EE 122, Fall 1998
Midterm #1
Professor Unknown

1. Short Answers [30%]

1.1 [5%] Packet-switching is more efficient than circuit-switching for bursty traffic because (check one box)

a. The switching delay is smaller for packet-switches [ ]
b. Packet-switching uses faster links [ ]
c. Bandwidth is not reserved when it is not needed [ ]
d. Circuit-switching uses slow modems [ ]

1.2 [10%] Assume that the internet is made up of only class B networks (recall that there are up to 2 :14: class B networks). We further simplify by ignoring subnetting and assuming that there is one router per class B network. For simplicity, we assume that all the local addresses are Ethernet addresses.

1.2.1 What is the size (in bytes) of each entry of a router table and of an ARP table? An entry of a routing table is (Net. IP address of next router, port number). Assume that the port number takes one byte. An entry of an ARP table is (Host part of local address, Ethernet address).
[Note Round off to an integer number of bytes.]

a. Size of each routing table entry:
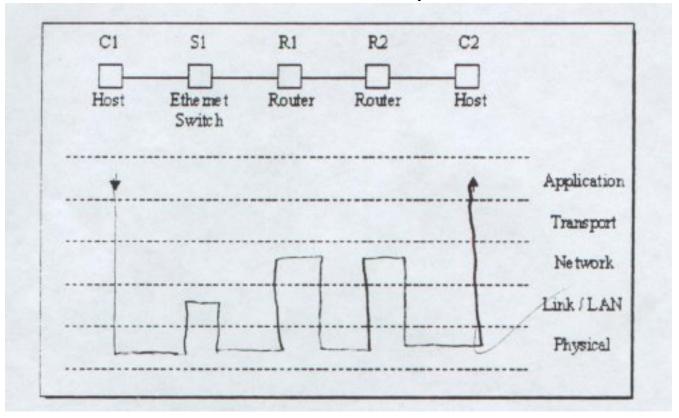
b. Size of each ARP table entry:

1.2.2 Estimate the maximum size (in kilobytes) of the routing table of each router and of the ARP tables of each router:

a. Routing Table:

b. ARP Tables:

1.3 [5%] Imagine a perfect naming system where the root has N domains, each domain has N subdomains, each subdomain has N sub-subdomain, and each sub-subdomain has N names. Say that there are 100 million names. Estimate the number of entries of each name server table.

Number of entries per name server table:

1.4 [5%] Show the flow of information at the correct layers in a connection from C1 to C2.

1.5 [5%] The internet Protocol provides (check one box)
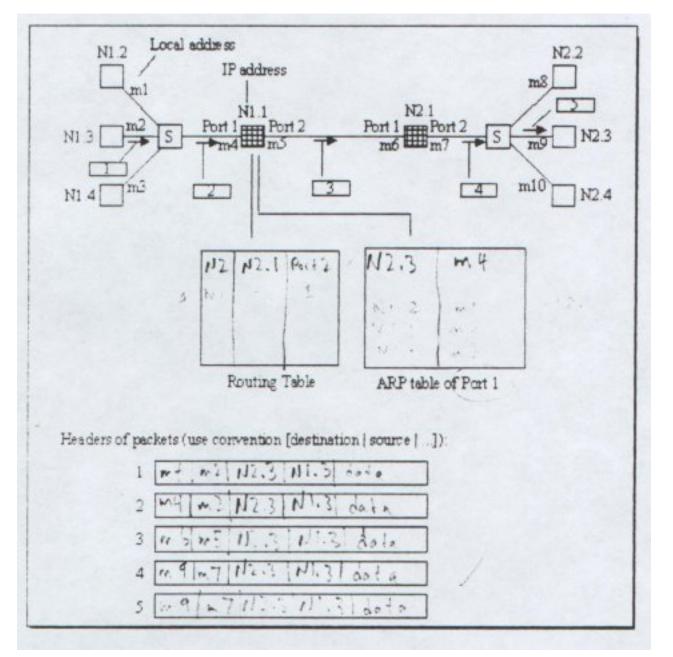
a. Reliable packet delivery between Internet hosts [ ]
b. Unreliable packet delivery between Internet hosts [ ]
c. Reliable packet delivery between hosts on the same LAN or Link [ ]
d. Unreliable packet delivery between hosts on the same LAN or Link [ ]

2. Problem [40%]

Consider the network below. To simplify, we use the class-based addressing Net.Host, with no subnetting and no CIDR.
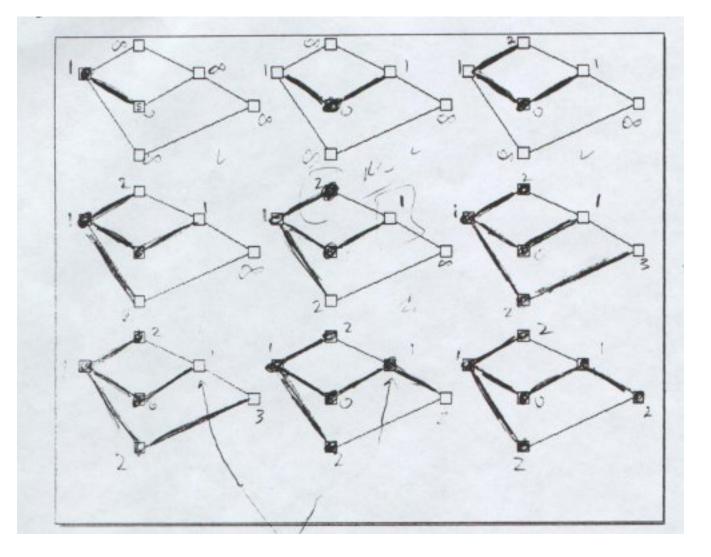
2.1 Fill in the Routing Tables and the ARP tables. A routing entry is (Net, IP address of next router, port number). An entry for a port ARP table is (IP address, local address).
2.2 Fill in the headers of the packets 1, 2, 3, 4, and 5 for a transmission from N1.3 to N2.3.

Routing Table   ARP table of Port 1

Headers of packets (use convention [destination | source | .]):

1. [m+ , m? | N2.3 | N1.3 | data]
2. [m4 | m? | N2.3 | N1.3 | data]
3. [5 | m? | N.3 | N.3 | data]
4. [m.9 | m.7 | N2.3 | N1.3 | data]
5. [9 | m.7 | N.3 | N.3 | data]

3. Problem [30%]

Shortest Path. Indicate the successive steps of the OSPF algorithm (Dijkstra) to find the shortest paths from the source S to all the other nodes. All the links have length 1. For each step, label the nodes, mark the nodes that should be marked, and select the appropriate links. Break ties by exploring nodes with the same smallest label in the order from left to right and from top to bottom.