

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

Homework Assignment 2

Due: Lecture #11

Question 1 (Strategic Connectivity)

While account aggregation is one of the hottest services being offered online by financial services firms, some executives are skeptical. Consider, for instance, the following recent news snippet from *ComputerWorld* magazine:

[[Banks, brokerages weigh merits of aggregation technology](http://www.computerworld.com/storyba/0,4125,NAV47_STO62332,00.html), July 17,2001
(http://www.computerworld.com/storyba/0,4125,NAV47_STO62332,00.html)]

“An executive at one online brokerage said it would cost his company about \$350,000 to install aggregation technology. That's a deal-breaker, considering that the brokerage hasn't heard a clamor for the capability from customers and that it sees no clear promise of a return on the investment, added the executive, who asked not to be named.

"You're going to adopt something out of fear that others will?" he said. "At the prices [the vendors] want, fear is a bad motivator.”

In another company, which decided to implement the account aggregation technology, Internet project leader, Jonathan Scott, is scared: [[Banks See Online Account Aggregation as Necessary Evil](http://www.computerworld.com/storyba/0,4125,NAV47_STO62443,00.html), July 23,2001 (http://www.computerworld.com/storyba/0,4125,NAV47_STO62443,00.html)]

“Scott said he isn't sure exactly how the technology will be received. ‘I don't know if it will be an effective tool or not,’ he said. And making it easier for online users to compare different money market accounts ‘scares me,’ Scott added, explaining that the 350,000-customer bank can't match brokerage houses that offer high interest rates.”

Meir Shor, CIO at Tel Aviv-based Bank Leumi le-Israel BM, on the other hand, seems to be quite enthusiastic, as reported below: [[Israeli bank pushes wireless service despite low usage](http://www.computerworld.com/itresources/restory/0,4167,STO63487_KEY68,00.html) Sep 3, 2001 (http://www.computerworld.com/itresources/restory/0,4167,STO63487_KEY68,00.html)]

“Despite having a mere 100 users per day for his company's year-old wireless service, Shor, is pushing an IT project that in the next few months will add Web and wireless-based account aggregation and transaction capabilities.”

1) Assume you were a manager in one of the above companies (you pick which company), please explain why you would choose to install or not install aggregation technology in your company. Analyze

the case using strategic frameworks discussed in class, as appropriate. Please provide your reasons as bullet points with short explanations.

2) Assume that it is year 2005 now, and all banks are providing account aggregation services to their customers. Having made the brightest decision to install online account aggregation technology several years ago, you are now realizing that your first mover advantage has subsided and the company managers are going to ask you to make another bright move soon. Luckily, you have taken 15.565/15.578 while you were at Sloan, you remember that “Online account aggregation is not an end to itself. Rather, aggregation needs to become a tool to understand and add value to customers”. Explain at least two new ideas that goes beyond simple account aggregation and perhaps also require some new additional aggregations be performed.

3) The dot-com boom is over, but you still decided to go for the MIT 50K competition with the idea of building an air fare aggregator. One of your team mates has gone through the Computer Project, therefore knows how to use the screen scraping technology developed at MIT, to extract information from different web sites, so you need not worry about the technical details.

a) Identify and describe some of the sources that you would be aggregating for this application. Why did you pick these sources?

b) During the 50K finals, a VC suggested that you are more likely to receive funding if you could identify how you could differentiate your service from the others on the market. Surprised and panicked to hear that there are already others in the market you make a search on Google for flight aggregators. Please describe at least one flight aggregator (the extent of its aggregation, capabilities, etc.) and explain how you are planning to differentiate your service from that competitor to get the VC funding?

c) Suppose that you decided to include Priceline (www.priceline.com) as one of your sources as part of your differentiation strategy. What kind of difficulties (technical, legal, etc.) do you expect including this source in your service?

Try to keep your answers to all of the above parts are short and concise as possible.

Question 2 (Network Protocols)

Consider the situation in Figure 1 which depicts two PCs connected via an Ethernet network (you do not need to worry about details of Ethernet for the purposes of this question). We want to copy file X from the hard disk₁ of PC₁, to the hard disk₂ of PC₂.

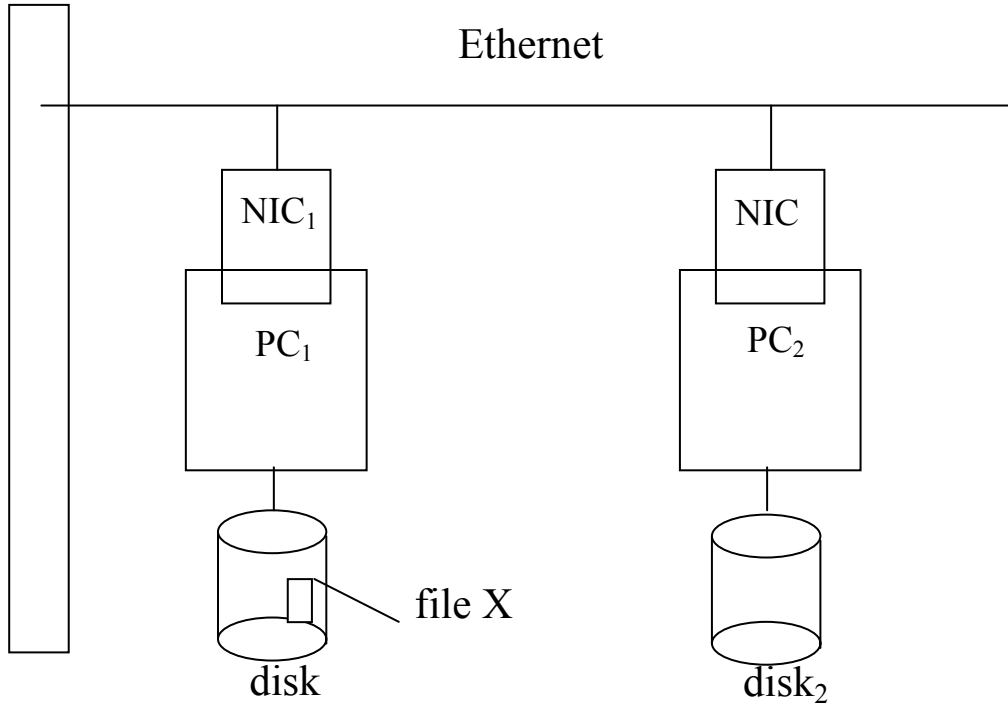


Figure 1. System Configuration

- a) You are told that file X is 809,317 bytes in size and that the Ethernet operates at 10M bits per second. Assuming that these are the only 2 PCs on the network, how long would a non-15.565/15.578 student expect it to take to copy file X? (i.e., for this part, do not be too fancy but do state any assumptions made).

The flow chart shown in figure 2 depicts our qdftp (Quick & Dirty File Transfer Program) protocols. The NIC (Network Interface Card or, in this case, Ethernet card) acts as the interface and buffer between the PC and the network.

- b) Identify at least two steps (or actions) that are omitted from the qdftp procedures depicted in Figure 2. Explain briefly what they are and why they would be needed.

Despite the deficiencies noted in (b) above, we will assume that Figure 2 is OK for purposes of this question. Table 1 below provides information on the speed of various activities and overhead/protocol data that is added at various stages.

- c) Using the information from Table 1, annotate Figure 2 showing the amount of time each step takes. Clearly show your calculations and state any necessary assumptions. Turn in this annotated Figure as part of the assignment.
- d) Based on your calculations of part (c):
- (i) How long will it actually take to copy file X from disk₁ to disk₂?
 - (ii) How does this compare with your answer in part (a)?
 - (iii) Assuming that you had given the answer of part (a) to your boss, how would you explain why the actual result is different? Provide a simple intuitive answer, not all the details of part (c). Highlight the bottleneck(s).
- e) We want you to design a new iqdfp (improved qdfp) to get better performance.
- (i) Propose changes to the qdfp protocol shown in Figure 2. Explain why you think those changes would help.
 - (ii) Using your iqdfp, repeat your calculations of parts (c) and (d). Clearly state any assumptions that you had to make in your calculations.
 - (iii) Are there any disadvantages to your proposed changes?

Size of file X that was sent: 809,317 Bytes

Size of the file packet qdfp reads from disk: 1474 Bytes

Time to read and write data from and to the disk: 8,000 μsec + 2 $\mu\text{sec}/\text{Byte}$
 (1 μsec = 1×10^{-6} sec, which = 0.000001 sec)

Time to transfer data between qdfp and the NIC card: 1,500 μsec + 1.0 $\mu\text{sec}/\text{Byte}$

Overhead data added to each packet by the qdfp software protocol: 25 Bytes

Speed at which the NIC transmits & receives over the Ethernet: 10 μsec startup delay,
 then 10,485,760 bits/second

Overhead added to each packet by the NIC card: 16 Bytes

[Note: this overhead is added after packet is received from qdfp and before it is sent, and then is removed by the NIC card on the other side before giving the packet to the receiving qdfp.]

Time for qdfp to build headers and analyze packet to send: 1,000 μsec

Time for qdfp to validate a received packet: 2,000 μsec

Size of an acknowledgement packet: 4 Bytes

Time for qdfp to determine whether it has sent the entire file: 10 μsec

Table 1. Speed and overhead data involved in qdfp

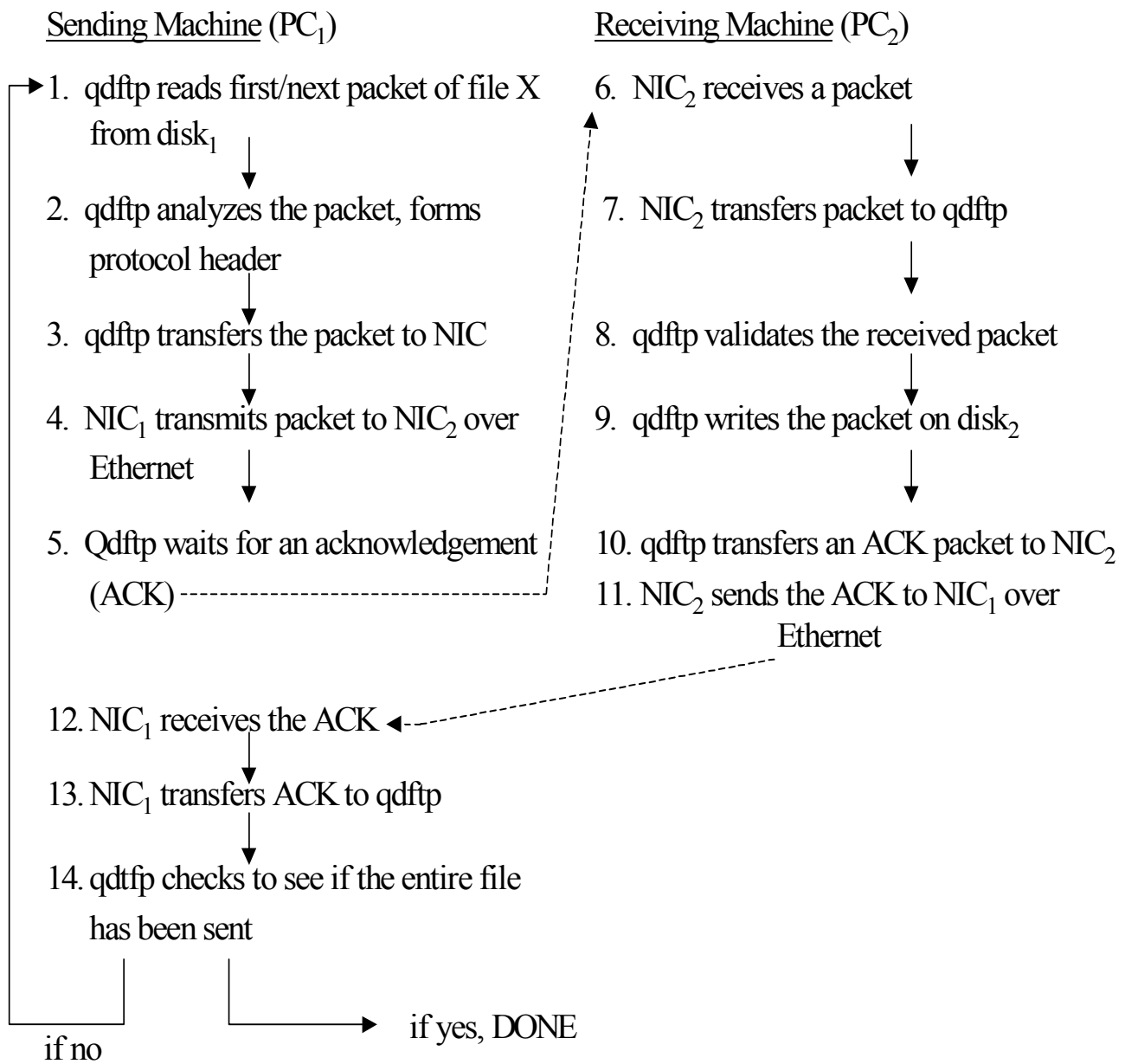


Figure 2. qdftp send and receive procedures