SIMPLE ROUTER – PROJECT 2

- Aakash Arayambeth
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- OH (Thu 5-6:30pm B250A)

Basic Forwarding Principles

- Remove IP datagram from Ethernet frame.
  - Could also be an ARP payload in Ethernet frame
- Verify checksum. If checksum is invalid, drop the packet.
- Inspect the packet's Destination Address.
  - If destination address is not one of the router's IP addresses :
    - Look up next-hop address by doing a Longest Prefix Match on the routing table using the packet's Destination Address
    - If it does not exist, send ICMP host unreachable
    - Decrement TTL, update header checksum
  - If TTL == 0 after decrementing, send ICMP time exceeded
  - From next-hop IP address, determine outgoing interface and next-hop MAC address
    - If necessary, send ARP request to determine MAC address
  - Encapsulate IP datagram in Ethernet packet
  - Forward packet to outgoing interface

Contd ..

- If the packet's Destination address is one of the routers interfaces:
  - If it's an ICMP echo request, generate an ICMP echo reply
  - Otherwise if it's a TCP or UDP packet, generate an ICMP port unreachable (needed for traceroute to work)

Main Functions and Structures

- In sr_router.h:
  - struct sr_instance is the context of the router
- In sr_router.c:
  - sr_handlepacket is called for every packet that goes through the router—you have to fill it out
- sr_protocol.h contains convenience structs for accessing fields in packets
  - Note: only the basic ICMP header is provided. sr_protocol.h doesn't include fields/structs for all the various ICMP packet types you'll need so you'll have to make your own.
- sr_if.h contains methods for getting information about the router's interfaces
- ARP Cache in sr_arpcache.h

A Few thoughts :

- Organize your code
  - Sticking everything in sr_router.c will probably give you a headache
  - Make some new files (suggestions, not necessary):
  - sr_arp.c/h for handling/generating ARP packets
  - sr_icmp.c/h for handling/generating ICMP packets
  - sr_ip.c/h for to handle generating IP packets
  - Add the sources and headers to the Makefile
- Do one thing at a time
  - You NEED ARP to send anything at all. A good place to start.
  - If you just do the forwarding path without ICMP, you should be able to route packets to the app servers.
  - You can add ICMP support later on. (Again, just a suggestion)

QUESTIONS?