EECS 489 Discussion 10

About Assignment 4

- ICMP (Internet Control Message Protocol)
- traceroute
- Environment Setup
- Rough Flow Chart

ICMP msgs

Type	Code	Description
0	0	echo reply (ping)
3	0	dest network unreachable
3	1	dest host unreachable
3	2	dest protocol unreachable
3	3	dest port unreachable
3	4	frag needed but DF set
3	6	dest network unknown
3	7	dest host unknown
8	0	echo request (ping)
9	0	route advertisement
10	0	router discovery
11	0	TTL expired
12	0	bad IP header

ICMP common usage

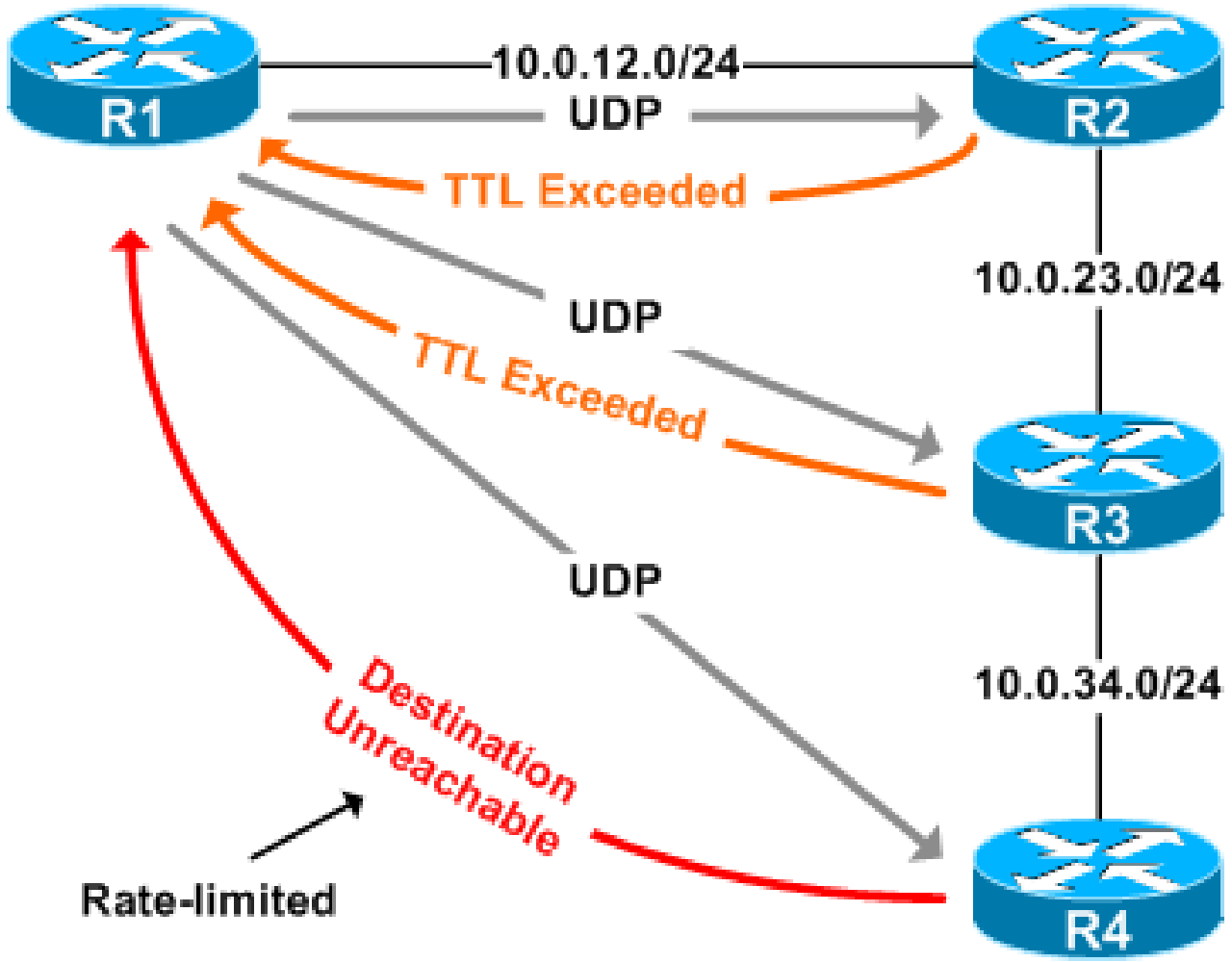
- Echo Reply (0) and Echo Request (8): this is ping.
- Destination Unreachable (3)
- Time Exceeded (11): This message has two uses.
  - First, it is used to send an error to the sending system when the IP TTL has been exceeded.
  - Second, it will notify the sending system if a fragmented IP datagram isn't reassembled within a certain time limit.

How traceroute works

- Live Demo of traceroute

- Source sends a series of UDP packets:
  - First 3 packets have TTL set to 1
  - Next 3 packets have TTL set to 2, and so on.
  - Packets all sent to an unused port number

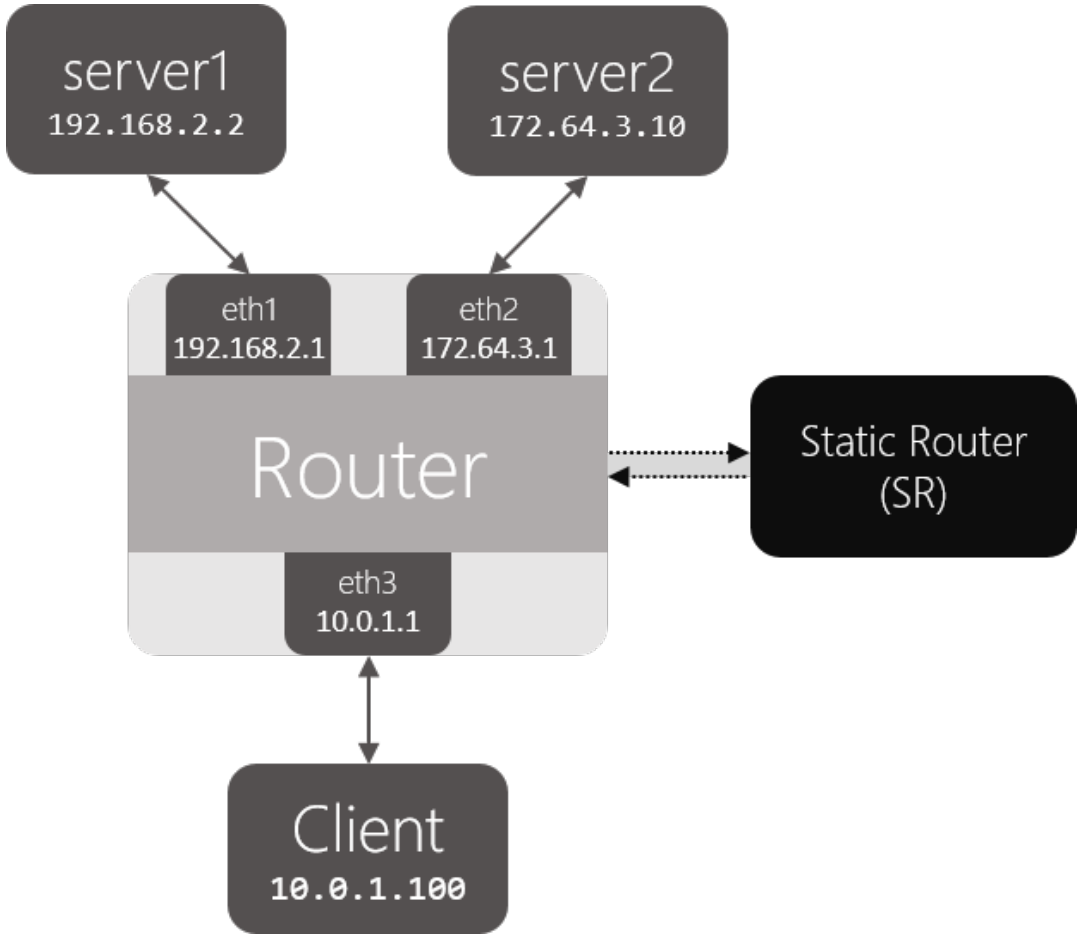
How traceroute works



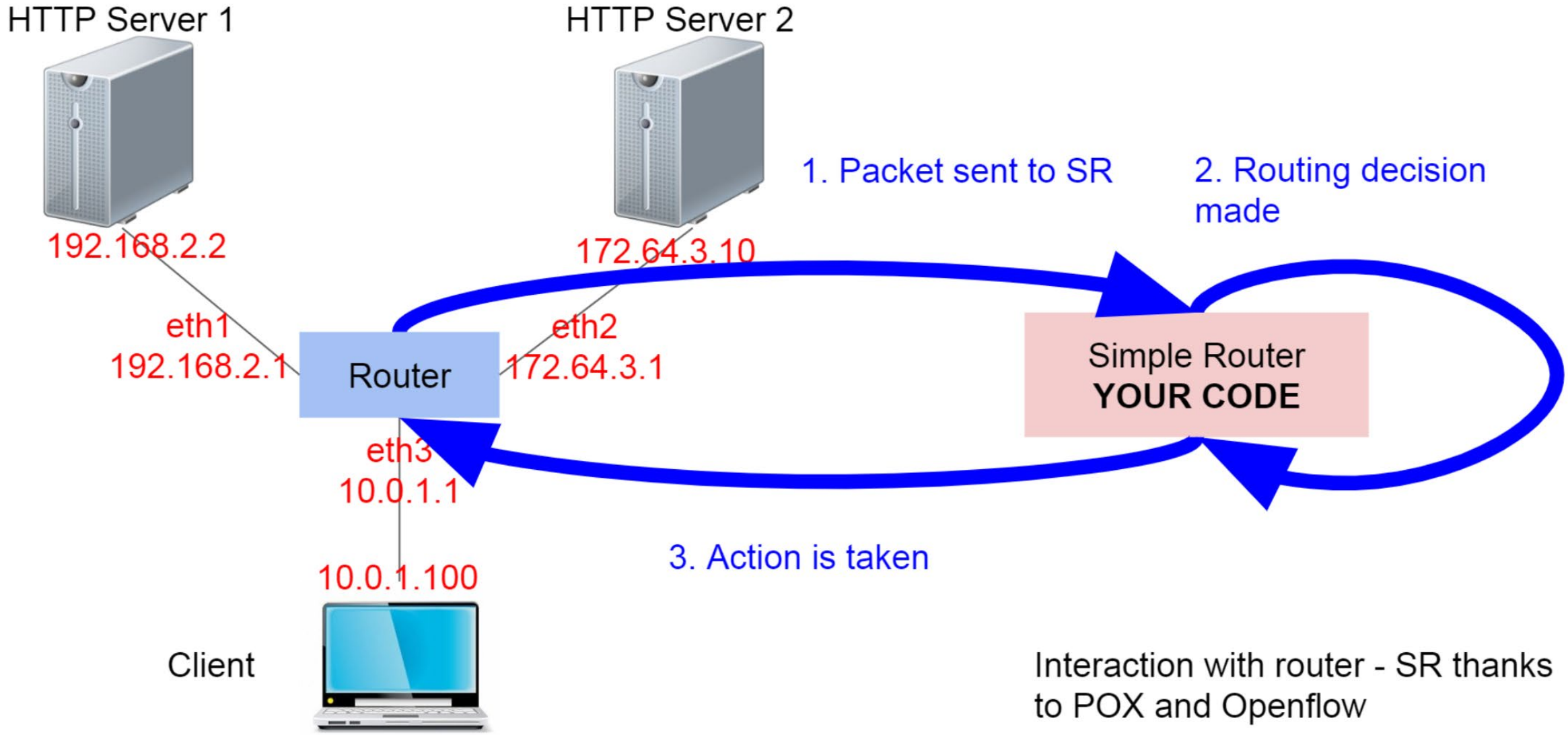
A4 environment setup

- The **Router** is a software-defined switch/router.
  - controlled by an external controller (POX)

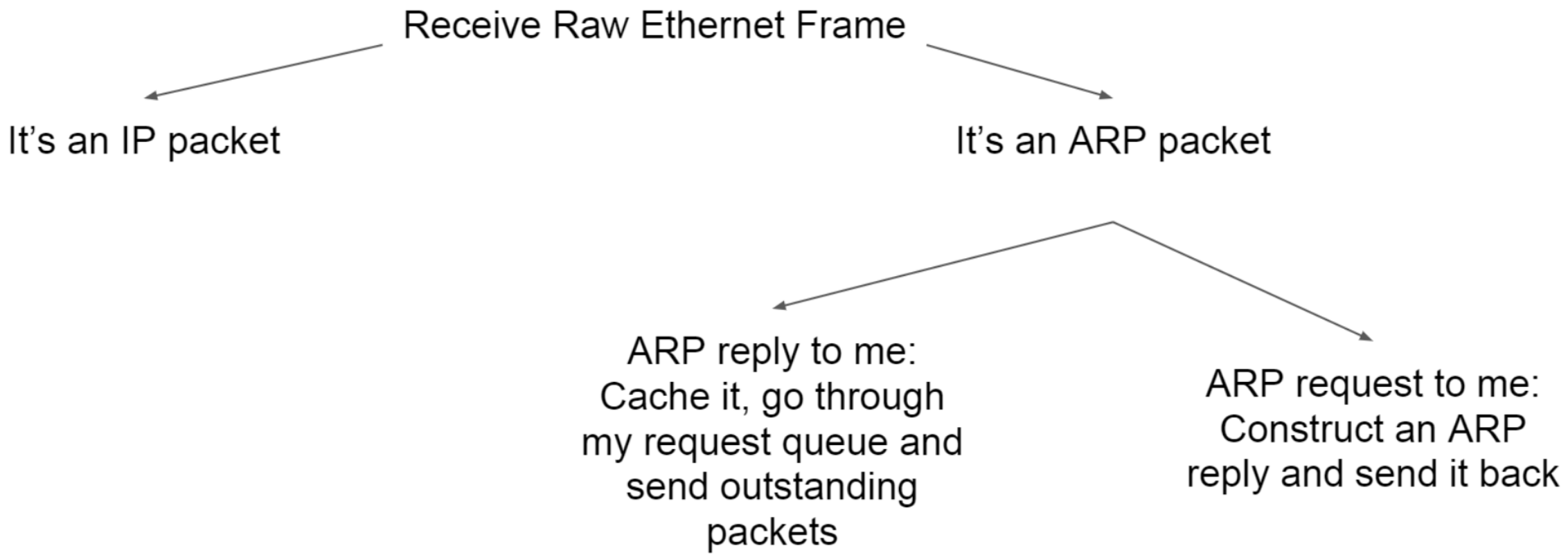
- **SR** talks to POX to control the **Router**.



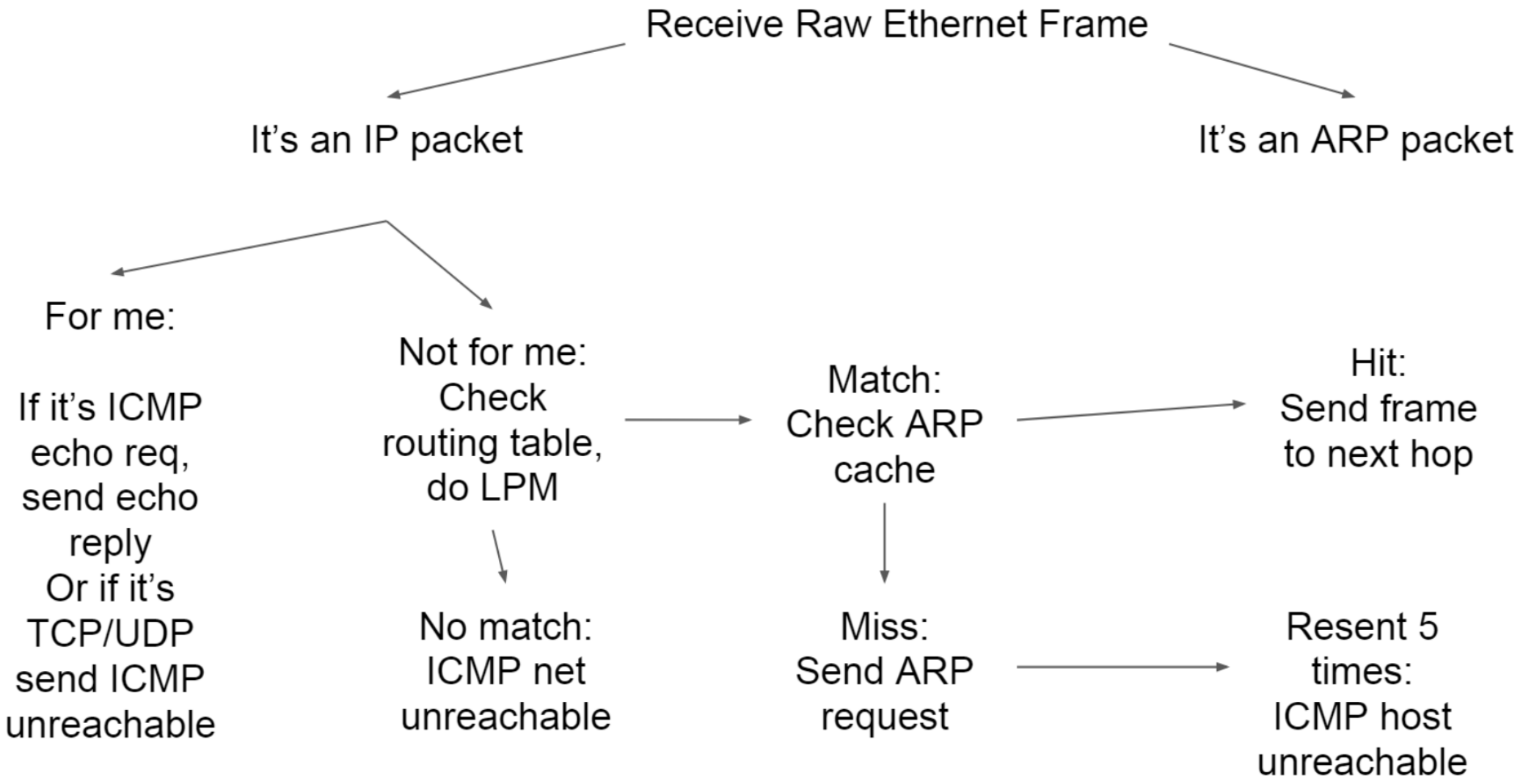
A4 environment setup



A4 sr Flow Chart – handling ARP



A4 sr Flow Chart – handling IP



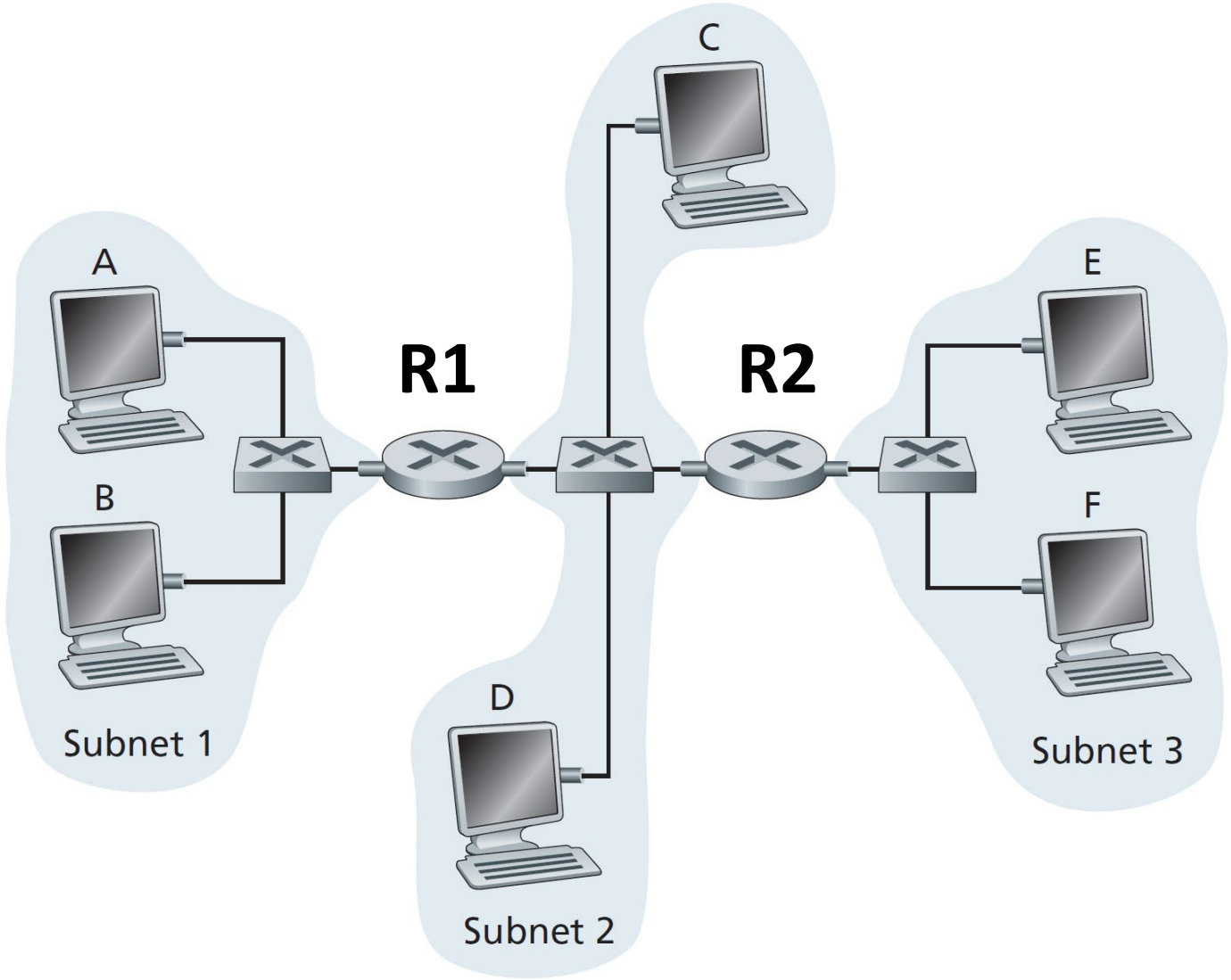
A4 Tips

- Debug using –l <pcap_file> and open pcap file with wireshark
- Compare wireshark output with reference output
- Don’t forget to use htonl, htons, ntohl, ntohs
- We have debug functions setup in sr_utils.c
  - print_hdrs(), print_addr_ip_int(), etc.
- Test your sr with ping, traceroute, wget, etc.

Q1

Consider sending an IP datagram from Host E to Host F. Will Host E ask router R2 to forward the datagram? Why?

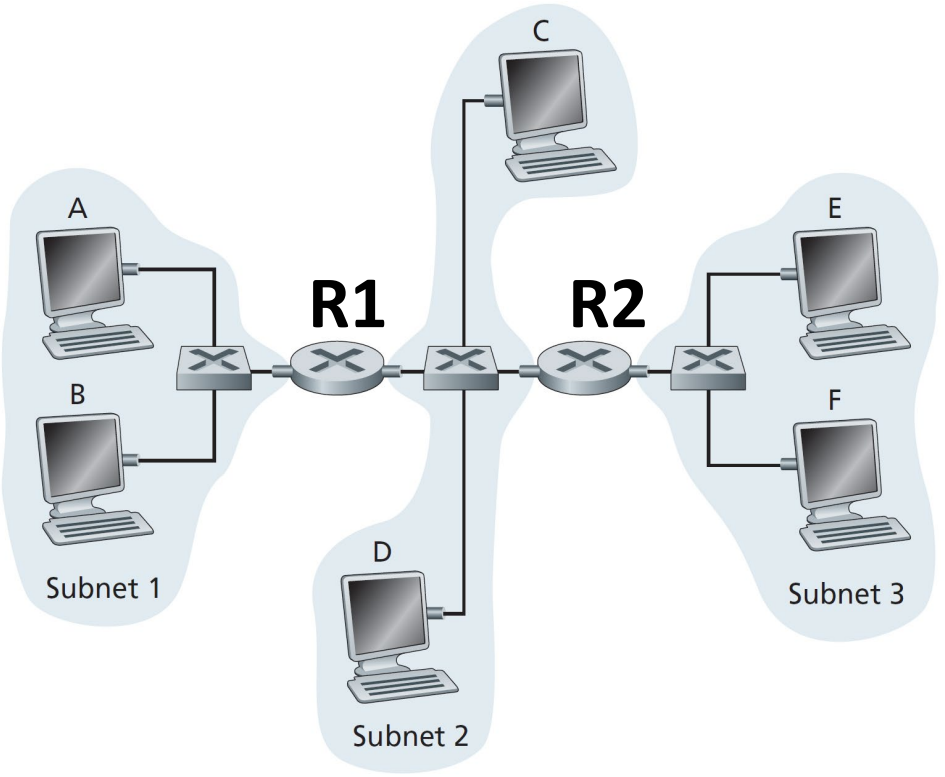
No



Q1

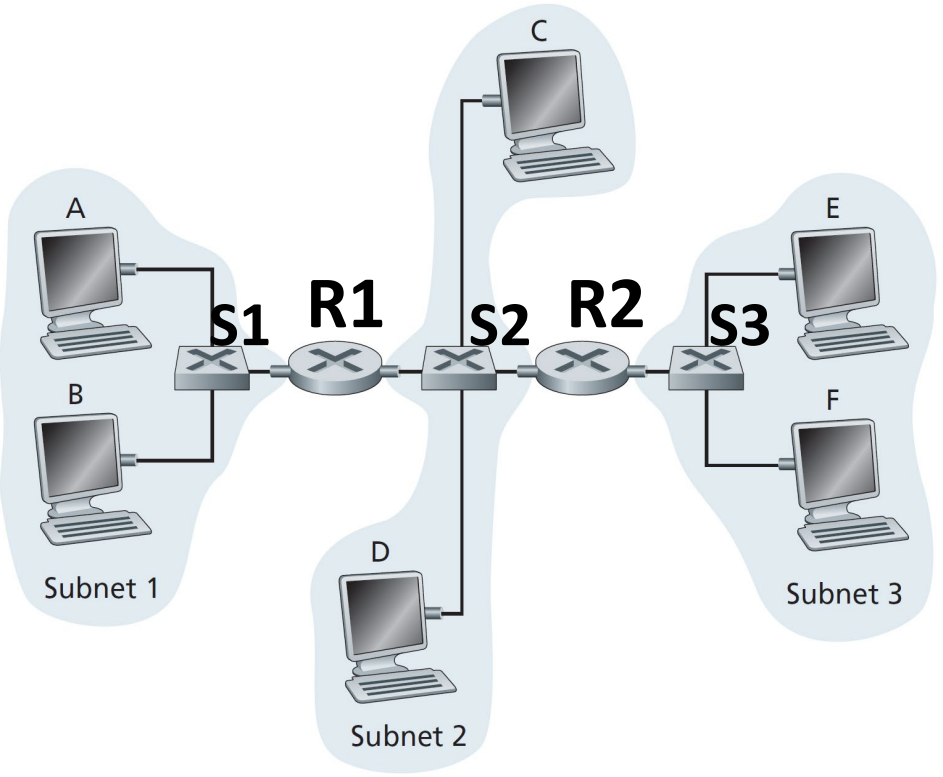
Suppose E would like to send an IP datagram to B, and assume that E's ARP cache does not contain B's MAC address.
Will E perform an ARP query to find B's MAC address? Why?

No



Q1

Suppose E would like to send an IP datagram to B. In the Ethernet frame (containing the IP datagram destined to B) that is **delivered to router R1**, what are the source and destination IP and MAC addresses?



srcIP: IP-E, dstIP: IP-B;
srcMAC: MAC-R2, dstMAC: MAC-R1