EE 4603, LOCAL AREA NETWORKS, QUIZ 1
Fall 2000

Quiz No. 1: Sept. 14, 2000

Prof. John A. Copeland
School of Electrical and Computer Engineering
Georgia Institute of Technology
Atlanta, GA 30332

Tel.: 404-894-5177
E-Mail: copeland@ece.gatech.edu

RULES.
      I   This quiz is closed book. Calculators may be used.
      ii   Answer all questions and show all work to receive full credit.
      iii   All questions have the same weight. (20 Points). All sub-
questions within a question are weighted equally.

   iv Please do not ask the proctors any questions during the exam about exam questions. Part of the test is understanding the question, as written, without supplemental information. If you feel additional data is needed to solve the problem, make (and state) an assumption and then work the problem.

Question 1 - Networks

A. How many bits can be carried by symbols that have 64 valid states (levels)?

6 $n = \log2(64)$ or $2^6 = 64$

B. Given a signal to noise ratio of 20 dB, how many levels could each symbol carry?

10 $L = \sqrt{S/N + 1}$ $S/N = 10^{(20\,dB/10)}\ 10^2 = 100$, $L = \sqrt{101} = 10.05 \rightarrow 10$

C. How many bits per symbol (Baud) for a symbol supporting 20 distinct levels (round down to an integer)?

4 $b = \log2(20) = 4$. (drop fraction part)

D: What is the Capacity (bits/sec) if the Baud Rate is 2400 per second and each symbol has 8 states (levels)?

7200 $C = 24000$ Baud/s $* \log2(\ 8$ levels$) = 2400$ Baud/s $* 3$ bits/Baud $= 7200$ bits/s

E. What bandwidth (Hz) is needed if NRZ coding is used and 2400 Baud per second are transmitted?

1200 For NRZ, $F = 0.5$ (minimum bandwidth meeded), $H = F * B = 0.5$ Hz/(Baud/s) $* 2400$ Baud/s

Question 2 – Ethernet versus Internet Protocol

A.   Does it make sense to argue which is better, Ethernet or IP? Explain why or why not?

No.   They are at different levels of the Protocol Stack.

They work together. TCP at levels 3,4, and 5 can be replaced by Novell IPX or Appletalk.

Ethernet at levels 1 and 2 can be replaced by another LAN.

Question 3 – Internet and World Wide Web

A. What is the difference between the Internet and the World Wide Web?

The World Wide Web is a collection of Web Servers.

One normally uses the Internet as the means to connect to them (and to other types of servers: mail, telnet, ftp, ...).

B. What aspect of the Internet has to be managed by a global authority.

All IP addresses have to be unique. This requires **a central agency to assign unique subnet addresses to each subnet** (the first 8, 16, or 24 bits of the 32-bit address). The network administrator can then assign the remaining bits to make unique host addresses for each host on the subnet.

Question 4 - Network Protocol Layer Duties.

Name the network layer that performs the following functions. Possible answers:
Application Layer (Telnet, HTTP, SMTP, ...)
Transport Layer (TCP or UDP)
Network Layer (IP)
Data-link Layer (DLL, includes the LLC and MAC sub-layers)
Physical Layer (PHYS)

A. Has a local address that was built in by the LAN adapter card manufacturer.
Data-Link Layer

B. Puts out and receives signals through an external port (connector).
Physical

C. Provides standard services to various computer programs.
Application

D. It uses a hierarchial address assigned by the local network manager.
IP or Network

E. Responsible for end-to-end connections across a multi-node switched network or router network.
Transport (TCP or UDP)

Question 5- Network Protocol Layer Duties.

1. Given the memonic, "APeS Transport Network Data Physically", list the seven ISO Reference Model protocol Layers in the normal order:

>   **7. Application**

>   **6. Presentation**

>   **5. Session**

>   **4. Transport**

>   **3. Network**

>   **2. Data-Link**

>   **1. Physical**

2. Which layers were not included in the IETF's Internet Protocol Model (by number or name)?

>   **5. & 6. (Presentation and Session layers were deleted).**

>   1. & 2. are the LAN layers. There were not included in the TCP/IP specification, but still must be present (supplied by Ethernet or another Local Area Network).