Report

1. Code explain:

a. When a host encounter a ping request, it first check its arp table whether the mac address of destination ip is in it or not. If is not it will set the destination mac address to 'ffff' and send the packet to the connected port. If the mac address exist it send an ICMP request packet to the connected port.

b. When a switch gets a packet, it first checks if the source mac address is in its table or not, if not it'll update the mac address and the port to it. Next, the switch will check if the destination mac address is in its table or not, if exist it'll sends to the right port, if not it'll send the packet to all connected port except the sending one.

c. When a host receive a packet, it'll first check is the destination mac address is 'ffff', if is 'ffff' and the destination ip address is itself, it'll updates its arp table and send an ARP reply, if not it'll simply drop the packet. If is not 'ffff', it'll check what type of the packet is and do the correspond action.

2. What is the difference between broadcasting and flooding in a network?
   Broadcasting comparing to flooding is more efficient and controllable which ensure packets are delivered to all nodes with as little redundancy as possible. On the other hand, flooding is more brute force and will duplicate many copy of packets to maximizes the chance of delivery by exploring all possible paths, flooding can also increase the network load and lead to congestion.

3. Explain the steps involved in the process of h1 ping h7 when there are no entries in the switch's MAC table and the host's ARP table.

   H1 first send an ARP request packet to s1, s1 then send the packet to all the connected port except the sending one. H2 receive the packet will drop it. S2 receive the packet will continue sending it to all connected port. In the end when h7 receive the packet it'll send an ARP reply packet to h1, and since s6 already has the mac address of h1, it'll know which port to send, after h1 receive the ARP reply packet, it'll then send an ICMP request packet to h7, h7 will receive an ICMP reply packet and the whole ping is done.

4. What problem can arise when connecting s2 and s5 together and thus creating a switching loop? How can this issue be addressed?

   There will be severe network congestion due to the loop, since a packet can be replicated and sent out on all outgoing links at each switch. Spanning Tree Protocol can resolve this issue, blocking packets from circulate indefinitely.