Lab Assignment 7

AIM: Study of packet sniffer tools TCPDUMP.

LO3: Explore the different network reconnaissance tools to gather information about networks.

THEORY:

What is TCPDUMP and how to install it?

Tcpdump is a command-line packet analyzer that allows you to capture and analyze network traffic in real-time. It's commonly used for troubleshooting network issues, analyzing network behavior, and diagnosing problems related to network communication. tcpdump captures packets as they travel through a network interface and provides detailed information about each packet, including source and destination addresses, protocol information, payload data, and more.

Linux (Debian/Ubuntu):

Open a terminal and run the following command to install tcpdump: sudo apt-get update sudo apt-get install tcpdump

Explain various commands in tcpdump to capture different types of packets.

tcpdump provides a wide range of commands and options to capture and analyze different types of packets. Here are some common tcpdump commands and filters to capture specific types of packets:

1. Capture All Traffic on a Specific Interface:

sudo tcpdump -i eth0

This captures all traffic on the "eth0" network interface.

2. Capture Traffic to or from a Specific IP Address:

sudo tcpdump host 192.168.1.100

This captures all traffic to or from the IP address "192.168.1.100".

3. Capture Traffic on a Specific Port:

sudo tcpdump port 80

This captures all traffic on port 80.

4. Capture Traffic Using a Specific Protocol:

sudo tcpdump icmp

This captures ICMP (ping) traffic.

5. Capture Traffic from a Specific Source IP:

sudo tcpdump src 192.168.1.200

This captures traffic originating from IP address "192.168.1.200".

6. Capture Traffic to a Specific Destination IP:

sudo tcpdump dst 192.168.1.100

This captures traffic directed to IP address "192.168.1.100".

7. Capture Traffic on a Specific Port Using a Protocol:

sudo tcpdump udp port 53

This captures UDP traffic on port 53 (DNS).

8. Capture Traffic Using a Combination of Filters:

sudo tcpdump src 192.168.1.100 and port 22

This captures traffic originating from IP address "192.168.1.100" and using port 22 (SSH).

9. Capture Traffic with Specific Packet Size:

sudo tcpdump greater 1000

This captures packets larger than 1000 bytes.

10. Capture Specific Number of Packets:

sudo tcpdump -c 10

This captures 10 packets and then exits.

11. Capture Packets Using Hexadecimal Filter:

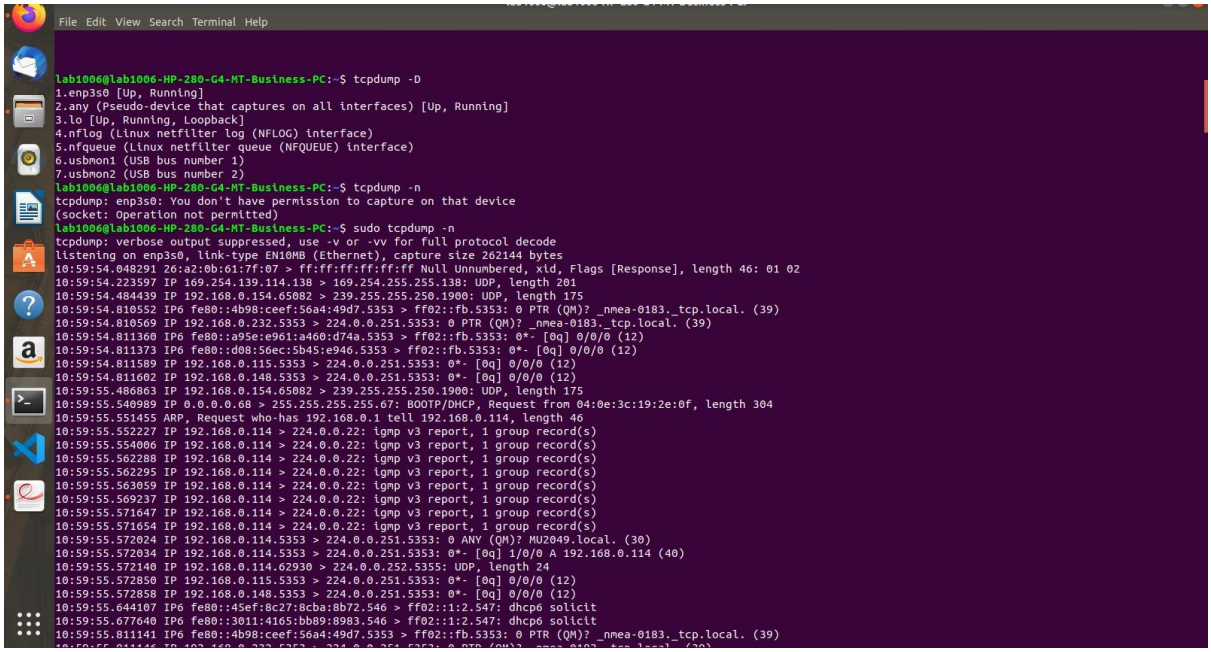
sudo tcpdump -X 'tcp[13] & 2 != 0'

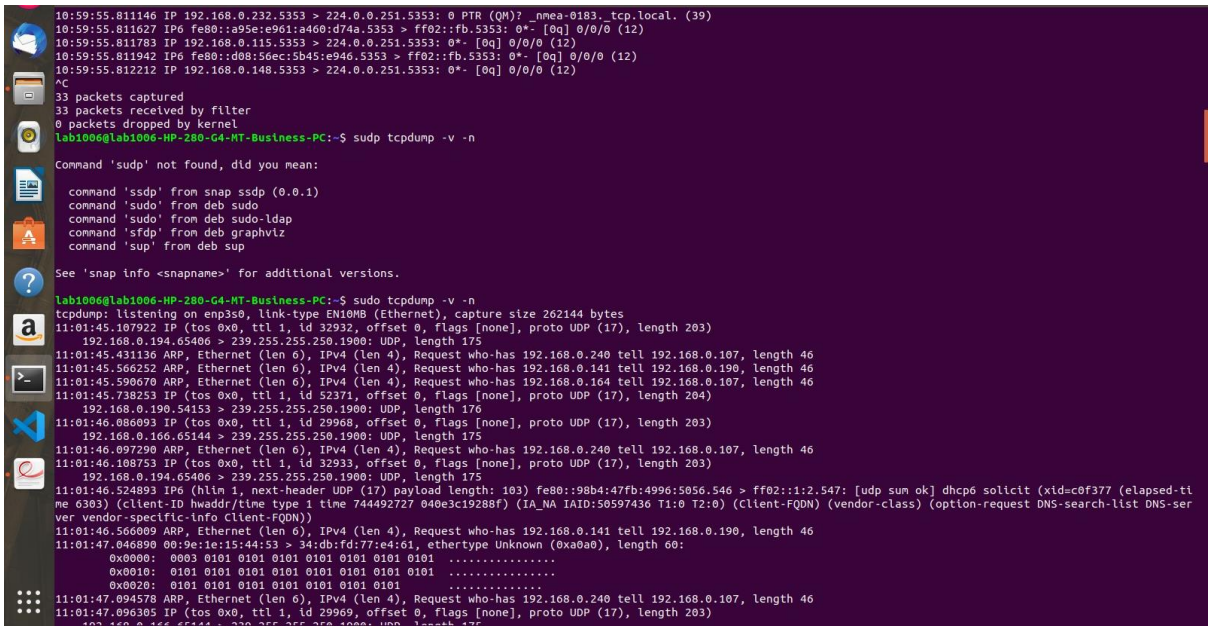
This captures only SYN packets (TCP packets with the SYN flag set).

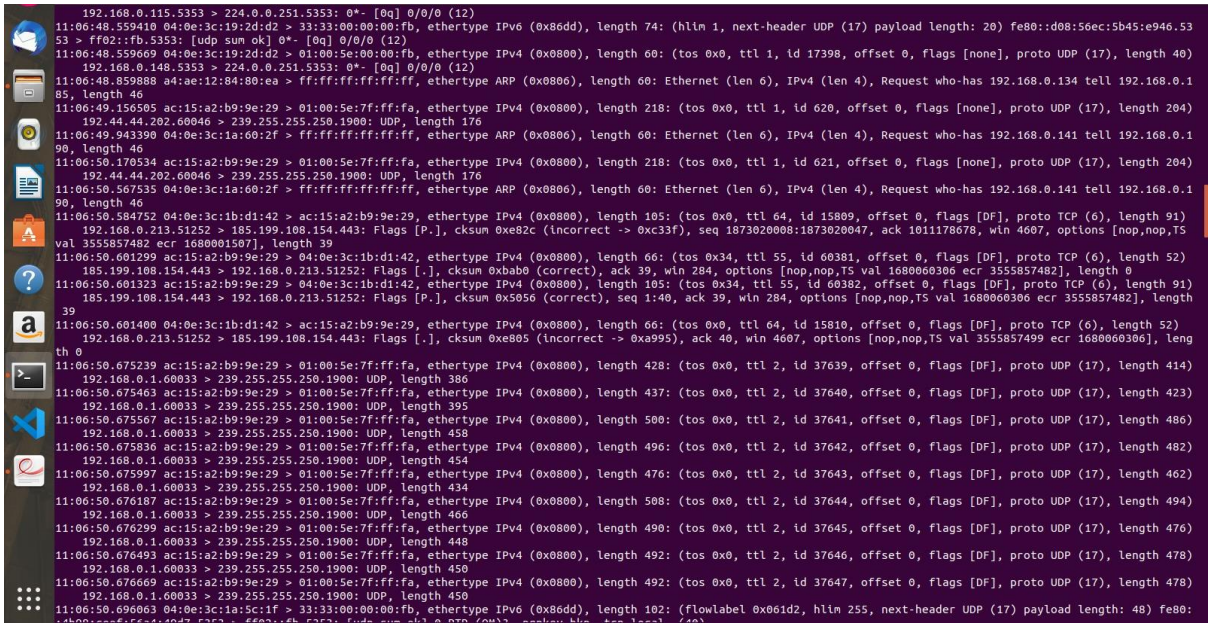
12. Capture and Save Output to a File: sudo tcpdump -i eth0 -w output.pcap

This captures traffic on the "eth0" interface and saves it to the "output.pcap" file.

OUTPUT


File Edit View Search Terminal Help
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ tcpdump -D
1.enp3s0 [Up, Running]
2.any (Pseudo-device that captures on all interfaces) [Up, Running]
3.lo [Up, Running, Loopback]
4.nflog (Linux netfilter log (NFLOG) interface)
5.nfqueue (Linux netfilter queue (NFQUEUE) interface)
6.usbmon1 (USB bus number 1)
7.usbmon2 (USB bus number 2)
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ tcpdump -n
tcpdump: enp3s0: You don't have permission to capture on that device
(socket: Operation not permitted)
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ sudo tcpdump -n
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp3s0, link-type EN10MB (Ethernet), capture size 262144 bytes
10:59:54.048291 26:a2:0b:61:7f:07 > ff:ff:ff:ff:ff:ff Null Unnumbered, xid, Flags [Response], length 46: 01 02
10:59:54.223597 IP 169.254.139.114.138 > 169.254.255.255.138: UDP, length 201
10:59:54.484439 IP 192.168.0.154.65082 > 239.255.255.250.1900: UDP, length 175
10:59:54.810552 IP6 fe80::4b98:ceef:56a4:49d7.5353 > ff02::fb.5353: 0 PTR (QM)? _nmea-0183._tcp.local. (39)
10:59:54.810569 IP 192.168.0.232.5353 > 224.0.0.251.5353: 0 PTR (QM)? _nmea-0183._tcp.local. (39)
10:59:54.811360 IP6 fe80::a95e:e961:a460:d74a.5353 > ff02::fb.5353: 0*- [0q] 0/0/0 (12)
10:59:54.811373 IP6 fe80::d08:56ec:5b45:e946.5353 > ff02::fb.5353: 0*- [0q] 0/0/0 (12)
10:59:54.811589 IP 192.168.0.115.5353 > 224.0.0.251.5353: 0*- [0q] 0/0/0 (12)
10:59:54.811602 IP 192.168.0.148.5353 > 224.0.0.251.5353: 0*- [0q] 0/0/0 (12)
10:59:55.486863 IP 192.168.0.154.65082 > 239.255.255.250.1900: UDP, length 175
10:59:55.540989 IP 0.0.0.0.68 > 255.255.255.255.67: BOOTP/DHCP, Request from 04:0e:3c:19:2e:0f, length 304
10:59:55.551455 ARP, Request who-has 192.168.0.1 tell 192.168.0.114, length 46
10:59:55.552227 IP 192.168.0.114 > 224.0.0.22: igmp v3 report, 1 group record(s)
10:59:55.554006 IP 192.168.0.114 > 224.0.0.22: igmp v3 report, 1 group record(s)
10:59:55.562288 IP 192.168.0.114 > 224.0.0.22: igmp v3 report, 1 group record(s)
10:59:55.562295 IP 192.168.0.114 > 224.0.0.22: igmp v3 report, 1 group record(s)
10:59:55.563059 IP 192.168.0.114 > 224.0.0.22: igmp v3 report, 1 group record(s)
10:59:55.569237 IP 192.168.0.114 > 224.0.0.22: igmp v3 report, 1 group record(s)
10:59:55.571647 IP 192.168.0.114 > 224.0.0.22: igmp v3 report, 1 group record(s)
10:59:55.571654 IP 192.168.0.114 > 224.0.0.22: igmp v3 report, 1 group record(s)
10:59:55.572024 IP 192.168.0.114.5353 > 224.0.0.251.5353: 0 ANY (QM)? MU2049.local. (30)
10:59:55.572034 IP 192.168.0.114.5353 > 224.0.0.251.5353: 0*- [0q] 1/0/0 A 192.168.0.114 (40)
10:59:55.572140 IP 192.168.0.114.62930 > 224.0.0.252.5355: UDP, length 24
10:59:55.572850 IP 192.168.0.115.5353 > 224.0.0.251.5353: 0*- [0q] 0/0/0 (12)
10:59:55.572858 IP 192.168.0.148.5353 > 224.0.0.251.5353: 0*- [0q] 0/0/0 (12)
10:59:55.644107 IP6 fe80::45ef:8c27:8cba:8b72.546 > ff02::1:2.547: dhcp6 solicit
10:59:55.677640 IP6 fe80::3011:4165:bb89:8983.546 > ff02::1:2.547: dhcp6 solicit
10:59:55.811141 IP6 fe80::4b98:ceef:56a4:49d7.5353 > ff02::fb.5353: 0 PTR (QM)? _nmea-0183._tcp.local. (39)


10:59:55.811146 IP 192.168.0.232.5353 > 224.0.0.251.5353: 0 PTR (QM)? _nmea-0183._tcp.local. (39)
10:59:55.811627 IP6 fe80::a95e:e961:a460:d74a.5353 > ff02::fb.5353: 0*- [0q] 0/0/0 (12)
10:59:55.811783 IP 192.168.0.115.5353 > 224.0.0.251.5353: 0*- [0q] 0/0/0 (12)
10:59:55.811942 IP6 fe80::d08:56ec:5b45:e946.5353 > ff02::fb.5353: 0*- [0q] 0/0/0 (12)
10:59:55.812212 IP 192.168.0.148.5353 > 224.0.0.251.5353: 0*- [0q] 0/0/0 (12)
^C
33 packets captured
33 packets received by filter
0 packets dropped by kernel
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ sudp tcpdump -v -n
Command 'sudp' not found, did you mean:
command 'ssdp' from snap ssdp (0.0.1)
command 'sudo' from deb sudo
command 'sudo' from deb sudo-ldap
command 'sfdp' from deb graphviz
command 'sup' from deb sup
See 'snap info <snapname>' for additional versions.
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ sudo tcpdump -v -n
tcpdump: listening on enp3s0, link-type EN10MB (Ethernet), capture size 262144 bytes
11:01:45.107922 IP (tos 0x0, ttl 1, id 32932, offset 0, flags [none], proto UDP (17), length 203)
192.168.0.194.65406 > 239.255.255.250.1900: UDP, length 175
11:01:45.431136 ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 192.168.0.240 tell 192.168.0.107, length 46
11:01:45.566252 ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 192.168.0.141 tell 192.168.0.190, length 46
11:01:45.590670 ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 192.168.0.164 tell 192.168.0.107, length 46
11:01:45.738253 IP (tos 0x0, ttl 1, id 52371, offset 0, flags [none], proto UDP (17), length 204)
192.168.0.190.54153 > 239.255.255.250.1900: UDP, length 176
11:01:46.086093 IP (tos 0x0, ttl 1, id 29968, offset 0, flags [none], proto UDP (17), length 203)
192.168.0.166.65144 > 239.255.255.250.1900: UDP, length 175
11:01:46.097290 ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 192.168.0.240 tell 192.168.0.107, length 46
11:01:46.108753 IP (tos 0x0, ttl 1, id 32933, offset 0, flags [none], proto UDP (17), length 203)
192.168.0.194.65406 > 239.255.255.250.1900: UDP, length 175
11:01:46.524893 IP6 (hlim 1, next-header UDP (17) payload length: 103) fe80::98b4:47fb:4996:5056.546 > ff02::1:2.547: [udp sum ok] dhcp6 solicit (xid=c0f377 (elapsed-time 6303) (client-ID hwaddr/time type 1 time 744492727 040e3c19288f) (IA_NA IAID:50597436 T1:0 T2:0) (client-FQDN) (vendor-class) (option-request DNS-search-list DNS-server vendor-specific-info Client-FQDN))
11:01:46.566009 ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 192.168.0.141 tell 192.168.0.190, length 46
11:01:47.046890 00:9e:1e:15:44:53 > 34:db:fd:77:e4:61, ethertype Unknown (0xa0a0), length 60:
0x0000: 0003 0101 0101 0101 0101 0101 0101 0101 ....
0x0010: 0101 0101 0101 0101 0101 0101 0101 0101 ....
0x0020: 0101 0101 0101 0101 0101 0101 0101 0101 ....
11:01:47.094578 ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 192.168.0.240 tell 192.168.0.107, length 46
11:01:47.096305 IP (tos 0x0, ttl 1, id 29969, offset 0, flags [none], proto UDP (17), length 203)



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    192.168.0.115.5353 > 224.0.0.251.5353: 0*- [0q] 0/0/0 (12)
11:06:48.559410 04:0e:3c:19:2d:d2 > 33:33:00:00:00:fb, ethertype IPv6 (0x86dd), length 74: (hlim 1, next-header UDP (17) payload length: 20) fe80::d08:56ec:5b45:e946.53
53 > ff02::fb.5353: [udp sum ok] 0*- [0q] 0/0/0 (12)
11:06:48.559669 04:0e:3c:19:2d:d2 > 01:00:5e:00:00:fb, ethertype IPv4 (0x0800), length 60: (tos 0x0, ttl 1, id 17398, offset 0, flags [none], proto UDP (17), length 40)
    192.168.0.148.5353 > 224.0.0.251.5353: 0*- [0q] 0/0/0 (12)
11:06:48.859888 a4:ae:12:84:80:ea > ff:ff:ff:ff:ff:ff, ethertype ARP (0x0806), length 60: Ethernet (len 6), IPv4 (len 4), Request who-has 192.168.0.134 tell 192.168.0.1
85, length 46
11:06:49.156505 ac:15:a2:b9:9e:29 > 01:00:5e:7f:ff:fa, ethertype IPv4 (0x0800), length 218: (tos 0x0, ttl 1, id 620, offset 0, flags [none], proto UDP (17), length 204)
    192.44.44.202.60046 > 239.255.255.250.1900: UDP, length 176
11:06:49.943390 04:0e:3c:1a:60:2f > ff:ff:ff:ff:ff:ff, ethertype ARP (0x0806), length 60: Ethernet (len 6), IPv4 (len 4), Request who-has 192.168.0.141 tell 192.168.0.1
90, length 46
11:06:50.170534 ac:15:a2:b9:9e:29 > 01:00:5e:7f:ff:fa, ethertype IPv4 (0x0800), length 218: (tos 0x0, ttl 1, id 621, offset 0, flags [none], proto UDP (17), length 204)
    192.44.44.202.60046 > 239.255.255.250.1900: UDP, length 176
11:06:50.567535 04:0e:3c:1a:60:2f > ff:ff:ff:ff:ff:ff, ethertype ARP (0x0806), length 60: Ethernet (len 6), IPv4 (len 4), Request who-has 192.168.0.141 tell 192.168.0.1
90, length 46
11:06:50.584752 04:0e:3c:1b:d1:42 > ac:15:a2:b9:9e:29, ethertype IPv4 (0x0800), length 105: (tos 0x0, ttl 64, id 15809, offset 0, flags [DF], proto TCP (6), length 91)
    192.168.0.213.51252 > 185.199.108.154.443: Flags [P.], cksum 0xe82c (incorrect -> 0xc33f), seq 1873020008:1873020047, ack 1011178678, win 4607, options [nop,nop,TS
val 3555857482 ecr 1680001507], length 39
11:06:50.601299 ac:15:a2:b9:9e:29 > 04:0e:3c:1b:d1:42, ethertype IPv4 (0x0800), length 66: (tos 0x34, ttl 55, id 60381, offset 0, flags [DF], proto TCP (6), length 52)
    185.199.108.154.443 > 192.168.0.213.51252: Flags [.], cksum 0xbab0 (correct), ack 39, win 284, options [nop,nop,TS val 1680060306 ecr 3555857482], length 0
11:06:50.601323 ac:15:a2:b9:9e:29 > 04:0e:3c:1b:d1:42, ethertype IPv4 (0x0800), length 105: (tos 0x34, ttl 55, id 60382, offset 0, flags [DF], proto TCP (6), length 91)
    185.199.108.154.443 > 192.168.0.213.51252: Flags [P.], cksum 0x5056 (correct), seq 1:40, ack 39, win 284, options [nop,nop,TS val 1680060306 ecr 3555857482], length
 39
11:06:50.601400 04:0e:3c:1b:d1:42 > ac:15:a2:b9:9e:29, ethertype IPv4 (0x0800), length 66: (tos 0x0, ttl 64, id 15810, offset 0, flags [DF], proto TCP (6), length 52)
    192.168.0.213.51252 > 185.199.108.154.443: Flags [.], cksum 0xe805 (incorrect -> 0xa995), ack 40, win 4607, options [nop,nop,TS val 3555857499 ecr 1680060306], leng
th 0
11:06:50.675239 ac:15:a2:b9:9e:29 > 01:00:5e:7f:ff:fa, ethertype IPv4 (0x0800), length 428: (tos 0x0, ttl 2, id 37639, offset 0, flags [DF], proto UDP (17), length 414)
    192.168.0.1.60033 > 239.255.255.250.1900: UDP, length 386
11:06:50.675463 ac:15:a2:b9:9e:29 > 01:00:5e:7f:ff:fa, ethertype IPv4 (0x0800), length 437: (tos 0x0, ttl 2, id 37640, offset 0, flags [DF], proto UDP (17), length 423)
    192.168.0.1.60033 > 239.255.255.250.1900: UDP, length 395
11:06:50.675567 ac:15:a2:b9:9e:29 > 01:00:5e:7f:ff:fa, ethertype IPv4 (0x0800), length 500: (tos 0x0, ttl 2, id 37641, offset 0, flags [DF], proto UDP (17), length 486)
    192.168.0.1.60033 > 239.255.255.250.1900: UDP, length 458
11:06:50.675836 ac:15:a2:b9:9e:29 > 01:00:5e:7f:ff:fa, ethertype IPv4 (0x0800), length 496: (tos 0x0, ttl 2, id 37642, offset 0, flags [DF], proto UDP (17), length 482)
    192.168.0.1.60033 > 239.255.255.250.1900: UDP, length 454
11:06:50.675997 ac:15:a2:b9:9e:29 > 01:00:5e:7f:ff:fa, ethertype IPv4 (0x0800), length 476: (tos 0x0, ttl 2, id 37643, offset 0, flags [DF], proto UDP (17), length 462)
    192.168.0.1.60033 > 239.255.255.250.1900: UDP, length 434
11:06:50.676187 ac:15:a2:b9:9e:29 > 01:00:5e:7f:ff:fa, ethertype IPv4 (0x0800), length 508: (tos 0x0, ttl 2, id 37644, offset 0, flags [DF], proto UDP (17), length 494)
    192.168.0.1.60033 > 239.255.255.250.1900: UDP, length 466
11:06:50.676299 ac:15:a2:b9:9e:29 > 01:00:5e:7f:ff:fa, ethertype IPv4 (0x0800), length 490: (tos 0x0, ttl 2, id 37645, offset 0, flags [DF], proto UDP (17), length 476)
    192.168.0.1.60033 > 239.255.255.250.1900: UDP, length 448
11:06:50.676493 ac:15:a2:b9:9e:29 > 01:00:5e:7f:ff:fa, ethertype IPv4 (0x0800), length 492: (tos 0x0, ttl 2, id 37646, offset 0, flags [DF], proto UDP (17), length 478)
    192.168.0.1.60033 > 239.255.255.250.1900: UDP, length 450
11:06:50.676669 ac:15:a2:b9:9e:29 > 01:00:5e:7f:ff:fa, ethertype IPv4 (0x0800), length 492: (tos 0x0, ttl 2, id 37647, offset 0, flags [DF], proto UDP (17), length 478)
    192.168.0.1.60033 > 239.255.255.250.1900: UDP, length 450
11:06:50.696063 04:0e:3c:1a:5c:1f > 33:33:00:00:00:fb, ethertype IPv6 (0x86dd), length 102: (flowlabel 0x061d2, hlim 255, next-header UDP (17) payload length: 48) fe80:
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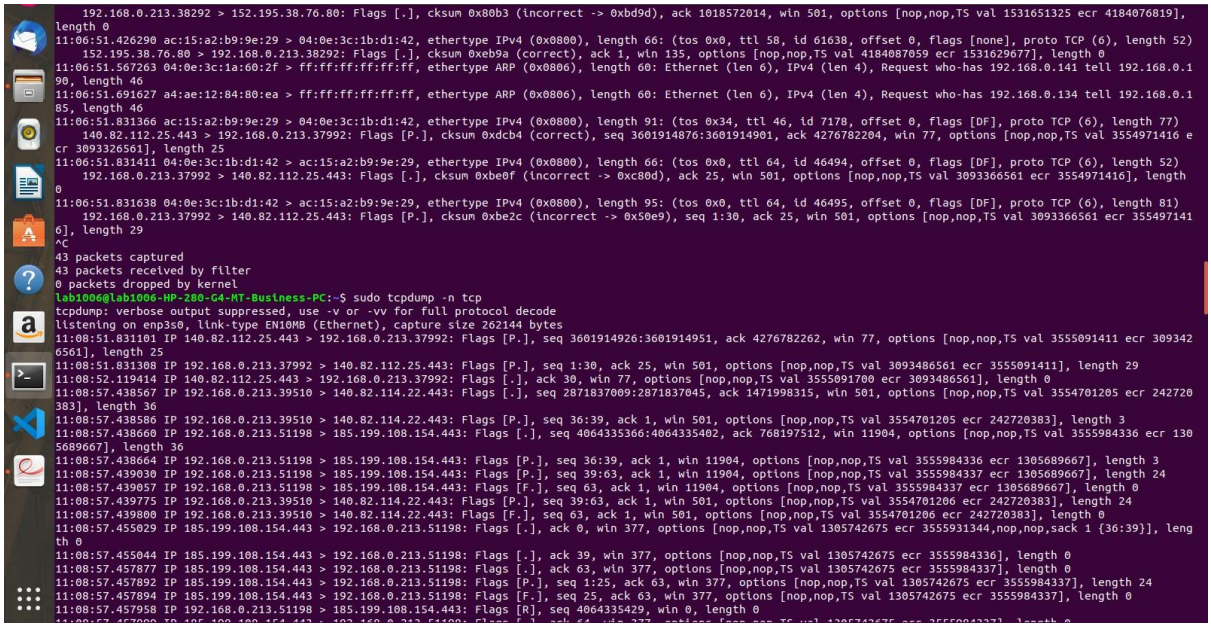

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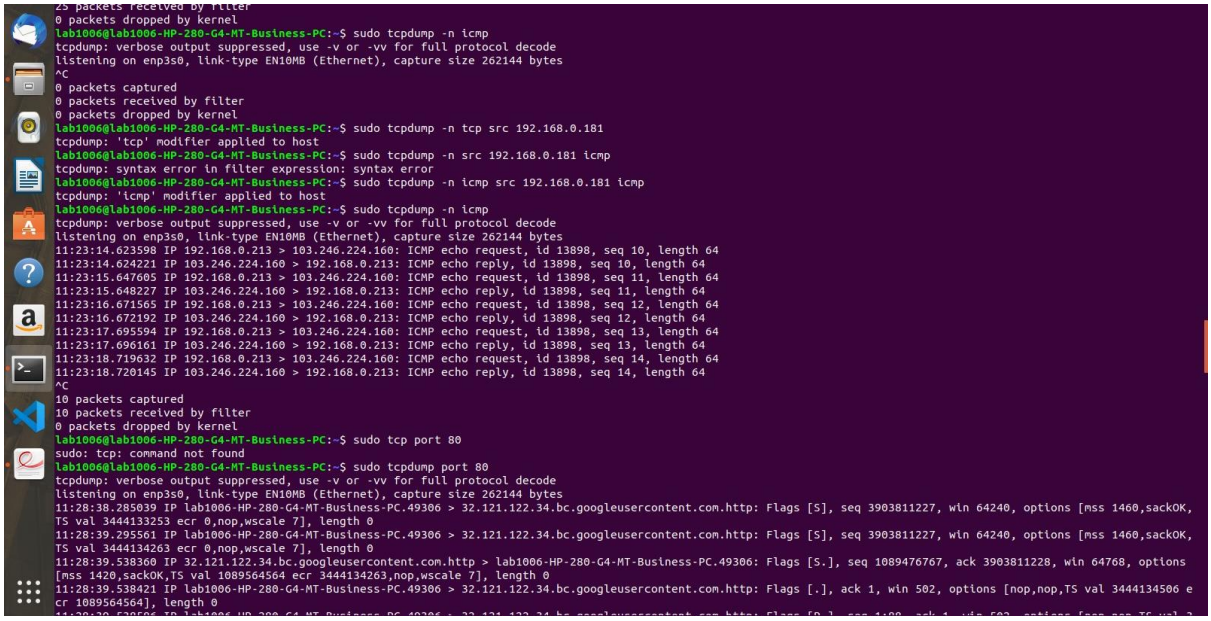
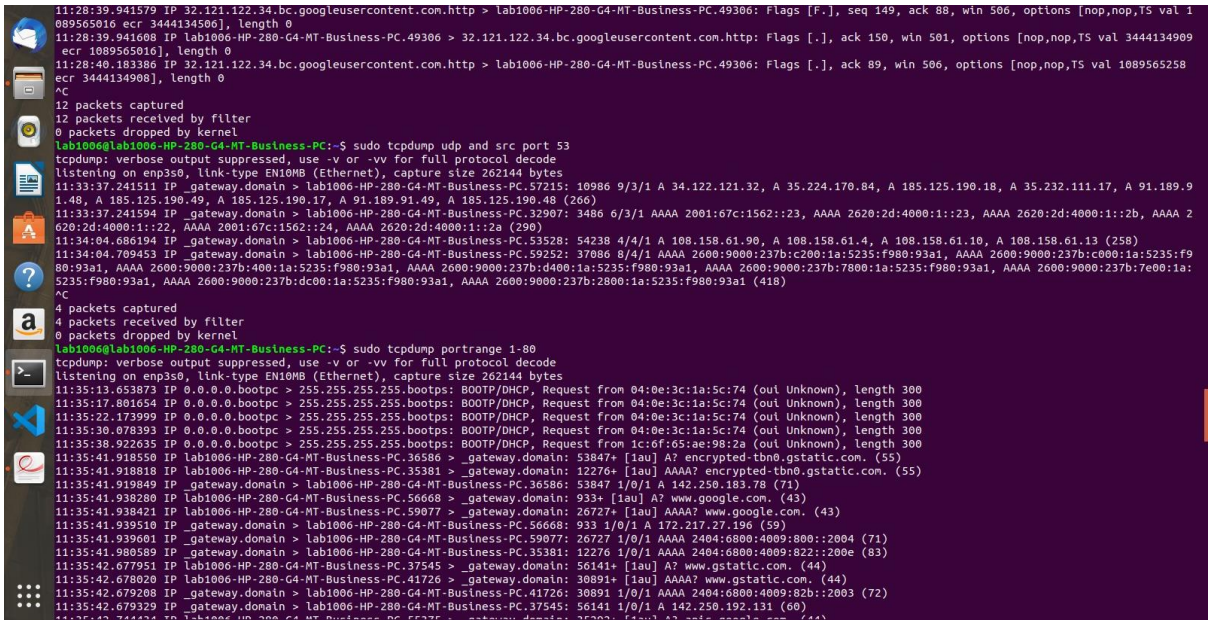
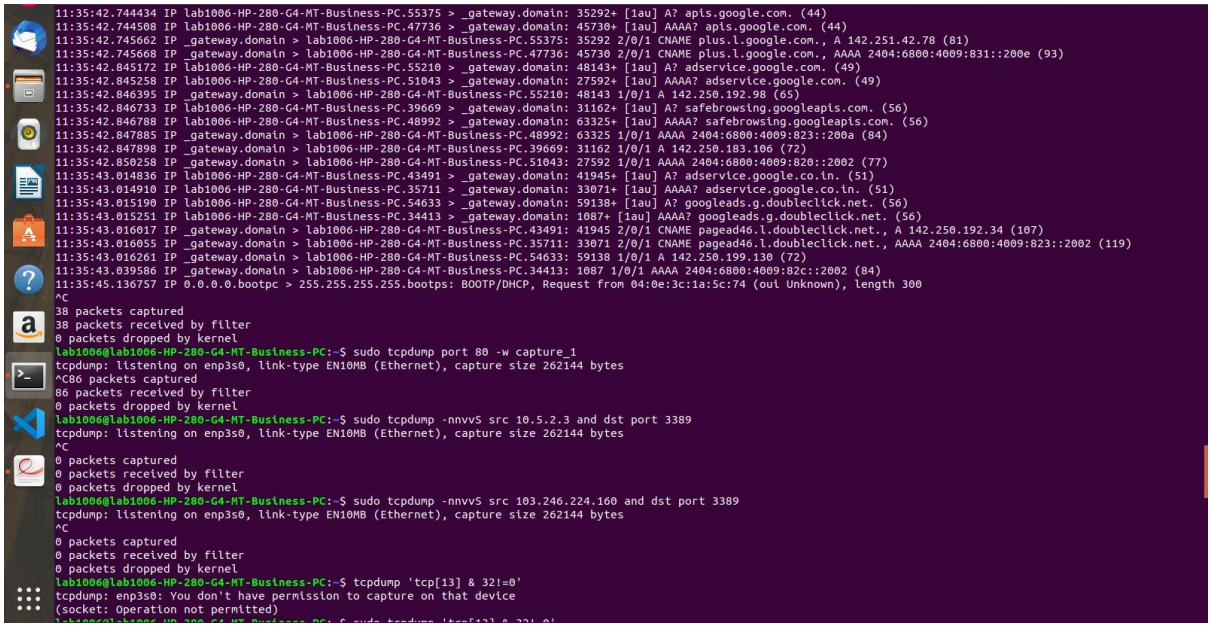
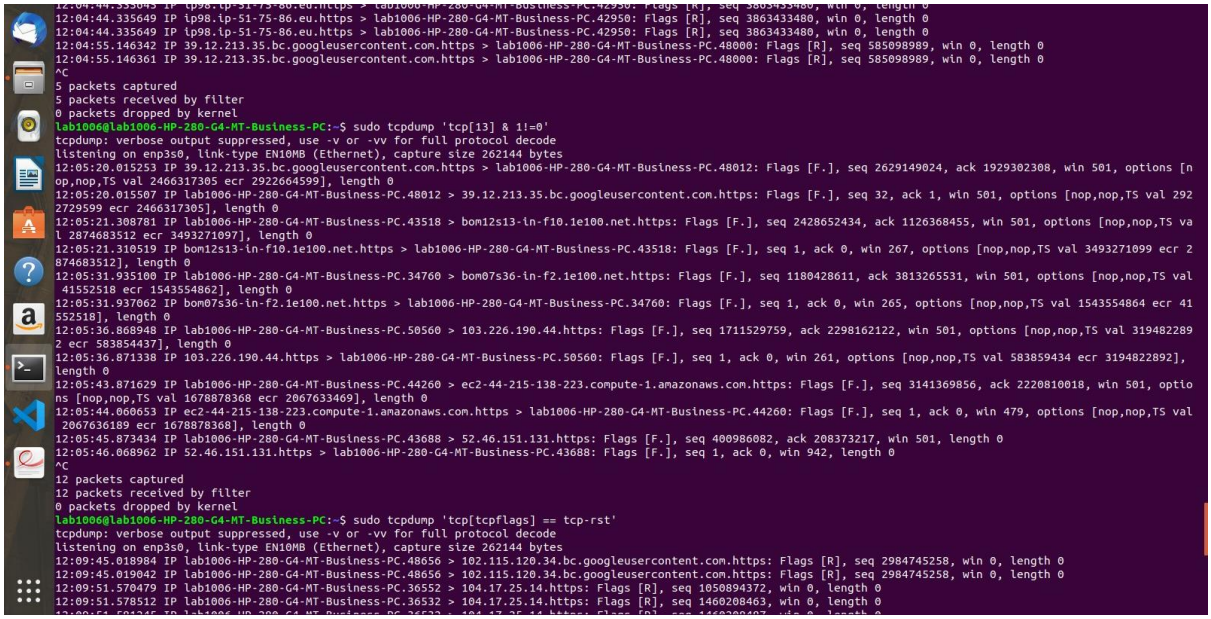
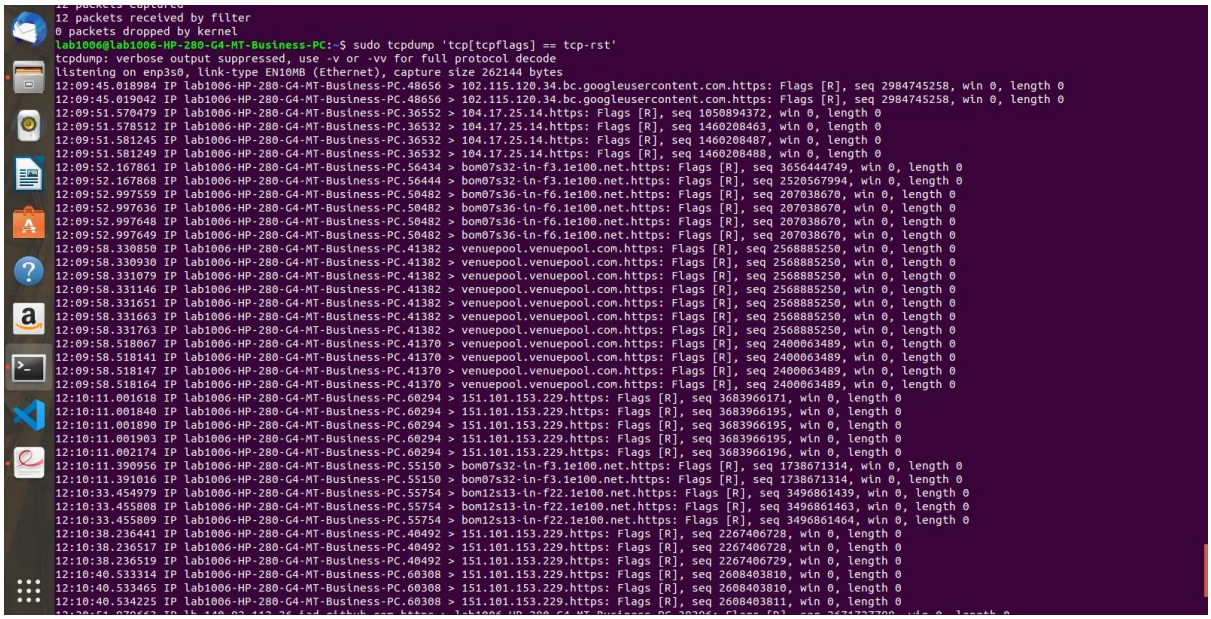
    192.168.0.213.38292 > 152.195.38.76.80: Flags [.], cksum 0x80b3 (incorrect -> 0xbd9d), ack 1018572014, win 501, options [nop,nop,TS val 1531651325 ecr 4184076819],
length 0
11:06:51.426290 ac:15:a2:b9:9e:29 > 04:0e:3c:1b:d1:42, ethertype IPv4 (0x0800), length 66: (tos 0x0, ttl 58, id 61638, offset 0, flags [none], proto TCP (6), length 52)
    152.195.38.76.80 > 192.168.0.213.38292: Flags [.], cksum 0xeb9a (correct), ack 1, win 135, options [nop,nop,TS val 4184087059 ecr 1531629677], length 0
11:06:51.567263 04:0e:3c:1a:60:2f > ff:ff:ff:ff:ff:ff, ethertype ARP (0x0806), length 60: Ethernet (len 6), IPv4 (len 4), Request who-has 192.168.0.141 tell 192.168.0.1
90, length 46
11:06:51.691627 a4:ae:12:84:80:ea > ff:ff:ff:ff:ff:ff, ethertype ARP (0x0806), length 60: Ethernet (len 6), IPv4 (len 4), Request who-has 192.168.0.134 tell 192.168.0.1
85, length 46
11:06:51.831366 ac:15:a2:b9:9e:29 > 04:0e:3c:1b:d1:42, ethertype IPv4 (0x0800), length 91: (tos 0x34, ttl 46, id 7178, offset 0, flags [DF], proto TCP (6), length 77)
    140.82.112.25.443 > 192.168.0.213.37992: Flags [P.], cksum 0xdcb4 (correct), seq 3601914876:3601914901, ack 4276782204, win 77, options [nop,nop,TS val 3554971416 e
cr 3093326561], length 25
11:06:51.831411 04:0e:3c:1b:d1:42 > ac:15:a2:b9:9e:29, ethertype IPv4 (0x0800), length 66: (tos 0x0, ttl 64, id 46494, offset 0, flags [DF], proto TCP (6), length 52)
    192.168.0.213.37992 > 140.82.112.25.443: Flags [.], cksum 0xbe0f (incorrect -> 0xc80d), ack 25, win 501, options [nop,nop,TS val 3093366561 ecr 3554971416], length
0
11:06:51.831638 04:0e:3c:1b:d1:42 > ac:15:a2:b9:9e:29, ethertype IPv4 (0x0800), length 95: (tos 0x0, ttl 64, id 46495, offset 0, flags [DF], proto TCP (6), length 81)
    192.168.0.213.37992 > 140.82.112.25.443: Flags [P.], cksum 0xbe2c (incorrect -> 0x50e9), seq 1:30, ack 25, win 501, options [nop,nop,TS val 3093366561 ecr 355497141
6], length 29
^C
43 packets captured
43 packets received by filter
0 packets dropped by kernel
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ sudo tcpdump -n tcp
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp3s0, link-type EN10MB (Ethernet), capture size 262144 bytes
11:08:51.831101 IP 140.82.112.25.443 > 192.168.0.213.37992: Flags [P.], seq 3601914926:3601914951, ack 4276782262, win 77, options [nop,nop,TS val 3555091411 ecr 309342
6561], length 25
11:08:51.831308 IP 192.168.0.213.37992 > 140.82.112.25.443: Flags [P.], seq 1:30, ack 25, win 501, options [nop,nop,TS val 3093486561 ecr 3555091411], length 29
11:08:52.119414 IP 140.82.112.25.443 > 192.168.0.213.37992: Flags [.], ack 30, win 77, options [nop,nop,TS val 3555091700 ecr 3093486561], length 0
11:08:57.438567 IP 192.168.0.213.39510 > 140.82.114.22.443: Flags [.], seq 2871837009:2871837045, ack 1471998315, win 501, options [nop,nop,TS val 3554701205 ecr 242720
383], length 36
11:08:57.438586 IP 192.168.0.213.39510 > 140.82.114.22.443: Flags [P.], seq 36:39, ack 1, win 501, options [nop,nop,TS val 3554701205 ecr 242720383], length 3
11:08:57.438660 IP 192.168.0.213.51198 > 185.199.108.154.443: Flags [.], seq 4064335366:4064335402, ack 768197512, win 11904, options [nop,nop,TS val 3555984336 ecr 130
5689667], length 36
11:08:57.438664 IP 192.168.0.213.51198 > 185.199.108.154.443: Flags [P.], seq 36:39, ack 1, win 11904, options [nop,nop,TS val 3555984336 ecr 1305689667], length 3
11:08:57.439030 IP 192.168.0.213.51198 > 185.199.108.154.443: Flags [P.], seq 39:63, ack 1, win 11904, options [nop,nop,TS val 3555984337 ecr 1305689667], length 24
11:08:57.439057 IP 192.168.0.213.51198 > 185.199.108.154.443: Flags [F.], seq 63, ack 1, win 11904, options [nop,nop,TS val 3555984337 ecr 1305689667], length 0
11:08:57.439775 IP 192.168.0.213.39510 > 140.82.114.22.443: Flags [P.], seq 39:63, ack 1, win 501, options [nop,nop,TS val 3554701206 ecr 242720383], length 24
11:08:57.439800 IP 192.168.0.213.39510 > 140.82.114.22.443: Flags [F.], seq 63, ack 1, win 501, options [nop,nop,TS val 3554701206 ecr 242720383], length 0
11:08:57.455029 IP 185.199.108.154.443 > 192.168.0.213.51198: Flags [.], ack 0, win 377, options [nop,nop,TS val 1305742675 ecr 3555931344,nop,nop,sack 1 {36:39}], leng
th 0
11:08:57.455044 IP 185.199.108.154.443 > 192.168.0.213.51198: Flags [.], ack 39, win 377, options [nop,nop,TS val 1305742675 ecr 3555984336], length 0
11:08:57.457877 IP 185.199.108.154.443 > 192.168.0.213.51198: Flags [.], ack 63, win 377, options [nop,nop,TS val 1305742675 ecr 3555984337], length 0
11:08:57.457892 IP 185.199.108.154.443 > 192.168.0.213.51198: Flags [P.], seq 1:25, ack 63, win 377, options [nop,nop,TS val 1305742675 ecr 3555984337], length 24
11:08:57.457894 IP 185.199.108.154.443 > 192.168.0.213.51198: Flags [F.], seq 25, ack 63, win 377, options [nop,nop,TS val 1305742675 ecr 3555984337], length 0
11:08:57.457958 IP 192.168.0.213.51198 > 185.199.108.154.443: Flags [R], seq 4064335429, win 0, length 0
```


25 packets received by filter
0 packets dropped by kernel
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ sudo tcpdump -n icmp
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp3s0, link-type EN10MB (Ethernet), capture size 262144 bytes
^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ sudo tcpdump -n tcp src 192.168.0.181
tcpdump: 'tcp' modifier applied to host
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ sudo tcpdump -n src 192.168.0.181 icmp
tcpdump: syntax error in filter expression: syntax error
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ sudo tcpdump -n icmp src 192.168.0.181 icmp
tcpdump: 'icmp' modifier applied to host
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ sudo tcpdump -n icmp
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp3s0, link-type EN10MB (Ethernet), capture size 262144 bytes
11:23:14.623598 IP 192.168.0.213 > 103.246.224.160: ICMP echo request, id 13898, seq 10, length 64
11:23:14.624221 IP 103.246.224.160 > 192.168.0.213: ICMP echo reply, id 13898, seq 10, length 64
11:23:15.647605 IP 192.168.0.213 > 103.246.224.160: ICMP echo request, id 13898, seq 11, length 64
11:23:15.648227 IP 103.246.224.160 > 192.168.0.213: ICMP echo reply, id 13898, seq 11, length 64
11:23:16.671565 IP 192.168.0.213 > 103.246.224.160: ICMP echo request, id 13898, seq 12, length 64
11:23:16.672192 IP 103.246.224.160 > 192.168.0.213: ICMP echo reply, id 13898, seq 12, length 64
11:23:17.695594 IP 192.168.0.213 > 103.246.224.160: ICMP echo request, id 13898, seq 13, length 64
11:23:17.696161 IP 103.246.224.160 > 192.168.0.213: ICMP echo reply, id 13898, seq 13, length 64
11:23:18.719632 IP 192.168.0.213 > 103.246.224.160: ICMP echo request, id 13898, seq 14, length 64
11:23:18.720145 IP 103.246.224.160 > 192.168.0.213: ICMP echo reply, id 13898, seq 14, length 64
^C
10 packets captured
10 packets received by filter
0 packets dropped by kernel
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ sudo tcp port 80
sudo: tcp: command not found
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ sudo tcpdump port 80
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp3s0, link-type EN10MB (Ethernet), capture size 262144 bytes
11:28:38.285039 IP lab1006-HP-280-G4-MT-Business-PC.49306 > 32.121.122.34.bc.googleusercontent.com.http: Flags [S], seq 3903811227, win 64240, options [mss 1460,sackOK,
TS val 3444133253 ecr 0,nop,wscale 7], length 0
11:28:39.295561 IP lab1006-HP-280-G4-MT-Business-PC.49306 > 32.121.122.34.bc.googleusercontent.com.http: Flags [S], seq 3903811227, win 64240, options [mss 1460,sackOK,
TS val 3444134263 ecr 0,nop,wscale 7], length 0
11:28:39.538360 IP 32.121.122.34.bc.googleusercontent.com.http > lab1006-HP-280-G4-MT-Business-PC.49306: Flags [S.], seq 1089476767, ack 3903811228, win 64768, options
[mss 1420,sackOK,TS val 1089564564 ecr 3444134263,nop,wscale 7], length 0
11:28:39.538421 IP lab1006-HP-280-G4-MT-Business-PC.49306 > 32.121.122.34.bc.googleusercontent.com.http: Flags [.], ack 1, win 502, options [nop,nop,TS val 3444134506 e
cr 1089564564], length 0


11:28:39.941579 IP 32.121.122.34.bc.googleusercontent.com.http > lab1006-HP-280-G4-MT-Business-PC.49306: Flags [F.], seq 149, ack 88, win 506, options [nop,nop,TS val 1
089565016 ecr 3444134506], length 0
11:28:39.941608 IP lab1006-HP-280-G4-MT-Business-PC.49306 > 32.121.122.34.bc.googleusercontent.com.http: Flags [.], ack 150, win 501, options [nop,nop,TS val 3444134909
ecr 1089565016], length 0
11:28:40.183386 IP 32.121.122.34.bc.googleusercontent.com.http > lab1006-HP-280-G4-MT-Business-PC.49306: Flags [.], ack 89, win 506, options [nop,nop,TS val 1089565258
ecr 3444134908], length 0
^C
12 packets captured
12 packets received by filter
0 packets dropped by kernel
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ sudo tcpdump udp and src port 53
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp3s0, link-type EN10MB (Ethernet), capture size 262144 bytes
11:33:37.241511 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.57215: 10986 9/3/1 A 34.122.121.32, A 35.224.170.84, A 185.125.190.18, A 35.232.111.17, A 91.189.9
1.48, A 185.125.190.49, A 185.125.190.17, A 91.189.91.49, A 185.125.190.40 (266)
11:33:37.241594 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.32907: 3486 6/3/1 AAAA 2001:67c:1562::23, AAAA 2620:2d:4000:1::23, AAAA 2620:2d:4000:1::2b, AAAA 2
620:2d:4000:1::22, AAAA 2001:67c:1562::24, AAAA 2620:2d:4000:1::2a (290)
11:34:04.686194 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.53528: 54238 4/4/1 A 108.158.61.90, A 108.158.61.4, A 108.158.61.10, A 108.158.61.13 (258)
11:34:04.709453 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.59252: 37086 8/4/1 AAAA 2600:9000:237b:c200:1a:5235:f980:93a1, AAAA 2600:9000:237b:c000:1a:5235:f9
80:93a1, AAAA 2600:9000:237b:400:1a:5235:f980:93a1, AAAA 2600:9000:237b:d400:1a:5235:f980:93a1, AAAA 2600:9000:237b:7800:1a:5235:f980:93a1, AAAA 2600:9000:237b:7e00:1a:
5235:f980:93a1, AAAA 2600:9000:237b:dc00:1a:5235:f980:93a1, AAAA 2600:9000:237b:2800:1a:5235:f980:93a1 (418)
^C
4 packets captured
4 packets received by filter
0 packets dropped by kernel
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ sudo tcpdump portrange 1-80
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on enp3s0, link-type EN10MB (Ethernet), capture size 262144 bytes
11:35:13.653873 IP 0.0.0.0.bootpc > 255.255.255.255.bootps: BOOTP/DHCP, Request from 04:0e:3c:1a:5c:74 (oui Unknown), length 300
11:35:17.801654 IP 0.0.0.0.bootpc > 255.255.255.255.bootps: BOOTP/DHCP, Request from 04:0e:3c:1a:5c:74 (oui Unknown), length 300
11:35:22.173999 IP 0.0.0.0.bootpc > 255.255.255.255.bootps: BOOTP/DHCP, Request from 04:0e:3c:1a:5c:74 (oui Unknown), length 300
11:35:30.078393 IP 0.0.0.0.bootpc > 255.255.255.255.bootps: BOOTP/DHCP, Request from 04:0e:3c:1a:5c:74 (oui Unknown), length 300
11:35:38.922635 IP 0.0.0.0.bootpc > 255.255.255.255.bootps: BOOTP/DHCP, Request from 1c:6f:65:ae:98:2a (oui Unknown), length 300
11:35:41.918550 IP lab1006-HP-280-G4-MT-Business-PC.36586 > _gateway.domain: 53847+ [1au] A? encrypted-tbn0.gstatic.com. (55)
11:35:41.918818 IP lab1006-HP-280-G4-MT-Business-PC.35381 > _gateway.domain: 12276+ [1au] AAAA? encrypted-tbn0.gstatic.com. (55)
11:35:41.919849 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.36586: 53847 1/0/1 A 142.250.183.78 (71)
11:35:41.938280 IP lab1006-HP-280-G4-MT-Business-PC.56668 > _gateway.domain: 933+ [1au] A? www.google.com. (43)
11:35:41.938421 IP lab1006-HP-280-G4-MT-Business-PC.59077 > _gateway.domain: 26727+ [1au] AAAA? www.google.com. (43)
11:35:41.939510 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.56668: 933 1/0/1 A 172.217.27.196 (59)
11:35:41.939601 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.59077: 26727 1/0/1 AAAA 2404:6800:4009:800::2004 (71)
11:35:41.980589 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.35381: 12276 1/0/1 AAAA 2404:6800:4009:822::200e (83)
11:35:42.677951 IP lab1006-HP-280-G4-MT-Business-PC.37545 > _gateway.domain: 56141+ [1au] A? www.gstatic.com. (44)
11:35:42.678020 IP lab1006-HP-280-G4-MT-Business-PC.41726 > _gateway.domain: 30891+ [1au] AAAA? www.gstatic.com. (44)
11:35:42.679208 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.41726: 30891 1/0/1 AAAA 2404:6800:4009:82b::2003 (72)
11:35:42.679329 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.37545: 56141 1/0/1 A 142.250.192.131 (60)


11:35:42.744434 IP lab1006-HP-280-G4-MT-Business-PC.55375 > _gateway.domain: 35292+ [1au] A? apis.google.com. (44)
11:35:42.744508 IP lab1006-HP-280-G4-MT-Business-PC.47736 > _gateway.domain: 45730+ [1au] AAAA? apis.google.com. (44)
11:35:42.745662 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.55375: 35292 2/0/1 CNAME plus.l.google.com., A 142.251.42.78 (81)
11:35:42.745668 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.47736: 45730 2/0/1 CNAME plus.l.google.com., AAAA 2404:6800:4009:831::200e (93)
11:35:42.845172 IP lab1006-HP-280-G4-MT-Business-PC.55210 > _gateway.domain: 48143+ [1au] A? adservice.google.com. (49)
11:35:42.845258 IP lab1006-HP-280-G4-MT-Business-PC.51043 > _gateway.domain: 27592+ [1au] AAAA? adservice.google.com. (49)
11:35:42.846395 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.55210: 48143 1/0/1 A 142.250.192.98 (65)
11:35:42.846733 IP lab1006-HP-280-G4-MT-Business-PC.39669 > _gateway.domain: 31162+ [1au] A? safebrowsing.googleapis.com. (56)
11:35:42.846788 IP lab1006-HP-280-G4-MT-Business-PC.48992 > _gateway.domain: 63325+ [1au] AAAA? safebrowsing.googleapis.com. (56)
11:35:42.847885 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.48992: 63325 1/0/1 AAAA 2404:6800:4009:823::200a (84)
11:35:42.847898 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.39669: 31162 1/0/1 A 142.250.183.106 (72)
11:35:42.850258 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.51043: 27592 1/0/1 AAAA 2404:6800:4009:820::2002 (77)
11:35:43.014836 IP lab1006-HP-280-G4-MT-Business-PC.43491 > _gateway.domain: 41945+ [1au] A? adservice.google.co.in. (51)
11:35:43.014910 IP lab1006-HP-280-G4-MT-Business-PC.35711 > _gateway.domain: 33071+ [1au] AAAA? adservice.google.co.in. (51)
11:35:43.015190 IP lab1006-HP-280-G4-MT-Business-PC.54633 > _gateway.domain: 59138+ [1au] A? googleads.g.doubleclick.net. (56)
11:35:43.015251 IP lab1006-HP-280-G4-MT-Business-PC.34413 > _gateway.domain: 1087+ [1au] AAAA? googleads.g.doubleclick.net. (56)
11:35:43.016017 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.43491: 41945 2/0/1 CNAME pagead46.l.doubleclick.net., A 142.250.192.34 (107)
11:35:43.016055 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.35711: 33071 2/0/1 CNAME pagead46.l.doubleclick.net., AAAA 2404:6800:4009:823::2002 (119)
11:35:43.016261 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.54633: 59138 1/0/1 A 142.250.199.130 (72)
11:35:43.039586 IP _gateway.domain > lab1006-HP-280-G4-MT-Business-PC.34413: 1087 1/0/1 AAAA 2404:6800:4009:82c::2002 (84)
11:35:45.136757 IP 0.0.0.0.bootpc > 255.255.255.255.bootps: BOOTP/DHCP, Request from 04:0e:3c:1a:5c:74 (oui Unknown), length 300
^C
38 packets captured
38 packets received by filter
0 packets dropped by kernel
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ sudo tcpdump port 80 -w capture_1
tcpdump: listening on enp3s0, link-type EN10MB (Ethernet), capture size 262144 bytes
^C86 packets captured
86 packets received by filter
0 packets dropped by kernel
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ sudo tcpdump -nnvvS src 10.5.2.3 and dst port 3389
tcpdump: listening on enp3s0, link-type EN10MB (Ethernet), capture size 262144 bytes
^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ sudo tcpdump -nnvvS src 103.246.224.160 and dst port 3389
tcpdump: listening on enp3s0, link-type EN10MB (Ethernet), capture size 262144 bytes
^C
0 packets captured
0 packets received by filter
0 packets dropped by kernel
lab1006@lab1006-HP-280-G4-MT-Business-PC:~$ tcpdump 'tcp[13] & 32!=0'
tcpdump: enp3s0: You don't have permission to capture on that device
(socket: Operation not permitted)





CONCLUSION:

We gained a practical understanding of how TCPDump can be employed to capture, dissect, and interpret network packets in real-time, offering valuable insights into network behavior, troubleshooting, and security assessment. By applying various filters and commands, we were able to capture specific types of traffic based on source and destination addresses, protocols, ports, and packet sizes.