HW1 report 110550070 郭傑誠

Modify packet:

I used memcpy to create a copy of each packet, used ether_shost and ether_dhost to accessed and modified both destination and source address.

For ip address, I first checked ether_type, and then accessed and modified both destination and source ip addresses by ip_header->ip_src.s_addr and ip_header->ip_dst.s_addr.

Time difference:

Get the time stamp of current and previous packet by header->ts, and took the difference to determined how long to sleep the program.

Result screenshot:

tcpdump

```
16:53:18.785284 02:42:ac:1c:00:0c > 02:42:3a:0a:3c:c3, ethertype IPv4 (0x0800),
 length 42: 192.168.0.1.53 > 10.0.0.1.1234: domain [length 0 < 12] (invalid)
16:53:18.785432 08:00:12:34:56:78 > 08:00:12:34:ac:c2, ethertype IPv4 (0x0800),
 length 42: 10.1.1.3.53 > 10.1.1.4.1234: domain [length 0 < 12] (invalid)
16:53:18.785451 02:42:ac:1c:00:0c > 02:42:3a:0a:3c:c3, ethertype IPv4 (0x0800),
 length 42: 192.168.0.2.53 > 10.0.0.2.1234: domain [length 0 < 12] (invalid)
16:53:19.786582 08:00:12:34:56:78 > 08:00:12:34:ac:c2, ethertype IPv4 (0x0800),
 length 42: 10.1.1.3.53 > 10.1.1.4.1234: domain [length 0 < 12] (invalid)
16:53:19.786608 02:42:ac:1c:00:0c > 02:42:3a:0a:3c:c3, ethertype IPv4 (0x0800),
 length 42: 172.28.0.12.53 > 10.0.0.3.1234: domain [length 0 < 12] (invalid)
16:53:21.789469 08:00:12:34:56:78 > 08:00:12:34:ac:c2, ethertype IPv4 (0x0800),
 length 42: 10.1.1.3.53 > 10.1.1.4.1234: domain [length 0 < 12] (invalid)
16:53:21.789502 02:42:ac:1c:00:0c > 02:42:3a:0a:3c:c3, ethertype IPv4 (0x0800),
 length 42: 172.28.0.12.53 > 10.0.0.4.1234: domain [length 0 < 12] (invalid)
16:53:24.893778 08:00:12:34:56:78 > 08:00:12:34:ac:c2, ethertype IPv4 (0x0800),
 length 42: 10.1.1.3.53 > 10.1.1.4.1234: domain [length 0 < 12] (invalid)
16:53:24.893822 02:42:ac:1c:00:0c > 02:42:3a:0a:3c:c3, ethertype IPv4 (0x0800),
 length 42: 172.28.0.12.53 > 10.0.0.5.1234: domain [length 0 < 12] (invalid)
16:53:26.196051 08:00:12:34:56:78 > 08:00:12:34:ac:c2, ethertype IPv4 (0x0800),
 length 42: 10.1.1.3.53 > 10.1.1.4.1234: domain [length 0 < 12] (invalid)
16:53:26.196091 02:42:ac:1c:00:0c > 02:42:3a:0a:3c:c3, ethertype IPv4 (0x0800),
 length 42: 172.28.0.12.53 > 10.0.0.6.1234: domain [length 0 < 12] (invalid)
16:53:27.397872 08:00:12:34:56:78 > 08:00:12:34:ac:c2, ethertype IPv4 (0x0800),
 length 42: 10.1.1.3.53 > 10.1.1.4.1234: domain [length 0 < 12] (invalid)
```

wireshark

| No. | Time | Source | Destination | Protocol | Length | Info |
|---|---|---|---|---|---|---|
| 1 | 0.000000000 | 192.168.0.1 | 10.0.0.1 | UDP | 42 | 53 → 1234 Len=0 |
| 2 | 0.000148281 | 10.1.1.3 | 10.1.1.4 | UDP | 42 | 53 → 1234 Len=0 |
| 3 | 0.000166967 | 192.168.0.2 | 10.0.0.2 | UDP | 42 | 53 → 1234 Len=0 |
| 4 | 1.001297964 | 10.1.1.3 | 10.1.1.4 | UDP | 42 | 53 → 1234 Len=0 |
| 5 | 1.001324438 | 172.28.0.12 | 10.0.0.3 | UDP | 42 | 53 → 1234 Len=0 |
| 6 | 3.004184846 | 10.1.1.3 | 10.1.1.4 | UDP | 42 | 53 → 1234 Len=0 |
| 7 | 3.004218395 | 172.28.0.12 | 10.0.0.4 | UDP | 42 | 53 → 1234 Len=0 |
| 8 | 6.108494302 | 10.1.1.3 | 10.1.1.4 | UDP | 42 | 53 → 1234 Len=0 |
| 9 | 6.108537502 | 172.28.0.12 | 10.0.0.5 | UDP | 42 | 53 → 1234 Len=0 |
| 10 | 7.410767105 | 10.1.1.3 | 10.1.1.4 | UDP | 42 | 53 → 1234 Len=0 |
| 11 | 7.410807055 | 172.28.0.12 | 10.0.0.6 | UDP | 42 | 53 → 1234 Len=0 |
| 12 | 8.612588017 | 10.1.1.3 | 10.1.1.4 | UDP | 42 | 53 → 1234 Len=0 |