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CS118

Lab 2 Report

Every time I receive a packet, I first check whether it is an ARP or IP packet. If it is an ARP packet, I pass the provided arguments to a function handling ARP request. Otherwise, I check if it is a valid IP packet. If so, I then check whether the router is the target host. If so, I further check if it is an ICMP message since a router can only speak ICMP. Otherwise, if it is a TCP or UDP message, I send an ICMP message called "Port unreachable" to the sending host. Now back to the case where the router is the target host for the ICMP message. I check if it is a valid ICMP message by validating the checksum as well as the length of the packet since I can predict the length of the ICMP message. This ICMP message is called an ICMP echo request. I respond by sending an ICMP echo reply. Since ICMP message is encapsulated in an IP packet, I do not have to create a new IP packet, but simply reuse it. I first change the ICMP message type from request to reply. Then I swap the source IP address and destination IP address in IP header. Finally I recomputed the checksum after first zeroing the checksum field for both the IP header and ICMP message. Before I send the IP packet back to the sending host, I encapsulate this packet in an Ethernet header. The source MAC address is the router's outgoing interface's MAC address, whereas the destination MAC address is the sending host's MAC address I obtained from the incoming Ethernet packet that I stored in the ARP table.

If the IP packet I receive is not targeted to the router, I simply forward the packet one hop by changing the destination MAC address with the next hop's incoming interface and the source destination MAC address with the router's outgoing interface's MAC address. The next hop's MAC address can be obtained using the ARP protocol. I first decrement the TTL by one and check if it is 0. If so, I send an ICMP message called "Time exceeded" to the sending host. If the incoming ARP message is not targeted to the router, I ignore the packet. Otherwise, I add the sender's protocol address to the ARP table only if it does not already exist. For every new ARP entry, I immediately send all the queued packets for the corresponding MAC address. Lastly, I check if the ARP message is a request. If so, I send an ARP reply to provide my MAC address only if the given IP address matches the router's IP address. I send an ARP request once every second for five seconds before I give up and send an ICMP message called "Destination host unreachable" to the sending host.