Project 2 Answers

PART 1

A. How many OpenFlow headers of type “OFPT_FLOW_MOD” are there among all the packets?
16 or 14 (Start reactive forwarding before starting mininet.)

15 or 13 (Starting mininet first will result in miss one FLOW_MOD header which matchs IPv4.)

Two headers are both OFPFC_DELETE_STRICT. In order to delete two flow rules installed temporarily by the reactive forwarding app.

PART 2

Match field: ARP

```
{
  "priority": 40001,
  "timeout": 0,
  "isPermanent": true,
  "deviceId": "of:0000000000000001",
  "treatment": {
    "instructions": [
      {
        "type": "OUTPUT",
        "port": "FLOOD"
      }
    ]
  },
  "selector": {
    "criteria": [
      {
        "type": "ETH_TYPE",
        "ethType": "0x0806"
      }
    ]
  }
}
```

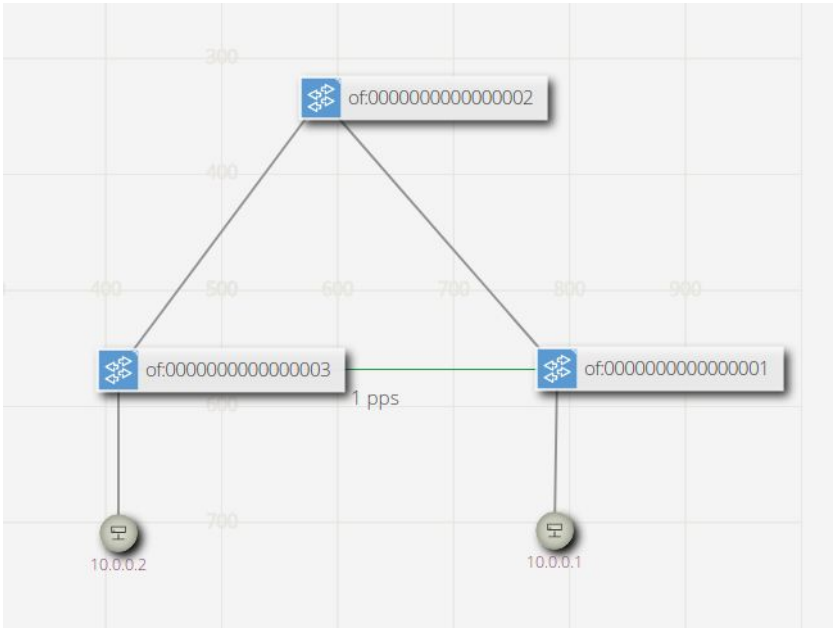
Match field: IPv4 destination address

```
{
  "priority": 40000,
  "timeout": 0,
  "isPermanent": true,
  "deviceId": "of:0000000000000001",
  "treatment": {
    "instructions": [
      {
        "type": "OUTPUT",
        "port": "1"
      }
    ]
  },
  "selector": {
    "criteria": [
      {
        "type": "IPV4_DST",
        "ip": "10.0.0.1/32"
      },
      {
        "type": "ETH_TYPE",
        "ethType": "0x0800"
      }
    ]
  }
}
```

```
{
  "priority": 40000,
  "timeout": 0,
  "isPermanent": true,
  "deviceId": "of:0000000000000001",
  "treatment": {
    "instructions": [
      {
        "type": "OUTPUT",
        "port": "1"
      }
    ]
  },
  "selector": {
    "criteria": [
      {
        "type": "IPV4_DST",
        "ip": "10.0.0.1/32"
      },
      {
        "type": "ETH_TYPE",
        "ethType": "0x0800"
      }
    ]
  }
}
```

PART 3

Topology (3swith-2host)



Flow rule (broadcast all the ARP pkts)

```
{
  "priority": 50000,
  "timeout": 0,
  "isPermanent": true,
  "deviceId": "of:0000000000000001",
  "treatment": {
    "instructions": [
      {
        "type": "OUTPUT",
        "port": "FLOOD"
      }
    ]
  },
  "selector": {
    "criteria": [
      {
        "type": "ETH_TYPE",
        "ethType": "0x0806"
      }
    ]
  }
}
```

Cpu usage (h1 pings h2 continously)

After install all the flow rules to the switch, execute command “h1 ping h2” in the Mininet. We get the result below indicating the broadcast storm.

STATE	PACKETS	DURATION	FLOW PRIORITY	TABLE NAME	SELECTOR	TREATMENT	APP NAME
Added	0	40	40000	0	ETH_TYPE:arp	imm[OUTPUT:CONTROLLER], cleared:true	*core
Added	0	20	50000	0	ETH_TYPE:arp	imm[OUTPUT:FLOOD], cleared:false	*rest
Added	26	40	40000	0	ETH_TYPE:lldp	imm[OUTPUT:CONTROLLER], cleared:true	*core
Added	26	40	40000	0	ETH_TYPE:bddp	imm[OUTPUT:CONTROLLER], cleared:true	*core
Added	3,999,881	40	50000	0	ETH_TYPE:arp	imm[OUTPUT:FLOOD], cleared:false	*rest