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MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Sloan School of Management

**15.565 - INTEGRATING INFORMATION SYSTEMS:
TECHNOLOGY, STRATEGY, AND ORGANIZATIONAL FACTORS**

**15.578 - GLOBAL INFORMATION SYSTEMS:
COMMUNICATIONS & CONNECTIVITY AMONG INFORMATION
SYSTEMS**

Spring 2002

SAMPLE MID-TERM EXAMINATION

GENERAL PROCEDURES

1. This examination is open book.
2. Read each problem completely before starting to answer it. Note the point values assigned to each problem and budget your time accordingly.
3. Your answers should be brief but complete. It is more advantageous to answer all the questions, briefly outlining the major points, than to answer only one or two in great detail.
4. Think. Organize. Do not spend too much time on any one question.
5. Write all answers in this exam booklet. If scratch work is not to be graded, clearly rule it out. If you do not have room to answer a question in the space provided, clearly write "continued on opposite page" and use the back of the preceding page, clearly indicating question and part number.
6. Write your name on every page. Check page numbers to ensure that your exam is complete.
7. You will have 80 minutes to complete the examination.

Question #

1.	30 points	_____	Strategic Connectivity
2.	40 points	_____	Physical Connectivity
3.	30 points	_____	Network Performance
	100 points	_____	TOTAL

Question 1 (Strategic Connectivity)

This question relates the recent *WSJ* article about H. Lee Scott, prospective CEO of Wal-Mart. Although much of the article is about Mr. Scott's background and personality, parts of it describe Wal-Mart's operation and the importance of logistics. After reading the selected excerpts below, answer the questions that follow.

"Logistics Whiz Rises at Wal-Mart." *Wall Street Journal*, 11 March 1999, Page B1.

- a) Using the Interlinked Value Chain analysis, what relationships are being stressed at Wal-Mart according to this article.
- b) What aspects of the Wal-Mart situations described correspond to examples discussed at McKesson's? Briefly explain.
- c) What are some fundamental differences between Wal-Mart and McKesson? In what way does that give Wal-Mart even more flexibility.
- d) In the McKesson case, key competitors quickly emulated McKesson's systems and today continue to be profitable competitors. Why do you suspect that Kmart, which are one time had sales exceeding Wal-Mart, lags so far behind today?

Question 2 (Physical Connectivity)

This question is related to a large half-page advertisement that appeared in the *Boston Globe*. It featured a large diagram of an astronaut landing on the moon. The text of the advertisement is reproduced below.

The Boston Globe.

- a) What is DSL and how does it work?
- b) What does the term “dedicated” mean? In particular:
- i) How does it differ from tradition phone modem?
 - ii) How does it differ from cable modem?
- c) The package also includes Internet access. Why is that essentially a necessity for DSL?
- d) Verio actually offers 4 packages, briefly summarized as:
- | | | |
|------------------|-----------|--------|
| Verio One | 144-200K | \$123 |
| Verio SOHO | 200-784K | \$250* |
| Verio Office | 416K-1.5M | \$500* |
| Verio Enterprise | 1-1.5M | \$750* |
- (* Estimated prices)

Assuming that someone told you that the technology and costs to Verio were almost identical for all 4 packages. How would you explain the differences in and rationale of the prices charged?

- e) Assuming that you bought and installed the Verio One (160K bps) system. Using your browser you visited a particular web site and noticed that when you downloaded a 160K byte file, it took considerably more than the 8 seconds (i.e., 160K bytes = 8 x 160K bits) that you expected. Give at least 4 different reasons that could explain or contribute to this result. [NOTE: For this part, do not limit yourself to only DSL-related issues.]

Question 3 (Network Performance)

This question is based on Homework 2 Question 3 (HW2Q3).

- a) In the solution you learned that the actual utilization of the Ethernet was under 500K bps.
- i) Assuming that a 500K bps Ethernet existed and was cheaper than the standard 10M Ethernet, what would be the impact of switching to the 500K bps version?
 - ii) Would your answer change much if there were 20 PC's sharing the Ethernet instead of just the two PC's?
- b) Let us now assume that the two PC's are 10 miles apart.
- i) Ignoring any problems with laying the cable, what are at least two reasons why an Ethernet CSMA/CD approach is not desirable for such lengths.
 - ii) If you assume that this Ethernet is only used for file transfers between these two PC's, what normal problems with such a long Ethernet CSMA/CD approach can be made to go away (or would not be significant)? Explain briefly.
- c) In the solutions to HW2Q3, the idea of sending one ACK for every three packets was suggested. This is in the spirit of "frame relay" or "fast packet" wide-area-network systems. In fact, such systems the ACK might only be sent after all the packets have been received --- in the HW2Q3 case, there would be only one ACK after about 550 packets. In the literature, it is usually explained that the "fast packet" approach was motivated by the transition from copper-based analog transmission to fiber-based digital transmission. What two properties of fiber-based digital do you think are important in motivating the "fast packet" protocol?