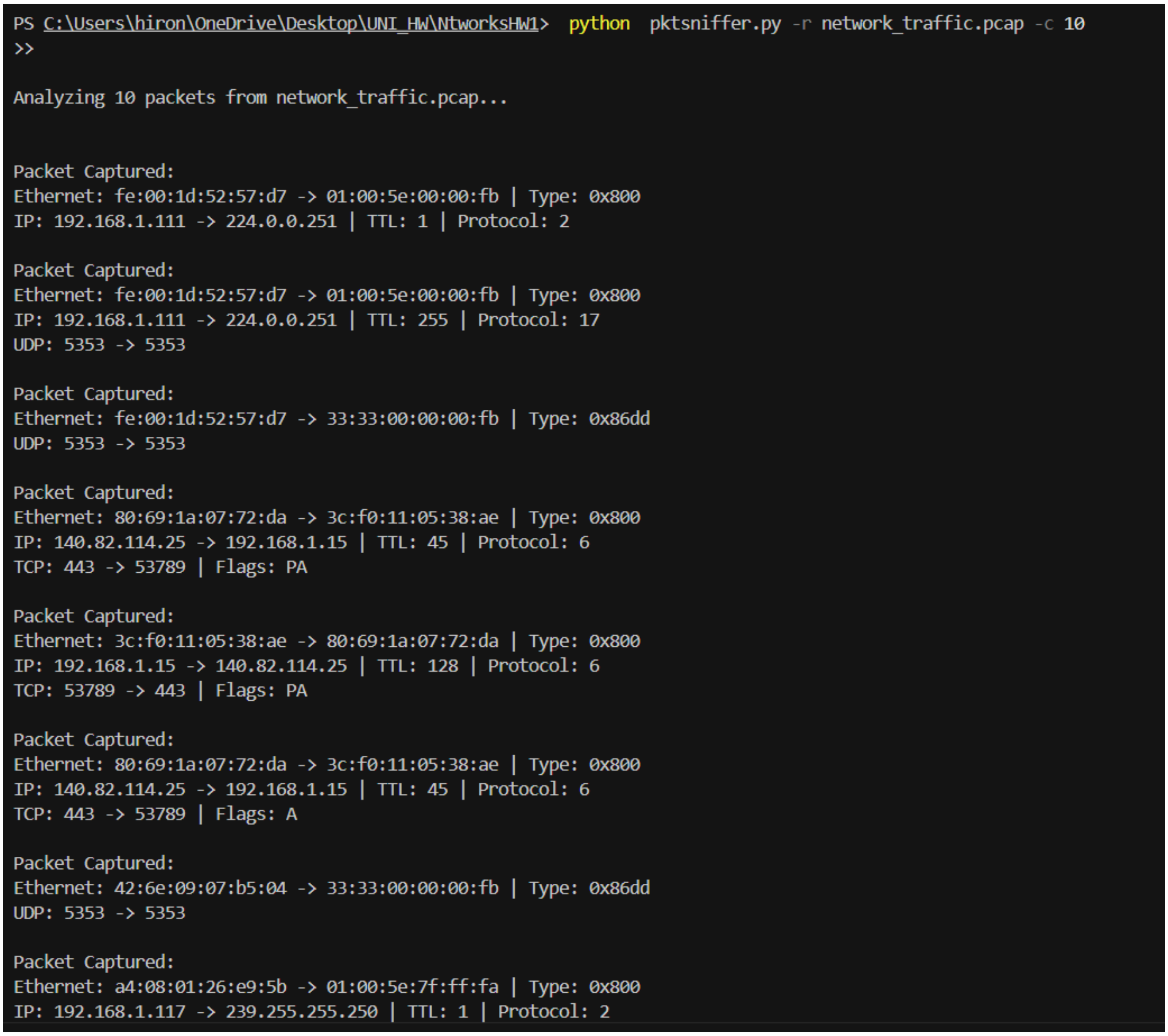
Packet Sniffer Report
Brian Tokumoto

Intro:

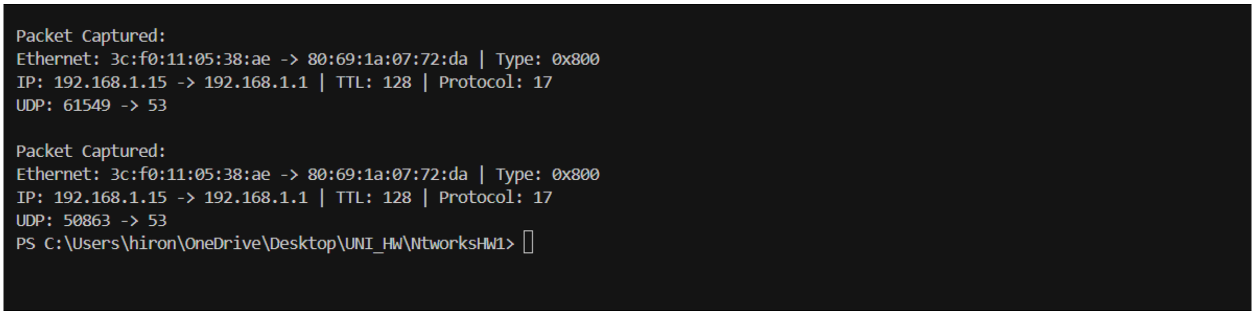
- This report presents the validation of the pktsniffer.py program, a network packet analyzer that reads packets from a .pcap file and filters them based on specific criteria. This report seeks to compare the output of pktsniffer.py with the corresponding results from Wireshark, ensuring the program correctly extracts and displays network packet

Capture Packets No Filters:

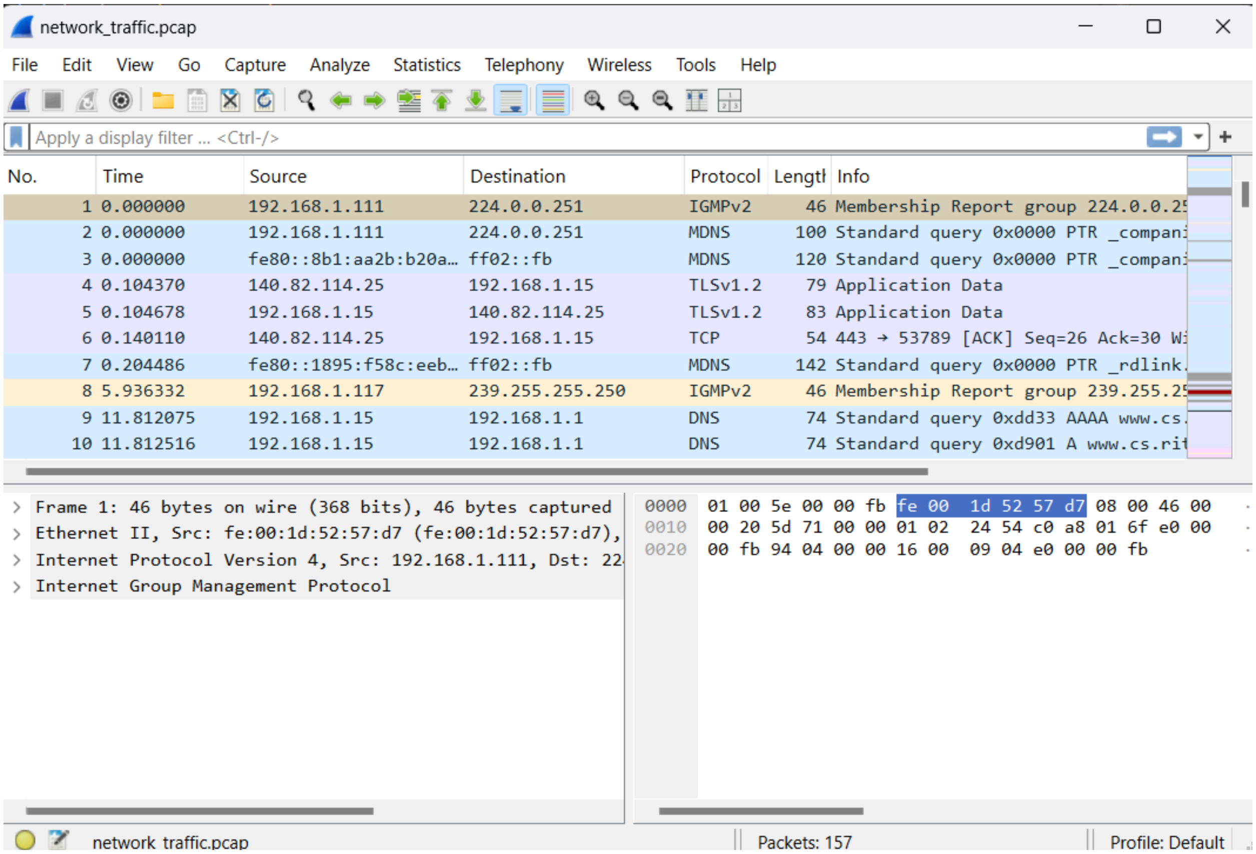
For common-line arguments: python pktsniffer.py -r network_traffic.pcap -c 10
Which limits the number of packets analyzed to 10. What is returned from pktsniffer.py is:



```
PS C:\Users\hiron\OneDrive\Desktop\UNI_HW\NtworksHW1>  python  pktsniffer.py -r network_traffic.pcap -c 10
>>

Analyzing 10 packets from network_traffic.pcap...


Packet Captured:
Ethernet: fe:00:1d:52:57:d7 -> 01:00:5e:00:00:fb | Type: 0x800
IP: 192.168.1.111 -> 224.0.0.251 | TTL: 1 | Protocol: 2

Packet Captured:
Ethernet: fe:00:1d:52:57:d7 -> 01:00:5e:00:00:fb | Type: 0x800
IP: 192.168.1.111 -> 224.0.0.251 | TTL: 255 | Protocol: 17
UDP: 5353 -> 5353

Packet Captured:
Ethernet: fe:00:1d:52:57:d7 -> 33:33:00:00:00:fb | Type: 0x86dd
UDP: 5353 -> 5353

Packet Captured:
Ethernet: 80:69:1a:07:72:da -> 3c:f0:11:05:38:ae | Type: 0x800
IP: 140.82.114.25 -> 192.168.1.15 | TTL: 45 | Protocol: 6
TCP: 443 -> 53789 | Flags: PA

Packet Captured:
Ethernet: 3c:f0:11:05:38:ae -> 80:69:1a:07:72:da | Type: 0x800
IP: 192.168.1.15 -> 140.82.114.25 | TTL: 128 | Protocol: 6
TCP: 53789 -> 443 | Flags: PA

Packet Captured:
Ethernet: 80:69:1a:07:72:da -> 3c:f0:11:05:38:ae | Type: 0x800
IP: 140.82.114.25 -> 192.168.1.15 | TTL: 45 | Protocol: 6
TCP: 443 -> 53789 | Flags: A

Packet Captured:
Ethernet: 42:6e:09:07:b5:04 -> 33:33:00:00:00:fb | Type: 0x86dd
UDP: 5353 -> 5353

Packet Captured:
Ethernet: a4:08:01:26:e9:5b -> 01:00:5e:7f:ff:fa | Type: 0x800
IP: 192.168.1.117 -> 239.255.255.250 | TTL: 1 | Protocol: 2
```



```
Packet Captured:
Ethernet: 3c:f0:11:05:38:ae -> 80:69:1a:07:72:da | Type: 0x800
IP: 192.168.1.15 -> 192.168.1.1 | TTL: 128 | Protocol: 17
UDP: 61549 -> 53

Packet Captured:
Ethernet: 3c:f0:11:05:38:ae -> 80:69:1a:07:72:da | Type: 0x800
IP: 192.168.1.15 -> 192.168.1.1 | TTL: 128 | Protocol: 17
UDP: 50863 -> 53
PS C:\Users\hiron\OneDrive\Desktop\UNI_HW\NtworksHW1> 
```



No.	Time	Source	Destination	Protocol	Lengtl	Info
1	0.000000	192.168.1.111	224.0.0.251	IGMPv2	46	Membership Report group 224.0.0.25
2	0.000000	192.168.1.111	224.0.0.251	MDNS	100	Standard query 0x0000 PTR _compani
3	0.000000	fe80::8b1:aa2b:b20a…	ff02::fb	MDNS	120	Standard query 0x0000 PTR _compani
4	0.104370	140.82.114.25	192.168.1.15	TLSv1.2	79	Application Data
5	0.104678	192.168.1.15	140.82.114.25	TLSv1.2	83	Application Data
6	0.140110	140.82.114.25	192.168.1.15	TCP	54	443 → 53789 [ACK] Seq=26 Ack=30 Wi
7	0.204486	fe80::1895:f58c:eeb…	ff02::fb	MDNS	142	Standard query 0x0000 PTR _rdlink.
8	5.936332	192.168.1.117	239.255.255.250	IGMPv2	46	Membership Report group 239.255.25
9	11.812075	192.168.1.15	192.168.1.1	DNS	74	Standard query 0xdd33 AAAA www.cs.
10	11.812516	192.168.1.15	192.168.1.1	DNS	74	Standard query 0xd901 A www.cs.rit

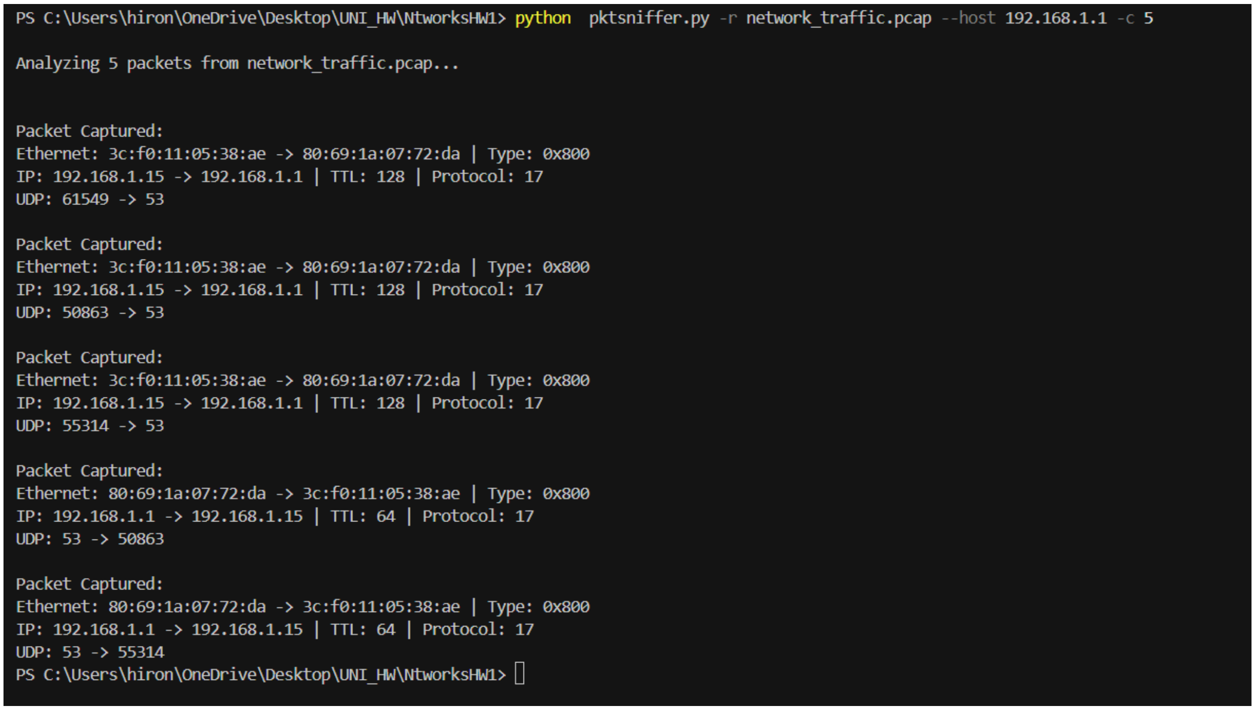
```
> Frame 1: 46 bytes on wire (368 bits), 46 bytes captured
> Ethernet II, Src: fe:00:1d:52:57:d7 (fe:00:1d:52:57:d7),
> Internet Protocol Version 4, Src: 192.168.1.111, Dst: 22
> Internet Group Management Protocol
```

```
0000  01 00 5e 00 00 fb fe 00  1d 52 57 d7 08 00 46 00
0010  00 20 5d 71 00 00 01 02  24 54 c0 a8 01 6f e0 00
0020  00 fb 94 04 00 00 16 00  09 04 e0 00 00 fb
```

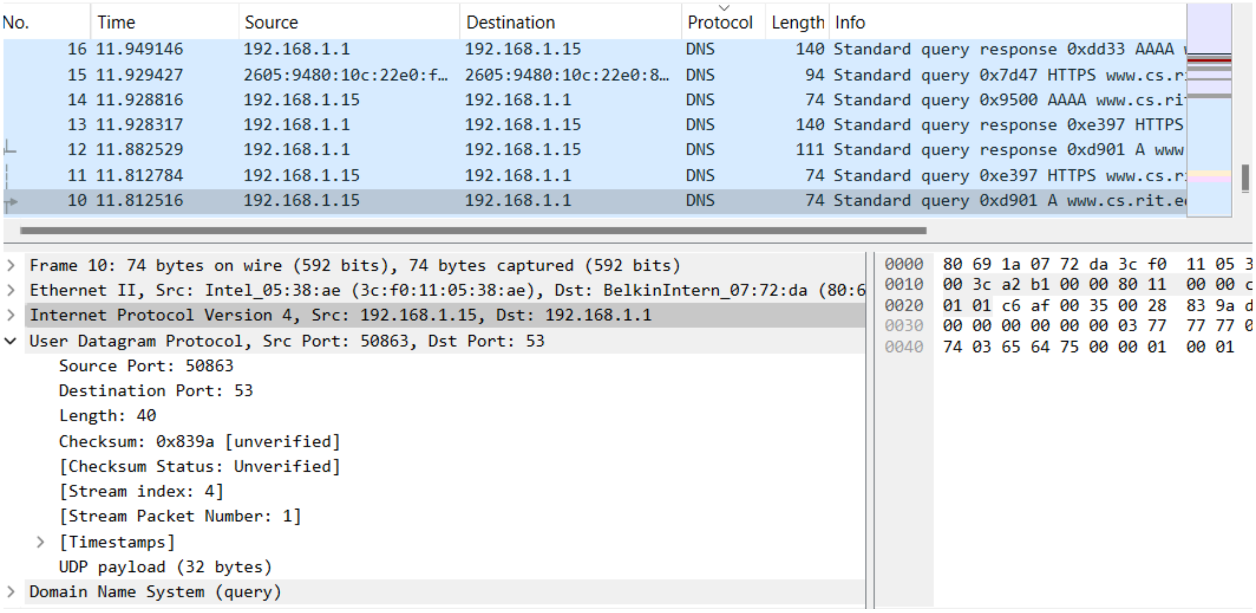
- The pktsniffer.py output correctly displays the first 10 packets.
- Screenshots from Wireshark and pktsniffer.py match when it comes to the first 10 packets**.**

Filtering Commands:

Filter by host (ip address):



```
PS C:\Users\hiron\OneDrive\Desktop\UNI_HW\NtworksHW1> python  pktsniffer.py -r network_traffic.pcap --host 192.168.1.1 -c 5

Analyzing 5 packets from network_traffic.pcap...


Packet Captured:
Ethernet: 3c:f0:11:05:38:ae -> 80:69:1a:07:72:da | Type: 0x800
IP: 192.168.1.15 -> 192.168.1.1 | TTL: 128 | Protocol: 17
UDP: 61549 -> 53

Packet Captured:
Ethernet: 3c:f0:11:05:38:ae -> 80:69:1a:07:72:da | Type: 0x800
IP: 192.168.1.15 -> 192.168.1.1 | TTL: 128 | Protocol: 17
UDP: 50863 -> 53

Packet Captured:
Ethernet: 3c:f0:11:05:38:ae -> 80:69:1a:07:72:da | Type: 0x800
IP: 192.168.1.15 -> 192.168.1.1 | TTL: 128 | Protocol: 17
UDP: 55314 -> 53

Packet Captured:
Ethernet: 80:69:1a:07:72:da -> 3c:f0:11:05:38:ae | Type: 0x800
IP: 192.168.1.1 -> 192.168.1.15 | TTL: 64 | Protocol: 17
UDP: 53 -> 50863

Packet Captured:
Ethernet: 80:69:1a:07:72:da -> 3c:f0:11:05:38:ae | Type: 0x800
IP: 192.168.1.1 -> 192.168.1.15 | TTL: 64 | Protocol: 17
UDP: 53 -> 55314
PS C:\Users\hiron\OneDrive\Desktop\UNI_HW\NtworksHW1>
```



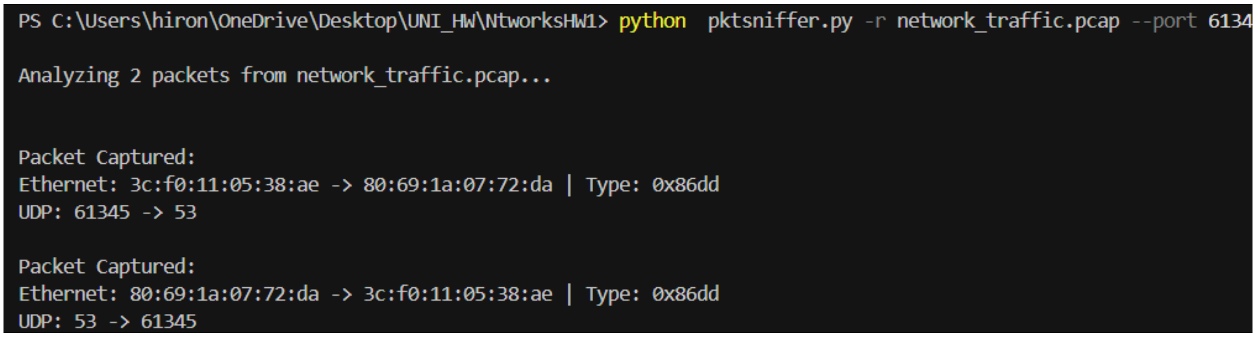
```
No.      Time       Source                  Destination             Protocol Length Info
     16 11.949146   192.168.1.1             192.168.1.15            DNS       140 Standard query response 0xdd33 AAAA
     15 11.929427   2605:9480:10c:22e0:f…   2605:9480:10c:22e0:8…   DNS        94 Standard query 0x7d47 HTTPS www.cs.r
     14 11.928816   192.168.1.15            192.168.1.1             DNS        74 Standard query 0x9500 AAAA www.cs.ri
     13 11.928317   192.168.1.1             192.168.1.15            DNS       140 Standard query response 0xe397 HTTPS
     12 11.882529   192.168.1.1             192.168.1.15            DNS       111 Standard query response 0xd901 A www
     11 11.812784   192.168.1.15            192.168.1.1             DNS        74 Standard query 0xe397 HTTPS www.cs.r
     10 11.812516   192.168.1.15            192.168.1.1             DNS        74 Standard query 0xd901 A www.cs.rit.e
```

```
> Frame 10: 74 bytes on wire (592 bits), 74 bytes captured (592 bits)
> Ethernet II, Src: Intel_05:38:ae (3c:f0:11:05:38:ae), Dst: BelkinIntern_07:72:da (80:6
> Internet Protocol Version 4, Src: 192.168.1.15, Dst: 192.168.1.1
v User Datagram Protocol, Src Port: 50863, Dst Port: 53
    Source Port: 50863
    Destination Port: 53
    Length: 40
    Checksum: 0x839a [unverified]
    [Checksum Status: Unverified]
    [Stream index: 4]
    [Stream Packet Number: 1]
  > [Timestamps]
    UDP payload (32 bytes)
> Domain Name System (query)
```

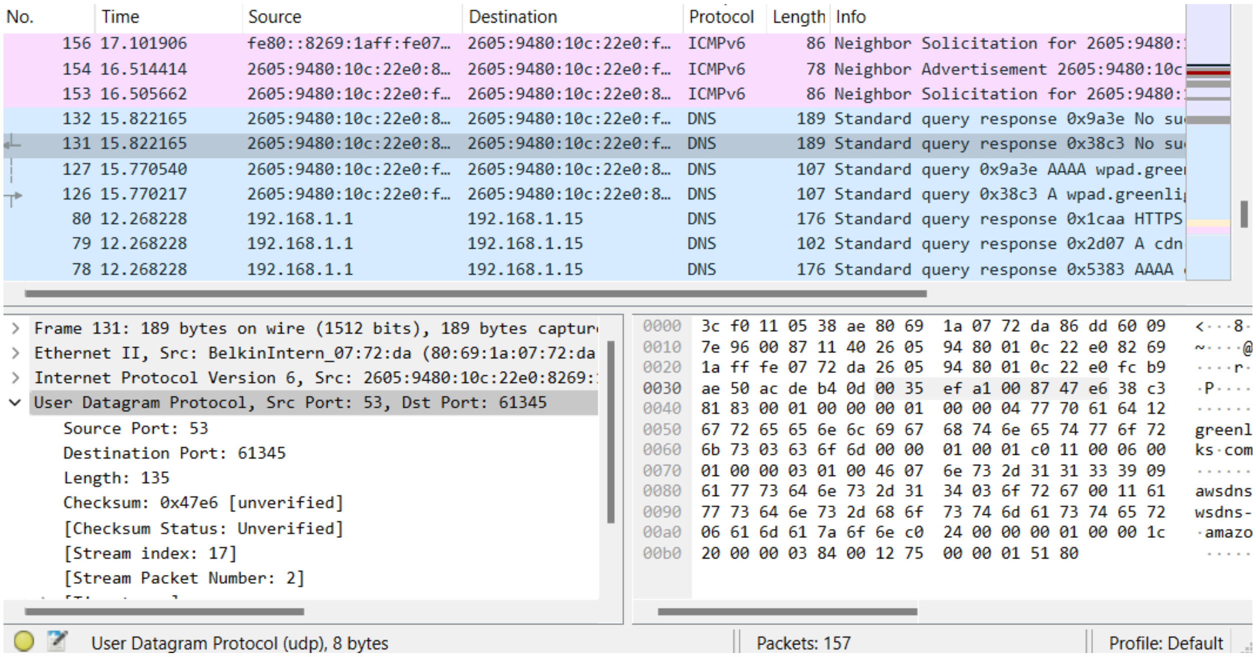
```
0000  80 69 1a 07 72 da 3c f0  11 05 3
0010  00 3c a2 b1 00 00 80 11  00 00 c
0020  01 01 c6 af 00 35 00 28  83 9a d
0030  00 00 00 00 00 00 03 77  77 77 0
0040  74 03 65 64 75 00 00 01  00 01
```

- The pktsniffer.py output correctly displays packets where 192.168.1.1 is either the source or destination.
- Screenshots from Wireshark and pktsniffer.py match in terms of IP addresses, protocol, and UDP port 53.

Filter by Port:



```
PS C:\Users\hiron\OneDrive\Desktop\UNI_HW\NtworksHW1> python  pktsniffer.py -r network_traffic.pcap --port 6134

Analyzing 2 packets from network_traffic.pcap...


Packet Captured:
Ethernet: 3c:f0:11:05:38:ae -> 80:69:1a:07:72:da | Type: 0x86dd
UDP: 61345 -> 53

Packet Captured:
Ethernet: 80:69:1a:07:72:da -> 3c:f0:11:05:38:ae | Type: 0x86dd
UDP: 53 -> 61345
```



No.	Time	Source	Destination	Protocol	Length	Info
156	17.101906	fe80::8269:1aff:fe07…	2605:9480:10c:22e0:f…	ICMPv6	86	Neighbor Solicitation for 2605:9480:
154	16.514414	2605:9480:10c:22e0:8…	2605:9480:10c:22e0:f…	ICMPv6	78	Neighbor Advertisement 2605:9480:10c
153	16.505662	2605:9480:10c:22e0:f…	2605:9480:10c:22e0:8…	ICMPv6	86	Neighbor Solicitation for 2605:9480:
132	15.822165	2605:9480:10c:22e0:8…	2605:9480:10c:22e0:f…	DNS	189	Standard query response 0x9a3e No su
131	15.822165	2605:9480:10c:22e0:8…	2605:9480:10c:22e0:f…	DNS	189	Standard query response 0x38c3 No su
127	15.770540	2605:9480:10c:22e0:f…	2605:9480:10c:22e0:8…	DNS	107	Standard query 0x9a3e AAAA wpad.gree
126	15.770217	2605:9480:10c:22e0:f…	2605:9480:10c:22e0:8…	DNS	107	Standard query 0x38c3 A wpad.greenli
80	12.268228	192.168.1.1	192.168.1.15	DNS	176	Standard query response 0x1caa HTTPS
79	12.268228	192.168.1.1	192.168.1.15	DNS	102	Standard query response 0x2d07 A cdn
78	12.268228	192.168.1.1	192.168.1.15	DNS	176	Standard query response 0x5383 AAAA

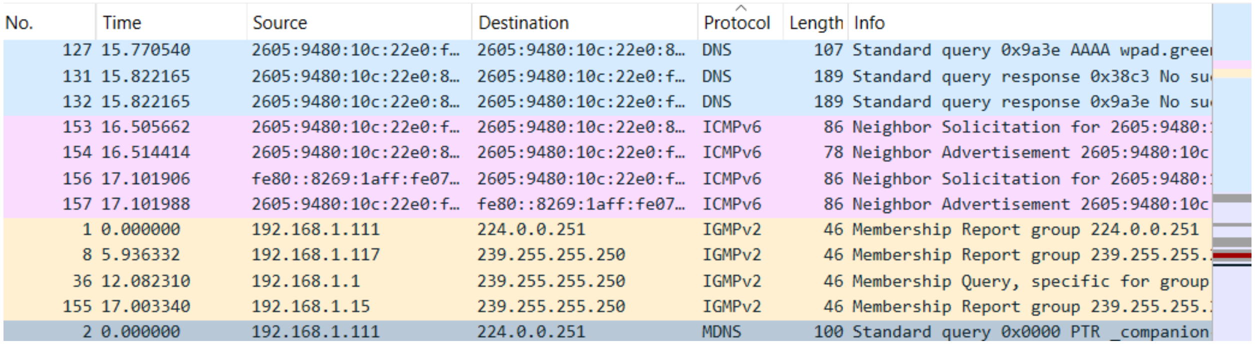
```
> Frame 131: 189 bytes on wire (1512 bits), 189 bytes captur
> Ethernet II, Src: BelkinIntern_07:72:da (80:69:1a:07:72:da
> Internet Protocol Version 6, Src: 2605:9480:10c:22e0:8269:
v User Datagram Protocol, Src Port: 53, Dst Port: 61345
    Source Port: 53
    Destination Port: 61345
    Length: 135
    Checksum: 0x47e6 [unverified]
    [Checksum Status: Unverified]
    [Stream index: 17]
    [Stream Packet Number: 2]
```

```
0000  3c f0 11 05 38 ae 80 69  1a 07 72 da 86 dd 60 09   <···8·
0010  7e 96 00 87 11 40 26 05  94 80 01 0c 22 e0 82 69   ~····@
0020  1a ff fe 07 72 da 26 05  94 80 01 0c 22 e0 fc b9   ····r·
0030  ae 50 ac de b4 0d 00 35  ef a1 00 87 47 e6 38 c3   ·P····
0040  81 83 00 01 00 00 00 01  00 00 04 77 70 61 64 12   ······
0050  67 72 65 65 6e 6c 69 67  68 74 6e 65 74 77 6f 72   greenl
0060  6b 73 03 63 6f 6d 00 00  01 00 01 c0 11 00 06 00   ks·com
0070  01 00 00 03 01 00 46 07  6e 73 2d 31 31 33 39 09   ······
0080  61 77 73 64 6e 73 2d 31  34 03 6f 72 67 00 11 61   awsdns
0090  77 73 64 6e 73 2d 68 6f  73 74 6d 61 73 74 65 72   wsdns-
00a0  06 61 6d 61 7a 6f 6e c0  24 00 00 00 01 00 00 1c   ·amazo
00b0  20 00 00 03 84 00 12 75  00 00 01 51 80            ·····
```

User Datagram Protocol (udp), 8 bytes | Packets: 157 | Profile: Default

- The program accurately captures packets where port 61345 is involved.
- Wireshark shows DNS requests and responses using port 61345, matching pktsniffer.py output.

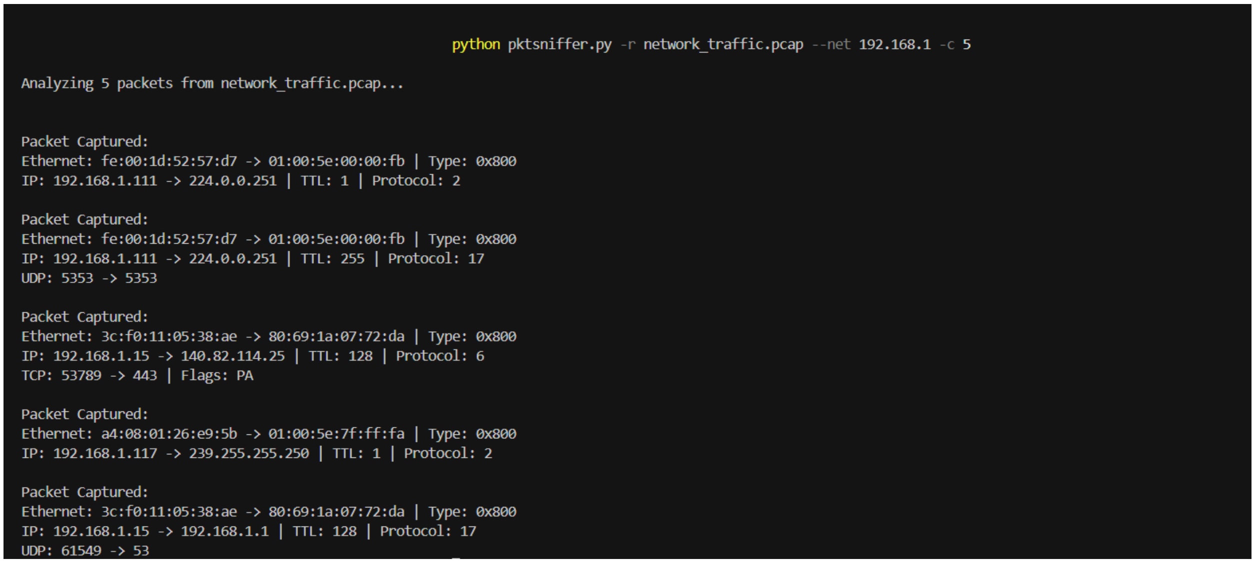
Filter by icmp:



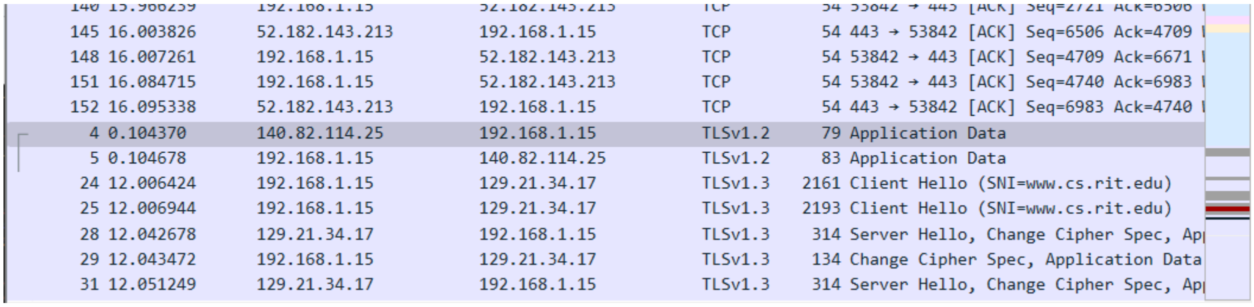
No.	Time	Source	Destination	Protocol	Length	Info
127	15.770540	2605:9480:10c:22e0:f…	2605:9480:10c:22e0:8…	DNS	107	Standard query 0x9a3e AAAA wpad.gree
131	15.822165	2605:9480:10c:22e0:8…	2605:9480:10c:22e0:f…	DNS	189	Standard query response 0x38c3 No su
132	15.822165	2605:9480:10c:22e0:8…	2605:9480:10c:22e0:f…	DNS	189	Standard query response 0x9a3e No su
153	16.505662	2605:9480:10c:22e0:f…	2605:9480:10c:22e0:8…	ICMPv6	86	Neighbor Solicitation for 2605:9480:
154	16.514414	2605:9480:10c:22e0:8…	2605:9480:10c:22e0:f…	ICMPv6	78	Neighbor Advertisement 2605:9480:10c
156	17.101906	fe80::8269:1aff:fe07…	2605:9480:10c:22e0:f…	ICMPv6	86	Neighbor Solicitation for 2605:9480:
157	17.101988	2605:9480:10c:22e0:f…	fe80::8269:1aff:fe07…	ICMPv6	86	Neighbor Advertisement 2605:9480:10c
1	0.000000	192.168.1.111	224.0.0.251	IGMPv2	46	Membership Report group 224.0.0.251
8	5.936332	192.168.1.117	239.255.255.250	IGMPv2	46	Membership Report group 239.255.255.
36	12.082310	192.168.1.1	239.255.255.250	IGMPv2	46	Membership Query, specific for group
155	17.003340	192.168.1.15	239.255.255.250	IGMPv2	46	Membership Report group 239.255.255.
2	0.000000	192.168.1.111	224.0.0.251	MDNS	100	Standard query 0x0000 PTR _companion

- No ICMP packets were found in the .pcap file, Wireshark has ICMPv6 but not ICMP and `` returned no results, confirming correctness.

Filtered by NET:



```
                                                python pktsniffer.py -r network_traffic.pcap --net 192.168.1 -c 5

Analyzing 5 packets from network_traffic.pcap...


Packet Captured:
Ethernet: fe:00:1d:52:57:d7 -> 01:00:5e:00:00:fb | Type: 0x800
IP: 192.168.1.111 -> 224.0.0.251 | TTL: 1 | Protocol: 2

Packet Captured:
Ethernet: fe:00:1d:52:57:d7 -> 01:00:5e:00:00:fb | Type: 0x800
IP: 192.168.1.111 -> 224.0.0.251 | TTL: 255 | Protocol: 17
UDP: 5353 -> 5353

Packet Captured:
Ethernet: 3c:f0:11:05:38:ae -> 80:69:1a:07:72:da | Type: 0x800
IP: 192.168.1.15 -> 140.82.114.25 | TTL: 128 | Protocol: 6
TCP: 53789 -> 443 | Flags: PA

Packet Captured:
Ethernet: a4:08:01:26:e9:5b -> 01:00:5e:7f:ff:fa | Type: 0x800
IP: 192.168.1.117 -> 239.255.255.250 | TTL: 1 | Protocol: 2

Packet Captured:
Ethernet: 3c:f0:11:05:38:ae -> 80:69:1a:07:72:da | Type: 0x800
IP: 192.168.1.15 -> 192.168.1.1 | TTL: 128 | Protocol: 17
UDP: 61549 -> 53
```



```
    140 15.966239   192.168.1.15      52.182.143.213    TCP       54 53842 → 443 [ACK] Seq=2721 Ack=6506
    145 16.003826   52.182.143.213    192.168.1.15      TCP       54 443 → 53842 [ACK] Seq=6506 Ack=4709
    148 16.007261   192.168.1.15      52.182.143.213    TCP       54 53842 → 443 [ACK] Seq=4709 Ack=6671
    151 16.084715   192.168.1.15      52.182.143.213    TCP       54 53842 → 443 [ACK] Seq=4740 Ack=6983
    152 16.095338   52.182.143.213    192.168.1.15      TCP       54 443 → 53842 [ACK] Seq=6983 Ack=4740
      4 0.104370    140.82.114.25     192.168.1.15      TLSv1.2   79 Application Data
      5 0.104678    192.168.1.15      140.82.114.25     TLSv1.2   83 Application Data
     24 12.006424   192.168.1.15      129.21.34.17      TLSv1.3 2161 Client Hello (SNI=www.cs.rit.edu)
     25 12.006944   192.168.1.15      129.21.34.17      TLSv1.3 2193 Client Hello (SNI=www.cs.rit.edu)
     28 12.042678   129.21.34.17      192.168.1.15      TLSv1.3  314 Server Hello, Change Cipher Spec, Ap
     29 12.043472   192.168.1.15      129.21.34.17      TLSv1.3  134 Change Cipher Spec, Application Data
     31 12.051249   129.21.34.17      192.168.1.15      TLSv1.3  314 Server Hello, Change Cipher Spec, Ap
```

- The output correctly shows packets involving the 192.168.1.x subnet.
- Matches observed in Wireshark confirm accurate packet selection

Conclusion:

- The pktsniffer.py program successfully replicates packet filtering behavior from Wireshark and all tests demonstrate that the extracted packets match those observed in Wireshark.