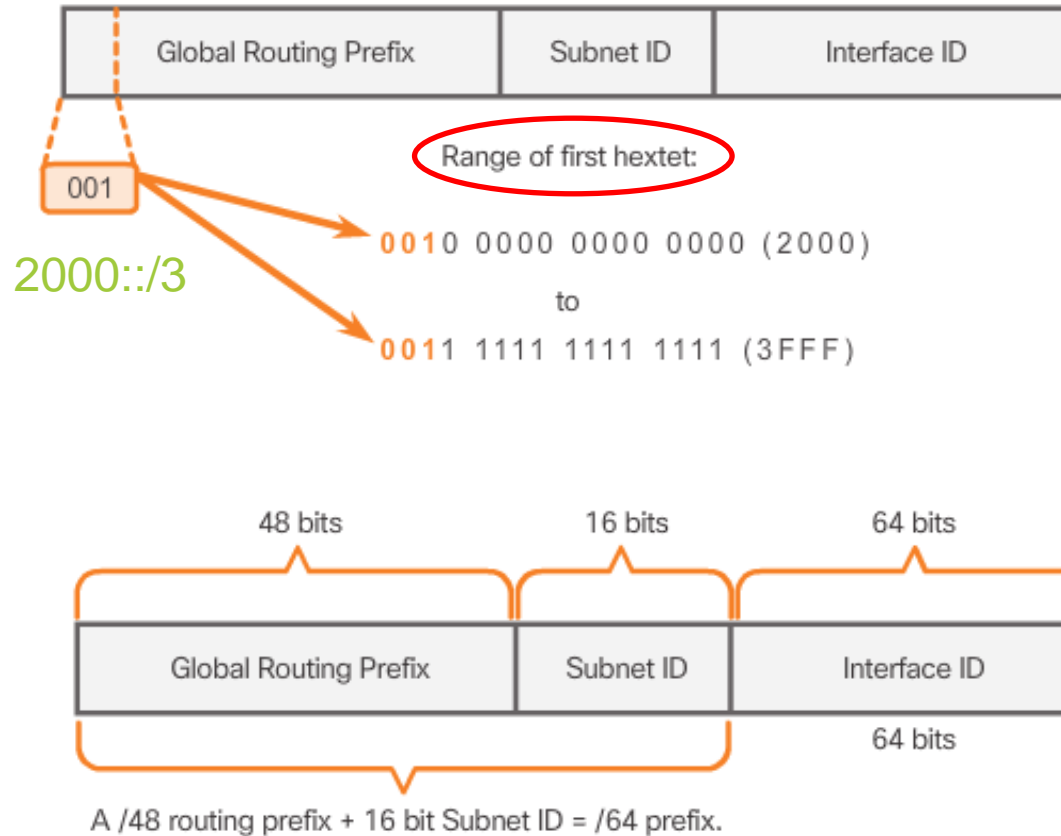
D) **2001:0:0:aa20:0:0:0:1**

You also need to uncompress IPv6 addresses.



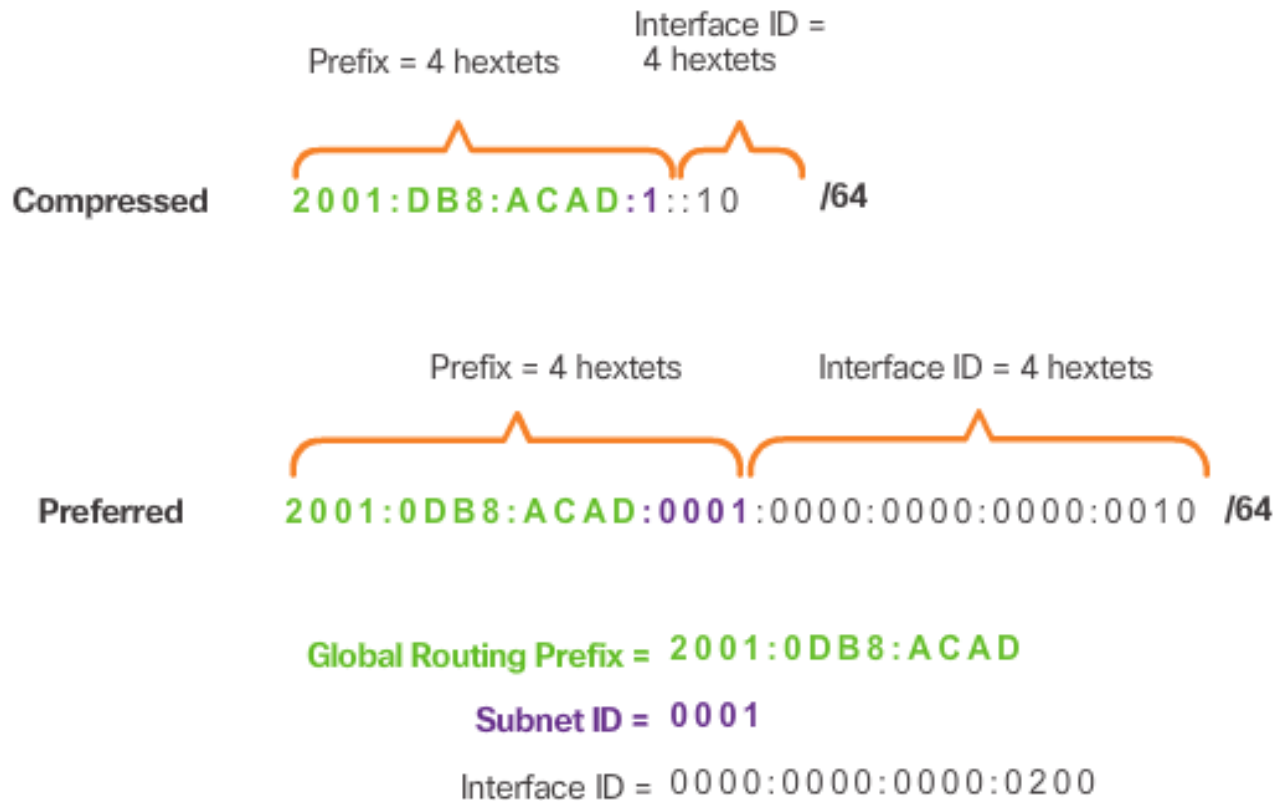
6a

# Structure of an IPv6 Global Unicast Address



# 6b Structure of an IPv6 Global Unicast Address (cont.)

## Reading a Global Unicast Address





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.

11111111.11111111.10000000.00000000  
17 bits

11111111.11111111.<sup>128</sup>1<sup>64</sup>00000000.<sup>32</sup>00000000.<sup>16</sup>00000000.<sup>8</sup>00000000.<sup>4</sup>00000000.<sup>2</sup>00000000.<sup>1</sup>00000000

255.

255.

128.

0



8. Convert 255.255.255.192 to slash notation.

255.

255.

255.

192

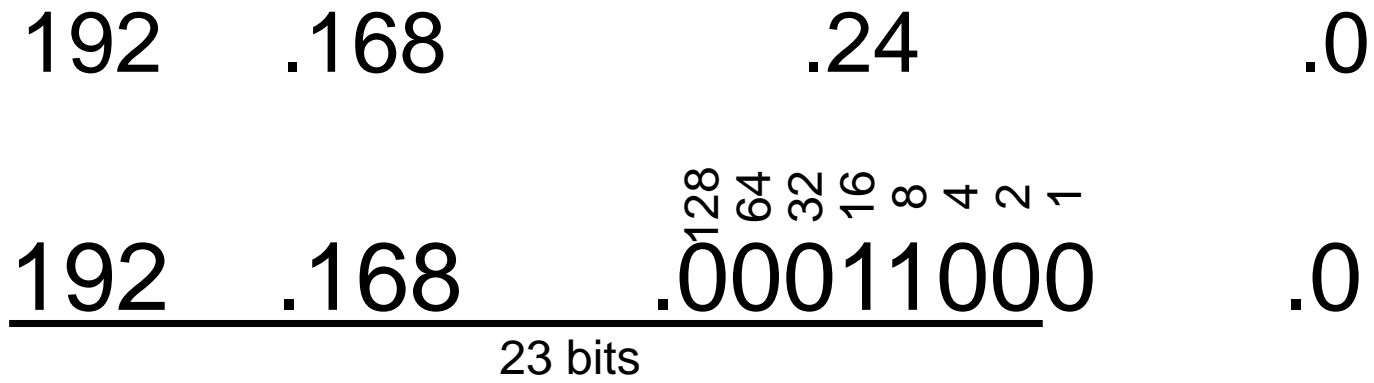
11111111.11111111.11111111.11000000<sup>128 64 32 16 8 4 2 1</sup>

11111111.11111111.11111111.11000000  
26bits

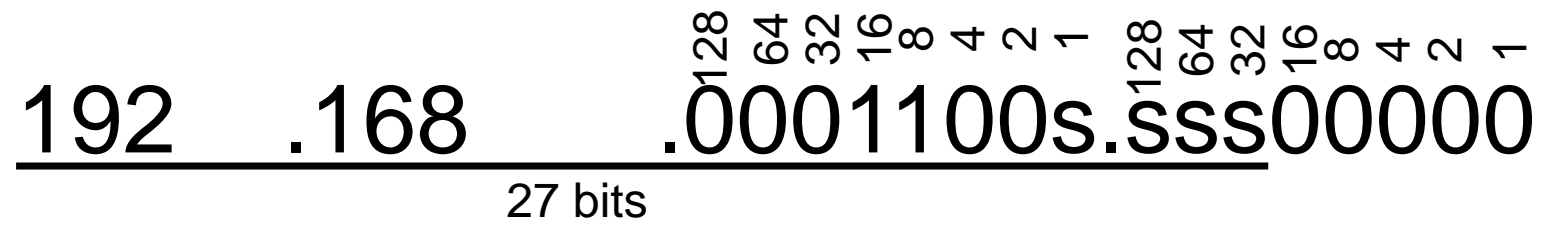
/26



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



16 subnets requires that we borrow 4 bits



Subnet 0;  
ssss=0000  
mask= /27



Subnet 3;  
ssss=0011;  
mask = /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 .1 ssssssss.sss00000

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

Subnet 0;  
sssssssss=  
000000000  
mask= /27

172 .16 .10000000.000000000

172 .16 .128 .0 /27

Subnet 5;  
sssssssss=  
000000101  
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 10<sup>th</sup> subnet, what are the first, last, broadcast addresses and number of hosts?

192 .169 .64 .0 /19

192 .169 .  $\overset{128}{0}\overset{64}{1}\overset{32}{0}\overset{16}{0}\overset{8}{0}\overset{4}{0}\overset{2}{0}\overset{1}{0}$   $\overset{128}{.}\overset{64}{0}\overset{32}{0}\overset{16}{0}\overset{8}{0}\overset{4}{0}\overset{2}{0}\overset{1}{0}$

Host = 13 bits

**directed broadcast**

192 .169 .  $\overset{128}{0}\overset{64}{1}\overset{32}{0}\overset{16}{1}\overset{8}{1}\overset{4}{1}\overset{2}{1}\overset{1}{1}$   $\overset{128}{.}\overset{64}{1}\overset{32}{1}\overset{16}{1}\overset{8}{1}\overset{4}{1}\overset{2}{1}\overset{1}{1}$

192 .169 .95 .255

**First = Net ID + 1**

192 .169 .64 .1

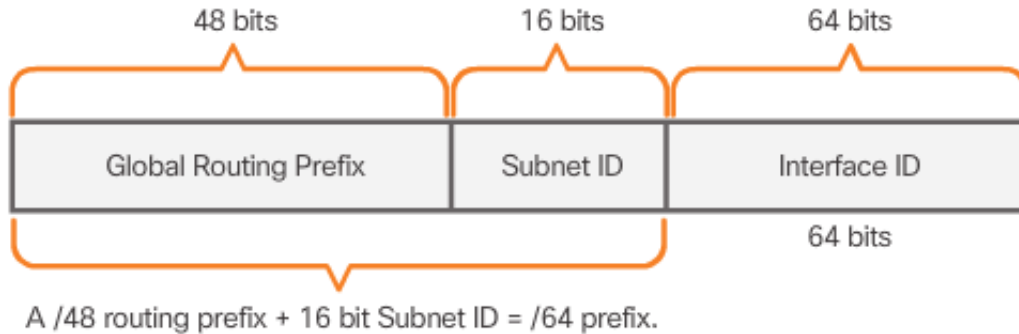
**Last = Broadcast - 1**

192 .169 .95 .254

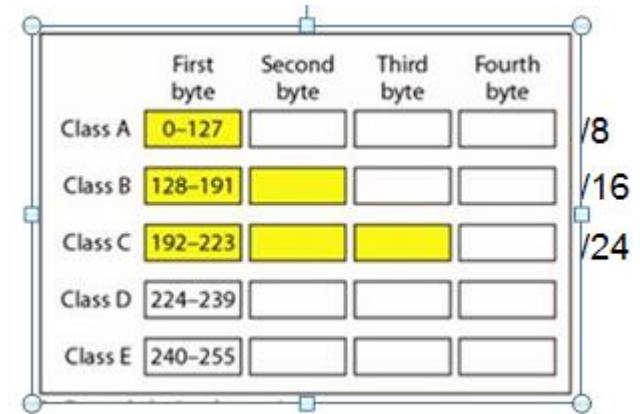
Number of hosts =  $2^{13} - 2 = 8,190$



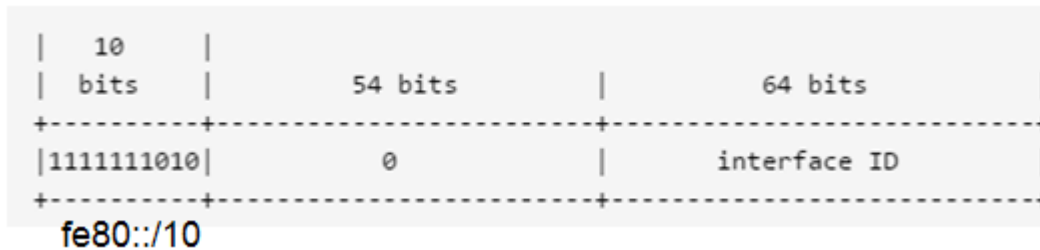
# Information Sheet



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

