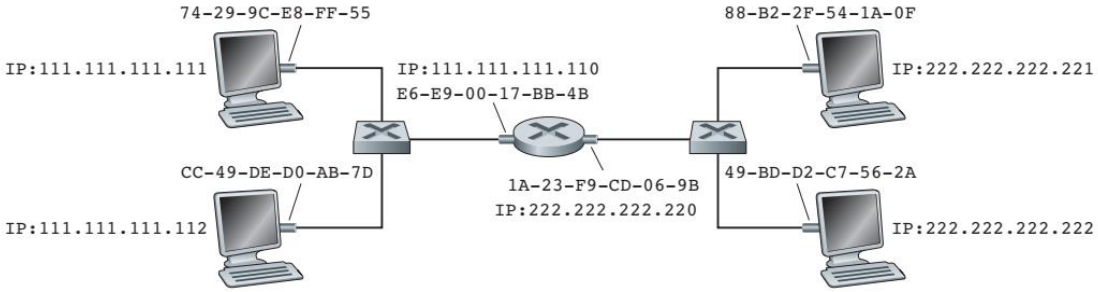
Unit 5 Question Bank

1. Suppose two nodes start to transmit at the same time a packet of length *L* over a broadcast channel of rate *R*. Denote the propagation delay between the two nodes as *d*prop. Will there be a collision if *d*prop < *L*/*R*? Why or why not?
2. Why is an ARP query sent within a broadcast frame? Why is an ARP response sent within a frame with a specific destination MAC address?
3. For the given network, the router has two ARP modules, each with its own ARP table. Is it possible that the same MAC address appears in both tables?



4. Suppose the information content of a packet is the bit pattern 1110 0110 1001 1101 and an even parity scheme is being used. What would the value of the field containing the parity bits be for the case of a two-dimensional parity scheme? Your answer should be such that a minimum-length checksum field is used.
5. Consider the 7-bit generator, G=10011, and suppose that D has the value 1010101010. What is the value of R?
6. In CSMA/CD, after the fifth collision, what is the probability that a node chooses *K* = 4? The result *K* = 4 corresponds to a delay of how many seconds on a 10 Mbps Ethernet?
7. Consider three LANs interconnected by two routers, as shown in Figure 5.33.

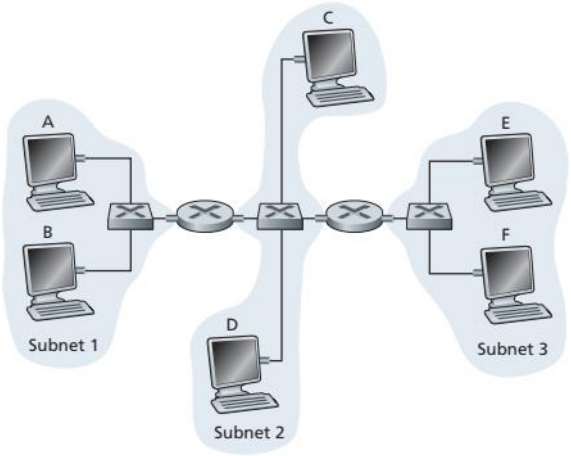


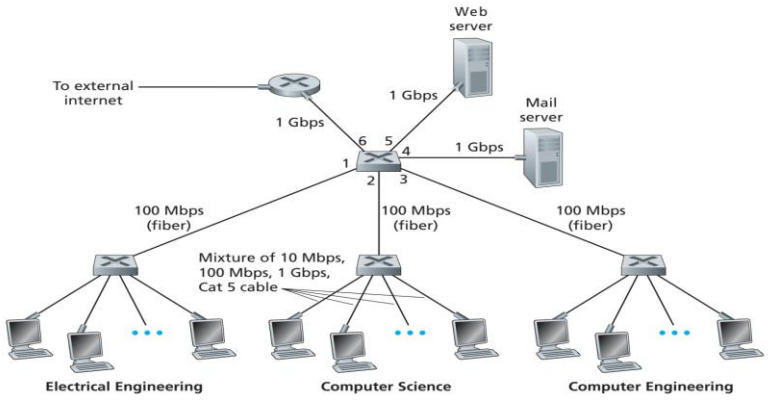
Figure 5.33 ♦ Three subnets, interconnected by routers

a. Assign IP addresses to all of the interfaces. For Subnet 1 use addresses of the form 192.168.1.xxx; for Subnet 2 uses addresses of the form 192.168.2.xxx; and for Subnet 3 use addresses of the form 192.168.3.xxx.

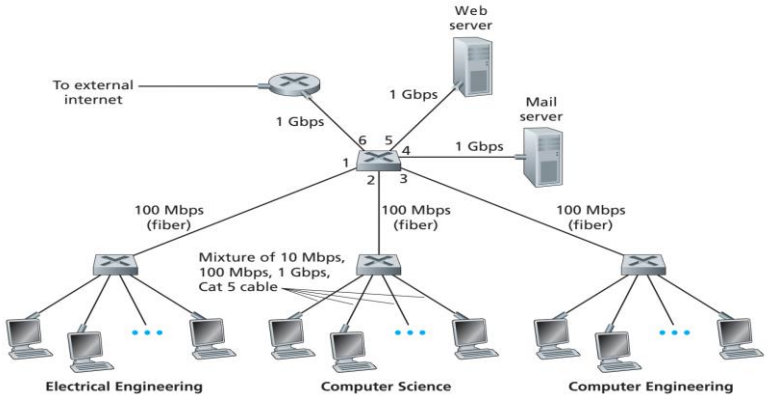
b. Assign MAC addresses to all of the adapters

Consider sending an IP datagram from Host E to Host B. Suppose all of the ARP tables are up to date. Enumerate all the steps

8. Consider the below figure and Suppose that all links are 100 Mbps. What is the maximum total aggregate throughput that can be achieved among the 9 hosts and 2 servers in this network? You can assume that any host or server can send to any other host or server. Why?



9. Suppose the three departmental switches in the below figure are replaced by are replaced by hubs. All links are 100 Mbps. What is the maximum total aggregate throughput that can be achieved among the 9 hosts and 2 servers in this network? You can assume that any host or server can send to any other host or server. Why?



10. Describe the hidden-terminal and exposed-terminal problems in wireless communication.
11. Describe the RTS/CTS handshake (request to send, clear to send) used in the IEEE 802.11 standard (Wi-Fi). In particular, draw and explain a space-time diagram of the RTS/CTS handshake.
    Also explain whether and how the RTS/CTS handshake solves the hidden and exposed terminal problems.
12. What is the general purpose of the Address Resolution Protocol (ARP)? Which entries does an ARP table have, and why?