CST 428/528

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Homework 6: Link Layer

Problem 1 (30 points)

Suppose that a packet's payload consists of 10 eight-bit values (e.g., representing ten ASCIIencoded characters) shown below. (Here, we have arranged the ten eight-bit values as five sixteen-bit values):

11011110 10000101
10011101 10011101
11110101 00001000
10011011 11111111
11110000 01001011

Compute the two-dimensional parity bits for each of the five rows and sixteen columns assuming even parity. Assume that the parity bit in the lower right corner is computed so that the parity of the row parity bits in the last row has even parity.

```
11011110 10000101   | 0
10011101 10011101   | 0
11110101 00001000   | 1
10011011 11111111   | 1
11110000 01001011   | 0
---------------------------
11011101 11101100   | 0
```

Problem 2 (20 points)

Now consider the example below that shows both the payload and the two-dimensional parity bits (shown in blue), and where exactly one of the payload or parity bits shown has been corrupted. In this example, even parity is used.

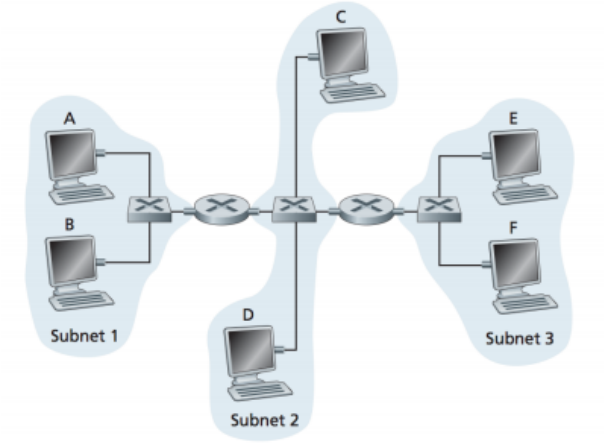
11011110 100001011
10011101 100111010
11110101 000010001
10011011 111111111
11111000 010010110
11011101 101001000

Indicate the row and the column location of the bit that has flipped from its original value

(row, column) = (4,4)

Problem 3 (50 points)

Consider three LANs interconnected by two routers, as shown in the figure below.



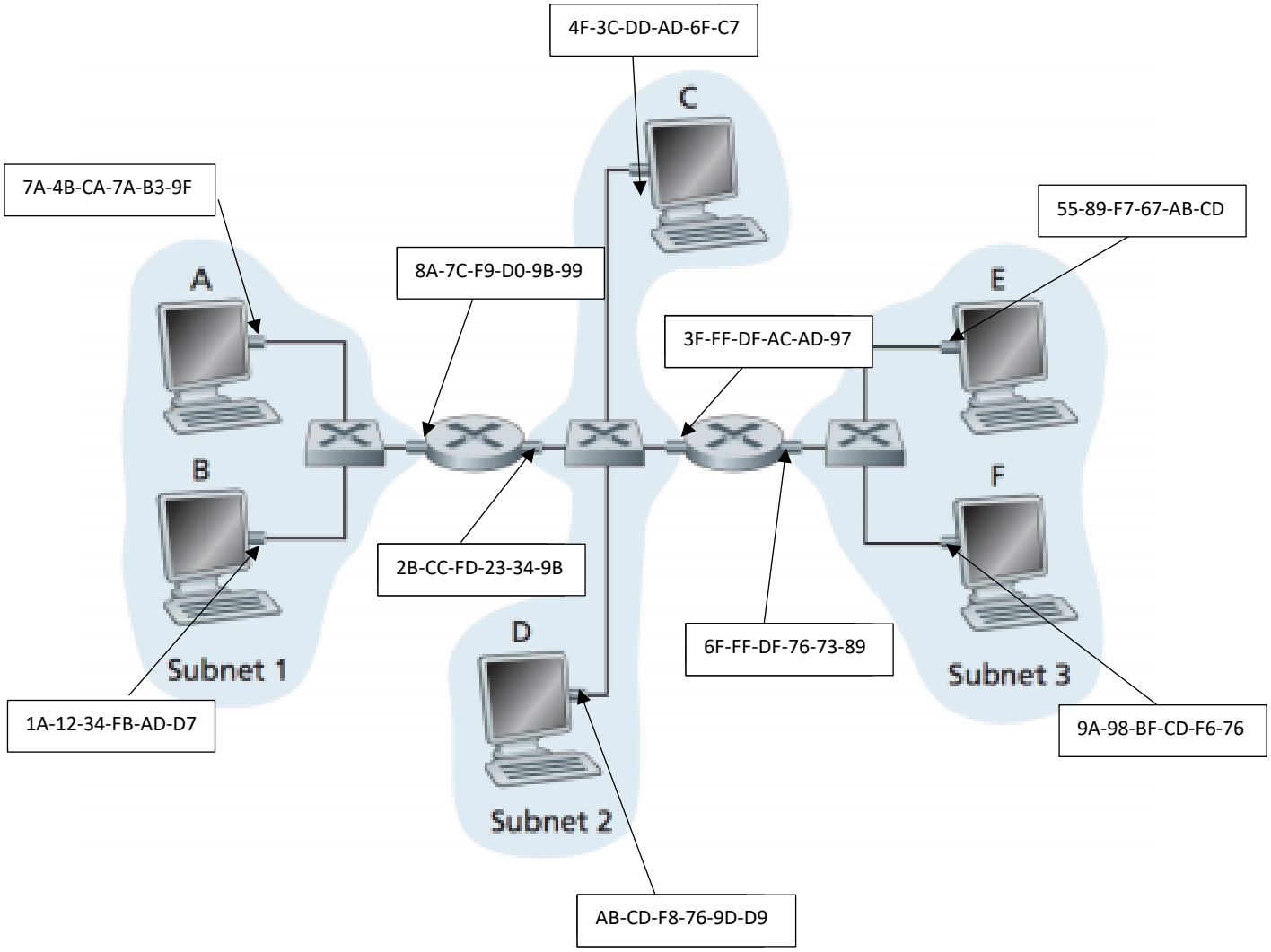
a. Assign IP addresses to all of the interfaces. For Subnet 1 use addresses of the form 192.168.1.xxx; for Subnet 2 uses addresses of the form 192.168.2.xxx; and for Subnet 3 use addresses of the form 192.168.3.xxx.

A: 192.168.1.001
B: 192.168.1.002

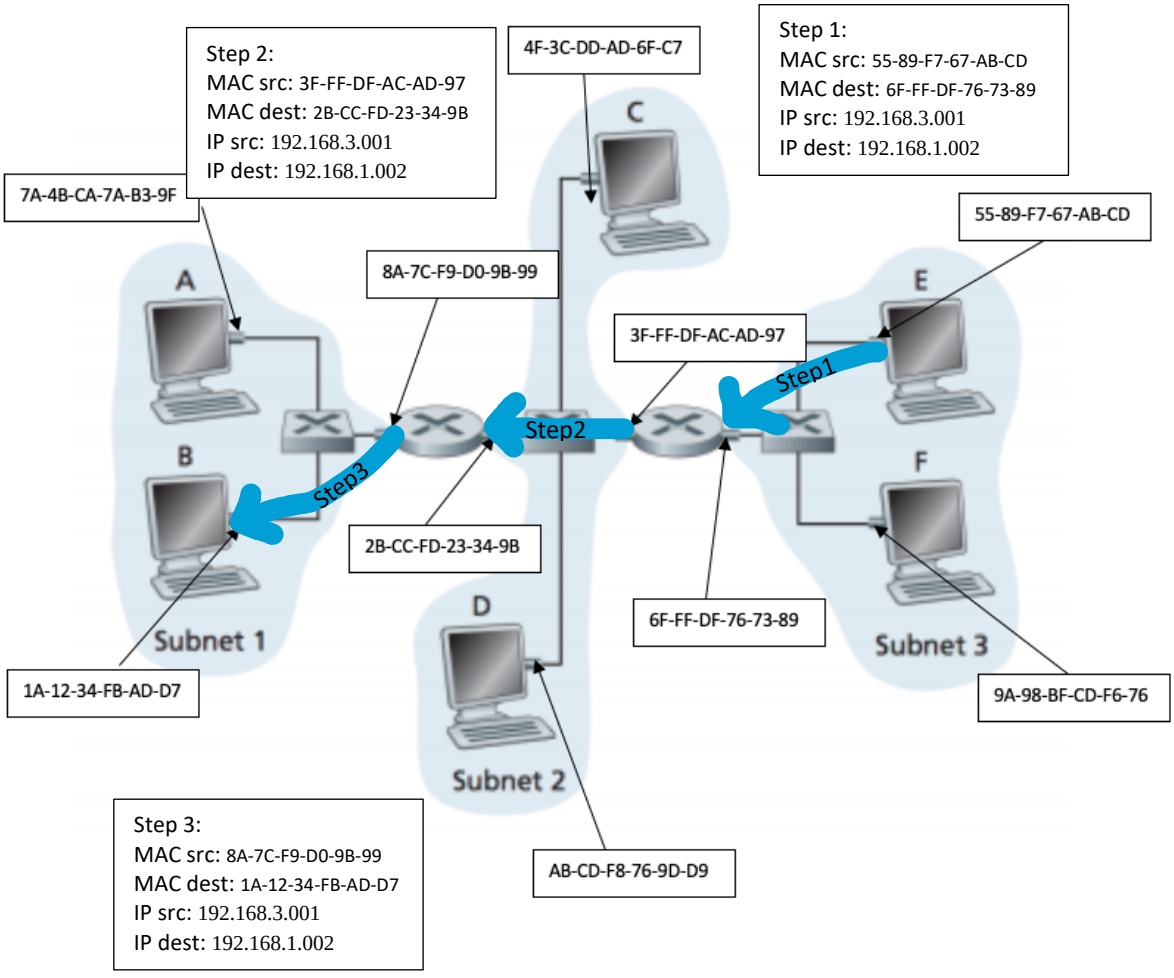
C: 192.168.2.001
D: 192.168.2.002

E: 192.168.3.001
F: 192.168.3.002

b. Assign MAC addresses to all of the adapters.



c. 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, as done for the single-router example in Section 5.4.1.



Repeat(c), now assuming that the ARP table in the sending host is empty (and the other tables are up to date).