Lecture 30: midterm recap and medium access control

CS450 Fall 2009 Midterm 2 Name:_____

1. (8 points) Match up the functionality with the (single) layer in which this functionality is customarily provided in the Internet. 1 point for each correct answer, -1 point for incorrect answer. 0 points for no answer. If you believe some function belongs in multiple layers, give a single answer, and describe your reasoning below. Minimum total score is zero points.

   (1) domain name service (2) end-to-end reliability (3) ordering guarantees (4) routing (5) congestion control (6) email (7) addressing (8) application multiplexing

   Application - 1, 6

   Transport - 2, 3, 5, 8

   Network - 4, 7

2. (4 points) Two Internet users, connected to two different WiFi access points, are both using the IP address 192.168.1.101. This is a very common occurrence in today's Internet. Name the mechanism that makes this possible, and describe the main benefits and drawbacks of this mechanism?

NAT - network address translation
share a single public IP between several computers
security advantage - primitive firewall
no server / no p2p / can't contact from outside

3. **IP host configuration and subnets**

(a) (4 points) What network configuration settings need to be set, either manually or by DHCP, in order to be able to successfully connect to an Internet connected IP network, and visit www.google.com?

IP address
netmask
default router / gw
DNS server

(b) (2 points) An IP subnet has a netmask of 255.255.224.0. What is the maximum number of hosts in this subnet?

8+5 bits = 13 bits of host address / id
2^13 = 8192, -1 broadcast address

(c) (2 points) A /29 network has its default gateway on IP address 138.28.3.254. You connect your laptop to the network, and manually set the IP address to 138.28.3.240, with netmask 255.255.255.0 and gateway 138.28.3.254. What two things are wrong with this setup?

netmask is wrong, should be longer

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4. Internet routing with BGP.

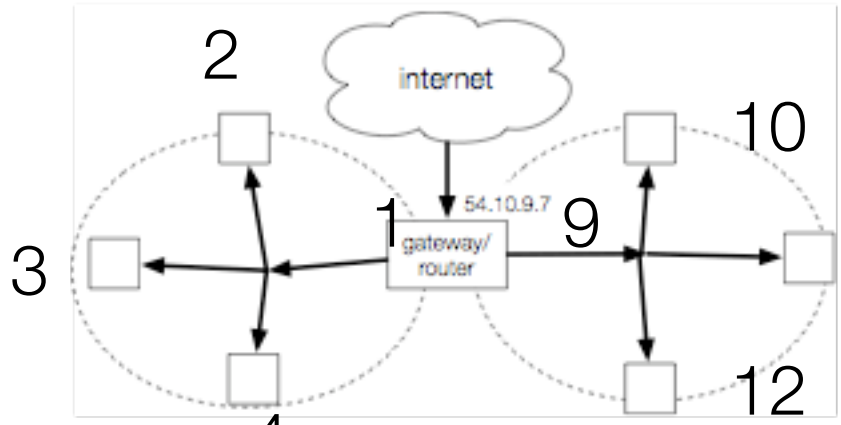
(a) (2 points) In BGP, what is an Autonomous System (AS), and what is the autonomous system number (ASN) used for?

unit of routing in BGP
network controlled by a single organization
internal routing is abstracted from Internet
(any routing protocol internally)
ASN is used to describe routing paths in BGP

(b) (2 points) What does the term 'peering' signify in BGP? Describe (succinctly) the difference between a peering policy vs. a customer-provider type relationship.

exchange of packets between networks
at the same level in the network hierarchy
typically no payments in either direction
peering relationships are not transitive
c/p relationship typically for pay, provider
carries all prefixes

5. **Network design.** You are configuring a router and a number of machines in the network topology described below:



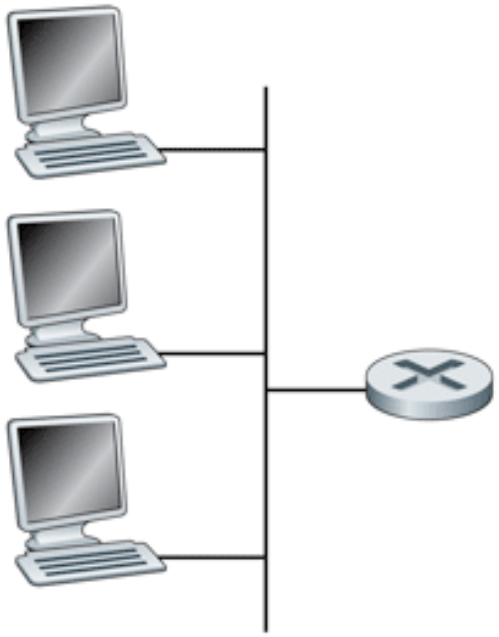
Your ISP has assigned you the the address range 54.10.8.0/28 for use in your network. However, in your case, your boss has deemed it desirable to have two separate IP subnets, as indicated by the dashed ovals.

(a) (4 points) Design a feasible addressing scheme for the network given the above constraints. For each interface indicate its address. Indicating the last (least significant) octet of the address is enough.

(b) (2 points) List a suitable prefix and netmask for each subnet.

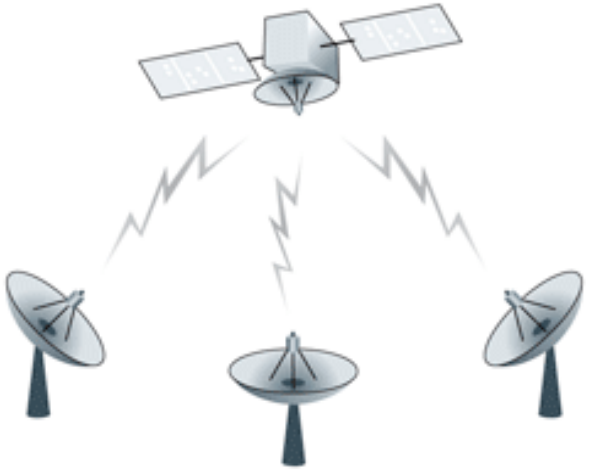
54.10.8.0 / 29 255.255.255.248
54.10.8.8 / 29 255.255.255.248

Shared wire
(for example, Ethernet)



Shared wireless
(for example, Wifi)

Satellite



Cocktail party

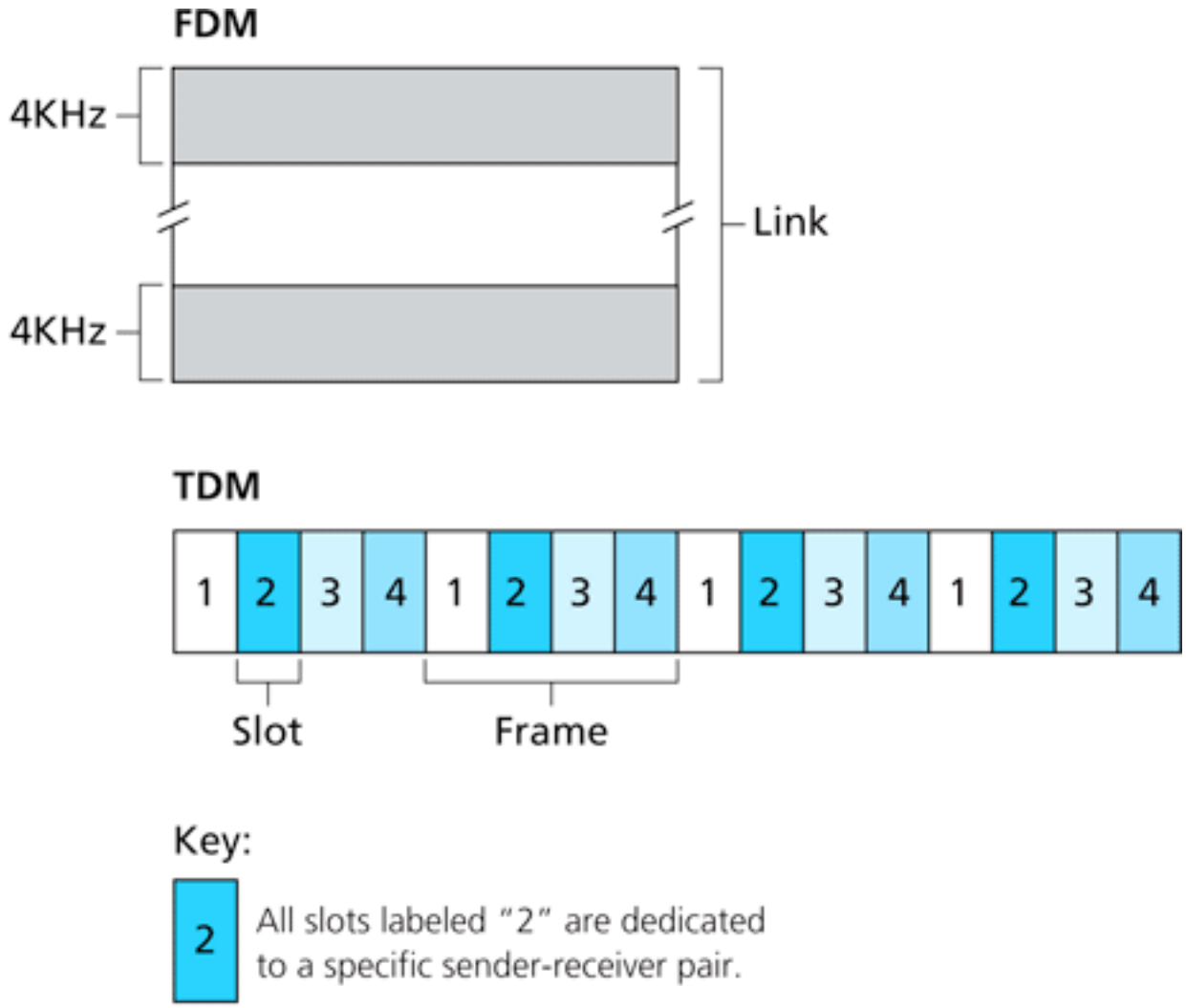
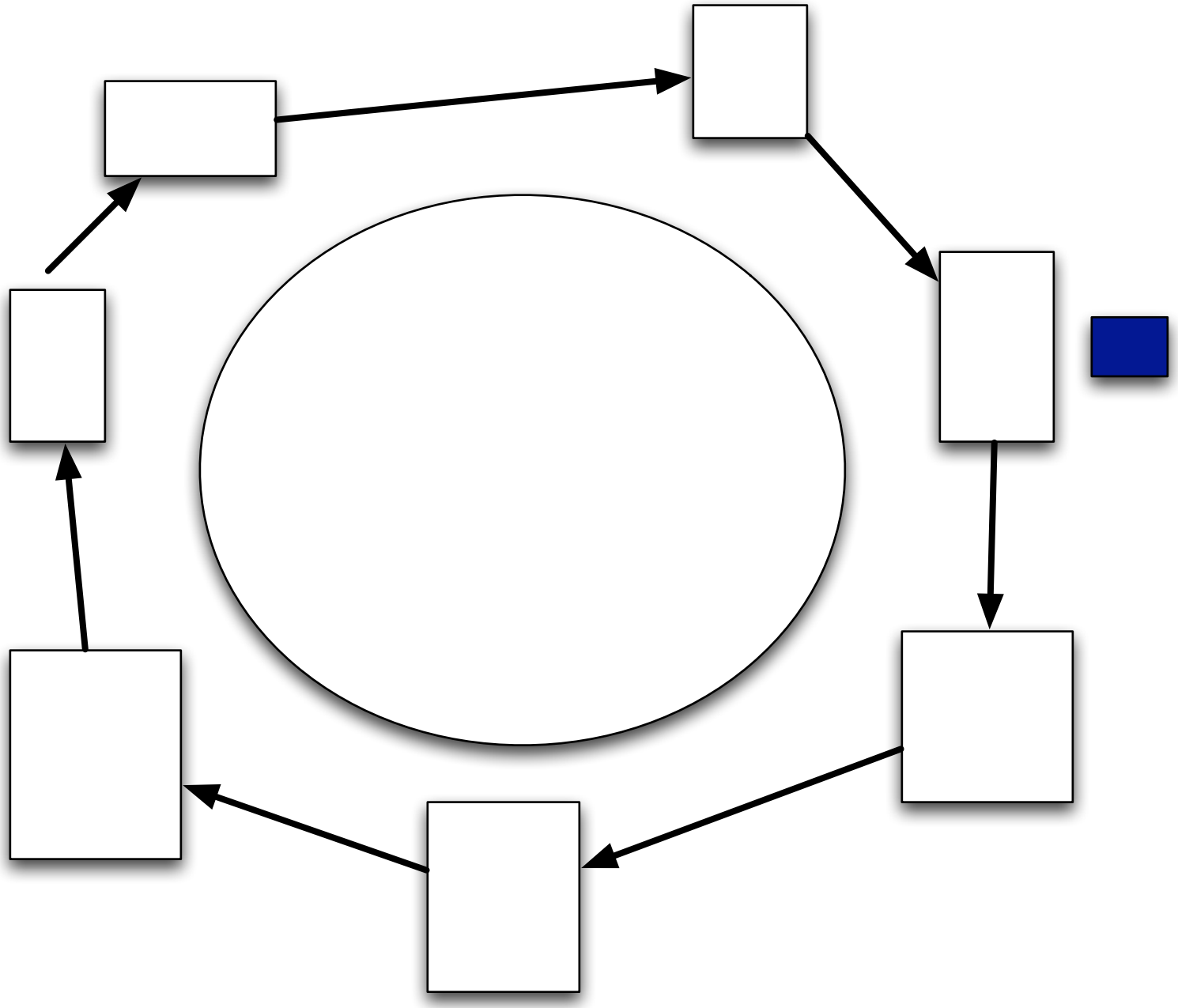
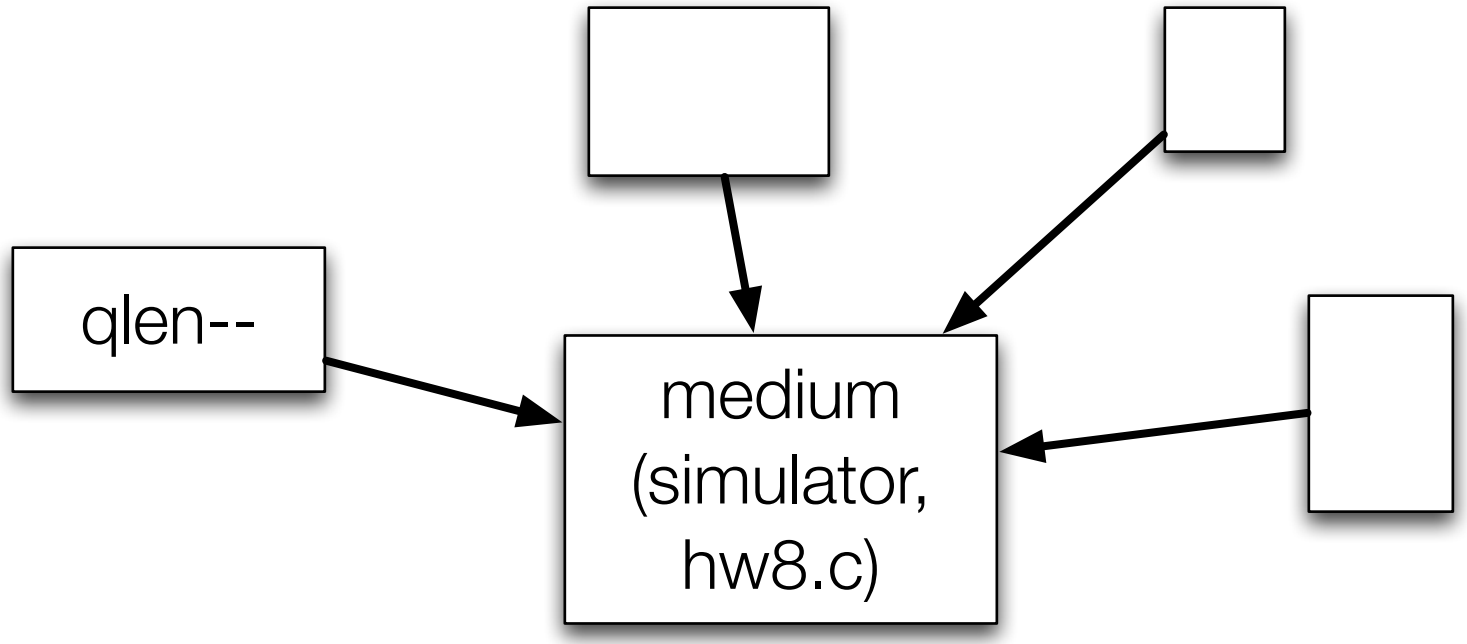


Figure 5.10 ♦ A four-node TDM and FDM example




qlen--
medium
(simulator,
hw8.c)