

Data Communications CS420/520

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Midterm 2 -- Spring 2006

Name: _____ Student ID: _____

This is a *closed* book, *closed* note exam. You may use a calculator but **no computers**. Show **ALL** your work to get full or partial credit for the problem. You have 60 minutes.

Use the space provided – focus on the main issues and do not write long stories. If you need more space than provided, your answer is probably too long!

Problem	Total	Points
1	10	
2	20	
3	15	
4	10	
5	15	
6	15	
7	15	
Total:	100	

1. (10 pts) With respect to Internetworking

a) Briefly describe the terms

i) 100Base-TX

ii) 100Base-FX

iii) 1000Base-SX

iv) 1000Base-LX

v) 1000Base-T

b) An old building has Cat 3 cables installed. Can this be used to install a 100Mbps local area network?

c) What are the main advantages and disadvantages of using fiber optic cable?

2. (20 pts) With respect to *circuit switched* and *packet switched* public data networks, i.e. CSPDN and PSPDN):

a) Describe the basic differences:

b) For each CSPDN and PSPDN, list one advantage, i.e. its defining strength.

c) What is the main impact of the packet size?

d) What happens when the packets are too big?

e) What happens when the packets are too small?

4. (10 pts) With respect to Internetworking

- a) Given a hub with N ports, what is the number of concurrently communicating pairs of computers on its ports.

- b) Now consider a switch with N ports. How many pairs of computers can communicate concurrently?

- c) Given the routing tables below: a frame, destined for Node 6, arrives at Node 1. Indicate the path the packet traverses, i.e. show which nodes it visits on its path to the destination.

Node 1 Directory

Destination	Next Node
2	2
3	4
4	4
5	4
6	4

Node 2 Directory

Destination	Next Node
1	1
3	3
4	4
5	4
6	4

Node 3 Directory

Destination	Next Node
1	5
2	5
4	5
5	5
6	5

Node 4 Directory

Destination	Next Node
1	2
2	2
3	5
5	5
6	5

Node 5 Directory

Destination	Next Node
1	4
2	4
3	3
4	4
6	6

Node 6 Directory

Destination	Next Node
1	5
2	5
3	5
4	5
5	5

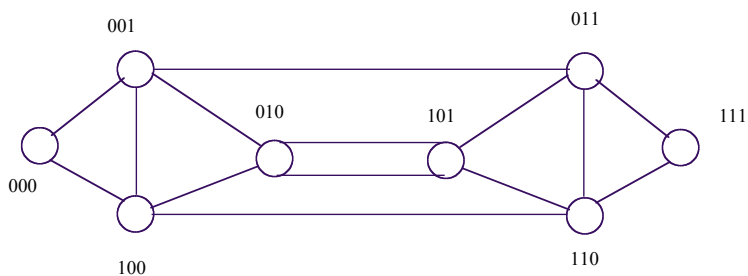
5. (15) Looking at bridged networks:

a) (8 pts) Assume that we have a network consisting of a collection of subnetworks (each with exactly 100 attached workstations and at most two 4-port bridges). From a given host, what is the maximum number of other hosts that can be contacted by going through no more than 2 bridges? Note, with a single 4-port bridges each subnet can have access to 3 other subnets, since it uses one port. Show your computations.

b) What is a spanning tree?

i) (4 pts) define the term:

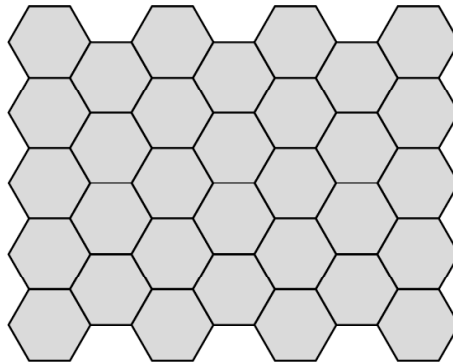
ii) (3 pts) given the network below, where bridges are represented by vertices and communication links by edges of the graph, indicate one possible spanning tree:



6. (15 pts) With respect to cellular networks

a) Assume hexagonal cell pattern, the following values of N, which is the number of cells in repetitious patterns are possible $N = I^2 + J^2 + (I \times J)$, $I, J = 0, 1, 2, 3, \dots$. It is better to have a small or large value of N? Argue your point.

b) Indicate the frequency reuse for $N = 7$ in the figure below. Number at least 14c ells.



c) Describe the term "Handoff" and indicate the key challenge associate with it.

d) Describe at least two advantages of Code Division Multiple Access (CDMA)

