Task 1

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1.1A

Ifconfig 查看广播地址之后完成 sniffer.py 代码：

```
from scapy.all import *

def print_pkt(pkt):
    pkt.show()

pkt = sniff(iface='br-0ec83bcbe5b9',filter='icmp',prn=print_pkt)
```

Root 权限运行如下：

```
[07/04/21]seed@VM:~/.../volumes$ gedit sniffer.py
[07/04/21]seed@VM:~/.../volumes$ sudo python3 sniffer.py
###[ Ethernet ]###
  dst       = 02:42:0a:09:00:05
  src       = 02:42:1b:37:76:44
  type      = IPv4
###[ IP ]###
     version   = 4
     ihl       = 5
     tos       = 0x0
     len       = 84
     id        = 29652
     flags     = DF
     frag      = 0
     ttl       = 64
     proto     = icmp
     chksum    = 0xb2bd
     src       = 10.9.0.1
     dst       = 10.9.0.5
     \options   \
###[ ICMP ]###
        type      = echo-request
```

普通权限则报错：因为普通用户没有权限创建 socket：

```
[2]+  Stopped                 sudo python3 sniffer.py
[07/04/21]seed@VM:~/.../volumes$ python3 sniffer.py
Traceback (most recent call last):
  File "sniffer.py", line 6, in <module>
    pkt = sniff(iface='br-0ec83bcbe5b9',filter='icmp',prn=print_pkt)
  File "/usr/local/lib/python3.8/dist-packages/scapy/sendrecv.py", line 1036, in
 sniff
    sniffer._run(*args, **kwargs)
  File "/usr/local/lib/python3.8/dist-packages/scapy/sendrecv.py", line 906, in
_run
    sniff_sockets[L2socket(type=ETH_P_ALL, iface=iface,
  File "/usr/local/lib/python3.8/dist-packages/scapy/arch/linux.py", line 398, i
n __init__
    self.ins = socket.socket(socket.AF_PACKET, socket.SOCK_RAW, socket.htons(typ
e))  # noqa: E501
  File "/usr/lib/python3.8/socket.py", line 231, in __init__
    _socket.socket.__init__(self, family, type, proto, fileno)
PermissionError: [Errno 1] Operation not permitted
[07/04/21]seed@VM:~/.../volumes$
```

1.1B1

同上

1.1B2

Tcp_sniffer.py 代码：

```python
from scapy.all import *

def print_pkt(pkt):
    pkt.show()

pkt = sniff(filter='tcp and src host 10.9.0.5 and dst port 23',prn=print_pkt)
```

Send 代码：

```python
from scapy.all import *

ip=IP()
ip.src='10.9.0.5'
ip.dst='10.9.0.2'
tcp=TCP()
tcp.dport=23
send(ip/tcp)

```

运行后结果：捕获成功

```
root@VM:/volumes# python3 sniffer.py
###[ Ethernet ]###
  dst       = ff:ff:ff:ff:ff:ff
  src       = 02:42:1b:37:76:44
  type      = IPv4
###[ IP ]###
     version   = 4
     ihl       = 5
     tos       = 0x0
     len       = 40
     id        = 1
     flags     =
     frag      = 0
     ttl       = 64
     proto     = tcp
     chksum    = 0x66b7
     src       = 10.9.0.5
     dst       = 10.9.0.2
     \options   \
###[ TCP ]###
        sport     = ftp_data
        dport     = telnet
        seq       = 0
        ack       = 0
        dataofs   = 5
        reserved  = 0
        flags     = S
        window    = 8192
```

```
     chksum    = 0x66b7
     src       = 10.9.0.5
     dst       = 10.9.0.2
     \options   \
###[ TCP ]###
        sport     = ftp_data
        dport     = telnet
        seq       = 0
        ack       = 0
        dataofs   = 5
        reserved  = 0
        flags     = S
        window    = 8192
        chksum    = 0x7b9f
        urgptr    = 0
        options   = []
```

1.1B3

Send 代码：

```python
from scapy.all import *

ip=IP()
ip.src='10.9.0.5'
ip.dst='128.230.164.1'
send(ip)
```

Sniffer 代码:

```python
from scapy.all import *

def print_pkt(pkt):
        pkt.show()

pkt = sniff(filter='ip and dst host 128.230.164.1', prn=print_pkt)
```

运行之后：

```
root@VM:/volumes# python3 subnet_sniffer.py
###[ Ethernet ]###
  dst       = 00:50:56:e4:7f:b5
  src       = 00:0c:29:2c:3e:1a
  type      = IPv4
###[ IP ]###
     version   = 4
     ihl       = 5
     tos       = 0x0
     len       = 20
     id        = 1
     flags     =
     frag      = 0
     ttl       = 64
     proto     = hopopt
     chksum    = 0x4bf4
     src       = 10.9.0.5
     dst       = 128.230.164.1
     \options   \

^Z
[1]+  Stopped                 python3 subnet_sniffer.py
root@VM:/volumes#
```

1.2

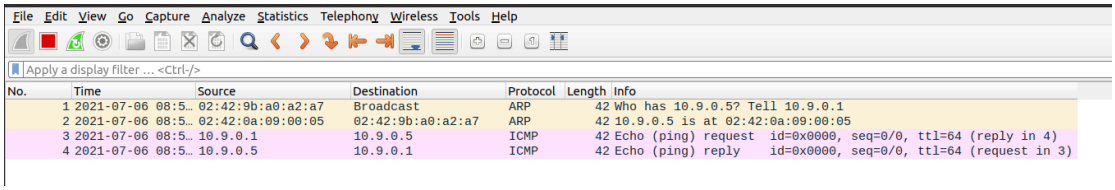
Spoofing 代码：

```
from scapy.all import *

a = IP()
b = ICMP()
a.dst = '10.9.0.5'
p = a/b
send(p)
```

运行：

```
[07/06/21]seed@VM:~/.../volumes$ sudo python3 icmp_spoofing.py
.
Sent 1 packets.
```

Wireshark 查看：



No.	Time	Source	Destination	Protocol	Length	Info
1	2021-07-06 08:5…	02:42:9b:a0:a2:a7	Broadcast	ARP	42	Who has 10.9.0.5? Tell 10.9.0.1
2	2021-07-06 08:5…	02:42:0a:09:00:05	02:42:9b:a0:a2:a7	ARP	42	10.9.0.5 is at 02:42:0a:09:00:05
3	2021-07-06 08:5…	10.9.0.1	10.9.0.5	ICMP	42	Echo (ping) request id=0x0000, seq=0/0, ttl=64 (reply in 4)
4	2021-07-06 08:5…	10.9.0.5	10.9.0.1	ICMP	42	Echo (ping) reply id=0x0000, seq=0/0, ttl=64 (request in 3)

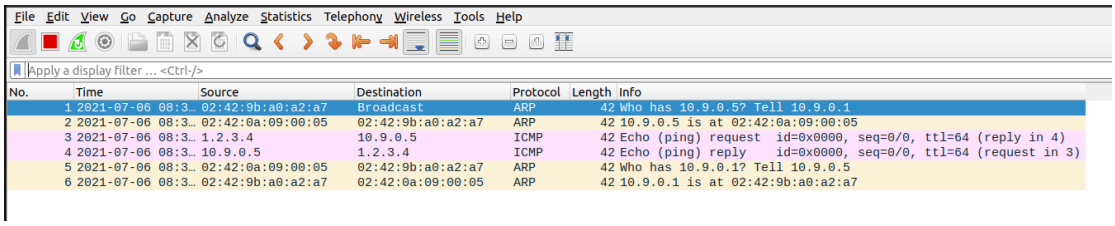
伪装 spoofing 代码：

```python
#! usr/bin/python3

from scapy.all import*

ip= IP()
ip.src = '1.2.3.4'
ip.dst = '10.9.0.5'
b = ICMP()
p = ip/b
send(p)
```

运行：

```
[07/06/21]seed@VM:~/.../volumes$ sudo python3 icmp_spoofing.py
.
Sent 1 packets.
```

Wireshark 查看：伪装成功



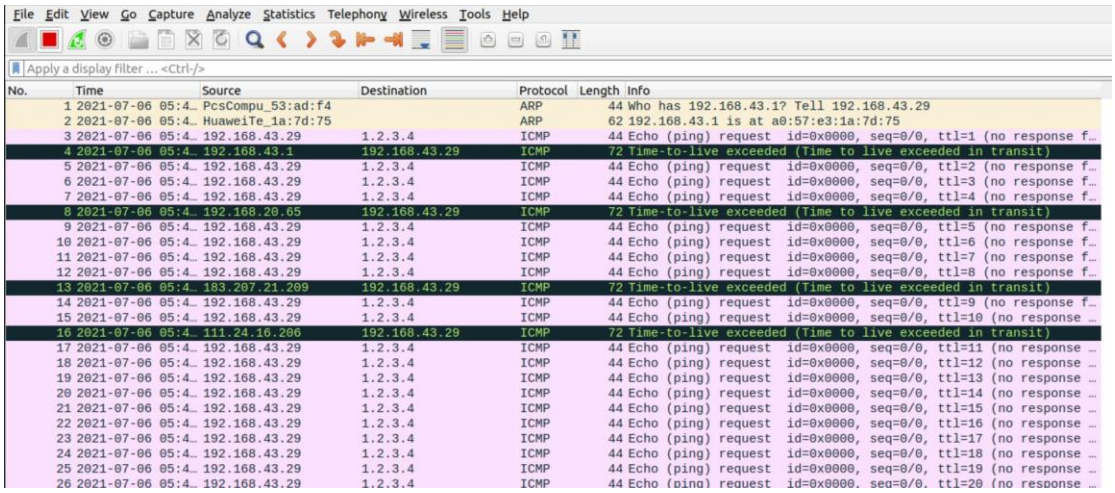
1.3

代码如下：无限循环 ttl

运行之后观察 wireshark：途径 ip 地址有

192.168.43.1,192.168.20.65,183.207.21.20,111.24.16.206，到达

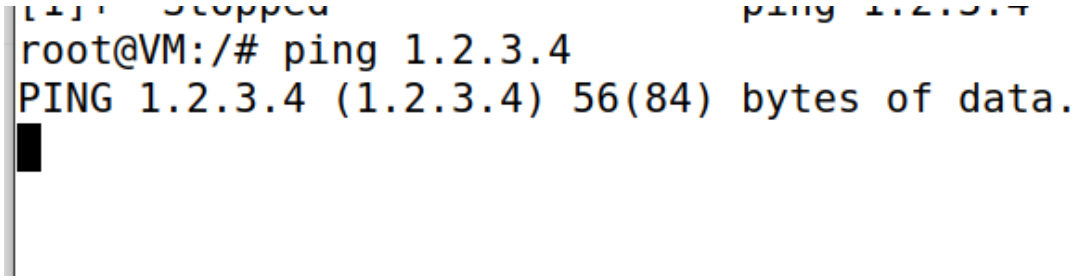
1.2.3.4



1.4

1.2.3.4

在宿主主机 ping 不通，因为网络地址不存在：



代码：

```python
from scapy.all import*

def spoof_pkt(pkt):
    if ICMP in pkt and pkt[ICMP].type==8:
        ip=IP(src=pkt[IP].dst,dst=pkt[IP].src,ihl=pkt[IP].ihl)
        icmp=ICMP(type=0,id=pkt[ICMP].id,seq=pkt[ICMP].seq)
        data= pkt[Raw].load
        newpkt = ip/icmp/data
        send(newpkt)

pkt=sniff(filter='icmp',prn=spoof_pkt)
```

捕获 ICMP 报文，宿源地址对调，设置 ICMP 为 reply 类型，发出即可伪造。

运行代码之后，则可以 ping 通：伪造成功

```
[07/06/21]seed@VM:~/.../volumes$ sudo python3 sniff_spoof.py
.
Sent 1 packets.
.
Sent 1 packets.
.
Sent 1 packets.
.
Sent 1 packets.
.
Sent 1 packets.
```

```
root@VM:/# ping 1.2.3.4
PING 1.2.3.4 (1.2.3.4) 56(84) bytes of data.
64 bytes from 1.2.3.4: icmp_seq=68 ttl=64 time=33.3 ms
64 bytes from 1.2.3.4: icmp_seq=69 ttl=64 time=33.4 ms
64 bytes from 1.2.3.4: icmp_seq=70 ttl=64 time=24.4 ms
64 bytes from 1.2.3.4: icmp_seq=71 ttl=64 time=26.6 ms
64 bytes from 1.2.3.4: icmp_seq=72 ttl=64 time=30.7 ms
64 bytes from 1.2.3.4: icmp_seq=73 ttl=64 time=25.5 ms
64 bytes from 1.2.3.4: icmp_seq=74 ttl=64 time=31.7 ms
64 bytes from 1.2.3.4: icmp_seq=75 ttl=64 time=35.1 ms
64 bytes from 1.2.3.4: icmp_seq=76 ttl=64 time=36.6 ms
64 bytes from 1.2.3.4: icmp_seq=77 ttl=64 time=33.3 ms
64 bytes from 1.2.3.4: icmp_seq=78 ttl=64 time=29.2 ms
64 bytes from 1.2.3.4: icmp_seq=79 ttl=64 time=33.1 ms
64 bytes from 1.2.3.4: icmp_seq=80 ttl=64 time=23.7 ms
64 bytes from 1.2.3.4: icmp_seq=81 ttl=64 time=35.4 ms
64 bytes from 1.2.3.4: icmp_seq=82 ttl=64 time=21.8 ms
```

10.9.0.99

运行代码前后均不可 ping 通，因为此为不存在的本机地址，不经过路由器：

```
[07/06/21]seed@VM:~$ ping 10.9.0.99
PING 10.9.0.99 (10.9.0.99) 56(84) bytes of data.
From 10.9.0.1 icmp_seq=1 Destination Host Unreachable
From 10.9.0.1 icmp_seq=2 Destination Host Unreachable
From 10.9.0.1 icmp_seq=3 Destination Host Unreachable
From 10.9.0.1 icmp_seq=4 Destination Host Unreachable
From 10.9.0.1 icmp_seq=5 Destination Host Unreachable
From 10.9.0.1 icmp_seq=6 Destination Host Unreachable
^Z
[8]+  Stopped                 ping 10.9.0.99
[07/06/21]seed@VM:~$
```

8.8.8.8

运行代码前后均可以 ping 通，因为主机存在：

```
root@VM:/# ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=128 time=31.0 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=128 time=31.0 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=128 time=29.7 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=128 time=30.1 ms
64 bytes from 8.8.8.8: icmp_seq=5 ttl=128 time=33.9 ms
64 bytes from 8.8.8.8: icmp_seq=6 ttl=128 time=31.9 ms
^Z
```

```
root@VM:/# ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=64 time=20.1 ms
64 bytes from 8.8.8.8: icmp_seq=1 ttl=128 time=31.3 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=64 time=20.2 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=128 time=30.9 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=64 time=19.5 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=128 time=32.3 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=64 time=25.5 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=128 time=33.0 ms
^Z
[1]+  Stopped                 ping 8.8.8.8
```