

CSC458/2209 PA1

Simple Router

Based on slides by: Antonin & Yinan Liu & Jun Lin Chen

Overview

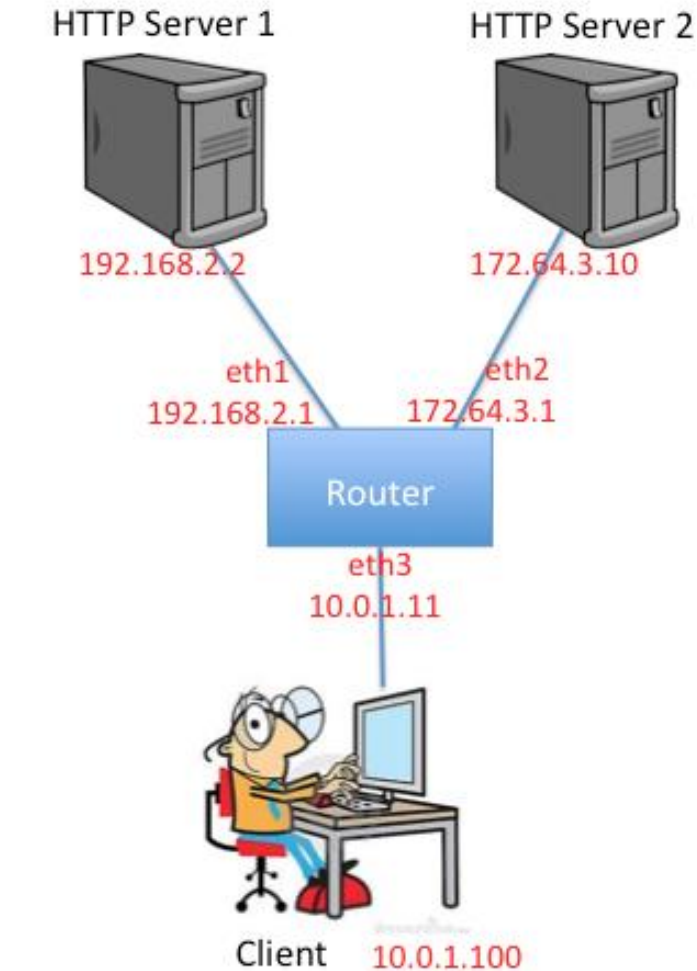
- You are going to write a “simplified” router
 - Given a static network topology
 - Given a static routing table
 - **You are responsible for** writing the logic to handle incoming Ethernet frames:
 - Forward it
 - Generate ICMP messages
 - Drop it
 - And more ...

But how to do it???

- Where will my routing logic run?
- Where will the traffic come from?
- How will I test my code?

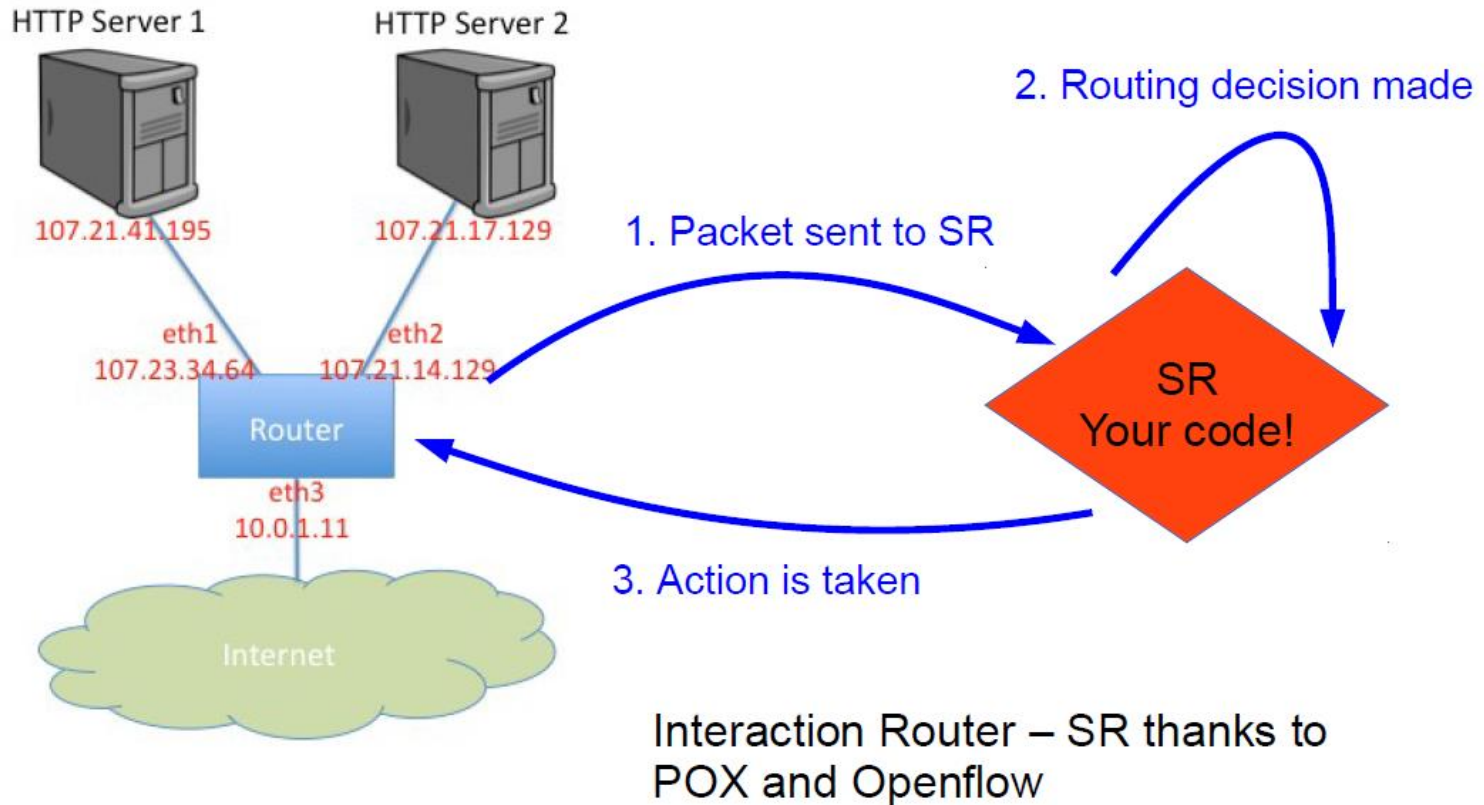
- No hardware router
- Network topology emulated with Mininet:
Your router connects 2 servers to a client
- Your router will handle real traffic

Emulated Topology

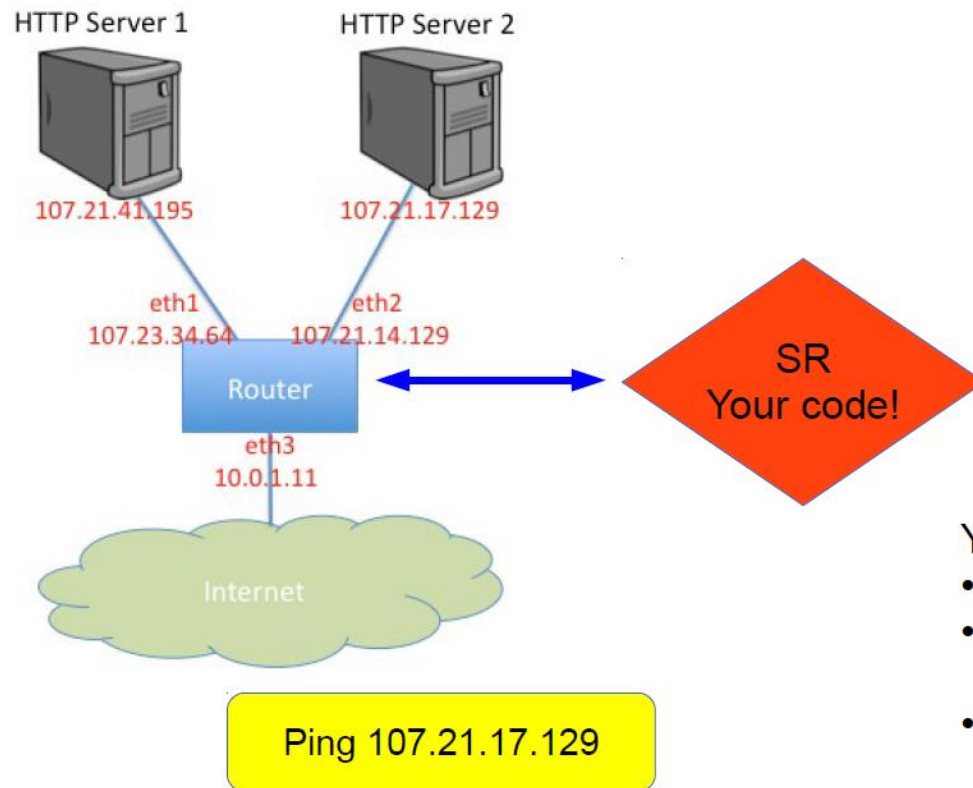


Topology for Simple Router

Emulated Topology



Emulated Topology



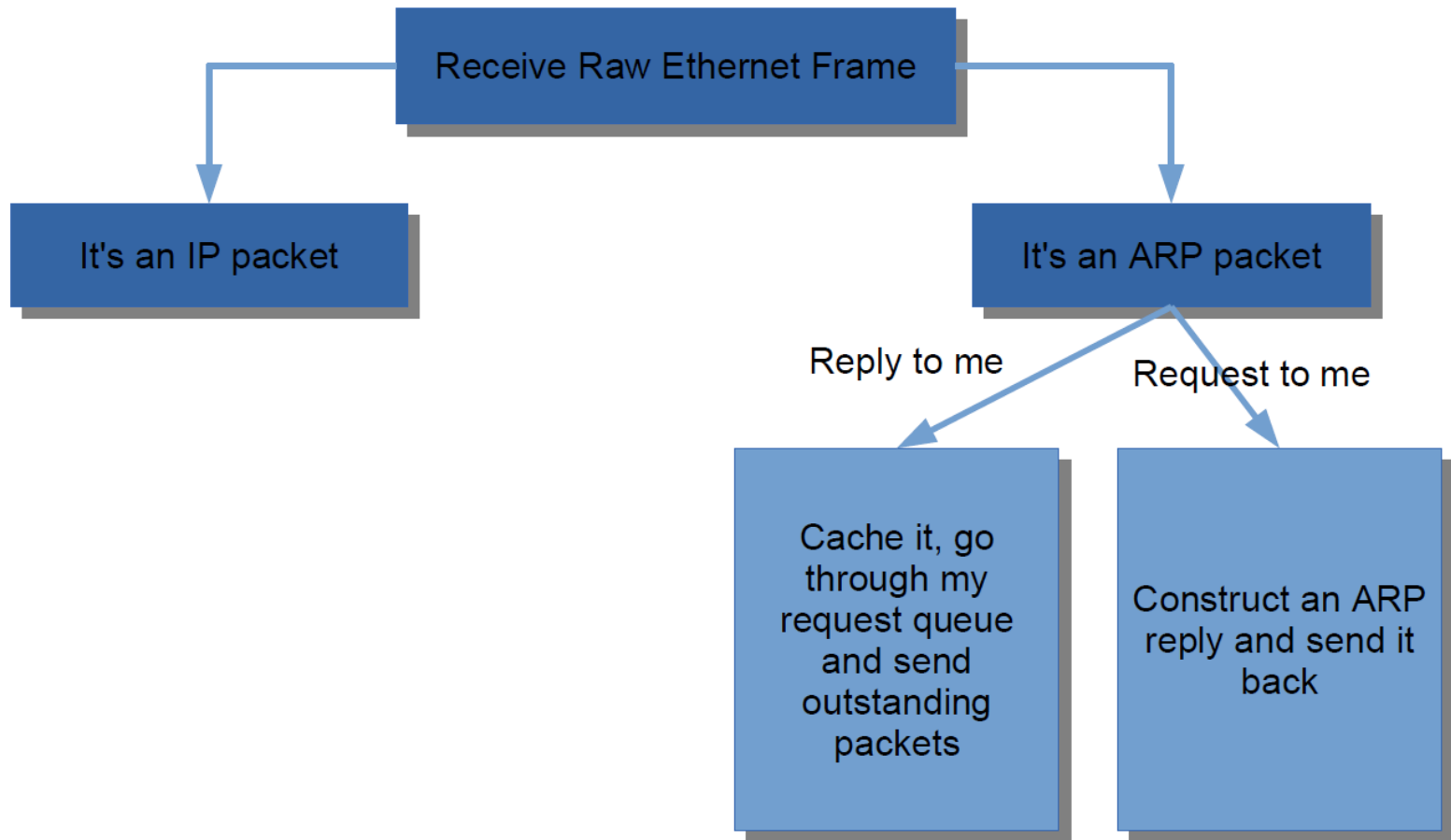
Your routing decision:

- Look at the routing table
- Figure out on which interface to forward the packet
- Make necessary changes to the packet

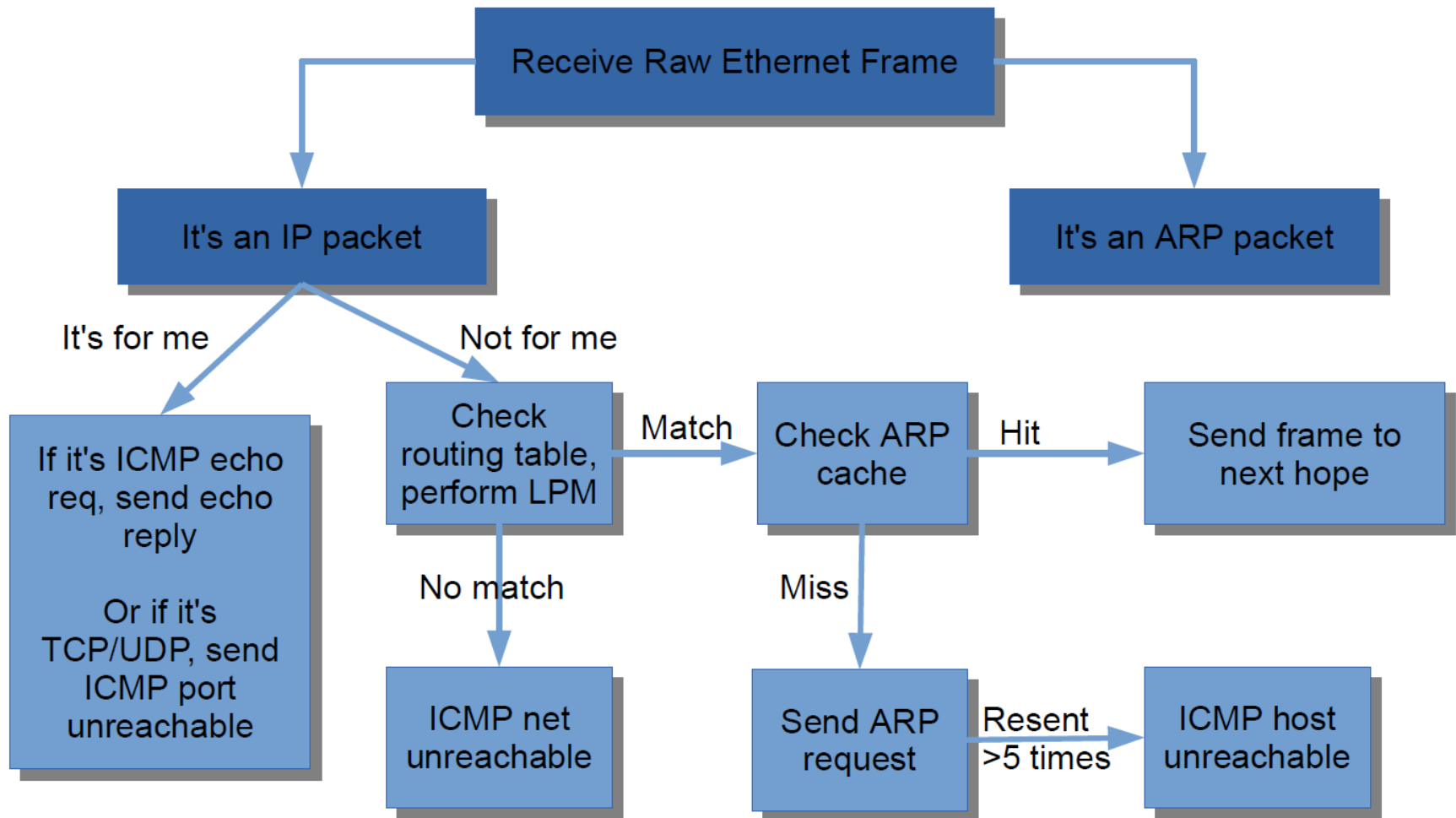
What your routing logic needs to do?

- Route Ethernet frames between the client and the HTTP servers
- Handle ARP request and replies
 - Maintain an ARP cache
- Handle traceroutes
 - Generate TTL Exceeds Message
- Handle TCP/UDP packets sent to one of the routers' interfaces
 - Generate ICMP Port Unreachable
- Respond to ICMP echo requests (ping requests)
- See assignment description for full requirements

A rough flow chart



A rough flow chart



A rough flow chart

- Many things missing from this chart
 - Checksums, TTLs
- Read the instructions carefully
- 500+ lines of code, so start early
- Final submission: **Oct. 10st at 11:59pm**

How to test your code

- Test connectivity with ping from a server or the client
- Traceroute will not work well outside of Mininet:
 - Use Mininet CLI
 - mininet> **server1** traceroute -n server2
- HTTP requests with wget, curl
- Don't forget to test “error” cases!

Some advice

- Be thorough in your testing
- Do not hesitate to change the routing table
 - What about an incorrect routing table?
- Be careful when implementing Longest Prefix Match
- Don't get mixed up with **endianness**:
 - Linux is little endian
 - Network is big endian
 - Try to put the calls to htonl, ntohs in a single place
- Write good quality code
 - Do not hardcode constants, avoid code duplication

<https://web.stanford.edu/class/cs244a/CS244aCodingGuidelines.html>

Things that may be useful

- Mininet console, which supports:
 - tcpdump
 - ping
 - traceroute

should be installed first: “apt-get install traceroute”
- Debug functions in sr_utils.c
 - print_hdrs, print_addr_ip_int

Questions?

