NSE Coursework: Network attack and defence

Project Report

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Contents

Chapter 1

Level 1: Build a network and test its connectivity

1.1 Network Topology

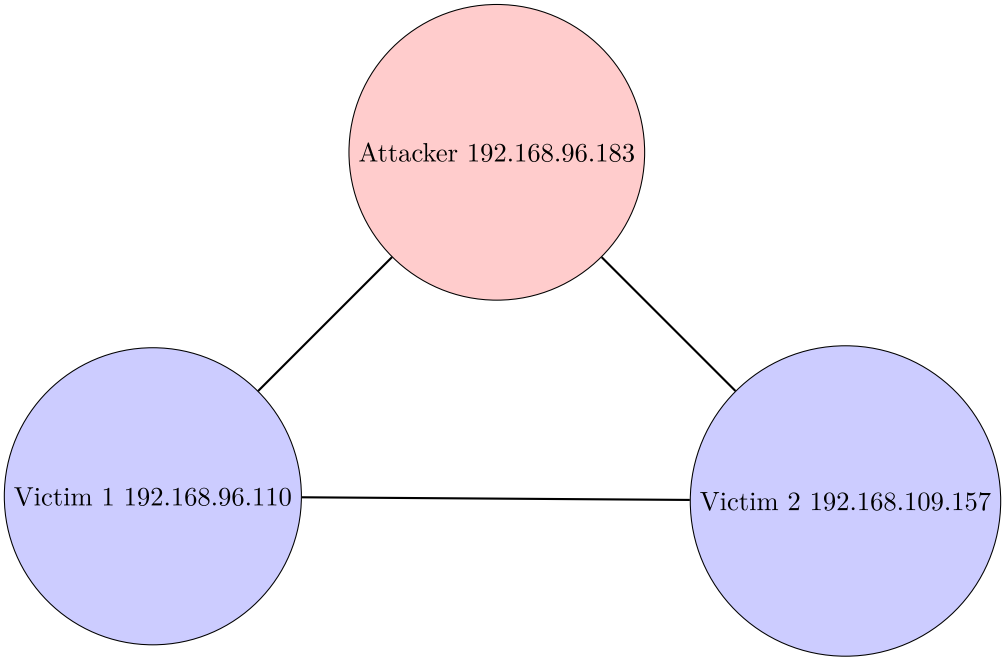
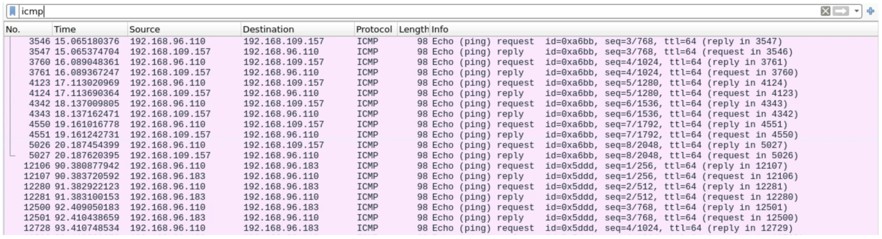


Figure 1.1: Network Topology

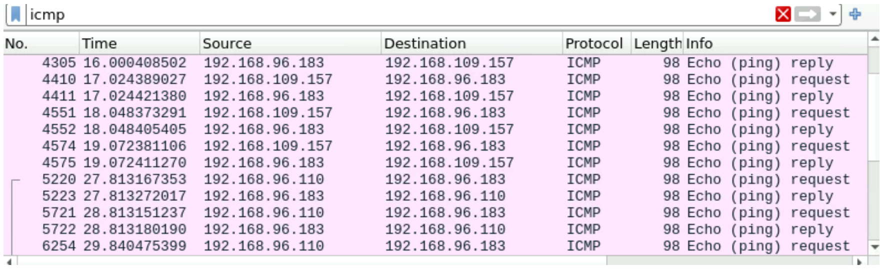
1.2 Connectivity Tests

The following screenshots demonstrate the successful ICMP ping tests between each machine, confirming that the machines are fully connected, as shown in Figure 1.1. The machines are also fully connected to the internet. We used the `iperf` tool instead of just browsing, as it reliably generates similar traffic on demand, further enhancing our ability to test the network's performance.



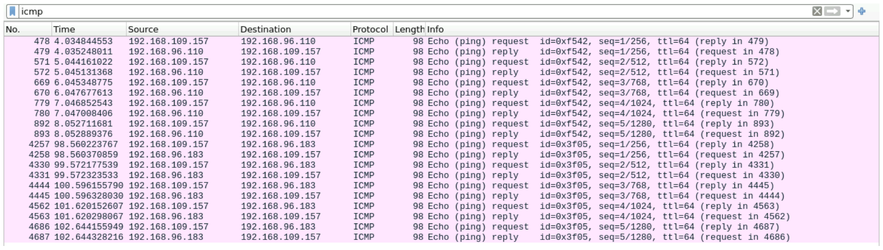
```
icmp
No.   Time         Source          Destination     Protocol Length Info
 3546 15.065180376 192.168.96.110  192.168.109.157 ICMP     98 Echo (ping) request  id=0xa6bb, seq=3/768, ttl=64 (reply in 3547)
 3547 15.065374704 192.168.109.157 192.168.96.110  ICMP     98 Echo (ping) reply    id=0xa6bb, seq=3/768, ttl=64 (request in 3546)
 3760 16.089048361 192.168.96.110  192.168.109.157 ICMP     98 Echo (ping) request  id=0xa6bb, seq=4/1024, ttl=64 (reply in 3761)
 3761 16.089367247 192.168.109.157 192.168.96.110  ICMP     98 Echo (ping) reply    id=0xa6bb, seq=4/1024, ttl=64 (request in 3760)
 4123 17.113020969 192.168.96.110  192.168.109.157 ICMP     98 Echo (ping) request  id=0xa6bb, seq=5/1280, ttl=64 (reply in 4124)
 4124 17.113690364 192.168.109.157 192.168.96.110  ICMP     98 Echo (ping) reply    id=0xa6bb, seq=5/1280, ttl=64 (request in 4123)
 4342 18.137009805 192.168.96.110  192.168.109.157 ICMP     98 Echo (ping) request  id=0xa6bb, seq=6/1536, ttl=64 (reply in 4343)
 4343 18.137162471 192.168.109.157 192.168.96.110  ICMP     98 Echo (ping) reply    id=0xa6bb, seq=6/1536, ttl=64 (request in 4342)
 4550 19.161016778 192.168.96.110  192.168.109.157 ICMP     98 Echo (ping) request  id=0xa6bb, seq=7/1792, ttl=64 (reply in 4551)
 4551 19.161242731 192.168.109.157 192.168.96.110  ICMP     98 Echo (ping) reply    id=0xa6bb, seq=7/1792, ttl=64 (request in 4550)
 5026 20.187454399 192.168.96.110  192.168.109.157 ICMP     98 Echo (ping) request  id=0xa6bb, seq=8/2048, ttl=64 (reply in 5027)
 5027 20.187620395 192.168.109.157 192.168.96.110  ICMP     98 Echo (ping) reply    id=0xa6bb, seq=8/2048, ttl=64 (request in 5026)
12106 90.380877942 192.168.96.110  192.168.96.183  ICMP     98 Echo (ping) request  id=0x5ddd, seq=1/256, ttl=64 (reply in 12107)
12107 90.383720592 192.168.96.183  192.168.96.110  ICMP     98 Echo (ping) reply    id=0x5ddd, seq=1/256, ttl=64 (request in 12106)
12280 91.382922123 192.168.96.110  192.168.96.183  ICMP     98 Echo (ping) request  id=0x5ddd, seq=2/512, ttl=64 (reply in 12281)
12281 91.383100153 192.168.96.183  192.168.96.110  ICMP     98 Echo (ping) reply    id=0x5ddd, seq=2/512, ttl=64 (request in 12280)
12500 92.409050183 192.168.96.110  192.168.96.183  ICMP     98 Echo (ping) request  id=0x5ddd, seq=3/768, ttl=64 (reply in 12501)
12501 92.410438659 192.168.96.183  192.168.96.110  ICMP     98 Echo (ping) reply    id=0x5ddd, seq=3/768, ttl=64 (request in 12500)
12728 93.410748534 192.168.96.110  192.168.96.183  ICMP     98 Echo (ping) request  id=0x5ddd, seq=4/1024, ttl=64 (reply in 12729)
```

Figure 1.2: Pings from Attacker to Other Machines



```
icmp
No.  Time         Source          Destination     Protocol Length Info
4305 16.000408502 192.168.96.183  192.168.109.157 ICMP     98 Echo (ping) reply
4410 17.024389027 192.168.109.157 192.168.96.183  ICMP     98 Echo (ping) request
4411 17.024421380 192.168.96.183  192.168.109.157 ICMP     98 Echo (ping) reply
4551 18.048373291 192.168.109.157 192.168.96.183  ICMP     98 Echo (ping) request
4552 18.048405405 192.168.96.183  192.168.109.157 ICMP     98 Echo (ping) reply
4574 19.072381106 192.168.109.157 192.168.96.183  ICMP     98 Echo (ping) request
4575 19.072411270 192.168.96.183  192.168.109.157 ICMP     98 Echo (ping) reply
5220 27.813167353 192.168.96.110  192.168.96.183  ICMP     98 Echo (ping) request
5223 27.813272017 192.168.96.183  192.168.96.110  ICMP     98 Echo (ping) reply
5721 28.813151237 192.168.96.110  192.168.96.183  ICMP     98 Echo (ping) request
5722 28.813180190 192.168.96.183  192.168.96.110  ICMP     98 Echo (ping) reply
6254 29.840475399 192.168.96.110  192.168.96.183  ICMP     98 Echo (ping) request
```

Figure 1.3: Pings from Victim 1 to Other Machines



```
icmp
No.  Time          Source          Destination     Protocol Length Info
 478 4.034844553   192.168.109.157 192.168.96.110  ICMP     98 Echo (ping) request  id=0xf542, seq=1/256, ttl=64 (reply in 479)
 479 4.035248011   192.168.96.110  192.168.109.157 ICMP     98 Echo (ping) reply    id=0xf542, seq=1/256, ttl=64 (request in 478)
 571 5.044161022   192.168.109.157 192.168.96.110  ICMP     98 Echo (ping) request  id=0xf542, seq=2/512, ttl=64 (reply in 572)
 572 5.045131368   192.168.96.110  192.168.109.157 ICMP     98 Echo (ping) reply    id=0xf542, seq=2/512, ttl=64 (request in 571)
 669 6.045348775   192.168.109.157 192.168.96.110  ICMP     98 Echo (ping) request  id=0xf542, seq=3/768, ttl=64 (reply in 670)
 670 6.047677613   192.168.96.110  192.168.109.157 ICMP     98 Echo (ping) reply    id=0xf542, seq=3/768, ttl=64 (request in 669)
 779 7.046852543   192.168.109.157 192.168.96.110  ICMP     98 Echo (ping) request  id=0xf542, seq=4/1024, ttl=64 (reply in 780)
 780 7.047008406   192.168.96.110  192.168.109.157 ICMP     98 Echo (ping) reply    id=0xf542, seq=4/1024, ttl=64 (request in 779)
 892 8.052711681   192.168.109.157 192.168.96.110  ICMP     98 Echo (ping) request  id=0xf542, seq=5/1280, ttl=64 (reply in 893)
 893 8.052889376   192.168.96.110  192.168.109.157 ICMP     98 Echo (ping) reply    id=0xf542, seq=5/1280, ttl=64 (request in 892)
4257 98.560223767  192.168.109.157 192.168.96.183  ICMP     98 Echo (ping) request  id=0x3f05, seq=1/256, ttl=64 (reply in 4258)
4258 98.560370859  192.168.96.183  192.168.109.157 ICMP     98 Echo (ping) reply    id=0x3f05, seq=1/256, ttl=64 (request in 4257)
4330 99.572177539  192.168.109.157 192.168.96.183  ICMP     98 Echo (ping) request  id=0x3f05, seq=2/512, ttl=64 (reply in 4331)
4331 99.572323533  192.168.96.183  192.168.109.157 ICMP     98 Echo (ping) reply    id=0x3f05, seq=2/512, ttl=64 (request in 4330)
4444 100.596155790 192.168.109.157 192.168.96.183  ICMP     98 Echo (ping) request  id=0x3f05, seq=3/768, ttl=64 (reply in 4445)
4445 100.596328030 192.168.96.183  192.168.109.157 ICMP     98 Echo (ping) reply    id=0x3f05, seq=3/768, ttl=64 (request in 4444)
4562 101.620152607 192.168.109.157 192.168.96.183  ICMP     98 Echo (ping) request  id=0x3f05, seq=4/1024, ttl=64 (reply in 4563)
4563 101.620298067 192.168.96.183  192.168.109.157 ICMP     98 Echo (ping) reply    id=0x3f05, seq=4/1024, ttl=64 (request in 4562)
4686 102.644155949 192.168.109.157 192.168.96.183  ICMP     98 Echo (ping) request  id=0x3f05, seq=5/1280, ttl=64 (reply in 4687)
4687 102.644328216 192.168.96.183  192.168.109.157 ICMP     98 Echo (ping) reply    id=0x3f05, seq=5/1280, ttl=64 (request in 4686)
```

Figure 1.4: Pings from Victim 2 to Other Machines

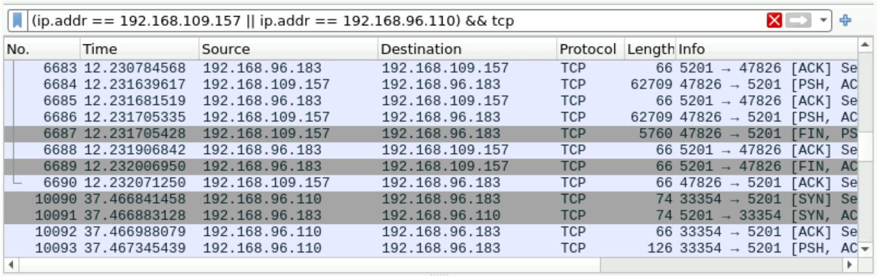
Chapter 2

Level 2: Generate and analyse traffic on your network

2.1 Protocol Analysis

To generate network traffic, we utilised the `iperf` tool to create UDP traffic between the machines in our network. We chose UDP traffic because the `iperf` tool automatically displays performance metrics such as jitter and packet loss when sending UDP traffic. We then analysed the captured traffic using Wireshark, a powerful network protocol analyser, to gain insights into the network's behaviour and performance.

Figure 2.1 provides a comprehensive view of the protocol hierarchy of the captured traffic. We used Wireshark's built-in filters to focus specifically on the UDP traffic generated by the `iperf` tool. The protocol analysis revealed that the TCP protocol dominated the network communication when including TCP traffic, likely due to the background connections the VM was making to the rest of the KCL network. However, the UDP traffic generated by the `iperf` tool was visible as a separate protocol in the Wireshark analysis, allowing us to isolate and analyse the UDP traffic independently.

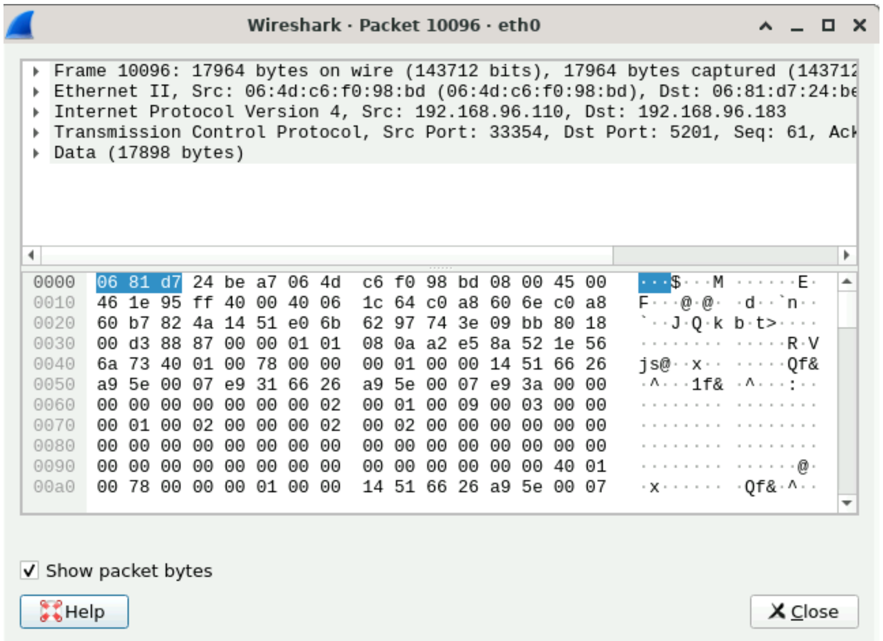


```
(ip.addr == 192.168.109.157 || ip.addr == 192.168.96.110) && tcp
No.    Time          Source           Destination      Protocol Length Info
  6683 12.230784568  192.168.96.183   192.168.109.157  TCP         66 5201 → 47826 [ACK] Se
  6684 12.231639617  192.168.109.157  192.168.96.183   TCP      62709 47826 → 5201 [PSH, AC
  6685 12.231681519  192.168.96.183   192.168.109.157  TCP         66 5201 → 47826 [ACK] Se
  6686 12.231705335  192.168.109.157  192.168.96.183   TCP      62709 47826 → 5201 [PSH, AC
  6687 12.231705428  192.168.109.157  192.168.96.183   TCP       5760 47826 → 5201 [FIN, PS
  6688 12.231906842  192.168.96.183   192.168.109.157  TCP         66 5201 → 47826 [ACK] Se
  6689 12.232006950  192.168.96.183   192.168.109.157  TCP         66 5201 → 47826 [FIN, AC
  6690 12.232071250  192.168.109.157  192.168.96.183   TCP         66 47826 → 5201 [ACK] Se
 10090 37.466841458  192.168.96.110   192.168.96.183   TCP         74 33354 → 5201 [SYN] Se
 10091 37.466883128  192.168.96.183   192.168.96.110   TCP         74 5201 → 33354 [SYN, AC
 10092 37.466988079  192.168.96.110   192.168.96.183   TCP         66 33354 → 5201 [ACK] Se
 10093 37.467345439  192.168.96.110   192.168.96.183   TCP        126 33354 → 5201 [PSH, AC
```

Figure 2.1: Wireshark Protocol Analysis

2.2 Packet Analysis

We can examine individual packets at the packet level to understand their structure and contents. Figure 2.2 displays a UDP packet captured during the traffic generation. The packet details show the source and destination IP addresses, ports, packet length, and checksum. This information is crucial for troubleshooting and identifying any anomalies in the network communication. While these packets are not malicious in this case, we can use this information to identify malicious packets at future levels.



Wireshark · Packet 10096 · eth0

```
▸ Frame 10096: 17964 bytes on wire (143712 bits), 17964 bytes captured (143712
▸ Ethernet II, Src: 06:4d:c6:f0:98:bd (06:4d:c6:f0:98:bd), Dst: 06:81:d7:24:be
▸ Internet Protocol Version 4, Src: 192.168.96.110, Dst: 192.168.96.183
▸ Transmission Control Protocol, Src Port: 33354, Dst Port: 5201, Seq: 61, Ack
▸ Data (17898 bytes)
```

```
0000  06 81 d7 24 be a7 06 4d  c6 f0 98 bd 08 00 45 00   ···$··M ······E·
0010  46 1e 95 ff 40 00 40 06  1c 64 c0 a8 60 6e c0 a8   F···@·@· ·d··`n··
0020  60 b7 82 4a 14 51 e0 6b  62 97 74 3e 09 bb 80 18   `··J·Q·k b·t>····
0030  00 d3 88 87 00 00 01 01  08 0a a2 e5 8a 52 1e 56   ········ ·····R·V
0040  6a 73 40 01 00 78 00 00  00 01 00 00 14 51 66 26   js@··x·· ·····Qf&
0050  a9 5e 00 07 e9 31 66 26  a9 5e 00 07 e9 3a 00 00   ·^···1f& ·^···:··
0060  00 00 00 00 00 00 00 02  00 01 00 09 00 03 00 00   ········ ········
0070  00 01 00 02 00 00 00 02  00 02 00 00 00 00 00 00   ········ ········
0080  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ········ ········
0090  00 00 00 00 00 00 00 00  00 00 00 00 00 00 40 01   ········ ······@·
00a0  00 78 00 00 00 01 00 00  14 51 66 26 a9 5e 00 07   ·x······ ·Qf&·^··
```

☑ Show packet bytes

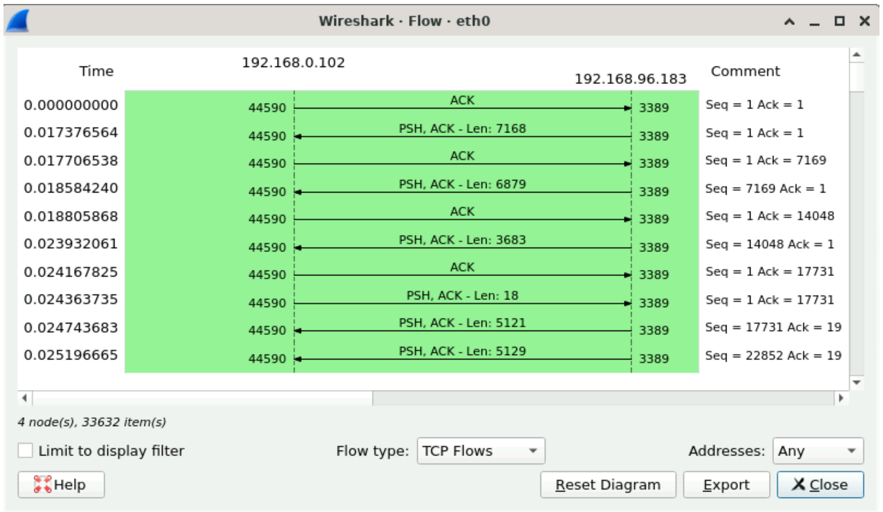
Help

Close

Figure 2.2: Wireshark Packet Analysis

2.3 Flow Analysis

Our analysis extended to the flow level, where we used Wireshark's Conversations feature to group packets into logical connections between endpoints. Figure 2.3 presents the UDP conversations in the captured traffic. Each row represents a unique UDP connection, showing the source and destination addresses, the number of packets exchanged, and the total amount of data transferred. This flow-level analysis demonstrates how we used `iperf` to generate UDP traffic between the machines in our network, setting up the attacker as an `iperf` server and the victims as `iperf` clients, with a separate connection between the attacker and each victim.



Time	192.168.0.102		192.168.96.183	Comment
0.000000000	44590	ACK →	3389	Seq = 1 Ack = 1
0.017376564	44590	← PSH, ACK - Len: 7168	3389	Seq = 1 Ack = 1
0.017706538	44590	ACK →	3389	Seq = 1 Ack = 7169
0.018584240	44590	← PSH, ACK - Len: 6879	3389	Seq = 7169 Ack = 1
0.018805868	44590	ACK →	3389	Seq = 1 Ack = 14048
0.023932061	44590	← PSH, ACK - Len: 3683	3389	Seq = 14048 Ack = 1
0.024167825	44590	ACK →	3389	Seq = 1 Ack = 17731
0.024363735	44590	PSH, ACK - Len: 18 →	3389	Seq = 1 Ack = 17731
0.024743683	44590	← PSH, ACK - Len: 5121	3389	Seq = 17731 Ack = 19
0.025196665	44590	← PSH, ACK - Len: 5129	3389	Seq = 22852 Ack = 19

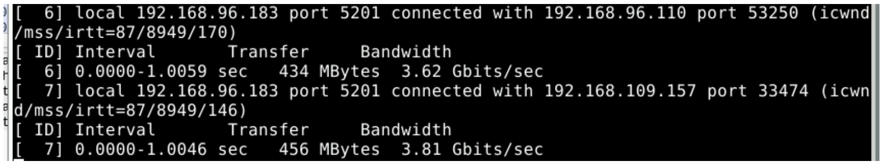
4 node(s), 33632 item(s)

☐ Limit to display filter Flow type: TCP Flows Addresses: Any

Figure 2.3: Wireshark Flow Analysis

2.4 Performance Analysis

Finally, we assessed the network performance by measuring key metrics such as throughput, delay, and packet loss. Figure 2.4 summarises the performance analysis results obtained from `iperf`. The UDP traffic achieved an average bitrate of 3.81 Gbits/sec, which, as we will observe in future levels, is exceptionally high and will drop when we introduce malicious traffic. This baseline measurement provides a reference point for evaluating the impact of network attacks on the overall performance.



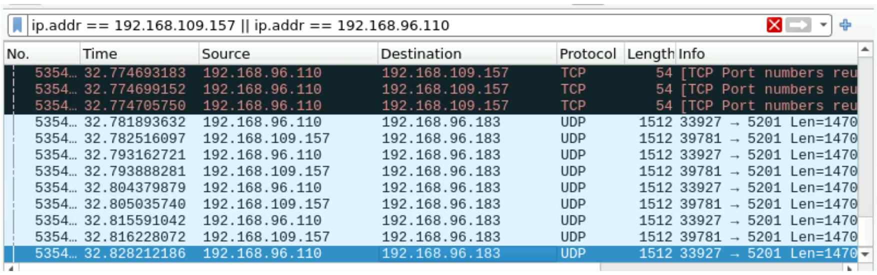
```
[  6] local 192.168.96.183 port 5201 connected with 192.168.96.110 port 53250 (icwnd
/mss/irtt=87/8949/170)
[ ID] Interval       Transfer     Bandwidth
[  6] 0.0000-1.0059 sec   434 MBytes  3.62 Gbits/sec
[  7] local 192.168.96.183 port 5201 connected with 192.168.109.157 port 33474 (icwn
d/mss/irtt=87/8949/146)
[ ID] Interval       Transfer     Bandwidth
[  7] 0.0000-1.0046 sec   456 MBytes  3.81 Gbits/sec
```

Figure 2.4: Performance Analysis

Chapter 3

Level 3: Network attacks

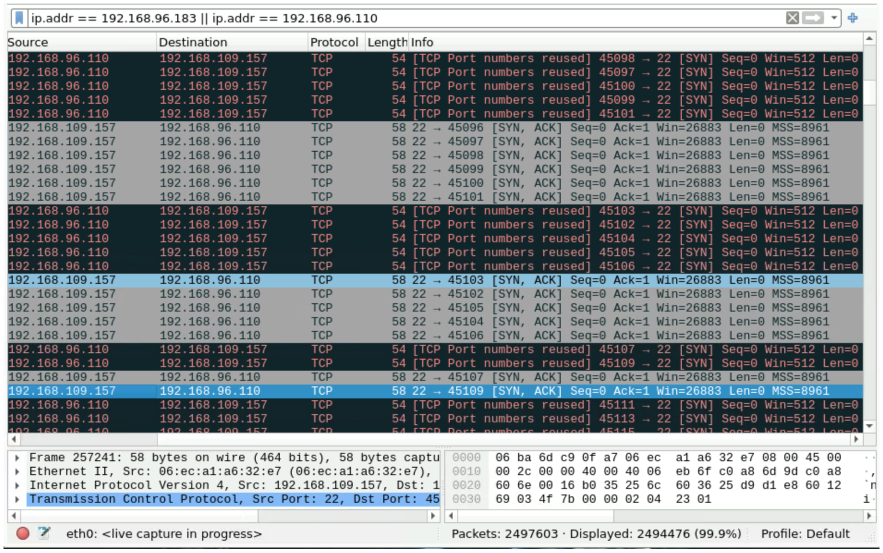
3.1 TCP SYN Flood Attack with IP Spoofing



ip.addr == 192.168.109.157 || ip.addr == 192.168.96.110

No.	Time	Source	Destination	Protocol	Length	Info
5354…	32.774693183	192.168.96.110	192.168.109.157	TCP	54	[TCP Port numbers reu
5354…	32.774699152	192.168.96.110	192.168.109.157	TCP	54	[TCP Port numbers reu
5354…	32.774705750	192.168.96.110	192.168.109.157	TCP	54	[TCP Port numbers reu
5354…	32.781893632	192.168.96.110	192.168.96.183	UDP	1512	33927 → 5201 Len=1470
5354…	32.782516097	192.168.109.157	192.168.96.183	UDP	1512	39781 → 5201 Len=1470
5354…	32.793162721	192.168.96.110	192.168.96.183	UDP	1512	33927 → 5201 Len=1470
5354…	32.793888281	192.168.109.157	192.168.96.183	UDP	1512	39781 → 5201 Len=1470
5354…	32.804379879	192.168.96.110	192.168.96.183	UDP	1512	33927 → 5201 Len=1470
5354…	32.805035740	192.168.109.157	192.168.96.183	UDP	1512	39781 → 5201 Len=1470
5354…	32.815591042	192.168.96.110	192.168.96.183	UDP	1512	33927 → 5201 Len=1470
5354…	32.816228072	192.168.109.157	192.168.96.183	UDP	1512	39781 → 5201 Len=1470
5354…	32.828212186	192.168.96.110	192.168.96.183	UDP	1512	33927 → 5201 Len=1470

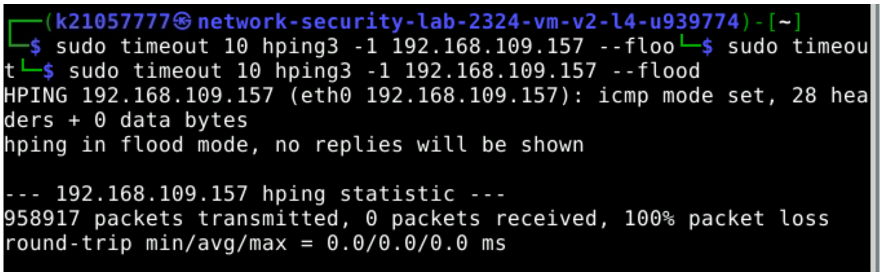
Figure 3.1: TCP SYN Flood with IP Spoofing *Attacker*



```
ip.addr == 192.168.96.183 || ip.addr == 192.168.96.110

Source           Destination      Protocol Length Info
192.168.96.110   192.168.109.157  TCP      54 [TCP Port numbers reused] 45098 → 22 [SYN] Seq=0 Win=512 Len=0
192.168.96.110   192.168.109.157  TCP      54 [TCP Port numbers reused] 45097 → 22 [SYN] Seq=0 Win=512 Len=0
192.168.96.110   192.168.109.157  TCP      54 [TCP Port numbers reused] 45100 → 22 [SYN] Seq=0 Win=512 Len=0
192.168.96.110   192.168.109.157  TCP      54 [TCP Port numbers reused] 45099 → 22 [SYN] Seq=0 Win=512 Len=0
192.168.96.110   192.168.109.157  TCP      54 [TCP Port numbers reused] 45101 → 22 [SYN] Seq=0 Win=512 Len=0
192.168.109.157  192.168.96.110   TCP      58 22 → 45096 [SYN, ACK] Seq=0 Ack=1 Win=26883 Len=0 MSS=8961
192.168.109.157  192.168.96.110   TCP      58 22 → 45097 [SYN, ACK] Seq=0 Ack=1 Win=26883 Len=0 MSS=8961
192.168.109.157  192.168.96.110   TCP      58 22 → 45098 [SYN, ACK] Seq=0 Ack=1 Win=26883 Len=0 MSS=8961
192.168.109.157  192.168.96.110   TCP      58 22 → 45099 [SYN, ACK] Seq=0 Ack=1 Win=26883 Len=0 MSS=8961
192.168.109.157  192.168.96.110   TCP      58 22 → 45100 [SYN, ACK] Seq=0 Ack=1 Win=26883 Len=0 MSS=8961
192.168.109.157  192.168.96.110   TCP      58 22 → 45101 [SYN, ACK] Seq=0 Ack=1 Win=26883 Len=0 MSS=8961
192.168.96.110   192.168.109.157  TCP      54 [TCP Port numbers reused] 45103 → 22 [SYN] Seq=0 Win=512 Len=0
192.168.96.110   192.168.109.157  TCP      54 [TCP Port numbers reused] 45102 → 22 [SYN] Seq=0 Win=512 Len=0
192.168.96.110   192.168.109.157  TCP      54 [TCP Port numbers reused] 45104 → 22 [SYN] Seq=0 Win=512 Len=0
192.168.96.110   192.168.109.157  TCP      54 [TCP Port numbers reused] 45105 → 22 [SYN] Seq=0 Win=512 Len=0
192.168.96.110   192.168.109.157  TCP      54 [TCP Port numbers reused] 45106 → 22 [SYN] Seq=0 Win=512 Len=0
192.168.109.157  192.168.96.110   TCP      58 22 → 45103 [SYN, ACK] Seq=0 Ack=1 Win=26883 Len=0 MSS=8961
192.168.109.157  192.168.96.110   TCP      58 22 → 45102 [SYN, ACK] Seq=0 Ack=1 Win=26883 Len=0 MSS=8961
192.168.109.157  192.168.96.110   TCP      58 22 → 45105 [SYN, ACK] Seq=0 Ack=1 Win=26883 Len=0 MSS=8961
192.168.109.157  192.168.96.110   TCP      58 22 → 45104 [SYN, ACK] Seq=0 Ack=1 Win=26883 Len=0 MSS=8961
192.168.109.157  192.168.96.110   TCP      58 22 → 45106 [SYN, ACK] Seq=0 Ack=1 Win=26883 Len=0 MSS=8961
192.168.96.110   192.168.109.157  TCP      54 [TCP Port numbers reused] 45107 → 22 [SYN] Seq=0 Win=512 Len=0
192.168.96.110   192.168.109.157  TCP      54 [TCP Port numbers reused] 45109 → 22 [SYN] Seq=0 Win=512 Len=0
192.168.109.157  192.168.96.110   TCP      58 22 → 45107 [SYN, ACK] Seq=0 Ack=1 Win=26883 Len=0 MSS=8961
192.168.109.157  192.168.96.110   TCP      58 22 → 45109 [SYN, ACK] Seq=0 Ack=1 Win=26883 Len=0 MSS=8961
192.168.96.110   192.168.109.157  TCP      54 [TCP Port numbers reused] 45111 → 22 [SYN] Seq=0 Win=512 Len=0
192.168.96.110   192.168.109.157  TCP      54 [TCP Port numbers reused] 45113 → 22 [SYN] Seq=0 Win=512 Len=0
192.168.96.110   192.168.109.157  TCP      54 [TCP Port numbers reused] 45115 → 22 [SYN] Seq=0 Win=512 Len=0

▸ Frame 257241: 58 bytes on wire (464 bits), 58 bytes captu     0000  06 ba 6d c9 0f a7 06 ec  a1 a6 32 e7 08 00 45 00   ··
▸ Ethernet II, Src: 06:ec:a1:a6:32:e7 (06:ec:a1:a6:32:e7),      0010  00 2c 00 00 40 00 40 06  eb 6f c0 a8 6d 9d c0 a8   ·,
▸ Internet Protocol Version 4, Src: 192.168.109.157, Dst: 1     0020  60 6e 00 16 b0 35 25 6c  60 36 25 d9 d1 e8 60 12   `n
▸ Transmission Control Protocol, Src Port: 22, Dst Port: 45     0030  69 03 4f 7b 00 00 02 04  23 01                     i·

eth0: <live capture in progress>     Packets: 2497603 · Displayed: 2494476 (99.9%)     Profile: Default
```

Figure 3.2: TCP SYN Flood with IP Spoofing *Victim*

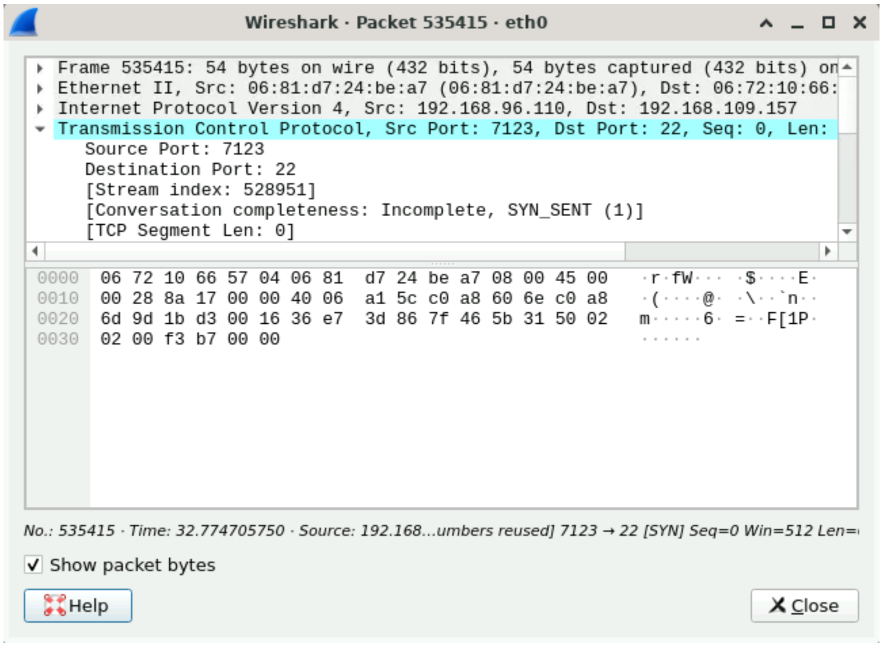
3.2 ICMP Flood Attack



```
┌──(k21057777㉿network-security-lab-2324-vm-v2-l4-u939774)-[~]
└─$ sudo timeout 10 hping3 -1 192.168.109.157 --floo└─$ sudo timeou
t└─$ sudo timeout 10 hping3 -1 192.168.109.157 --flood
HPING 192.168.109.157 (eth0 192.168.109.157): icmp mode set, 28 hea
ders + 0 data bytes
hping in flood mode, no replies will be shown

--- 192.168.109.157 hping statistic ---
958917 packets transmitted, 0 packets received, 100% packet loss
round-trip min/avg/max = 0.0/0.0/0.0 ms
```

Figure 3.3: ICMP Flood *Attacker*

3.3 Packet Analysis

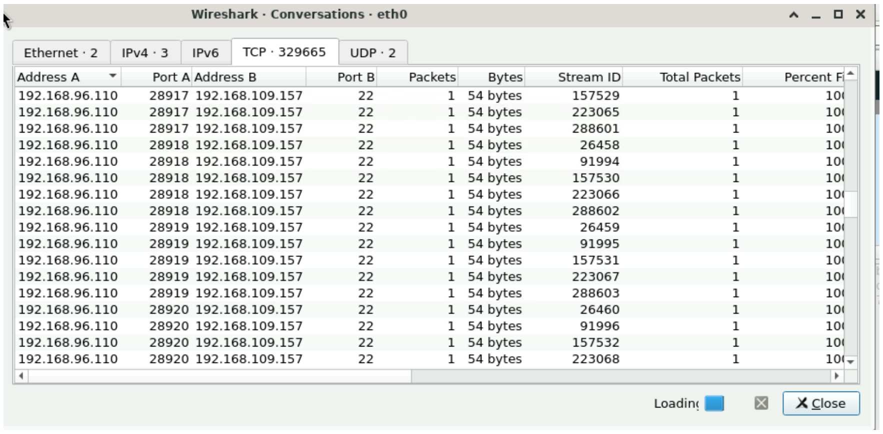


```
▸ Frame 535415: 54 bytes on wire (432 bits), 54 bytes captured (432 bits) on
▸ Ethernet II, Src: 06:81:d7:24:be:a7 (06:81:d7:24:be:a7), Dst: 06:72:10:66:
▸ Internet Protocol Version 4, Src: 192.168.96.110, Dst: 192.168.109.157
▾ Transmission Control Protocol, Src Port: 7123, Dst Port: 22, Seq: 0, Len:
    Source Port: 7123
    Destination Port: 22
    [Stream index: 528951]
    [Conversation completeness: Incomplete, SYN_SENT (1)]
    [TCP Segment Len: 0]

0000  06 72 10 66 57 04 06 81  d7 24 be a7 08 00 45 00   ·r·fW···  ·$····E·
0010  00 28 8a 17 00 00 40 06  a1 5c c0 a8 60 6e c0 a8   ·(····@·  ·\··`n··
0020  6d 9d 1b d3 00 16 36 e7  3d 86 7f 46 5b 31 50 02   m·····6·  =··F[1P·
0030  02 00 f3 b7 00 00                                  ······

No.: 535415 · Time: 32.774705750 · Source: 192.168...umbers reused] 7123 → 22 [SYN] Seq=0 Win=512 Len=
```

☑ Show packet bytes

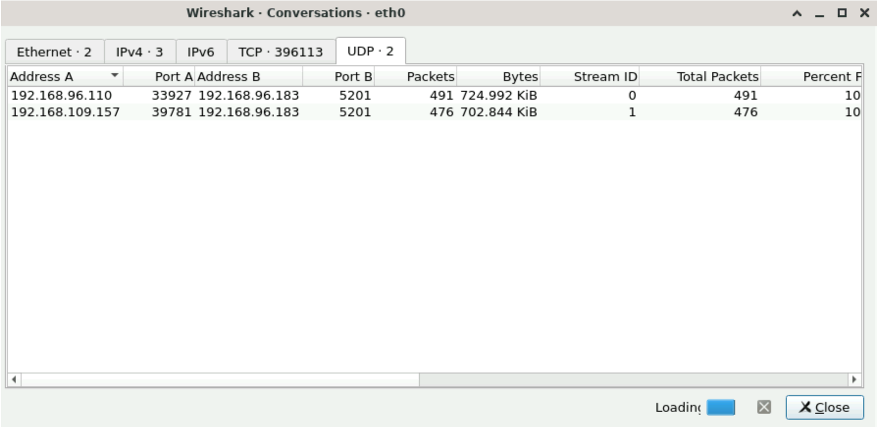
Figure 3.4: Packet Analysis

3.4 Flow Analysis



Address A	Port A	Address B	Port B	Packets	Bytes	Stream ID	Total Packets	Percent F
192.168.96.110	28917	192.168.109.157	22	1	54 bytes	157529	1	10
192.168.96.110	28917	192.168.109.157	22	1	54 bytes	223065	1	10
192.168.96.110	28917	192.168.109.157	22	1	54 bytes	288601	1	10
192.168.96.110	28918	192.168.109.157	22	1	54 bytes	26458	1	10
192.168.96.110	28918	192.168.109.157	22	1	54 bytes	91994	1	10
192.168.96.110	28918	192.168.109.157	22	1	54 bytes	157530	1	10
192.168.96.110	28918	192.168.109.157	22	1	54 bytes	223066	1	10
192.168.96.110	28918	192.168.109.157	22	1	54 bytes	288602	1	10
192.168.96.110	28919	192.168.109.157	22	1	54 bytes	26459	1	10
192.168.96.110	28919	192.168.109.157	22	1	54 bytes	91995	1	10
192.168.96.110	28919	192.168.109.157	22	1	54 bytes	157531	1	10
192.168.96.110	28919	192.168.109.157	22	1	54 bytes	223067	1	10
192.168.96.110	28919	192.168.109.157	22	1	54 bytes	288603	1	10
192.168.96.110	28920	192.168.109.157	22	1	54 bytes	26460	1	10
192.168.96.110	28920	192.168.109.157	22	1	54 bytes	91996	1	10
192.168.96.110	28920	192.168.109.157	22	1	54 bytes	157532	1	10
192.168.96.110	28920	192.168.109.157	22	1	54 bytes	223068	1	10

Figure 3.5: Flow Analysis 1



Address A	Port A	Address B	Port B	Packets	Bytes	Stream ID	Total Packets	Percent F
192.168.96.110	33927	192.168.96.183	5201	491	724.992 KiB	0	491	10
192.168.109.157	39781	192.168.96.183	5201	476	702.844 KiB	1	476	10

Figure 3.6: Flow Analysis 2

Chapter 4

Level 4: Network defence

Chapter 5

Level 5: Critical evaluation and reflection