Computer Networks Homework

Link Layer

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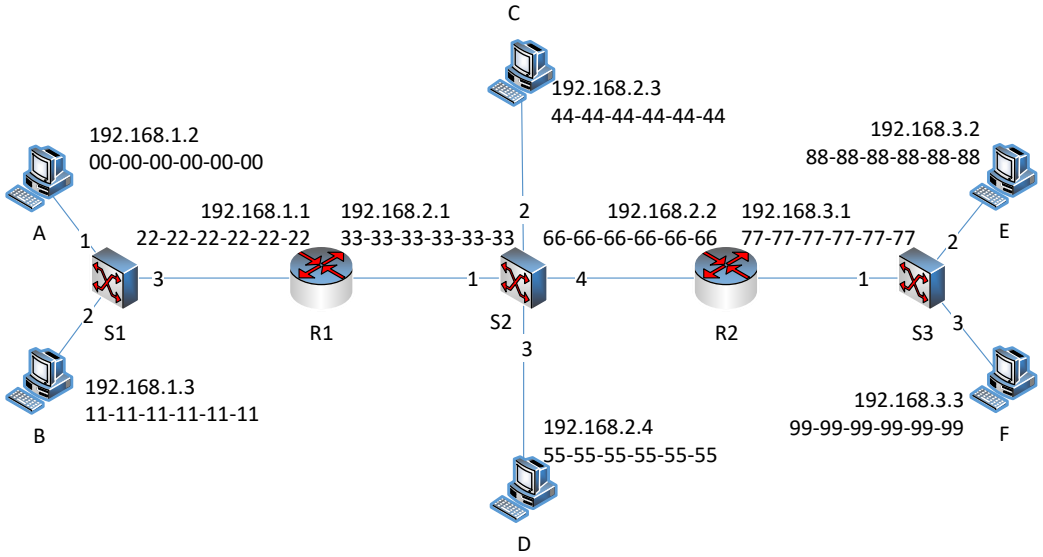
1. In CRC, consider a 5-bit generator, G=10011, and suppose that D has the value 1010101010. What is the value of R?

   解：由题意知，$r = 4$. 由R的计算公式得:

   $$R = \text{remainder}\frac{D \cdot 2^r}{G} = \text{remainder}\frac{10101010100000}{10011} = 0100$$

2. Consider the following network.



   a. How many LANs are interconnected? List the hosts, switches and router interfaces belonging to each LAN.

   答：有三个 LAN.

	hosts	switches	Router interface
LAN1	A B	S1	192.168.1.1
LAN2	C D	S2	192.168.2.1 192.168.2.2
LAN3	E F	S3	192.168.3.1

   b. Suppose host A sends an IP datagram to host F, for the three path segments from A to R1, R1 to R2, and R2 to F, list all the source/destination IP addresses and MAC addresses in each path segment.

   答：

	IP	MAC
A to R1	192.168.1.2 To 192.168.3.3	00-00-00-00-00-00 To 22-22-22-22-22-22

R1 to R2	192.168.1.2 To 192.168.3.3	33-33-33-33-33-33 To 66-66-66-66-66-66
R2 to F	192.168.1.2 To 192.168.3.3	77-77-77-77-77-77 To 99-99-99-99-99-99

c. Suppose each pair of hosts have successfully pinged each other, list the ARP table for each host (ignore the TTL).

答：

Host A

IP 地址	MAC 地址
192.168.1.3	11-11-11-11-11-11
192.168.1.1	22-22-22-22-22-22

Host B

IP 地址	MAC 地址
192.168.1.2	00-00-00-00-00-00
192.168.1.1	22-22-22-22-22-22

Host C

IP 地址	MAC 地址
192.168.2.1	33-33-33-33-33-33
192.168.2.2	66-66-66-66-66-66
192.168.2.4	55-55-55-55-55-55

Host D

IP 地址	MAC 地址
192.168.2.1	33-33-33-33-33-33
192.168.2.2	66-66-66-66-66-66
192.168.2.3	44-44-44-44-44-44

Host E

IP 地址	MAC 地址
192.168.3.1	77-77-77-77-77-77
192.168.3.3	99-99-99-99-99-99

Host F

IP 地址	MAC 地址
192.168.3.1	77-77-77-77-77-77
192.168.3.2	88-88-88-88-88-88

d. List the switch tables of the switches (ignore the TTL).

答：

Switch S1

MAC 地址	**接口**
00-00-00-00-00-00	1
11-11-11-11-11-11	2
22-22-22-22-22-22	3

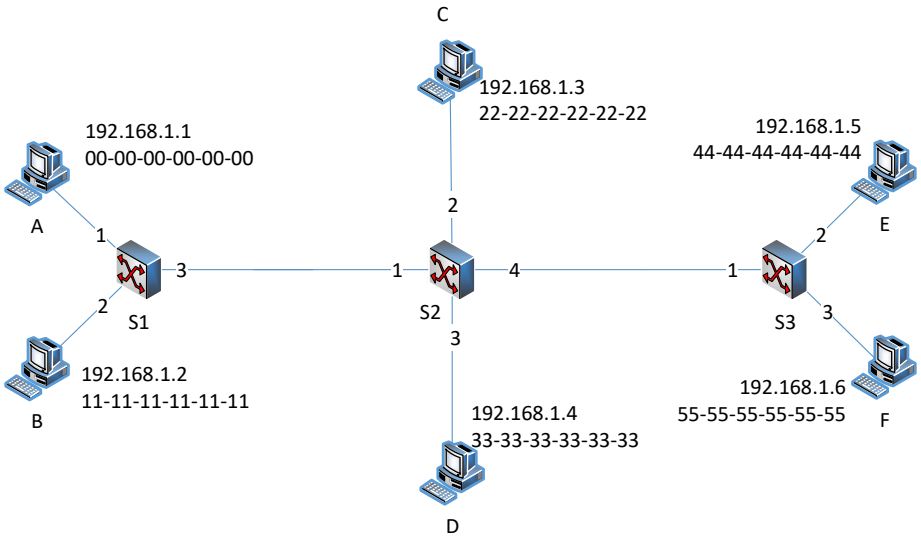
Switch S2

MAC 地址	接口
33-33-33-33-33-33	1
44-44-44-44-44-44	2
55-55-55-55-55-55	3
66-66-66-66-66-66	4

Switch S3

MAC 地址	接口
77-77-77-77-77-77	1
88-88-88-88-88-88	2
99-99-99-99-99-99	3

3. Consider the following network, and suppose each pair of hosts have successfully pinged each other, list the switch table for each of the three switches (ignore the TTL).



Switch S1

地址	接口
00-00-00-00-00-00	1
11-11-11-11-11-11	2
22-22-22-22-22-22	3
33-33-33-33-33-33	3
44-44-44-44-44-44	3
55-55-55-55-55-55	3

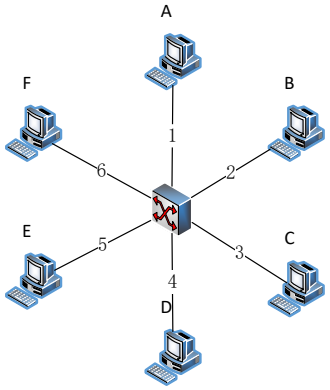
Switch S2

地址	接口
00-00-00-00-00-00	1
11-11-11-11-11-11	1
22-22-22-22-22-22	2
33-33-33-33-33-33	3
44-44-44-44-44-44	4
55-55-55-55-55-55	4

Switch S3

地址	接口
00-00-00-00-00-00	1
11-11-11-11-11-11	1
22-22-22-22-22-22	1
33-33-33-33-33-33	1
44-44-44-44-44-44	2
55-55-55-55-55-55	3

4. Let's consider the operation of a learning switch in the context of a network in which 6 nodes labeled A through F are star connected into an Ethernet switch. Suppose that (i) B sends a frame to E, (ii) E replies with a frame to B, (iii) A sends a frame to B, (iv) B replies with a frame to A. The switch table is initially empty. Show the state of the switch forwarding table before and after each of these events. For each of these events, identify the link(s) on which the transmitted frame will be forwarded.



解：

关于 **Switch table：**

(i)之后：

地址	接口
B	2

(ii)之后：

地址	接口
B	2
E	5

(iii)之后

地址	接口
B	2
E	5
A	1

(iV)之后

地址	接口
B	2
E	5
A	1

关于 **forwarding link：**

(i) 数据报发往 1,3,4,5,6

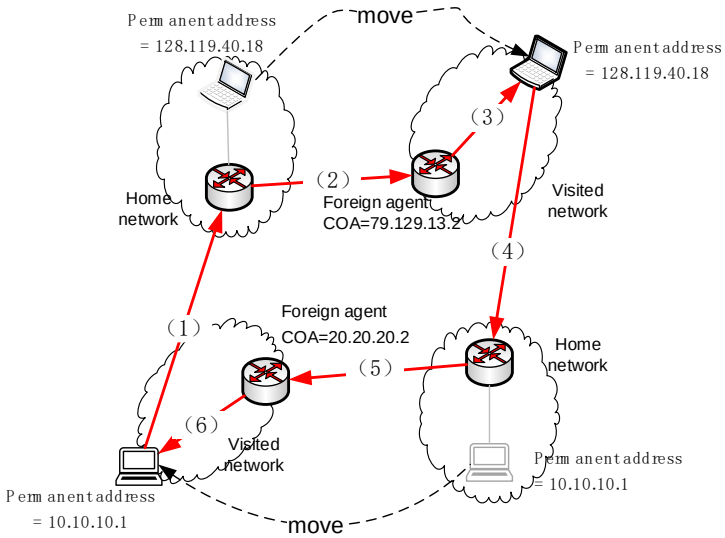
(ii) 数据包发往 2

(iii) 数据包发往 2

(iv) 数据包发往 1

5. Suppose two mobile nodes communicate with mobile IP, as shown in the following graph, each has its permanent address and care-of-address, and the visited networks have dedicated mobile agents on the routers. On which paths the IP packets contains encapsulated headers, and give all

the destination addresses of the IP headers (including the encapsulated headers) for the packets on each path.



答：含有封装 IP 首部的路径有(2)(5).

在(1)中，目的 IP 地址为 128.119.40.18

在(2)中，目的 IP 地址有 79.129.13.2(外部)、128.119.40.18(内部)

在(3)中，目的 IP 地址为 128.119.40.18

在(4)中，目的 IP 地址为 10.10.10.1

在(5)中，目的 IP 地址有 20.20.20.2(外部)、10.10.10.1(内部)

在(6)中，目的 IP 地址为 10.10.10.1