

1. Server Bandwidth

Consider a server that is used as a router, copying packets from input ports into memory, processing them, and then copying them to output ports. Suppose the bus speed is 500 Mbps.

- (a) How many switched 1.5Mbps T1 links could such a server support?
- (b) Suppose that the server can perform switching of 15000 packets per second and each packet is 1500 bytes in size. What's the total throughput that a switch can support?
- (c) How large should the packets be so that the throughput is limited by the bus bandwidth rather than switching speed?

2. Learning Switches

Refer to Figure 1 for this question. The circles with numbers denote learning switches, with ports labeled by small numbers, and letters denote hosts.

- (a) Suppose switching tables for all switches are initially empty, and then the following two transmission occur: $D \rightarrow G$, $B \rightarrow D$. The following transmission is $E \rightarrow B$. Which hosts hear the third transmission?
- (b) Show the switching table at switch 6 after the three transmissions.

3. Virtual Circuits

Figure 2 shows hosts (A–J) connected by virtual circuit routers (1–6). Assume that each VC may have a different VCID on each link, and VCIDs are assigned starting at 0 and using the next available ID. Suppose that there are virtual circuits established between: $A \rightarrow J$, $B \rightarrow G$, $E \rightarrow D$, $F \rightarrow I$, $B \rightarrow C$, in that order.

- (a) Show the forwarding table at router number 6.
- (b) Suppose there is an additional virtual circuit formed from J to F . Show the virtual circuit IDs that a packet will use traveling along that virtual circuit.

4. IP Addressing

Suppose a router has the following routing table:

130.126.75.0/24	if1
130.126.75.96/30	if2
130.126.64.0/20	if3
130.126.66.0/23	if4
130.128.0.0/10	if5
0.0.0.0/0	if6

- (a) For each entry in the table, list the range of IP addresses that will be matched by that entry (ignoring any overlap between entries) and state the number of addresses in each group
- (b) Which interface will be used for each of the following addresses? Remember that routers use the rule with the longest matching prefix.
 - i. 130.126.75.1
 - ii. 130.126.75.100
 - iii. 130.126.67.50
 - iv. 130.129.10.7
 - v. 130.127.10.7

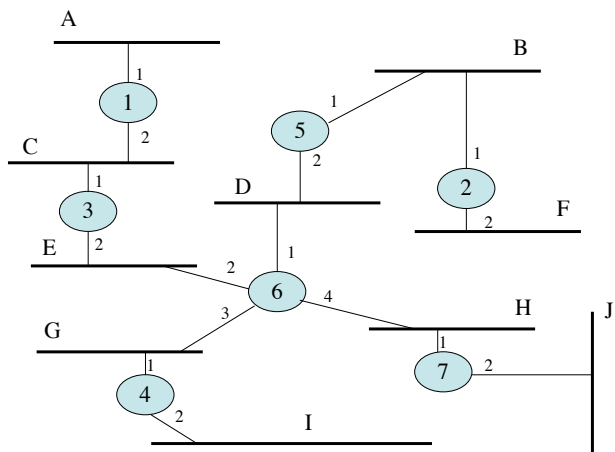


Figure 1: Diagram for Problem 2.

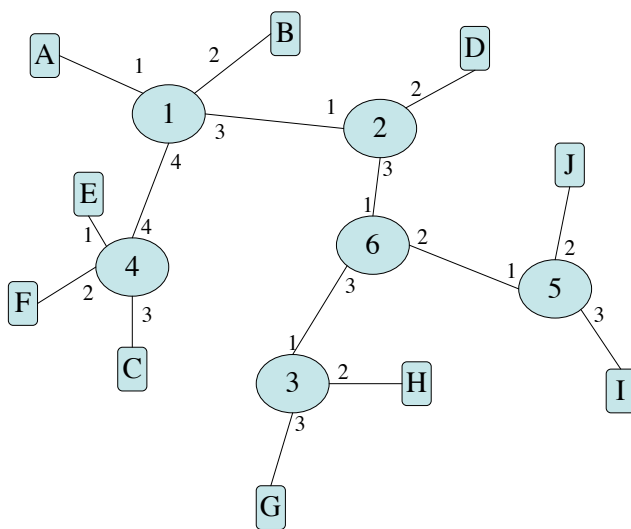


Figure 2: Diagram for Problem 3.